5. SHARING AND REPORTING VIDEO WORK[4]

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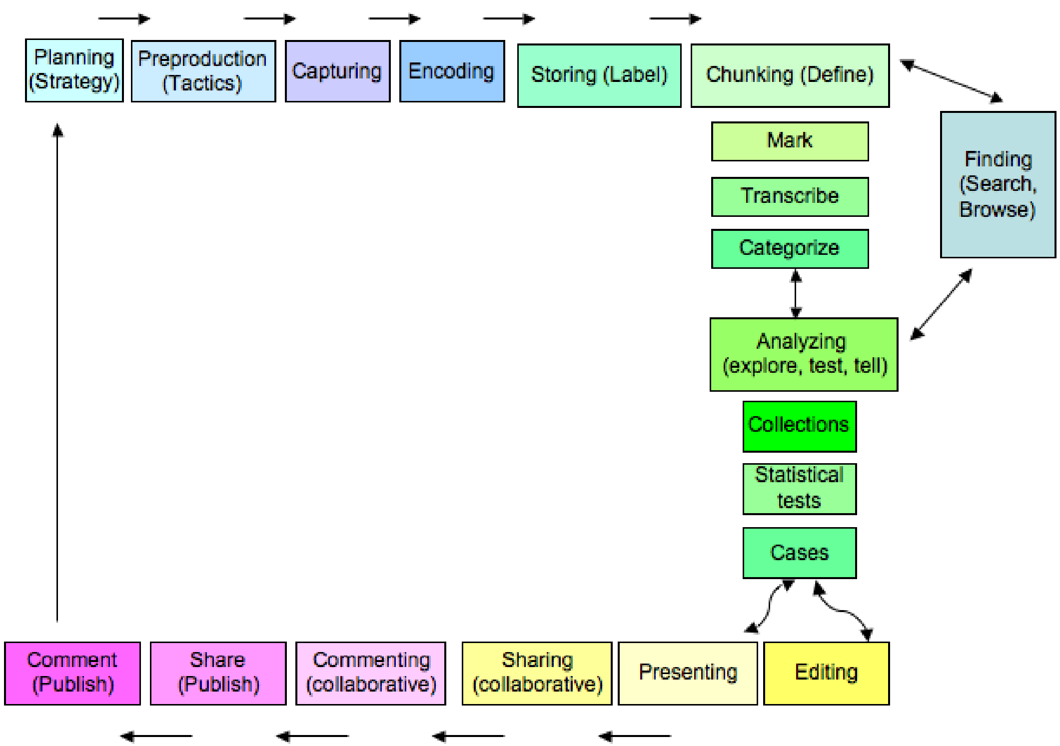
In this section, we consider the range of issues involved in the phases of video research workflow often described as *sharing* and *reporting*. It is important to observe that video research workflow is highly iterative, and not a simple linear flow from capture to transcribing to coding to reporting. The video researcher begins the process by pulling video recordings into some kind of order, from the simple act of labeling them for easy retrieval later to the much more intricate activities that add the value of interpretation to these records. The researcher may chunk the video record into segments that are defined by event boundaries, time markers, or a variety of semiotic considerations, as explained in earlier sections. And the researcher continues by marking video segments of interest, creating transcripts at different levels of detail depending on the purpose at hand, and developing and using categories that the researcher considers useful in a recursive manner. These activities involve an ongoing accumulation of research identified through processes of finding, tracking, searching and browsing, at best yielding a deepening analysis of the human activities that have been recorded. The researcher marks, transcribes, and categorizes a little; analyzes and reflects a little; searches and finds a little; and so on, in the recursive loops that define such knowledge-building activities (analogous to the writing process). In essence, there are close interdependencies between the activities of video record de-composition (e.g., segmenting, naming, coding) and re-composition (e.g., making case reports, collecting instances of commonly-categorized phenomena, making statistical comparisons of chunked episodes). Then the workflow moves on to presenting and sharing video analyses, in a variety of formats. Such sharing may be formative as one collaboratively develops and comments on a developing video analysis, or a summative account as the video analysis is published (e.g., in a journal or on the Web or a DVD) and commented on by others in the community. To close the loop, the substantive insights from specific video research workflow activities might influence the next cycles of video research workflow in the field. This basic idea is depicted in Figure 5.1 from Pea & Hoffert (2007).

To support learning among video researchers in education, the community of scholars who developed this report advocates sharing a broad range of "boundary objects"[5] that can help inform

[4] With contributions by Sharon Derry

deliberation and choices for researchers at all points in the video workflow process. These boundary objects include such issues as technical practices, tool selection, data selection, coding schemes and practices, video data banks, metadata schemes for video, theories and conceptual frameworks for guiding video research practices, institutional review board (IRB) forms and practices, and video reporting practices and genres. We should welcome diversity in these boundary objects because they will help us move toward an interdisciplinary understanding of how to build knowledge about human activities using video records. At the same time, progress as a research community will depend on gradually moving toward standardizing some of these boundary objects and promoting their widespread use.

FIGURE 5.1. DIAGRAM OF VIDEO RESEARCH WORKFLOW PROCESSES (PEA & HOFFERT, 2007)



Consider the aphorism: Words are the chains that set us free. This paradoxical concept makes more sense, Wittgenstein (1953) explains in his *Philosophical Investigations*, when considered in light of the "problem of other minds." Words "set us free" in the generative sense that each new occasion of

[5] The notion of boundary objects was developed by Star (1989), where she considers how "like the blackboard, a boundary object sits in the middle of a group of actors with divergent viewpoints" (p. 46). Bowker and Star (2000, p. 298) present evidence that boundary objects can be ideas, tools, stories, memories, and material items, and that as they circulate in networks of actors across situations, boundary objects play different roles in communication.

language use is creating a unique expression, different in at least some respects from any other occasion in terms of context, speaker history, and intent. But these words are also "chains," because there must be some commonality, a constraint in meaning, to provide the very possibility of building bridges between minds, of sharing ideas and perspectives that another mind can understand. Words need to build on some common meaning to be understood by communicators, or else a language user would be uttering terms in a private language that only she or he understands.

This introduction is meant to draw an analogy between words used for communication and the development of standard boundary objects to support scientific knowledge building and communication through video research. Standards of certain kinds will be essential for the video research community to build a cumulative scientific knowledge base. The questions to be raised are what kinds of boundary objects can be agreed to with little controversy, and what kinds are likely to keep the community mired in debate? Where are the lines to be drawn, and why?

BOUNDARY OBJECTS FOR VIDEO RESEARCH

In this section we present a short list of boundary objects that are particularly worthy of our attention and development. Each merits more lengthy treatment; citations are provided for further review. We omit discussion in this chapter of several important boundary objects that are covered in other chapters of this report, including: recording practices, data selection practices, frameworks for video analysis, and protocols for meeting institutional review board (IRB) requirements related to involvement of human subjects in research. Boundary objects for sharing and reporting of video research that are explicitly addressed here include: technological tools supporting video analysis; technological tools supporting video case development and sharing; models for sharing video in research; metadata schemas; architectures supporting collaboratories and virtual repositories; and practices addressing legal and ethnical issues related to video sharing.

Video Software Tools

Analysis tools. It is useful to briefly characterize several of the many available tools for video analysis, editing, and reflection. Accumulating findings from a workshop bringing together leading video researchers in the learning sciences and teacher education, Pea and Hay (2003) identified 10 different functions of video research that are supported (or not) by these different tools: (a) acquisition; (b) chunking; (c) transcription; (d) way-finding; (e) organization and asset management; (f) commentary; (g) coding and annotation; (h) reflection; (i) sharing and publication; and (j) presentation.

Many of the tools used by research communities have focused on developing only a few of these capabilities, and as several examples illustrate, the tools vary considerably in how well they support these functions. For example, Video-Paper Builder is designed primarily to facilitate the creation of Web-based "video-papers," educational research publications that incorporate video clips

(Beardsley, Cogan-Drew, & Olivero, 2007; Nemirovsky et al., 2001). The CLAN tools that MacWhinney and colleagues (2000) have developed for TalkBank provide an exceptional suite of transcription, coding, and annotation tools but are not oriented to supporting reflection, sharing, or commentary. In contrast, the Teachscape platform for providing video case studies of exemplary teaching supports chunking (by highlighting sections of each of the videos, for particular instructional purposes) and reflection (by supporting study groups of teachers who use the online community features at home, e.g., Lu & Rose, 2003). But the Teachscape platform does not support development of coding schemes or provide transcription tools, because it is designed more as a teacher professional development environment than as a support for research.

There is a long history to video annotation and analysis systems, which have been under development for at least two decades (e.g., Harrison & Baecker, 1992; Mackay & Beaudouin-Lafon, 1998; Roschelle, Pea, & Trigg, 1990). Development of new tools continues. Such tools help video researchers create and organize video collections, create transcripts, chunk and annotate video clips, search video banks, develop coding schemes, and create summary reports that support analysis. One of the earliest leading examples was Orion, formerly Constellations (Goldman-Segall, 1994). Orion is a Web-based program, the goal of which is to foster community by enabling researchers to add and share their research videos and related descriptors, comments, links, and transcripts. Orion also supports collaborative, distributed (coders can be separated by time and distance) coding of video selections.

The Transana tool developed at the Wisconsin Center for Education Research (2005) allows researchers to create large video collections, identify and access analytically significant portions of video data, organize video clips into meaningful categories, apply searchable analytic keywords to video clips, engage in data mining and hypothesis testing across large video collections, and share analytic markup with distant colleagues. It supports transcription and supplies a number of reporting formats. Transana is a stable open source system with a large user community that has been funded by many sources and adapted for varied uses, including serving as the basis for development of video games.

Neither Transana nor Orion can support simultaneous analysis of multiple tracks. An example of a tool with that capability is Anvil, http://www.dfki.de/~kipp/anvil/, a free Java-based video annotation tool that also supports hierarchical multi-layered annotation driven by user-defined annotation schemes. The annotation board shows color-coded elements on multiple tracks in time alignment. The tool was developed primarily for research about gestures but is used more broadly.

Several video analysis tools support researchers by allowing them to mutually reference and have conversations about specific time segments from a video corpus or about specific regions within a spatial representation of a corpus. DIVER is a software environment first created for research uses of panoramic video records (Pea et al., 2004). To move toward supporting collaborative video analysis and emerging prospects for "digital video collaboratories," Pea (2006) developed a Web-enabled DIVER that allows for distributed access and annotation of consumer digital camera video. The central work product in DIVER is called a "dive" (as in "dive into the video"). A dive consists of a set of XML metadata pointers to segments of digital video stored in a database and their affiliated text annotations. By authoring dives on streaming videos via any Web browser, a user is directing the attention of others who view the dive to see what the author sees; it is a process referred to as *guided noticing* (Pea et al., 2004). To make a dive using DIVER, a user logs in and chooses any video record that has been made available in the searchable virtual video repository (which may comprise distributed video servers). The video selected can be viewed using standard video controls. As the video plays, a user can manipulate a virtual camera viewfinder on top of the video to focus on a specific area of interest. By clicking a MARK button, the user saves a reference to a specific point in space and time within the video and places it within a data container on the DIVER Web page that is signified with an image thumbnail. Dives can also be created by creating pointers to an entire segment of the video and storing the path taken by the virtual viewfinder during that segment. Marks and longer segments can be annotated by adding text. Multiple users can replay dives simultaneously, although there is no need for users to watch the same portions at the same time.

Reed Stevens' VideoTraces system (Cherry et al., 2003; Stevens & Toro-Martell, 2003; Stevens, 2007) is oriented to reflection and presentation, by enabling users of the software to lay down a reflective "trace" on top of a video record (the "base" layer that can be played at variable speeds). The trace consists of voice and text annotation and a pointing gesture implemented as a hand cursor. A VideoTraces file may then be replayed so that one hears the audio trace overlay and can see the specific aspects of the video record that the cursor "points at" and upon which comments are being made. The fact that Stevens and colleagues have used this system in science education museums and in diverse courses in higher education, including rowing and dance composition, illustrates the value of this methodology for providing a time- and space-based interpretive layer on video records. Stevens' use of virtual pointing and voice-recorded commenting within a video record provides a complementary but different mechanism to DIVER's "guided noticing" for achieving common ground among researchers analyzing a complex video stream. For now, the VideoTraces system is a stand-alone desktop application written in Macromedia Director, but a use community can respond to a file at a VideoTraces installation site in the manner of a threaded discussion.

We are able to highlight only a few example tools in this report, although many others exist and development of new tools continues as a thriving enterprise. Moreover, standard tools for qualitative social science research, such as NUD*IST, NVivo, and ATLAS.ti., also possess some basic capabilities for supporting video analyses. Video editing and chunking are often accomplished with commercial tools such as Apple Computer's iMovie or Adobe Premiere, but these are not oriented to coding or reflection, which are among the needed functions described above.

Tools for developing and sharing video cases. There are many instances of researcher-created video cases of classroom practices, as well as teacher-created video cases that are accessed and used to share teaching scholarship with other teachers and for teacher professional development. Consideration of what constitutes a *case* is discussed further in the sections of this report on data selection (Chapter 3) and learning with video (Chapter 6). Examples of how cases are being used to support teacher learning and research on teacher learning are also described in Chapter 6.

Although video cases are sometimes published as instructional materials (e.g., Hammner & van Zee, 2006), most video cases are "shared" for instructional use rather than "reported" as research. Diverse computer-based tools exist to support both development and sharing of video cases for teacher professional development, including the commercial products Teachscape and LessonLab. LessonLab (owned by Pearson Education) provides a client-server solution for supporting K-12 schools in constructing training materials from video that they capture themselves. Related efforts include the Carnegie Knowledge Media Lab, the Case Creator Project (Doerr et al., 2003), Indiana University's Internet Teaching Forum (Barab, MaKinster, & Schecker, 2003), eSTEP (Derry et al., 2005), and the work of Schrader et al. (2003) on pre-service teachers' Web-based video cases in elementary literacy.

Elaborated documentations of professional vision in teaching have been developed at the Carnegie Foundation for the Advancement of Teaching. The Carnegie Foundation, through the Carnegie Academy for the Scholarship of Teaching and Learning (CASTL) and the foundation's Knowledge Media Laboratory, provides exemplary teachers with resources and technical support to fully document an extensive aspect of their teaching, such as a course. Their stories are partly expressed in richly annotated Web-accessible video cases http://gallery.carnegiefoundation.org/. The foundation's Knowledge Media Laboratory currently makes freely available the KEEP toolkit, an easy-to-use Web-based system at http://www.cfkeep.org/static/index.html for creating, archiving, and sharing cases of teaching scholarship.

Related efforts include the Case Creator Project, http://www.sci.sdsu.edu/mathvideo/cc/, which provides a tool that teacher educators can use to create interactive video case studies of teaching. Cases are created by importing QuickTime videos and transcripts, creating an "issues matrix" of many different pedagogical issues that are relevant to the case, and adding Web hyperlinks and/or supplementary text. Teachers and teacher educators have also used in a similar way the previously discussed VideoPaper Builder, a Web-based archival publishing environment, to create and share video cases for teacher professional development.

Formats for Sharing Video Research

The field needs cases and models for different ways in which video data are shared, commented on, and reported in concert with print and other media. Moving beyond the standard journal-reporting formats discussed in the previous chapter on video analysis (Barron & Engle, this document), we provide several exemplars of practice that include video data in the public reporting of research. Each one is regarded as a classic by many researchers, and each was produced by a senior researcher who has substantial experience with the challenges of reporting with video data.

The first example is drawn from a "multiple analysis" project: the same video data independently analyzed by several leading researchers with differing theoretical perspectives. The analyses were published in a single issue of the journal *Discourse Processes* (*27*, no.2; 1999) as separate articles, with an introduction by the researchers whose work generated the original video data and with commentaries by additional researchers, much as in a conference symposium with discussants (which had in fact taken place before the writing of the final articles). In this case the data made available to the article authors, consisting of six minutes of a single-camera video stream, was provided on a CD-ROM included with the distribution of the printed issue of the journal. The CD-ROM also included a complete transcript and a drawing of the physical setting.

The second example is the distribution, again on CD-ROM but in a limited way and primarily to interested scholarly colleagues, of parallel print and multimedia versions of two research publications by Goodwin (2000; 2003). Provided were portable data format (.pdf) versions of the printed articles and more complete versions, including links to video clips, in-line image stills, links to audio-only files, and graphical mark-ups of transcripts and stills showing relationships (e.g. with drawn arrows). The multimedia versions (developed with Marjorie Goodwin) made the relationships between data and argumentation far clearer than is possible in the printed versions, which include only textual transcriptions. This model creatively uses evocative still-frame capture from a video recording to represent vital aspects of an interaction sequence. While Margaret Mead and Gregory Bateson pioneered the use of photographic stills from film for ethnographic analyses in the 1930s and 1940s, the Goodwins' techniques illustrate many unique ideas for marking out and labeling the central properties of images used in analyses. A sense of the hypermedia style of the multimedia versions can be gained from browsing: http://www.sscnet.ucla.edu/clic/cgoodwin/projects.htm.

The third example is the availability on a Web site, http://www.pointsofviewing.com/, of brief video clips keyed to pages in the text of Goldman-Segall's *Points of Viewing Children's Thinking* (1997). At the bottom of relevant pages in the printed book are very small video stills representing the action analyzed in the text. Relevant video clips can be accessed on the Web site, and site visitors may add commentary. The commenting facility is derived from a research tool and itself exemplifies the epistemological stance of the research: the meaning of what we see depends on the perspectives (spatial and cultural) from which we view it.

In each of these cases an important criterion is met:

> *Make available to the audience of the research report a sufficient sample of the video data on which the report's argument is based, to allow the audience to assess the quality of the argument based on the data.*

Experienced researchers agree that just as the map is not the territory, so the transcript is not the video (nor the video, the event!). Even if research results depend mainly on analysis of transcripts, access to a sample of original video allows scholarly peers to assess the results of transcription and to place analyses in the wider context of features of the video-recorded event that may not have appeared relevant to the original researchers. Making available a sample of original video is a less stringent standard than making all data available for re-analysis. The purposes are to enable researchers to more clearly convey the evidentiary basis of their arguments and to permit a closer assessment of the work reported.

Given the limitations of print publication and of material distribution of media (e.g., through DVD), it seems likely that the guideline for good research practice as described above – making available a sample or original video – can best be met in the near future by use of online multimedia supplements to or versions of printed research reports. More broadly, we need to share and debate cases of research involving video analyses reported in standard journals, as well as models for alternative and experimental formats (e.g., good Web sites, such as those previously described, that incorporate video cases, analyses, and publications).

There are also vital roles to be played by early release of findings in a formative mode before traditional print archival publications are developed in a summative mode, as in the justly famous case of e-prints in fields such as high-energy physics. The analog in video research may well be draft releases of video analyses that are shared openly with a community (such as members of a collaboratory) before archival versions of these video analyses are published digitally, either in print, on-line, or in CD-ROM or DVD media. It is now possible to upload and publish digital video recordings so that they can be played in streaming media or downloadable format not only from a Web site devoted to video (e.g., Google Video or YouTube) but also using a video player that can be inserted into blogs or social networking sites. Thus the researcher can create a composite video analysis that references multiple clips that may reside on multiple servers and be provided to observers as a seamless composite re-mix of video clips (Pea, 2006). Such flexibly adaptive uses and re-uses for video data and analyses raise important issues concerning attribution, standards for re-use and re-mixing, protocols for protecting human subjects and the like, as will be discussed further in this chapter and the final chapter on ethics.

Sharing Video as Data Sources for Research

As noted above, it is good practice to make a sufficient sample of video available with published research based on that data, which enables readers to make certain kinds of judgments about the data and how it is being used. But it is also good practice to find ways to make a larger fraction, or even the complete corpus of relevant video sources, available to peer researchers for re-analysis. Reasons for doing so include making it possible to subject claims based on the data to scholarly debate and enabling other researchers to benefit from the time – and in many cases public money – invested in acquiring the data. In the past, making video data available was not practical because of the difficulty and expense of copying and distributing analog videotapes. Such drawbacks no longer apply to digital video data, and in the near future even very large video files will be made available online. In this section we consider what boundary objects must be further developed to support such sharing.

Metadata schemas. As interesting as the distinct video tools described above are, the most important lesson derived from our video research workshop was that the usefulness of such tools is limited without effective metadata schemes (Pea & Hay, 2003). Unless metadata coding and affiliated XML schemas are used for the purpose of exposing such work to browser search, analyses developed with any of these tools will be isolated in data islands that can only be used and understood within the tools and projects in which they are created. This is a serious problem.

Examples of the type of work on coding metadata that video researchers must undertake include the Gateway to Educational Materials (GEMs) instructional topics hierarchy (www.thegateway.org/), which builds on the Dublin Core (http://dublincore.org/). Another example is found in the activities of the OLAC (Open Language Archives Community, www.language-archives.org), which conforms to the larger OAI (Open Archives Initiative, www.oai.org). The stated goal of OLAC/OAI is that "any user on the Internet should be able to go to a single gateway to find all the relevant language resources available at all participating institutions, whether the resources be data, tools, or advice. The community will ensure on-going interoperation and quality by following standards for the metadata that describe resources and for processes that review them." Another important project involving coding metadata for instructional materials is the Sharable Content Object Reference Model (SCORM, http://www.adlnet.gov/scorm/index.aspx), a widely used standard and specification for Web-based e-learning objects that uses XML. These efforts are based on the emergence of the Semantic Web and its use of the Resource Description Framework (RDF), which integrates a variety of applications using XML for syntax and URIs (universal resource identifiers, which include URLs) for naming.

Although the challenges affiliated with establishing broadly applicable metadata for video analyses and video cases in learning and teaching are significant, including the need for generic and discipline-specific metadata categories, such efforts are needed to achieve the broader goals of establishing distributed research teams that can communicate about their video data productively.

Virtual repositories and collaboratories. Here we consider the prospect of sharing video through "digital video collaboratories" in which researchers who are distributed across time, location, discipline, and hardware platforms can upload video files as common resources for multiple researchers to examine. Although an individual researcher or group might have a sizeable collection of digital video assets, repositories associated with video collaboratories are envisioned on a larger scale. Further, such repositories include more than video, and for this reason, the phrase *virtual repository* is used to characterize a distributed set of heterogeneous video, metadata, client tools, and other digital resources contained in a single searchable archive. An example of such a virtual repository is Google Video, where video files and metadata associated with them are stored and accessed across many thousands of computer servers.

A virtual repository is a key element in collaborative research because it provides a research community with an accessible touchstone corpus of empirical materials and analyses (Berman, Fox, & Hey, 2003). There currently exists no such virtual repository for video data in the human sciences, although the Open Video Project has developed a large testbed resource for digital video research work on such topics as automatic segmentation, summarization, surrogate representations of video content, and face recognition algorithms (Geisler et al., 2002). The closest analog to a video repository currently is TalkBank, which provides a few heavily-used and oft-cited data corpora (particularly audio data) in a number of language-related sub-disciplines. However, TalkBank is currently a site-specific, not a distributed, repository.

While a research community might be built around a single site-specific repository, video storage requirements demand distributed storage. The storage needs are vast for even 100 researchers contributing a few hundred hours of video each (a common corpus size for a single study) at a variety of resolutions and different compression ratios. This is a "small" corpus relative to the many thousands of human scientists using video integrally in their research. A moderate-size research community would need to store and manage tens and even hundreds of terabytes (TB) of video (with petabytes and exabytes close within view). Consider that television worldwide is generating about 31 million hours of original programming (~70,000 TBs) each year, while worldwide production of original film is about 25,000 TBs per year (Lyman & Varian, 2003). Several research centers already serve data from petabyte-size storage archives (http://en.wikipedia.org/wiki/Petabyte).

An important research issue in distributed storage is insulating users and applications from idiosyncratic features of multiple repositories. This will require an intermediate software layer that can query each specific repository and translate whatever data are returned into a standard form. This software architecture would provide repository services to client applications via a public interface. The software would interact with repository-specific translation components that map generic calls for access, search, and retrieval into repository-specific interfaces. Using this client software, repositories could expose their contents to all members of the collaboratory without altering their practices for storing and retrieving video and metadata, so long as they also implement a version of the translation layer.

Developing a practical search function is perhaps the greatest challenge in establishing a virtual video repository. There is a large gap between the ideal of a single searchable repository and the reality of repositories with heterogeneous metadata schemes, some standardized and others ad hoc. We suggest that at least three different types of search capabilities will need to be developed, each having implications for metadata development and the functions of the software layer that translates between the generic virtual repository interface and the specific interfaces of each local video repository:

1. Full-text search of all metadata.
2. Core-metadata search. The repository would support a core set of metadata (e.g., Dublin Core) guaranteed to apply to all local repositories. Thus resources in all participating repositories would have a base level of visibility.
3. Extended-metadata search. The repository would expose to the user information about all of the metadata schemas available across the local repositories to which the repository has access. Users would select metadata schemas for searches. Only repositories supporting those schemas would be queried.

Different researchers' video repositories should not have to re-index data to a common metadata scheme, rather all members of a collaboratory's repository must support a core metadata set (such as the Dublin Core), while exposing the user of the virtual repository to a broader range of metadata schemes. The development of a scientific field is enhanced by the common ground established by shared metadata. An example of researchers working toward this goal is CMU's Brian MacWhinney and his group. They have been building into the TalkBank XML Schema (xml.talkbank.org) a system for classifying interactional structures – metadata characterizers based on the vocabulary of analytic methods such as conversational analysis, speech act theory, discourse analysis, and classical rhetoric. This metadata development is to be compliant with OLAC (Open Language Archives

Community, http://www.language-archives.org/) and the larger Open Archives Initiative (http://www.openarchives.org/).

Norms and Practices for Attribution and Reuse

We recommended that researchers make original video data available to other qualified researchers and users, with the provision that they agree to abide by legal and ethical guidelines governing use, reuse, and attribution. Negotiating exactly what those legal and ethical guidelines are is part of the boundary-object work that remains for the community of educational video researchers to accomplish. Our thoughts on these guidelines that follow pertain to helping this community overcome barriers to broad sharing and reuse of video. (We note that in some instances there are barriers to broad sharing due to concerns over the rights of human subjects who appear in the videos. Discussion of this human subjects issue is omitted here but covered in the chapter on ethics).

Attribution standards and policies. We need to develop sensible attribution and authorship policies for video data. Both the metadata for and analyses of video records need to indicate authorship and attribution. There are considerable subtleties here that will require learning from best practices in related fields (e.g., motion pictures, music, photography, published written works). For example, in the case of text and photos, there are now licensing schemes (see below) under which authors may choose to contribute their media for the public good, with or without attribution, for specific purposes (e.g., non-profit, commercial).

Standards governing video re-use and re-mixing for particular purposes. This issue is simultaneously exciting in its potential and vexing in its challenges. As in the case of data sharing in genomics and neuroscience, which is now widespread and even required by some journals and funding agencies, the video data used in learning and educational research could, with suitable human subjects protections, help accelerate the growth of scientific understanding of learning and teaching as multiple researchers gain access to video data records that now tend to reside on the shelves and hard disks of individual researchers. The nonprofit Creative Commons licenses have built on the "all rights reserved" concept of traditional copyright by offering different simple licenses that follow a voluntary "some rights reserved" approach (e.g., free re-use with attribution). They establish a flexible range of protections and freedoms as well as protections for such creators as authors, artists, videographers, musicians, and educators.

The rapid uptake, within many communities, of Creative Commons licenses that content creators use to freely assign rights to their texts, photos, music, and videos for enabling their re-use and, with some of the licenses, re-mixing, has illuminated frontiers for intellectual property rights related to educational research video. There are many obvious advantages to be garnered from being able to release publicly certain rights for use of educational video.

CONCLUDING COMMENT

The premise of this chapter is that those who conduct educational research based on video records are more likely to advance cumulative knowledge building if a major part of their research activity includes sharing and vetting the boundary objects that are integral to the socio-technical practices of video research. To return to Wittgenstein's aphorism for words and apply it to video research, we see standardized boundary objects as essential chains that will allow the video research community to make progress toward this goal.