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The Davideon Project: Capitalizing the Possibilities of Streaming Video as Flexible Learning Objects for the Humanities

by André Rosendaal and Johan Oomen

Audiovisual material has been a valuable resource for the humanities. As Andrew Buchanan wrote in 1951, "The function of film in education is to add to man's sense of reality by adding the faculty of sight to abstract apprehension. To see the things of which we learn completes, or almost completes, our study. The eye can often teach that which no words can convey" (15). Indeed, as the availability of audiovisual and online media has increased, the study of both the content and the impact of such media on society has become more significant. Although the use of online audiovisual sources is certainly advantageous for numerous disciplines, incorporating such materials into history, journalism, media studies, and other humanities courses provides particularly relevant learning opportunities.

However, integrating audiovisual materials into education has often been a difficult and time-consuming process. Luckily, content suppliers are now investing significant effort in making their audiovisual material more accessible and flexible. Digitization and Web technology have helped create dynamic and innovative learning environments that integrate databases, hyperlinked information systems, interactive learning resources, and tools to support both collaborative and individualized learning.

A number of organizations around the world have capitalized on these opportunities ([Exhibit 1](#)). Like these initiatives, the [Davideon](#) project, which started in September 2002 and ended in December 2004, considered the value of streaming media as a tool for enriching and improving the learning process. A large-scale project in which three Dutch educational institutes participated (the [University of Groningen](#), the [University of Amsterdam](#), and [Windsheim University](#)), Davideon aimed at developing interactive audiovisual tools for courses in the humanities.

Streaming technology makes it possible to deliver high quality audiovisual content through the Internet to both students and educators. However, what is technologically possible is not always pedagogically desirable. Because of its specific goal of developing good pedagogical practices for using streaming technology in the study of audiovisual media, the Davideon project provides an exemplary model for the integration of audiovisual materials into learning environments.

Scope and Goals of the Davideon Project

In 1999, the University of Groningen launched [Av@lon](#), a pilot project designed to investigate the use of high quality streaming audio and video in an educational context. This project provided necessary information on technical and organizational aspects of using audiovisual material in education. However, the pedagogical challenges that obviously play an important role in redesigning education were not addressed in the Av@lon pilot.

Facing these challenges was the main goal of the Davideon project. Managed by the University of Groningen, Davideon operated with a total budget of €705,486 (\$853,709) and was granted €354,837 (\$429,388) by [SURE](#), the higher education and research partnership organization for network services and information and communications technology (ICT) in the Netherlands. The [Netherlands Institute for Sound and Vision](#), one of the largest collections of audiovisual material in Europe, acted as the principal content provider. Approximately 1,250 hours of material from its archive were selected during the project and are now available online.

Because of its focus on pedagogy and course (re)design, Davideon operated with a directive "to teach competencies aimed at using audiovisual collections...[that] differ in level and include both subject matters and professional skills" (Rosendaal [2002](#), 9). Davideon distinguished three levels of such competencies:

Conducting in-depth research: At this level, students learned to collect, select, analyze, edit, and present audiovisual material from various archives and databases. These activities required negotiation of technical, financial, and juridical conditions as well as reflection on research activities according to the standards of the relevant discipline.

- *Learning the principles of audiovisual grammar:* At this level, students learned to interpret the past and the present through analysis of audiovisual collections. After mastering this level, students demonstrated knowledge of audiovisual language and could describe, analyze, and assess audiovisual material with regard to technical characteristics and content.
- *Selecting, editing, and presenting:* At this level, students selected and analyzed audiovisual material in a pre-selected corpus. They learned to formulate research questions, to develop strategies for searching and analyzing material, and to present and reflect upon their results.

In addition to redesigning curricula, Davideon aimed to disseminate the technological, organizational, and pedagogical outcomes of the project. This directive resulted in the project Web site as well as the handbook *Davideon: A World in Sound and Vision* ([2004](#)), both of which describe the project, reflect on its implications, and offer concrete examples illustrating the value of streaming media in higher education.

Course (Re)design

At the outset of the Davideon project, we planned that each participating institution would (re)design at least two courses, that those courses would overlap in subject matter and audiovisual content, and that instructors with various levels of expertise in using streaming media would participate. We ultimately selected nine courses for the project ([Exhibit 2](#)).

We originally sought to create a common pedagogical framework for all courses, with instructional designers at each institution assisting in course design. However, after several months, we realized this top-down approach did not work. Many instructors wanted to be able to experiment with audiovisual materials and adapt their courses at their discretion, and we were thus reluctant to implement an imposed pedagogical approach. There was also a significant knowledge gap between instructors and instructional designers in terms of course content. These challenges necessitated an alternative approach.

We therefore changed our approach from top-down to bottom-up, giving each instructor freedom to experiment with different ways of using streaming media. However, we also developed a common terminology for course design, processual evaluations, and interim reports by defining seven pedagogical functions: *motivating, activating prior knowledge, instructing, practicing, giving feedback, regulating, and assessing* ([Exhibit 3](#)). Although this new terminology created some initial uncertainty for most instructors had never discussed their courses using this pedagogical terminology, the common framework helped teachers and instructional designers to communicate with each other.

For each course, instructors selected 30 to 100 hours of audio and video from the Sound and Vision archives and constructed assignments that required students to analyze material systematically and to report their findings ([Exhibit 4](#)).

Streaming Media Tools

In order to encourage active student participation in our courses, we developed the Virtual Cutter and METAlibre, specialized tools students and teachers could use to incorporate bits of streaming material into papers, Web pages, and presentations. In order to guarantee interoperability, these tools needed to be

integrated with a metadata search engine based on standards such as those outlined by [Dublin Core](#).

The [Virtual Cutter](#), a free application developed at the University of Groningen, offered these functionalities. A Web-based application, the Virtual Cutter enables users to create a clip of a streaming file by selecting start and end points. In the main window of the Virtual Cutter, users view a streaming file on the left and create start and end points by clicking buttons on the right while the stream plays. These points can be adjusted or entered manually. The Virtual Cutter then generates a hyperlink that can be copied to Word, PowerPoint, or any other document that can contain hyperlinks. When a user clicks on this link, a player application such as Windows Media Player or Real Player opens and plays the clip. Alternatively, the Virtual Cutter can generate HTML code that users can copy to Web pages. The Virtual Cutter thus enables students and teachers to create media-enriched documents.

We also developed METAlibre ([Exhibit 5](#)), a tool that allows students and teachers to make detailed annotations of video content based on different templates that instructors create. The most popular template describes news and current affairs television programs by dividing them into different news items and, subsequently, into shots. Both items and shots have their own characteristics, including content, start time, end time, duration, camera movement, sound, and focus. METAlibre presents these characteristics in list boxes, where users select options and create bookmarks with buttons similar to those included in the Virtual Cutter. When a user plays back the video, METAlibre synchronizes item or shot descriptions with the streaming file and automatically switches between different media players if necessary. Students can then use these descriptions to analyze audiovisual material. Future versions of the METAlibre application will contain more elaborate automated analysis tools and templates, such as a storyboard template that can contain several streaming files.

Results and Evaluations

Both students and instructors evaluated each course at the course's midterm and at the course's conclusion. We used these evaluations to improve and compare courses as well as to compile and disseminate good practices to a broader audience through the Davideon handbook and Web site. Evaluations suggested several advantages of incorporating streaming media into instruction.

One important advantage of using streaming media is increased flexibility. By creating clips with the Virtual Cutter, instructors could prepare a list of useful pieces of audiovisual material, play items from this list during class, and/or add these items to a virtual learning environment. Instructors could access fragments from an audiovisual database spontaneously to respond to questions or sudden inspiration during class. Similarly, students could access a vast amount of audiovisual material through a single server rather than through copied audio or video tapes that only allow for limited distribution and degrade with use. Instructors thus had more freedom to give assignments that required students to study audiovisual content, and they gave such assignments much earlier in their courses.

Davideon's structured approach to increasing audiovisual competency also allowed instructors to differentiate between students more easily, allowing them to assign a broader range of appropriate projects. At higher competency levels, students had access to a variety of audiovisual material for their assignments and could use this material to formulate research questions that interested them.

Evaluations also demonstrated that in combination with the proper tools, streaming media allowed students to integrate audiovisual material into an academic context by selecting relevant clips and linking to them in papers and presentations. As one student noted in the evaluations, "I liked working with streaming video. It is a useful invention and it will be handy for students who study film. Isn't it strange that one writes about film, but cannot illustrate with film fragments?" For the first time, students could now rely on streaming technology to "quote" audiovisual sources and thus overcome the constraint noted by Raymond Bellour: "The text of a film is unattainable because it is an unquotable text" (2000, 22).

A last advantage worth mentioning is the fact that streaming technology allowed instructors and students to view multiple files simultaneously. This helped students to learn to compare, contrast, and evaluate audiovisual material and thus select more suitable material for their assignments.

Project Outcomes

Learning Outcomes

Because our aim in the Davideon project was to "prove the concept" and to experiment with different pedagogical approaches to using streaming media, we have not measured the effect of such technology in terms of learning outcomes. However, our experience suggests that streaming media has a positive effect on learning outcomes. Because audiovisual material can transfer information, especially when its content is relevant to viewers, a large online audiovisual database can assist students with authentic assignments that are related to their future field of activity. The relation between practice and theory can also change when students have access to audiovisual material because students can use such material as a starting point for their own research and later compare their results with existing theory.

Technical and Organizational Outcomes

Although the success of the Av@lon pilot had suggested that streaming technology was a proven tool, we encountered unexpected difficulties with the technology and had to invest considerable effort in making the audiovisual data stable and reliable. Our main problem came from the use of the [Kasenna Broadband Player](#), which we used to play mpeg-1 files from the [Kasenna Mediabase Server](#) on which Sound and Vision hosted their audiovisual content. In contrast to other players, the Broadband Player often caused computers to hang up or respond very slowly, especially in combination with the Virtual Cutter. On some systems, clips created with the Virtual Cutter started and ended a few seconds too late, whereas the same clips worked without problems on other computers. When Kasenna released an upgraded version, the parameters for StartPosition and EndPosition in video clips changed from milliseconds to seconds, causing all clips created with the Virtual Cutter to malfunction. Most problematically, while other players display a video still when a stream is paused, the Broadband Player displayed a black video window, making it impossible for users to discuss the contents of the video still. After two years of frustration, Sound and Vision transcoded all mpeg files to the Windows Media format, making it possible to view streams without problems ([Exhibit 6](#)).

On the organizational side, we learned that selecting material from older archives is a time-consuming process, taking up to ten weeks to retrieve, check, renovate, evaluate, encode, and deliver material online. And because actual content sometimes differs from catalogue descriptions of audiovisual material, instructors need to view that material before it is encoded to minimize the amount of less useful material.

Pedagogical Outcomes

The Davideon handbook describes the initiative's pedagogical outcomes in detail. Here, we present the most significant pedagogical principles that emerged from our experience:

- *Using streaming media makes audiovisual assignments more realistic.* Both teachers and students reported that using audiovisual sources was a realistic reflection of students' future professional environment. Although both streaming and traditional media offer this advantage, a large online corpus that includes both very recent material and material that is difficult to find or access makes it much easier to create a flexible, authentic learning environment.
- *Adding links to streaming audiovisual material stimulates discussion about selection criteria.* Because a tool like the Virtual Cutter can integrate links to streaming material into papers and presentations, instructors and students can *quote* rather than merely *describe* audiovisual content. In the Davideon courses, this capability to quote audiovisual material prompted students to consider selection criteria

- *Streaming media makes it possible to give students a more active role in the learning environment.* Because audiovisual content was readily accessible, Davideon instructors incorporated hands-on audiovisual assignments early in the term and connected several assignments throughout their courses. Students were thus required to play an active role throughout the term.
- *The pedagogical power of streaming media is not that it is independent of time and place, but that the content is rich and varied.* Because of the quality and corresponding required bandwidth (1.2 – 1.5 mbps) of our streaming technology, most students viewed the audiovisual material at their universities. Time and place independency, an often cited advantage of online learning, was thus not applicable to our project since students were restricted to the available work places and hours of their institutions. Although improved compression techniques and lower bandwidth costs will make high quality audiovisual content over the Internet more available, we discovered that the very quantity of readily available content, built around varied themes and still growing, made streaming media a powerful pedagogical instrument.
- *Using streaming media requires different prior knowledge and skills.* Streaming media requires both students and teachers to acquire new skills, such as working with new tools, searching online audiovisual databases, and (sometimes) installing software. Not all students (or instructors) master these skills to the same degree. Instructors planning to use streaming media thus need to plan appropriate skills acquisition.
- *Streaming media has hidden persuaders.* Working with online databases can have unexpected side effects. Occasionally, students become so inspired by viewing audiovisual material that they forget to work on their actual assignments. In addition, because online databases make so much material so readily available, some students restrict their research to the Internet. Taking students to "real" archives can alleviate these problems by providing students with hands-on experience in researching beyond the online viewing experience.

Conclusion

Davideon has become a proven basis of streamlined service for Dutch higher education as a whole, providing high-quality archive content in streaming media for a non-prohibitive fee. Indeed, Sound and Vision now offers "[Sound and Vision in Academia](#)" to the entire higher education community in the Netherlands; through this service, educators now have access to all streaming material that Sound and Vision places on the SURFnet Video Portal. This material includes archives from the Davideon project, archives from other projects, a selection of public television programs that are added daily, and further materials that institutions can order from Sound and Vision. At the moment, 1,500 hours of streaming material are available; this number is expected to grow to 4,000 hours in 2008.

Davideon has also produced important input for the technical and organizational aspects of such a service, including a more elaborate metadata framework—based on the Institute of Electrical and Electronics Engineers Learning Objects Metadata ([IEEE LOM](#)) standards—as a new feature. The organizations participating in the Davideon project are confident that disseminating the good practices that have emerged from this initiative will lead others to use streaming media as flexible learning objects.

Over 50 years ago, Andrew Buchanan wrote about the role film could play in education, particularly in the study of the humanities. Davideon is the 21st-century embodiment of this vision. Moving images have become flexible learning resources, providing endless possibilities for teaching and learning.

[This article was modified from a presentation at the [DIVERSE](#) annual conference in Amsterdam, June, 2004.]

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