GETTING INTERACTIVE MEDIA INTO SCHOOLS

Experiences from a Pilot Project in Austria

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Abstract: The introduction of new types of audiovisuals - streaming videos, hypervideos, and video-based E-Lectures – into classroom was addressed in a nationwide Austrian school project, in which a large number of digitized audiovisual media were provided. The aim of the project was to create an Internet-based platform which allows teachers to access a large database of digitized educational movies, equip it with convenient tools for searching, ordering and downloading, and gain some empirical insights in its acceptance by teachers and students, its feasibility for classroom teaching, and its appropriate instructional scenarios. Details of the project and its empirical evaluation are described in this paper. The main part of the article is devoted to a discussion of three conceptual issues whose relevance can be deduced from theoretical grounds and which also have been found important in the empirical evaluation of the project. Finally, some general considerations about the educational future of audiovisual media will be made.

Key words: Real-life learning, media-on-demand, e-learning, e-lectures, changing role of teachers.

1 INTRODUCTION

Currently, the field of New Media, including its interactive variants, is characterized by a growing usage of film-like modes of presentation (Manovich, 2002). This trend is partly motivated by a number of technological developments which enable the production, storage,

dissemination and usage of dynamic audiovisual materials with reasonable effort and at low cost. It includes the availability of cheap and easy to use digital cameras and editing software, increased and cheaper computational power and storage capacities as well as the possibility of streaming audiovisual material at relatively low bandwidth with few losses in quality. But it is also motivated by the increasing demands for audiovisual materials on part of the users, as indicated by the success of video or computer games, video on demand services or net-based videophones.

This overall trend is also mirrored in the field of educational applications of New Media. A growing number of collections of educational movies is being digitalised and made available via Internet databases. Additionally, new types of digital videos appear, including Hypervideos (Zahn, Schwan & Barquero, 2002; Zahn, Barquero & Schwan, in press), which structure the video-material in a non-linear fashion, or E-Lectures, in which the video record of a speaker giving a lecture is synchronized with his or her presentation slides, a table of contents and eventually a written transcript of his or her talk (He, Grudin & Gupta, 2000). By means of the vividness and authenticity of its content presentation, both traditional video in its digitized form and new types of nonlinear or interactive videos promise to enrich classrooms with diverse kinds of real-life experiences – be it exchange of knowledge with external experts, producing and analyzing records of field trips, or visualisation of everyday situations as a starting point for discovery learning.

2 THE AVD PROJECT: AUDIO-VISUAL SERVICES FOR CLASSROOM TEACHING

AVD stands for "AudioVisuelle Dienste" which translates "audiovisual services". It is a nationwide project funded by the Austrian Federal Ministry of Education Science and Culture (bm:bwk) and Austrian telecom. Basically, it comprises of a network of tools and services, by which digitalized educational movies are produced, stored in a searchable database, delivered via Internet and satellite, and flexibly integrated into classroom education in an interactive manner. The AVD project consists of three main components:

- AV media: A web-based database which contains about 400 professional educational movies in digitalized form. The videos cover a wide spectrum of topics, ranging from physics to geography, and also address different age groups of students. The database possesses a range of features which allow for a very flexible use, including extended searching possibilities, detailed content description as well as

the possibility to preview the videos and to order them for classroom usage. These features are described in more detail below.

- AV academy: A learning platform by which video-based live lectures may be attended to via the Internet in an interactive fashion. The live lectures are recorded and stored in a second database with characteristics comparable to the aforementioned one. Again, these "e-lectures" may be searched, previewed and ordered in a largely self-regulated manner.
- A technical infrastructure by which the chosen and ordered videos or e-lectures are transmitted to the server of the respective school via broadband satellite technology.

After its components had been designed, implemented, and tested, AVD was made available via WorldWideWeb and all Austrian schools were given an opportunity to participate in a field trial. Overall, 89 schools took part in the trial, which lasted over one year and was free of charge. After resolving most of the technical problems during the first few months, the teachers were encouraged to try out these new possibilities in their classroom.

During the last three months of the first project stage, an extensive empirical evaluation was conducted. The questionnaire contained 36 items, including both closed and open questions. In particular, it addressed the following topics: differences between AVD and traditional use of media, benefits and problems, strategies of use in classroom, attendances of e-lectures and overall acceptance. Conducting the questionnaires was complemented by gathering in-depth interview data. Its main focus was on the integration of the AVD material into the classroom and the reactions of the students, as witnessed by the teachers, therefore providing a number of important additional insights.

3 INTRODUCING AVD INTO CLASSROOM: THEORETICAL CONSIDERATIONS AND EMPIRICAL FINDINGS

In retrospect, analyses of the fate of rather short-lived media like videodiscs suggests that a number of preconditions must be met in order to ensure a more successful introduction of film-like learning material into classroom (Wetzel, Radtke, & Stern, 1994). This includes:

- Technological and organizational barriers should be minimized. The process of searching, selecting and using relevant video material should be kept as simple and convenient as possible. Therefore, use of digitized audiovisual material in school should be supported by an

appropriate technological infrastructure (Collini-Nocker, Knierzinger & Weigner, 2002).

- Empirical studies show that teachers often restrict video use in the classroom to a mere presentation of a whole video without any interactive or collaborative instructional intervention. Teachers should thus be encouraged to appropriately integrate these new types of media into regular classroom education in a more variable manner.
- Most importantly, the use of audiovisual material must promise some advantages with regard to knowledge acquisition. This includes not only an added value in terms of increased learning effectiveness or efficiency. Additionally, such dynamic and interactive pictorial media should also overcome the cognitive drawbacks of traditional video media which have hindered its widespread use in regular education.

4 NEW FORMS OF AUDIOVISUAL MEDIA: OVERCOMING THE DRAWBACKS OF TRADITIONAL EDUCATIONAL VIDEOS

Whereas the technical and organisational context and the instructional modes set the stage for its appropriate utilization, the most important question is whether computer-based, digitized videos indeed promise to foster learning and understanding of a given topic. In other words, their use in classroom teaching can only be justified if they possess clear learning advantages in comparison with less complex media like text or static pictures in terms of increased effectiveness or efficiency.

For some types of content and types of learning tasks, this can be affirmatively answered. In general, films and videos possess a number of specific features which clearly distinguish them from other media like texts or pictures. Firstly, they comprise of a mixture of different symbol systems, namely pictures, spoken words and sounds, which are simultaneously presented. Secondly, with regard to pictorial quality, they do not only capture shape, colour and layout of objects and scenes, but also their dynamic changes over time. Therefore, in comparison to other media, films and videos are characterized by a high degree of realism in their spatiotemporal depiction of state of affairs.

But films and videos should not be reduced to the notion of maximum realism. Instead, compared to real-life experiences, they possess the additional advantage of allowing customization of the presentation to the cognitive needs of its viewers. As an example, Schwan, Garsoffky & Hesse (2000) show that film depictions of complex activity sequences could be

made more intelligible through the placement of film cuts, thereby facilitating the process of cognitively segmenting the stream of activity into comprehensible units. Therefore, audiovisual media are not merely valid reproductions of real facts, but should be conceived as *instruments for information processing*. They give its authors and producers a great degree of freedom for shaping the presentation of information, which may even be greater than for a common observer under conditions of natural, everyday experience. For example, a film director can record a given event simultaneously from multiple viewpoints, and can subsequently choose the best, "canonical" view for each part of the event. In contrast, everyday observers typically are restricted to their particular standpoint (Garsoffky, Schwan & Hesse, 2002).

Despite these advantages, videos do not play the role in the context of school teaching which they deserve. Besides problems of finding appropriate video material, acquiring it and integrating it into classroom education, audio-visual learning material has been additionally shown to possess the danger of being more shallowly processed than printed materials. This lack of mental elaboration, which is manifest in fewer inferences and a lesser degree of activation of prior knowledge, may be attributed to at least three potential causes. Due to its high degree of realism, viewers tend to interpret them as mere reproduction of reality instead of being a communicative device, whose fundamental meanings and intentions must be actively deciphered by means of elaborating its surface content. Additionally, due to its dynamism, the cognitive processing must proceed within a restricted amount of time. This problem may get worse, if no special attention is paid for an appropriate relationship between spoken commentary and pictorial presentation, leading to dangers of cognitive overload (Mayer, 2001).

Another severe drawback of traditional types of educational films or video is that they do not allow for much control over the viewing process, thus not supporting self-regulated learning. Whereas reading a text is a highly self-regulated activity, watching a video is typically not. During text reading, learners may adapt their reading speed to the complexity of the text and their own cognitive demands. Large texts can be browsed quickly, unimportant or uninteresting passages may be skipped while relevant paragraphs may be reread several times. In contrast, watching a video is typically done in a passive fashion with only few video-related activities.

Taken together these problems of shallow cognitive processing and lack of possibilities for self-regulated learning, it comes as no surprise that reading a text on a given topic outperforms watching a respective video in terms of memory and understanding (Salomon, 1984). But with the advent of digitalized, computer-based and networked types of video media, a number of new solutions to tackle these problems have been developed. These

solutions comprise augmenting video material with additional, more abstract types of information, allowing for a structured, random access to different parts of the video, as well of providing interactivity in terms of controlling pace and sequence of the video. These aspects will be discussed in turn.

Firstly, computers can be conceived as platforms which allow the integrated presentation of diverse symbol systems within a unified and homogeneous framework. Therefore, one important strategy for overcoming the problem of shallow processing of video data is to augment them with additional presentation types like written texts or animations. Thereby, the videos become part of a larger network of hypermedia information sources, which in turn affords a more elaborated cognitive processing, because it requires the user to integrate these various information particles into a homogenous mental representation. This augmentation may be done defining navigable "hot spots" within the videos, which directly link to other information sources (Zahn et al., 2002; Zahn et al., in press). Another solution, which was pursued in the AVD project, is to add a repository to each video which contains various additional information sources like texts, animations, simulation or links to relevant WWW sites.

Secondly, digital videos which are presented via computers can be accessed in a random fashion, thereby facilitating a number of self-regulated learning processes like acquiring an overview over its content before watching the complete video, or searching and selecting particular parts of the video according to ones own motivation, prior knowledge and interests. In the AVD project, several functions provide such kinds of access. In the case of educational films, viewers can read and search a written transcript of the spoken commentary. Additionally, a sequence of keyframes of important scenes, which give a visual overview over the video is presented and allows for skipping through. In the case of electronic lectures, a structured list of the presentation slides is provided, which also can be navigated and used as entry points into specific parts of the lecture. Studies of electronic lectures have shown that viewers make heavy use of these navigational possibilities.

Thirdly, computer-based videos also allow for types of self-regulated learning which to date were primarily provided for static media like texts, pictures or graphics, including the interactive control of sequence and pace of the presentation by means of entry points, stop and pause, and video sliders. Again, in a recent empirical study it could be shown that viewers make heavy use of such controlling devices and that their provision leads to more effective and efficient learning (Schwan & Riempp, in press).

To sum up current empirical evidence, computer-based types of video media have the potential of keeping the advantages of authenticity and customization while reducing its drawbacks, leading both to a more self-regulated acquisition and a deeper elaboration of its contents. These

advantages were also acknowledged by the teachers who participated in the AVD project, who made heavy use of both of the extended navigational possibilities and the supplemental repositories. In particular, they used keyframes and interactive navigation through the videos in order to select appropriate material (91%) and to get an overview of the content of the video (48%). Compared to traditional types of video navigation (i.e. rewinding), these new types of interaction were considered easier and more efficient by 86% of the teachers. Similarly, the supplemental repositories of learning materials and didactical suggestions were used for classroom preparation (86%), for making work-sheets (47%), and to a lesser extent for search tasks for the students during phases of self regulated learning (32%).

All in all, and most notably, in contrast to common reservations against videos in classroom, only 9% of the teachers indicated that AV media had led their students to a more passive and receptive mode of learning. Instead 25% saw AV media as an appropriate mean of inducing a more active and self regulated learning style.

5 SUMMARY AND CONCLUSIONS

Educational movies, at least in their traditional forms, face a number of barriers which have hindered their widespread and regular use in the classroom. These barriers include the complicated and laborious process of finding and obtaining appropriate videos material, the difficulties of utilizing videos in more student-oriented and self-regulated instructional scenarios as well as the tendency of the students to view videos in a rather passive manner without deeper cognitive processing.

As the results of the Austrian-wide AVD project have shown, most of these barriers can be substantially reduced by a compound of new media technologies - including video digitization, access by means of user-friendly databases, distribution via Internet and satellite, as well as provision of supplemental multimedia material. The consequences of these technologies can be traced in the infrastructural-organisational, the instructional, and the cognitive realms of using video at school.

With regard to infrastructure, providing a convenient way for selecting and accessing the video material seems to be of special importance, as the comparison of AV media with AV academy, its live lecture counterpart, makes clear. Whereas AV media with its stock of videos received positive to enthusiastic evaluations, the reactions to AV academy were more mixed. In particular, the teachers stressed the conflict between their regular classroom schedules and the spatial and temporal restrictions imposed by the live broadcasting format of the lectures. This has to be considered a severe

problem for e-Lecture streaming: Whereas all participants of the evaluation study used AV media on a more or less regular basis, 41% of them did not use AV academy at all, and of the remaining, only 33% used it in live mode, whereas the rest accessed the lectures only in their recorded form.

As a consequence, and most importantly, AVD media led the participants to a change in their teaching strategies. The majority (54%) reported an increase in their usage of audiovisual media in the classroom lessons. But media use did not only change in quantity, but also in quality, ranging from "chalk and talk" modes to learning projects and group work. Thus, in sum, the strategy of providing such material in a digitalized and easy-to-access manner seems to be a promising contribution of new media in the endeavour of introducing more enriched and varied teaching styles at school.

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