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Reinventing the Lecture: Web Casting Made Interactive

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Description
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Reinventing the Lecture: Webcasting Made Interactive[1]

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Abstract

We present a novel system (called ePresence) for highly interactive webcasting with structured archives. We discuss how various kinds of interactivity among both local and remote participants in lectures are enabled by this technology. We suggest how ePresence may be an effective tool for creating a knowledge base and enhancing learning. Finally, we illustrate these concepts with an example of using the system to encourage and facilitate the formation of a learning community.

1 Background

The lecture has long been a dominant method for transmission of information from instructors to students, particularly in undergraduate education. In an age of increasing use of technology-based distributed education, lectures are still cost-effective presentations and performances of carefully designed sequences of material that can be attended and viewed concurrently by many students. Yet this type of delivery model also has disadvantages, particularly within the context of current research on how people learn (Donovan et al, 1999). Perhaps most serious is that it is typically a one-way broadcast medium from instructor to student, with little back-channel communications and little dialogue between instructor and student and among the students themselves.

Despite its prevalence, this transmission model is not conducive to the learner-centred model presently considered to be the more effective approach to pedagogy (Olson & Bruner, 1996). Furthermore, it does not take into consideration the social nature of learning or the need to accommodate different learning objectives with a variety of teaching tools and techniques (Branson, 1998). Thus lectures are increasingly under challenge (Kerns, 2002), as we understand more about learning and the kinds of environments we should be creating to support learning

2 The ePresence system

The technology of webcasting gives us the opportunity to reinvent the lecture. *Webcasting* is the Internet broadcasting of streaming audio possibly accompanied by streaming video so that it can be viewed via a Web browser on a personal computer. Webcasting use grows as Internet broadband communications becomes more available and more affordable, as people seek to avoid travel, and as teachers and learners see demonstrations of its effective use.

To allow scaleable visual communications at a distance, our research seeks to make webcasting:

- Interactive, engaging, flexible, scalable, and robust
- Accessible in real-time and via archives
- Useful for communications, information sharing, knowledge building, and learning.

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[3] Also with the Ontario Institute for Studies in Education at the University of Toronto.

To date, we have created a viable and innovative webcasting infrastructure called ePresence (Baecker, 2002). This currently supports video, audio, slide, and screen broadcasting; slide review; integrated moderated chat; question submission; the automated creation of structured, navigable, searchable event archives, and automated data collection for evaluation. Capabilities for audience polling and for linking in wireless mobile devices are under development.

The ePresence system architecture, functionality, and user interface has been developed in response to a set of design requirements which have been classified into 5 categories: **P**(articipants), **M**(edia), **I**(nteractivity), **A**(rchives), and **S**(ystem). We "reinvent the lecture" by seeking to support the needs of a variety of participants, by transmitting rich media to remote participants, and by enabling interactivity among participants. Unlike traditional lectures, the primary content is available in useable archives after the event. Primary goals are to increase the potential for collaborative learning and to support the development of a learning community.

The requirements are:

P1: Design keeping in mind the needs of various classes of participants: speaker, moderator, local attendees, real-time remote attendees, and retrospective remote attendees.
P2: Support scalability to hundreds of viewers.
P3: Support both local and remote audiences.
P4: Do not severely impact the local audience experience to support the remote audience.
P5: Work hard on room design issues, which are more critical than one might expect.
P6: Do not allow slide display to depend upon receiving digital versions in advance, but exploit this to advantage when it does happen.
P7: Plan for a significant role for a moderator.

M8: Ensure quality sound even at the expense of sacrificing quality video.
M9: Do not force speakers to use only Powerpoint, but support a variety of rich media.
M10: Transmit video of the speaker, but emphasize delivery of content media even more.
M11: Enhance the sense of presence with high-quality cinematography.

I12: Support interactivity.
I13: Allow slides to be controllable by the viewer independently of the speaker.
I14: Afford viewers easy Web access to relevant material.

A15: Make events available retrospectively through video archives.
A16: Allow video archives to be randomly accessible via navigation and searching mechanisms.
A17: Allow archives to be viewable interactively with the capability for annotations.
A18: Support archive construction that is as automatic as possible.

S19: Strive for elegance and simplicity.
S20: Ensure robustness.
S21: Ensure malleability and extensibility.
S22: Provide for logging and data collection in forms usable for social science research.

Most of these requirements have been met to some extent, although much remains to be done. Our work can be compared and contrasted to Abowd (1999), Cadiz et al. (2000), He, Grudin, & Gupta (2002), Isaacs and Tang (1997), Jancke, Grudin, & Gupta (2000), and Rowe, et al. (2001). The approach may be distinguished relative to this body of work in that:

- We do not force speakers to use Powerpoint, and support the Internet transmission of a variety of rich media presentation formats

- We encourage dialogue among remote viewers and questions to the speaker using an integrated chat facility and (currently) a moderator as an intermediary
- We produce automatically structured, navigable, searchable video archives
- We evolve our technology via an iterative design process, introducing new system prototypes as often as weekly and evaluating them in real use.

3 Enabling and Exploiting Interactivity in Webcast Lectures

Of great importance is supporting and enhancing the experience of 'presence' through interactivity among all actors in a distributed presentation room, including the lecturer, local attendees, and remote attendees. We do this by enabling various kinds of interactivity:

1. Interaction between lecturer and remote audience
A distinguishing feature of our system is a mechanism for remote attendees to ask questions of the speaker. This is currently done via a moderator, although we will be investigating techniques for communicating directly with the speaker. This poses a design challenge because this must be done in such a way as not to distract the speaker or make her lose concentration. On the other hand, there are opportunities for lecturers to use techniques that will help engage the remote (as well as local) audience. For example, the lecturer will also soon be able to "ask questions" of the remote audience via a polling mechanism.

2. Interaction among members of the remote audience
Members of the remote audience can communicate via an integrated chat subsystem and can also send private messages to one another. Unlike attendees at a traditional lecture, they can do this without disturbing other attendees and without distracting the speaker. An example of the use of this capability is discussed below.

3. Interaction between lecturer and local audience
Speakers will soon be able to augment traditional verbal and nonverbal communication with the local audiences by allowing those who have mobile wireless devices to ask questions of the speaker and be polled by her, either directly or via the moderator.

4. Interaction among members of the local audience
Local attendees who have mobile wireless devices will also soon be able to participate in the chat and private messaging. An open question is the effect of this capability on the concentration and understanding of the local audience, on the ambience in the lecture hall, and on the concentration and effectiveness of the speaker.

5. Interaction between local and remote audiences
Local and remote participants will then also be able to communicate with one another via the chat and private messaging capabilities.

6. Interaction among the retrospective audience viewing the archives
Finally, interactions can continue (or start) anytime after the event while viewing the archives. We are developing mechanisms to allow chat and structured dialogue to occur as the archives are viewed and reviewed.

There are many other open questions. One is the extent to which these kinds of interactivity are useful and useable. Another is the extent to which successive viewers of lectures will add layers of annotations and engage in conversations, and the extent to which this will support and enhance collaborative learning and foster the development of a "learning community."

4 The Millennium Dialogue on Early Child Development

An interesting case study of ePresence has been its use by the Millennium Dialogue on Early Child Development (MDECD) project. MDECD is the Atkinson Centre for Society and Child Development's [see http://www.acscd.ca] first step towards establishing a learning community for child development based on an iterative theoretical model for developing a learning society network (Keating & Hertzman, 1999; Matthews & Zijdemans, 2001; Zijdemans, 2000; see also http://www.webforum2001.net/]. The research as envisioned involves several stages:

- Pulling together a cross-disciplinary knowledge base from diverse and traditionally separate fields in child development;
- Forming a research team of researchers and practitioners to examine existing pedagogical practice and develop curricula grounded in the knowledge base;
- Developing effective tools for communicating the research knowledge to a geographically distributed and broad audience;
- Extending the knowledge base by developing and testing new educational materials;
- Continuing collaborative partnerships to translate and communicate the knowledge to a variety of audiences in ways that affect practice.

To this end, the first phase of the model involved bringing together eight internationally renowned experts from different areas in child development, and preparing the context for cultivating the learning community through the creation of an inclusive technological infrastructure designed to support a variety of technology-based distributed learning initiatives. These included a cross-Canada collaborative curriculum development project, a face-to-face and online graduate level course, and a public webcast and face-to-face conference featuring the work of the eight scientists.

The two-day conference (held in November, 2001) was attended by roughly 200 local participants and was webcast using ePresence to 20 remote North American groups. Over 600 public and private chat messages among the remote groups were exchanged. Table 1 shows how the composition of the chat messages changed over the two days. Of particular interest is the increase in the percentage of messages related to the content of the sessions, from an average of 4% on day 1 to 13% on day 2, and in the percentage of social messages, from 8% on day 1 to 26% on day 2.[4]

Table 1: Categorizing chat messages over the four half-days of WebForum 2001

	a.m. Day1	p.m. Day1	a.m. Day2	p.m. Day2
Content-related	11	5	13	16
Technology-related	116	112	44	41
Administrative	38	21	13	10
Social	30	1	28	30
Other	18	19	13	14

The post conference phase of the project has established the ePresence multimedia archive of the scientist presentations as the knowledge base and continues to nurture the learning community through several ongoing activities. Subsequent to the conference, the knowledge base has been incorporated into three separate courses for graduate students and professional development. One extension of the knowledge has led to the creation of *Conversations on Society & Child Development* [see http://www.cscd.ca]. *CSCD* is an interactive ePublication that uses CD and Web

[4] White, et al. (2000) report that text exchanges went from 27%:62%:11% content:technology:social messages to 60%:14%:26% over the last 3 sessions of their course.

technologies to create an environment for accessing the knowledge and supporting exchange among those who generate research and those who want to apply the findings. Ongoing curriculum development is now taking place in the area of early child education in the form of a collaborative project involving colleges across Canada. The knowledge is being used as base for developing an interactive multimedia resource, and is slated to be implemented in Early Childhood programs nationally and internationally in the fall of 2003. Finally, discussion is in progress with a national media outlet to translate the knowledge for public consumption for use by parents, educators, and policy makers.

The conference oral presentation will discuss this case study and others in progress in more detail.

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