Abstract

This paper discusses the efficiency of approaches for synchronous, online, and interactive collaboration in open and distance learning (ODL) environments. Based on interviews with participants of online seminars, the assets and drawbacks of online seminars in relation to conventional face-to-face seminars are discussed.

Traditionally, higher education is based on synchronous communication, on real-time discussions of a certain topic. On the other hand, conventional eLearning is based on written courses. Communication in ODL is mainly asynchronous (email, newsgroups), or bilateral synchronous (telephone). Several attempts have been made to integrate multilateral synchronous communication in ODL. Most of them have the disadvantage of expensive equipment and high bandwidth requirements.

In certain cases, there are some good reasons for using online seminars instead of face-to-face seminars. Sometimes, participants are not able to travel to a common meeting place. This may be due to personal reasons (e.g. disabilities, care for family members, imprisonment), or to vocational reasons (no time for travel).

1. Introduction

Though there are some good reasons for participating in online seminars, in the long run these can be successful only if technology is available, and costs can be kept lower than expenses for travel. The availability of high bandwidth connections is a problem in rural environments and less favoured regions. A second dimension to keep in mind is that of stability and reliability. If these can not be guaranteed to a high degree, the acceptance of online seminars is very low. The last crucial factor is the efficiency of the whole solution. This does not only cover the technical aspects, but also the learning success with respect to the subject matter.

An online seminar system was implemented and tested at University of Hagen in 2004 [1]. It is now run on a regular base. A server at the university is acting as main hub for a seminar. It hosts an instant messaging application [2] and an audio reflector [3]. In addition, this server hosts the shared applications (Acrobat and PowerPoint) which are remotely controlled by the participants via VNC [4]. Though most users in Germany are now connected via DSL, some of them are still using modem-line connections only. The system works very reliable and offers high quality communication to all participants [5].
group. To provide a synchronous seminar-like environment to a group of students, typical synchronous communication techniques like video-conferencing are the first choice. Unfortunately, they require high bandwidth capacities. A video-conference with more than two communication partners is a typical point-to-multipoint application. If a true collaboration of all partners is desired, the partner with the smallest bandwidth limits the communication.

For synchronous seminar-like events, a real interaction both between the students and between students and the tutor is required, so a bandwidth-saving way of interaction is needed as an alternative to the video based communication. Pure text-based communication (chat) does not meet the requirement of real interaction. A multipoint audio conferencing system is the first choice, as students are familiar with telephone conversations. Furthermore, they can interact in real time. Eventually, it works even with modem-line connections. In most cases, there is no need for hardware investment, as sound cards and headsets are very common. For learning jointly, a platform for the exchange of documents is desirable. For seminar like events, it is indispensable.

3. The technical point of view

The approach presented is based on standard low-cost computer hardware, low-bandwidth communication channels, and open-source/free software. It combines instant messaging, voice-over-IP, and application sharing. The main means of communication is multipoint voice-over-IP. It is the most natural way of communication, enabling users to discuss with (almost) no technical barriers and to react very quickly. If necessary, it can be supported by either broadcast or bilateral text messages. When working on a shared document, or resenting results to the other participants, the respective program can be operated by the participants. The documents are stored on a central server, which can be controlled remotely. All participants can see the results of the operations immediately.

4. Equipment of users

All students that participated in online seminars so far used standard PCs; none of them used workstations or Apple computers. So, the results may not be valid for those not using standard PCs. The following numbers will apply to those participants that answered the questionnaire. Numbers are rounded to the next integer value.

About 60% used some kind of Microsoft operating system (ranging from Windows 98 to Windows XP professional). About 32% used Linux. 8% did not know about the operating system they used, or did not give any information about it. Theses students used either PCs of friends or participated from internet cafes. Surprisingly, 30% mentioned that they used both Windows and Linux (50% of Linux users and 33% of Windows users).

Respondents used both desktop PCs and Notebooks. The processor speed greatly varied from 800 MHz to 3 GHz. Main memory varied from 384 MB to 1024 MB. 15% did not give any information about hardware. Most users had a DSL connection (77%), some ISDN (15%), a few did not know (8%, the same users that did not give information about the operating system). For the latter category, we assume that a DSL connection was used. None of the respondents was connected by a modem line. This fact will be discussed later on. 61% were behind a firewall, 31% were not protected, and 8% did not know.

84% had the necessary hardware (PC, modem/LAN-card, headset) available, 8% had to buy some hardware, and 8% did not have any hardware available.

5. General remarks by users

A number of participants (30%) mentioned that the missing feedback from the auditory disturbed them when giving their talks. Some suggested a video connection, but this is not suitable for modem users [6]. A virtual 3D-environment was tested in 2004 and worked very well, but was not accepted by users.

Other comments were related to the long period of concentrated work in front of a computer display. This was due to the fact that the seminars were operated en bloc with 8 to 10 talks on a single day.

Some users proposed additional ways of communication between seminar supervisors and participants to indicate critical situations as lost network connection or incomprehensibility of speech.
Several times, the effect of saving time and money for travel was mentioned. One respondent proposed to have more regular events like this and to use the platform for communication between students.

6. Overall satisfaction of users

For this category, multiple answers were possible. Therefore, the total percentage may exceed 100%. For the situation during the talks, there were different categories for presenters and auditors. All presenters rated the situation during their talks as “unfamiliar”. Nevertheless, 23% rated it as “relaxed”, and a further 23% as “unnatural”. None of the presenters had real problems with the situation.

The picture changes when looking at the discussions after the talks. Now, 46% felt “relaxed”, followed by 38% that felt “unfamiliar”. 8% rated it as “unnatural”. As there was a communication (i.e. feedback from others), it was perceived like a phone conversation.

Most of the auditors rated the situation when listening to the presentations of others as “relaxed” (92%). Few of them (8%) mentioned it as “unfamiliar”, “unnatural”, and “disturbing”. 62% reported no technical problems, while 38% encountered mostly slow transfer of presentations. A few internet connections were shortly disrupted, but this was not related to the seminar software.

When talking about their overall impression on online seminars, most participants (69%) declared that they would prefer online seminars in the future. No one would refuse to participate in such an event, but 8% would prefer traditional seminars. About half of the participants claimed to have learned the same as in traditional seminars, while 15% thought that the effect was less than in traditional seminars. This strongly corresponds with those having some problems with the situation. The rest could not decide.

7. Impact of equipment on technical performance

Looking at the relationship between technical equipment of the participants and technical performance as rated by them, there is no obvious correlation. Some users with high-end PCs and internet connection claimed “bad” performance, while some of those with low-end PCs did not report any problems. This might look confusing at first sight. But there are two reasons for this effect. First the psychological dimension. If users expect a certain result of an action, they will be disappointed when the result does not meet their expectations. On the other hand, if the result exceeds their expectations, they will be happy. So, if a user with very good equipment does to get the speed and quality of a connection he expects, he/she will give it a bad rating. If in contrast the user does not have high expectations, but it runs smooth, he/she will praise the system.

The second dimension is the complex technical implementation of an online seminar. There are some bottlenecks within the system. First the computer that runs the audio reflector. Second that one that runs the VNC software. And finally the internet connections between these two and the PCs of the users. The hardware at the university does not cause any problem, as it is able to serve much more participants than it really did. But the way the VNC connection to the users is implemented is critical. The users are not served at the same time, but one-by-one. Therefore, a participant with a low bandwidth connection can slow down the transfer of presentations to others. This will be further investigated by our research group. For the audio reflector, there is not such a problem.

But if a few rules are observed, technical environment will not play the major role. First, the presentations should concentrate on content, not on layout. Background without information for the presentation should be omitted. Effects like fading and moving text should be avoided. Videos should be kept to a minimum. Respecting these rules, data to be transmitted will not need high bandwidth. Processor speed and amount of memory did not show to be restrictive in this context.

Though there was no participant with a modem connection who filled the questionnaire, some modem users participated in the seminars. The effect of these connections was described above. The modem users themselves did not mention any major problems when informally asked after the seminars.
8. Impact of equipment on satisfaction

There are two dimensions of an online seminar to assess. The first one is the technical one, how well the technical solution did perform. The second one is more important, it is the efficiency in terms of knowledge transfer.

As mentioned above, user satisfaction is sometimes related more to expectations than to real events. From the user interviews, the expectations towards the technical performance greatly differ, as the user satisfaction. For the second dimension, expectations of users are much vaguer. As it was the first time to participate in an online seminar for all of them, they expressed some “uncertainty” about the results. When evaluating the outcome of the seminars, none of them felt disappointed. In contradiction, 77% rated online seminars as “good policy”, 46% would “recommend it in general”. There is neither a correlation between disaffirmation and technical problems, nor between affirmation/disaffirmation and the equipment used by the participants.

9. Efficiency as rated by participants

From the participants’ view, efficiency of a seminar is assessed in the dimensions costs, time spent, and learning effect. The dimension costs covers equipment and online time on the one side, and travelling on the other. Most students do not need to invest for equipment; otherwise a few long-distance travels avoided can finance a PC.

The respondents in a vast majority opt for online seminars, as they can save a lot of money and plenty of travelling time, while having the same learning effect in most cases. Those who judged that they have learned less than in traditional seminars do not rate this effect as serious.

But the perception of the participants is based not only on verifiable facts, but also on expectations of what will happen and experiences during the event. To get a more precise picture on learning effects, we need much bigger numbers of participants. In examinations, there is no significant difference between participants of traditional versus online seminars.

10. Conclusions

This paper is based on the voluntary feedback of participants of online seminars. Though by far not all of them filled in the questionnaire, all were asked in an informal way immediately after the event about their view on it. The result of both the questionnaires and the interviews was that in general, the participants do like this method of communication.

Hardware is not the main issue in online seminars. Broadband internet connections are desirable, but are no indispensable condition for a successful event. A thorough technical introduction is much more important. Even if users with modem connections are involved, it is possible to get a sufficient throughput if presentations are restricted to the essence. Nevertheless, it is necessary to put further effort in data compression and parallel distribution of content to a number of participants with heterogeneous internet connections.

Especially if students need a great effort to convene at a certain time and location (due to handicap, family situation, vocational duties, expensive travel costs, etc), online seminars are efficient ways of learning.

11. References


