

Implementation and Observation of Interactive Distance Teaching

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Abstract

We describe one inexpensive solution for the provision of interactive distance lessons. It is shown that the usage of a server's remote control for arranging of a shared common session by teacher and students for demonstration of particular software work as well as tools for accompanying the demonstration by video-audio communications between remote teacher and remote auditorium. Students' considerations regarding implied tools are collected in the form of questionnaires and the results are observed.

Keywords

Interactive distant lessons, server remote control, survey

INTRODUCTION

The use of computerized learning has become today an integral part of the learning process. It includes the software tools for instructors, tools for the design and maintenance of teaching materials, tools for students to take computer-based training and systems for maintenance and administration of e-course and users, like Moodle.

We are engaged in the organization and technical support of interactive distance lessons and monitoring of remote students' satisfaction. We have done the following:

- examination of potential low-cost tools for the provision of interactive distance lessons;
- implementation of these tools for the provision of interactive distance lessons;
- survey in form of questionnaires collecting views of our virtual lessons' participant regarding implemented solution.

REQUIREMENTS FOR THE TOOLS PROVIDING INTERACTIVE LESSONS

In the case of distance learning the teacher-student collaboration (hereinafter by the teacher is meant any educator - teacher, lecturer, instructor, academic, professor, etc.; by student hereinafter is meant any trainee) must be sufficiently convenient (Jekabsons, Krauklis, Lavendels, Sitikovs, 2010). For lectures the following should be the provided:

- student-teacher visual communication, where the student sees the teacher and teacher sees student. This type of communication stimulates the most appropriate speed of presentation, helps to maintain student interest and so on;
- student-teacher audio communication. Teacher's voice delivering a lecture, students' questions and discussions;
- presentation of course materials, usually using a computer. There may be various types of presentations (Power Point, Word, execution of specific software, etc).

During practicum (hands-on training) in addition to the items listed above also should be provided means (tools) for teacher-student collaboration for completion tasks using software environment. It is necessary to note that in the case of classroom lessons the teacher has the opportunity to observe a student's work at the computer and have the opportunity to advise the student directly on the base of seen on the screen, including showing of particular necessary manipulations.

DESCRIPTION OF THE SOLUTION

Implementing four European Social Fund projects in Latvia (Lavendels, Sitikovs, Latisheva, 2005; Lavendels, Sitikovs, Krauklis, 2008a; Lavendels, Sitikovs, Krauklis, 2008b; Agency, 2010) we pointed out two parallel channels operating in co-operation (Figure 1):

- channel for audio and video transmission. Audio communication for teacher's voice, students' questions, discussions and the video communication for broadcasting of teacher's image to audience and auditorium image to teacher;
- channel for presentation of course materials and for collaboration (presentation of slides, demonstrations of practical manipulations, monitoring of students performance during completeness of assigned tasks, analysis of student's work and individual student assistance).

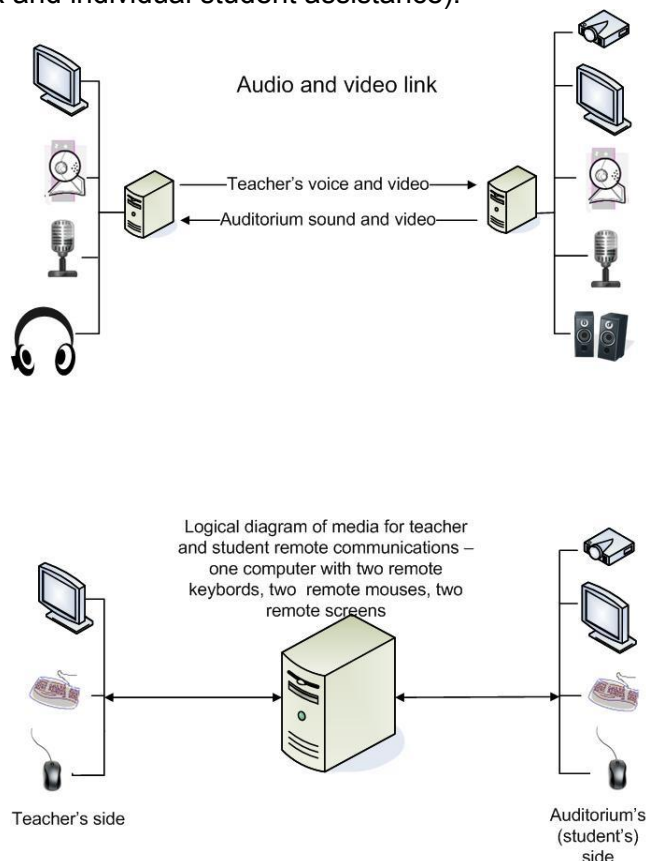


Figure 1: Schematic diagram of Teacher-Student collaboration

Voice and video channel could be realized by the use of Internet communication tools such as Skype. Channel for presentation of course materials and for cooperation (actually for application sharing – working with the same instantiation of software product) could be realized by different means of cooperation on the Internet. On the logical level this channel is realized as an imaginary (virtual) computer, hereinafter called as "cooperative computer", which has two controls: one on the remote teacher's side and one on the remote student's side (bottom part of Figure 1). Depending on the type of lessons - lecture in one auditorium, simultaneous lecture in several auditoriums, software demonstration, student's control, consultation, etc. – channel for presentation of course materials could be realized by a variety of different means, giving to the channel a slightly different properties.

Below are described our implementations that were used for distance teaching and learning of different target groups.

Examples of practical implementation of distance learning means

Examples of implementations for provision of remote lectures and remote hands-on training are described below.

Simultaneous lecture in several classrooms

The simplest means for lecture for a number of audiences at the same time could be Skype in "screen sharing" mode in combination with "High Speed Conferencing Service" (Krauklis, Shitikov, 2007).

Simultaneous lecture in a number of audiences can be provided using separate channels for audio and video transmission (teacher's voice and image) and channel broadcasting lecture's presentations. In this case, the presentation material (e.g. power point presentation) is posted on the server during the lectures. An audience connects to the server and lecture's presentation is projected on the screen.

However in such solution the teacher cannot see particular student's work with the program, therefore interactive collaboration between teacher and student is actually lost. As a consequence, for distant hand-on training such approach does not work.

Usage of PC remote control

For providing common work of teacher and student on the same software unit (program) on the base of remotely controlled computer, there are two possibilities:

- take-over control of student's computer;
- take-over student's terminal session on a server (*How to enable*).

Remote Control of Student's PC

Taking-over control of student's computer has the following shortcoming – the screen of the computer is seen either by the student (normal work) or by the teacher (remote control). It means that the teacher can correct the mistakes the student has made, but the student does not see this process. At the same time, when the student is working with the program, the teacher does not see what the student is doing.

Remote control of Server's session

More complicated, but at the same time more efficient alternative is taking-over student's terminal session on a server (Figure 2). In this case, necessary working environment is created in the following order:

- at first student starts a remote terminal session on a server;
- then teacher (having the required access rights) takes-over control of the student's session.

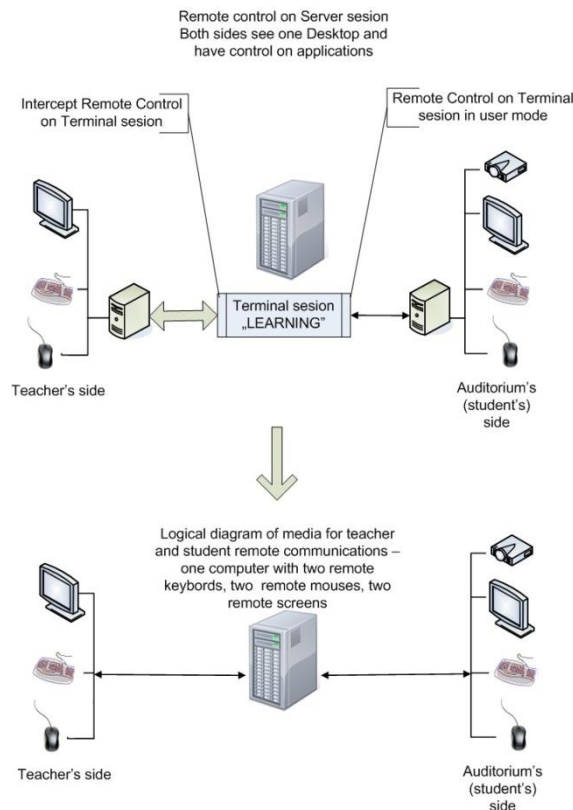


Figure 2: Topological and logical diagrams when taking-over student's terminal session

This way, both student and teacher see the same session's screen (desktop of the server and all applications running on the server). Both sides are able to control the process and the mouse pointer is being seen all the time for both sides.

The approach described here provides possibilities for two people to be working at the same computer. And in the remote learning, it is very important because basically, there are no essential difficulties to arrange video conference for a teacher and a listener, but it is much more important to provide to both these participants working at the same application and being able to correct student's mistakes and to show good practice of using the software.

It is necessary to note that application of what both student and teacher are working is executed on the server. This means that all programs and data required are to be accessible from the server. Practically this means that the teacher has beforehand to deploy on the server all necessary programs and data. Work on the server is potentially dangerous in term of computer viruses, so the right of user-student has to be limited till minimally required.

It is necessary to note also that the suggested approach is useful for giving a lecture as well as for arranging hands-on training. During the lecture projector could be connected to the student's computer and the presentation could be watched by everyone in the classroom. The interchange of audio information is being done by using Skype and, if available, Skype is used for video call. In this case, the teacher can watch the audience, and the audience sees its teacher. For hands-on training or consultations (tutorials), from the audience's side just a single student is working at the "cooperative computer" and the teacher is interacting just with him.

Advantages of solution

This approach does not require installation of additional software on trainee's computer. This enables potential users of remote lectures easily try out a new kind

of lessons. Approach can be applied also to train skilled users, especially when working with data placed on the server.

Disadvantages of solution

It is necessary to note that applying this approach all programs and data must be deployed on the server in advance. For less qualified students it could be quite difficult to understand its place in a rather sophisticated environment. A trainee's computer may have different properties than installation on the server, so there might be differences in further execution of the same being studied program directly on a trainee's computer.

EXAMPLE OF IMPLEMENTATION

We implemented this approach in training course for secondary schools teachers mastering MOODLE environment (Agency, 2010). It should be noted that our trainees were not specialists in the area of information technologies - these were teachers of biology, economics, mathematics, literature, culturology, history. Moreover, most of them had no experience with computerized tools for online communication. We worked with five groups of trainees - each group of 10 persons (by 5 teachers from 2 schools). Lessons were conducted from Riga to seven cities in Latvia. It is important that group of trainees had already been familiar, so immediately can communicate and help each other.

For arranging of remote lessons we had been used MS Windows 2003 Server on which studying system MOODLE was installed. Lessons are always held from Riga – from different places, depending on the teacher. Trainees during the lessons were in computer classes of participating schools in 7 other cities.

The teacher always uses just one computer on which both Skype videoconferencing and remote session on the server were running. Sometimes it was a computer with two monitors (separately for MOODLE and Skype), sometimes with one – combining both windows.

To the trainee's physical computer were connected projector, speakers and microphone. On this computer also were running both remote server's session and Skype video conference. Thus trainees simultaneously watch on one wall screen both teacher's video and window with running MOODLE. Listening to the teacher and watching running MOODLE trainees in parallel performing on their computers the same operations as teacher. If necessary they ask teacher's advice, using classroom microphone.

The teacher, in turn, watching what is happening in the auditorium could regulate the speed of lecture and level of necessary details. With each group 5 remote lessons were held, each of one and a half hours duration.

Assessment

To assess the acceptability of this approach after the end of the course surveys of trainees was conducted. In a survey have been participated 33 secondary school teachers whose were trained using virtual remote sessions platform. Some results of the survey are given in Table 1.

Views of respondents regarding duration of virtual lesson is given in Table 2.

At the same time, the minimal, maximal and optimal numbers of trainees in the audience during virtual lessons are presented in Figure 3.

Brief analysis of presented results show the following (Lavendels et al., 2011):

- For audience it is important to see the video of lecturer;
- Approach provides sufficient technical quality, even in places with rather low speed of Internet connection;
- Despite two parallel channel sessions, it was provided synchronization of video conference and running of "learning computer";

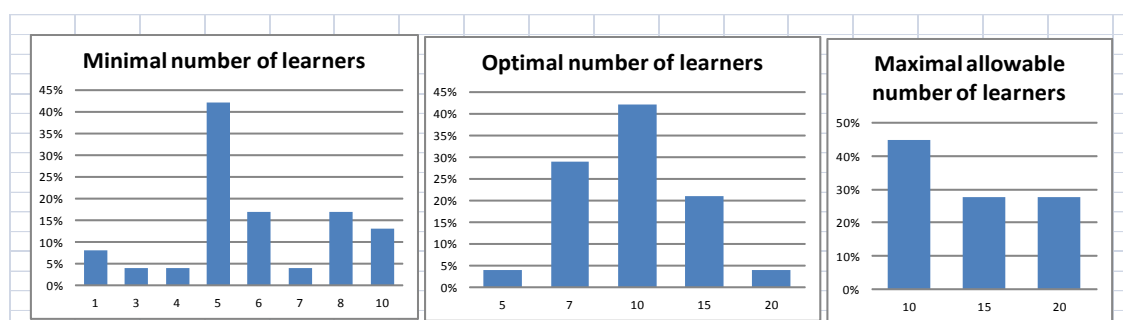
- During virtual lessons, trainees very often consult with colleagues;
- Realized environment can provide for teacher ability to adapt to the audience;
- Despite of rather high interest, only 30% of the participants wanted to try themselves as teacher in such online lessons.

Table 1: Results of the survey of virtual classes participants

	Yes (%)	50/50 (%)	No (%)
Does the quality of teaching material's video image was sufficient?	80	13	7
Does the cursor and its movement was always visible on the screen?	79		21
Do the movements of cursor and teacher's voice were always synchronized?	78		22
Does the quality of sound (teacher's voice) was adequate?	67		33
Is it necessary to see video images of teacher during the lesson?	79	6	15
Did you feel discomfort on the presence of video camera in the classroom?	3	6	91
Was the teacher able to regulate temp of training lesson?	91	6	3
Does the temp of virtual lesson must be slower than on class-room's lesson?	50	25	25
Does the duration of virtual lesson must be shorter than in class-room?	21	58	21
Does it necessary to have a moderator in the remote auditorium during virtual lesson?	91	6	3
Does it necessary to demonstrate teaching materials directly on the learner's screen instead of projection to the wall's screen?	29	16	55
Do you see usefulness of virtual classes in your subject areas (non-it)?	69	23	8
Do you want to conduct by yourself virtual lesson on your subject?	33	12	65
Are you in general satisfied with such environment and method of virtual lesson?	84	10	6

Table 2: Desired length of the virtual lesson

	30 min.	40 min.	60 min.	90 min.
Frequency of responses	15%	54%	23%	8%

**Figure 3:** Frequency of responses regarding the size of the audience for virtual lessons

CONCLUSIONS

1. Trainees gladly accepted such form of training. For a person with a minimum experience in the field IT isn't a problem to run virtual remote session.
2. There is no need to use two computers at each of the sides to carry out remote sessions – combining two screens on one monitor provides sufficient technical quality. In addition, this quality does not depend on the location of the teacher during lessons. It is very important that the participants were mutually friendly and sociable. Within each group, it is desirable to have one leader, which assumes the functions of communication with the remote teacher.
3. There is an assumption that one and a half hours is the maximum appropriate time for remote lessons, after this time trainees dramatically lose their concentration.

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Biography



Jurijs Lavendels is professor of Riga Technical university, doctor of Engineer Science, head of department of Informatics and programming. Main scientific interest is computer aid teaching, learning and training. Most important scientific project – UNITE: 26964 (FP6-2004-IST-4) Unified eLearning environment for the school 01/02/2006 – 31/07/2008.

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