

USING VIDEO IN DISTANCE LEARNING

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This paper describes the creation of training video materials in the Siberian State University of Telecommunications and Information Sciences (SibSUTIS), the experience of video consultations via videoconferencing facilities, and the experience of remote defence of a graduation project using videoconferencing. The authors discuss technical aspects of preparation of educational video lectures in special video studio, features of equipment selection, recording and editing of video lectures. This paper reports on hard- and software required for Internet videoconferencing and methods of videoconferencing in training process. It considers cognitive and incentive roles of the lectures on the electronic medium. This paper also describes methods of creation of video and audio sets for electronic lectures.

Keywords: e-learning, studio video lectures, electronic medium lectures, videoconferences, distance learning

Such method of training like lecture appeared more than 1,000 years ago, and became the leading form of the traditional educational process. Having lost in the beginning its significance when the new educational technologies, such as computer training, appeared lecture came back as video lecture on the individual electronic medium or on the web server [6]. Video lecture gained the most important advantage of the textbook: student can stop the playback at any moment and look for the required explanations in previous sections of the video lecture, or other sources. It became possible to increase both cognitive and incentive roles of the lectures on electronic medium [1, 3].

Currently, there are several types of electronic video lectures. A number of American universities [7–9] placed on their web sites video recordings of traditional classroom lectures, which were carried out by skillful and trained operators.

Other universities offer videos of lectures recorded in a special studio and representing

alternation on the screen of the lecturer and shots with schemes or formulas (they can be prepared in advance or played by the lecturer during the lecture). In process of improvement of recording methods it became possible to combine the lecturer and the course materials on the same screen (Fig. 1). Sometimes, electronic avatar is placed on the screen instead of the lecturer himself who reads the text of the lecturer. In this paper the authors deal with the issues of creating and using electronic studio video lectures (Fig. 1) and videoconferencing used in distance learning at SibSUTIS. The rest of this paper is organized as follows. The next two sections discuss the methods of formation of the motives for learning among distance students and introduce the technical aspects of creating a video studio at the university. Finally, last section shows the use of videoconferencing in distance learning. Presentation of the effectiveness of video lectures' implementation into the learning process concludes the paper.



Fig. 1. Screenshot of the studio video lecture on the PC monitor

Methods of motivation of students

It is very important for instructor to know how to attract attention and to awake students' interest in the lecture when creating learning video material. The instructors who prepare video lectures for students of distance learning are trained in the following methodical modes.

The contents of the video lecture should be understandable, and its volume has to be feasible for the student. The material has to be implemented by the principle from the simple to the complex. Systematization of the material and its correct rubricating play important role in the video lecture. Each video lecture should represent holistic and complete fragment.

One of the most powerful methods of motivation is the use of well-known didactic principle of theory-practice connection [7, 4]. Practice-oriented video lecture is not only interesting and gives professional knowledge, but also is a good school of life.

An introduction of problem elements into the video lecture gives the essential motivation for learning [5]. The whole point is that the lecturer creates a problem situation or gives a challenging task, which has to be settled by the lecture with the assistance of students. The lecturer reveals the logic of solving the problem, shows the difficulties and ways to get over them. Students become participators of the research. Such activity promotes a developing of creative and mental capacity of students.

The lecturer's speech is one of the most important "tools" of teaching in the video lecture. The strength of the speech is in ability to share lecturer's emotional mood with listeners. Speech of the lecturer must not contain inaccurate turns and professional dialect. It is unacceptable to use vulgar expressions. It should be brief and consist mainly of short sentences. The lecturer should be expressive.

In pedagogy great importance is attached to the behavior of the lecturer, his style and manner. The expressiveness of the speech can be enhanced by using gestures, facial expressions, and poses. The gesticulation has to be as temperate as possible. Facial expressions are also very important. However, it is inadmissibly to use entertainment mimicry: grimaces, winks etc. The face of the lecturer should have kind expression and should always express positive attitude towards the student.

Since the effectiveness of studying discipline depends to a large extent on the quality of the video lecture, instructors have to take the creation of video lectures responsibly. Something that goes unnoticed

in a traditional classroom lectures, will be forever imprinted in the video lectures on the electronic medium.

Technical aspects of video lectures creation

The main functions of the video studio are the following: video recording, audio recording, video editing and arrangement, video storage, and video recording on different carriers.

The main element of the video studio is a video camera. The more professional video camera the better the video quality. It is important that it should have a high definition recording format. It would be good if the camera in the studio pavilion was equipped with a special teleprompter with TFT monitor, such as TLW-LCD150. Such a teleprompter is able to play the text of the lecture that is visible to the lecturer, but "invisible" for the camera.

The lecturer can use any video material during his lecture, such as a slide presentation that is pre-recorded on a dedicated computer (usually a laptop) and put by lecture "to the air" at the right moments. Thus two video streams are consolidated in the video studio: one from the camcorder and the other from the lecture's laptop. These two streams are combined by a device that is called "video mixer" (e.g. video mixer SE-500, "Data Video").

In order to record the sound clip-on microphone ("SENNHEISER EW 122-G2") is used. In order to make a sound of a high quality it is also necessary to use a condenser microphone, for example, "AKG C 3000 B". In order to mix the sound mixing console "Yamaha MGC – 124 CX" is used. Sound control is put into effect by the instrumentality of audio monitors "Yamaha MSP-3" and "Beyerdynamics DT990 PRO" earphones.

Generic data flow that is formed in the video studio transmits to the apparatus room. Since modern facility in the video studio generates video and audio signals in digital form, special equipment has to be used for transmitting a digital data flow from the video studio to the apparatus room.

The main device in the apparatus room is a nonlinear editing station based on Apple MacBook Pro and Final Cat Studio 2.0. software package. It provides high-quality video and sound files editing. As a rule video and audio mixers are put in apparatus room and not in studio pavilion.

In SibSUTIS a simplified version of video studio was chosen, which nevertheless allows one to create a learning product of high quality [2].

Fig. 2 shows the appearance of SibSUTIS studio pavilion and central control room.

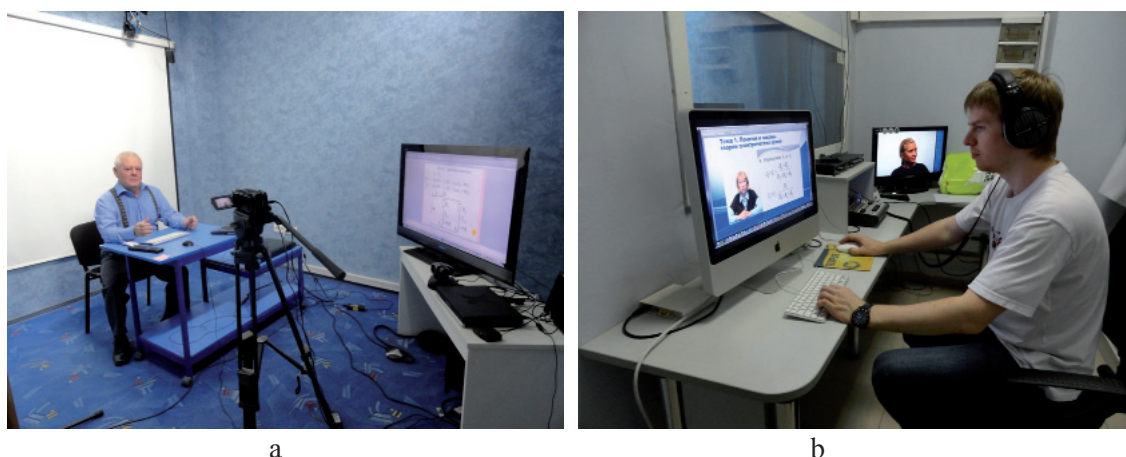


Fig. 2. Appearance of the studio pavilion (a) and apparatus room (b) in SibSUTIS

When recording of the video lecture in pavilion is over an engineer puts it on a temporary nonlinear editing program track and makes a draft of the lecture. In this instance the lecture work is not over. It must be reviewed by the instructor, whose lecture was recorded, and he must specify those video parts on a temporary track that need to be corrected. Video engineer makes correcting and editing of clips (scenes) via nonlinear editing tools, or if such a correction is not possible, retakes these clips. In order to store these digital files special device RAID-array (e.g., Promise SmartStor NS4300N), which provides easy access to the stored files, has to be used. Four 1 – terabyte hard disks are placed inside of the RAID-array. Such memory space will provide a file backup and storage of 130 hours of unreduced video lectures and 600 hours in a packed form. Finally, the video lectures are placed on the training web-site or recorded for students to DVDs.

The use of videoconferencing

Modern videoconferencing system includes the following hardware and software:

- terminals with a camera and microphone providing a visual communication;
- video and audio output facilities (PDP or LCD panels, monitors, TVs, projectors, sound amplifiers, speakers, etc.);
- special videoconferencing servers;
- specialized software (for data collaboration, text and graphic documents, etc.).

It is very conveniently to exercise the videoconferencing via equipment that is called Emblaze VCON's xPoint. It is good for group videoconferencing so long as it allows one to display the presentation on big screen, to connect the external laptop for collaborate work of the users with the data and a variety of documents.

Currently the following kinds of video communication are used in SibSUTIS distance learning: network online video lectures broadcasted via the Internet to one or more classrooms; online workshops, video consultations, colloquiums, testing, remote tests and examinations, and distance defense of students' degree thesis [10].

Fig 3 shows the organization of distance defense of graduate works in SibSUTIS. On the one monitor the speaker is shown and on the other one presentation materials of the speaker are displayed. It is also possible to see colleagues on Fig 3, b, who are involved into remote defence and stay in another classroom, on the monitor.

The described in this paper saving engineering solution for creating video studio enables one to put into practice high-quality video and audio recording on various carriers.

Conclusion

Functional capabilities of the used in SibSUTIS educational process videoconferencing systems allow one to organize any on-line training sessions: lectures, laboratory practical, consultations, testing, and defence of students' degree thesis.

In order to find out the effectiveness of introducing educational video materials in distance learning, two polls for graduates were conducted. The first questionnaire was aimed at students' satisfaction with e-learning technology, in which training videos were used. The second poll was aimed at students' assessment of the quality of electronic educational video materials. 150 students participated in the survey and they graduated from the following specialties: "Economics and Management", "Communication Networks and Switching

Systems”, “Computer Aids and Automated Systems’ Software”, “Multi-channel communication systems”, and “Radio Communication and Television”. Approximately 46% of the graduates gained their first higher education, and 54% gained their second degree. The survey showed that 88% of respondents worked in the sphere of telecommunications.

The assessment of distance learning in SibSUTIS showed that all specialties’ graduates have highly estimated (9,8 points) the usability of training video materials. The degree of interest in video materials was evaluated by graduates at 8,8 points, and the availability and convenience of distance learning web-site – at 8,5 points. Results of the survey are presented in Table 1.

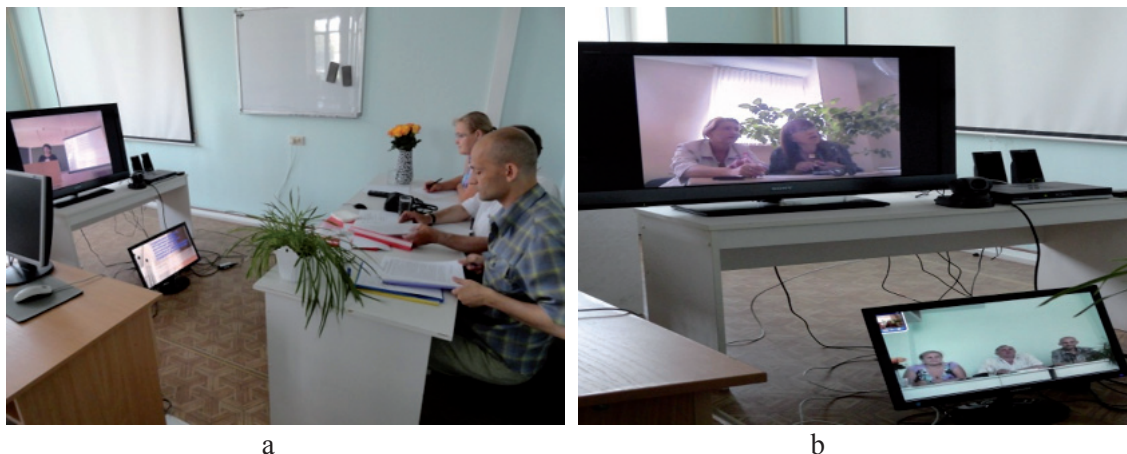


Fig. 3. Organization of the distance defence of graduation project in SibSUTIS

Table 1

Students’ satisfaction with e-learning technology

Estimable Parameter	Specialty					Average grades
	“Economics and Management”	“Communication Networks and Switching Systems”	“Computer Aids and Automated Systems’ Software”	“Multi-channel communication systems”	“Radio Communication and Television”	
Availability of training materials	8,9	9,1	8,8	9,1	6,5	8,5
Degree of interest in video materials	8,0	8,5	9,7	8,8	9,0	8,8
Utility of training materials	9,9	9,7	10,0	9,5	9,8	9,8

Table 2

E-learning materials grade estimation

Estimable Parameter	Specialty					Average grades
	“Economics and Management”	“Communication Networks and Switching Systems”	“Computer Aids and Automated Systems’ Software”	“Multi-channel communication systems”	“Radio Communication and Television”	
Theoretical material	6,1	7,6	7,1	6,3	8,1	6,8
Tests and yearly projects implementation study guides	6,5	8,1	7,5	6,5	8,4	7,1
Virtual laboratory works	7,2	8,5	7,1	8,0	8,4	7,7
Educational video materials	7,6	9,3	9,1	9,8	9,5	8,9

Respondents were asked to rate the following types of e-learning materials: a theoretical material, guidelines for the implementation of tests and yearly projects, laboratory works, educational video materials.

Analysis of grades showed the following results:

- the quality of the theoretical material – 6,8 points;
- the quality of tests and yearly projects implementation study guides – 7,1 points;
- the quality of virtual laboratory works – 7,7;
- the quality of educational video materials – 8,9.

Results of the e-learning materials grade estimation are presented in Table 2.

In conclusion, it should be noted that the implementation of the above-described video lectures for distance learning in SibSUTIS enabled students to significantly improve their motivation to studying.

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