Using of Multimedia and New Communication Technologies in Complete Computer Support of Education

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Abstract—The article describes practical application of multimedia and communication systems used at the process of education in Technical University of Košice.

I. INTRODUCTION

In the framework of projects for development of infrastructure and modernization of IKT at Technical University of Košice, general contractor elfa, s.r.o. has arised a task for his subcontractor ViaNet, s.r.o. focused on particular progress and application of new information and communication technologies for everyday using in the process of education at the Technical University in Košice. The article describes the application of modern audiovisual technologies and video communication systems in the large capacity classrooms of the university.

Using of the modern audiovisual and communication systems in process of education at university increase undoubtedly the quality of education on the higher level. Audiovisual aids and communication technologies enables teachers using material of higher quality. Therefore students obtain more extensive information in better quality and also an opportunity to be in touch with modern technologies in their practical application.

The contact of students with modern multimedia and communication technologies in everyday life of education will help them to stop focusing on the technology as the barrier but move them to accept the technologies as the tool of modern way of education and also start to concentrate more to the information that are presented at the lecture.

II. DESIGN PROCESS OF THE "INTEGRATED MULTIMEDIA LECTURE DESK"

Integrated Multimedia Lecture Desk means complex solution containing of audiovisual and communication systems controlled by graphical interface of intuitive system of control. Integrated Multimedia Lecture Desk also contains different interface for connection of external systems of sound and projectors with projection screens .

A. External projectors with projection screens, cameras and sound systems

According to equipping of the large capacity classrooms with modern audiovisual systems, was necessary to involve the projectors with projection screens, camera technologies to the classroom environment and design high quality of the sound by integrated speaker boxes.

Figure 1. High capacity classroom with external projection systems and screens, cameras and speakers

There was necessary assume with using visualization systems in classrooms which contains two performance projectors and two electrically operated projection screens. Dimension of projection screens and projectors performance was designed according the dimensions and architecture of classroom environment.

There was replaced old classical blackboards by new ceramic boards with respect to the new audiovisual technology. Using of old classical blackboards and their dust has negative effect and decreases life and quality of using new technology.

We use four speaker boxes for the sound system in each classroom which are usually installed mainly on the front and middle part of the side wall with accent to the adequate quality of sound level in any place of classroom.

For the distance education and video communication reasons there was installed two cameras in each high capacity classroom:

i) High Definition camera for video communication system in the quality of 1280x720 pixels and 30 frames per seconds motion.

ii) High quality CCD camera that combines a high-speed, quiet pan/tilt with a wide-angle view and 40x zoom (10x optical + 4x digital), all in a compact, easy-to-use package.

The last challenge but not simple task was realization of cable distribution to each of these active system integrated in the environment of high capacity classrooms.

B. Audiovisual and communication systems

There was installed the Integrated Multimedia Lecture Desk in to the each high capacity classroom. In the process of Integrated Multimedia Lecture Desk design we

was focused for next important points of requests with respect to daily of education process:

i) Installation of complete audiovisual and didactic technology of high capacity classroom into the one central place with possibility of secure lock and with respect for the operation environment request of each technology and subsystem.

ii) Integration of all necessary systems and technology important for daily using in process of education

iii) Integration of interactive systems which allows to work with different electronic document formats, 3D objects and software applications

iv) Design of simple way of control whole Integrated Multimedia Lecture Desk and systems inside with main focus on simplicity and final result of simple technology for daily use.

Figure 2.   Audiovisual an communication systems of Integrated Multimedia Lecture Desk

We have designed Integrated Multimedia Lecture Desk after summarize all aspects and goals mentioned hereinbefore.

Basic interactive technology used in the Integrated Multimedia Lecture Desk are computer with keyboard and mouse, 17" inch touch display and 4,3" inch graphical touch display for desk control. On the right side of the desk are VGA, audio and 230V interfaces for laptops connection. On the top of the dest is installed interface for external USB memory or SD memory card connection.

The whole desk with particular systems are controlled through simple graphical interface with 4.3" inch touch screen programmed for easy of use and controlling of all systems during the education process. This is the main system which helps teachers to simplify they work with dest and provides them quickly startup or open up the any function of any technology that are needed. Thera are available wide range of audio inputs (total 6), then switching matrix of video inputs different sources (total 5) to output of any display and screen (total 4), to controlling the video communication system, sound systems and microphones.

The desktop screen of the computer and the particular running applications can be controlled not only by connected keyboard and mouse but also 17" inch touch screen situated on the top of the desk. The computer is one of the basic interactive application for the teachers during the they work. It enables for example to edit or draw into the presentations used during teaching.

On the left side of the desk, there is socket with documentation camera, which enable to view printed documents or 3D subject. Its high quality optics enables to zoom the details of small even very small subjects.

The last but not the easiest challenge was to develop the system of power control which power all the particular technologies in safe condition and reliable operation of individual integrated technologies will be ensured. The solution came as "one button solution". It turns off the whole desk with using the touch screen, the key or simply closing the top cover counter of the desk.

The main parts of the designed sound system are: amplifier, echo canceler, equalizer, mixer and microphones.

The main parts of visual systems, displays and screens are: video matrix which ensure the switching many of video sources to the elective range of accessible displays and screens.

The video sources usually are: video communication system, integrated computer, external laptops, DVD/VHS player, document camera.

Figure 3.   Interactive and control systems of Integrated Multimedia Lecture Desk

Installation of all Integrated Multimedia Lecture Desks to the high capacity classrooms contains three main phases of process:

i) Installation of external visual systems such as projectors and projection screens, cameras and speaker boxes

ii) Integration of complete cabling and its ending in the place of installation of the desk

iii) Install all technology to the desk and preparation of the desk for final installation to the classroom environment and all systems setting and programming of control

iv) Desk transportation and installation at the destination

v) Set up systems to the real operation and final administrator training.

C.   Video communication systems

The part of Integrated Multimedia Lecture Desk is also the video communication system produced by LifeSize, which ensure video communication in standard SIP and H.323. Despite this, the system enables to use Skype and "EVO" The World Wide Collaboration Network for the communication.

Thanks implementation of video communication system in environment of high capacity classrooms there is space for connecting with external participant. This is the way for realization of distance education for foreign students or to connect students with professors from foreign countries or peple from the real industry.

III. FURTHER APPLICATIONS OF INTEGRATED MULTIMEDIA LECTURE DESK

The Integrated Multimedia Lecture Desk can be adapt for implementation to smaller classrooms at elementary or secondary schools. Adapt them for particular applications and equipment to offer the teachers complete but easily controlled tool for educational process. On the other hand, playful and interactive tool for pupils and students. They can familiarize the technology that they can meet on higher level of their education or in life.

The desk can be integrated with interactive desks or added with didactical technique.

Introduction of video communication technology on lower levels of education can lead to motivation and inspiration in further education on higher levels and mediate the contact of students and professors or other interesting people from practice.

IV. CONCLUSION

The project of development of infrastructure and modernization of IKT on Technical University in Košice shows the importance of projects like this. Thanks the realization of the project, there is multitask and "alive" equipment of audiovisual technology in high capacity classrooms, which can be improved, developed and added new applications.

One of these applications is for example digitalization of education for passive participants that cannot attend the lecture. It can be understand as implementation of different streaming technologies for streaming of people and content video. The easy way of using ("One Button Solution") this kind of technology is main importance to keep them life in real operation.

System of digitalization, which ensure easy start of recording and online streaming lectures and after the end automatic save and publishing on the school web server for next education process. The result is that students would have access to presentations and content where they had absence. The presentations could be also provided to external foreign users as material of e-learning education process.

Integrated Multimedia Lecture Desk is already today prepared for the integration with system like this, where it ensure capture and provide audio and video outputs for further processing to other higher systems in process like systems for streaming and publishing.

ACKNOWLEDGMENT

The aim of the article is to refer to particular practical use of multimedia and communication technology in process of education on elementary, secondary schools and universities. We wanted to refer also to openness of the system of Integrated Multimedia Lecture Desk and its further possible application on lower levels of education and also the opportunity of integration with the other systems used for digitalization of education (e-learning).

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