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Videoconferencing as Tool of Higher Education

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Abstract. In the decade up to 2020 European Higher Education will have a vital contribution to realize a Europe of knowledge that has a relevant role, at national and international level, in the cultural and economical development of countries. The higher education will also face the major challenges and opportunities of globalization with accelerated technological developments with new providers, new learners and new types of learning. New educational requirements stimulated by the innovative telecommunication technologies, leads, almost as direct consequence, to the latest educational materials and methodologies, to videoconferencing and distance learning issues. In this framework, the three-year ViCES (Video Conferencing Educational Services) Project was launched and financed by the European Commission within the TEMPUS (Trans-European Mobility Scheme for University Studies) programme. The VICES project will provide an environment that increases student and academic mobility as well as infrastructure that will ease the process of harmonization of different curricula outcomes.

Keywords: higher education, TEMPUS European Programme, innovative educational methods, distance learning, curricula harmonization, national and international cooperation.

1 Introduction

Higher Education plays a very important role in the development of human beings and societies and enhances cultural and economical development as well as expertise for educational growth. It includes in fact teaching, research and social services activities of Universities and refers to education provided by Universities, colleges, institutes of technology and other collegiate level institutions awarding academic degrees or professional certifications [1].

Since 1950, article 2 of the first Protocol to the European Convention on human Rights [2] obliges all signatory parties to guarantee the right to education. World-wide, the United Nations' International Covenant on Economic, Social and Cultural Rights of 1966 [3] guarantees this right under its Article 13, which states that «higher education shall be made equally accessible to all, on the basis of capacity, by every appropriate means, and in particular by the progressive introduction of free education».

The European Higher Education Area is the objective of the Bologna Process [4][5], devoted, since 1999, to create more comparable, compatible and coherent education systems throughout Europe, based, among others, on the European Credit Transfer System – ECTS. The higher Education institutions, to achieve the objectives above and to encourage cooperation between countries, may take part in a wide range of programmes, such as LLP (Lifelong Learning Programme) [6], ERASMUS MUNDUS [7], TEMPUS (Trans-European Mobility Scheme for University Studies) [8].

The TEMPUS Programme is designed to support the "transition and modernization processes" in higher education through a range of interventions and to create an area of co-operation in countries surrounding the EU. Established in 1990 after the fall of the Berlin Wall, the scheme now covers 27 partner countries in the Western Balkans, Eastern Europe and Central Asia, North Africa and the Middle East [8]. In addition to "people to people" academic cooperation, Tempus aims at having an impact on higher education policies, and closely following national higher education priorities.

Higher education and learning are taking place across the whole life span in a wide range of environments and with different aims. New educational requirements and innovative education practices stimulated by the new information and telecommunication technologies enable all the actors involved in the educational process almost instantaneously to access the latest educational materials and methodologies. Students are usually familiar with the use of different technologies for their studies and research. This fact opens the possibility for creating an education environment, where high end internet based services are used to implement techniques which cannot be implemented in traditional classrooms. Technology itself is not inherently good or bad for educational process support. It is the way it is used that matters.

Video conferencing enabled learning is a new way of acquiring knowledge, which is highly adaptable to different kinds of student profiles, from people that do not have time to attend normal courses to a practical enhancement of ordinary courses with additional access to the knowledge. It facilitates and promotes the co-operation, at national and international level, generating new networks and more immediate communications processes of personal and professional contacts. Exchange of knowledge and consultation process among students and available expert authorities (professor/instructor), are very important aspects of learning, in addition to the static contents that are provided in books and different digital multimedia.

In this framework, the University of Florence and the Ss Cyril and Methodius University launched in 2008 a three-year TEMPUS JP Project called VICES (Videoconferencing Educational Services) financed by the European Commission in the frame of the TEMPUS IV for the period 2009-2012 [9].

The project, carried out by the University of Florence and the Ss Cyril and Methodius University in Skopje, together with all consortium members (three partner Universities of the European Union and different Universities in Albania (AL), Republic of Macedonia (MK) and Serbia (RS)), will introduce a new approach towards the treatment of Information Communication Technologies at University level. It is expected that VICES will provide an environment that supports and increases student and academic mobility as well as infrastructures that will ease the process of harmonization of different curricula among educational institutions.

2 Higher Education in Europe: From the Bologna Process to the Tempus Programme

One very important step to reach more comparable and more compatible educational systems in Europe can be initially identified in the Recognition of Qualification concerning Higher Education in the European Region which considers the great diversity of education systems in the European region and tries to identify a strategy for the recognition of studies, certificates and diplomas and degrees obtained in different countries of the European Area [11]. After that, the Bologna Process [4][5] (started in 1999 with the signature of the Bologna Declaration from the ministries of Education of different European countries) aims to create a European Higher Education Area (EHEA) based on international cooperation and academic exchange that is attractive to European students and staff as well as to students and staff from other parts of the world.

The EHEA aims to: facilitate mobility of students, graduates and higher education staff; prepare students for their future careers and for life as active citizens in democratic societies, and support their personal development; offer broad access to high-quality higher education, based on democratic principles and academic freedom. Some of the Bologna action lines are qualification frameworks (Three cycle System), joint degrees, mobility, recognition, quality assurance, social dimension, employability, lifelong learning.

The Bologna Process is taken forward through a work programme that receives orientations from ministerial conferences every two years (Praga 2001, Berlin 2003, Bergen 2005, London 2007, Leuven 2009) [4]. These conferences are prepared by a Bologna Follow-up Group, which in turn receives input from working groups and Bologna Seminars. The last ministerial conference in Leuven last April 2009 [4], stresses the achievement on the Bologna Process until 2009 and define the priorities in education on the decade up to 2020 in terms of Social dimension (equitable access and completion), lifelong learning, employability, student-centred learning and teaching mission of higher education, education, research and innovation, international openness, mobility, data collection, multidimensional transparency tools and funding. In the Leuven Communiqué the European Ministers responsible for Higher Education state that the Bologna Process is leading to greater compatibility and comparability of the systems of higher education and is making it easier for learners to be mobile and for institutions to attract students and scholars from other continents with a constant focus on quality.

Access to higher education is expected to be provided by fostering the potential of students from underrepresented groups. This involves improving of the learning environment, removing barriers to study, creating the appropriate economic conditions for students to be able to benefit from the study opportunities at all levels towards the achievement of equity in higher education. Lifelong learning is perceived as an integral part of the European education systems. Recommendations to assure the accessibility, quality of provision and transparency of information are included. Lifelong learning involves obtaining qualifications, extending knowledge and understanding, gaining new skills and competences or enriching personal growth.

Lifelong learning implies that qualifications may be obtained through flexible learning paths, including part-time studies, as well as work based routes.

Student-centred learning requires empowering individual learners, new approaches to teaching and learning, effective support and guidance structures and a curriculum focused more clearly on the learner in all three cycles. Curricular reforms are identified as an ongoing process leading to high quality, flexible and more individually tailored education paths.

It is expected that Higher education should be based at all levels on state of the art research and development thus fostering innovation and creativity in society. The potential of higher education programmes, including those based on applied science, to foster innovation is recognized. European higher education institutions are called to further internationalise their activities and to engage in global collaboration for sustainable development. The attractiveness and openness of European higher education is highlighted by joint European actions.

The mobility of students, early stage researchers and staff is considered as an added value in the quality of programmes and excellence in research and for the academic and cultural internationalization of European higher education. Mobility is important for personal development and employability; it fosters respect for diversity and a capacity to deal with other cultures. It encourages linguistic pluralism, underpinning the multilingual tradition of the European Higher Education Area and it increases cooperation and competition between higher education institutions.

The above mentioned priorities are taken into account in a number of initiatives of the European Commission and Member States in the field of education and training. The Council Conclusions on a strategic framework for European cooperation in education and training ("ET 2020"), adopted in May 2009, build on progress made under the previous work programme and set four strategic objectives: making lifelong learning and mobility a reality; improving the quality and efficiency of education and training; promoting equity, social cohesion and active citizenship; enhancing creativity and innovation, including entrepreneurship, at all levels of education and training. These activities also contribute to the Bologna intergovernmental process in the field of higher education.

One of the main European funded co-operation Programme in the field of Higher Education is the TEMPUS Programme [8] (Trans-European Mobility Scheme for University Studies) (Fig. 1). It supports the modernisation of higher education and creates an area of co-operation in countries surrounding the EU. Established in 1990 after the fall of the Berlin wall, the scheme now covers 27 countries in the western Balkans, Eastern Europe and Central Asia, North Africa and the Middle East (going beyond the «iron curtain»). It strengthens cooperation in higher education between the European Union and its partner countries and at the same time it enhances understanding between cultures, promoting the “people to people” approach.

The overall objective of Tempus is to contribute to the creation of an area of cooperation in the field of higher education between the European Union and Partner Countries in the countries neighbouring the EU. The specific objectives of Tempus are: to promote the reform and modernisation of higher education in the Partner Countries; to enhance the quality and relevance of higher education to the world of work and society in the Partner Countries; to increase the capacity of higher education institutions in the Partner Countries and the EU, in particular their capacity to co-operate internationally and to continually modernize, and to assist them in opening up to society at large, the world of work and the wider world in order: to overcome inter-country

fragmentation in the area of higher education and inter-institutional fragmentation in countries themselves; to enhance inter-disciplinarity and trans-disciplinarity between university faculties; to enhance the employability of university graduates; to make the European Higher Education Area more visible and attractive in the world; to foster the reciprocal development of human resources; to enhance mutual understanding between peoples and cultures of the EU and the Partner Countries.

The TEMPUS Programme can finance two types of actions: Joint Projects, based on multilateral partnerships between higher education institutions in the EU and the partner countries. They can develop, modernise and disseminate new curricula, teaching methods or materials, boost a quality assurance culture, and modernise the management and governance of higher education institutions. The second type of action are Structural Measures which contribute to the development and reform of higher education institutions and systems in partner countries, enhance their quality and relevance, and increase their convergence with EU developments.

Fig. 1. The countries in blue are the European Union countries and the countries in green are the partner countries to which the TEMPUS Programme is addressed [8].

3 From the Video Conferencing Approach to the TEMPUS VICES Project

Comprehensive new approaches to valuable learning, which will allow citizens to move freely between learning settings, jobs and countries, making the most of their knowledge and competences, should be always considered as very important for every community [12] [13]. Videoconferencing services, used in combination with other educational services significantly ease this access by lowering the cost of original production of educational material and increasing the possibility to update educational materials more frequently.

Video conferencing involves a two-way video, audio and data communication between two or more parties over a remote connection [14]. Video conferencing is

carried out over a variety of media, the most popular of which uses Internet Protocol (IP) technology. The cost of video conferencing over IP is getting so low that it has become the most popular means of video conferencing [15].

Streaming technology is considered to be a very important internet based network technology that enables the deployment of video conferencing services. Streaming technology covers one way transmission of audio, video and possibly other content to an end user. When speaking about videoconference, archiving and subsequent methods of retrieval of archive content must be specified. Real-time streaming of videoconferences is of great importance as a videoconference service. It should be noted that the quality of service of the real time video streaming is of great importance for the end user perception of the content. This importance is even increased in case of bidirectional interactive streaming such as video conferencing in education. The second technical issue important for video conferencing is the video format resolution [16]. Figure 2 compares the typical formats used in different video standard that can be streamed. It is obvious that more audience requires better video resolution. Unfortunately, this makes providing the needed quality of service more complex. That is the main reason why it is important to build large a scale video conferencing educational system over the manageable network infrastructure. A Typical example of such an infrastructure is the national academic internet network.

Fig. 2. Typical resolutions for standard video formats

The components of the learning environment that promote the usage of video conferencing services can be itemized as follow: educational methodology used in the learning process, mapping of video conferencing technology onto the educational methodology, and institutional factors influencing the educational process.

In order to make video conferencing to function effectively, the instruction and course content must be interactive, and the instructor must exhibit flexibility and creativity when teaching the class. At the same time, he/her has to able to manipulate multimodal content (video, audio, and data) that should be presented to the students. In addition to this, technical support for managing the video conferencing equipment is required. A typical scenario for the 30 students' classroom includes 2 video screens

that are presented to the students at the same time – one for standard video conferencing and one for educational material. Figure 3 illustrates those video screams and related video sources. It is obvious that a certain technical knowledge has to be provided for such classroom.

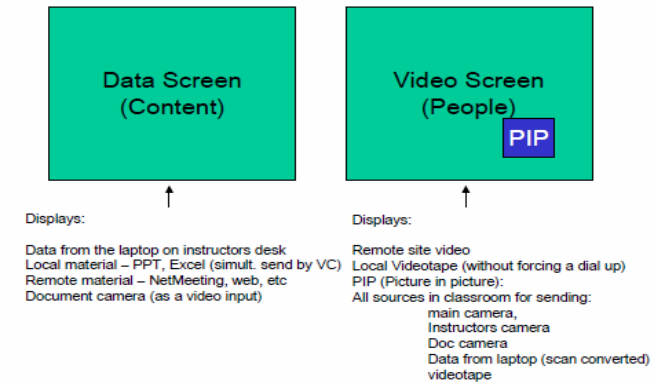


Fig. 3. Elements of Multimodal presentation in video conferencing classroom

Video conferencing enhanced distance learning increases educational opportunities offered by any institutions. It reduces the costs of teaching and learning, while allowing students to have more access to a variety of degree programmes. The management of video conferencing-based education is dependent on the geographical distance of the participants and the number of separate sites involved in the interaction.

Videoconferencing can help to make the different systems of higher education more compatible and comparable and to promote equal opportunities to quality education. Furthermore, it can guarantee accessibility, lifelong learning as an integral part of education systems by introducing flexible learning paths.

Furthermore, the use of innovation technologies in learning foster innovation and creativity in society, enabling students to be more employable and more advanced in knowledge, skills and competences. Videoconferencing can be considered as an important ICT tool to carry out the priorities of the Bologna Process in the next decade.

There are other factors which influence the successful implementation of educational processes. These factors relate to the institutional needs in higher education:

- The need for large scale collaboration in education technology development.
- The need to share resources, especially transferable courseware, on a national scale.
- The need for staff development.

The establishment of a video conferencing infrastructure and corresponding educational methodology (two outcomes of the TEMPUS VICES project) [9] will be the basis for further development of an efficient lifelong learning universities' educational system.

4 Expected Results and Future Perspectives of VICES

The Macedonian Universities have commitments to protect and preserve the cultural heritage of the region and its citizens. One of the most significant cultural heritages is the language. Thus, at the Universities in Macedonia, lectures are given in Macedonian, Albanian and English language depending on the needs of the students that attend different classes. In this context a multi-cultural and multi-lingual educational environment is created.

One of the main objectives of the TEMPUS VICES project (Videoconferencing Educational Services) [9] will be to enable the usage of sophisticated video conferencing and other distance learning environment services in combination with traditional face to face learning in order to establish the ratio of different learning methodologies most suitable for the students' needs taking into account cultural, technical and economical partner country background and needs [17].

The VICES project will provide one centred Video conference management system and seven video conference classrooms in R. Macedonia, as well as two video conferencing classrooms in Albania and Serbia. The general scheme of the VICES video conferencing infrastructure is given on Figure 4.

The Video Conference management centre will be facilitated by the Macedonian Academic and Research Network (MARNET), due to the already established management of the academic network infrastructure. This equipment will consist of three parts: management software, recording and streaming server and multipoint conference units. The management software will be able to utilize and optimize the network traffic generated by the video conferencing sessions. The recording and streaming server will provide recording capabilities for any video conferencing sessions, thus enabling their later streaming to any web enabled client [18]. It has to

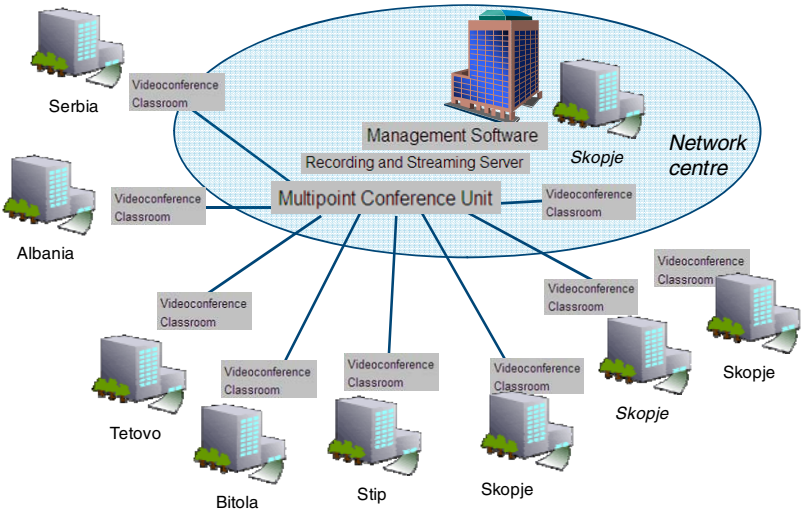
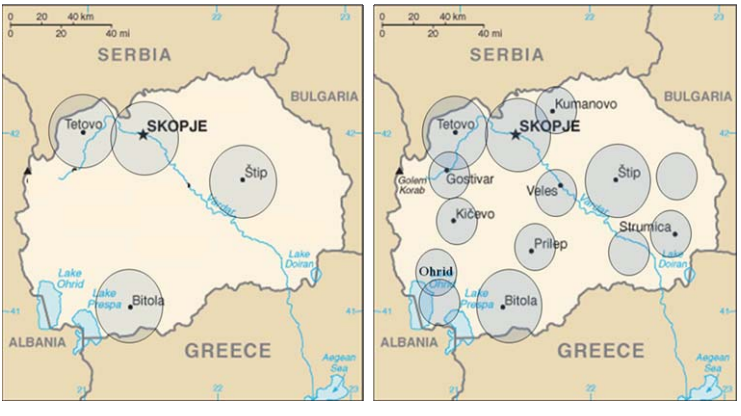


Fig. 4. The VICES video conferencing infrastructure

be stated, that in this case, the students will not be able to interact with their instructors. The multipoint conference units should enable parallel and multicast session among different video conferencing classrooms. In this way, using the video portal provided by the VICES project, students from different Universities will be able to attend different lectures on the same or similar subjects. Students will be able to exchange their ideas and educational findings with wider student communities that share similar interest [19].

Figure 5a presents the initial geographical placement of the video conferencing classrooms within R. Macedonia covered by the VICES project, while Figure 5b presents the potential video conferencing classrooms. The potential classrooms locations are determined according the locations where the Universities that participate in the project have dispersive centers. As it can be seen from this figure, it covers significant population in R. Macedonia, providing equal access to all students to the higher education facilities.



(a) (b)

Fig. 5. (a) Initial and (b) potential placement of video conferencing classrooms

The establishment of video conferencing infrastructure and corresponding educational methodology will be the basis for further development of an efficient lifelong learning universities' educational system.

The VICES Videoconferencing Educational Services will be evaluated by students at their last year of undergraduate studies in Information Technologies using standard evaluation techniques adopted to video conferencing systems [20][21]. The students will be asked whether the video conferencing is useful for their studies. The questionnaires given to the students for evaluation will include three types of questions regarding: student experience in using video conferencing technologies in education, multimodal accessibility of the educational content, and quality of service of video conferencing.

5 Conclusion

Higher Education will play a central role to realize the Europe of knowledge in the decade up to 2020. A great number of initiatives are actually carried out in this direction from the European Commission and member states.

One of the main European funded co-operation Programme in the field of higher Education is the TEMPUS Programme that supports the modernization of Higher Education and creates and area of co-operation in countries surrounding the EU (Western Balkans, Eastern Europe, Central Asia, North Africa and the Middle East). One of the main features of TEMPUS is the introduction of innovative teaching and learning methods through regional and international co-operation aimed to have an impact on higher education policies, making the different system in higher education more compatible and comparable.

New educational requirements and novel educational methods, such as Video Conference, supported by new telecommunication technologies enable almost instant access to latest educational materials and methodologies.

In this framework the TEMPUS Project VICES (Videoconferencing Educational Services), carried out by the University of Florence and the Ss Cyril and Methodius University in Skopje, was launched and financed by the European Commission for the period 2009-2012.

This project will introduce a new approach towards treatment of Information Communication Technologies at University level with the purpose to increase the virtual student and academic staff mobility. This approach will also enable higher level of harmonization of different curricula among partner institutions and at international level. This will increase the usage of new ICT technologies within the educational process, making it more efficient in the same time.

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