Proceedings of Papers
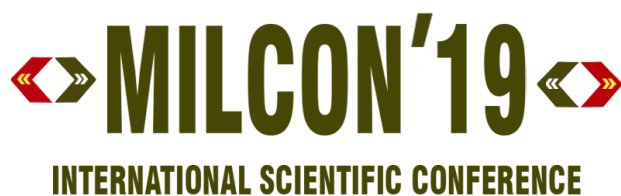
2-nd International Scientific Conference MILCON'19, Skopje

MILCON'19
INTERNATIONAL SCIENTIFIC CONFERENCE

November 12th, 2019

MILCON 2019 International Scientific Conference is supported by:

This conference is organized under scientific auspices of the following institutions:

The Conference is organized by the Military Academy "General Mihailo Apostolski"- Skopje associated member of the University "Goce Delcev" - Shtip, within the RADLI Project (Regional Advance Distributive Learning Initiative), supported by the Kingdom of Norway and implemented by the Jefferson Institute, USA.

The Conference has been immensely supported by the Ministry of Defence and the Armed Forces of the Republic of North Macedonia

Preface

Respected readers,

In front of you is the thematic Proceedings, as a collection of papers presented at the 2nd MILCON'19 Conference "Contemporary education based on ADL", organized on November 12th 2019, by the Military Academy "General MihailoApostolski" - Skopje associated member of the University "Goce Delcev" - Shtip, within the RADLI Project (Regional Advance Distributive Learning Initiative), supported by the Kingdom of Norway and implemented by the Jefferson Institute, USA.

The objective of the Conference was to gather educators and trainers from different countries in order to give us the opportunity to increase both knowledge and cooperation within all aspects of advance distributed learning - ADL. Hence, the Proceedings contain **32** papers focused on the contemporary trends in the use of information technology in a pedagogical way, as well as the best practices both from a theoretical point of view, but also from a practical aspect on the topics related to educational programs using blended learning, emerging learning technologies, multiplatform delivery of courseware, motivational and pedagogical learning strategies and other topics related to ADL. This international scientific conference gives us a wonderful opportunity for exchanging experience and knowledge between the scientific workers and the practitioners from North Macedonia, USA, Serbia, Poland, Slovenia, Bosna and Hercegovina and Norway.

The papers published in the Proceedings are written by eminent scholars as well as by members of the security system participating in the educational process of the army, police and other security services from different countries.

Each paper has been reviewed by international experts competent for the field to which the paper is related.

The data and information gained with the empirical research, as well as theoretical thoughts and comparative analyses in the Proceedings will give a significant contribution to the development of the use of ADL in a pedagogical way.

We wish to extend our gratitude to all authors and participants to the Conference, as well as to all those who contributed to, or supported the Conference, especially the Kingdom of Norway and the Jefferson Institute, as well as to the Ministry of Defense and the Armed Forces of the Republic of North Macedoniafor their immense support of the Conference.

Skopje, November 2019

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Table of contents

Video-conferencing distance learning

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Abstract. One of the most popular and reliable distance learning technologies is videoconferencing. Videoconferencing uses audio and video telecommunications to bring people at different sites together when travel is not an option. Videoconferencing is used to bridge the distance gap between various sites, in order to stimulate collaboration, support and enhance student or staff communication and to enable flexible quality learning and accessibility with minimal costs. The aim of this study is to evaluate the potentials of videoconferencing distance learning and to understand student perceptions and their satisfaction with this kind of education. Also, a comparison of students' attitude between videoconferencing distance learning and traditional classroom environment learning is made. The results showed that this form of distance education can be accepted equally good as traditional methods of teaching.

1. Introduction

Distance education has been defined as "a separation in time and/or space between the learner and the instructor. More than a geographic separation of learners and teachers, it is a distance of understanding and perceptions that must be overcome by teachers and learners" [1]. There are many types of distance-education models including online courses and virtual laboratories [2], [3], [4], interactive videoconferencing, videotaped lectures, and audio-taped lectures.
Videoconferencing is a method of communicating between two or more locations in which sound, vision and data signals are conveyed electronically to enable simultaneous interactive communication. Much more personal and effective than audio conferencing, all parties involved can see the facial expressions and body language that are so vital to the way we communicate [5], [12].

Videoconferencing is a well-known facility, used in business and now increasingly in education, for bringing together – synchronously, visually, aurally – parties otherwise separated geographically. Video conferencing has recently become increasingly popular and disperse in the wake of faster and cheaper internet connections and better technologies. Modern standalone video conferencing units provide advanced video and audio quality due to more efficient compression and can function over normal broadband internet connections. Growing processing power and cheaper accessories, such as webcams, have also made it possible to participate in a video conference using dedicated software on a normal personal computer without any expensive special hardware [6], [11], [12].

Video conferencing works by using few different technologies. Some of these technologies are hardware while others are software related. A Video conference can be between two sites, i.e. locations which are connected to each other via the video conference, or the conference can connect multiple locations. Besides the audio and visual transmission of meeting activities, allied videoconferencing technologies can be used to share documents and display information on whiteboards.

Videoconferencing became a popular method with campus-based universities who were previously unable to reach their students effectively in different areas. Where geographical isolation had been a problem, the videoconference promised to bring new opportunities and options. Recent changes in the nature and size of the university population will necessarily create a wider range of particular circumstances and therefore, greater flexibility of provision [7]. Videoconferencing, in so

far as it supports distance education, may be an important factor to consider in alternative patterns of teaching and learning [13].

The current structure of the university, challenges the "Goce Delcev" University to organize and support its education with attention for communication and collaboration between the various campuses. Today this is mainly realized through physical mobility of staff and/or students between different locations. But, the university is progressively supporting initiatives that replace or enhance physical with virtual mobility. Considering the new challenges in higher education and understanding the importance of innovation in education through new educational technologies, the University "Goce Delcev" –Stip is doing permanent efforts to integrate various forms of distance learning with the traditional education.

Figure 1. Locations of the "Goce Delcev" University dispersed units

The purpose of this paper is to describe the current implementation of the videoconferencing system at the university as a case-study and to remark on some non-functional requirements related to the technology and infrastructure and emerging during the process of implementation. The paper also presents students' perspectives of videoconferencing in distance education. these findings resulted from a preliminary evaluation process of the videoconferencing system at the university [8], [9], [10].

2. Technical infrastructure for videoconferencing

The architecture of the videoconferencing system implemented at the 'Goce Delcev' University - Stip is presented in Figure 2. The core of the system is the videoconferencing management system, to which many end-points are connected. It consists of two segments:

  a) software for scheduling and management
  b) hardware components.
The main hardware components in the system are:

  • Multipoint Control Unit (MCU), composed of a mandatory Multipoint controller (Mc) used for call signalling and conference control, and an optional Multipoint Processor (MP) used for switching/mixing media streams, and sometimes real-time transcoding of the received audio/video streams. Although the McU is a separate logical unit, it may be combined into a terminal gateway or gatekeeper. The McU is required in a centralized multipoint conference where each terminal establishes a point to point connection with the McU. The McU determines the capabilities of each terminal and sends each a mixed media stream. In the decentralized

model of multipoint conferencing, an Mc ensures communication compatibility but the media streams are multicast and the mixing are performed at each terminal.

• Gateway, provides data format translation, control signalling translation, audio and video codec translation, call setup and termination functionality on both sides of the network.

• Gatekeeper, provides address translation, admission and access control of endpoints, bandwidth management, and routing of all calls originating or terminating in its zone. Endpoints register themselves at a gatekeeper [6].
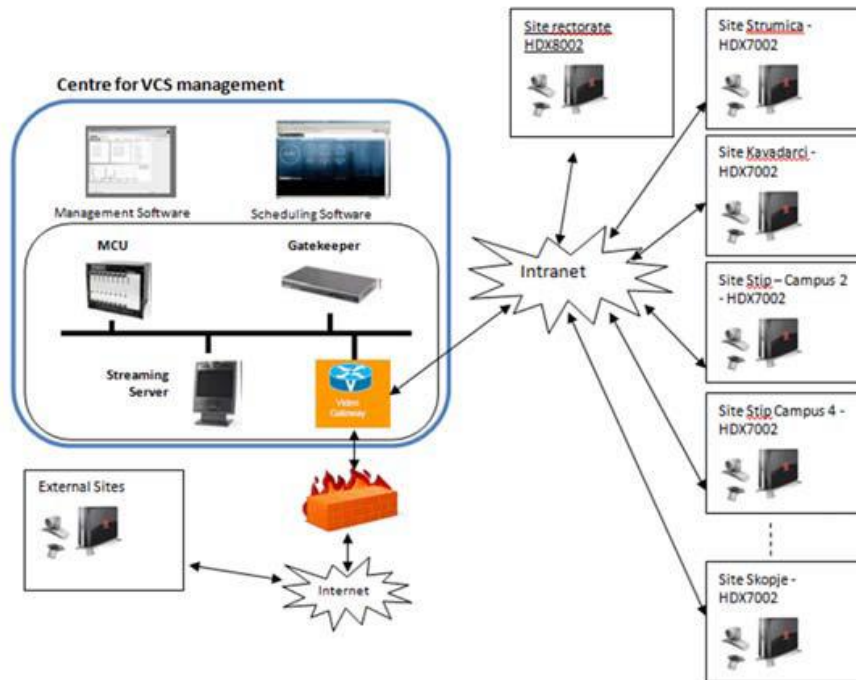

Figure 2. "Goce Delcev" University - Stip, videoconferencing system architecture

3. Research methodology

To evaluate the potentials of videoconferencing education as well as to understand students' perceptions and satisfaction with this kind of distance education compared to the traditional classroom environment, but also to understand the main challenges in this kind of setting, an experimental research was conducted.

The research was conducted for Microcomputer systems (MS) course delivered during the winter semester. This course was delivered to two separate groups of regular students at the Faculty of Computer Science, University "Goce Delcev". The first group counted 60 students and was located in the city of Stip. The lectures for this group were taught face to face in a traditional classroom environment. The second group, counting 42 students was attending the same course in asynchronous sessions via interactive videoconferencing. Students from the second group were enrolled at one of the dispersed campuses of the Faculty of Computer Science, University "Goce Delcev" located in the city of Strumica. The instructor was physically located in the city of Stip.

The distance-education lectures were delivered from a classroom equipped with Polycom HDX 8000 end-point (Figure 3), 36 computers, document camera, interactive whiteboard, two LCD projectors and monitor.

Figure 3. Polycom HDX 8000 end-point, with table microphone, Multiview camera and remote controller

The lecturer had the ability to combine and to switch among three views delivered to the distant classroom:
- video image (e.g., the lecturer);
- computer screen (e.g., PowerPoint presentations); and
- the document camera (e.g., used to show hardcopies of figures and demonstrate working out calculations by hand).

One LCD projector projected the image being transmitted to the distant classroom, and at the monitor, the image of the students in the distant classroom was presented. The distant classroom was equipped with Polycom HDX 8000 end-point, document camera, two LCD projectors and whiteboard. They were projecting picture big enough to be perceived clearly by all students. During transmission, the distant site also had a faculty facilitator present at least for the beginning of each class, and two technicians monitored the entire transmission.

The traditional classroom lectures were delivered in a classroom equipped with a computer, a document camera, two video projectors and one interactive whiteboard. The synchronous distance education environment is summarized in Figure 4.

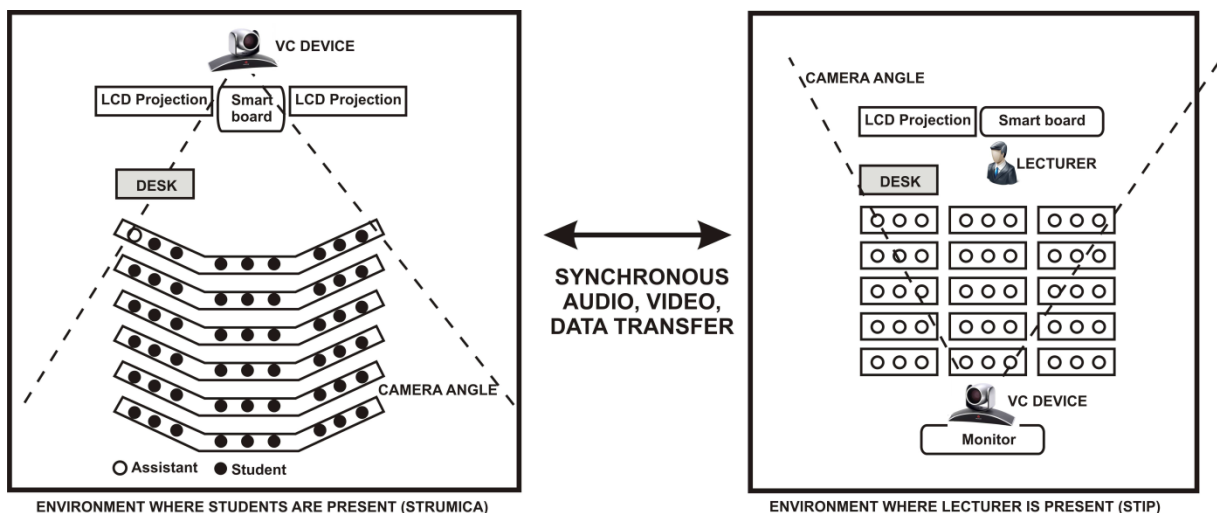**Figure 4.** Synchronous distance education environment

Evaluation at a personal level throughout the course but also at a curricular level can lead to improvements to better suit the needs of the students. Course and instructor evaluations were

administered to each group at the conclusion of the courses. The questions rated students' perceptions of the course and instructor using a 5-point Likert scale anchored at 5 = strongly agree and 1 = strongly disagree. The variances of the results were first analysed using Levene's test for equality of variances. The evaluations were then analysed using independent sample t – tests based on the assumption of the equal variances or unequal variances where appropriate in SPSS v19.0. The final course grades were analysed by the same method.

4. Results

Students' demographic data are presented in Table1. The traditional classroom students had a higher computer science grade point average (GPA) (P = 0.012) at the onset of the 2 courses, and the distance-education students had a higher mean grade in the prerequisite Digital logic (DL) and Computer architecture (CA) courses (P = 0.321 and P = 0.222 respectively) that preceded the MS course. No other significant differences were found.

Table 1. Student demographics

	Traditional classroom settings [mean value]	Videoconferencing distance education settings [mean value]
Age (years)	16.40	17.56
Overall CS GPA (on the scale 5-10)	8.67	7.44
Grade in DL	8.80	8.15
Grade in CA	7.90	8.83

Students who completed the course in the traditional classroom setting had an average final course grade of 8.92 compared to an average final course grade of 8.45 among students in the interactive videoconferencing group (P = 0.031). The response rate for the course and instructor evaluation was 95.24% (40 out of 42 students) for the distance-education students and 95.00% (57 out of 60 students) for the traditional classroom students. The mean evaluation score (Table 2) for the distance-education students was higher than for the live students (4.7 ± 0.6 and 4.4 ± 0.7, respectively; $P < 0.001$).

Table 2. Domain analysis of student responses

	Traditional classroom settings [Mean (SD)]	Videoconferencing distance education settings [Mean (SD)]
General	4.4 (0.7)	4.7 (0.6)
Lecture content	4.4 (0.5)	4.6 (0.8)
Presentation / style	4.6 (0.5)	4.8 (0.4)
Student contact	4.3 (0.8)	4.7 (0.6)

During the videoconferencing lecture, the number of interactions between students, as well as between students and teacher were counted. The number of interactions is presented in Figure 4. As it may be observed from the figure the number of interactions is growing, which means improved synchronous communication.
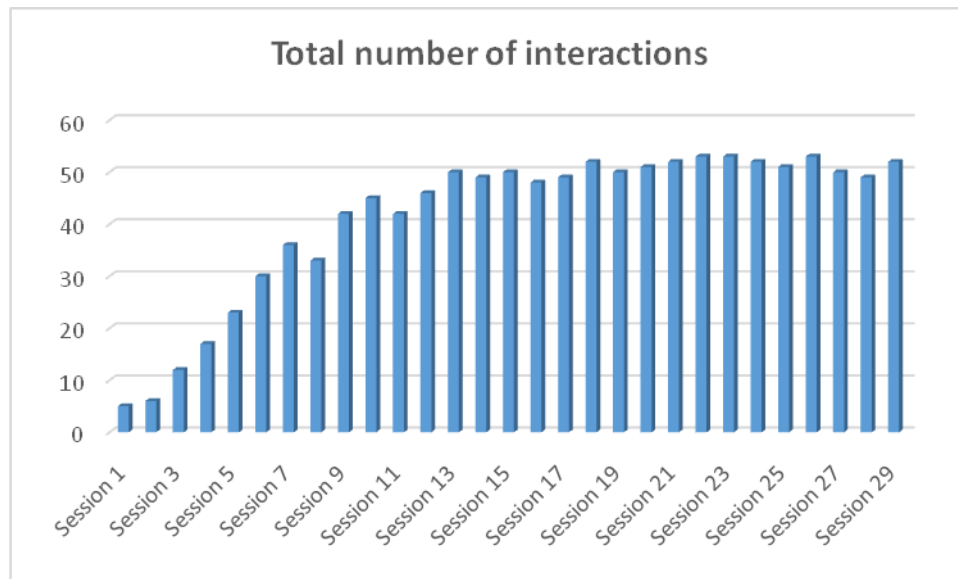
Figure 5. Total number of interactions during the synchronous

5. Conclusion

Video conferencing could lead the way for a dual approach, giving students more responsibility for their learning, working in groups, and doing educational tasks; all of which would benefit conventional teaching, but video conferencing provides an opportunity to implement them. It does not replace the use of print or other methods used in the conceptualization process. It can be used to encourage construction and its true use lies in encouraging dialogue and increasing the scope for dialogue. With the advancement and ease of availability of high speed and cheap internet connections, it is expected that video conferencing will increasingly become popular thus, leading to more interest and use of distance learning [11].

In our paper, students completing the MS course in a traditional classroom setting or by videoconferencing performed well and had a high overall perception of the instructor and courses. The distance education course was rated higher by students than the same course delivered in a standard classroom. Several techniques were used by the instructor to facilitate the instruction via videoconferencing that may have influenced the distant students' perceptions of the course. Based on the results of the interview with the distance students the use of recitations was highly valued by the distant students. Therefore, the incorporation of regularly scheduled recitation-type sessions should be considered when developing a distance-education course. Moreover, encouraging interactivity with discussions between sites and group works were also highly appreciated. Therefore, as a general finding from this research is the need for instructors to understand and acknowledge that using videoconferencing, as a delivery mode will have an impact on teaching styles and methods. Other findings also indicate that whether the course delivery mode is a traditional one or a technology-based mode, effective lecturers establish and maintain a highly interactive classroom community. Also, for efficient delivery of educational content through distance videoconferencing mainly depends on how much teachers are knowledgeable about their subject, about their learners, and about pedagogy.

References
[10] Hunter T.S, Deziel E, Marsh W.A, (2003). Assuring excellence in distance pharmaceutical education. Am J Pharm Educ. 2003;67.
[11] Davcev K., Koceska N., Koceski S., (2019). Teaching Basics of Serial Robot Chains's Kinematics to Computer Science Students. In: International Conference on Information Technology and Development of Education 2019, 110-115.

[12] Bogatinova, K., Koceski, S., & Koceska, N. (2015). Development and evaluation of virtual laboratory for engineering education. A journal for information technology, education development and teaching methods of technical and natural sciences, 5(1), 23-34.

[13] Koceski, S., & Koceska, N. (2015). Development and evaluation of video game for learning capabilities improvement of ADHD children. In: International Conference on Information Technology and Development of Education-ITRO 2015, 63-67

[14] JNT Association (2007). Introduction to Video Conferencing. http://www.ja.net/vtas © The JNT Association

[15] Rachel R, (2009). Video Conferencing in Distance Learning: A New Zealand School's Perspective. Journal of Distance Learning ©Distance Education Association of New Zealand, Vol. 13, pp. 91 – 107

[16] Knipe D & Lee M, (2002). The quality of teaching and learning via videoconferencing. British Journal of Educational Technology, 33(3), 301–311.

[17] Koceski S and Koceska N, (2013) Challenges of videoconferencing distance education - a student perspective. International Journal of Information, Business and Management, 5 (2). pp. 274-281. ISSN 2076-9202

[18] Koceski S and Koceska N, (2012) Videoconferencing systems for synchronous multicampus distance education. In: Video Conference as a Tool for Higher Education. The Tempus Vices Experience. Firenze University Press, pp. 83-96. ISBN 978-88-665-5108-9

[19] Bashovski V, and Koceska N, and Koceski S, (2014) Multicampus distance education based on video-conferencing system. In: International Conference on Information Technology and Development of Education - ITRO 2014, 27 June 2014, Zrenjanin, Republic of Serbia.

[20] Rop, K. V., & Bett, N. K. VIDEO CONFERENCING AND ITS APPLICATION IN DISTANCE LEARNING.

[21] Gillies, D. (2008). Student perspectives on videoconferencing in teacher education at a distance. Distance Education, 29(1), 107-118.

[22] Newman, S. (2008). Videoconferencing and the K12 classroom: What is it? And why do it? In D. Newman, J. Falco, S. Silverman, & P. Barbanell (Eds.), Videoconferencing technology in K-12 instruction, best practices and trends. Hersley-New York: Information Science Reference.