WEB CONFERENCING TO SUPPORT BLENDED LEARNING IN THE SCHOOL CONTEXT: A CASE STUDY IN A SECOND CHANCE SCHOOL

Dafni Meimaridou, Ioannis Magnisalis, Stavros Demetriadis, and Andreas Pombortsis
Aristotle University of Thessaloniki
Greece

Abstract

This study focuses on the use of synchronous web services for designing blended courses with collaborative characteristics in the school context. An implementation in the 2nd Chance School of Thessaloniki is presented as a case study, analyzing the design of a blended learning activity integrating a functionally rich web-conferencing tool and collaborative tasks to increase in-course learning interactions expected to lead to improved learning outcomes. This is an explorative study aiming to provide useful experiences/feedback to teachers. Study results indicate that using web-conferencing increases in-course learning interactions leading to a strong sense of classroom community. Important future issues to investigate are directed towards an integrated Virtual Learning Environment (VLE), incorporating synchronous and asynchronous characteristics, to better design our blended courses supported by web-conferencing facilities.

Introduction

With the advent of broadband networks the integration of synchronous web-conferencing tools in distance and blended learning settings has become a common issue. Several web-conferencing tools are already available for the teacher/learner to support teleconference-based activities. However, these tools may exhibit different functionalities, affordances and technical characteristics and a comparative analysis of these aspects can provide valuable information to the interested user. Recent advances in technology has shifted focus from more passive and individual learning of content to more student-centered and collaborative ways of learning (Conole, 2007). However, the use of networked technologies, such as web-conferencing systems to facilitate collaborative learning, provides no guarantee of improved learning outcomes, prompting for research to investigate the factors that support their effective use (Naidu & Jarvela, 2006; Suthers, 2006).

In this work, we first analyze specific characteristics of some important currently available web conferencing tools and then we present a case study of integrating one of these tools in a blended learning activity in the school context. The purpose of this case study was to analyze a six-week graduate-level course taught entirely from distance via the Internet using the Moodle and a web-conferencing system as a unified e-learning support environment. The emphasis was on exploring through interviews-questionnaires and collaborative tasks embedded in the course the dynamics of sense of collaboration in a classroom community supported by the specific web-conferencing tool. Finally, we discuss limitations and possible future directions of our approach.

Theoretical Background

With the advent of broadband networking, high bandwidth synchronous tools like Web (video) conferencing have started to demonstrate their capacity in supporting complex learning tasks, such as collaborative learning activities (Nielsen & Greenberg, 2011). Web conferencing is typically described as a synchronous communication service used to conduct "live meetings, training or presentations via Internet" (Wikipedia, 2011) through the synchronized transfer of users' audiovisual information. Remotely situated web-conferencing users just need an internet connection, a browser, a web camera and headsets to be engaged in an experience, simulating a face-to-face meeting.

Web-conferencing systems have become a desirable option not only in formal education but also for educational purposes in the business context, as developments are reported to advance web-conferencing tools (Geer, 2005). The importance of web conferencing in improving learning and communication between instructors and students can be analyzed from various perspectives. One significant benefit is reducing the perception of transactional distance. Moore defines transactional distance as "a psychological and communications space to be crossed, a space of potential misunderstanding between the inputs of instructor and those of the learner" (1993, p. 22). Web conferencing systems may serve as a tool for bridging the inherent psychological and communications space in e-learning systems thus improving student satisfaction and possibly learning itself (Harley et al., 2004). Early studies indicate that small groups benefit most when engaged in collaborative learning assisted by videoconferencing and simultaneous teacher support (Knapczyk et al., 2005; Stein et al., 2005). Also, web conferencing can be an effective tool for learning and collaboration, if instructors know how to make the best use of it in their virtual classrooms (Clark, 2005).

However, the majority of the relevant studies have focused on exploring the impact of the web-conference service in the higher levels of education (i.e., tertiary) without providing much evidence of how this service could become useful in the school context, and especially in a context of life-long learning. Some studies attempt to measure the added value of using web-conferencing

systems in settings for teacher professional development (Bonk et al., 2002) but not in student professional development. In Angeli et al., (2003) we observe that there are issues related to the use of web-conferencing systems, such as promoting interactivity, studying the variations in pedagogical activity and task structure, and facilitating the readiness of mentors and learners. Studies in the area (Reushle & Loch, 2008) imply that careful research and investigation are needed before applying web-conferencing systems in learning contexts.

Rovai and Lucking (2000) define classroom community sense as participants having the feeling of belonging, a feeling of caring one to another and to the group as a whole, that they have commitments to each other and to the school, and that they hold shared expectations from the educational environment they exist. Classroom community sense can be thought of as consisting of specific features: (a) the setting or the environment of education; (b) learning is of first priority; and (c) the community is organized according to a schedule, a teacher that supports them and content that accompany their effort towards learning. It is important to point out the distinction between classroom community which is a community of learners and school community which is a workplace community of principal, teachers, and others who are primarily managers of learning. The four constituents of classroom community sense as theorized by Rovai and Lucking (2000) are spirit, trust, interaction, and learning, forming the sense classroom community index (SCCI) and are used in this study as presented in the relevant section of study results below.

Against the above background this study explores the use of web-conferencing tool to support blended learning tasks in the school context. The form of the study is an explorative case study, focusing on collecting useful experiences for the teachers, regarding both the technical and the pedagogical aspects of using web conference in the school context. The motivation for the study is to provide valuable feedback to teachers who will be in better position (a) to reflect on the instructional value of the web-conference service, and (b) integrate the service in a pedagogically more efficient manner in future implementations.

Comparison of Web-conferencing Tools and uiMeet Platform

Why Use Synchronous Tools?

The term synchronous refers to the time dimension of a learning session whether collaborative or not. This means that the time teachers and learners interact is simulating the face-to-face setting of a classroom. Physical distance can be thought of as the obstacle to overcome. Thus the better a computer tool supports most of the functions that teachers and learners can perform inside classroom, the better the ‘feeling’ of the learners is as if being at the same physical location.

The benefits of using web-conferencing systems for educational purposes are important and can be listed as follows (Frost & Sullivan, 2001; Mayrhofer et al., 2004):

- learners receive instant feedback,
- friendliness and social structures between learners are developed,
- web-conferencing supports human functions of everyday life; auditory, vision, writing and asking,
- supports student-student and student-teacher interactions in real time,
- argumentation is supported through opinion exchange via bidirectional audiovisual communication,
- exchange of learning content through file upload and exchange, application sharing and electronic whiteboard,
- sharing of applications and whole desktops,
- exploitation of simulation software for implementation of virtual labs,
- simultaneous video presentation in the form of streaming,
- seminars through web (webinars),
- efficiency gains in terms of time and costs, and
- arching of meetings for future re-use and reference

Comparison of Available Systems

Before adopting platforms and technologies we have investigated the field of web-conferencing systems (Adobe, 2011; Jed, 2011; Mayrhofer et al., 2004; Nilssen, & Greenberg, 2011; Publicare, 2011; Wikipedia, 2011). A lot of them are available in open source format. The findings of our comparative research are illustrated in Table 1. This helped us in deciding the platform solution to adopt.

Besides testing the actual collaborative web-conferencing systems mentioned in the table, we have critically undertaken a comparative analysis through dimensions that are requirements for such a system and are the titles of the columns of Table 1. We briefly explain these requirements:

- Desktop sharing: This feature allows the meeting organizer to show his or her computer screen to the meeting attendees located remotely.

- Polling & voting: Gathering feedback from the attendees in a way that can be counted and even statistically analyzed at a later point in time.

- Rich media streaming**:** Presenting rich-media like video to prospects, customers, or colleagues located remotely.

- Whiteboard**:** A whiteboard operates like a physical whiteboard that one might see in a boardroom or a classroom.

- Multi-point conferencing: View multiple remote attendees on a screen at once.

Table 1: Comparative Analysis of Web-conferencing Solutions

WEB CONFERENCE SYSTEMS	License	Capacity	OS	Desktop sharing	Polling & voting	Rich media streaming	Recording	Whiteboard	Multi-point conferencing	Custom rooms	Extensibility	Language Support
Adobe Acrobat Connect	Proprietary	1-500	✓	✓	✓	✓	-	✓	✓	✓	-	-
BigBlueButton	Open source	1-25	-	✓	✓	✓	-	✓	✓	✓	-	-
Dimdim	Proprietary	20 - 250	-	✓	✓	✓	✓	✓	✓	✓	-	-
Open Meetings	Open source	1-25	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
WebEx	Proprietary	1-100	-	✓	✓	✓	✓	✓	✓	✓	-	-
Elluminate	Proprietary	2 - 125	-	✓	✓	✓	✓	✓	✓	✓	-	-
Citrix GoToMeeting	Proprietary	1-25	-	✓	✓	✓	✓	✓	✓	✓	-	-
Saba Centra	Proprietary	1-300	-	✓	✓	✓	✓	✓	✓	✓	-	-

uiMeet Platform

Our strategic decision was that the solution should be based on technologies/ infrastructures upon software of open source code. The uiMeet platform supports interoperability with other information systems and especially well known open source Learning Management systems like Moodle. It is also important that our solution provides suitable API (application programming interface) for the system evolution and the development of plug-ins. Regarding the user interface (UI) the main objective of our platform is to provide intuitive navigation in the e-learning sessions.

A Case Study: The uiMeet Tool in the School Environment

In the 2nd Second Chance School of Thessaloniki we implemented a blended course using both synchronous and asynchronous tools in a unified Virtual Learning environment (VLE). Our aim was to explore the use of web-conferencing tool in the Second Chance School (SCS), in order to provide useful experiences to teachers regarding the efficiency of the tool in blended learning activities. Students of the SCS are a special group that has the characteristics of adults who have not completed basic education. These characteristics make the education in SCS more special than in any other form of adult education and a challenge for any adult educator.

Purpose and Objectives

The purpose of this study is to investigate the benefits and drawbacks related to the use of web-conferencing tools in order to support blended learning activities in the school context, and especially the SCS. Specifically the present study focuses on the issues of whether web-conferencing tools promote collaboration and sense of classroom community.

Participants

Participants were 24 adult learners (16 males and 8 females) all of whom were students in the 2nd Chance School of Thessaloniki who were observed and interviewed at the beginning and end of the course in order to evaluate aspects of classroom community.

The subject of the course was “Learning to use PowerPoint.” This course is a component of an on-line teaching program and all learners had previously completed at least one online course. Twelve (7 males and 5 females) of the learners were asked to work individually through the whole course activities, while the other 12 formed 3 groups of 4 learners each.

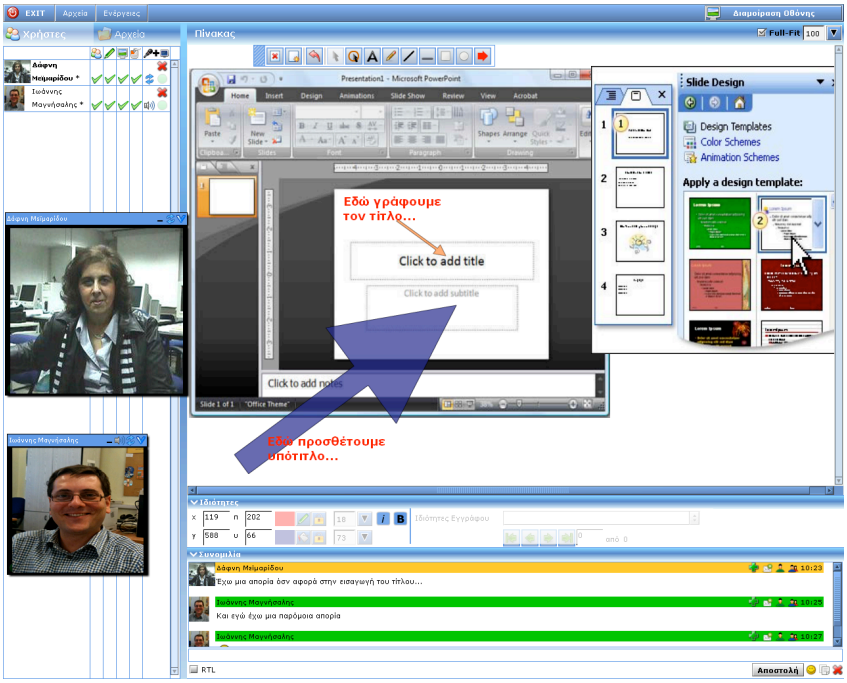
No specific technical requirements for enrolment were involved, besides that the learners should possess a basic knowledge and use of a browser. The majority of

the learners claimed prior experiences with collaboration and most of them had been engaged in collaborative learning activities in a class in 2nd Chance School of Thessaloniki in other face-to-face courses.

Procedure

The course instructors were experienced in teaching courses at a distance, including use of the Moodle Learning Management System. Graded course components, with associated weights, consisted of three weekly quizzes (20%), three project-based exercises (40%), and three presentations and discussions using the integrated uiMeet platform (40%). Exercises were specifically designed so that they could be performed individually and collaboratively. During these exercises, learners were required to follow instructions towards the final solution with the time restriction of one week. During individual or collaborative work, learners had the availability to communicate through uiMeet platform.

Figure 1: A Snapshot from uiMeet Platform in use



After all individual or group learners had submitted their work they were invited to present their work in a common room in uiMeet platform. Therefore, each group (or individual) had to upload the PowerPoint deliverable in the "Whiteboard" section of uiMeet and present it to others through audiovisual and specific annotation tool support (Figure 1). In the last two activities for the whole class, learners were asked: a) to assess-evaluate the whole course in free-text and b) to participate in a uiMeet session were instructors presented selected recordings of presentations that offered ground for discussion.

Finally, learners who were asked to work collaboratively were also engaged in two more activities: a) answer a questionnaire grasping the sense of classroom community, and b) interviews in order to clarify with open questions of the questionnaires.

Results

An observational case study design employing quantitative and qualitative methods was used. Analysis examined: a) course interactions, and b) sense of classroom community. The procedures used for each analysis are described in the following sections.

Course Interactions

Quantitative data were automatically gathered by uiMeet system and the Moodle VLE. We were able to produce statistics of total number of system access, peak hours of system access, male and female comparisons on system usage. What is worth mentioning here is stated as "Learners working collaboratively tend to use more the VLE and more specifically the uiMeet platform." This is quantitatively supported by Table 2. In this table "course interactions" includes every action an individual is performing whether in the VLE or uiMeet platform. Thus, writing in a chat, reading a message, reading an exercise and every action a user performs inside VLE is recorded and then normalized by the factor of the time (time scale measurement was the day) this action lasted, resulting in a metric called "course interactions per user per day." Therefore, we observe that learners working individually present less activity in the VLE (and in uiMeet) than those engaged in group work. In addition, the course interactions increase almost geometrically when uiMeet platform is involved. This can be justified by the fact that learners witnessed during interviews that uiMeet promoted sense of classroom community and successfully substantiated face-to-face meetings.

Table 2: Course Interactions per User per Day

Course interactions	Individual work	Collaborative work
VLE (except uiMeet)	14	45
uiMeet	68	134

Classroom Community Sense

In this aspect of our research we focused on the classroom community feeling that learners working in groups pointed out through online questionnaires and personal interviews.

At first, we formed data from questionnaires of 20 questions, 5 questions attempting to elicit answers for each of the components of spirit, trust, interaction,

and learning, reflecting the sense of classroom community index (SCCI) (Rovai & Lucking, 2000). The SCCI was used as a theoretical basis to measure sense of classroom community. Sample items for each component of SCCI are: (a) spirit — "I feel excited about uiMeet" and "I feel a sense of familiarity with other students when we are in uiMeet"; (b) trust — "I trust my collaborators" and "I feel unsure about others' intentions in this course"; (c) interaction — "I feel that I am encouraged to raise questions" and "I feel that during discussions I can make comments freely"; and (d) learning — "I feel that using uiMeet provides valuable communication skills" and "I feel that this course does not meet my educational needs." A five-point Likert scale of potential responses followed each item with the choices: strongly agree, agree, neutral, disagree, and strongly disagree. These items were reverse-scored where appropriate to ensure the most favorable choice is always assigned a value of 5 and the least favorable choice is assigned a value of 1. Results are presented as a mean of all scores in Table 3.

Table 3: Classroom Community Sense Measures

Sense of Classroom Community Index (SCCI)	Questionnaires
spirit	4.3
trust	3.9
interaction	4.7
learning	3.9
total	4.2

We also interviewed the learners and identified that the main two reasons for having a good sense of classroom community were firstly uiMeet and secondly tasks designed to be collaboratively performed. In Table 4 we see the percentage of the learners that felt this classroom community due to two above design course elements.

Table 4: Classroom Community Supported by uiMeet and Collaborative Task Design

Classroom community sense	Interviews
uiMeet integrations	85%
Collaborative tasks (projects & presentation of projects through uiMeet)	80%

Some sample answers from interviews indicate this fact:

- This (uiMeet) helped to make the atmosphere in the discussions friendly.

- uiMeet facilitated the glue that most of us needed substituting satisfactory face-to face meetings.
- The web-conferencing tool run in respectably high speeds and did leverage the feeling of classroom community.
- I used uiMeet whenever I needed not only to collaborate but also to communicate with my classmate.
- Recordings was an asset that facilitated review of one's mistakes.
- uiMeet has obvious advantages in its use but more frequent support by the teacher was needed.
- We needed more training in uiMeet before using it and more support from the instructor (especially through e-mail)

Discussion and Future Directions

Many contemporary online learning environments like those mentioned in Table 1 afford multimodal collaboration. They offer a wide array of modalities for facilitating interaction and co-construction of knowledge, making these rich environments for studying collaborative learning. Nevertheless, there is a rather limited range of studies in literature about how web-conferencing collaborative learning environments are being used in order to promote learning. For instance, Bower (2010) reports that a search of the ERIC database as of August 26, 2009 returned only 31 references with the term ''web conferencing" in any field and none of the articles had applied a systematic approach to investigate the interactions of web-conferencing participants. Thus, we believe that there is open field for research in the use of web-conferencing tools in education.

The present study provides explorative indicative evidence that uiMeet along with tasks designed to be collaboratively executed promotes a sense of classroom community, meaning that the participants are not left isolated behind a system, but they cooperate frequently and have an intimacy resembling the face-to-face meeting a traditional course has. Results indicate also a tendency to increase in-course learning interactions and sense of classroom community through the use of web conferencing. However, achieving this goal requires that the on-line teacher designs the course in such a way that facilitates interactive discussions through web-conferencing systems in order to avoid feelings of isolation and promote community sense.

This study is clearly explorative in the sense that the ability to generalize findings beyond this study is limited. This is due to the small sample size, the specific

learner characteristics, the particular course content, and of course the design and pedagogy used in this blended course. In addition, the increase of classroom community sense in this study may not be typical for students inexperienced to web-conferencing systems, particularly if they are interacting in an unfamiliar environment, without any opportunity of getting used to it. Moreover, indications in Tables 3 and 4 that classroom community sense may leverage learning should be validated and further investigated in future with more result oriented studies.

Other variables that could also be important in studies of web-conferencing community in VLEs include: teacher communication and writing styles, pedagogy used, teacher characteristics immediacy, cultural communication patterns (Rovai, 2001), level of learner education, level of learner's collaborative skills, course content, and length of course. Our future research purpose is to examine the relationship of these variables to classroom community sense and identify on-line course designs and pedagogy that lead to better learning outcomes in a setting where collaboration and web-conferencing systems play a vital role.

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