University of Hradec Králové

Faculty of Informatics and Management

The Impact of Synchronous and Asynchronous Communication Tools in Distance Education

A case of Ethiopian Higher Academic Institutions

Master's Thesis

Alemat Gebru Gerecheal   **May, 2015**

Univerzita Hradec Králové

Fakulta Informatiky Managementu

Dopad Synchronních a Asynchronních Komunikačních Nástrojů v Distančním Vzdělávání

Případ Etiopských Vysokoškolských Akademických Institucí

Master's Thesis

Alemat Gebru Gerecheal   **May 2015**

Univerzita Hradec Králové

Fakulta Informatiky Managementu

Dopad Synchronních a Asynchronních Komunikačních Nástrojů v Distančním Vzdělávání

Případ Etiopských Vysokoškolských Akademických Institucí

Master's Thesis

Author: Alemat Gebru Gerecheal

Branch of Study: Information Management (IM4)

Advisor: Poulová Petra, Doc. RNDr. Ph.D.

Hradec Králové   **May, 2015**

Declaration:

I, Alemat Gebru Gerecheal, declare that this thesis is my own work and that it has not been presented and will not be presented to any other University in a similar or any other degree award.

In Hradec Králové

Date: ……………………….. Signature………………………………

Acknowledgment

Foremost, I would like to express my sincere gratitude to my advisor Doc. RNDr. Petra Poulová, (Ph.D) for the continuous support of my research, for her patience, motivation and enthusiasm. Her immense knowledge on eLearning and guidance helped me in all the time of research, including creating the test web conferencing environment and writing of this thesis. I could not have imagined having a better advisor and mentor for my thesis.

Secondly I would like to thank System Administrators of University of Hradec Kralove for their support in creating the eLearning and Web Conference Testing Environment.

Finally, I most gratefully acknowledge my parents, family, and friends for all their support throughout the period of this research.

Abstract

Distance education was already a mature field when the Internet became public. Its three sub-fields (correspondence, audio-only, and audio-visual) had each developed as a result of specific technologies but were constrained by the limits of those media. Although the expansion of the Internet blurs the boundaries, distance education technologies are divided into two modes of delivery: *synchronous learning* and *asynchronous learning*.

The purpose of this study is to examine the impact of using synchronous and asynchronous communication as an alternative to face-to-face meetings in hybrid classes in Ethiopian higher education; this paper also documents the experiences of a wide variety of Ethiopian higher academic institutions that have benefited both academically and financially from the implementation of these enabling technologies. In addition, to date, few comprehensive studies have examined influence of infrastructure and culture that challenges the adoption of distance learning technologies in the country.

Distanční vzdělávání, bylo již zralé v době, kdy se internet stal veřejně dostupným. Každé z jeho tří základních dílčích polí (textová korespondence, pouze zvuk, video obsahující zvukovou stopu), byly výsledkem specifických technologií, ale každé z nich bylo vázáno na možnosti a limity jejich jednotlivých oblastí, kde se používaly. Ačkoliv rozšíření internetu stírá jednotlivé hranice, distanční vzdělávací technologie, jsou rozděleny do dvou používaných metod: synchronní vzdělávání a asynchronní vzdělávání.

Cílem této studie je zkoumat dopad využití synchronní a asynchronní komunikace, jako alternativu k face-to-face setkáním v hybridních třídách v etiopské oblasti vyššího vzdělávání; Tento dokument také zachycuje širokou škálu zkušeností z etiopských institutů vyššího vzdělávání, které díky zavedení těchto technologií, získaly mnohé výhody jak po akademické stránce, tak po stránce finanční. Kromě toho, v současné době, bylo provedeno několik komplexních studií, které zkoumaly vliv na infrastrukturu a kulturu země, kde mimo jiné zároveň vyzvaly k zavedení distančních vzdělávacích technologií v zemi.

Acronyms:

LMS: Learning Management System

WCS: Web Conferencing System

SALT: Synchronous and Asynchronous Learning Tools

CMS: Content Management System

VC: Video Conferencing

PCI: Plasma Channeled Instruction

Keywords: Synchronous and Asynchronous Communication tools, Online Learning, Web Conferencing System, Learning Management System, Hybrid classes.

Table of Contents

1. Introduction and background

Ethiopia is a federal democratic state located in the eastern part of Africa. Ethiopia's economy is largely based on agriculture, which accounts for 46.6% of the gross domestic product (GDP) and 85% of total employment. Over the past decade, Ethiopia has attained high economic growth, averaging 10.7 percent per year. According to the World Bank report, in 2012 Ethiopia was the 12th fastest growing economy in the World. If the country continues its historically impressive growth performance, it could potentially reach middle income status by 2025.

Education is the key to the country's fast economic growth; at this time there are a number of public and private universities and colleges exist in Ethiopia. These universities and colleges are the main resources for establishing sustainable development in the country by searching for, cultivate, preserve, and transmit knowledge.

Following the 1994 education and training policy reforms, the ministry of education (MOE, 1994) of the Federal Democratic Republic of Ethiopia (FDRE) has made a number of paradigm shifts with respect to the teaching and learning practices that encompassed the introduction of student-centered learning (active learning approaches), teachers training, ICT [such as television, radio, internet, videos, films etc.] integration in education, so as to improve the flexibility, accessibility and quality of education.

1.1. ICT in Ethiopian Higher Academic Institutions

In a baseline survey conducted by the Ministry of Education, it emerged that most universities and institutions of higher learning in Ethiopia have computers. However, these computers are few and, therefore, shared at a student-computer ratio of 10:1 in most cases. The study also showed that despite the presence of computers, most of the institutions lack a network infrastructure and have limited connectivity. The lecturers are yet to adopt ICT as a teaching tool, and only a small number of students use computers and the Internet as a learning resource.

One of the key roles that ICT has played in the higher education sector is that of distance learning through the Internet. In Ethiopia, however, most of the nation's universities have indicated they are not involved in electronic distance education (EDE) initiatives; in fact, only 15% of private universities have indicated that they use EDE.

However, there has been some movement from some universities. The University of Addis Ababa, for instance, has an ICT development office charged with the sole responsibility of implementing ICT initiatives.

These include developing systems and infrastructure for use by students, lecturers, and the administration. The university is also collaborating with the Indira Gandhi National Open University on electronic distance education.

At the school level, the co-ordination seems to be centralized at the Ministry of Education through the Regional Education Bureau. However, at the university and college level, it appears most activities are carried out and co-ordinate by the universities themselves.

Other players in government include the Ministry of Finance and Economic Planning, the Ministry of Capacity Building, the Ministry of Defense, and the Ministry of ICT.

1.2. Current ICT Initiatives and Projects

WoredaNet Initiative

This is a major e-government initiative that connects all 600 of Ethiopia's local councils (woredas) to 11 regional capitals through Internet telephone and video-conferencing. .) Half the links are by cable, and half by satellite, The initiative also provides connectivity to the SchoolNet, eHealth, and the soon-to-be launched AgriNet. WoredaNet is implemented by the Ethiopia Telecommunication Agency with funding from the World Bank and the African Development Bank throug
h the Ministry of Capacity Building.

SchoolNet Ethiopia

The joint initiative by the Ministry of Education and UNDP is probably the most visible project in the country with a total of 181 schools equipped with a minimum of 15 networked computers per lab all connected to the Internet. An additional 15 schools were to be equipped with computers and a printer by the end of February 2007. There are new programmes around this initiative in the planning stages, including creating an extranet that will connect the schools.

1.3. Distance Learning

The Ministry of Education has initiated distance learning in initiative using video-conferencing with the Indira Gandhi National Open University in India. The project has started accepting students, mostly teachers, and offering master's degrees in economics, marketing, and business administration. The project is in collaboration with the University of Addis Ababa, Alemaya University, and St Mary's College.

1.4. Implementing ICT in Education:

What Helps and What Hinders? Unlike many African countries where educationalists are still grappling with policy issues and trying to formulate strategies for adoption of ICT within their education sector, Ethiopia has done well in developing a detailed strategy and an accompanying implementation plan all with action plans and timelines.

However, chalk and talk is still the predominant method of delivering instructions across the country. Even though some higher educational institutions such as Addis Ababa University, Jimma University, Mekelle University, Bahirdar University and Gondar University are increasingly employing synchronous and asynchronous internet-based technologies in their educational settings, adoption of distance education technologies is still very much in its infancy.

Learners have begun demanding ubiquitous, on-demand and quality e-learning opportunities with enough support services in recent years. To meet these demands, there is need for developing "affordable, efficient, easily accessible, open, flexible, well-designed, learner-centered, distributed, and facilitated learning environments". With rapid growth in web technology, it becomes more possible to fulfill these demands. Thus, the research has been done on web-conferencing in fully online courses, and on hybrid classes which are a combination of face-to-face meetings and online instruction.

Considering the fact that Ethiopia is a third world country with low technology and it faces many challenges in the provision of services, this research would also like to find out and identify key constraints in seeking to implement and develop online learning strategies and practices, and also to suggest some measures to be taken to improve the adoption and integration of synchronous and asynchronous learning technologies in distance education. Based on the findings and evidences provided by respondents , it is difficult to draw overarching generalizations about the practices of using synchronous and asynchronous online learning tools and their impacts in Ethiopian higher academic institutions. Nevertheless, three main conclusions can be drawn:

1. There is a wide variety of different practices of using synchronous and asynchronous communication tools for online learning (distance education) in Ethiopia;

2. Usage of synchronous and asynchronous communication tools for distance education is still very much in its infancy across most of the country's higher education institutions

3. There is much enthusiasm amongst respondents for developing the potential of integrating synchronous and asynchronous communication tools in their institutions.

2. Literature Review

2.1. What is Distance Education?

Distance education or distance learning is a mode of delivering education and instruction, often on an individual basis, to students who are not physically present in a traditional setting such as a classroom. Distance learning provides "access to learning when the source of information and the learners are separated by time and distance, or both.

A number of other terms (distributed learning, e-learning, online learning, etc.) are used roughly synonymously with distance education. However distance is the oldest and mostly commonly used term globally.

2.2. Types of Online Learning Approaches

There are three types of eLearning approaches:

- *Enhancing approach:* The IT is used to support, facilitate and enhance the face to face (f2f) learning by using web-based technology. This approach should reduce a maximum 24% of f2f meetings.

- *Blended approach:* It mixes traditional and online learning; consequently, substantial portion of content is delivered online. Typically this approach can reduce 25 to 75% of f2f meetings.

- *Online approach:* It uses the virtual learning, which can be realized without any need to f2f meeting, however, it could has some f2f meeting, e.g. for exams.

2.3. Hybrid or Blended Courses

"Hybrid" or "Blended" are names commonly used to describe courses in which some traditional face-to-face "seat time" has been replaced by online learning activities. The purpose of a hybrid course is to take advantage of the best features of both face-to-face and online learning. A hybrid course is designed to integrate face-to-face and online activities so that they reinforce, complement, and elaborate one another, instead of treating the online component as an add-on or duplicate of what is taught in the classroom. (uwm.edu)

The definition of hybrid or blended continues to be a much debated topic, as does the use of the term hybrid or blended itself. Although many definitions of hybrid and blended learning exist, there is a convergence upon the three key points identified above: (1) Web-based learning activities are introduced to complement face-to-face work; (2) "seat time" is reduced, though not eliminated altogether; (3) the Web-based and face-to-face components of the course are designed to interact pedagogically to take advantage of the best features of each. This Web site uses the term "hybrid" throughout for historical reasons specific to our campus; we intend our usage, however, to include the alternative nomenclatures "blended" or "mixed mode."

How do hybrid courses differ from Web enhanced and online courses?

While Web enhanced courses may have a course Website or some instructional activities online, these supplement but do not replace face-to-face coursework. Students continue to meet in the classroom for the standard number of scheduled hours for that course.

An online or distance education course is conducted entirely and exclusively via the course management system assessable from the Internet. The online format is the primary method to deliver the course materials. Communication and interaction occur online between faculty and students. All assessment of student work is conducted online.

Although most institutions recognize a continuum from Web enhanced to hybrid to fully online courses, there is no broadly accepted taxonomy or cutoff points for these three course formats. As a general rule of thumb, courses in which fewer than 20% of the learning activities occur online are more likely to be labeled Web enhanced than hybrid. At

the other end of the continuum, many institutions — for obvious logistical reasons — require that a course advertised as "online" in fact include *no* face-to-face component, and that 100% of learning activities be Web based. However, even here there are a few institutions in which a program identified as online may include an initial face-to-face orientation session, so the distinction between hybrid and fully online can blur on this end of the continuum as well.

Is there a recognized standard for the structure and schedule of hybrid courses?
No, the schedule and structure of hybrid courses can significantly vary from one class to another. This underscores the pedagogical flexibility characteristic of the hybrid model. The instructor of a hybrid course typically determines what instructional activities should be online or face-to-face depending on the learning goals, course objectives, content, and available resources. Similarly, the timetable for face-to-face versus online work can be organized in quite different ways that may reflect not only pedagogical criteria but also the particular circumstances of the instructor and students.

Here are a few examples of hybrid courses that illustrate different structures for the deployment of face-to-face and online learning activities:

- The instructor lectures and facilitates class discussion in the face-to-face classes, students complete online assignments based on these classroom activities, then these online assignments are posted to asynchronous discussion forums for online discussion;
- An instructor places lectures online using voiceover PowerPoint or streaming media for students to review, then subsequently in class students use these preliminary online materials to engage in face-to-face small group activities and discussions;
- Students prepare small group projects online, post them to discussion forums for debate and revision, then present them in the face-to-face class for final discussion and assessment.

By the same token, hybrid schedules can be quite diverse:

- A typical practice is for an instructor to meet with the class face-to-face for a couple of weeks, then go online for a week;
- Alternatively, the first few weeks of the course may be face-to-face preparation, followed by an extended period (such as a month or more) of online work;
- or a night class that would ordinarily meet face-to-face for three hours once a week reduces each class meeting by 45 minutes and requires the students to complete assignments online in lieu of maintaining the full three hours of face-to-face class time.

2.4. Distance Education Technologies

Although the expansion of the Internet blurs the boundaries, distance education technologies are divided into two modes of delivery: *synchronous learning* and *asynchronous learning*.

In synchronous learning, all participants are "present" at the same time. In this regard, it resembles traditional classroom teaching methods despite the participants being located remotely. It requires a timetable to be organized. Web conferencing, videoconferencing, educational television, instructional television are examples of synchronous technology, as are direct-broadcast satellite (DBS), internet radio, live streaming, telephone, and web-based VoIP.

In general Synchronous Learning: Means that all students and instructor are logged on at the same time and communicate directly and virtually with each other. Synchronous eLearning events include live web-casts, chat rooms, application sharing, and whiteboard sessions

In asynchronous learning, participants access course materials flexibly on their own schedules. Students are not required to be together at the same time. Mail correspondence, which is the oldest form of distance education, is an asynchronous delivery technology, as are message board forums, e-mail, video and audio recordings, print materials, voicemail, and fax. In this model of learning, the communication between participants does not occur simultaneously. "Learners can thus take courses at own pace. Courseware is normally available 24 h per day, 7 days per week". Examples of this model includes, taking a self-paced course, discussion group. Sometimes it is called "distributed learning" and it receives more attention because of its lower cost of development, reusable components and convenience to the learner.

Learning Management Systems such as Blackboard, Moodle, Sakai and eContent, and Web conferencing Systems such as BigBlueButton, BigBlueButton, Lync and Adobe Connect help to facilitate meetings in distance learning courses and usually contain additional interaction tools such as text chat, polls, hand raising, emoticons etc. These tools also

support asynchronous participation by students being able to listen to recordings of synchronous sessions. Immersive environments have also been used to enhance participant presence in distance education courses.

The two methods can be combined. Many courses offered by Addis Ababa University (AAU), Jimma University, Ethiopian Civil Service University College and increasing number of campus based institutions use periodic sessions of residential or day teaching to supplement the sessions delivered at a distance. This type of mixed distance and campus based education has recently come to called "blended learning" or less often "hybrid learning". Some universities uses a blend of technologies and a blend of learning modalities (face-to-face, distance, and hybrid) all under the rubric of "distance learning.

2.5. The Need for Synchronous and Asynchronous Interaction

While current research shows that online learning can be as effective as a traditional classroom, it is believed that adding synchronous interaction on its own or in a blended environment provides significant advantages.

For many educational institutions, the majority of distance courses use asynchronous tools, possibly in conjunction with synchronous text chat or streaming video. With asynchronous distance education programs, students often experience a feeling of isolation. Throughout their program, students work primarily on their own, having little contact with other students and instructors. For many, this isolation can be a serious detriment to learning. Studies indicate that interactions between students and instructors as well as student-to-student interaction greatly enhance distance education by improving student attitudes and motivation, increasing completion of coursework, enabling better performance on tests, and facilitating greater retention. Moreover, increased interaction provides a sense of community for students.

Research in distance learning continues to emphasize the importance of interaction for effective learning and teaching. Historically, technologies that increase interaction have been expensive, difficult to use, and not often utilized. With the advances of technology and the ubiquitous nature of the Internet, distance learning is changing. It is now easy and cost-effective to incorporate interactive instruction using a new model of distributed learning that combines asynchronous online learning with online synchronous solutions.

Synchronous collaboration software, such as virtual classrooms, allows for real-time interaction with students and instructors. A model that combines both asynchronous and synchronous learning to bridge students, instructors, and educational content in vibrant online learning communities is the ideal solution. The desired outcome of using these synchronous communication tools is to add value of real-time interaction rather than just static content.

Synchronous interaction has many benefits to students and instructors, including the following:

- Provides immediate instructor and student feedback
- Replicates the physical classroom model
- Reduces the feeling of isolation
- Provides a forum where students can collaborate at any time
- Fosters a sense of community with the learners
- Motivates students and helps them structure their time
- Increases students☐ technical aptitude

In all levels of education, the trend for distance learning programs is to provide a blended approach, which combines synchronous and asynchronous experiences in an attempt to leverage the benefits of both modalities.

2.5.1. Academic benefits of using synchronous communication learning tools

In his article, "Reconnecting the Classroom: E-learning Pedagogy in US Public High Schools," Georgetown University☐s David Huffaker discusses the impact of Internet-based eLearning, including active engagement, social learning, continuous feedback, and real-world applications. Huffaker says that eLearning applications can be personalized for the individual learner☐s needs, provide communication tools that foster collaborative work, and offer anywhere/anytime transfer of information. He advocates that we "lose the „E☐ in eLearning" to make it the norm, redefining how education is designed and bringing students and teachers closer together using the technology that manifests in society.

According to Graeme Wilson in "The Impacts of Synchronous Activities Upon Online Learners," the virtual classroom provides a number of beneficial impacts. These include the sense of community developed by teachers and students, the ability to share and collaborate with peers, improved communication and immediacy of response, a positive influence on

students□ self-esteem and self-confidence, and increased motivation. In addition, Wilson found that the synchronous classroom was a great equalizer for students of all abilities, removing some of the prejudices students had experienced in a face-to-face classroom and allowing students to move at their preferred pace.

The academic benefits of synchronous online learning include:
- Creating effective distance learning
- Extending the physical classroom
- Building learning communities
- Enhancing professional development
- Leveraging limited teaching resources
- Facilitating faculty, staff, and administrative communication and collaboration
- Enhancing infrastructure support

1. Creating Effective Distance Learning

Live eLearning enables academic institutions to deliver real-time, instructor-led classes to students, regardless of their geographical location and with all the advantages of traditional face-to-face classrooms. Online technology addresses multiple learning styles and levels the playing field for those not previously successful in a traditional learning environment, from special needs to gifted students, increasing self-esteem and motivation. It can also easily be integrated with asynchronous learning or management content systems.

2. Extending the Physical Classroom

Live eLearning and web collaboration technology can also be used in conjunction with onsite activities in the traditional classroom environment. This enabling technology can connect online and onsite students, enable instructors to present engaging content onsite and remotely, leverage teachers between physical schools, record content for students who miss a class or need help preparing for exams, and bring in remote lecturers and experts.

3. Building Learning Communities

Nothing enhances learning better than peer-based discussions and mentoring. With live eLearning and web collaboration technology, students can collaborate on projects, provide peer mentoring, and create online communities to discuss a variety of topics. Some schools have even used the technology for extra-curricular activities and groups. At the same time, educators can connect with peers, share content, generate discussion, and more.

4. Enhancing Professional Development

The way to prepare students to complete in a global economy is to first prepare our educators. With synchronous eLearning technology, academic institutions can offer cost-effective opportunities for instructor collaboration and professional development, helping to recruit and retain qualified instructors. Remote experts can address staff to keep them up-to-date on new technologies, policies, strategies, and teaching methodologies. Instructors can use their time more effectively by attending sessions without traveling and even play back recorded sessions at their convenience.

5. Leveraging Limited Teaching Resources

Live eLearning technology enables academic institutions to teach across geographical boundaries. For example, if there are too few students to justify a class at a single campus, the technology can be used to broadcast the class to remote students at other campuses, schools, or around the world.

6. Facilitating Communication and Collaboration

According to the 2006 Horizon Report, collaboration between The New Media Consortium and the EDUCAUSE Learning Initiative, social computing is the application of computer technology to facilitate collaboration and working in groups. The report goes on to explain

that dynamic knowledge creation and social computing tools and processes are becoming more widespread and accepted. No longer in their infancy, tools for working collaboratively at a distance are easier to use and more commonly available. As the tools have matured, the practice of online communication and collaboration has increased as well.

Web collaboration technology provides an enhanced meeting environment with voice over the Internet that eliminates long-distance and teleconferencing charges and reduces travel costs. With the proliferation of multi-campus institutions with satellite campuses, rising travel costs, and tight budgets, the advantages of virtual live meeting technology become greater. Many institutions are using web conferencing for executive council and committee meetings.

7. Enhancing Infrastructure Support

Academic institutions can use synchronous learning technology in many other ways, including internal training, research, help desk support, and online library resources. Many schools use live eLearning or recorded tutorials to provide remote training for software applications and learning/content management systems, policies and procedures, best practices, and more. The technology can even be used as part of new student orientation and for parent/teacher meetings.

7.1. Training

Many schools and other academic organizations use live eLearning to provide remote training for software applications and learning/content management systems, policies and procedures, best practices, and more. The technology can even be used as part of new student orientation. All the advantages of saving travel cost and time through remote, virtual meetings are realized with synchronous online training.

7.2. Research

Universities and graduate programs can use synchronous learning for sharing research drafts and papers within multi-campus institutions and between other institutions, bringing

in subject matter experts. Sharing computer applications, electronic manuals, technical material, and more with associates is a significant benefit to researchers, making remote meetings more effective than mere telephone or video conferencing.

7.3. IT Helpdesk

As software releases are rolled out, IT helpdesk personnel can train new users remotely, taking over their desktop, and showing them how to do something rather than just telling them. In addition, the helpdesk staff can create recorded sessions to provide a resource library or an audit trail as they make desktop configuration changes.

7.4. eLibrary

The virtual library reference desk is another valuable use of synchronous online learning technology. Library staff can conduct web tours and allow participants to navigate within each URL to experience campus library resources firsthand. Students and faculty can also share the results of eLibrary research with their remote counterparts, facilitating group project work.

2.5.2. Financial benefits of using synchronous communication learning tools

The government of Ethiopia is spending huge amount of money for the purpose of plasma channeled instructions which are broadcasted from India and South Africa. This study suggests some appropriate, affordable and open source web conferencing tools that can replace the plasma channeled instructions in Ethiopia.

While there are a wide variety of benefits associated with using a synchronous online learning solution, there are also significant hard dollar savings and revenue that can be achieved as well, including:

- Return on investment
- Cost savings
- Revenue generation

1. Return on Investment

Today, academic institutions are required to balance educational outcomes with the financial bottom line, including demonstrating a rapid return on their technology investment. Doing more with less has become a way of life for academia as it has in the business world. At the same time, schools are operating in an increasingly competitive environment and global marketplace. Synchronous online learning is a cost-effective solution that provides universal access with lower total cost of ownership and strong ROI.

2. Cost Savings

Live eLearning and web collaboration technology mirrors the interaction of the traditional classroom session or face-to-face meeting, while eliminating the need for expensive teleconferencing and travel. A single teacher can be leveraged to reduce the need for additional hiring, a regularly scheduled conference call can be replaced with an Internet-based meeting, and a remote subject matter expert can address a class online from across the globe without traveling a mile. The possibilities are almost endless.

3. Revenue Generation

Along with reducing costs, increasing revenues also contributes to achieving a rapid return on an institution's investment in synchronous technology. As outlined in earlier examples, synchronous interaction adds significantly to the learning experience, including increasing completion rates, which leads to increased revenue. At the same time, use of the technology can also expand reach, often on an international level, which translates to an increase in enrollments and subsequent revenues. What's more, offering convenient, flexible distance education programs that include opportunities for student-student and student-instructor interaction can provide significant competitive advantage to those institutions trying to attract new and returning students as well as retain existing students.

2.6. Synchronous and Asynchronous Learning Platforms

The test elearning environment created in University of Hradec Kralove for the study purpose was using Moodle and BigBlueButton, however I have also made assessment on some synchronous and asynchronous learning platforms and made comparison to find out who offers what, so as to suggest the appropriate platform for developing countries like Ethiopia.

Learning Management Systems such as Blackboard, Moodle, Sakai and eContent, and Web conferencing Systems such as BigBlueButton, BigBlueButton, Lync, Adobe Connect and others help to facilitate meetings in distance learning courses and usually contain additional interaction tools such as text chat, polls, hand raising, emoticons etc. These tools also support asynchronous participation by students being able to listen to recordings of synchronous sessions. Immersive environments have also been used to enhance participant presence in distance education courses.

2.7. What is web-conferencing system?

Web-conferencing is a system to perform live meetings between two or more participants from different locations over the Internet. The system could be a web-based application in which participants attend the meetings by clicking the website of the meeting room or could be a software required download (Wikipedia). There are assigned web pages to hold meetings in which participants can share audio, video, files and whiteboards. Participants can attend the meeting from their own computers via the internet.

Synchronous online meetings have been called various names in reviews: webinar (one way from the presenter to the audience with limited interaction opportunities), virtual meeting, virtual conference, web conference, e-conferencing, online conferencing, etc. Web-

conferencing system include built-in audio conferencing and video conferencing tools, chat rooms or shared whiteboard, which support real-time collaboration, instant interaction and feedback. Synchronous web meetings with VOIP (Voice over Internet) or advanced video capabilities enable such interactions that resemble closely face-to-face class experiences.

According to the literature, web-conferencing can be either asynchronous or synchronous conferencing based on the tools employed. Asynchronous conferencing allows learners to access learning materials anytime and gives time to learners to response to questions or assignments before posting them to the discussion forum.

On the other hand, synchronous conferencing provides immediate interaction between students and instructors with audio, video and chat features, but limited time flexibility (scheduled meeting times) is still an issue. This study refers specifically to synchronous or live meetings.

2.8. History of Web Conferencing

Picture Phone was the first video conferencing system put into practice by AT&T in the 1960's. As telecommunication technologies developed (Integrated Services Digital Network ISDN, and compressed video data transmission), two-way video technologies for e-conferencing have become applicable.

In the early 1990s in higher education, the audiographic technology included bridged telephone lines and computers with modem, both of which were used for live meetings. This video-conferencing system could only be set up in dedicated classrooms, so both the instructor and students had to come to class. Because of the place and time limitations of the system (phone line bridging and software restrictions), it was not possible to reach all students, thus this technology was abandoned in the second half of the 1990s. In the early 2000's, the Web 2.0, or second generation of web services, took center stage and advanced web-conferencing systems were the results which are available today.

The advanced web-conferencing systems have expanded their capabilities greatly in ten years. Communication attributes have especially been improved. Currently, a web-conferencing system is generally offered as a web service and can be accessed from a web-server without downloading any software. Meeting holder and participants can join the meeting from any computer with internet connection.

Most web-conferencing systems in the market support real-time web-based interaction and collaboration with added tools including private and public text chat, VoIP (Voice over Internet) audio conferencing, video conferencing, shared whiteboard, integrated survey tool, shared application, or desktop. With a microphone and a webcam, participants can share audio and video with each other. Learners can communicate during web meeting via built-in chat room. Hosts and users can share their desktop, files, software and multimedia applications (such as PowerPoint), can work collaboratively on whiteboard with built-in tool sets (drawing, typing, etc.), and can even conduct a survey. Furthermore, new web-conferencing systems such as BigBlueButton allow instructors to pass the control to any participant.

2.9. Review of Researches

Learners have a positive impression of using virtual conferences. Jennings and Bronack (2001) examined the interaction between intern teachers and instructional designers through desktop video-conferencing with chat, whiteboard and document-sharing capabilities. The learners valued the authentic learning environment in which collaboration was supported, even though technical problems interrupted communication and interaction.

Another study on using two-way interactive video-conferencing technology in online classes for a nursing program resulted in the conclusion that using the video-conferencing technology with appropriate pedagogical techniques in the online class improved the learner interaction and engagement. (MacIntosh, 2001).

In their study of integrating synchronous classroom software into an ongoing online program, Little, Passmore and Schullo (2006) examined the way the instructors used the synchronous tool (VOIP) and the students' perceptions about synchronous classroom sessions. They found that the synchronous sessions used in addition to web-based course instruction improved learner satisfaction and learning because of increased interaction.

Grant and Cheon (2007) investigated the effects of synchronous conferencing technology on teaching and learning and the factors for success and failure of synchronous conferencing in hybrid classes in higher education. Active support and convenience are the advantages, and if technical quality improves, synchronous conferencing will be a convenient instructional method in hybrid classes.

Vitaras, Rowe, and Ellis (2008) conducted a study on using a web-conferencing system (Elluminate Live) in a business school to examine the early experiences of students with web-conferencing. The study reported that students felt they were part of a real classroom setting and were engaged with the instructor and their peers.

However, students needed clear instructions on using the technology. Furthermore, the authors mentioned in their study that the instructor was the critical factor in developing

student confidence and successful web-conferencing experiences, thus they concluded that professional development is important for instructors to be comfortable with the technology and integrate it into the curriculum in an appropriate way.

Reushle and Loch (2008) conducted an action research on the trial of web-conferencing system in a university. They observed that web-conferencing promoted student-centered learning and engagement of students and instructors. It is required that the software package should be available for all users and be compatible with different operating systems with minimized hardware and software requirements. Support and professional development are also important elements for successful applications of web-conferencing systems.

"Initial evaluation findings reveal that through web-conferencing, external students feel engaged and connected, which may lead to better student evaluations, higher university ranking and additional government funding" (Loch & Reushle, 2008, p. 566).

Skylar (2009), explored the student performance and perception of a hybrid course, which employed both asynchronous text-based lectures and synchronous web-conferencing. She found that both asynchronous and synchronous online instructions are effective ways of teaching an online course. 75% of the students reported that they would prefer the online class with a synchronous web-conferencing system rather than asynchronous lectures.

Kalk (2009) examined peer interactions in an online course which included asynchronous forums and synchronous web-conferencing in the socio-constructivist framework. It was revealed from the study that the chat room in the web-conferencing system was an effective tool. Learners generated interaction and community.

2.10. The Advantages and Disadvantages of Web-Conferencing

There are many advantages to employing web-conferencing system in higher education to increase student's satisfaction. Web-conferencing system is a remarkable opportunity for online courses within higher education. Faculty and students can make live presentations in addition to asynchronous communication settings through the online class.

Some advantages are:

- It reduces travel time and money expenses.
- It allows exchanging knowledge in real time and accessing the instructor immediately to ask questions and get prompt feedback.
- It provides a suite of tools within one environment.
- The recording opportunity for these systems ensures access to any lecture, presentation or meeting that is over
- It is a cost-efficient technology which is quite affordable
- It promotes student engagement with real-time discussion opportunities.
- Synchronous conferencing generates an associated community with active interaction.
- It is an alternative to interrupted education due to emergency cases. For example, the instructor can hold a web meeting when s/he is not able to come to class or when the university is closed because of bad weather or other emergencies

However, this type of environment requires a set date and time for meeting and this contradicts the promise of "anytime, anywhere" learning that online courses have traditionally promoted. Also, typing is slower than speaking which can be a disadvantage. Messages might be received out of order. Learners sometimes found it difficult to know

when to interrupt to ask questions because they could not always see others preparing to ask questions.

There are, however, some factors which can improve the success of implementing the web-conferencing system. Audio and video qualities are essential for quality meetings. It is crucial to have equipment and alternative ways in the case of overflowing data.

Another factor is that both instructors and students need to be familiar with the technology. To meet this requirement, a basic training at the beginning of the course would be beneficial. In addition, successful instruction with web-conferencing depends on an appropriate pedagogical approach to the use of technology. New approaches to instruction must accompany new technologies, adjusting to the changing teacher's role, motivating learners, and preparing learning materials to fit the synchronous conferencing.

2.11. Web Conferencing Platforms used for Education and collaboration

I have tried to assess some Open Source and commercial web conferencing platforms used for education and collaboration, to check who offers what;

Professional Suites

Premium web conferencing platforms are delivered by Adobe Connect, Saba, and Cisco WebEx. These platforms are browser-based, and participants are able to connect through VoIP on all three. Additionally, these platforms are generally able to host greater amounts of attendees, and their features are highly customizable, whether an organization seeks to focus on collaboration or learning. This customized functionality comes at a premium, and most often the agreement is negotiated based on the needs of the client. If you work in the ICT4D field, the most important factor to consider among web conferencing platforms is the level of bandwidth necessary to run- and these top-level options won't be ideal.

The ideal option for an organization among the three premium platforms depends on an organization's priorities. Saba is built to create a rich online learning experience geared toward professional training and development. Since 2011, Saba has adapted its model by creating apps that are specialized for certain HR functions in the workplace. In the realm of online learning, Saba offers "Learning@Work" for organizations to build capacity among employees through online learning options that integrate virtual classrooms, collaborative goal-setting and tracking, and course selections tailored to the interests and goals of employees. Adobe Connect and Cisco WebEx can serve an organization's web meeting needs, but also offer the option to extend their services to include webinar and event management, as well as features that encourage social learning.

For these 3 platforms, an organization is able to purchase various levels of participant limits and customize platform features based on its needs.

- Cisco WebEx Meetings– $69/mo for 100 participants with annual commitment
- Adobe Connect – Price Negotiated
- Saba Learning@Work – Price Negotiated

Mid-Level Suites

These web conferencing clients are in a battle royale for low prices, simple aesthetic, and competitive functionality. We'll be focusing on Fuze Meeting, Vyew, Yugma, GoToWebinar, and Blackboard Collaborate. I want to first discuss my favorite of the bunch—Fuze Meeting, as it offers just about everything that the premium platforms offer. It allows multiple call–in options, video conferencing, the ability to record and download webinars, mobile device integration, and breakout rooms. GoToWebinar and Yugma both offer similar features at a higher price point, but do not include breakout rooms. Vyew is ideal for web conferencing among a smaller number of participants, and is available at varying price points for a maximum of 15 simultaneous participants. For 5 participants, it offers video conferencing (but not much else) for a mere $9.95/month.

- Fuze Premium– $40/mo for 250 participants with annual commitment
- Yugma – $79.95/mo for 100 participants
- Vyew – $9.95/mo for 5 participants
- GoToWebinar – $79/mo for 100 participants
- Blackboard Collaborate – Price Negotiated

Open-Source Suite

BigBlueButton is an open-source platform geared towards educational institutions. It can be modified to fit the needs of the client, but would require a knowledgeable IT team to do it. It offers the ability to present via video and conference with students, annotate presentations, and has been updated to include the ability to record sessions and view them at any time. It still lacks mobile integration, but continues to be updated, and is highly recommended for organizations that have a good handle on tech and want a cost-effective and easy-to-use option.

- **Big Blue Button – $0 for Unlimited Participants**

Here is table of who offers what;

Webinar platform	Chat/note/whiteboard	Desktop Based	Web Based	VOIP	Tele-phone	Recordable	Video Conferencing	Breakout Rooms	Rich Document Share	Mobile compatible
ADOBE	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
SABA	✔	✔	✔	✔		✔	✔	✔	✔	✔
VYEW	✔		✔	✔			✔	✔	✔	
YUGMA	✔		✔		✔	✔			✔	
FUZE	✔		✔	✔	✔	✔	✔	✔	✔	✔
WEBEX	✔	✔		✔	✔	✔	✔		✔	✔
GOTOMEETING	✔		✔	✔	✔	✔				
ELLUMINATE	✔	✔		✔	✔	✔	✔	✔	✔	
BIGBLUEBUTTON	✔		✔	✔			✔	✔		

Table 1

Advantages of using these web conferencing platforms

1. Application and Desktop Sharing

One of the most important advantages of web conferencing is desktop and application sharing. The ability to present information through PowerPoint Presentations, Excel Spreadsheets, and any number of other applications ensures that your meeting runs smoothly and that everyone is on the same page despite the distance.

2. Increase Productivity

Web conferencing does save travel time, but that's the only way it can save you time. Through web collaboration solutions, companies can give online demos of products and services without wasting time in the planning process. By having a webinar demo or tutorial ready to deploy online, you save all the time that's usually spent on coordinating with clients, employees, and customers.

3. Conduct Students Training Easily

Most people think of the advantages of web conferencing in terms of internal meetings, but you can also utilize it for employee training. Vendors like Blackboard specialize specifically on training and education, making it easier than ever to teach students located in various locations at the same time.

4. Improve student and teacher Relations

Web conferencing tools can even be used to improve students, teacher and customer support relationships, if they are used in companies. Utilizing the advantages of web conferencing solutions can give your support team more ability to take control of a client's computer and fix problems in a more efficient and timely manner.

5. Business Processes are No Longer Constrained by Location

Finally, the biggest web conferencing benefit is that it allows your organization to act without geographical limitations. You can manage and run all the operations of your company through web conferencing and the best webinar tools, and the technology is improving at such a meteoric rate that the distance between employees and team members will soon be a non-issue.

2.12. Video Conferencing Vs Web Conferencing

Both Web conferencing and video conferencing use the Internet to cut the cost of traveling to meetings. With video conferencing, you connect two or more locations by the use of webcams for an interactive meeting. Web conferences or webinars dispense with video, though they sometimes include audio, and are not necessarily interactive.

Equipment

A two-person video conference requires a webcam for each location involved in the meeting and an Internet connection with enough bandwidth for video. For larger groups, or presentations where top video quality is required, it may require a dedicated room designed for video conferencing to let everyone participate. Web conferencing requires everyone involved have access to a computer, and that the computers all have the same conferencing software, such as Live Meeting, WebEX or Lotus Sametime Unyte.

Costs

Web conferencing usually costs less than video conferencing. Not only does it require less equipment, but you can conduct even a large conference or seminar without booking a room, as participants can log in from their computer. There's no need to pay for good lighting or maximum bandwidth. Improvements in technology have made video conferences more competitive. However, if you don't need high-definition video images, the benefits of all participants being able to see each other may be worth the extra costs.

Sight

The great advantage of video conferencing is that participants can make eye contact and watch each other's body language, instead of working with only voice or online messages. This makes it easier for everyone to get involved, instead of focusing their attention elsewhere. If the point of the presentation is to convey important data, the visual element can be a drawback, as participants focus on clothes, body language and other nonessential details instead of key facts.

In the Flesh

Video and Web conferencing both save money and time compared with traveling for a meeting, but meetings are often about more than sharing data. Face-to-face meetings help with networking and bonding and make it easier to motivate employees or partners to work as a team. Some businesses are adopting a hybrid approach to get the best of both worlds: A physical meeting with key speakers video conferencing, or distributing important material online in advance so that meetings are shorter and more productive.

2.13. BigBlueButton Web-conferencing System

BigBlueButton web-conferencing software is a powerful tool which allows live meetings through the web. During meetings, the presenter is able to browse the web with the participants, show his computer screen and designate any attendee as a presenter. Built-in chat, video and audio provide additional interaction opportunities for attendees. These features enhance student engagement and give a new impulse to online education.

BigBlueButton is a user-friendly technology: attendees are not required to download any software or program. They do not need to sign up to have an account either. They can attend the meeting instantly by going to the web address of the meeting room. BigBlueButton has built-in audio and two-way video, which is important to create a learning environment similar to face-to-face classes. BigBlueButton works with a variety of operating systems like Windows, Mac, and Linux. Web browsers like Firefox, Internet Explorer, and Chrome are also supported (BigBlueButton, n.d.).

What can be done with BigBlueButton?

- Audio and video conferencing (two-way video)
- One can share and co-browse web pages, computer screen, documents and whiteboard
- Public and private chat
- Recordings of the meetings
- Pass control to attendees with video and audio
- Add a survey or poll in a meeting
- Secure your meeting room
- Customize the teleconferencing
- Get a clear picture from the drawings on whiteboard with built-in laser pointers and zoom tools

3. Research Purpose and Methodology

The purpose of this study is to assess the status of online learning in Ethiopia and examine the impact of synchronous and asynchronous learning tools in distance education.

Two graduate level hybrid courses including synchronous interactive web meetings and asynchronous discussion forums were also evaluated for the study using blackboard, moodle LMSs and BigBlueButton Web Conferencing System.

The research presented in this study addresses the following questions:

1. What is the status of using synchronous web-conferencing tools in Ethiopian academic institutions?
2. What are the students' and teacher's perceptions of the usage of synchronous and asynchronous learning tools?
3. What are the practices and findings in literacy in using the systems?
4. What are the problems and issues surrounding the use of the systems?
5. How do the findings from this study relate to the previous studies?
6. What are the implications of this study for further research?
7. What advantages has your institution got by using Learning Management System or Web Conferencing System you mentioned in the previous page?
8. What are the problems and issues related to the systems?
9. What are the improvements achieved in regards to the use of the systems throughout the class?

4. Study Method

4.1. Settings of the Study

Creating of eLearning environment using moodle and BigBlueButton

Online Learning environment using a Learning Management System (Moodle) and a web conferencing system (BigBlueButton) was created in University of Hradec Kralove for the study purpose.

Both the learning management system and webcoferencing system were integrated through BigBlueButton's API, so as to enable teacher to create live class sessions as an activity on the Learning management system.

The created eLearning environment enabled both synchronous asynchronous distance learning in real-time virtual classrooms with features including:

- Live video streaming,
- Integrated chat,
- Interactive whiteboards,
- File transfer, chat rooms,
- Presentation of PDF documents and Microsoft Office documents etc.

Moreover, users may enter the conference in one of two roles: viewer or moderator.

As a viewer, a students or professors may join the voice class/conference, share their webcam, raise their hand, and chat with others.

As a moderator, a user may mute/unmute others, eject any user from the session, and make any user the current presenter. The professor or presenter may upload slides and control the presentation.

Another useful feature of the system is that the sessions are recorded online and can be readily accessed for later use.

System Deployment Strategies

Below are details of the deployment environment requirements for the LMS and Web Conferencing applications. It lists the logical components of the application and explains how they communicate with each other.
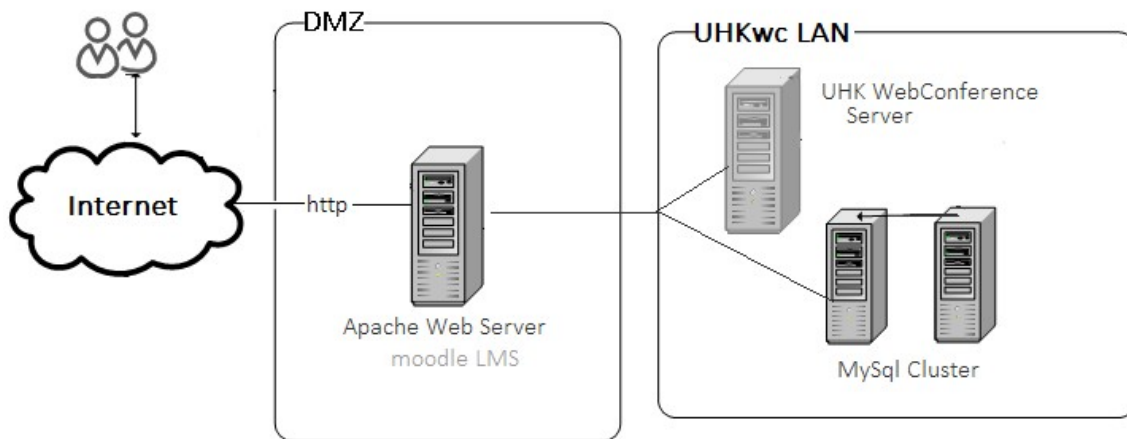
Logical Deployment Diagram

Figure 1-1 Deployment Diagram

Deployment Strategy

Initially, the LMS and Web Conference deployment consists of the following *logical* components:

- **Web Server** – The web server machine runs Apache HTTPD, Moodle. This machine load balances all HTTP requests and forwards them to the Web Conference and MySql Database server cluster.

- **Web Conference Application Server –** The Web Conference Server runs Ubuntu, Red5 flash server, Apache Tomcat, Grails, Active MQ, ImageMagic, swf Tools, FreeSWITCH, RedIS popcorn.js, Open Office and BigBlueButton.

- **Database Server Cluster –** The MySQL database cluster also consists of 2 initial servers, Principal Database server and Mirror Database server which can be scaled horizontally in future when the need arises. In case of failure of the principal server, the mirror database server takes over and starts replying requests. Requests from the Web server and Web Conference Server to the database Servers were also load balanced using Apache Load balancer on the Web server.

Proposed Hardware Infrastructure

The following infrastructure was suggested to meet the high performance and availability requirements of UHK Web Conference and moodle.

1.4.1. Web Server Requirements

- 1x
- Windows Server 2008/7/8
- 4 GB of memory (8 GB is better)
- Xeon E5-2650 CPU or faster

1.4.2. Web Conference Application Server

The requirements are

- 1x
- Ubuntu 10.04 64-bit

- 4 GB of memory (8 GB is better)

- Quad-core 2.6 GHZ CPU (or faster)

- 500G of free disk space (or more) for recordings

1.4.3. MySql Server Requirements

- 2x

- Windows Server 2008/7/8

- 4 GB of memory (8 GB is better)

- Xeon E5-2650 CPU or faster

1.5. Ports

The following ports were opened to the internet (for inbound connections)

Server	Port	Description
Web Server	80	SIP
UHK Web Conference Server	8o, 1935, 9123	HTTP, RTMP, Desktop Sharing

The following ports were also opened within the LAN (for inbound connections)

Server	Port	Description
Database Server	TCP 3306	MySQL

4.2. Courses Created for study purpose

Two courses were created for the study purpose in June 2014. The courses were "*Learn with Moodle*" which was created by (Pascale Colonna, http://mytrainingsite.me/moodle/course/view.php?id=8) and is freely available on moodle.net for download, and the other course is *Using BigBlueButton* which was created by me, the course was basically a guideline of using the web conferencing system and set of discussion forum questionnaires.

The courses were created as a means of gathering feedback from users.

Both courses were administered by me in a hybrid format through the moodle online course management system that is installed in University of Hradec Kralove. These courses were available to guests (respondents of my questionnaires) and were enrolled as student's role.

Users had two options to access the courses: they could access them anytime anywhere (hybrid learning) or, especially for the live class session they could join the live meeting through BigBlueButton online web-conferencing over the Internet.

Besides these meetings, users (enrolled as students of the course) and me (enrolled as teacher of the courses) continued the asynchronous online discussions related to course subjects and a variety of topics and issues through moodle throughout the years. Furthermore, a web portal developed by me using Drupal LMS including video lectures and text-based lectures about course content was provided to the learners.

The structure of both courses was mainly the same. The Web 2.0 social interaction tools within moodle like discussion forum, blog, chat room, and wiki were used to provide communication as the online part of the courses. Blogs, wiki and forums were required tools to use by users. The chat rooms in moodle were not as actively used as the chat function in the BigBlueButton because students have to enter the chat room to see who is in chat, so it was not common to enter chat simultaneously. Blog was used as a diary for the work students had made toward completing their systems' feedback goals to be reviewed by me as instructor. Each user had their own blog which was assigned to their name in the moodle and they were required to write the progress they made into the blog at least three times throughout the semester. Wiki was used for posting cool tools by users students. The

most used and important tool was the discussion forum, which promoted peer-to-peer support. Users played an active role in the forum by asking questions, and responding to the other posts. It was common to see that users were asking for peer review in the forum. The forum included two parts: General Discussion and BigBlueButton. A variety of discussions took place about the problems students faced under the title of General Discussion. They were informing about their perception regarding using the systems and suggesting how important these tools would be to improving the learning experience in Ethiopia, if they were implemented in all academic institutions. BigBlueButton was placed in the forum to collect feedback and suggestions from users with respect to the use of BigBlueButton in the course and was not required. It was a learner-centered environment in which I participated and monitored developments.

I am IT professional with more than 6 years experience in eLearning Systems Development, I myself created the testing Online Learning Environment for this research purpose, and also I am mostly teaching courses about web and eportfolio design, instructional design, and design with Web 2.0 tools. I am highly familiar with the technological tools and their applications in educational settings. I am confident using the technology.

4.3. Web Conferences with BigBlueButton

The live online meetings were conducted by using the BigBlueButton web-conferencing system at the times of face-to-face meetings. This was the first time in which most of the users from Ethiopian higher Educational institutions had ever used BigBlueButton, which was also new at the university. Audio and video-conferencing tools, chat windows, desktop, and application-sharing were some of the tools of the system used during the meetings. Users shared their desktop with attendees, whether they were browsing the web, or sharing power point presentations or videos. Students were active in chat by posting questions and comments. I read these posts aloud. In the chat window, the posts were flowing so quickly, that it was hard to follow. Until the end of the semester, I occasionally made some of the users' presenter during meetings. I developed the way I used the system according to users' feedback. In the beginning of the semester there were some minor technical problems with the system, such as hard disc was full because of the recordings and other technical problems related to system deployment configurations, but I dealt with these problems quickly. I encouraged users in the forum to provide their feedback on using BigBlueButton and made adjustments based on their demands and the problems they experienced. I used to tell them the importance and helpfulness of these systems to our country's quality of education if we start using them.

4.4. **Participants**

There were a total of 87 users participated, the majority of whom were staff and administrators at universities, colleges and public schools; teachers; and graduate assistants in the university.

Respondents to the survey were from more than 30 different Ethiopian educational universities, University of Hradec Kralove and University of Stavanger; see Annex 1 for further details. Of those providing details of their gender, 35% (21) were women and 65% (36) were men. Of those who reported an educational context within which they were working, (77%) were from higher education institutions, (8%) from vocational and technical institutions. Of those who responded to questions about e-synchronous and asynchronous communication tools and blended learning, 42% said they used Learning management system but not web conferencing system and 68% used blended learning approaches. The majority of identifiable respondents to the survey were thus men, working in Ethiopian higher educational institutions that had some experience of using synchronous and asynchronous communication tools.

4.5. Data Collection

The major data source used in this study was online discussion posts. In the discussion forum, I opened up a new discussion under the title of *BigBlueButton* to collect students' feedback about using web-conferencing throughout the year from my respondents of my questionnaires. The data sources consisted of posts from both courses related to the use of BigBlueButton and Moodle in the courses and other outside of the courses made for similar researches. These posts included learners' feedback and suggestions about using BigBlueButton and Moodle. Students mentioned their ideas about advantages of using BigBlueButton and moodle, their demands, the problems and issues related to BigBlueButton and moodle, and the improvements achieved in regards to the use of BigBlueButton throughout the class in the forum.

I requested feedbacks from users regarding the use of BigBlueButton and LMSs, and their impacts on online learning (distance education) and responses were posted in the discussion forum. I asked: "Did you think it got in the way at all, or was it fairly transparent? If you were logged in to BigBlueButton during the class, what did you think about the BigBlueButton experience? Did you find the controls intuitive to use? What are the problems and issues related to the systems? Can you think of anything I could do better to improve the manner in which I was using BigBlueButton in class?" If your institution is using another web conferencing system, what are the differences comparing to BigBlueButton? What advantages has your institution got or do you think would get by implementing Learning Management System or Web Conferencing System?

4.6. Data Analysis

Data analysis for this study focused on users reactions to Learning Management System and web-conferencing technology. The qualitative data (discussion posts) were analyzed by using coding analysis via Nvivo (qualitative analysis software).

For short, to say few words about Nvivo; NVivo enables you to collect, organize and analyze content from interviews, focus group discussions, surveys, audio, social media, videos and WebPages. Researchers, evaluators, policy advisers, social workers, educators, and students are amongst the 1.5 million NVivo users accessing smart, time saving tools to help them deliver quality outcomes. Free video tutorials on how to use Nvivo are on YouTube.

Coding scheme that categorizes the similar reactions was developed in four main themes: advantage, issues, student demands, and the adjustments I made as instructor of the courses. Because the study aimed to analyze the insights of students about using synchronous and asynchronous communication tools, specifically web conferencing system and Learning Management, and the impacts of using these systems for distance education, written reactions made by students throughout the courses were examined to learn how students benefited from thes systems that I used in my own way and to learn what the advantages and issues of the use of web conferencing and Learning Management Systems in these courses were.

During the analysis of the data, I asked,

- What are the educational levels addressed by your e-learning courses, in your institutions?
- What are your suggestions about making elearning more effective in Ethiopia?
- What do you think about the advantages and issues of the use of the BigBlueButton web-conferencing system?
- How efficient was my ways of using the technology?
- How did the developments through the course effect the process?
- What are the problems and issues related to the systems?

- Can you think of anything I could do better to improve the manner in which I was using BigBlueButton in class?

- If your institution is using another web conferencing system, what are the differences comparing to BigBlueButton?

- What advantages has your institution got or do you think would get by implementing Learning Management System or Web Conferencing System?

- Please mentions the constraints, if exists, in seeking to implement and develop e-learning strategies (for both LMS and Web Conferencing systems) and practices, including the lack of infrastructure particularly connectivity, and especially in rural areas, the need for appropriate training and capacity development, a lack of relevant digital content, and the cost of implementation.

5. Study Findings

The following part summarizes information about the impact and status of using synchronous and asynchronous communication tools in Ethiopian higher educational institutions based on the responses to a survey questionnaire circulated to students and teachers and, it also presents the users perceptions of learning management systems and web conferencing system that came up from an analysis of the feedback posted in the discussion forums by the students and teachers.

This finding represents approximately 70% of the respondents, and is likely to reflect those who are already most committed to the use of synchronous and asynchronous online learning tools.

Respondents to the survey were from more than 30 different Ethiopian educational universities and Institutes; see Annex 1 for further details. Of those providing details of their gender, 35% (21) were women and 65% (36) were men. Of those who reported an educational context within which they were working, (77%) were from higher education institutions, (8%) from vocational and technical institutions. Of those who responded to questions about e-synchronous and asynchronous communication tools and blended learning, 42% said they used Learning management system but not web conferencing system and 68% used blended learning approaches. The majority of identifiable respondents to the survey were thus men, working in Ethiopian higher educational institutions who had some experience of using synchronous and asynchronous communication tools.

These respondents provided a wide variety of information about their synchronous and asynchronous online learning tools practices, and it is difficult to draw overarching generalizations based on the evidence provided. Nevertheless, three main conclusions can be drawn:

- There is a wide variety of different practices of using synchronous and asynchronous communication tools for distance(online education) in Ethiopia;

- Usage of synchronous and asynchronous communication tools for distance education is still very much in its infancy across most of the country's higher education institutions

- There is much enthusiasm amongst respondents for developing the potential of integrating synchronous and asynchronous communication tools in their institutions.

Findings from the study showed that synchronous and asynchronous communication technologies are efficient in terms of promoting interaction, composing an online community and engaging students. They brought flexibilities regarding reducing the commute time and monetary expenses which are emphasized by students as a key aspect of the learning management system and web conferencing system.

BigBlueButton was seen as user friendly by users, even though some minor troubleshooting problems interrupted the class especially in the first few meetings. Many students wanted to have records for online meeting sessions and an alert feature in chat. A considerable point from the posts was the adjustments and arrangements made by me to improve the quality of live class (web conferencing) sessions.

When asked about the educational levels addressed by their e-learning courses, respondents listed the following:

- Higher education 53%
- Continuing education 37%
- Vocational 23% (20)
- Secondary school 22% (11)
- Informal/non-formal 22% (11)
- Technical education 21% (10)
- Primary school 10% (4)
- Special educational needs 9% (28)

This reinforces the view that, amongst practitioners who responded to the survey, the majority of uses for e-learning were in the higher educational and vocational fields.

5.1. The value of Synchronous and Asynchronous Communication tools

Unsurprisingly, given that the respondents were drawn specifically from a survey database of those interested in synchronous and asynchronous tools, 68% of respondents remarked that they thought that synchronous and asynchronous tools are, or could be, very valuable for their learning and teaching needs, 6% suggested that they were quite valuable, 17% that they were valuable, and only 11% were unsure or thought it inapplicable.

5.2. How to make using Synchronous and Asynchronous Communication tools more effective

Many different suggestions were received as to things that would make using Synchronous and Asynchronous Communication tools more effective in respondents' institutions. Among the most frequently mentioned were:

- Availability of hardware (particularly computers)
- Faster Internet connectivity/improved bandwidth
- Improved software
- Appropriate policies favoring e-learning
- Provision of technical support for e-learning at a range of scales
- Lower prices for connectivity
- Availability of reliable electricity
- Appropriate content in appropriate languages
- Awareness raising about the value of e-learning
- Improved training for teachers in e-learning at all levels

5.3. Using Synchronous and Asynchronous Communication Tools Practices in Ethiopia

According to my findings, many Open Source systems such as moodle, saki, efront and others are becoming popular in Ethiopia. However, many respondents were unable to say which Learning Management Systems (LMS) and web conferencing system they were using. In response to the questions 'which e-learning management system(s) and we conferencing system do you use', a respondent from Arbaminch University thus commented that '*I don't understand this question, but the system I am using is lunix and windows*☐ whereas others commented that they simply used the Internet or e-mails. The most popular Learning management system was Moodle, mentioned by most of the respondents.

According to respondents, most of Ethiopian higher educational institution never used web based conferencing system like BigBlueButton, instead they are using video conferencing (plasma) which the lectures of the higher studies are being broadcasted from India and South Africa, and due to this the government of Ethiopia is expending huge amount of money each year for this purpose, and respondents suggested that this web conferencing system with the ability of recording live class sessions would save the money and also improve the quality, flexibility and accessibility of learning processes in Ethiopia. . The over-riding conclusion to be drawn from this evidence is that the majority of those claiming to be using elearning is not using an integrated formal synchronous and asynchronous communication tools at all, but are rather using basic digital technologies to enhance their learning, more often than not interpreting elearning simply as accessing information from the Web.

In another question, respondents were specifically asked whether they were involved in online learning content development, and only few (20 individuals) answered in the affirmative; the majority of respondents therefore did not see themselves as being involved in content production for online learning. Interestingly, in a further question, even fewer respondents claimed to be involved in the management of online learning courses.

5.4. Advantages and disadvantages of using synchronous and asynchronous learning platforms for education

Advantages

These technologies gave an alternative option to students in the hybrid class; students could attend the class meetings via Internet instead of commuting the class. Especially students in remote areas saved time and money which are important factors for higher education students who also work full-time.

Numerous contrasting views were expressed as to the advantages of using synchronous and asynchronous communication tools for distance education, including

- Ease of access to information
- Ability to supervise students at a distance
- Safe digital environment for students to submit work
- The potential for interactivity amongst and between learners and teachers
- Combination of both synchronous and asynchronous learning
- Enabling of quality education for increasing numbers of students
- Potential for re-use of content
- Students can learn at their own pace
- Facilitates the management of student records
- Helps motivate students

Most of the respondents appreciated BigBlueButton the alternative web meeting option:

- *I really like BigBlueButton. Using this tool, I like having the option to either come to class or log in on-line. The flexibility works well with my schedule, my life. So, thank you for that. I was just curious as to why didn't use this system to make our courses 100% on-line? or maybe we will in the future. Either way, BigBlueButton is a great tool and as I've stated somewhere in the forum, I would love to see it*

*become more popular with online classes in Ethiopia as it might alleviate some
missed class time for our student athletes.*

Due to working and studying at the same time, higher education students look for online
class opportunities. They prefer flexible courses to make more time and ease their life and
get their degree (Sule Yima Ozdel). From this perspective, BigBlueButton was used in the
hybrid class converted it completely online course by giving web-conferencing opportunity
to students instead of commuting to class. Some students in the class valued the web-
conferencing technology in terms of eliminating commuting time:

In forums regarding BigBlueButton, one said

- *As a downstate resident, I was very pleased with BigBlueButton, especially since I
  did not have to drive to Newark for a 1.5 hour class. The technology not only saved
  me time and money, but it was easy to participate in the class from home.*

In the above forum posts, typically, users express their appreciation of not commuting to
school; saving time, and money; and getting rid of parking problems. I concluded that this
tool is a good extension for distance education by providing qualified synchronous online
communications besides asynchronous communications especially for adult learners with a
busy life. In addition to these advantages, BigBlueButton is a user-friendly technology
which is another advantage of web-conferencing, It is important that user-friendly
technologies ensure students and instructors are easily adapted to technology in the course
settings. BigBlueButton does not require any technical or software knowledge. A few users
of the system reflected on their experiences using BigBlueButton:

- *I found BigBlueButton to be very convenient and user-friendly. I wouldn't consider
  myself very experienced when it comes to new technology; however I was able to
  pick this up quite easily.*
- *Now that the kinks have been worked out with BigBlueButton, I really do enjoy
  attending class in this way. The ease of use is outstanding and allows me to attend*

class without have (sic) to struggle to be there physically. I commend the University
for taking this approach to expand their learning environment.

These Synchronous and Asynchronous communication tools also made students feel more in the class and part of the online community. Reflecting on how the technology provides associated learning community while removing physically attendance to class, a student explained:

One unusually comprehensive response concerning the advantages of such systems was as follows:

- *BigBlueButton is unique, and for me, I don't feel like I'm missing out too much by not being on campus. I do love being on campus, but it is an hour and a half from my home. Really though, with every class, I feel very much a part of the learning while at the same time a part of the group of distance learners.*

Creating online community is an important part of online meeting to improve the quality of communication and interaction between students. The more students know each other the more they work collaboratively. A few students indicated the feeling of connection and working collaboratively in the course:

- *I feel like I have had a chance to meet classmates in a new way. It feels like we are "connected" and somehow working together on discovering stuff.*
  I'm becoming more comfortable with BigBlueButtong. I like how students can help other students with answers or talk to other students during class that aren't necessarily sitting next to them. I do like the face- to-face experience more, but I am glad this is an option.

There were other factors that promoted the sense of being online community. First BigBlueButton has built-in chat which was actively used by the students through web-conferencing. Students were asking questions and discussing different issues. Students in

their responses below reflected that chat promoted communication and collaboration between the students:

- *I don't feel that I'm missing anything by not being in class, since I get to hear or see all of the questions, and I get to ask my own as well. One added benefit is that, through chat, students can carry on side conversations without taking up class time. I think we have created a community feeling, with students helping each other through the problems we have encountered in our portfolios. Sure, we've lost sound or connectivity a few times, but these have been very minor inconveniences. Regardless, having the chat available is great and certainly helps us to be more involved with everyone. Of course, being in Milford makes BigBlueButton an ideal way to learn-I can watch instruction and hear what's going on as it's happening-I really appreciate the experience.*

Current synchronous and asynchronous web conferencing technologies made a new difference by providing communications like face-to-face classes. Especially built-in video makes sophisticated synchronous discussions possible beyond asynchronous online discussions. Students were able to see professor and hear him through video and audio. BigBlueButton has built-in audio and two-way video which was important to simulate face-to-face class experiences and gave various interaction opportunities to attendees. These features enhanced student engagement and collaboration. Some students wrote about how video conferencing in BigBlueButton promotes engagement:

- *I think BigBlueButton is great; it really gives someone the opportunity to participate in class and feel part of the class when they are not in the same room. I am fascinated by how it works. Someone can be sitting in a different part of the world or right down the hall and be part of the class that is going on. I really like the video aspect of BigBlueButton, because it gives the person from the computer a view to the class. So not only do you hear the voice, but you can put a picture with the voice. I am going to come to class next time, but i will use BigBlueButton again. This is great.*

Today when I was on bigbluebutton from home it felt as though I was in class. The video is a huge help in making the experience more real. The only problem I noticed (minor) is that sometimes there is a very small synchronization lag between voice and visual ... on the whole bigbluebutton is very helpful and useful in making you feel that you really participated in class. Not to mention that the professor is so incredible at keeping all the distance learners involved as well!

One unusually comprehensive response concerning the advantages of synchronous and asynchronous communication tools were as follows:

- *It encourages learner centered approach to learning.*
- *No cancellation of classes in case the lecturer is out of the other to attend a conference.*
- *These platforms cater for individual differences e.g., through the collaboration tools, students who are too shy (introverts) to ask questions in class have the opportunity to do so.*
- *Assignments are no longer pushed under the lectures☐ doors. These are safe environments for students to submit their assignments and also get their grades.*
- *Tracking students progress also helps to rectify their problems before it is too late to help them.*
- *Minimizing academic dishonesty is also practiced because there some software such as Turnitin (plagiarism detection software) which can be incorporated in these platforms to detect any work which is not acknowledged by students* (Jima University).

Responses such as this indicate that amongst some respondents, especially from Jima University and Addis Ababa University, there is indeed a very high level of understanding concerning the potential and value of synchronous and asynchronous learning tools.

There also appears, though, to be some variation in views about the value of technical platforms depending on the Institution in which respondents are teaching and studing.

Although the numbers are insufficient to draw any firm conclusions, several respondents from Mekelle University and Gondar University, for example, tended to emphasize the way in which such platforms can support the 'massification' of education, while those from Addis Ababa University and Jima University emphasized motivational factors and the opportunities that they provide for an enhanced learning experience. There are also diverse views about the costs of implementation of these systems. Advocates of Open Source solutions, especially those from Addis Ababa and Jima University tend to suggest that they can '*reduce the cost of current face to face learning*⬜*,* whereas those from other Institutions where costs of electricity and connectivity are high, or institutions are tied into proprietary systems, suggest that such solutions can be much more expensive than traditional modes of teaching.

The benefits of synchronous and asynchronous learning tools are not, though, without disadvantages, and many respondents drew attention to these, typified by the following:

- *These tools have a quite steep learning curve and it needs a fair time investment in face-to-face, hands-on, training to get started, which is not easy to arrange when working on a voluntary base. The saying, "The first online course you do well is the second" is very true. To overcome this starting inertia is very hard because it takes time to really deeply understand the potential of eLearning and see the results, especially when working with a foreign language and being a newbie with PC. Prompt tutoring is crucial* (Bahirdar University)

- *Disadvantages which I have personally identified are that many people are not familiar with most of these platforms and by this I am referring to both lectures and learners and as a result this has been a disincentive, also many students and lectures do not have access to current and latest platforms and many have also found it costly to be able to afford these latest technical platforms* (Arbaminch University)

5.5. Issues with synchronous and asynchronous communication tools

One of the common issues in using these synchronous and asynchronous tools in classes is managing the chat window. It is hard for the instructor to keep up with all the conversation flowing in the chat, while conferencing because the topic of students' posts could be inconsistent with each other and chat was flowing quickly. Sometimes the questions and comments are not related to the conversation that is going on in the chat; thus it is possible that the questions can be missed by the professor. Two students implied about missing questions in the chat during web conferencing:

- *Sometimes it took a while for a few of our questions to get noticed, but I understand it must be challenging to teach and check out chat at the same time. Multiple virtual students can ask questions at the same time. While this is good because there's a lot of what needs to be answered, it also means that some student's questions could move up and off the screen before being answered. It would be fantastic if the questions could be organized by topic somehow, or if there was a way to "raise your hand" and be called on... so there was turn-taking.*

During gathering students perception on using There were some glitches that interrupted the course at the beginning of the semester. A student mentioned about having the technical problems in early weeks:

- *The first few classes have taken class time away trying to get the glitches out, and therefore, class has not been all that productive in that sense.*
  I was in class and had BigBlueButton on - one other small problem that I noticed was that there was a slight synchronization problem between action and sound - could be a slow network problem?

5.6. Infrastructure: the availability of electricity, computers and the Internet

Among the many problems facing those involved in delivering online learning (distance education), the availability of electricity is often mentioned as being of particular importance, especially in new universities. Interestingly, 37% of respondents indicated that they had a regular supply of electricity, and a further 39% said they had irregular mains electricity. Other sources of electricity used by respondents included local hydro-electric power, batteries and solar power; wind power was mentioned by only 2 respondents as a source of electricity. This survey was admittedly undertaken among active users of these systems, but the quite widespread availability of electricity would suggest that other factors may actually be more important in deterring people from developing online learning (distance education) activities than just the supply of electricity.

Respondents were also asked about the availability of computers in their institutions. Again this indicated that access to computers may be higher than is sometimes expected: respondents (20%) indicated that there was more than one computer lab in their institution, and as many as 10 people (6%) claimed that there was one laptop computer available per student or worker. At the other extreme, only 55% of respondents said that there were no enough computers available where they study, and only 28% commented that there was only one computer per class available.

Another aspect of infrastructure that was explored in further detail was the availability of Internet connectivity. As might be expected, this was broadly normally distributed, but as many as 13% of respondents claimed that their connectivity was excellent, and only 27%, respondents from new universities, said that it was poor or non-existent; 60% of respondents said that their connectivity was at least adequate.

In interpreting these figures, it must be remembered that the respondents were drawn from the study survey's, and many of them were from universities, but the findings of these questions specifically targeted at aspects of infrastructural provision suggest that these constraints may not be as significant as is often claimed.

To be sure, availability of computers, electricity and Internet connectivity in Ethiopia are indeed far below those in many other parts of the world, but it would nevertheless seem that much more could be done with the infrastructure that currently exists than is currently the case. Indeed, these findings would seem to contrast with those from the earlier questions asked of respondents about the factors that could enhance online e-learning, which suggested that availability of computers, the Internet and electricity were indeed major constraints.

Perhaps these 'hard' technological elements are the most visible aspects of e-learning and therefore the most easy to 'blame', whereas it might actually be the case that the real need is for greater attention to be paid to the 'softer' less tangible dimensions of human capacity development, management structure and policy enhancement. It is also undoubtedly the case that the quality of infrastructure provision varies hugely across the country, but this national variation does not seem to have been the overall determining factor in explaining people's responses.

Thus, people from Addis Ababa University, Jima University, Mekelle University and Bahirdar University accounted for 12% of the total number of respondents, and it might be expected that they would have had markedly higher opinions about the quality of Internet access in their university than did people from elsewhere, especially from new universities. Interestingly, though, only 15% of the total number of responses given as adequate and above in terms of quality of Internet connectivity was actually from Addis Ababa University, thereby suggesting once again that it may well be other factors that are more important in influencing the effective delivery of elearning across Ethiopia.

6. Limitation

One of the limitations of the study is that there were not enough posts about using synchronous and asynchronous communication tools for online learning made by students and teachers from Ethiopian Higher Academic institutions, and this is because most of the respondents have never been used Web Conferencing systems, they only use video conferencing(Plasma). Even though they were able to access the testing web conferencing environment we created in UHK and, in fact which for most of them was the first time to use the web-conferencing technology, they were not able to compare it with other experiences. Users also had slow internet connectivity problem during web conferencing. Furthermore, the study relied on only self-reported posts. A survey to determine students' overall satisfaction level at the end of the semester could have been conducted to support findings from the coding analysis.

7. Recommendation and Conclusion

This snap shot of using synchronous and asynchronous communication tools in distance education in Ethiopia is based on a relatively small sample of Ethiopians who by their very presence on the survey database are already actively interested in e-learning. The sample is thus a privileged one, but it is nevertheless abundantly clear that many different practices of using synchronous and asynchronous learning tools are currently evident across the country, and is helping the Ethiopian higher educational institutions in improving the accessibility, flexibility and quality of learning process, and the real-world examples discussed in this white paper demonstrate that synchronous online learning continues to have a significant impact on academic institutions and provides a wide variety of benefits—both academic and financial.

The findings revealed from this study indicated that students are favorable towards the synchronous and asynchronous learning technologies. Students who work full-time valued the convenience of the technology in terms of eliminating travel time and costs and also being user friendly. Especially, web-conferencing technology enabled students to feel a part of the class. The sense of being online community was promoted with audio, video conferencing, chat and the professor's approach to use the technology. Also, two suggestions raised by students during the semester included recording the meeting sessions and having an alert system in chat for notifying the instructor.

For further research, the effect of synchronous and asynchronous leaning systems on teaching and learning can be analyzed and the factors for successful experiences can be determined. The collaboration between students was mentioned by few students in the study but it needs to look more in-depth on whether this technology promotes peer to peer collaboration. An additional study might be conducted to examine what pedagogical methods work best with web-conferencing and promote student engagement.

8. Bibliography

Bentley, K., & Collins, S. (2007). *The evolution of web-conferencing*. Retrieved from http://net.educause.edu/ir/library/pdf/DEC0705.pdf

Hary Har, ICT In Education in Ethiopia http://www.infodev.org/infodev-files/resource/InfodevDocuments_402.pdf

BigBlueButton. Retrieved from http://www.bigbluebutton.org

Forrester, B. D. (2009). Global connections: Web-conferencing tools help educators collaborate anytime, anywhere. International Society for Technology in Education ISTE.
TJ, Thomander, Web conferencing platform from
https://www.techchange.org/2011/08/10/9-web-conferencing-platforms-for-education-and-collaboration-2-0-what-should-your-organizations-use/

Grant, M. M., & Cheon, J. (2007). The value of using synchronous conferencing for instruction and students. *Journal of Interactive Online Learning*, 6(3), 211-226.

Jennings, M., & Bronack, S. C. (2001). The use of desktop video conferencing as a medium for collaboration between beginning instructional designers and intern teachers. *International Jl. of Educational Telecommunications*, 7(2), 91-107.

Fraser Sherman, Demand Media Video Conferencing and Web conferencing :
http://smallbusiness.chron.com/video-conferencing-vs-conferencing-45831.html

Kalk, D. (2009). Fostering Peer Support in e-Learning : A Socio-constructivist Approach. In G . Siemens & C . Fulford (Eds.), *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2009* (pp. 1621-1624). Chesapeake , VA: AACE. Retrieved from http://www.editlib.org/p/31694.

Khan, B. H. (2005). Learning features in an open, flexible, and distributed environment. *AACE Journal*, 13(2), 137-153.

Knapczyk, D. R., Frey, T. J., & Wall-Marencik, W. (2005). An evaluation of web-conferencing in online teacher preparation. *Teacher Education and Special Education*, 28(2), 51-61.

Little, B. B., Passmore, D., & Schullo, S. (2006). Using synchronous software in web-based nursing courses. *Computers, Informatics, Nursing*, 24(6), 317-325.

Loch, B., & Reushle, S. (2008). The practice of web-conferencing: Where are we now? *Proceedings ascilite Melbourne 2008*. (pp. 562-571). Melbourne.

Macintosh, J. (2001). Learner concerns and teaching strategies for video-conferencing. *The Journal of Continuing Education in Nursing*, 32(6), 260-265.

National Center for Educational Statistics. (2008). *Distance education at degree-granting postsecondary distance education: 2006 – 07*. Washington, DC: U.S. Department of Education. Retrieved from http://nces.ed.gov/pubs2009/2009044.pdf

Sule Yilmaz Ozden. University of Delaware . Student Perceptions of Web Conferencing in Hybrid Classes from
 http://udel.edu/~shule/new/ActionResearchPaper.pdf

Reushle, S. & Loch, D.B. (2008). Conducting a trial of web-conferencing software: Why , how , and perceptions from the coalface. *Turkish Online Journal of Distance Education-TOJDE*, 9(3), 19-28.

Rowe, S., Ellis, A., & Bao, T. Q. (2006). The evolution of audiographics : A case study of audiographics teaching in a business faculty. *Proceedings of the 23rd annual Ascilite*

conference: Who's learning? Whose technology? (pp. 707-716). The University of Sydney, Australia. Retrieved from

Shi, S., & Morrow, B. V. (2006). E-conferencing for instruction: What works? *Educause Quarterly*, 4. Retrieved from
http://www.educause.edu/EDUCAUSE+Quarterly/EDUCAUSEQuarterlyMagazineVolum/EConferencingforInstructionWha/157428

Skylar, A. A. (2009). A comparison of asynchronous online text-based lectures and synchronous interactive web-conferencing lectures. *Issues in Teacher Education*, 18(2), 69-84.

Stephens, K. K., & Mottet, T. P. (2008). Interactivity in a web conference training context: Effects on trainers and trainees. *Communication Education*, 57(1), 88-104.
The Horizon Report. (2006). Stanford, CA. Retrieved from http://www.nmc.org/pdf/2006_Horizon_Report.pdf

Vitartas, P., Rowe, S., & Ellis, A. (2008). Student' s first experiences with a web-conferencing system – preliminary findings. Retrieved from
http://ausweb.scu.edu.au/aw08/papers/refereed/vitartas/paper.html.

Elluminat (n.d):
http://www.blackboard.com/Platforms/Collaborate/Resources/Whitepapers/Blackboard-Collaborate-White-Paper-Request-Form.aspx?wp=New-Lease-on-Learning-ProEd-white-paper.aspx

Wilkinson, K. L., & Hemby, K. V. (2000). An examination of perceptions of the use of virtual conferences in organizations: The organizational systems research association (OSRA) and the association for business communication (ABC) members speak out. *Information Technology, Learning, and Performance Journal,* 18(2), 13-23.

Wikipedia. (n.d.). *Web-conferencing*. Retrieved from
http://en.wikipedia.org/wiki/Web_conferencing

9. Appendices

Appendix 1 - Academic Institutions Participated on Survey

University or college	Number of Respondents
Addis Ababa University	7
Jima University	3
Bahirdar university	3
Ministry of Communication and Information Technology	5
Mekelle University	4
Gondar University	4
Arbaminch University	2
Alamaya University	3
Hremaya Universiry	1
Dilla University	0
Hawassa University	0
Wollega University	5
Adama University	3
Axum University	2
Ambo University	3
Debre Berhan University	1
Dire Dawa University	2
Hossana University	2
Jijiga University	2
Samara University	1
Soddo University	0
Unity University	2
Abay Health College	0
Addis Ababa Commercial College	1
Addis College	0
Addis Continental Institute of Public Health	1
Admas University College	3
Afro-Canadian College	2
Africa Beza College	2
Africa University College	3
University of Hradec Kralove	13
University of Stavanger	7

Appendix 2 - Coding Scheme for Data Analysis

1. Advantages of synchronous and asynchronous tools

   a. Reducing commute time and monetary expenses

   b. Being user friendly

   c. Creating online community

2. Issues with synchronous and asynchronous tools

   a. Conversational flow/interruptions

   b. Technical problems

3. Student Requests during synchronous and asynchronous tools usage

   a. Recording sessions
   b. Alert feature

4. Adjustments made by me as instructor during web conferencing to improve the experience

Appendix 3 - Coding Examples Based on the Coding Scheme

1. Advantages of Synchronous and Asynchronous Communication Tools

a. Reducing commute time and monetary expenses

I think that BigBlueButton is a wonderful idea. It is good for me because I live in for instance now I am in Ethiopia but I can attend the class in Europe from here. This is totally awesome! I look forward to seeing how easy it is to access and listen to the class discussions on Tuesday.

b. Being user friendly

I found BigBlueButton to be very convenient and user-friendly. I wouldn't consider myself very experienced when it comes to new technology, however I was able to pick this up quite easily.

c. Creating online community

Using BigBlueButton web conferencing system I don't feel that I'm missing anything by not being in class, since I get to hear or see all of the questions, and I get to ask my own as well. One added benefit is that, through chat, students can carry on side conversations without taking up class time. I think we have created a community feeling, with students helping each other through the problems we have encountered in our portfolios. Sure, we've lost sound or connectivity a few times, but these have been very minor inconveniences. And it is due to the internet connection problem we have in our university.

2. Issues rose during usage of Synchronous and Asynchronous learning tools

a. Conversational flow/interruptions

During web conferencing using BigBlueButton, it would be helpful if everyone who was present in class had a microphone so that when they ask a question, we can hear them. Otherwise, it requires the professor to repeat everything a student says.

b. Technical problems rose in using BigBlueButton

I tried using bigbluebutton from work today and have had some problems getting sound to come out. In addition, the internet has kicked me out from time to time, saying there is an error. I'm not sure if it was a problem with my computer or the big blue button web conferencing system.

Student Requests during live class sessions
a. Recording sessions

I just wish that BigBlueButton could be recorded smoothly without any technical delay with the sound recording so that those who can't be there during the lesson both in the classroom and online, can still watch it some other time. This is also useful if we want to review the lesson in another time.

b. Alert feature

Would it be possible in BigBlueButton for a sound to go off when someone posts a question in BigBlueButton? Or maybe have questions color coded? This way an instructor knows a question was asked and the response can be more timely which may add to the discussion at hand.
This may help those who don't have the audio component working and want to be a part of the discussion in 'real time.'

4. Adjustments made by me as instructor to improve the experience during the web conferencing session using BigBlueButton

I spent some time tonight figuring out the audio options in BigBlueButton. It appears that the presenter has 5 virtual microphones to hand out to participants. The next time we try using audio in class, therefore, I need to assign them one of those microphones in order for them to be able to talk out loud in class. When they have one of these microphones, a mic icon appears in the participant bar. To enable their mic, they need to click it. Actually, tonight when I did this, the user had to click the black arrow to pull down the menu and choose Restart A/V Broadcaster. Once this was done, it worked really well.

Univerzita Hradec Králové

Study Programme: Systems Engineering and Informatics

Faculty of Informatics and Management

Form: Full-time

Academic Year: 2014/2015

Branch/comb.: Informační management (im2-p-an)

Document for registration DIPLOMA STUDENT'S THESIS

Submits:	ADDRESS	PERSONAL NUMBER
Gerecheal Alemat Gebru	Mexico Square 0, Addis Ababa	I1300110

TOPIC IN CZECH:

Náraz Synchronních a Asynchronních Komunikačních Nástrojů v Distančním Vzdělávání

THESIS TITLE IN ENGLISH:

The Impact of Synchronous and Asynchronous Communication Tools in Distance Education.

SUPERVISOR:

doc. RNDr. Petra Poulová, Ph.D. - KIKM

RESEARCH PLAN:

Objectives: To examine the impact of synchronous and asynchronous communication tools as an alternative to face-to-face meetings in hybrid classes in Ethiopian higher education.
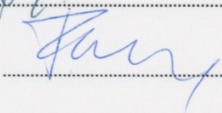
Contents:
Introduction and Background
Literature Review
Objectives and Methodology
Findings
Study limitations
Recommendations and Conclusion
Bibliography

List of recommended literature:

Bentley, K., & Collins, S. (2007). The evolution of web-conferencing. Retrieved from
http://net.educause.edu/ir/library/pdf/DEC0705.pdf
Hary Har, ICT In Education in Ethiopia http://www.infodev.org/infodev-files/resource/InfodevDocuments_402.pdf
BigBlueButton. Retrieved from http://www.bigbluebutton.org
Stephens, K. K., & Mottet, T. P. (2008). Interactivity in a web conference training context: Effects on trainers and trainees.
Communication Education, 57(1), 88-104.
The Horizon Report. (2006). Stanford, CA. Retrieved from http://www.nmc.org/pdf/2006_Horizon_Report.pdf
Shi, S., & Morrow, B. V. (2006). E-conferencing for instruction: What works? Educause Quarterly, 4. Retrieved from
http://www.educause.edu/EDUCAUSE+Quarterly/EDUCAUSEQuarterlyMagazineVolum/EConferencingforInstructionWha/15
7428

Student's signature: ....

Date: 03-03-2015

Supervisor's signature: ....

Date: ....

(c) IS/STAG , Portal - Final thesis details , I1300110 , 28.04.2015 16:16