Social Environment for Arts Education and Research

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Abstract

Current learning environments follow a traditional organization where there is someone in control, the administrator, someone responsible for the content available, the teacher, and then someone to absorb the knowledge transmitted by the professor, the learners. This system denies students the opportunity to share their knowledge and contribute to the learning environment.

Discussion about research results and work done is one of the most beneficial activities to improve art student’s capacities and helps them express their thoughts and ideas. Limitations imposed by the learning environments prevent students from sharing their work, especially to share different multimedia contents such as images, video and audio files.

Personal Learning Environments (PLEs) can overcome most difficulties of current learning environments, however, tools are spread in different platforms and no one uses the same tools, difficulting collaboration and content sharing between individuals.

In this dissertation we explore the opportunity to create a social learning environment in order to overcome most learning management system’s handicaps and to shorten the need for disperse tools in which personal learning environments depends. This will allow students to share different multimedia content with each other, enabling their work to be seen and used by the community and, at the same time, improving critical thinking. Furthermore, the problem of communication between students from remote locations and distance learning is also addressed.

In order to accomplish such environment, Drupal, a Content Management System (CMS), is being used, which will allow us to extend its functionalities in order to be able to enable students to share their work in groups, to contribute with their knowledge allowing them to post content and to communicate in a more convenient way. Different approaches to how to enchant Drupal are studied and their benefits and downsides are compared. To complement Drupal, BigBlueButton, a web conferencing system, is being used to establish communication and assist the distance learning process.

The final platform has been tested by members of NEA (Núcleo de Educação Artística), an organization which takes action in arts education and investigation, and later by students from their courses, Doutoramento em Educação Artística (DEA) and Mindelo Escola Internacional de Arte (M_EIA). As expected, this solution will help to achieve a higher communication between students, allowing easier sharing of contents and awake creativity and critical sense, removing the necessity to use different tools located in different environments, however it will not substitute
tools for content creation and editing. It was also proven that this solution can suit distance education and even the possibility to use it for Massive Online Open Courses (MOOC) is left open.
Resumo

Os ambientes de aprendizagem atuais seguem uma organização tradicional, onde há alguém responsável pelo controlo da plataforma, o administrador, alguém responsável pelos conteúdos disponibilizados, o professor, e alguém para absorver o conhecimento transmitidos pelo professor, os alunos. Este sistema nega aos estudantes a oportunidade de compartilhar os seus conhecimentos e contribuir para o ambiente de aprendizagem.

Discutir os resultados de investigação e trabalhos realizados é uma das atividades mais benéficas para a melhoria das capacidades dos estudantes de artes, bem como os ajuda a expressar melhor os seus pensamentos e ideias. As limitações impostas pelos ambientes de aprendizagem impedem os estudantes de partilhar os seus trabalhos, especialmente no caso de partilha de diferentes conteúdos multimédia, tais como imagens, vídeo e ficheiros de áudio.

Os Ambientes de Aprendizagem Pessoal (PLEs) podem superar a maioria das dificuldades dos ambientes de aprendizagem atuais, no entanto, as ferramentas estão dispersas por diferentes plataformas e ninguém usa as mesmas ferramentas, dificultando a colaboração e partilha de conteúdo entre indivíduos.

Nesta dissertação exploramos a oportunidade de criar um ambiente de aprendizagem social, a fim de superar a maioria das lacunas dos sistemas de gestão de aprendizagem e para reduzir a necessidade de utilizar ferramentas dispersas, das quais os ambientes de aprendizagem pessoais dependem. Isto permitirá aos alunos compartilhar diferentes conteúdos multimédia entre eles, permitindo que o seu trabalho seja visto e usado pela comunidade e, ao mesmo tempo, desenvolver o pensamento crítico. Além disso, o problema de comunicação entre os alunos a partir de locais remotos e de ensino à distância é também abordado aqui.

Para construir este ambiente social, Drupal, um Sistema de Gerenciamento de Conteúdo (CMS), está a ser utilizado, o que nos permitirá estender as suas funcionalidades, de modo a ser capaz de permitir que os alunos compartilhem o seu trabalho em grupos, contribuindo com o seu conhecimento e permitindo-lhes postar conteúdo e comunicar de uma forma mais conveniente. Diferentes abordagens de como estender a implementação do Drupal são estudadas, e os seus benefícios e desvantagens são comparados. Para complementar o Drupal, está a ser utilizado um
sistema de video conferência, BigBlueButton, o qual permite estabelecer comunicações entre alunos e professores, e auxiliar no processo de aprendizagem à distância.

A plataforma final foi testada por membros do NEA (Núcleo de Educação Artística), uma organização que atua na educação e investigação artística, e mais tarde por alunos de seus cursos, Doutoramento em Educação Artística (DEA) e Mindelo Escola Internacional de Arte (M_EIA). Como esperado, esta solução irá ajudar a alcançar uma comunicação mais eficiente entre os alunos, permitindo uma partilha mais fácil de conteúdos, despertando a criatividade e raciocínio crítico dos mesmos, removendo a necessidade de utilizar diferentes ferramentas localizadas em ambientes dispersos. No entanto, esta solução não visa substituir as ferramentas para criação e edição de conteúdo. Também foi provado que esta solução serve de apoio à educação à distância e deixa em aberto a possibilidade de usá-la para Cursos Online Massivos e Abertos (MOOC).
Acknowledgements

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João Daniel Osório Santos
“Simplicity is the ultimate sophistication.”

Leonardo Da Vinci
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## Abbreviations

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<td>NEA</td>
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<td>PLE</td>
<td>Personal Learning Environment</td>
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<td>SLE</td>
<td>Social Learning Environment</td>
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Chapter 1

Introduction

In a constant developing technological world we need to fasten our pace to keep up with technology. Unfortunately, some technologies get outdated and are kept in use. Current learning environments are one of these examples.

NEA (Núcleo de Educação em Artes) is an educational centre that acts in artistic education and research, crossing art discipline with visual culture, contemporaneous art museums and history of art education. Focusing heavily in the practice of investigation, they also promote education through the Doctoral in Arts Education and their collaboration with other schools. Their needs go beyond the current capabilities of conventional web platforms. Current learning environments are too closed, limiting students' abilities to create, communicate and collaborate. Its vertical organization requires one person to be responsible for all available content, as well as monitoring of all students and their actions on the platforms, thereby removing freedom of thought and expression.

If learning environments, like Moodle, allowed students to work collaboratively, sharing knowledge on certain topics, research results and even work they developed, it would be possible to develop critical skills by evaluating the work done by other students. The problem involves restructuring the learning model in which current learning environments are based, and establishing a direct link between education and technology.

The main weaknesses of closed learning environments could be amended with the implementation of an environment where students are allowed to share their knowledge complementarily with teachers, being the shared contents editable by both parts. Moreover, such solution should allow participants to share different multimedia contents such as images, video and even sound samples. Other interesting approach would be to integrate video call in the platform. This way students that could not be present would still be able to attend classes and even share and access content being taught, all in the same place.
Introduction

In order to implement a social learning environment capable of satisfying the necessities expressed previously, Content Management System (CMS) tools such as Drupal shall be used, allowing the content to be separated from the server logic. This way the platform can be built over the existing students and teachers management system created by NEA.

In this dissertation we will start by analysing the different theories of learning, and how can they influence the teaching methods. We will then reflect about the needing’s of art education and how can technology influence it. After, we will review the main e-learning platforms, their roles, and their advantages and disadvantages.

After a reflection about how technology can be used in favour of education and how it can benefit both learners and teachers, we will analyse different approaches to solve our main problems, the need for collaboration tools and the need for feasible communication. The approaches chosen to solve the problem are more detailed in order to help anyone that desires build a similar environment. The results obtained from the use of the social environment built near our users are shown just before conclusions are made.
Chapter 2

Theories of Learning

Learning is the process through which an individual acquires, modifies or reinforces existing knowledge, behaviours, skills or values and different types of information may be involved in this process [1]. This process differs from person to person, since everyone absorbs, processes and retains information differently. Learning theories aim to describe this process.

The three main theories of support to learning (Behaviourism, Cognitivism and Constructivism) are all centred in the perception of how the individual learns.

Driscoll[2] considers learning can be categorized by three epistemological frameworks: objectivism, pragmatism and interpretivism.

By objectivism, the author considers that knowledge is acquired through experiences, and reality is external to the individual, being objective. In pragmatism, knowledge is product of negotiation through experience and thinking, being reality provisional. Lastly, the concept of interpretivism states that knowledge is built based in the internal reality of the individual.

This three epistemologies are strongly related to the three common theories of support to learning. Objectivism is linked to behaviourism, pragmatism is the base for cognitivism and interpretivism is very similar to constructivism.

Siemens[3] defines behaviourism as a “black box” learning activity, in which we are not focused in what happens inside the learner but rather on the external behaviours that can be evaluated. Ertmer[4] adds that learning can be expressed as the process of giving a response associated to a stimulus. That is, when a certain stimulus, for example an equation, is shown the learner will give an answer which may or may not be correct. We can tell that learning was successful when the right answer is given, in other words, learning occurs when a response is associated with a stimulus.

Behaviourism is primarily concerned with making such associations, strengthening them, and maintaining them. It focus on the success of those associations and claims that responses that are reinforced are more likely to persist, leaving alone the information processing and how the
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knowledge is structured in learner’s mind. “The learner is characterized as being reactive to conditions in the environment as opposed to taking an active role in discovering the environment.”[4]

Cognitivism, in the other hand, addresses what is not explored by behaviourism, the reality interior to the learner, equating learning as a process of changes between states of knowledge rather than changes in likelihood of response. It focus on the internal process of assimilating information, and analyses the internal mental structures, addressing how the information is captured, systematized, stored and finally retrieved. [4]

As Snelbecker[5] states “thinking, problem solving, language, concept formation and information processing” began to be emphasized instead of observable behaviour. Previous knowledge has to be taken in account and represents a major role, since new knowledge must fit previously obtained and stored knowledge. This leads to the fact that different individuals have different learning necessities, which influences the way learning must occur.

Furthermore, cognitivism feedback is distinct from behaviourism feedback since there is no reward or penalty associated with it.

Constructivism shares many similarities with cognitivism, both consider learning a mental activity. What separates these two theories is the paper mind represents. Being a tool to conceive the real world for cognitivism, mind is for constructivism a tool that filters inputs from the exterior to construct its own world.[6]

Sharing traces with interpretivism, learners build their personal interpretations of the external world based on their previous experiences and surroundings. Constructivism believes that there are different perspectives to represent external world, knowledge depends in the context it is used and is obtained from diverse fonts depending on the problematic to solve. To summarize, knowledge depends on the individual and is not imposed by the world solely.
2.1 Use of technology in Education

Computer assisted learning is an area where there is still much to discover and filled with unknown places to explore. Even in areas where much has been discovered, there are missing details or parts that need to be fixed as conditions changes. The introduction of new technologies or a broader integration of existing ones are an example of the changes that can create opportunities to explore missing links. The field of computer assisted learning is constantly changing due to innovation, which opens opportunities to revise old findings, to open new investigations and to contest conventional beliefs about the ways in which learning and teaching should follow whether or not a teacher is present.[7]

Technology can be helpful to achieve new discoveries and make great progresses. Just like every field, visual arts can take advantage of technology through new equipment and tools to both create and study art. From all the technology advancements, computers are the most influential and the principle responsible for art education progress.

Walling states that there are two main topics to discuss when it comes to the involvement of computer in art education. The first one is related with art making. Computers can be helpful when it comes to manipulate any kind of media, being able to create, recreate or edit images. Students may take advantage of this resource to produce plans for sculptures, create virtual objects, make wireframes for a website, make a digital scan of a sketch or object and manipulate it, the possibilities are infinite. The author considers that computer-assisted techniques changed the commercial art in a way that they are fundamental for student’s curriculum who want to act in this field. The second topic regards pedagogy. Students may use physical devices such as CD-ROMS or DVDs, or most likely a web browser, to research music, video clips, print different types of resources, and even visit a virtual museum. The author refers that students find this types of support more engaging and motivational to use.[8]

When it comes to teaching however the scenario changes. The role of technology in arts education cannot be analysed without taking into account knowledge, skills, attitudes and values. Bresler[9] defends that technology can bring advantages or disadvantages to learning depending on the capacities of the teacher and students. The author gives a brief example, imagining that a teacher wants to devote part of her class time to the use of technology in music composition, and, because in teacher’s idea, students constructing music using concepts they learnt in a previous experience is a better way to teach music, teacher dedicates personal time designing a solution to do this with available technology. In teacher’s mind the process students follow to create music is important and the results from the process can be discussed and analysed. Watching students work together in groups in order to make decisions about sound aesthetics brings joy to the teacher, which is reinforced by the excitement of students about this creative process. This reinforces teacher’s confidence about this strategy and global teaching. In essence, this teacher comprehends how to structure an experience in music composition, how to give appropriate tasks and to analyse the expected result. He is also talented at leading discussions about the created
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music and how it can be related with other pieces of music studied previously. The overall set of skills teacher possesses, his knowledge about music, how to group students in order for the activity to be well succeeded, about technical aspects of the technology used, and how much time the activity should last, all contribute to a successful learning experience.

In the previous example, making use of technology to assist music learning and teaching was a positive experience, however the lack of knowledge about technical details of music or the technology used, poor skills using computers or even disinterest in group work, could lead to a dramatically negative experience. This proves that learning is aided by knowledge, different skills, and positive attitudes, not by technology in its own. This prevails for any kind of art such as dance, theatre and visual arts, not exclusively for music.[9]
Chapter 3

E-learning environments

E-learning is the use of technology applied to teaching and learning. The ‘E’ may have many meanings, including enterprise, electronic, engaging and easy [10]. E-learning can refer to online education, virtual education, digital education and virtual learning environments (VLEs). E-learning environments are commonly known as VLEs or learning platforms.

VLEs are gradually becoming an indispensable tool for delivering online and flexible learning opportunity. Most institutions already have VLEs in use, however only a few use them with a significant number of students and at the same time others are still deciding which type of VLE best suits their needs. In fact, learning platform is a generic term used to define a set of web-based applications which are integrated together. Some examples of the most common included applications are web pages, which make use of hypertext to present different navigable contents, e-mail to communicate asynchronously between diverse entities, message boards such as forums to discuss a vast range of subjects, videoconference which enables distant communication through a simple video call, shared diaries such as blogs to express personal ideas, wikis to enable collaborative sharing and editing of information, online social areas such as chats to communicate synchronously and assessment tools to provide feedback to work done by students or help with organizing such work.

Additionally e-learning refers to the educational environment where learning resources are obtained recurring to information and communication technologies. This said, communication is an important aspect from these environments, meaning that communication is also an important learning skill. Through the use of computers and computer networks, communication channels are built to provide additional and complementary communication to conventional channels. There are those communication channels that connect learners with each other, with learning contents, with data and the general tools provided.

VLEs are a well-structured information space, integrating a variety of tools to support different functions such as information, communication, collaboration, learning and management,
E-learning environments

similar to physical learning environments which provide courses, resources (books), formal communication (boards), informal communication (refectory) and administration. As the idea of environment expresses, integration and organization is present in learning platforms.[11]

According to their functionalities, learning environments can be categorized in two main groups, learning management systems (LMSs) or content management systems (CMSs).
3.1 Learning Management Systems

LMSs can have many goals, ranging from training and education management to distributing online or blended courses over the internet with features to enable communication. While in colleges and universities the main purpose of this systems is to deliver online courses and to extend courses over the campus space, LMSs can also be used to offer online training, automate employee registration and actions control, and reporting of training events in an enterprise environment. However, in the enterprise side not everything is that simple. There are many offers available, which makes it hard to compare different suppliers.[12]

Whether we are referring to the educational systems or enterprise system, LMS is a software application that automates administration, tracking of actions, and reporting of training events. Although every LMS possesses this functions, there are many other characteristics that they should have, such as:

- Centralization and automation of administration;
- Make use of services orientated to the system;
- Easy and efficient content delivery;
- Assure scalability for training and learning activities;
- Provide portability and standards;
- Customizable and reusable content;

More important, an LMS should integrate with other enterprise application solutions used by HR and accounting, enabling management to measure the impact, effectiveness, and overall cost of training initiatives.

Siemens defends that although LMS are well suited for the activities defined before, they are not a good solution to manage learning. Learning, as an uneven and disordered process, is not meant to be managed. Organizations can do an admirable work delivering courses through LMS, but they will not satisfy every need in informal learning, supporting their users, or managing users’ knowledge. The reason why LMSs are not well suited for the former requisites is because one tool cannot do everything without losing functionality, which evidences that other tools must be integrated to satisfy learning needs.[13]
E-learning environments

3.1.1 LMS Examples

There are many systems available when it comes to learning management, being one of the fastest growing economies, it is not always easy to choose one to use. A list of the most popular LMS can be consulted in Appendix A – Top LMS Software[14]. Two of those LMS are shortly presented here.

3.1.1.1 Moodle

Moodle[15] is an open source learning platform, which means its source code is publicly available for use and modification, built by the Moodle project and supported by a large group of certified partner companies worldwide. You can download the software required to setup your own web server or you can get assistance from Moodle partners in order to have it running.

Has a community result it has been translated to 120 languages and is used by countries all around the world, in order to avoid linguistic limitations to online learning. It is designed to provide both educators, administrators and learners a single system to create personalised learning environments, to be scalable, customisable and secure.

Moodle provides support to both blended learning and online courses. It can be configured by enabling or disabling core features, and can easily integrate tools such as forums, wikis, chats and blogs. However, Moodle is not yet suitable for some pedagogical support that personal or social oriented environments require.
“In future, as the technical infrastructure of Moodle stabilises, further improvements in pedagogical support will be a major direction for Moodle development.”[16]

3.1.1.2 Blackboard

Much like Moodle, Blackboard is a learning management environment oriented to teachers, which let them set up course through a series of menus, Content Areas, Course Tools, Course Options, User Management, Assessment, and Help, and customize the course with different styles of buttons.[17]

Blackboard focus heavily in students’ grading, letting teachers design tests and quizzes straightforward, although it requires a considerable amount of data entry into the application's Web forms. They can, however, archive tests and questions for reuse in later courses, and multiple-choice tests that return instant results to the students is a great feature. It also features a spreadsheet view, which displays all the grades for a class and can be exported to Excel.
E-learning environments

Interaction among students and teachers, is promoted through threaded discussion and chat. In addition to being able to download materials and assignments, students can manage the whole process directly within the Blackboard window, where they can submit work to an instructor through a drop box system, check their grades via the My Grades tab, keep track of class events in the calendar and plan their time with personal to-do lists.[18]

Figure 2 - Blackboard Configuration[54]
3.2 Content Management Systems

A content management system (CMS) is a piece of software that implements a web based system for the delivery of information, in which the content of the information is separated from the appearance of the presented information.

The pages of the information are organized into documents and borders. Each border and document is further divided into an outline, organizing the content, and a template organizing the appearance. Individual content is stored in a native format enabling creators and maintainers to use familiar software tools for creation and maintenance. When retrieving the information, an assembly process gathers the content in accordance with the document’s outline and formats the content in accordance with the document’s template. The data structure allows triggers to be associated with content such that automated maintenance procedure can be implemented based on the activation of the triggers.

CMSs should provide the creators with a framework capable of working on specific pieces of content with tools they are familiar with, maintaining the original format of the content.

Another objective from CMSs is to enable the separation of task in different logical units, in order to ease the maintenance and upgrade of the system. It is also expected that a system like this organizes content in a logical data structure separating it from organizational components and formats. Usually, a web interface is used to create this content and edit it. This interface should allow the users to create static or dynamic web pages where content is displayed.

The typical setup of a network where a content management systems is integrated can be observed in the following figure.[19]
Figure 3 – Setup of a Content Management System[19]
3.2.1 CMS Examples

Just like LMSs, there is a wide variety of CMSs to choose from, ranging from free solutions to subscription or paid solutions. Some examples can be consulted in the following image, and two of them are presented here.

![CMS Examples](image)

Figure 4 - CMS list[58]

3.2.1.1 Drupal

Drupal[20] is an open source content management system that allows users to build websites ranging from simple static pages to e-commerce platforms and complex environments. It is supported by a large community of users that contribute with modules to extend the core functionalities.

Drupal has many tools to organize, structure, find and re-use content, out of the box. Content can be categorized with taxonomy, friendly path URLs created automatically, create custom lists, associated with other content on the site, and create smart defaults for content creators.
E-learning environments

One of the main points Drupal focus in, is making it easy to connect your website to other sites and services across the web, using aggregation, feeds, and search engine connection capabilities. Social networking integration is also widely supported in order to allow engagement with a wider audience. Drupal also offers your site easy ways to interact with external media and file services.

Drupal also focus on social publishing, which can help you create sites and applications to help your users express their opinions and engage with other users. It allows you to have tight control over who can create, view, administer, publish and otherwise interact with content on your site.[21]

Figure 5 - Drupal architecture overview[55]
3.2.1.2 Joomla

Joomla is a content management system that shares most characteristics with Drupal. The main differences rely in the way both can be used and configured. While Drupal requires a longer period to get used to, Joomla is easy to use, and well organized. However, despite being more user friendly, there are more limitations when it comes to get the configuration pretended.

Joomla requires some messing around with code to get pages to look like we pretend, unless we find a template out there that matches what we envision for our website.

Media management is very poor and limited with no ability to move, resize, crop, scale, organize or really do anything with images other than upload and delete through the media manager. This is a big issue for a CMS with this level of activity and popularity, and the fact that this was overlooked may lead us to adopt other CMS solutions.[22]

![Joomla Administration Panel](image)

**Figure 6 - Joomla Administration Panel**[56]
3.3 Personal Learning Environments

Institutions want to control online based learning through the use of their learning management systems and virtual learning environments. We are now slowly realising that we cannot simply reproduce previous learning environments and expect them to work correctly – the classroom and the university personified as software. Recreating the school structure as software leads to creating sterile spaces, lacking freedom of innovation. As a result, students feel the need to escape from this places. Personal Learning Environment (PLE) is a new approach to the use of technology to support learning. PLEs are not a software application, they are a set of social software that suits the needs of their users. Social software is meant to let people communicate, exchange ideas, send data and collaborate, all through a computer network.

“PLEs supports networks of people, content and services that are more adaptable and responsive to changing needs and goals. Social Software adapts to its environment, instead of requiring its environment to adapt to software.” [23]

Social software use is incrementing in the areas of education and online training through the use of applications such as blogs, wikis, tools and applications to create, edit and share different multimedia formats, and tools for sharing diverse personal and interpersonal knowledge including web references, bookmarks, and even e-book collections.

When different applications are in use, and configured individually, standards are critical to ensure that applications can communicate effectively with each. The idea of social software is all about small pieces connected with each other making use of standards and web services to link ideas, knowledge and content.

Besides giving the users the possibility to use content, social software is also about giving the user the power to create content, narrowing the division from producers to consumers. Users become themselves the producers creating and sharing their own content instead of consuming only produced content by others. These possibilities allow new open content, books, multimedia and learning materials to be created by learners themselves.

Social software created an extensive approval of portfolios for learners gathering knowledge from different sources of information, different contexts and fonts of learning, that when put together can provide lifelong learning, capable of expression from different points of view never explored before.

In summary, the idea of a personal learning environment is all about being able to aggregate different tools that provide services that we need and feel comfortable using.

A typical PLE may include tools for different ends, such as: [23]

- Word processor for writing papers and essays;
- E-mail client for asynchronous communication;
E-learning environments

- Scheduling tools to manage daily work;
- Audio tools;
- Photography manipulation tools;
- Video editing tools;
- Weblog client in order to manage blogs;
- A content management system for creation of websites;
- Web browser for multiple purposes;
- Bookmark sharing service;
- Podcast publishing;
- Presentation software;
- Newsreader;
- Social networks to communicate and share experiences;
- Instant messaging and VOIP;
- Search engines;
- FTP client for sharing multimedia files;

The use of so many technologies lets you create a powerful personal environment to create and share your own content. However, there is a big downside. All this software takes a lot to setup correctly, configure and maintain. This is a time consuming task which not every teacher or learner has the potential to accomplish. Furthermore, and despite all standardization, the different software used by different users may restrict content sharing and communication.
3.4 Social Learning Environments

Interaction, communication and engagement are fundamental components of the learning progression. In the traditional school classrooms, teachers structure their coursers in order to include laboratorial activities, group projects and question-and-answer time to captivate students and gather their focus. A social learning environment provides learners the necessary tools to collaborate and interact with teachers and colleagues both inside the classroom space and outside the physical school space. Participants can exchange ideas both synchronously and asynchronously and work together on collaborative projects and group works. A social network learning environment can, in fact, extend the instructional period by allowing extended dialogue between teachers and learners and collaboration beyond school schedule. Furthermore, the availability of a social learning environment can extend productivity and allows users to work at their own schedule, taking advantage of periods of energy boost experienced normally between early and mid-evening [24].

Social interaction is essential for the learning process. Diverse researches highlight that social interaction can enhance the learning activity [25]. Social learning focus on many aspects of learning that are ignored by traditional learning, and the fact that it is closer to the natural learning process it makes it effective. To fulfil what is missing in traditional learning, social interaction web interfaces are being more commonly adopted.

The e-learning community has benefited greatly from the social web concepts and the emerging technologies, especially the semantic web. Learners and educators now live in the world of Facebook, Wikipedia, YouTube and other social services. The notions of social interactions and collective intelligence take a major role. Collective learning is gathering more importance than isolated content, which cannot be edited, updated or discussed freely.[26]

A well-rounded social learning environment typically will include the following elements:

- Identity – each participant has a unique identifier, including username, image and traits;
- Presence – the awareness of sharing the same space; being able to see when others are online;
- Relationships – how the participant is connected with others and common characteristics;
- Goals – the purpose of the group and the individual members is well defined;
- Incentives – there are compelling reasons to take part in conversations and to come back;
- Messaging – asynchronous methods for communicating ideas;
- Conversations – synchronous method for real-time exchange of ideas;
- Groups – the essence of the ‘social’ element, provides a sense of belonging;
- Sharing – contributing photos, links, documents and other virtually tangible items for the good of the group or project;
- Moderation – managing and resolving misunderstandings and fostering participation within the online community.[24]
E-learning environments

In conclusion, a SLE is much more than just a social network. It provides a wide range of social and collaborative functionalities, which can be used whenever and wherever required. Beyond that, SLEs also support the integration of the needed tools in a way that they are easily accessible to users. This may be accomplished through the use of a personal dashboard or more conveniently through an integrated suite of tools within a platform.[27]

3.5 Blended Learning

Blended learning is both simple and complex. At its simplest, blended learning is the thoughtful integration of classroom face-to-face learning experiences with online learning experiences. There is considerable intuitive appeal to the concept of integrating the strengths of synchronous (face-to-face) and asynchronous (text-based Internet) learning activities. At the same time, there is considerable complexity in its implementation with the challenge of virtually limitless design possibilities and applicability to so many contexts.[28] Blended learning can have different meanings and depending in the context it is used it may refer to:

- The combination or mixing of modes of web-based technology (e.g., live virtual classroom, self-paced instruction, collaborative learning, streaming video, audio, and text) to accomplish an educational goal;
- The use of various pedagogical approaches such as constructivism, behaviourism and cognitivism in order to produce and optimal learning outcome, with or without the use of instructional technology;
  - The combination of any instructional technology such as an e-learning platform, with face-to-face instructor-led training;
  - The mix instructional technology with actual job tasks in order to achieve a harmonious effect of learning and working.

The point here is that blended learning has different meanings to different people. In reality, these definitions illustrate the untapped potential of blended learning.

Blended learning solutions are a great way for an organization to initiate into e-learning. Using blended learning benefits the learner, the training staff and even the organization's bottom line, since it allows organizations to gradually move learners from traditional classrooms to e-learning in small steps, allowing time to adapt to changes and accepting them with less resistance. Working in a blended environment allows instructors and instructional designers to develop the skills needed for e-learning in small increments. Training professionals can move small sections online as they develop the needed e-learning skills and the need to have online resources available appears. Another driving factor are the cost and resources invested, many organizations have
E-learning environments

spent a great deal of money developing materials and they are not to throw that investment away. Blended learning allows them to supplement or complement existing courseware rather than having to replace it or render it unusable.[29]
Chapter 4

Problem

Actual learning environments vertical organization is a problem that can be solved giving power to users rather than to technology. Learning management systems give teachers all the power to control students actions but deny learners the freedom to participate in the learning environment proactively. It was proved that collaboration and communication is essential for the learning process, so a solution that allows easier communication and share of content between users will facilitate this process.

Learning management systems are great for managing courses, while content management systems are better suited for managing different types of content. Currently, personal learning environments, are the most common solution in practice. PLEs came as a natural solution. The need to share different types of content, better communication tools, content management, in order to facilitate learning, led students to use external tools to the learning environment provided in their colleges and universities. However, as we have seen in 3.3 not everyone uses the same tools, which creates another problem. Tools are disperse and this affects communication and collaborative work.

In order to satisfy all the learners’ and teacher’s needs, a content management system provided with external tools is being used. This way, a social learning environment can be built, having all the advantages of using a personal learning environment, without the need to use disperse tools, being them aggregated to the platform.

This solution shall include tools to allow communication between learners and teachers, means to share their work with other colleagues and let them create content collaboratively, and a way to allow research work to be easily published and accessed to be shared across different conferences. In this chapter we will explore some solutions in order to provide our Drupal implementation with the right tools to achieve this solution.
4.1 Content Sharing

Sharing content within the platform is one of the most important aspects when it comes to passing knowledge. Instead of creating blocks of text for everything we need other people to know or sending pdf files around, we can share information in different types of media. Users are allowed to share images, that can be annotated, audio files such as podcasts, and even videos uploaded by them or from external sources.

4.1.1 Google Drive Tools

Google has a suite of tools, known as Google Drive, which let users store different types of content and share them with individuals or groups. Furthermore, some content types can be shared collaboratively such as documents with Google Docs, spreadsheets with Google Sheets, slideshows with Google Slides, forms with Google Forms, drawings with Google Drawings and even maps with Google My Maps.[30]

There are some modules available for Drupal[31][32] that use Google API to integrate Google Drive with Drupal, however they do not function as expected due to recent changes to Google Drive API. Despite the efforts made to correct the modules and even implement a new one, reusing some of the existing ones functions, we could not setup Drive in a way convenient for the users, so other approaches were studied.

4.1.2 Using Drupal Modules

Drupal has many modules available to setup an environment to share files, share different multimedia content and even embed media from other websites such as YouTube and Facebook.

One simple trick to share content in a more practical way is to setup groups where users can post different multimedia content that will be promptly available for other every user within the same group.

There are many ways to setup groups. The one chosen relies on an easy module to configure and use. Organic groups[33] allows us to create public or private groups, where content will be shared with every member, and we can also limit content in public groups to be only available to group members.

To achieve simplicity and usability, a single content type is going to be used. Adding optional fields allows users to add content they want without being forced to fill fields that are meaningless depending on the goal of the content.
To embed images all we need are the fields and Image modules that are part of the core. We can also use the media module to get some image styles set, or we can add our own. To create an image style we can go to Drupal » Administration » Configuration » Media » Image Styles and create a new one. We can set for example a maximum height, using scale and setting only the height of the image. There are several other transformations we can apply to images so that they suit the style pretended. Remember to set the folder sites/all/files/styles/style permissions to read write so that images stored there can be loaded by the browser. Besides being able to configure the way images are displayed we can also choose where are files stored, in a public or private folder in our server, and we can also change the default number of images to upload from one to how many we want.

To embed audio there are many possibilities and modules available. We use the AudioField module[34] to handle the audio upload and the MP3 Player module[35] to play files, an audio player used in WordPress blogs. Google MP3 player comes with Drupal by default, but it is currently broken. There are other possibilities being jPlayer[36] one of the most used, however, the most recent version is incompatible with the AudioField module which results in a malfunctioning player. Similar to images, we can change the number of audio files a user can upload per post created.

There are many modules available to upload and embed video. Since our server is limited to 2Mb of upload, it does not make sense to allow users to upload videos, which would take much space from the Drupal server, and 2Mb is not enough for a long video or a higher quality one. So, we chose a simple module, video embed field[37], that does not require additional configuration and allow us to embed videos from youtube, vimeo or even facebook and...
Problem

brightcove. It is possible to extend this module in order to allow users to embed videos from additional sources.

In addition to images, video and audio fields we also added another field in order to allow users to share other content types such as pdfs and documents. In order to create this field we made use of two Drupal modules, Files Entity[38], that allows files to be fieldable, grouped into types and formatted using field formatters, and Multiupload Filefield Widget[39] so that users can select and upload as many files as they want at once. We can configure Files Entity, under Administration » Configuration » Media » File Settings, to support all types of files we want. Just take care with the formats allowed, since some file types such as exe can be used maliciously. In a general idea, file types such as jpeg, gif, txt, doc, pdf, ppt, mp3 and mpeg should be safe and useful for users to share.

4.2 Video Conferencing

Video calls are one of the main tools used to communicate, especially with remote communities.

Although it allows students to share their work and even to assist to classes where they cannot be physically present, video calls can bring some issues, mainly latency because limited bandwidth. This can lead to voice and image desynchronization or to broken communications.

Skype is the main tool used for video conferencing, and although it is suitable for most situations, it is too heavy for distant learning where network bandwidths can be limited and distance introduces some barriers.

4.2.1 Using Skype

Skype[40] is a Microsoft communication tool that lets user send messages, make voice calls, video calls, send files or even share their desktops with other Skype users. It also has more features such as making calls to a mobile phone or sending SMS which can be used with a fee, or even professional solutions, to connect multiple employees and clients, at a monthly cost.

Skype offers a great service, however video calling can be too heavy for some connections and it requires you to download and setup a client and everyone to have an account.
4.2.2 Using Drupal

One solution to solve the limited bandwidth would be to limit the information sent over IP, so that Skype could be used to send only voice packets instead of voice and video at the same time.

So, how would image be sent? Well, Drupal allows user to upload files to the server. Presentations can be uploaded and slides can be presented separately using a slideshow presentation, which is commonly used to display a gallery of images with auto advancing functionality built in.

To assure that every user is in the same slide, synchronization tools need to be used. In order to synchronize information between users, an external server needs to be used. One possibility would be to use a Node.js server, since Drupal has some modules that allow the integration of Node.js. It is also possible to embed JavaScript code in Drupal pages so that calls to the server are allowed.

Independently from the technology used, the server must implement authentication in order to verify that only the presenter can change the slide that is currently being presented, and a service to send "next slide" or "previous slide" instructions to the Drupal side. In the Drupal side, JavaScript must be running in order to refresh the page where the slides are being displayed. In
order to refresh only the area of interest, eliminating unnecessary load of resources, Ajax calls can be used.

4.2.3 Adobe Connect

Adobe Connect[41] allows users to emulate video conferences, sharing presentations, annotating them, using share video and audio. FCCN[42] has an implementation, Colibri[43], available to the Portuguese scientific and academic community, which can be used by University of Porto instructors to create web conferencing sessions.

Colibri has more functionalities than a server side Drupal implementation, eliminating the need to recur to skype or another external tool for video calling.

However, Adobe Connect has some costs, so it is not suitable for every school. Furthermore it is not an open source tool, so it may not be suitable for some uses where customization is needed.

Although subjective, Colibri is not the most user friendly implementation, which makes it a little too complicated for a basic usage. It also does not offer an exposed API, which makes the integration with Drupal overcomplicated.

![Colibri User Interface](image)

Figure 9 - Colibri User Interface

4.2.4 BigBlueButton

BigBlueButton is an open source implementation of a video conferencing tool. Sharing most of the functionalities with Adobe Connect, it allows users to share slides, annotate them, chat with
Problem

each other, share video cam image, sound and desktop, and even to warn the presenter that they want to make an intervention simulating the "raise hand" system that is used traditionally in school.

BigBlueButton name comes from the intention to create a system similar to one where the user only needs to press a metaphorical blue button to be able to connect with others in the same place.

There is a module that provides integration of the API with Drupal[44], which makes it easier to implement. Unfortunately, this module assumes that your Drupal server has the PHP setting allow_url_fopen enabled, which can cause security issues[45], such as cross-site scripting attacks, if inputs are not treated properly. In the case where PHP allow_url_fopen is disabled, the function bbb_api_call needs to be rewritten in order to use curl to get the request from the BBB server URL. This changes can be consulted in Appendix B.

A BigBlueButton server has some requirements, mainly it is best suited to be installed in a 64 bit Ubuntu machine, and preferably with some space to allocate presentations and recordings as well as enough bandwidth to deal with concurrent users. To install the server, the instructions provided at server installation guide[46] should be followed.

![Big Blue Button architecture overview](image)

**Figure 10 - Big Blue Button architecture overview[56]**
Problem

After installing the server there is a secret key that it used to encrypt and validate the calls to the API. This key shall not be shared with anyone, in order to prevent unwanted calls to the server. This key is the only thing that we need to provide to the Drupal module in order for the calls to be verified, along with the server name or address. This key can be obtained using the command "sudo bbb-conf -secret".

In order to use BigBlueButton with Drupal we first need to install the module provided at http://www.drupal.org/project/bbb. To do this, go to Drupal » Administration » Modules » +Install new module and either insert the URL for the module compress file or upload it. Going back to Drupal » Administration » Modules we can see the module under the Big Blue Button tab and enable it.

After installing and enabling the newly added module we need to configure it in Drupal » Administration » Configuration » Media » BigBlueButton inserting our server address and secret key.

![Big Blue Button meetings](image)

Figure 11 - Big Blue Button Drupal's module configuration
Problem

After we have configured the module we need to create a new content type for the BBB meetings. To create a new content type we can go to Drupal » Administration » Structure » Content Types » + Add content type. The first thing you want to do is assign a name to the content type, such as Meeting or BBB meeting. A description can also be useful for users that will create content of this type if you have many content types. The only settings we are interested in are the Big Blue Button settings, but you can also change other settings such as publishing options or even set this content as a group content in the Organic groups tab. In the Big Blue Button settings tab make sure to select the options “Treat this node type as meeting” and “Show links to attend, moderate or terminate a meeting beneath the node”. This way, a node created from this content type will show the links to attend and moderate a meeting that will be open in your server via API calls.

There are also two other options that you can select. “Record new meetings of this type, by default” will allow you to record a meeting, pressing the record button in the meeting room. This option can be changed when you create a new meeting, it will only set the default value. If this value is selected when you create a meeting, this meeting will be recorded but won’t be rendered unless you press the record button during a meeting. In case the button is not pressed there is still the possibility to render the entire meeting, in contrast to what happens when you press the button, which makes it that only part of the meeting record is rendered after the meeting is terminated. If you do not want a meeting to be saved to the server to future render, you can select the option to not record the meeting, and in this case no button will be shown to record the meeting nor there is a possibility to render it after it is terminated.

The other option is to require a moderator to be present in a meeting, which makes it so that if users attend a meeting before a moderator is presented they will be told to wait until the meeting starts, and they will be automatically redirected to the meeting room when it starts.

In addition to this settings there are meeting features that can be set by default here, namely, a welcome message, that will be shown in the chat when a user joins, a dial number in case there is some support available for a meeting, a moderator and attendee password which are only used to validate calls to the API, and a logout URL, to where users will be redirected when a meeting ends. We recommend setting the return URL to your Drupal website, since in case no URL is specified users will be redirected to the BigBlueButton server URL. This values can be changed for every new meeting that is created using this content type.

A useful interface to test the API and help troubleshoot can be found here[47]. In order to make use of it, only the server address and secret key need to be provided, so that calls to the API can be validated through a SHA1 checksum. Also a meeting ID and moderator password can be provided to make calls such as getting meeting information, join a meeting as moderator or end a meeting.
4.3 Research

Research is a major part of the work developed in NEA. It is important for both students and researchers to share their work so that the whole community can benefit from it.

It is common for results from research work to be published as articles. Their work is therefore submitted to different conferences or websites, which require them to fill many forms that share common characteristics. In order to allow their work to be reused, we use a module for bibliographic management, biblio[48], which allow users to import and export their research work as well as other bibliographic work.

With biblio it is possible to set up a database of bibliographic references which can be searched and filtered by author or date which can then be exported in formats such as BibTex or EndNote. These can also be formatted in a number of styles including the American Psychological Association (APA), Council of Science Editors (CSE) and Institute of Electrical and Electronics Engineers (IEEE).

![Figure 12 - Drupal's Biblio Module New Entry](image)

When creating a new entry in the database it is also possible to add full html view of a document or a file, in pdf or other document format, uploading it as an annex.
4.4 Course Administration

Although Drupal is more oriented to content management, it is also possible to manage courses through Drupal, namely students and grades. Building a system for course management and grading dispenses the use of another system or website for this purpose.

In order to provide Drupal with a functional course and users management system, we need to rethink the way content is handled. In a normal website, we could create queries to get grades from students enrolled in a course from a database, where these three entities would be stored and correlated. In Drupal, students, courses and grades would be seen as three different content types, each one with their different properties represented as fields. To associate students with their grades in each course we can make use of Drupal entity reference module which allows us to create fields that reference other entities. This will simplify the way grades are seen by Drupal users and how they can be attributed to students, and no changes to the Drupal database are needed to be programmed manually. This is especially useful in the case of M_EIA, where course managers have little database knowledge, since we can build views over the entities so that grades can be easily attributed to students and courses without knowledge of how they are represented or related in Drupal’s database.

Using entity module allows us to create a view where we can display students’ grades for each course adding a relationship to that view under Advanced » Relationships, and we can even display the average of the grades based in the ECTS or based on all grades ECTS. To display calculations all we need to do is change the format of the view to Views Calc Table and choose which attributes we want to display the calculation and the type of calculation.

Figure 13 - M_EIA Student Progress
Another useful feature we can add to our site when it comes to course management is to create a view to see a course plan, this way students can see what courses are lectured each semester, the effort required to each course, measured in ECTS in our case, and the optional courses they can opt between.

<table>
<thead>
<tr>
<th>Course</th>
<th>Semester</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tacita Geral da Organização do Espaço</td>
<td>2</td>
<td>1.50</td>
</tr>
<tr>
<td>Desenho II</td>
<td>2</td>
<td>7.50</td>
</tr>
<tr>
<td>Introdução II</td>
<td>2</td>
<td>9.00</td>
</tr>
<tr>
<td>Cultura Visual I</td>
<td>2</td>
<td>3.00</td>
</tr>
<tr>
<td>Geometria I</td>
<td>2</td>
<td>3.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ano 2º</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tradição Construtiva I</td>
<td>2</td>
<td>1.50</td>
</tr>
<tr>
<td>Oficina/Tecnologias III</td>
<td>3</td>
<td>4.50</td>
</tr>
<tr>
<td>História da Arte III</td>
<td>3</td>
<td>3.00</td>
</tr>
<tr>
<td>Cultura Visual II</td>
<td>3</td>
<td>3.00</td>
</tr>
</tbody>
</table>

**Figure 14 - M_EIA Course Plan**
During the semester, a Drupal implementation has been worked to solve the main problems imposed by current learning platforms. This Drupal implementation has been tested near the end users, teachers in NEA and students from DEA. There were many aspects considered when evaluating the product near the users, being the two main aspects functionality and ease of use.

Biblio is the Drupal module that has been used longer, so it was possible to create a sizable database of publications from NEA members and other bibliographic references. It is a suitable tool for the needs, and its utility can be demonstrated by the fair use of it.
Results

To test the suitability of the content sharing features we create two different groups, a public and a private one. We then asked students to share some content using the Media content type created to share different types of multimedia in one place. Students found it accessible to add content and practical to share different media formats.

L'image manquante - Rithy Panh - 2013

Figure 16 - Content Share Using Media Content Created

One of the difficulties that led to this dissertation is the communication between students and teachers especially from remote locations, and countries where network resources are limited. It is difficult to make a presentation where slides have to be shown, normally sharing your
Results

desktop, and sometimes video and sound synchronization are essential. That is what our integration of BigBlueButton with Drupal tries to solve.

To test the feasibility of this solution, how it performed, and the utility of the tools provided different test have been made. First it was tested locally within the Faculdade de Belas Artes da Universidade do Porto, where it was found that there were some issues preventing the calls from Drupal to reach the BBB server. This issues have been corrected and addressed in 5.2.4. After, it was created a group for conferences in Drupal, so that users could easily join or create new meetings. Functionalities like the group chat, private messaging, video call, voice chat and desktop sharing have been tested and users found them intuitive to use, despite the comments unfavourable to BBB general aspect from some users.

The final test, has been made with the collaboration from a student in Cape Verde, Rita, who made a small presentation about art’s education politics and practices in Cape Verde higher education, recorded and made available in our BBB server. With this presentation it was possible to test the use of the platform for distant communication, and take some conclusions. Recording 3 video cameras at the same time, it was possible to hear the presenter despite some interruptions, but there were some image discontinuities in the presenter camera, which did not occur with the other cameras. After webcams were disabled it was possible to hear the presenter and the slides display was on sync with the presenter speech. The same presentation test was made using Skype between teacher and presenter only, but it was not successful since the connection failed and the slideshow could not be shared. With this test it could be shown that BBB solved the low bandwidth connection problems that existed, and can be a valuable tool to assist both presenters and attendants. Furthermore, this tool can be used as a chatroom or a study room for students without the need to recur to external tools or ask everyone for their contacts since users can easily create a meeting and participate in others.

Another important aspect that was tested, was the difficulty to use the course administration tools implemented in the M_EIA platform. In order to test them, we asked M_EIA administrators to attribute the grades to their students according to the semester results for each curricular unit. The results where impressing, despite the lack of technological knowledge, they were able to manage the grades without visible difficulties since they were already familiarised with the Drupal look and the tools are correctly visible and simple to use.

The positive results led to the writing of a paper, with the intention to highlight the needs for learning environments that focus more on the needs of the users, oriented to different types of learning and teaching, which is still being written and will greatly benefit from the positive results achieved by the social environment here presented. This paper has been submitted to an EERA conference, ECER 2015, has been approved and as a result it will be presented between September 8th and 11th in ECER Main Conference hosted in Budapest. The contribution can be read in Appendix C.
Chapter 6

Conclusions

During this initial phase of the project it was possible to analyze the main work done in the area of learning environments, and how technology can be used to create opportunities to improve art study. It was made clear that there is an opportunity to change the way learning is addressed currently, and that it is reasonable to create a new learning environment that gives the users the power to control what is being shared and the ability to communicate and collaborate with each other.

We have managed to successfully set up a social learning environment, building over Drupal, an open source content management system supported by a large community of developers. Since we are using an open source implementation, one of our objectives was to give back to the community part of what it gave to us, allowing anyone that is looking to build a similar learning system to follow the instructions needed to guide them and let them set it up with ease. This was done during Problem chapter, where we describe the steps to set up the modules used, how to configure them properly and how to overcome some possible errors or difficulties.

This social environment can be used to suit different learning contexts, such as blended learning, where there is a combination of face-to-face classes and the use of the platform to collaborate outside the school space, as an auxiliary tool to share content during classes, to make it more accessible to students and easier for teachers to manage, and even to create online courses making use of the recording features that allow teachers to record their classes to be available for students to learn from watching.

The Drupal configuration was tested and used by DEA professors and students, in a blended learning context, where there are classes in a physical classroom with the presence of a teacher and work is shared over Drupal. Moreover, there is collaboration with schools such as M_EIA[51] in other countries, where there are internet connection’s limitations, and the Drupal configuration is being now used to establish communication.
Conclusions

We can conclude that the social environment created allowed students to share their work successfully and with ease, overcoming barriers imposed by previous learning environments being used like Moodle, and, most importantly, meetings can now be made between countries with a satisfactory quality, overcoming previous latency and desynchronization issues caused by the low bandwidth connections when using Skype.

Taking into account the context in which the environment is being used and was tested, there is still room for exploration, mainly in the online courses context. We believe that it is possible to create online courses, open to the community or to be used within the existing courses to substitute classroom, using the BigBlueButton recording and playback functionalities, functionalities which are also being developed[52] so that playbacks can be edited and recorded in a more user friendly way.
References


References


References


Appendix A – Top LMS Software
Appendix B – bbb_api_call

```php
function bbb_api_call($params, $call) {
    $query_string = bbb_api_generate_querystring($params, $call);
    $request = BIGBLUEBUTTON_BASE_URL . '/api/' . $call . '?' . $query_string;

    // Use cURL in case allow_url_fopen is not enabled
    if (ini_get('allow_url_fopen') == true) {
        $xml = simplexml_load_file($request);
    } else if (function_exists('curl_init')) {
        $curl = curl_init($request);
        curl_setopt($curl, CURLOPT_RETURNTRANSFER, true);
        $curl_request = curl_exec($curl);
        curl_close($curl);
        $xml = simplexml_load_string($curl_request);
    } else {
        // Enable 'allow_url_fopen' or install cURL.
        throw new Exception("Can't load data.");
    }

    // If XML is available, parse the API response.
    if (!empty($xml)) {
        $response = bbb_api_parse_response($xml);
        // Check if request was successful.
        if (isset($response->returncode) && $response->returncode == 'SUCCESS') {
            // Everything is OK.
        } else {
            // If errors occurred, log them.
            if (isset($response->message)) {
                watchdog('bigbluebutton', '%message', array('%message' => $response->message), WATCHDOG_ERROR);
            } else {
                watchdog('bigbluebutton', 'BigBlueButton error. API call: %call. Request URL: %url', array('%call' => $call, '%url' => $request), WATCHDOG_ERROR);
            }
            return $response;
        } else {
            watchdog('bigbluebutton', 'BigBlueButton service not available. API call: %call. Request URL: %url', array('%call' => $call, '%url' => $request), WATCHDOG_ERROR);
            return FALSE;
        }
    }
}
```
Appendix C – ECER Paper

Proposal Information of Contribution 1328

Title: Social Environment for Arts Education and Research

Authors: João Daniel Santos, Ana Carolina Santos, João Daniel

Abstract:
Arts education and research need to go beyond the current capabilities of conventional learning environments since they are too closed, limiting students’ abilities to create, communicate, and collaborate. The vertical organization requires one to be responsible for all available content, as well as monitoring all students and their actions on the platforms, thereby removing freedom of thought and expression.

In learning environments, like those used in academic environments, allowing students to work collaboratively, sharing knowledge on certain topics, research results, and even their teachers, would be possible. It would be possible to develop critical thinking and encourage the work done by other students. The problem involves structuring the learning model in which current learning environments are based, and establishing a direct link between education and technology.

The main advantage of closed learning environments could be manipulated with the implementation of an environment where students are allowed to share their knowledge collaboratively with teachers, being shared contents available for both parts. Moreover, such solution should allow participants to share different multimedia contents such as images, videos, and even spoken content. Other interesting approaches are to integrate video call in the platform. This way students that could not be present would still be able to attend classes and even share and assess context being taught.

Methodology, Materials, Research Instruments or Sources Used:
- Personal Learning Environments (PLEs) can overcome many difficulties of current learning environments, however, tools are spread in different platforms and no one uses the same tools.
- In order to implement a learning environment capable of surpassing this obstacle, the necessary structure is needed.
- A Social Learning Environment (SLE) is being developed. Making use of Drupal, a Content Management System (CMS) that allows content to be separated from the server topic, we aim to build a learning environment with different tools for allowing straightforward communication and collaboration.
- Conclusions, Expected Outcomes or Findings


1/1