A Blended Learning Approach to Enhancing Innovation

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Abstract: This paper introduces blended learning as a pedagogical approach, which was explored through the European project InnoEd and the way InnoEd undertook by using the on-line InnoEd VRLE. European educators in the InnoEd project have utilised a range of learning activities to help improve Innovation Education. A mixture of lectures, visual diagrams, assessments and group activities has up to date been the mainstay of classroom training. Blended learning is a combination of all these many approaches and the use of ICT in ODL.

Blended learning can take many forms. In one course, a teacher may assign weekly self-paced online modules to a group of learners and also periodically bring the group together for in-person sessions, presentations and group discussions. Another blended learning program may bring together a menu of online reading materials, self-paced tutorials allowing learners to choose the mode that best meets their learning style and then demonstrate their understanding of the materials by completing an online assessment.

The definition of blended learning is a combination of different online learning modes, or of online and in-person learning. Blended learning is becoming more common in the educational world with the availability of both synchronous and asynchronous online learning options.

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1. Introduction

The context of the article is the development of the InnoEd project and its supporting pedagogy. The background was a curriculum development work aimed at improving Innovation Education in Europe. Blended learning was implemented in the InnoEd (see figure 2) in order to improve the Conventional Innovation Education in Europe.

The InnoEd project aims at improving in-service Innovation Education teacher and students skill and knowledge within the Virtual Reality Learning Environment (VRLE). The InnoEd

VRLE (see figure 2) was used to help teachers to facilitate the management of Innovation Educational courses. It focused on the use of new learning technologies using managed learning environment for teachers in innovation education. The VRLE supports Internet and database technologies, to facilitate blended learning. The InnoEd project uses the VRLE platform as a tool to facilitate the way the participants work together. It is a continuous meeting place for them, a stable base to work from and at the same time an easily accessible archive of the entire InnoEd project teaching material all the undertaken activities are based on.

This paper firstly reports the InnoEd project. Secondly, it defines and demonstrates possibilities inherent by using VRLE Managed Learning Environment in the context of blended learning as a way of improving Innovation Education.

2. The InnoEd Project

The InnoEd project (2001-2005) was based on the need for innovative and effective ideas for increasing the efficiency of Innovation Education teachers' and students daily work. In essence, the project is aimed at finding new ways of how to teach Innovation Education and how the teachers themselves can learn and upgrade their knowledge and skills as well as their teaching methods by using blended learning approach. The proposed project concerns the development of an in-service teacher training course on national and European level. The participants were from England, Iceland, Finland and Norway.

The InnoEd project developed and implemented an online course for both teachers and students. The course was both pedagogical and technical and the participants used the VRLE.

The specific InnoEd VRLE software used for the InnoEd project is a general Managed Learning Environment (MLE) adapted to the needs of working with Innovation Education material through an online process. A Managed Learning Environment (see figure 1.) is a computer program that facilitates computerised learning and can both be used in the context of open and distance learning and as a support to face-to-face education in a conventional school context. Such computerised learning systems are also called Learning Management System (LMS), Course Management System (CMS), Learning Content Management System (LCMS), Managed Learning Environment (MLE), Learning Support System (LSS), or Learning Platform (LP); it is education via computer-mediated communication (CMC).

The VRLE was adjusted to the IE pedagogical model as a support to the ways in which students develop their ideation skills. When this project was undertaken many schools in Iceland had already started to use it as a support to IE classes and for the Icelandic Young Inventors Competition. The VRLE was established to be a tool to facilitate ideation and host online IE materials in order to facilitate the innovation process. Specific online workshops, based on an underlying database, were built to enable the formation of teacher's and students' online communities (see figure 1).
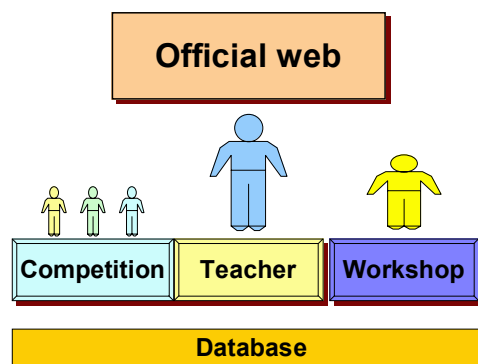
Figure 1. The basic structure of the VRLE.

The VRLE has management characteristics, in the form of online workshops both for students and teachers. The teachers' workshops enable the teachers to support the students when working through the innovation process, keeping track of their work and evaluating their progress and achievements (see figure 1). The student's workshops are a personal learning space (PLS) inside the VRLE. The foundation of the PLS design plan (see fig 1) is based on the possibility to use computer technology to reinforce identification of needs, and development of solutions. The tools developed for this purpose have the names "My Needs" and "My Ideas" (see fig 2).

The students could edit needs and ideas/solutions with specific drawing tablets (CAD) and store them in their VRLE´s personal database. With webcams they could also produce graphic representations of solutions they are working on and store them. From their workshops students could use many communication tools such as chat room, emails, set up "pop up" messages and enter the 3D virtual reality part of the VRLE. The VRLE offered both asynchronous and synchronous communication and interactions, both between students and teachers and students themselves. The participants could communicate both within the VRLE and with the world outside the school. Figure 2 shows and example of the individual's personal learning space.

Figure 2. The interface for the students' workspace inside the VRLE.
(Details are changed to protect student).

The management possibilities in the workshops are different both in content, complexity and function. They offer students access to their ideas and needs, they have hosted in their database and allow them to upgrade them. The students can manipulate the outlook of the workshop by changing its colours and insert a photograph of them. This possibility was designed to increase the ownership feeling for their workshop and to enable the users to personalise them.

Early in the InnoEd project the participants identified the need for keeping both personal and shared working place safe from any extraneous visits. The Icelandic hosting company Skyrr (Skyrr.is) offered secure hosting for the database and the workshops. Skyrr´s requirements and security policy is strict and respected by Icelandic authorities. The company has many years experience hosting tax returns and bank transfers of Icelandic banks. This security was also considered essential to persuade teachers, parents and students to trust the technology and to counteract stories about the internet as a potentially dangerous place.

Security was one of the conditions for establishing the online community of practice. It was both important to obtain the students, teachers and parent trust for the VRLE and build up an

image of it as a child friendly and secure system. To establish this trust a specific database registration was set up for all the Icelandic schools and connected to the Icelandic National registration office, which provided automatically the VRLE database with all the participants national insurance numbers, to enable identification of the VRLE´s incoming traffic. Each participant needed to log on to their site and the system did not offer any guest accounts. It was also not possible to log on the VRLE unless through the Skyrr security system and their firewalls. All teachers in the InnoEd project also needed to be vetted by an institutional representative in each school before they were able to give access to students.

The development of the security was also important to enable the possibility to share needs and solutions inside of the VRLE community. All the tools in the workshops were based on the InnoEd database and the system automatically recorded information about activities and enabled searches. By using the VRLE database the learners could share their ideas and needs with any person in InnoEd or groups defined in the database.

The virtual reality environment part of the InnoEd workshops was developed as a communication tool. It allowed the participants to utilize synchronous virtual communication with sound, pictures and movements. It also offered the possibility for using CAD for communicating ideas in the form of drawings and formation of 3D objects. The use of the VRE element was established with security requirements. It was possible to enter the VRE from inside a personal workshop after the user had passed all the security requirements. When the user entered the VRE he or she could choose from a set of avatars (see figure 3). These avatars were both children and adults.

Figure 3. The avatar range available.

The VRE is designed as a house with many rooms and a garden. The students could walk about and communicate by using voice over IP or by sending text that appeared on the screen. They could also interact and communicate using the avatar's body language.
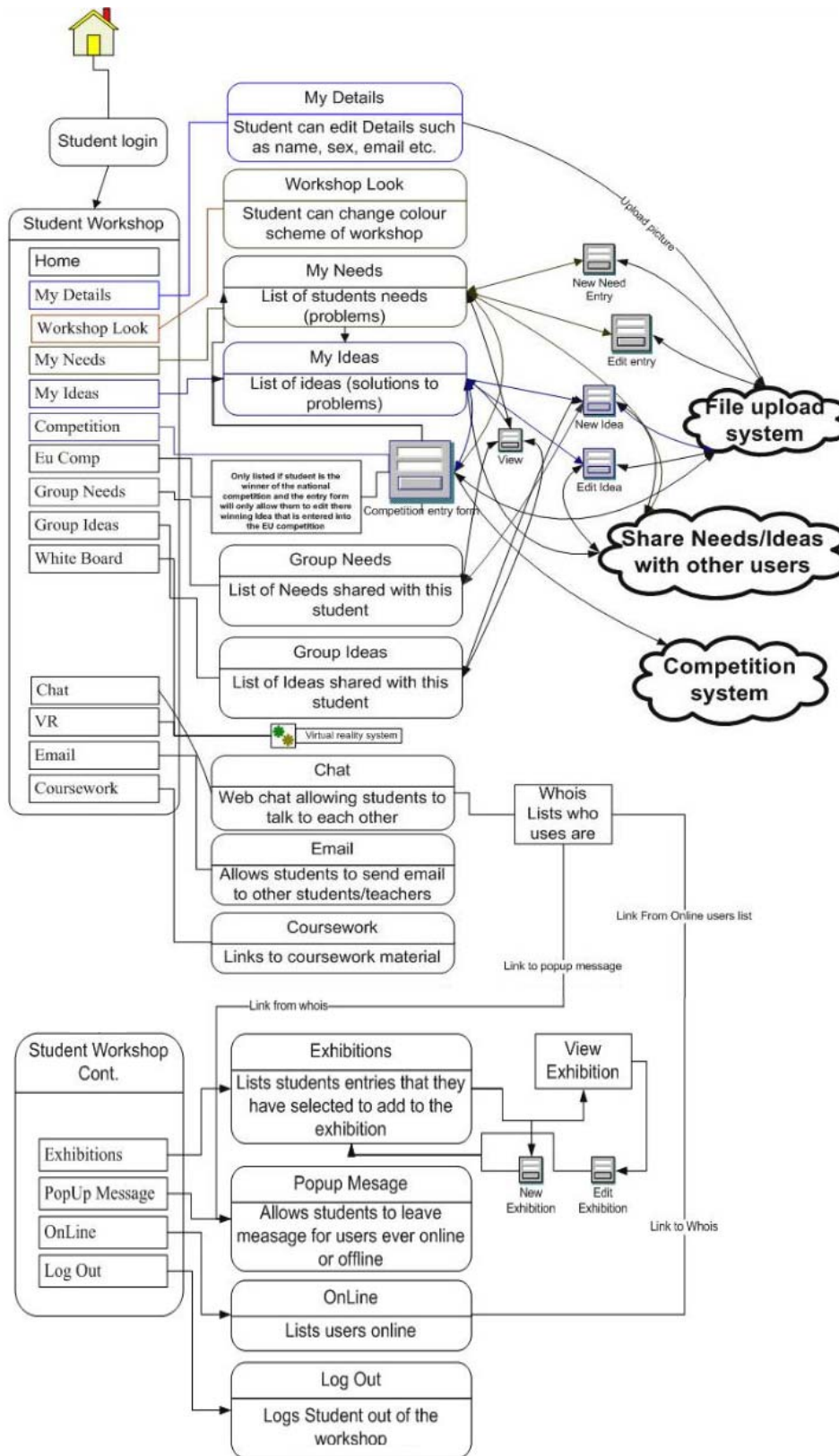
**Figure 4.** Shows the complex construction of the students' workshop.

There are many definitions for Managed Learning Environment. Managed Learning Environment is commonly referred to as a learning environment mediated by computers and digital technology. Wilson [12]defines the MLE in a broad way: *"it is a computer-based environment that is a relatively open system, allowing interactions and encounters with other participants and providing access to a wide range of resources"* [12:8]. The Joint Information Systems Committee [7] defines Managed Learning Environment as components in which learners and tutors participate in online interactions of various kinds, including online learning.

A Managed Learning Environment (VLE) (see figure 1) is a software system designed to help teachers to facilitate the management of educational courses, especially by helping them and the learners with course administration. The system can often track the learners' progress, which can be monitored by both teachers and learners. While frequently thought of as primarily tools for distance education, they are most often used as a supplement for face-to-face classroom.

Hall [6] describes Managed Learning Environment as a term used to illustrate a wide range of applications that track student training and may include functions such as:

- Authoring;

- Classroom management;

- Competency management;

- Knowledge management;

- Certification or compliance training;

- Personalization;

- Mentoring;

- Chat;

- Discussion boards.

The services that MLE provide are aimed at teachers, pupils, administrative personnel, and parents. Access to the MLE is via the Internet or an intranet, and there is usually an option to work offline. A key characteristic of a MLE is that learning can take place "anytime and anywhere" and is not dependent upon the traditional school timetable or whether the learning is taking place inside or outside the school building. It is therefore preferable that MLE is connected to the users school's Management Information System as illustrated in figure 5.
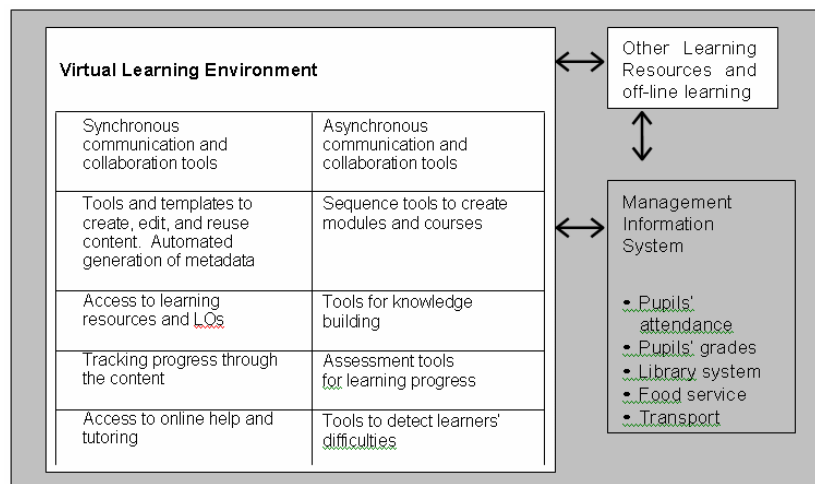

Figure 5. The figure represents some of the possible features of a MLE that can be linked with school's Management Information System [10].

3. Blended Learning

Educational approaches that represent a shift in instructional strategy are often described as blended learning and virtual reality learning environments often considered as educational environments for blended learning. Blending learning is usually defined as the use of multiple approaches to learning. Bonk & Graham [1] describe blended learning as the combination of web-based and face- to-face learning (figure 3). Their definition [10:5] reflects that blended learning *"is the combination of instruction from two historically separate models of teaching and learning: Traditional learning systems and distributed learning systems. It emphasises the central role of computer-based technologies in blended learning."*

Figure 6 shows blended learning as combination learning with the VRLE and face-to-face learning. The InnoEd VRLE includes both network-based (online learning, Internet-based learning, and Web- based learning) and non-network-based learning (computer-based learning).
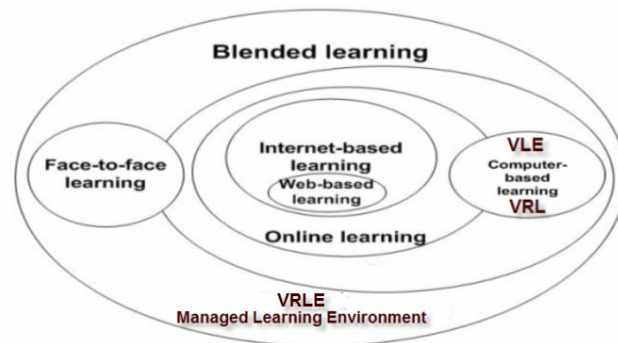
Figure 6. Components of blended learning (developed from Bonk and Graham diagram [8:5], for blended learning).

4. Using Managed Learning Environment (MLE) for Blended Learning

The InnoEd project was established to improve the communication and teacher's work through the context of on-line education. However, the application of the Managed Learning Environment used in the project can support and facilitate group processes in conventional face-to-face classroom based communication or be totally online for distance interaction and learning. MLE is designed for multiple learners working at the same workstation or across networked machines. The purpose is to support students in learning together effectively. MLE can support communicating ideas and information, sharing information and documents, and providing feedback on problem-solving activities [5].

MLE commonly use basic computer equipment such as monitors, mouse and headset. It attempts at immersing the learners in an experience as close to the actual as possible within the limitations of the equipment. The goal is for the learner to interact with the other users and the actual environments at the same time in order to facilitate and improve the collaboration that takes place.

Educators using the blended learning approach often aim for better thinking skills, problem solving abilities, and collaborative development of knowledge within a field of practice. This includes both emphases on individual and collaborative aspects of learning. Identification of social interactions becomes an important element of knowledge construction, a focus on the learner(s) and their activities [2].

Blended learning gives opportunities for collaborative learning that by using MLE can also be considered as tools [8] to support in-service teacher education. When such tools are used in social settings for important learning processes, providing objects for shared attention and activity, we could consider them as sociomental tools [8].

Blended learning can be more sophisticated than previous approaches of computer support in

education. As an often-social learning context, there are an infinite number of variables. It is therefore more difficult to evaluate the effectiveness of such activities [3]. Nevertheless, all actors involved in blended learning based MLE processes, need to have evidence of whether, how, and when expected improvements in learning take place.

5. Conclusions

Blended learning offers opportunities for both in-service teacher trainers, in-service teachers and their learners. The learning methods and options introduced in the article would not have been possible to use ten years ago, and there is little doubt that additional technologies and online tools can support blended learning in order to improve in-service teacher training.

The benefits of blended learning, such as increased learner satisfaction and understanding of materials, along with improved course quality and completion rates, are reasons for using blended learning. The increased cost, reduced training time, and the ability to easily update training materials offer additional compelling reasons for educators to embrace blended learning. We believe that the use of blended learning for Innovation Education training will continue to grow over the coming years.

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