# The digital board in a University setting: two real cases in Europe and East Africa

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**Abstract.** Usually the digital board is thought of as a tool that can only be used beneficially in the context of primary school, secondary school or in a situation of learning handicap. In this case study we want to highlight how the new tools can be used in more broad settings such as teaching in scientific and technical universities. The easy adoption of all useful software on the market to the use of these tools makes them an innovative element in the teaching techniques of the future

**Keywords:** Digital whiteboard advanced teaching tools, repository.

## 1 Introduction

The paper explores the use of advanced innovative technology in the classroom for effective teaching and learning. The digital whiteboard tool is a flexible and powerful didactic instrument that can greatly enrich the experience of both the learner and the teacher. This paper presents one completed real case in Italy and a work in progress case in Kenya.

## 2 The Project

The initial aim of this project was to show the advantages of adopting a new set of tools for classroom teaching, in particular, teachers explore the use of interactive whiteboards and associated software to evaluate the true effectiveness in terms of improvement of training specifically aimed at students with disabilities. The number of students attended to by the University Disability Service of the University of Modena and Reggio Emilia is equal to about 1% of total students enrolled, which makes it even more significant when compared to the national average of 0.5%. This fact was also an incentive for trying to increase the quality of service provided.
A further objective was to introduce a major technological innovation in the teaching of university courses, usually associated with fairly rigid patterns of presentation that hardly suit the needs of disabled students and more generally a little weak in supporting learning .
In particular it was decided to introduce new teaching aids such as digital whiteboards which can also store additional content during the frontal exposition by the teacher, store the teacher's classes, usually in Microsoft Power Point or non-editable PDF format.

The project was implemented according to previously established implementation steps and in particular:
1. Identification of appropriate technology.
2. Identification of the classrooms to equip (2 for each Faculty)

3. Drafting the contract
4. Construction of classrooms
5. Initial training targeted at each faculty with groups of up to 20 people
6. Continuous training based on the presence of certified internal trainers
7. Creation of an automatic repository for distribution of material to facilitate the distribution of digital lessons. (Developed by the Computing Center of the University)
8. Direct control of the distribution policy and manual submission of the material in the classroom by the teacher in order to maintain control over what you want to distribute
9. Export this experience to other universities or contexts, in order to increase understanding about the benefits in more real life cases

The first stages was reached by a close collaboration between Faculty Teaching Coordinators, Disability Services Office for disabled students, and technical staff responsible for supporting new technologies in order to identify classrooms to equip according to the usage and the practicability of an installation that is non-invasive to traditional teaching. The goal was to introduce a new method and not to replace one considered obsolete by some and yet for many still much more effective.
It was thus decided to use both by placing the digital whiteboard next to the standard board to allow gradual use.

To avoid the setting up of the PC for each use, the machines were installed in the vicinity of the digital whiteboard, wall mounted in armored cages without adding peripherals such as mice or keyboards. If need be, wireless keyboard and mouse could be used.
The decision to put two digital boards in the same faculty was made because of the following purposes:

i. *Fault Tolerance:-* To have continuous operation in event one encountered technical problems (that has not occurred since).

ii. *To encourage the use of the tool among teachers:-* It is known that in the introduction of new technology there is always an initial exploratory phase in which the first steps are made with a little fear into the tool, and then begins a stage more "competitive" between the instrument and its user. This was in addition to creating a desire to share the experience with colleagues as the stage of insertion is typically more delicate.

iii. Having two large enough classrooms with digital whiteboards enabled the sharing of these resources with no initial conflicts in timetabling between teachers involved and creating curiosity and interest to those who had not yet approached the instrument.

After the drafting of the contract, the Computer center immediately began the analysis and implementation of the Repository in order to have the application up and running at the same time that the classrooms were equipped and ready. The repository was structured to create a folder for each faculty and dividing the contents of each in subfolders, one for each course curriculum.
Access is via authentication using the credentials of the student. In this way a student has access only to the course materials related to their curriculum.

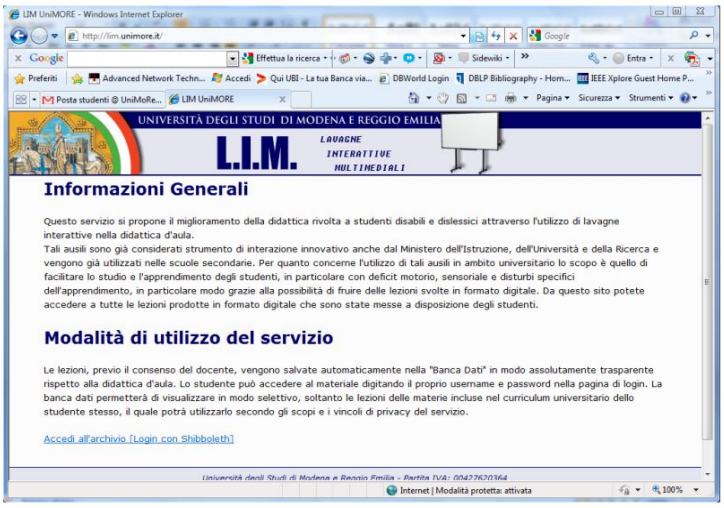


**Fig. 1.** Web page of the L.I.M Repository http://lim.unimore.it

To do that it was necessary to ascertain the specifications of the machine suitable for digital whiteboard and their location. Also it was necessary to ensure that no one could access the system without authorization, and that access to the new technologies does not require the assistance of a technician.
University technicians tied the use of the dedicated machine to the presence of a "certified" flash to the whole system's USB port. At the point of inserting the flash disk, the unit turns on automatically and the saving of the lessons presented in a specific folder either for publication or not are sent to it.
The idea of associating the serial number of the USB key (unique for each device produced in the world) was born to automate the writing and saving files in a simple way by the teacher and without adding information or work to the technicians to catalog all files in a second time before placing them in the database of lessons. On saving the lesson(s) on the network drive, the teacher has permission to publish the saved file directly in the folder of the course he/she teaches relevant to the rights they have, as explained in the description of the repository.
The identification of the user has an additional advantage in terms of transparency of the instrument: it is known that the PC market provides different operating systems, each of which must not be neglected to avoid having the initial disaffection towards the use of the instrument by the teacher.
To remedy this, the project was implemented using different virtual machines on an Apple system.
In accordance with the preference of the teacher (associated with the serial number of the key) an operating system is selected automatically at the start-up according to the request of the teacher certification made at the time of the key registration.
Enabling-disabling the key is the only operation required of the technician (one from each faculty) in addition to the normal operation of the equipment present. This happens in a few minutes using a simple program specifically implemented by the university's computer center.

## 3 Training

The training was custom designed for each option so that only 20% of initial training (about 3 hours total) was used to familiarize with the new tools and how they can publish the lessons. The rest was used to adapt innovative teaching to the needs of the teacher in explaining the topics. After an exploratory phase of the instrument was done to familiarize and techniques through learning-by-doing with the most valuable

applications for the 'teaching of the interested parties, passing from the traditional to the one with standard software programs and then reach the 'use of multimedia such as movies or audio files

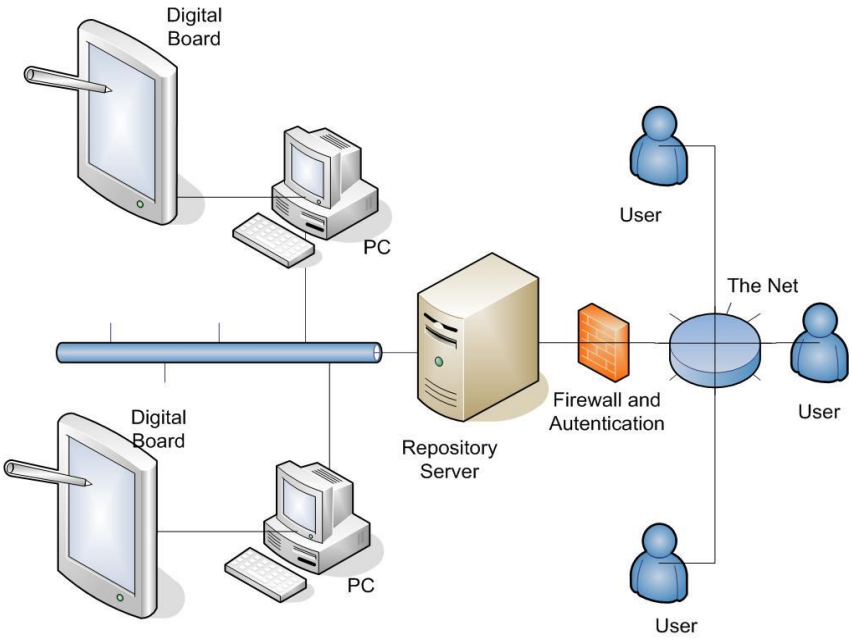


**Fig. 2.** Representation of the system devices connections : from Digital Board to the End Users

## 4 Innovation

A strong innovative content was found when it was noticed that teachers would have wished in some cases to avoid using the digital whiteboard in the usual way or by means of presentation, going over to use the whiteboard linked to technical software like CAD or simulation programs by integrating the possibility to take visual notes, along with diagrams, and notes due to the flexibility that the digital whiteboard provides.
An example can be seen in Figure 3 where the notes were made directly in the classroom during training and off-line.

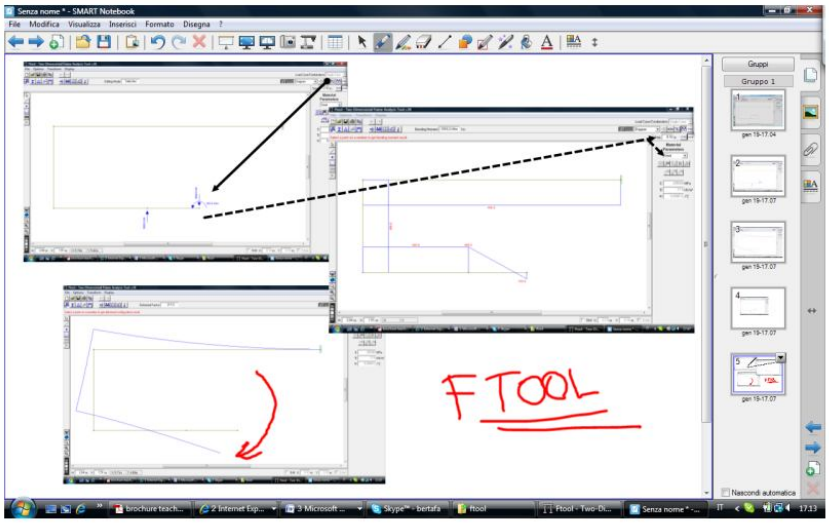

**Fig. 3.** Summary of a little storyboard of a specific engineering software (FTool). The digital whiteboard increases the teaching effectiveness and becomes an enhanced interface to explain and discuss with the classroom in an interactive mode about real cases and examples.

## 5 Conclusion

What had been thought for 1% of the students brought a benefit across the board. Several teachers have gradually begun to use new educational materials not only to improve the focus and effectiveness of instruction, but also stimulate a strong demand by students of the course material so obtained which allows a more complete reading of the topics addressed in the classroom. The increased motivation of students is palpable and some lessons on a trial basis were also made with audio support. All this was achieved without the presence of a technician in the classroom to support the new technology.
The introduction of new technologies in education requires a careful assessment of the impact it has on the teaching itself: the need for easy accessibility and easy use of new tools must take priority over everything. A teaching tool that is placed before the teacher that is invasive, impacts negatively on the performance of the teacher and hence on the quality of his teaching.
Finally, both the initial training that the subsequent training support for using advanced instrument should not be generalized but tailored to the needs and the use to which it is put.

**Fig. 4.** A typical digital whiteboard installation: note the presence of the traditional blackboard and the installation of the PC fixed to the wall on the left

## 6 Future work

The passion and strong interest in new advanced techniques of instruction in addition to cooperation agreements between the University of Modena and Reggio Emilia and Masinde Muliro University of Science and Technology in Kenya, the staff of the two universities will evaluate the possible implementation of the project at the Kenyan university. In this case the benefit will be even greater as it will help reduce the cost in the use of white printable paper in this region. That can be avoided by sharing the lessons in softcopy by mailing list or USB flash disk.
In addition, Kenyan University registers a dismally low enrollment of the disabled pursuing higher education. This instrument might be used as a boost to having an improved presence if it is used across the board notwithstanding the level of learning (i.e. primary, secondary, tertiary) institution.
To make the fastest possible integration of the digital whiteboard in MMUST as expressed by their interest on the instrument, a staff member of Modena was hosted by the University in Kenya to find the best strategies and implementation modalities in the introduction of the new technologies