

## **Schools in the *Digital Age*: teachers' training role in the innovative use of the Interactive Whiteboard**

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### **Abstract**

Questo lavoro descrive una ricerca (LIM@Trento) condotta in un Liceo Classico della Provincia Autonoma di Trento, nella quale si fa un buon utilizzo della Lavagna Interattiva Multimediale (LIM) ai fini della didattica e dell'apprendimento. In particolare abbiamo osservato e studiato come gli insegnanti utilizzino la LIM durante le lezioni di greco e latino. Nel lavoro si evidenzia che spesso le scuole spendono il loro budget prevalentemente nell'acquisto di tecnologie piuttosto che in una politica di formazione delle risorse umane, e in questo modo corrono il rischio di sottovalutare le possibilità pedagogiche offerte dalle tecnologie e di limitare i cambiamenti positivi auspicabili nelle strategie didattiche e nell'apprendimento. Dalla nostra ricerca sembra emergere il bisogno fondamentale di investire nella formazione dei docenti per favorire l'uso didatticamente corretto della LIM nella Scuola e per migliorare apprendimento, motivazione e partecipazione degli studenti. Non investire nella formazione implica correre il rischio di ridurre la LIM a uno strumento passivo, cioè niente di più che un proiettore collegato ad un personal computer. Il ruolo fondamentale della formazione degli insegnanti è legato anche al fatto che la generazione dei nativi digitali presenta stili di comunicazione e di apprendimento molto diversi da quelli dei loro insegnanti.

This paper deals with a case study research (IWB@Trento) conducted in an Italian secondary school, situated in the Trento's Province that makes good use of Interactive Whiteboard (IWB) for the teaching/learning process. We explored in detail how teachers use the Interactive Whiteboard (IWB) during Greek and Latin classrooms. In the paper we stress that usually schools use to spend their budget in technologies and they do not implement an appropriate human resources' training

policy, therefore they run the risk of underestimating the pedagogical skills offered by the new equipment and limiting the desired positive changes of the teaching/learning methods. In our research it seems to emerge the fundamental need of investing in the teachers' training, to increase the IWB's positive contribution to the teaching/learning process and to help students' learning, participation and motivation. Otherwise, it will be possible to run the risk of reducing the IWB to a passive instrument, i.e. anything more than a projector connected to a computer. The essential role of teachers' training is due, also, to the fact that digital natives generation has got ways of communication and learning styles that are different from their teachers.

**Parole chiave:** LIM, Lavagna Interattiva Multimediale, strategie di apprendimento, tecnologie didattiche, nativi digitali, formazione dei docenti

**Keywords:** IWB, Interactive Whiteboard, learning strategy, educational technology, digital natives, teachers' training

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### Introduction

*How should we call these “new” students? Some refer to them as the N-[for Net]-gen or D-[for digital]-gen. But the best definition I found for them is Digital Natives. Nowadays, our students are all “native speakers” of the digital language of computers, video games and the Internet (Prensky, 2001, p.1).*

Prensky is the first author who defined the generation raised with Internet and those that adults call “new” technologies. Prensky points out that technologies are “new” for adults but not for those children who grow up with them.

Some authors argue that there are specific brain differences between natives and digital immigrants and they even reckon that we could no longer speak of Homo Sapiens (Ferri, 2011, PP. 1-2), while others are more sceptic and wonder whether there are really such significant differences. (Margaryan et al., 2011).

However, all authors agree on the fact that, in light of the pervasiveness of communications technology, nowadays' students have learning, communication and socialization styles significantly different from the past, thanks to technologies which are available from an early age. For this reason, schools are more and more adopting various educational tools of the digital age like educational software, computers, tablets, interactive whiteboards, digital books and so on.

In this study we focused on the use of interactive whiteboard (IWB) in a Trentino district secondary school: we wonder if this technology really leads to a real innovation in teaching. Today the School has a new task: making people capable to live in the digital world (UNESCO, 2008) so that teachers have to deal with the new

generations and the technologies they use, encouraging a greater *educational* use during classrooms of ICTs and particularly of IWB.

Prensky speaks of "digital wisdom" to define what is needed to be able to discriminate what it can really be helpful – in a pedagogical way - to the school today: *"What in education should evolve and change with the times, and what should not?" As we quest for a better, 21st century education for today's and tomorrow's children, figuring out the best solution to this thorny problem is perhaps our biggest educational challenge. In my view, most of today's education reformers, when they bother asking this question at all, get it wrong. In order for us to get it right we will need a lot more of what we typically call "wisdom"—perhaps even "digital wisdom."* (Prensky, 2011, p.8).

Facci M. et al., 2013, talked about the "digital culture", pointing to the need to overcome a specific analysis of which is the best technology to adopt, in favour of a general awareness that can promote the development of knowledge, skills and a cultural framework that can help to integrate educational technologies in the schools. The risk is, in fact, that IWB will be used as any other kind of technology without exploiting the pedagogical potential that could bring a real positive innovation in the teaching/learning process.

### **1. Scientific literature analysis**

To understand the magnitude of the studies carried out abroad about the use of IWB and of the relating investments, you can refer, for example, to Lewin (2009). Lewin did a research (conducted in 2004-2006 on a sample of 528 schools, 10 case studies and 21 Local Authorities) about the use of IWB in primary schools that had received it between 2003 and 2004 and have used it for about 2 years. Also in England Smith (2006) did a survey about 184 lessons (with and without IWB).

In literature you can find studies on the use of IWB in specific subjects: for example Gillen et al. (2008) for science education, Johnsona et al. (2010) and Schmid (2010) for English, Lopez (2010) for mathematics and Smith (2006) for literature.

As far as the geographical origin of the studies is concerned, it is easy to see that, in addition to British studies mentioned above, there are many studies from other states, such as Germany (Schmid, 2010) and Mexico (Cardenas and Fernandez de la Garza, 2010) naming only two of them.

We can say that in general authors questioned the pros and cons of IWB (Schmid, 2008; Blue and Tirotta, 2011), how the IWB can help to coordinate the various multimodal stimuli which can occur in teaching (Littleton et al., 2010) and the pedagogical use of IWB (Mohon, 2008).

In general, the authors agree in supporting the educational effectiveness of the IWB only if it is used properly, or if it is used as a tool to involve actively the students and so to encourage collaborative learning, allowing students themselves to interact with the IWB. It should be noticed, however, that the IWB mustn't be

come the prevalent tool, but it has to fit into the school environment to promote a balanced and comprehensive, inclusive and collaborative education.

The national scientific literature about introduction of the IWB does not seem to be comparable to that produced abroad. In our country there are several publications about the use of IWB (Bonaiuti, 2009; Bolondi et al., 2011) mostly about best practices, guidelines and tools for teachers.

***IWB@Trento project: the research methodology***

In the last years one of the most important initiative, in terms of economic impact, for the Italian schools undertaken by the Ministry of Education is the “Piano Scuola Digitale” (Digital School Plan). This plan is divided into several actions but the most important is certainly the introduction of the IWB in the Italian schools. On October 2011 the Italian Ministry of Education says that in Italian schools there are 35.115 IWB. In the academic year 2009/2010 there were 361.133 classrooms, so the 9,72% of Italian classrooms has an IWB. The Trento Education Department has invested more on the introduction of the IWB in the schools because Trento is an autonomous province and has different resources: in this province there are 1.958 IWB and 3.410 classrooms, so the 57,42% of Trento classrooms has an IWB.

We thought that this initiative was a very good chance to investigate:

1. how the teachers do effectively use the IWB
2. the efficacy of the different IWB's uses by the teachers
3. how the schools support the teachers effort in introducing this innovation

We called our research *IWB@Trento project* and the case study was conducted in the “Giovanni Prati” High School. In this school teachers use technologies every day in teaching, not only the IWB but also eLearning and eBooks. At the time of our study (Spring 2011) the school had 475 students, 52 teachers and 23 classes, and 9 classes with interactive whiteboards.

In the first step we participated as observers in 10 classes of different topics' to get a general idea about how the IWB was used by the teachers. We observed 5 classes of *I Liceo* (third year of Italian high school, U.S. equivalent pre-K 11, Lower Sixth Key Stage) and 5 classes of *II Liceo* (fourth year of Italian high school, U.S. equivalent pre-K 12, Key stage Upper Sixth). The average number of student per classroom is 21, with a standard deviation of 1.33.

Later on we structured our study in two phases:

- *a quantitative analysis*: we conducted a quantitative data collection (by means of a questionnaire) with 31 teachers to investigate how they use technologies at work or in their life, what they think about the IWB, how many times they use it in their classrooms and how they used it. We focused on the difference between teachers who followed a training or not, trying to verify our hypothesis that *training has a decisive influence in the educationally competent way the teacher uses IWB*;

• *a qualitative analysis*: we concentrated ourselves on the deep analysis of our case study not trying to explore static phenomena, but the processes underlying these phenomena and their dynamics caught in their own context (Tarozzi, 2008). We concentrated in observing 18 lessons concerning humanities: 8 of Italian, 5 of Greek and 5 of Latin. Then we conducted a focus group with the school management staff; we interviewed 10 teachers and, finally, we observed teaching materials produced with and without IWB.

## 2. Discussion

### **Quantitative study**

The survey involved 31 teachers of different disciplines:

*Table 1 - Topics of the teachers' lessons*

Letters	19
History, Philosophy, Religion	5
History of Art	1
Foreign Languages	6

*Table 2: Do you use Internet for purposes other than work?*

No	6.45%
Yes, rarely	16.13%
Yes, often	45.16%
Yes, every day	32.26%

*Table 3: Age*

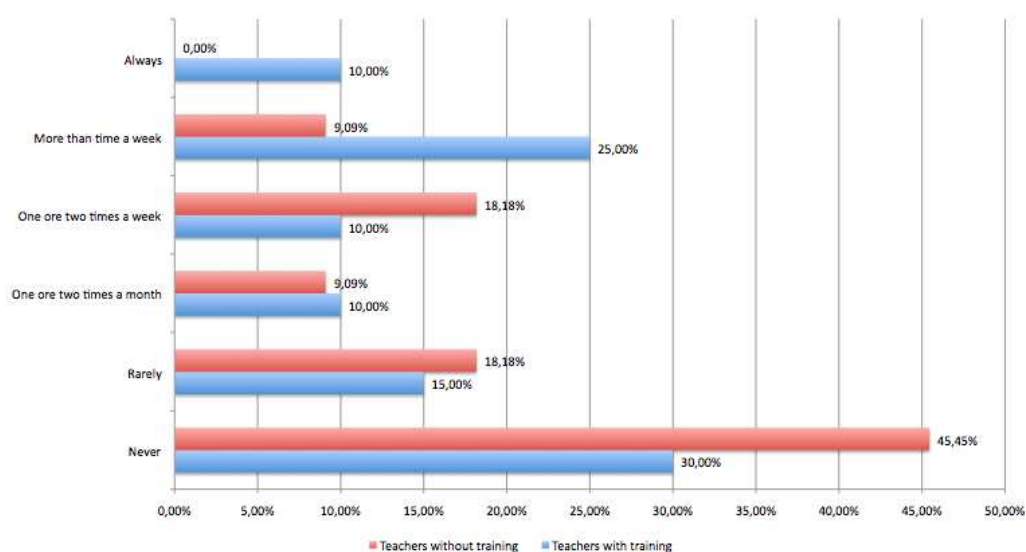
18-25	0
26-35	6
36-45	8
46-55	13
56-65	4

Table 4: How much do you feel at ease using computers and ICT technologies?

No way	3.23%
Not so much	9.68%
Enough	67.74%
Very much	19.35%

We asked how much, approximately, do the teachers use the IWB in their classroom. 20 teachers out of 31 attended training courses and in the following figure we present the different IWB's quantitative use in the case of teachers with and without training.

Figure 1: How many times do you use the IWB in classroom?



As we can see the teachers who attended the training courses tend to use more frequently IWB. But do they use IWB differently? We asked:

You use the IWB predominantly to (up to 2 responses):

- show websites or multimedia content found in Internet
- write notes, lectures and exercises
- show slides, specific software, movies, pictures or other off line materials
- connect to learning platforms (AVAC, eLearning etc...)

We tried not to influence the answers referring, in the question, to concrete actions instead of methodological theories.

The answers with the verb *to show* refer to a passive use of the IWB with the use of Internet contents or other teaching aids such as slides or movies. On the other hand the answers with verbs *to write* or *to connect* refer to a more interactive use (writing notes, lectures, exercises) and collaborative use (connecting to learning platforms). Here are the survey results:

Figure 2 - How the teachers use IWB

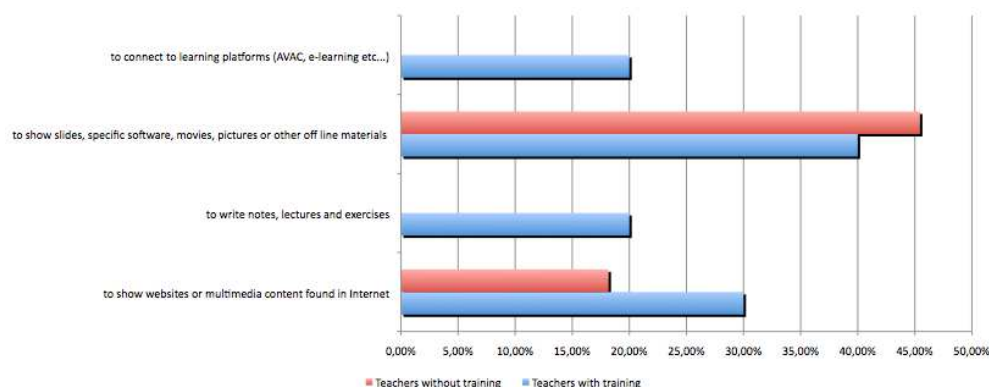


Figure 2 shows that all teachers who did not receive training on the use of IWB chose answers with the verb *to show*. Teachers who followed some training courses, as evidenced in the graph, make a more varied use of the IWB. It seems that not following the training courses exposes more to downgrading IWB to a projection device, just to show content.

91.00% of the teachers who did not have any training said that they would be interested in attending a training courses about the use of IWB, and this shows that the differences in the IWB use are not related to the teachers' motivation. The gender and age are not significantly influencing these results.

In conclusion, data shows that our hypothesis is confirmed as it seems clear that training affects positively teachers with respect to a conscious use of the IWB. Accordingly it is important to encourage the teachers' training if we want to build awareness for the potential of the interactive whiteboard making it something different from a computer connected to a projector.

Unfortunately it is not possible to conduct a further study about what kind of teachers' training is more effective because the teachers participated individually in different training sessions, organized by the school or by other institutions. Some teachers have also participated in private training courses. These diversified situa-

tions are also highlighted in the focus groups. On the website of the Ministry of Education, it is stated that 30,000 teachers have been trained in all of Italy, it is not, however, published a detailed training program with the objectives and expected skills.

### ***Qualitative study***

We conducted a focus group with the school management staff in order to understand what they think about how IWB is used in the school. It showed that the staff was very aware of how teachers use IWB in the school and that teachers of different departments were active in monitoring the use of the IWB in different subjects. Also we conducted interviews with teachers wanting to learn how better to use technologies, in particular the IWB, in a balanced, inclusive, effective and efficient way. The school organization therefore seemed appropriately careful in wanting to make better use of IWB.

The most important moment of our study was the observation of the teaching process, either with or without the aid of the IWB. We compared the different students' and teachers' behaviours, their gestures, their posture and their action of taking notes.

During our lessons observation we recorded three different ways of using the IWB:

- **Passive use**: teachers doesn't use the IWB with the relative software, so they write on the computer, often sitting behind the desk, and use it only to show slides or other material in a passive way, reducing the IWB to a simple computer connected to a projector;
- **Interactive use**: teachers use the IWB as a touchscreen device, standing next to it and controlling the computer by touching the IWB. Anyway, they do not use the specific software and they don't write on the IWB.
- **Collaborative use**: teachers exploit the full potential of the IWB, not reducing it just to a touchscreen device, but also using its specific software, writing on it by means of appropriate markers, preparing ad-hoc multimedia materials to allow the active participation of the students, customizing them in the classroom and publishing them online for the students for example in an eLearning platform (Ghislandi & Raffaghelli 2012).

We observed some Latin lessons during which the teacher produced a specially IWB designed material: he visualized on the IWB the original Latin text (*De Catilinae coniuratione*, chapter 5, Sallustio), without notes and comments. He provided the class with the same text on paper. The text is read, analyzed and commented by the teacher and by the students directly on the IWB, almost as they were entering the text, pointing out, erasing, highlighting and annotating. For what the content is concerned, we found substantial similarities to the traditional classes, but we found



significant changes about the feedback of the class that can be summarized on the following table.

*Table 5 - Analysis of differences in a Latin text analysis lesson with and without IWB*

<b>Analysis of a Latin text using traditional method (each student has his own book)</b>	<b>Analysis of a Latin text using IWB (with distribution to the students of a photocopy of the text)</b>
The teacher is sitting on the chair.	The teacher is standing near the IWB.
The teacher reads the book and teaches, students take notes on their texts. Students cannot see where teacher is pointing or what teacher is marking on his/her book.	The teacher can draw graphic signs on the IWB screen and everyone can see in which way he approaches the study of the text.
The students attention is divided between listening to the teacher and reading the book.	The students attention is focused at IWB, where they can see the teacher analyzing the text and the text itself.
The students complete their textbook with notes as the teacher explains.	The students notes on their books are the synthesis of what the teacher says and what he/she write on the IWB screen.

IWB creates a new proxemics in the classroom: the student goes near to the teaching post where the IWB is placed next to the blackboard; the teacher is generally upright and positioned in front of the blackboard, the student stands in front of the IWB where the pure Greek or Latin text is presented, without any dictionary, translations, notes or memos.

We observed the interaction between the students and the IWB, which was often conducted without the use of an appropriate marker, but simply with their hands. Through their fingers they changed colours thanks to the software, and textual analysis was carried out by colouring the subjects and the verbs in a different way, by dividing the sentences, underlining the archaisms and so on as required by the teachers.

The IWB role of digital integrator (Lee, 2010) is very powerful because it summarizes in a single place all the things necessary to the text approach, and that becomes a catalyst for the attention: the text itself, the powerful tools to analyse and highlight, the teacher and the student. Then, the teacher saves the text with all the

graphic signs made during the analysis and put it online, as study material for the next lesson.

The lessons in which the added value of the IWB could be better captured were those of Greek literature. The teacher behaved in the same way we described before. First of all, he prepared the materials IWB-based, scanning and projecting the Greek texts (Aristotele, *Poetica*, IV 1448 B) without notes and translations. The analysis was done using the IWB pen again, with all the advantages described above. Writing a Greek text with the computer requires particular skills, or at least to have the software or specific fonts for Greek alphabet. It is therefore possible for a teacher to present a Greek text using computer and projector and, if necessary, to write keywords using the computer. Thanks to the IWB, however, it is possible to project a scanned text, perhaps from one of the many old books of the school library and it's also possible to write on it, using markers directly with the IWB. This way to study Greek isn't really innovative. It recalls the time when it was not possible to distribute copies and was not so easy to have textbooks, so the teacher used to copy the text on the blackboard. Of course doing it in a digital way turns out to be much faster and also effective, due to the multimedia possibilities offered by the new technologies.

As far as the use of IWB is concerned, we observed some typical teachers' behaviour. More or less consciously they used to approach the IWB pointing at the parts of the text they were talking about, looking and touching them. This can only be a further contribution to convey the students' attention on a particular target. The use of IWB actually stimulates the body language and the direct interaction with the text, and this is strategic to improve the effectiveness of teaching. The teacher gesturing can zap between different teaching methods (highlighting text on IWB, reading the book, listen to the students, etc..) and he can guide attention by orienting his body and gestures toward the class, the IWB or the blackboard (Fernandez-Cardenas and Silveyra-De La Garza, 2010).

There is a growing awareness about the actual role played by the teacher in making more or less useful the presence of IWB in the classroom setting. The teacher mediate the interaction, facilitate the development of pupils' creative responses and orchestrate the various elements of education by harmonizing them (Wood and Ashfield, 2008), as it is probably true for any other technology incorporated within the classroom setting.

It is not the mere introduction of IWB in classrooms that improves learning and teaching. Any change in teaching and learning will be provoked by the cognitive and pedagogical effective use of IWB. This statement is about to improve the importance of the teaching style and the fact that often the teacher identifies his own academic and professional identity in it, and it intends to exploit the increasing complexity of teaching, that conveys the reality of experiences in new media (Mohon, 2008). For this precise reason, UNESCO has established the ICT com-

petency standards for teachers and, regarding the professional development of teachers, wrote:

*New technologies require new teacher roles, new pedagogies, and new approaches to teacher training. The successful integration of ICT into the classroom will depend on the ability of teachers to structure the learning environment in non-traditional ways, to merge new technology with new pedagogy, to develop socially active classrooms, encouraging cooperative interaction, collaborative learning, and group work. This requires a different set of classroom management skills to be developed. The key skills of the future will include the ability to develop innovative ways of using technology to enhance the learning environment, and to encourage technology literacy, knowledge deepening and knowledge creation. Teacher professional development will be a crucial component of this educational improvement. However, teacher professional development has an impact only if it is focused on specific changes in teacher classroom behaviours and particularly if the professional development is on-going and aligned with other changes in the educational system. (UNESCO, 2008, p. 9)*

Due to the potential that the collaborative use of IWB can have in education, it is necessary to further encourage its pedagogically sound use in schools. The research shows clearly that teacher training can have a significant impact on the correct use of IWB. But the lack of a sufficient training and a general culture in the use of this innovative media can lead them not to exploit the potential of the digital age. Culture, or the set of behaviours, actions, initiatives and attitudes that lead to a good use of technology, can not be achieved simply by introducing in schools artefacts such as IWB technology, but also encouraging high quality training.

### **Conclusions**

We believe that this lack of cultural backgrounds could happen also because IWB is not an ecological tool<sup>1</sup>. IWB is a tool designed for schools, in fact it could be found almost exclusively in schools. It is an object that is not present in the everyday life: it is an educational technology, used almost exclusively within the school context. It's difficult to promote the acquisition of a full awareness of the instrument because it's not experienced in other contexts different from the school's ones. Actually, pen, print, television, computers, Internet web sites are technologies used in schools but also well integrated into the social context, so teachers and students have the opportunity to see, use, and then experience them outside the school. The correct use of these technologies is accessible because there's more time to interact with them.

<sup>1</sup> From a cognitive point of view, we can define ecological a tool used in everyday environments of people's lives. The ecological approach in psychology is introduced by the American psychologist James Jerome Gibson, known for his studies on visual perception: he argued that psychological research could not be done only under the artificial workshops conditions, but it was also necessary to use an ecological approach, in the everyday environmental circumstances.

Our considerations do not imply that schools should only use ecological tools and don't have to use tools specifically designed for teaching. Nevertheless, we want to keep in mind the fact that IWB doesn't seem to be as ecological as other instruments and, consequently, this can bring to a certain difficulty in creating a cultural background that encourage a pedagogically sound use of it.

However, it is to be considered that the IWB appears to be close to a generation that we can call the touch-generation. This is a generation of children who are not only growing up with digital technologies and Internet access, but who are also increasingly reducing the mediation distance between them and the digital world. In fact keyboard, mouse and other devices are gradually disappearing, in favour of the touchscreens' direct manipulation. We can see more and more mobile phones with a touchscreen, and also a greater spread of tablet and touch technology in general, used in various contexts. For example during the TV news every evening: the journalist enlarges or reduces the different newspapers touching them on the screen desktop. In this sense, the IWB is in line with those generations who expect to touch and interact directly with the digital instrument.

The correct use of the IWB can give an overall increase in levels of attention, concentration and motivation, and can bring improvements in the processes of storage. In the process of innovation you may have some problems. To give an example: you can have a kind of relaxation given from having the materials ready and the possibility of downloading them from the network could lead to the fact that students do not invest much in producing notes during the lesson.

These considerations led us to two practical implications:

1. first, for educationally effective use of IWB it is necessary to balance carefully the use of multimedia resources to avoid a cognitive overload or otherwise to distract the attention on issues not relevant to the learning;
2. second, you must continually ask students not to receive passively the media content, but rather to interact, to create, to process information actively and critically (Schmid, 2008a).

Here following, on the table, we summarize the pros and cons of IWB in education.

*Table 6 - pros and cons of teaching with IWB*

<b>Pro</b>	<b>Against</b>
It can promote the motivation.	The motivating effect may vanish after the first phase of curiosity and enthusiasm, if the active profile doesn't constantly and interactively engage the students in first person.

It can help attention, focusing it in one place.	If IWB visual effects are too spectacular, you can achieve the opposite effect and consequently divert attention from the focus of learning.
It can promote collaborative and active learning lessons. This potential occurs only if the teacher has been trained on the cognitive and pedagogical potential of the IWB.	The risk would be to accommodate the student who, finding the materials ready online, does not apply sufficiently in class.
The IWB is a digital instrument and it is important to prepare students to approach the technology that they could use in everyday life.	The IWB is not cognitively ecological and therefore students can't easily experience it outside the school context.
It allows you to have internet access in the classroom, a sound system, a computer and what is necessary to teaching in the Digital Age.	There are similar tools that integrate into a single device the same features of the IWB. In some cases it would be cheaper to give a tablet for each student then install a IWB for a single classroom.

### ***Three approaches to digital technologies***

#### **The school as a counterweight to the digital society**

You might think that school has the task to re-enter the coordinates of space and time, waiting, reflection and mediation to which the Internet generations are no longer accustomed. Internet breaks the limitations of space and time, in fact thanks to copy-paste and all-and-now, you can make everything online, and you can do it easily. This perspective can lead teachers to believe that it is important that students develop, at least at school, the basic cognitive abilities that they exercise less in the context of everyday life. So they adopt policies to make skills and knowledge acquired and developed at school complementary to those learned in everyday life, by teaching them to wait, to cope with space and time, to listen, to concentrate on a single task rather than on many things at once (multitasking).

#### **The school accommodating the digital society**

The opposite perspective is to think that the school has to adapt itself to the rhythms and the styles of the digital era, introducing its languages, its means and its artefacts. It's necessary to enter more and more technologies in the schools by encouraging their use and their learning. You put educational content on the web, maybe on social networks like Facebook because it is widely used by students and

considered in line with their expectations. You try to adopt tools, languages and styles of digital natives, in some way chasing the next generation.

### **The integrative-balanced approach**

We believe that the school should take a balanced position, or better, it has to integrate various resources. It is essential that the school keep up with times, ways and demands of the society. It is important to put technology in schools. The school nevertheless has to strongly recover the educational role that distinguishes it, by educating to the use (without the abuse) and teaching respect, modulation and integration of different sources, resources and stimuli, promoting in this way the full cognitive and social development of the citizen.

Decisions about the use of learning technologies should not be based on preferences and styles of students, but instead on a deeper comprehension of what the educational value of these technologies is and how these may or may not improve the training process and the results of learning. This goal can not be achieved without the research and the testing of various technologies for the teaching in order to assess the effectiveness of these tools and, above all, by publishing the results and sharing them with the school community (Margaryan, 2011). In the light of this consideration, it is obvious that investing in a single specific technology, as the IWB or any other instrument, couldn't be the priority, but it would be better to invest in adequate attention to the human resource development. In fact, you should find out how to implement a training process that knows how to integrate and orchestrate significantly different multi-modal approaches (Littleton et al., 2010).

You should therefore start from human resources, not only in terms of training but also for study and researches, to prepare culturally people to welcome and take advantage from the technological resources, providing in this way the appropriate tools not only to exploit technology but also to choose the best technologies, which are more appropriate to the different contents. You can make investments for the purchase and integration of technologies in school's organizations, but always bearing in mind that the education is based on respect to the pedagogical and cognitive value of the technologies use (Yanez and Coyle, 2010). The technology diffusion has to be combined with studies about the impact of these technologies in teaching (Lewin et al., 2009).

As part of a well-integrated and balanced approach, it is important to use in teaching, above all, the computer connected to internet, which is an imperative instrument for the citizens of the digital society. Teachers who wish to undertake educational activities to give to the students the opportunity to use the computers are often forced to take the classes to the computer lab, with all the limitations that this movement entails: travel time, settling, dispersion of attention and so on. We believe that we should shift investments to have a tablet, or at least a netbook for each student in each class, because the computer is the tool that will be increas-

ingly present in their everyday life. It should be promoted and integrated an approach to provide teachers with the opportunity to use various teaching tools in an easy and practical way.

However, it is always good to remember that it is not the use in the classroom of the technology that may affect the learning styles or the cognitive variables. On the contrary it is the style of teaching adopted by the teacher that influences the learning and, consequently, how these technologies can be exploited in a balanced manner.

To sum up, the research revealed the following conclusions:

- The IWB, when used in a collaborative way, encourages the attention and the active participation of the students. It allows to adopt new teaching methods and to share online materials produced in classroom, in collaboration with students.
- The IWB is a tool designed specifically for the schools and therefore the students and the teachers have no way to experience it in everyday situations or for personal use. Unlike what happens with the computer, they have the opportunity to experience the IWB only using it in class or attending training courses.
- The teacher training promotes the proper use of IWB and helps to exploit its educational potential. Nevertheless at national and provincial levels, compared to other foreign countries, there has been a lack of adequate training design anticipating or accompanying the IWB's diffusion in school organizations in order to exploit its potential, and a disproportion between the investment implemented for the introduction of technology in schools and the one dedicated to the teachers training has emerged.
- Compared to other foreign countries there is not an appropriate research plan, in terms of monitoring and evaluating the incorporation of IWB in Italian schools.
- In general there's a lack of a cultural background that can foster an educational and cognitively efficient technologies' use in schools, because we tend to see education as a way to chase the technologies included in school's organizations.
- It would be necessary to help forming a brainframe that fosters motivation and positive attitudes with respect to the technology's inclusion in our schools, anticipating the pedagogical, methodological and technological training, even in university courses, where we tend to propose tests of literacy (ECDL) rather than educational use of technologies.
- This study should help institutions to understand how important it is to invest in the teachers' training, not only to improve the processes of teaching, but also to take advantage of the investments made for the purchase of technologies.

### Acknowledgments

The research was conducted at the High School “Giovanni Prati” of Trento, founded in 1540, which is one of the most ancient schools in Italy. In addition to Prati, also Alcide De Gasperi and Cesare Battisti studied in this high school, it is considered among the most prestigious school in Trentino.

### Credits

Although the ideas on the paper are completely shared by the two authors and the design of the paper was completely agreed by them, we want to say that:

Patrizia Ghislandi wrote the Introduction, Scientific Literature Analysis and Conclusion. paragraphs.

Michele Facci wrote the IWB@Trento Project: the research methodology and the Discussion paragraphs.

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### **Sitografia**

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