Effects of the Interactive Whiteboard (IWB) in the Classroom, Experimental Research in Primary School

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Abstract

Concerning new technologies, we live in a time characterized by constant improvements and updates in schools. The Interactive Whiteboard (IWB) can be considered a tool for education which promotes the development of skills and multiple intelligences. In recent years, the Italian Government has funded technology in educational institutions across Italy with an aim to widen resources as well as enhancing the learning experience for students, through a project called "The Interactive School".
The introduction of the IWB, in schools has been met with differing opinions amongst the teaching community. Many teachers have welcomed this technology with great enthusiasm whilst others believe that this is a fad within the industry and consider it a distraction to their profession.
The hypotheses of research stems from the curiosity about some questions raised by the teachers against the introduction of the IWB in their schools. These questions are about the potentiality of the use of the IWB to enhance the learning process and meet different cognitive styles as well as possible positive changes in terms of motivation, involvement, independency, concentration, attitudes towards the school environment, attributes and metacognition. In order to answer these questions an experimental research has been conducted in a primary school in Trentino.
The constructivist approach and the cooperative learning (CL) methodology has been applied in the theoretical framework of this study.
The results of the study showed that the use of the IWB in a constructivist frame can enhance the leaning process and influence learning styles as well as increase students' motivation.

1. Introduction

New technologies in teaching have never been greater and with the recent addition of the Interactive Whiteboard (IWB), teachers are able to integrate this tool into their lessons. The IWB is not only an innovative tool which meets cognitive and learning styles, but also different intelligences in a group class. This recent technology has inspired many teachers to further their expertise in teaching and facilitate learning. The purpose of this study was to question whether the IWB enhances students with acquisition and maintenance of learning. Furthermore, the research undertaken was to find out if cognitive styles [1] are affected by the use of the IWB and if it does positive changes in terms of motivation, involvement, independency, concentration, attitudes towards the school environment, attributes and metacognition.
The research carried out wanted to try to give concrete answers to the questions agreeing with Galliani (2000) stating that "we need to dispel some common misconceptions, unfortunately, [...] that the use of media cause learning automatically when in fact they are processes, or ways to use media to determine the learning outcomes [...] that a medium is superior to another (almost always the new technology than the old), while in reality are the ways of structuring the program and interaction with the student to cause a different quality of education" [2].

2. Methods & materials

The research was conducted in two fifth classes of a primary school in Trentino, Italy, for a total duration of seven months. The research design (Table 1) is based on two sample groups: the experimental group and the control group. The experimental group has organized its activities in Cooperative Learning using the IWB. The control group carried out its activities in Cooperative Learning without using the IWB, in a manner customarily used by the teacher. To perform the activities and lessons in the two sample groups was build a common design pattern that would make monitoring the activities carried out in order to keep under control all the variables, namely:

- activities were organized to take into account the variables that were investigated in the research;
- lessons have been formalized through repeatable processes and procedures in both groups.

All activities were carried out using the Structural Approach by Spencer Kagan [3]. In addition, all the activities planned were included in a generative learning environment where constructivist framework is the basis of the study. For this reason, the IWB has been used mainly by pupils in a cooperative way and not by the teacher.

Table 1
Research experimental design

GROUP	INITIAL ASSESSMENT	EXPERIMENTAL ACTIVITY	FINAL ASSESSMENT	AFTER 3 MONTHS
EXPERIMENTAL GROUP	Pre-test	Activities in Cooperative Learning using the Interactive Whiteboard (IWB)	Post-test	Maintenance test
CONTROL GROUP	Pre-test	Activities in Cooperative Learning without using the IWB	Post-test	Maintenance test

The research hypotheses were investigated through the use of measurements both qualitative and quantitative (Table 2) in order to get the best possible information in context.

Table 2
Quantitative and qualitative measurements

QUANTITATIVE MEASURAMENTS	QUALITATIVE MEASURAMENTS
Questionnaire QMS [4] Learning tests Maintenance learning test	Researcher diary record Video recordings Teachers structured observations Students qualitative questionnaire Circle time

Statistical analysis of the data obtained were performed by means of the program Statistical Package Social Science / SPSS (version 17). Specifically, the following techniques were used for data analysis: the t-test and correlation between pairs of variables (Spearman's rho).
In detail, to answer the first question the t-test was used as well as the Mann-Whitney test and the analysis of the frequencies of the learning tests marks. For the second question the t-test was used to analyse the QMS data and for the third question the t-test was used along with the correlation analysis (Spearman's rho) between the variables: motivation, involvement, independency, concentration, attitudes towards the school environment, attributes and metacognition, under investigation by the QMS.

3. Results

The results (Table 3) show that the use of the IWB has led to a trend which increases the level of pupils' learning of the class where the IWB was used. The evidence came from a comparison between the two sample groups before and after the research. The experimental group before the research had a lower level than the control group. After the study the experimental group has significantly improved its level, overtaking the control group. In addition, they had a greater permanence in time of knowledge than the control group.

Table 3
Learning tests results

GROUP		TESTS RESULTS			
		A	B	C	D
EXPERIMENTAL	BEFORE	17%	50%	33%	
	AFTER	67%	25%	8%	
CONTROL	BEFORE	43%	43%	7%	7%
	AFTER	29%	57%	14%	

A= best performance; D=worst performance

From the QMS data resulted (Table 4) that all the cognitive styles of the pupils of the experimental group were influenced as there was a small shift towards the style of visual/verbal since the IWB was introduced in their class.

Table 4
Experimental group cognitive styles

	Mean average scores and standard deviation				*T-TEST*	
	Pre		*Post*			
VARIABLES	X	*d.s.*	X	*d.s.*	*t*	*p*
Systematic/ Intuitive	11,0	1,5	11,3	2,1	-.33	n.s.
Global/Analytic	14,9	1,9	15,4	1,8	-.65	n.s.
Reflected/Impulsive	14,3	2,1	10,9	1,6	4.45	n.s.
Verbal/visual	11,0	2,1	11,5	1,8	-.60	.001*

*P<.001

The analysis of the correlation between pairs of variables (Table 5) showed an increment of pupils' motivation which was related to an increase of concentration and a positive attitudes towards the school environment. Moreover, an increase of independency was correlated to an increase of a positive attitudes towards the school environment and attributes. An increase of a positive attitudes towards the school environment corresponded to an improvement of the attributes.

Table.5
Experimental group correlation analysis

VARIABLES	Mot.	Invol.	Indip.	Concen.	Attit.	Attrib.	Metac.
Motivation				.43*		.48*	
Involvement							
Independency					.42*	.55**	
Concentration							
Attitudes towards the school environment						.44*	
Attributes							
Metacognition							

* P<.05; **P<.01;

4. Discussion

One of the objectives of the research was to find out whether the use of the IWB enhanced students with acquisition and maintenance of learning. The results showed that there was an increase of the students level. This finding could be related to the feature of this tool which enabled students to have more meaningful interactive experiences in the classroom, due to the fact that this instrument meets different cognitive styles and multiple intelligences. Moreover, students showed a greater maintenance of knowledge in time. In education the figure could be an indicator for the development of a methodology aimed at acquiring the skills that allow for learning throughout the life span (Life Long Learning).
The second question was about cognitive styles. The data registered a shift toward the verbal/visual cognitive styles in the experimental group. This variation could be interpreted according to the results obtained from a survey conducted by Wall, Higgins and Smith [5]. The visual style is particularly stimulated by the high number of images on the IWB. The pictures, help to understand the teacher's verbal explanation. The verbal style, however, benefits from the discussion and sharing ideas towards peers and the teacher about what is presented to the board. In support of this discussion there are the results of another research conducted by Slay, Sieborger and Hodgkinson-Williams [6], which highlighted as a large screen size allows easier viewing, facilitating the understanding of the concepts and the storage to what is shown.
The third purpose of the research undertaken was to find out if the use of IWB involves positive changes in terms of motivation, involvement, independency, concentration, attitudes towards the school environment, attributes and metacognition. From the data it was evident that the experimental class improved their motivation, concentration, independency and the attitudes towards the school environment. The trend of the data obtained from the research aforementioned, correlated with another research conducted by the Australian teacher Hounsell [7], who demonstrated a strong involvement of students in activities with the use of the IWB. K. Wall, S. Higgins, H. Smith [5] stated that motivation increases and helps students to get involved in the activity.

5. Conclusions

The introduction of the IWB in schools has raised new questions and attitudes which has led to different types of teachers: some have met this technology with great interest, convinced of its power to help learning and to involve students, and others who, by contrast, consider this technology to be a buzzword and not central around their teaching.
Compared to the expectations of the research, where it was assumed that the use of the IWB in a cooperative way led to a widening of the metacognition, it was found that this occurred only in the control group. In the light of this conclusion I believe that is necessary to design activities and lessons relevant on

this basis. Indeed, technology itself does not necessarily lead to expected results, as *"between new technologies, learning and cognitive processes are not deterministic relationships and, in some contexts, the technologies are inconsistent and in other misleading. Finally, may create opportunities to facilitate specific learning need to know then that the educational context grasp this potential internal and incorporate them into relevant and objective cognitive research to help find them happy integration points"* [8].

What emerges from the survey is that the balance may tilt to one side or the other depending on the use of the instrument. For this reason, the planned activities were included in a generative learning environment where the framework was the constructivist approach and the cooperative learning which ensured that the IWB was used mainly by students.

References

[1] Cornoldi C., (1991a) Stili cognitivi, in I disturbi dell'apprendimento, (a cura di) Cornoldi C., Bologna, Il Mulino.
[2] Galliani L., (2000) Le tecnologie didattiche, Lecce, Pensa Multimedia Editore.
[3] Kagan S., (2007) L'apprendimento cooperative: l'approccio strutturale, Roma, Edizioni Lavoro.
[4] Cornoldi C., De Beni R., Gruppo MT (2001) Imparare a studiare 2, Trento, Erikson.
[5] all K., Higgins S., Smith H. (2005) The visual helps me understand the complicated thngs': Pupil views of teaching and learning with interactive whiteboards, British Journal of Education Technology, vol.36, n.5, pagg. 851-867.
[6] Slay H., Sieborger I, Hodgkinson – Willilams C., (2008) Interactive whiteboards: Real beauty or just <<lipstick>>?, Computer & Education, vol.51, pagg. 1321-1341.
[7] http://iwbrevolution.ning.com/profiles/blogs/with-and-without-an-iwb
[8] Calvani A., (2009) Presentazione, in G. Bonaiuti, Didattica attiva con la LIM. Metodologie, strumenti e materiali per la Lavagna Interattiva Multimediale, Trento, Erickson.