WCES 2012

Quality of the learning environment in digital classrooms: an Italian case study

Andrea Garavaglia [a] *, Valentina Garzia [b], Livia Petti [c]

[a]*Dipartimento di Scienze Umane per la Formazione "R.Massa", Università degli Studi di Milano-Bicocca, Piazza Dell'Ateneo Nuovo 1, 20126, Milano, Italy*
[b]*Dipartimento di Scienze Umane per la Formazione "R.Massa", Università degli Studi di Milano-Bicocca, Piazza Dell'Ateneo Nuovo 1, 20126, Milano, Italy*
[c]*Dipartimento di Scienze Umane per la Formazione "R.Massa", Università degli Studi di Milano-Bicocca, Piazza Dell'Ateneo Nuovo 1, 20126, Milano, Italy*

Abstract

Over the past three years, a growing number of Italian schools have launched digitalization projects, integrating new technologies into their classrooms. There is a tendency for project leaders to acquire as many technological tools as possible for each classroom, based on the belief that this will significantly enhance the quality of the learning environment.The aim of the current contribution is to investigate the implications of this trend, using as a case study three classes at an Italian primary school. This school was selected for analysis because it had invested in a broad range of technological devices (electronic whiteboards, one netbook per child, interactive tables etc.), although starting out from a traditional scenario in which none of the teachers had experience of educational technology.Qualitative research methods, specifically student focus groups and teacher interviews were used to explore the students' perceptions regarding the change in classroom setting. The findings appear to suggest that technology is not critical to achieving a higher quality learning environment.

Keywords: digital classrom, learning environment, setting, one-to-one computing;

1. Introduction

Over the past three years, a growing number of Italian schools have launched digitalization projects, integrating new technologies into their classrooms (such as "Classi 2.0" or "Scuola Digitale"). There is a tendency for project leaders to acquire as many technological tools as possible for each classroom, based on the belief that this will significantly enhance the quality of the learning environment (Calvani, 1999). This tendency often goes hand in hand with interest in obtaining large-scale grant-funding, with a lesser emphasis on the didactic requirements of the

pupils and on the need to re-design the classroom environment in line with the new teaching methodologies implemented.

The aim of the current contribution is to investigate the implications of this trend, using three classes at an Italian primary school as a case study.

2. Methodology

In order to conduct an in-depth qualitative investigation, we focused on a primary school that had invested in a broad range of technological devices, starting out from a traditional scenario in which none of the teachers had experience of educational technology. This particular school was selected for analysis because all three classrooms involved were equipped with the devices most commonly found in Italian schools including interactive whiteboards, one netbook per child (William, 2000), and advanced technological tools such as interactive tables.

Qualitative research methods, specifically student focus groups (Corrao, 2005) and teacher interviews (Kanizsa, 1993), were used to explore students' perceptions regarding the change in classroom setting. Prior observation of lessons was carried out to develop an accurate and detailed understanding of the context, in terms of the characteristics of the classroom setting and the didactic methodologies implemented by the teachers alongside the technologies. We also observed photographs of the classrooms in order to analyze in detail the physical structure of the setting and the layout of furniture, school equipment and technological devices.

3. Student perceptions of the quality of the learning environment

The study yielded a number of interesting findings in relation to the introduction of technology into the classroom.

3.1. General outcomes of introducing technology into the classroom

To attain in-depth and complete understanding of the digital classroom setting, it is necessary to examine the primary outcomes of introducing technology into the classroom:

a)   Technologies were a popular topic with the children given their novel status within the school, but they were not the only key theme in the children's talk about the classroom. Many of the children's statements indicated that they considered other features to be equally as important as (or more important than) technology, such as having a garden close to classroom and clean desks (e.g. one child stated *"I was fine last year too, but this year the garden is next to our classroom, the desks are the same and they have been cleaned"*).

b)   The children tended to split into two groups: one group with a greater focus on the innovation brought about by the technology, and the other placing a greater emphasis on environmental features other than technology that enhance learning.

c)   The majority of children recognized the importance of the teacher, in all focus groups it was stated that *"first of all you need a good teacher, then you can consider using technology, but the teacher is more important"*.

3.2. Layout of classroom environment

The focus group discussions conducted with the students raised some interesting issues regarding space management within the classroom and the school.

First, technological devices generate new requirements: they must be handled with care and they occupy traditional working areas that were previously free and easily accessible. As one child said: *"the computer creates a lot of extra needs. It's a bit delicate and we have less space than before when we didn't have the interactive whiteboard or the interactive table. There was nothing and so it seemed more spacious... the chalkboard instead of the Interactive whiteboard left more space to play"*. Moreover, the netbook takes up part of the desk surface, giving

the child the feeling that this new device has reduced their personal workspace. The same applies to the teacher's desk, which now hosts multiple inter-connected devices.

A further key aspect emphasized by the children is the quality of the learning environment: the children declared a preference for a quieter and more peaceful classroom location as this endowed them with a greater sense of wellbeing. The digital classrooms in the case study were located in a quiet wing of the school, where the students were not disturbed by noise from other classrooms, and each classroom enjoyed direct access to the garden outside (as one child commented: *"here you feel good, there is much more silence, there are only three classes here and that's all."*).

A third issue to consider when designing a classroom setting is the management of daylight: it is necessary to ensure that the screen of the Interactive whiteboard and the chalkboard are clearly visible to all pupils in the classroom. Students in unfavorable positions reported problems in reading off both boards, due to the different lighting required to see each type of board properly.

Regarding desk lay out, there did not seem to be a consensus between pupils: some children preferred the desks to be arranged in groups, while others preferred them to be laid out in rows (the latter arrangement was that in place prior to introduction of the new technologies). For example, a child that preferred the group desk arrangement commented: *"For me it's better now, because before we were in rows and you couldn't see anything if you had heads in front of you. Now, everybody can see the boards, it's easier to see"*. In contrast, a child that preferred the desks in rows, said *"I was fine with the desks in rows because if someone wanted to ask you something, you were close to them, while this way you can't have more than one classmate right next to you, so you often have to get up"*.

Our analysis seems to confirm that preference for one desk layout or another is a personal matter and therefore it is difficult to identify an ideal solution that caters for every need (Genovese & Kanizsa, 1993). This issue may be partly related to the teaching methods adopted (Calvani, 2011) and partly to the need to solve the technical problems which constantly arise and cannot be managed by the teacher, leading the students to activate peer tutoring processes.

Regardless of desk lay out, most children preferred having technological devices in the classroom, as though technology had a special charm. At the same time, however, they could not justify this attraction, providing explanations that often seemed weak (e.g. "*it corrects me … it's nicer … it's easier*"). In addition, some children claimed to have developed a particular attachment to the devices (e.g. "*I'll never let go of the computer*.").

A change was also detected in teacher-student proximity: when correcting exercises in class, the teacher did not go around the desks checking the pupils' copies, but stayed in her place, using a remote software program to check the children's work and correct it directly on individual computers or on the Interactive whiteboard.

Finally, a change was also noted in student-teacher proximity: before the introduction of the Interactive whiteboard, when the teacher needed to display an image, the children went up to the teacher's desk to view it, whereas now the teacher displays images on the Interactive whiteboard or sends it to the individual netbooks. This means that the children stay in their place, losing a key opportunity to reduce the distance between themselves and the teacher.

3.3. Three critical issues regarding one-to-one computing

The focus group discussions brought to light some critical situations regarding the one-to-one computing setting model adopted in these classrooms.

First of all, the children tended to communicate with the classmate sitting to their left or right but not with the students seated opposite them, because they could see the same screen as classmates sitting beside them without changing position. It seems that the screen creates a communication barrier that discourages face-to-face communication. The children also seemed to prefer working in pairs or small groups as opposed to individually. On these occasions, it is unnecessary to have one laptop per child: "*I like most when we … how can I explain? When we work in pairs like we did this morning, because I was working with my friend, but she didn't have her computer … well, she has a computer, but today she didn't have it with her and it was great working together with her on one computer*".

Another critical point relates to availability of a permanent Internet connection to each student, even when it is unnecessary. Continuous access to Internet may lead to increased levels of distraction during lessons, as is clear from the words of this student: *"sometimes, when the teacher's not looking, my friend and I surf the Internet to look for new wallpapers for the desktop. Sometimes the teacher tells us to search for pictures on the Internet, but other times we surf without her permission"*. The students made it clear that these occasions are a sort of distraction coinciding with lapses in concentration, and as such these activities may not be considered multitasking processes. In fact, according to Bennet, Maton & Kervin (2008) multitasking may not be as beneficial as it appears, and can result in a loss of concentration and cognitive 'overload' as the brain shifts between competing stimuli (Rubinstein, Meyer & Evans, 2001; Sweller, 1988).

Finally, the computer is seen by all pupils as serving mainly for play, in fact the key point invariably emphasized is that it is fun to have a computer at school, with less than half the students describing availability of computers as a key educational opportunity. In particular, in one of the classes in our case study, the students spent the greater part of their break time sitting at their computers playing games by themselves. This suggests that it may be important for teachers to promote the idea of the computer as school equipment and an educational tool, recommending alternative uses of it to counter the temptation to use it for playing games or for other non-study related activities.

3.4. Three instances of the added value provided by technology in classroom settings

The focus group discussions pointed up three aspects clearly defined by the children as examples of added value offered by technology.

First, the large screen connected to a computer allows all the students to view multimedia objects more clearly than traditional school equipment. Students also had the perception that use of the Interactive whiteboard could enhance the teacher's explanations. This effect is likely to depend on appropriate use of the Interactive Whiteboard tools (such as underlining, enlarging, highlighting) which can help to explain concepts clearly (Penuel, 2006).

A second element of added value is the Internet connection, which allows the students to search on the Web for resources in real time during lessons and to communicate with people outside the classroom through video conferencing and other communication tools (e.g. one student stated "*this year during study periods we can search for particular resources on line, or connect with people who can help us...*").

Finally, computers allow multiple tools and resources to be integrated into one piece of school equipment. The PC is therefore an "all-in-one product", although it cannot be expected to substitute all traditional tools, with the children reporting that it does not simplify all operations: for example, the students considered paper and pencil more flexible and easier to use for drawing.

4. Conclusions

It is difficult to draw firm conclusions in an experimental situation like that described in our case study. The teachers interviewed clearly indicated that they required further training in use of the technological devices; in fact although they had undergone initial training prior to the beginning of the school year, they were still receiving ongoing training. The lack of competency reported by the teachers leads them to restrict use of technological devices and tools to when they feel confident that they can conduct the entire didactic process without too many technical problems. This means that most lessons are based on the teachers' technological know-how, whereas a better criterion for the use of technology would be its potential to solve a didactic issue or facilitate a learning process. This aspect also brings into play the overall didactic competence of the teachers; in fact, technology *per se* cannot solve the more serious or complex issues that can arise in schools.

Our findings should therefore be considered dynamic guidelines for the design of digital classroom settings. This study is also preliminary to further research on the introduction of technological devices into schools, such as a recently initiated, large-scale study monitoring a one-to-one computing project in the Piedmont region over a three-year period with the participation of 32 schools and 750 students.

References

Bennet, S., Maton, K., & Kervin, L. (2008). The 'digital natives' debate: A critical review of the evidence. *British Journal of Educational Technology*, 39(5), 775-786. doi:10.1111/j.1467-8535.2007.00793.x

Calvani, A. (1999). *I nuovi media nella scuola*. Roma: Carocci, (Chapter 2).

Calvani, A. (2011). *Principi dell'istruzione e strategie per insegnare*. Roma: Carocci, (Chapter 6).

Corrao, S. (2005). *Il focus group*. Milano: FrancoAngeli, (Chapter 1).

Genovese, L., & Kanizsa, S. (1993). *Manuale della gestione della classe*. Milano: FrancoAngeli, (Chapter 5).

Kanizsa, S. (1993). *Che ne pensi? L'intervista nella pratica didattica*. Roma: Carocci, (Chapter 3).

Penuel, W. R. (2006). Implementation and Effects Of One-to-One Computing Initiatives : A Research Synthesis. *Journal of Research on Technology in Education*, 5191(3), 329-348. Retrieved from http://proxy.lib.utk.edu:90/login?url=http://vnweb.hwwilsonweb.com/hww/jumpstart.jhtml?recid=0bc05f7a67b1790ea50545894de012dc329 da2757101a151db60af2b745a0ff9da496deb355a2e04&fmt=P

Rubinstein, J., Meyer, D. E., & Evans, J. E. (2001). Executive control of cognitive processes in task switching. *Journal of Experimental Psychology: Human Perception and Performance*, 27(4), 763–797.

Sweller, J. (1988). Cognitive load during problem solving: effects on learning. *Cognitive Science*, 12(2), 257–285.