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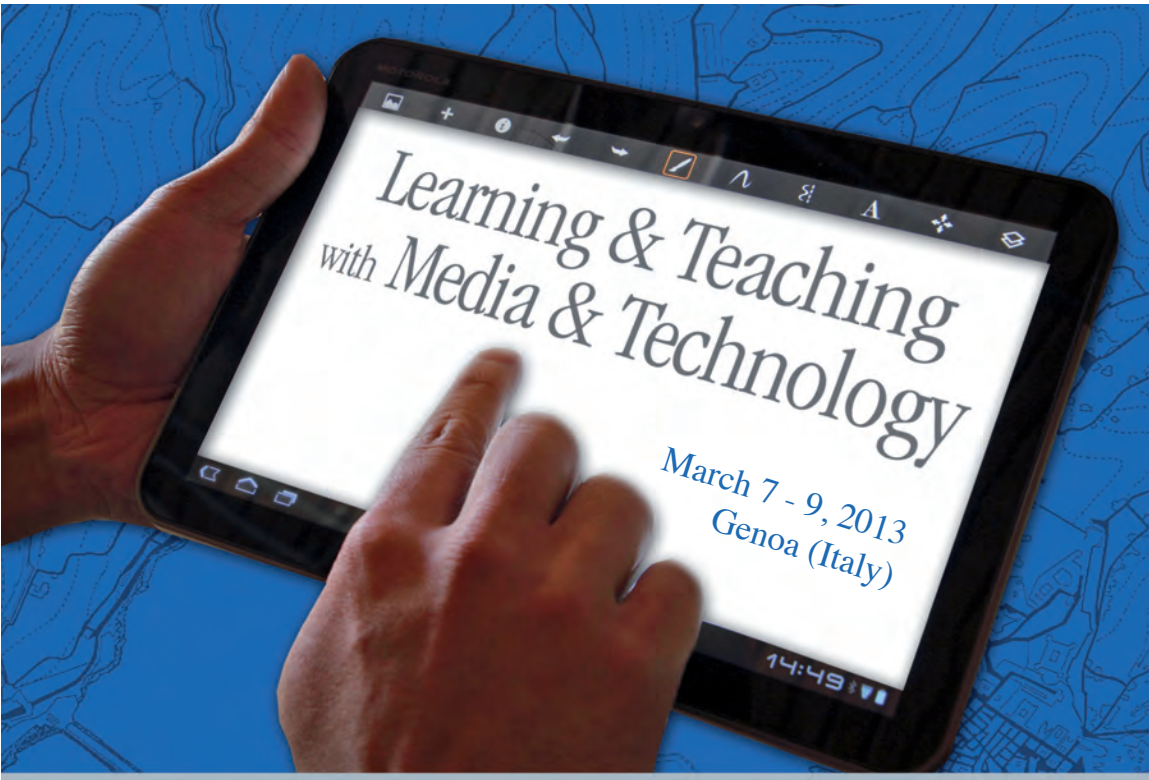

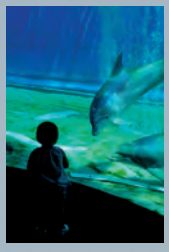

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Sustaining innovation: a research on the variables that enable ICT-based educational innovation

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Abstract
The article examines the impact and sustainability of ICT-based innovation in the secondary school. The work is based on an empirical research conducted in Italy, between the years 2009-2012 in 12 middle-schools in Piedmont, which were members of the Cl@ssi 2.0 national project. The paper focuses on verifying which variables have favoured, not fortuitous, but long-term sustainability of these innovative practices within schools. This research has identified four pivotal factors for the sustainability of ICT innovation: light and easy-to-use technologies; well balanced redistribution of work and incentives among all teachers; empowerment arising from digital competences and good relationships with the wider stakeholder system. Teachers play a central role in ICT based innovation at school therefore, more investment is needed in the "human factors" than on technology.

Keywords
Sustainability, learning technologies, human capital, innovation factors, ICT

1.The monitoring of the Cl@ssi 2.0 experience: a framework for investigating the long term sustainability of ICT projects

The "Cl@ssi 2.0" programme in Italy is part of a broader programme, based on the "Digital Classroom of tomorrow" (DCOT) concept.

The goal of "Cl@ssi 2.0" was to the check if, and how, technologies can modify the learning environment and support relevant changes to teaching practices.

The project started in 2009 in 156 Italian secondary schools.

The present paper focuses on the experimentation carried out in the Piedmont region, in which 12 classrooms were involved, in conjunction with other research analysis carried out by the authors, in the last two years, on digital innovation, the relationship of schools with the web 2.0 culture and the changing relationship between students and teachers (Taddeo & Tirocchi 2012a; Taddeo & Tirocchi 2012b).

The aim of this contribution is to analyse the long-term sustainability of such an ICT project, trying to empirically highlight, from a sociological point of view, both the individual and systemic factors that were the driving forces behind the best results achieved in the classrooms.

The project was part of a longer experimental path, which has brought about an evolution in the idea of school innovation. In fact, as Mosa underlined (2009), compared to the first initiatives, such as the "forTIC" project in 2002, and then the "Apprendere digitale", "Digiscuola", "Innovascuola" projects right up to the DCOT initiatives ("Isole in rete", "Piano diffusione LIM" and "Cl@ssi 2.0") the approach has changed, passing from a technology-centred approach, in which the main investments were on hardware and on the introduction to generalist software, to a user-centred approach, in which more attention is paid to the single users (teachers and students) and to the specific, didactical contexts of usage.

The need to work more on "human factors" within the projects of digital innovation is also underlined by the European Digital agenda 2020: a recent survey conducted by the European Commission (EU, 2013), which collected and benchmarked information from 31 European countries, on the access, use, competence and attitudes of students and teachers regarding ICT in schools, highlighted how an integrated approach to ICT teaching in schools is needed. This means not only investing in infrastructure but also, and to a greater extent, in teachers' training, in rewards for teachers that use ICT in the classroom, and creating ICT coordinator posts.

This study also underlines that Italy is still behind in the European process toward the digitalisation of schools: in fact, while Scandinavian and Nordic countries (Sweden, Finland, Denmark) have the best equipment, students in Poland, Romania, Italy, Greece, Hungary and Slovakia are most likely to lack the right equipment.

However, the same study claims that good technological equipment is not the main factor in true digital innovation: the survey shows how often lack of equipment does not mean lack of interest: in fact, some countries with the highest use of computer equipment are the ones with the lowest scores on equipment provision (e.g. Bulgaria, Slovakia, Cyprus and Hungary).

Research evidence shows that simply putting computers into schools is not enough to impact student learning.

According to the research "Monitoring and Evaluation of ICT in Education Projects", (Wagner et al., 2005), three main issues must be considered in terms of the impact of ICTs in education:

- student outcomes such as higher scores in school subjects or the learning of entirely new skills;

- teacher and classroom outcomes such as development of teachers' technology skills and knowledge of new pedagogical approaches, as well as improved attitudes toward teaching;
- other outcomes such as increased innovativeness in schools and increased access of community members to adult education and literacy.

In this framework, the impact of digital innovation must not be considered only in relation to measured and circumscribed effects, but also to a more systemic and global capability to involve and renovate the whole school, intended as a system of intertwined stakeholders: students, teachers and also parents and local communities, and to impact on a rich system of attitudes, capabilities and values in the long term.

Another important factor in evaluating the impact of ICT projects is to their ability to respond to long term sustainability, during and beyond the scheduled funded project and to produce broader effects than those foreseen in the initial phase.

In accordance with this approach, we wanted to measure what were the factors that, starting from a given level and similar investment in classroom technology, really influenced the success of the various projects and impacted on the long term change of each school.

In order to achieve this, the research was conducted with a multi-method, qualitative investigation approach, based on:

- analysis of the annual self-evaluation reports, produced by teachers, related to the perceived success of the implemented initiatives and to the factors that contributed to greater or lesser success;
- monitoring of the long term activities and of the main educational products that had a continuous and consistent use;
- direct interviews to 10 teachers.

These materials were coded according to a multiple grid based on the following elements:

- perceived success and failure factors related to the adopted technologies ("state of the art" technologies, internet connection, continuity of access);
- success and unsuccess factors related to teachers' previous attitudes and digital skills;
- success related to organizational factors, relationships among teachers and type of teamwork;
- success and unsuccess factors related to the wider context and to the schools' stakeholders.

In particular, with regards to these technologies, we wanted to explore if the quality, quantity and updatedness of the adopted technologies in each classroom was perceived as a determining factor for the success of the project.

Furthermore, we investigated teachers' attitudes taking into account their "technological style" and preliminary level of digital competence, as well as their general attitudes towards being "innovators" and "early adopters" (Rogers, 2003); we also examined the presence of "leaders" and tried to identify the structure of teachers' networks, in order to link the success of the project to specific social and professional patterns.

By using longitudinal monitoring and the teachers' self-evaluation reports, we finally acquired an in depth understanding of the relationship that each classroom created with the "external world": the aim was to investigate whether the ability to create positive relationships, both within the school and in the wider stakeholder system, could be considered an influential factor for the sustainability of the projects.

Taking into account of all the above-mentioned factors, we attempted to draw a more rich and complex scenario of the multitude of human, technological and organisational factors that determine "the success" of an ICT project in schools.

2. Theoretical framework. Innovation and sustainability at school

The "Cl@ssi 2.0" programme, therefore, is part of a broader frame of interpretation related to school innovation and educational use of ICT. In this respect, before illustrating the research data, it could be useful to better define the concepts of innovation and sustainability in schools, trying to explain the peculiarity of our theoretical approach.

According to several references (Mioduser et al, 2004; Biondi, 2012) school innovation can be defined as a process, which implies schools are using ICT:

- to implement innovative teaching and learning methods, also showing evidence of significant changes in teachers' and students' roles;
- to re-organise school learning spaces and time management;
- to support personalisation of the teaching and learning process;
- to develop close relationships with the local environment (other schools, companies, associations, parents and families).

So, a real innovation could be defined as a significant paradigm shift where substantive changes take place in the school system as a whole.

The concept of sustainability is probably more complex to define, because it has different meanings depending on the context to which it refers. Generally, the definitions of sustainability are related to sustainable development and so have to do with: living within the limits, understanding the interconnections among economy, society, and environment or equitable distribution of resources and opportunities. From another point of view, sustainability refers to the ethic dimension of the adoption of technologies and, finally, it could refer to the possibility to maintain innovations in a long-term perspective. So, sustainability is a very important issue for school innovation, also because many promising innovations disappear when project funding ends, so in such cases the concern is how might the innovation be sustained. According to Adelman and Taylor, sustainability is «in terms of institutionalizing system changes» (Adelman & Taylor, 2003, p. 2).

Besides, «despite the growing body of knowledge about school reform and special education practices, researchers know little about the extent to which innovations are sustained over time and what factors influence their sustainability» (Sindelar et al., 2006, p. 317). For this reasons, research should address more systematically the factors and processes that support sustainability, to avoid that technologies come back to lie in laboratories and that teachers continue to carry out a traditional way of teaching. In studies on classroom reforms, researchers have identified three main factors related to sustainability: district (referred to the American context) and state policy, leadership, and teaching/classroom factors. In research on the sustainability of school-wide reform, an important factor in the sustainability is school culture: «schools with shared vision and cultures of communication and shared decision making, and schools that involve teachers in the design of an innovation, are more likely to sustain innovations» (Sindelar et. al, 2006, p. 318).

An OECD study about the adoption of ICT at school, demonstrates that external project funding, links with universities and the presence of impressive technology all place additional pressure on a school to make good use of ICT (OECD/CERI, 2001). But this conclusion raises a question about whether this change can be sustained once these external factors are withdrawn. The concept of sustainability applied to the "Cl@ssi 2.0" programme mainly concerns the possibility of preserving the innovations set in place in the three year project: holding on to all the changes in the physical learning environment, maintaining the changes in the teaching and learning methods and preserving the new way the relationship between school and extra-school environments is conceived. Briefly, sustainability means ensuring the survival of the innovation model, even without the funds provided and even facing the replacement of most of the actors involved.

3. Sustainability factors: an overview

3.1 Is the medium the success?

Due to the high value that the ministerial Cl@ssi 2.0 guidelines attributed to the role of technology, we examined, first of all, whether some technologies were considered more strategic and useful than others in driving innovation and causing a deep paradigm shift.

In order to do so, we started with an overview of the technologies adopted in each classroom at the beginning of the project, and compared it with the final technological landscape of the classrooms at the end of the project. Furthermore, we asked teachers to tell us precisely not only what they used more frequently, but also about their process of "domestication" (Silvertsone & Hirsch, 1992) of technologies and the progressive path of discovery, personalization and adaptation that they accomplished in order to fit these technologies in their daily didactic scenario.

Several interesting considerations can be shared on this point.

All the classrooms started from a technological landscape based on a LIM (interactive multimedia dashboard) plus a notebook, netbook or a PC for each student, according to an approach which stressed, at the same time, the "spectacularization" of the didactic method (Taddeo & Tirocchi, 2012a), to gain students' attention and engagement, and personalization, allowing each student to work autonomously.

From this general and shared scenario, we noticed that not all digital innovation had the same long-term impact on the experimentation: open software (platforms, in particular) and mobile technologies have been considered more strategic and useful in the long term transformation of schools, compared to proprietary and "stand alone" media.

Irrespective of the specific technology, tools that were able to adapt to the context and change over time, were considered more suitable in the context of school innovation.
Examples of such type of tools, software and contents were, for example:

- Google Drive and other cloud computing tools (e.g. Dropbox) for sharing contents and creating dynamic and smart exchanges of resources;
- Facebook for managing and supporting student engagement, instead of closed communities and Learning Management Systems;
- Basic and easy-to-use mobile devices (e.g. I-pad, tablet) instead of more powerful stand alone dock stations.

Light, modular and easy to use technologies and software also reduced the cognitive and ergonomic effort, allowing a more flexible approach and the possibility to experiment with less cost and fear of failure compared to powerful and complex multi-purpose technologies (such as PCs) and didactic tools (such as the traditional Learning Management Systems).

In conclusion, the classrooms that adopted these types of technologies had a more dynamic, flexible and adaptable approach to innovation, showing a better capability to change over time and to support the project according to their needs and contexts.

3.2 The role of human networks versus digital ones

Another goal of the research was to investigate the type of relationships, group dynamics and organizational contexts that teachers experienced during the project: we wanted to analyse what kind of relationships developed among teachers and which model of teamwork characterized the activities of each school, identifying the social patterns that led to better results and satisfaction during the project.

According to our observation and the results of the interviews, we can affirm that in almost all -schools only a handful of teachers pull the whole group.

There was no real network and peer to peer distribution of the daily innovation work, rather a "scale free" network (Barabási, 2012) in which few nodes centralized and managed the main part of the cognitive, cultural and motivational resources of the project.

This situation, detected at the beginning of the project, remained essentially unchanged during the three years of the project: technologies did not modify the power relations between teachers and the team structures, so the earliest nodes in the network became the biggest innovation hubs of today. This is often called the "Matthew Effect" from Merton's famous paper (1969), and is also sometimes called "cumulative advantage". The bottom line is that there is a bias toward more connected nodes.

This phenomenon, which Barabási detected in the structure of the Internet, as well as in the social networks, is recognizable also in the teacher's network in our schools: teachers who at the beginning constituted a "hub" for their colleagues, delivering contents, sharing competences, managing web resources such as blogs or simply proposing experimentations at school, continued to cumulate importance and detain a strategic role during the Cl@ssi 2.0 project, despite the common technological habitat, and that communication technologies introduced by the project could leverage the advantages and favour a more distributed circulation of resources.

In this manner, the network of knowledge, online resources as well as skills and competences supported by the Cl@ssi 2.0 project, has replaced the human, cultural and social network previously present in the group, maintaining also the same "hubs" and leadership roles.

We can also underline that leadership in digital innovation is likely to be positively associated with a larger interest and proactive approach to school innovation and that the role of "hubs" and "leaders" tend to be static in such contexts due to the substantial unattractiveness of this role for teachers.

In fact, teachers do not consider being a leader and "early–adopter" as a real added value in improving their actual professional condition:

- they don't obtain money or economic benefits;
- they must be responsible for the whole network;
- there is no balance and reciprocity among the colleagues: the workload due to being a "hub" in the network of digital innovation is often cumulated with the other work, and it's not compensated by the effort of colleagues in other fields.

Thus, being leader in one's school is an anti-economic choice and it is non sustainable in the long term: we can conclude that technology by itself is not sufficient to drive new organizational set-ups in schools and to create a more dynamic and balanced teamwork among teachers, but specific incentives and social intervention must be planned to boost the creation of additional leaders.

3.3 Digital competences: a key skill to promote

A key factor that affected the sustainability of the "Cl@ssi 2.0" project concerned teachers'-technological skills, and in particular the issue of digital competences, in relation to constraints and opportunities in the digital scenario, particularly that of the web 2.0 environment. According to Calvani, Fini, Ranieri «digital competence consists in being able to explore and face new technological situations in a flexible way, to analyse, select and critically evaluate data and information, to exploit technological potentials in order to represent and solve problems and build shared and collaborative knowledge, while fostering

awareness of one's own personal responsibilities and the respect of reciprocal rights/obligations" (Calvani, Cartelli, Fini & Ranieri, 2008, p. 186).

These skills have become strategic because of the increasing importance of digital technologies in the knowledge society and the consequent attention given to Media Literacy and to Digital Literacy also in school projects and curricula. The issue of digital skills was, therefore, treated already with reference to the 1.0 digital environment, and even more so in relation to the convergence culture and the so-called participatory web.

Firstly, there is a deep gap between the digital skills of students and those of teachers (although this does not mean that kids use technology in a more conscious way). Secondly, not all teachers use digital technologies in the same way, because "access" is not the only element which affects digital competence.

The subject of teachers' digital skills is related to four other important issues:

1. the issue of digital divide. Has the "Cl@ssi 2.0" programme helped to increase or decrease the digital inequality among teachers?
2. "Materials" factors (time availability, support of the head teacher). Have these factors had an impact on teachers' willingness to innovate?
3. the "human" and emotional factors: the interest of students and the "fun" of teachers in making lesson;
4. the importance of being a "leader" in the project.

With reference to these factors, the analysis showed that teachers already proficient in the use of new technologies increased their competence, while those who were on the edge of innovation, maintained their lack of competence. An important element was, however, the "peer to peer" channel activated by the more competent teachers to teach these technologies to colleagues.

In addition, teachers with greater availability of time and with the support of the head teacher more easily developed innovation.

The motivation of young people and their positive reactions to change in the learning environment were key factors, as well as the enthusiasm and the desire to have fun while teaching, which all contributed to turn a challenging enterprise into a pleasurable one.

3.4 The role of stakeholders: schools talk to the local community

The presence of local community stakeholders in the school was a fundamental factor for many classes. In some cases, the constant contact with local government and the activation of partnerships with local companies proved to be a big factor of sustainability because it allowed schools to:

- enhance the symbolic role, visibility and prestige of the school (and of the reference teacher) by advertising the project within the local community;
- emphasize the importance of fundraising as a source of additional funding for the project;
- support the project by means of peer-to peer local community involvement (mayor, councillors, cooperatives, etc.).

The role of stakeholders is strategic for school enhancement in the local community as well as vital in ensuring that teachers are seen as strategically important for their entrepreneurial, policy making and planning capabilities.

4. Conclusions. Not only technologies: the importance of human factors

The research data discussed in this article highlights the importance of assessing the validity of innovation processes on the basis of their durability and persistence in the long term. The "Cl@ssi 2.0" programme represents an important occasion of innovation for Italian schools, but, as with many other projects, it runs the risk of nullifying its positive effects, after these three years of work.

So, what are the factors that could favour the sustainability of this project in the long term? We can summarize the results with reference to the four above-mentioned factors:

1. investments in digital technology must play an ancillary role compared to the investments in the human and social capital of the school: above all, they should be flexible and fit the needs of teachers. For example, the level of broadband and Wi-Fi connectivity was more important than "updating" the device. 'Innovativeness' in terms of mere presence of advanced technology is not the issue that significantly affects the impact and sustainability of technology-based innovation;
2. more distributed networks need to be created, by increasing the desire of teachers to engage themselves as leaders. This could be done by encouraging (with symbolic incentives, but also material ones) teachers to become "hubs", that are able to push and disseminate the innovation. Innovation had a slow degree of diffusion in the teaching staff and followed an exclusive peer-to-peer model based on a few strong nodes;
3. digital literacy must be spread among teachers, promoting the acquisition of digital skills, trying to level the "competitive advantage" of the more competent, through specific training paths;
4. teachers must be motivated to play a central role in the system of local stakeholders, through the construction and maintenance of positions of centrality. The link between teachers and the wider system, both physical and "virtual", of educational institutions, private stakeholders and students' parents is a determining factor when embarking on the journey towards innovation.

So, the element that emerges most strongly from the results of our analysis is the importance of the human factors, opposed to the centrality of technologies, considered as the most important driver of social and pedagogical change. Human factors are related to the notion of human capital. The term "capital" implies a usable productive resource and the concept of human capital involves a person's knowledge, skills, and expertise and is acquired through the development of skills and capabilities that enable people to perform in new ways.

From our point of view, therefore, human capital is represented by all the human resources involved in the project: first of all the teachers, but also the schools head teachers, the students, the families and the local administrators, involved in the project in various ways.

Among the factors related to human capital, certainly, teachers represent the most important resource. The role of teachers in Italian schools, as shown also by IARD surveys (Cavalli, Argentin, 2010) has always been a difficult one. Teachers think their role is characterized by a lack of professional prestige and their public image (even the one built by the media) is not particularly positive. Nevertheless, some researches show that teachers have expressed a positive attitude towards technological innovations related to ICT, despite their traditional resistance to innovation. This same spirit of openness was also evident with respect to the "Cl@ssi 2.0" programme.

Teachers, in fact, have been shown to play an important role in all the phases of the project:

- in the design and start-up activities;
- in the early stages of implementation in individual classrooms;
- in the monitoring activities required by a self-assessment support group;

- in the closing phase of the project;
- in the transition to the next teaching cycle (teachers take classes from year 1 to year 3 and then start again with a new class), to ensure the continuity and thus the sustainability of the project.

Of course, we must consider-teachers as part of a larger network of human factors (such as school staff, local administrators, principals, universities, and so on), but they probably represent the most important hub. All these factors interact and the teacher's possibility/ability to act, also depends on the context and on its individual characteristics.

We hope that, in the future, policy makers will develop policies for schools that will take into account the centrality of the human factor, reducing the deterministic vision and the symbolic importance that has historically been attributed to communication technologies.

References

Barabási, A.L. (2002). *Linked: The New Science of Networks*. Cambridge: Perseus.

Biondi G., (2012), Emergenza/Sistema. Innovazione e scuola. In Anichini A. (Ed), *La didattica del futuro*, Milano-Torino, Pearson, pp. 23-34.

Calvani A., Cartelli A., Fini A., & Ranieri M. (2008), Models and Instruments for Assessing Digital Competence at School. *Journal of e-Learning and Knowledge Society*, 4 (3), pp. 183 - 193.

Cavalli A., Argentin G. (Eds) (2010). *Gli insegnanti italiani. Come cambia il modo di fare scuola*. Bologna: il Mulino.

EU (2013), Survey of schools: ICT in Education. (Retrieved May 04, 2013, from: http://europa.eu/rapid/press-release_IP-13-341_en.htm).

Merton R. K. (1968). The Matthew effect in science. *Science*, 159, pp. 56-63.

Mioduser D., Nachmias R., Forkosh-Baruch A., & Tubin D. (2004). Sustainability, Scalability and Transferability of ICT-based Pedagogical Innovations in Israeli Schools. *Education, Communication & Information,* 4 *(1),* pp. 71-82.

Mosa E. (2009). Innovazione scolastica e tecnologie didattiche. Dai corsi di aggiornamento all'assistenza on the job, *TD-tecnologie didattiche*, 48, pp. 22-31.

OECD/CERI (2001), *ICT in Innovative Schools: Case Studies of Change and Impacts*. (Retrieved May 04, 2013, from http://www.oecd.org/site/schoolingfortomorrowknowledgebase/themes/ict/ictandinnovativeschools.htm)

Rogers, E. (2003). *Diffusion of Innovation (5th edition)*. New York: Free Press.

Silverstone, R. & Hirsch, E. (Eds.) (1992). *Consuming Technologies: Media and information in domestic spaces.* London/New York: Routledge.

Sindelar P. T., Shearer D. K., Yendol-Hoppey D., & Liebert T. W. (2006). The Sustainability of Inclusive School Reform. *Council far Exceptional Children,* 72 *(3),* pp. 317-331.

Taddeo G., Tirocchi S. (2012a). Learning in a 2.0 classroom: results from an empirical research in the italian context. In Pumilia-Gnarini P., Favaron E., Pacetti E., Guerra L. & Bishop J. (Eds), *Handbook for Didactic, Strategies and Technologies for Education*. Hershey, PA: IGI-GLOBAL, pp. 57-67.

Taddeo G., Tirocchi S. (2012b). «Re-tweet the teacher...» Are Italian teachers «followed by» or «following» the Web 2.0 culture? *REM*, 4, *(2)*, pp. 219-234.

Wagner D., Day B., James T, Kozma R.B, Miller J. & Unwin T. (2005), *Monitoring and Evaluation of ICT in Education Projects: A Handbook for Developing Countries*. Washington, DC: infoDev /World Bank. (Retrieved May 04, 2013, from http://www.infodev.org/en/Publication.9.html).