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THE USE OF COMPUTERS AND MULTIMEDIA IN THE ITALIAN KINDERGARTEN, PRIMARY, AND LOWER SECONDARY SCHOOLS IN RESULTS BY EU PROJECT SECURE RESEARCH ON THE USE OF COMPUTER IN ITALIAN COMPULSORY SCHOOLS

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Abstract

The European Project SECURE, investigating the curriculum of mathematics science and technology, provide a relevant set of data related to the actual situation of the scientific education in the base schools. On the base of those data, the actual situation of the use of the ICT technology in the Italian school is analyzed and addressed to highlight the main characteristics and the main critical points.

1. Introduction

The main goals of the SECURE project are to provide relevant and rigorous research data and translate them in recommendations that contribute to the debate among policy makers on mathematics science and technology curricula and their objectives in a way that address the balancing between the needs of training future scientists and the broader social needs.

A total of 11 partners in 10 countries, of which 7 universities and 2 pedagogical institutes are involved in the project: Katholieke Hogeschool Kempen University College, Dienst Katholiek Onderwijs vzw, Universität Graz, University of Cyprus, Technische Universität Dresden, Università degli Studi di Udine,, Nationaal expertisecentrum SLO, Uniwersytet Jagiellonski, Univerza v Ljubljani, University of Gävle, Nottingham Trent University.

The cores of the project are: the analysis and the comparison between the objectives and the contents of the scientific curricula in the involved countries.

In different contexts of the research in education, the definition of “curriculum” has different meaning (Beauchamp, 1986; Pinar et al., 1995; Walker, 2003) which have substantive distinctions between them (Clements, 2007).

As theoretical framework of the research, the van den Akker (2003) theory represented by him as a curricular spider web (Fig. 1) with the addition of the motivational aspect was placed at the ground of the analysis.

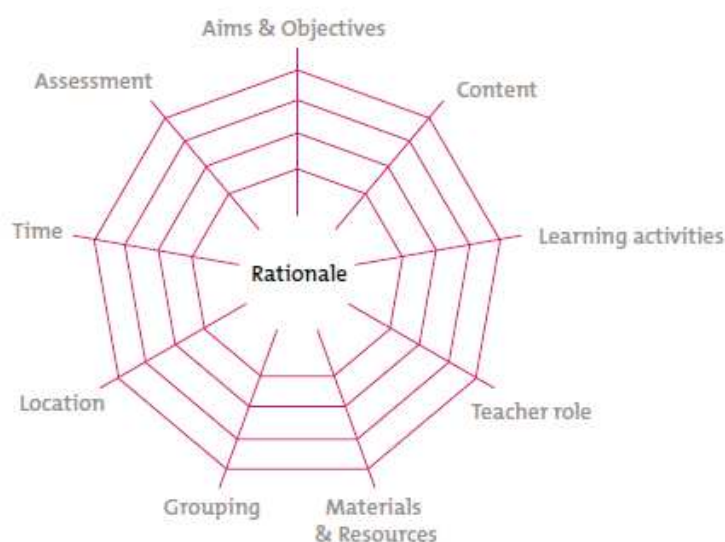


Figure 1: van den Akker's representation of the curricular spiderweb.

The SECURE research was focused on the analysis of the curriculum of mathematics science and technology of 5, 8, 11 and 13 years old learners. This analysis was done at different levels - Supra (international), Macro (national), Meso (school, institute), Micro (classroom, teacher), Nano (individual, pupil) – by using grid for the analysis of the official documents, and questionnaires and interview to investigate pupils and teachers opinions.

To investigate the national documents a specific grid based on the Bloom's taxonomy was developed and all of the curricular documents of the involved countries were analyzed. To investigate pupils opinions, two different version of the questionnaires were developed: one for the 8 year old pupils and one for the 11 and 13 years old and semi-structured protocol of interview. The two versions of the questionnaires differ for the number of questions (97 and 108, respectively) and the number of options available for the close replies (3 and 4 respectively).

Questionnaires and interviews were also performed with teachers by preparing questionnaires and protocols of interviews depending on the subject matter taught. In this paper will be presented the results emerging from the investigation of the technology curriculum in Italy (Michellini & Vercellati, 2012).

2. The investigation of the Italian official ICT in school curriculum

Two documents were analyzed: the curricular indication of the 2004 and the one of the 2007.

In the former, emerges how there is not an explicit mention of ICT as regard the 5 y.o. pupils (kindergarten), while it is explicitly mentioned for the 6 y.o. pupils (first year of primary school) where are mentioned elements related to the earlier approach to the use of the computers: i.e. know the main component of computers, be able to turn on/off the computer, begin to use internet, perform simple educational games. At 8 y.o. – third year of primary school – word processing and web search activities are introduced and developed in the following two years of education, where are also reported the capability to create simple web pages and the use of didactic software concerning elemental calculus and geometry. The 11 and 12 y.o. represents the first two years of lower secondary school. At the end of those, pupils had to know the functioning of the operative systems and to be able to use real time communication network and “translate” algorithm in a program by means of the use of simple programming language. The organization of information in information structures, the capability to ménage at distance and remote activities (i.e. automation, telecommunication, teleworking...) and the knowledge of the first useful element needed to obtain the European Computer Driving License (ECDL), are the final goals for the base school in Italy.

In the 2007 Curricular indication, specific ICT goals are related only to the 10 and 13 y.o. pupils (i.e. at the end of the primary and lower secondary education. At the end of the primary school, pupils had to be able to use computer tools and communication in situations of games and relationship with others and to use new technologies and languages to develop multimedia works across disciplines to present the results and to enhance the

communication skills. For the 13 years old, instead, they must be able to use the new technologies and multimedia languages to support their work, advancing hypotheses and validating them to evaluate themselves and to present the results of the work and ad to be able to look for information by selecting and synthesizing them, developing their ideas to be able to share them with others.

3. Pupils' and teachers' perceptions of the ICT in Italian curriculum

In Fig.2 are reported the distribution of use of the learning materials during the class of mathematics, science and technology.

For all of the subjects matter and for all of the pupils, but the technology class for 8 y.o., the most used learning materials is the textbook. In detail, as regards mathematics, computers are only occasionally used, while video are almost never used with the exception of the 8 y.o. pupils, where the use of such learning materials is more frequent even if also in an occasionally way.

In science the situation is similar to the ne reported for mathematics, even if the use of videos is more often. For technology, as for the other subjects, the distribution of the use of the material for the 8 y.o. pupils differs from the other. Here, it happens in more manifest way, because in the Italian primary schools the technology is often seen as coincident with the use of computers, while

in lower secondary it is a wider subject.

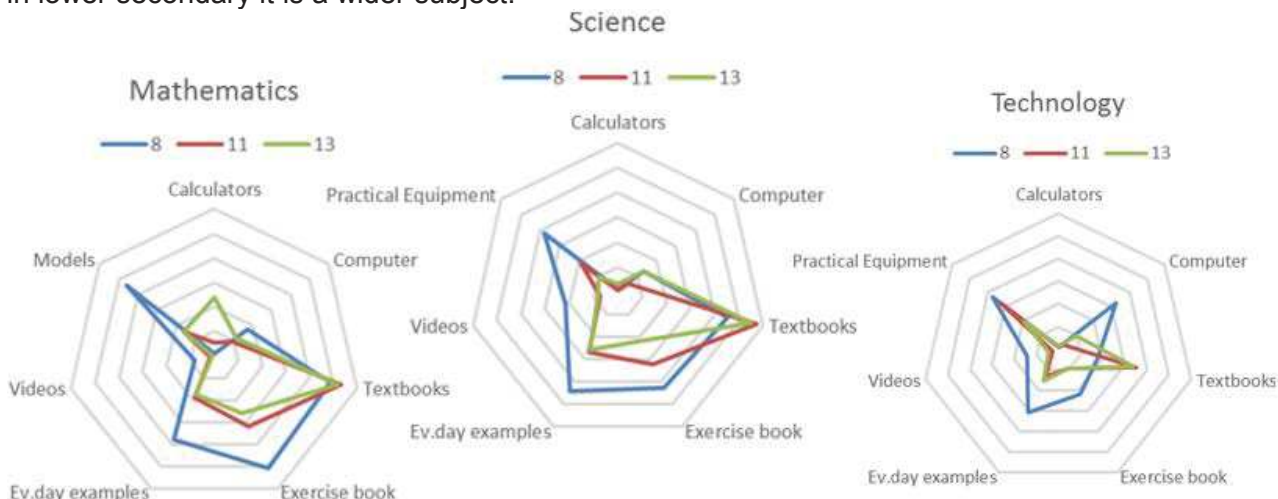


Figure 2: Pupils' use of learning materials during their class of mathematics, science and technology

From the teachers point of view this picture is confirmed: the two ages in which the use of the computer is more often are 8 and 13 y.o. Generally it is more use in relation to activity of science and technology, while for mathematics it is an occasional role; Fig. 3.

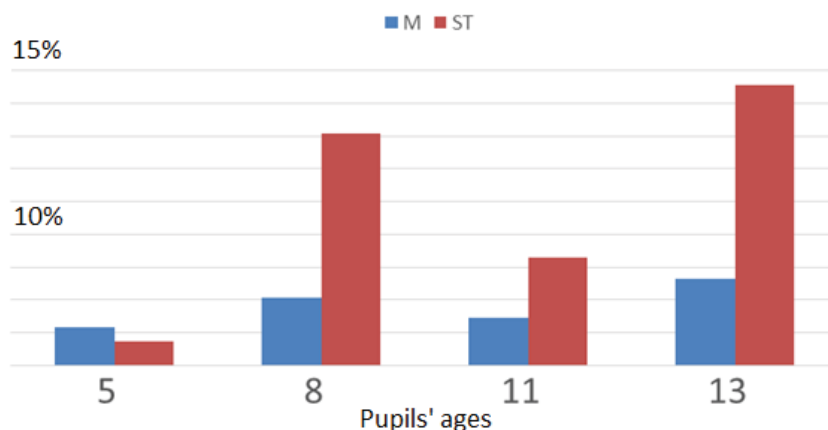


Figure 3: teachers' replies about the use of computer in class.

This low use of computer in the school practices was investigated among three factors: the lack of hardware, software and support in the use of the ICT devices. As could be noticed by the distribution of replies reported in Fig.4, the main limitation factor is the lack of support. It is highlighted in all of the involved ages, while the lack of hardware and software are more peaked in secondary schools becoming the main factor for the 11 y.o. pupils.

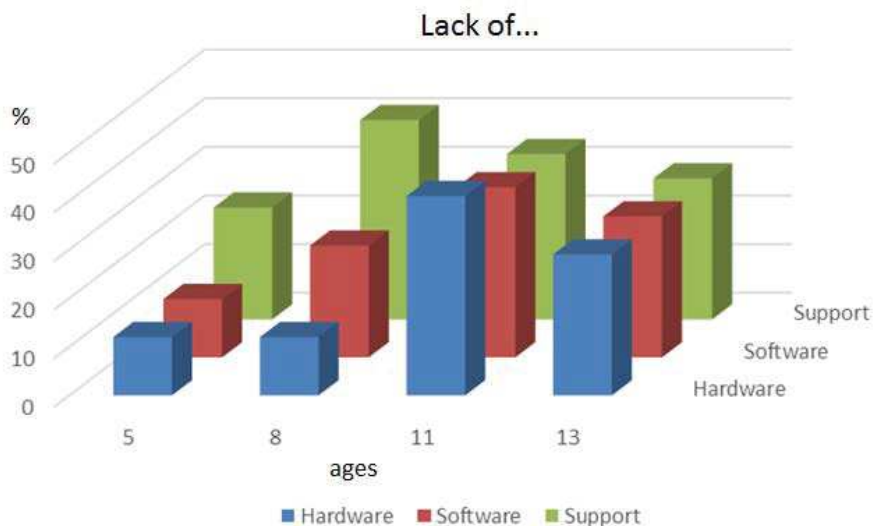


Figure 4: distribution of the limitation factors for the use of ICT in class.

From the analysis of the interviews, 2 on 6 of the 11yo teachers of mathematics and science used the IWB to show video and picture (mainly in science) and to do better geometric drawings (mainly in Mathematics). During the use of computers in class, pupils work mainly alone even if peer cooperation activities are allowed and promoted. Almost all of the teacher of 5 and 8 y.o. denoted a lack of textbooks and proposals of activities for children of that ages, while emerge a big work of designing and preparation of the leaning material by some teachers (mainly in primary) who do a big amount of work of design and develop by their own learning path for their students.

4. Conclusions

The analysis of the collected data allows the reconstruction of the actual situation of the Italian schools as concern ICT, providing information about the frequencies with which the multimedia materials are used during the learning activities. Teachers and pupils vision appear to be in accordance. Even if, with several projects and initiatives, the multimedia materials were introduced in school, they are not frequently used even if pupils appreciate them. Teachers found in the lack of support the main limitation factor in addition to the lack of textbooks and organic proposal for the use of ICT in the subjects the reason of it. Nevertheless, there are several teachers that, by they own, try to overcome this situation providing to their pupils learning materials and self-designed learning path. Indeed what emerges is a gap between the intended goals written in the curricular guidelines and the school practice even if some individual teachers or small groups of teachers are working on this issue, but this is not enough. A focused work on the development of content related proposals has to be done to address systematically this problem providing teachers with clear and effective strategies for the use of the multimedia materials and the ICT in the teaching of their subjects.

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