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Digital classroom and students with learning disorders: a study to improve learning processes and teaching practices

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Abstract

This study is an overview of the technologies used by students with learning disorder (LD) and has the purpose of investigating how and the conditions on which digital technology can be an integral part of a motivating and barrierless learning environment also for students with special educational needs. Classrooms of the 21st century could be equipped with a teacher's PC, student devices, e-board, Internet connection and a full suite of technological equipment, content, software and applications specially designed for education. The aim of this research was to observe whether the didactic work carried out in digital classrooms is beneficial to students with LD. By comparing data from the quantitative analysis and the observations carried out in the classroom, it is possible to affirm that the introduction of technologies in the classroom provides the benefits described by international works on this topic.

Keywords: *special educational needs, information and communication technology, primary school, secondary school.*

Introduction

With the expression "Specific developmental disorders of scholastic skills", the diagnostic manual ICD-10 labels all the "specific" disorders that refer to a specific skill domain that prevents the normal acquisition of some scholastic skills (WHO, 1992). Depending on the specific ability affected, these disorders take a different denomination: dyslexia (specific reading disorders) when the disorder affects both speed and accuracy of reading; disorder of written expression if the disorder affects writing, in particular handwriting and the graphic aspects or spelling and mathematics disorder when calculation skills are impaired in both the organisation of the numerical cognition and the executive procedures.

In Italy, the right of every student of any grade and age to have a personalised didactic and the help of assistive technology both at school and at university is guaranteed by the Law 170/2010 "New standards about scholastic learning disorders" and the "Guidelines regulating the right to education of students with scholastic learning disorders" attached to the D. M. 5669/2011.

The introduction of compensatory tools to facilitate the instrumental aspect of the performance affected by the disorder gives students the possibility to read a text using the text-to-speech software, while the student who wants to write a text can do it using a video writing program and the student who has to perform a math exercise can do it by using a calculator.

The didactic aspects are in full right part of the clinical discussion about the rehabilitation procedures. If on the one hand international clinical studies are trying to define some guidelines, based on the evidences of the neuroscience for diagnosis and treatment of specific learning disorders (LDs; Schulte-Korne, 2016), on the other hand, there is a question whether it is always right to rehabilitate specific disorders (Lucangeli, 2014). Does it make sense to do it with students who are beyond the school age finalised where procedural learning is relevant? (Zanzurino, 2015).

Stella (2010) points out that speech therapy comes into play when the child shows phonological and metaphonological problems during the early stages of scholastic learning, remembering that the logopaedic rehabilitation and the other proceedings to reduce functional difficulties are recommended from the end of the first class of primary school or at the beginning of the second class of primary school if there is a strong diagnostic suspect of LD. However, it is a little bit premature to diagnose dyslexia and dysgraphia before the second year of primary school and to diagnose dyscalculia before the third year of primary school.

After the first years of primary school, it is believed that to continue with the rehabilitation, it is better to rely on other specialists such as educators and specialised teachers who, unlike therapists, follow cognitive psychology and special pedagogy in constant interaction with the scholastic and extra-scholastic educational processes. A very

important role in this process is played by assistive technologies, to help students meet with the request of both school and society in a lifespan perspective.

The World Health Organization (WHO; pag. 101) defines assistive technology as "any item, piece of equipment, or product, whether acquired commercially, modified, or customised, that is used to increase, maintain, or improve the functional capabilities of individuals with disabilities". Common examples of assistive devices are crutches, prostheses, hearing aids and cochlear implants for those with hearing impairments; white canes, magnifiers, ocular devices, talking books, and software for screen magnification and reading for people with visual impairments and communication boards and speech synthesisers for people with speech impairments.

Assistive technologies, when appropriate to the user and the user's environment, have been shown to be powerful tools to increase independence and improve participation, but when we talk about new inclusion technologies, we are not necessarily talking about highly advanced technological instruments. In fact, we have several technologies available to support learning in inclusive environments; these can be grouped into conventional technologies, normally available in commerce, such as laptops, tablets, interactive whiteboards and smartphones, and assistive technologies (TA), which compensate the difficulties and limitation in accessing new technologies, such as medical aids (mobility devices and hearing aids) and learning devices (screen reader, alternative keyboard, communication devices and other specialised technologies) (European Agency for Development in Special Needs Education, 2013).

In a more inclusive perspective, the use of these devices should be implemented not only at home or during the rehabilitation process but also in school. The international literature on this topic (international surveys) can count on the contributions of Singleton with his revision of public data (2009) regarding the effect of specific teachings about progress and results on students (from age 5 to age 18) with dyslexia (Singleton, 2009, pag. 123), detecting the benefits that the use of a computer can give to students with LD:

- enhanced motivation
- individualised instruction
- delivery of immediate informative feedback
- provision of an active learning environment and
- capacity to monitor the pupil's performance in real time.

It is clear that the number of factors identified in these researches (Blamires, Stansfiels & Miles, 2009), in addition to the evidences regarding the use of technology (O' Connel, Freed & Rothberg 2010; Rose & Gravel, 2010) and the inclusive didactic planning (CAST, 2010; Novak, 2016), is the main ingredient to build a privileged classroom environment where a student can grow up in a positive way. A review (Surma, Forlin & Furlonger, 2015) defines the introduction of evidence-based educational practices and appropriate assistive technologies as fundamental criteria to build a standard in support of the students with dyslexia and to build an inclusive learning environment.

Mitchell (2014) suggests 27 educational strategies in support of an inclusive teaching and learning model in which the emotional, social and cognitive aspects play an important role. Fortunately, according to Mitchell (ibidem, p. 197), all the elements can be modified by effective teaching strategies. One of these strategies is based on the use of assistive technologies and their ability to improve the skills of students with special educational needs and also the skills of students with LD.

Referring to studies of Hattie (2009), Mitchell suggests an interesting fact, namely, a more effective use of the computer when:

- there is pre-training in their use
- there is a diversity of teaching strategies
- there are multiple opportunities for learning
- when feedback is optimised and
- when the student, not the teacher, is in control of learning.

1. Research design

What does the introduction of the technology change in the everyday didactics? How does it change teaching practices? Can these practices facilitate pupils with learning disabilities?

The research takes the moves from the hypothesis that by changing the setting through technology, also the teaching practice will change, benefitting students with learning difficulties also.

Starting from these questions, the research describes how and in which learning contexts the constant and widespread use of technologies by qualified teachers can improve the learning process of all students, particularly of those with dyslexia.

The study sample included 10 digital classrooms of 7 public Italian schools: 8 classes from primary school and 2 classes from secondary schools, located in Umbria and Lazio regions, for a total of 186 pupils, 6.5% of whom were with dyslexia, and 39 teachers.

The unit of analysis was composed by the class involved in the digital classroom's projects, projects that guarantee a technology donation in every classroom together with a specific teacher training.

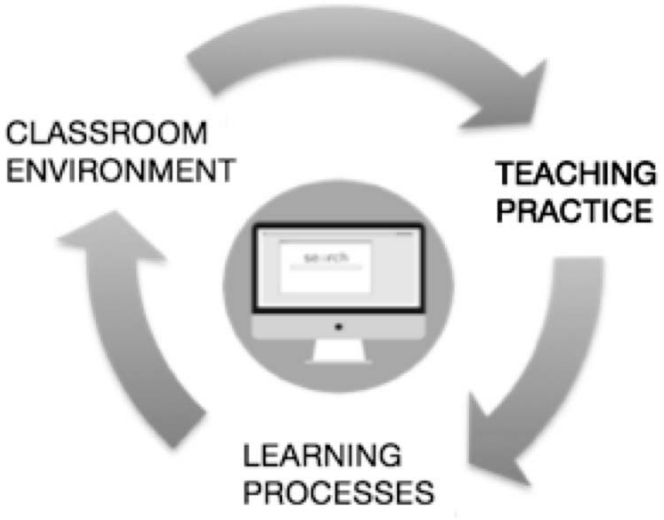

Fig. 1 Trends emerging from the three areas of the circular pattern

This circular pattern (Fig. 1) shows that class context, teaching practices and learning process are closely linked and dependent on each other. This pattern wants to highlight this complexity that not only makes the study of educational dynamics really fascinating but also makes it very difficult to have a deep command of the subject. The goal of a research based on the analysis of the practices is to know, according to complex and integrated logic of the comprehension, the dynamics related to the educational practice.

The target is not only to understand how the teachers, in the case of scholastic practices, act in a given context but also to understand the meanings of this action, the expectations and the tacit knowledge involved, in order to examine the practices and to problematise them, so to improve and promote the educational quality, a quality that concerns the multiple aspects of the practice, but first of all the teacher's action in relation to the context and the student.

1.1.Method

The research strategy, which has a prevalent interpretative feature (Trinchero, 2002), required the combined use of appropriate detection techniques, according to an integrator template that allows, in a systemic perspective, to identify the effects of mediation and situational processes (Altet, 2003) on the interactive behaviours of teachers and students mediated by digital technology.

The research used the mixed methodology (McMillan & Schumacher, 2010; Mertens, 2014) to collect, analyse and integrate quantitative and qualitative data. Quantitative data include information such as performance instruments (standardised tests). The analysis of this type of data consists of statistically analysing. Qualitative data consist of information gathered through interviews, discussion groups and observations. The analysis of the qualitative data (word, text, video) follows the path of aggregating it into categories of information.

Trying to understand, even partially, the complexity of digital classrooms as physical and social contexts in which teachers and students interact and are the players of a cyclical teaching and learning process, has required the use of different tools, both qualitative and quantitative, designed ad hoc and standardised.

As can be seen from figure 2, the three aspects analysed in the circular pattern shown before have been studied by the means of different investigation devices:

- Tools for the study of the class context: this series of instruments includes videotaped observations performed in all classes, preceded by short semi-structured interviews with teachers and the narratives of the researcher, a descriptive report about the observation in the classrooms, guided by a special observation grid.
- Tools for the analysis of the teaching practices: they refer to the documentation based on the teachers' reflections about their own work in class. Here, we have a lesson plan model and the transcription of the topics that came out from the discussion groups about the analysis of the videos.
- Tools for the analysis of the learning process: two types of standardised tests have been used (both writing and study tests) and also a survey for the students.

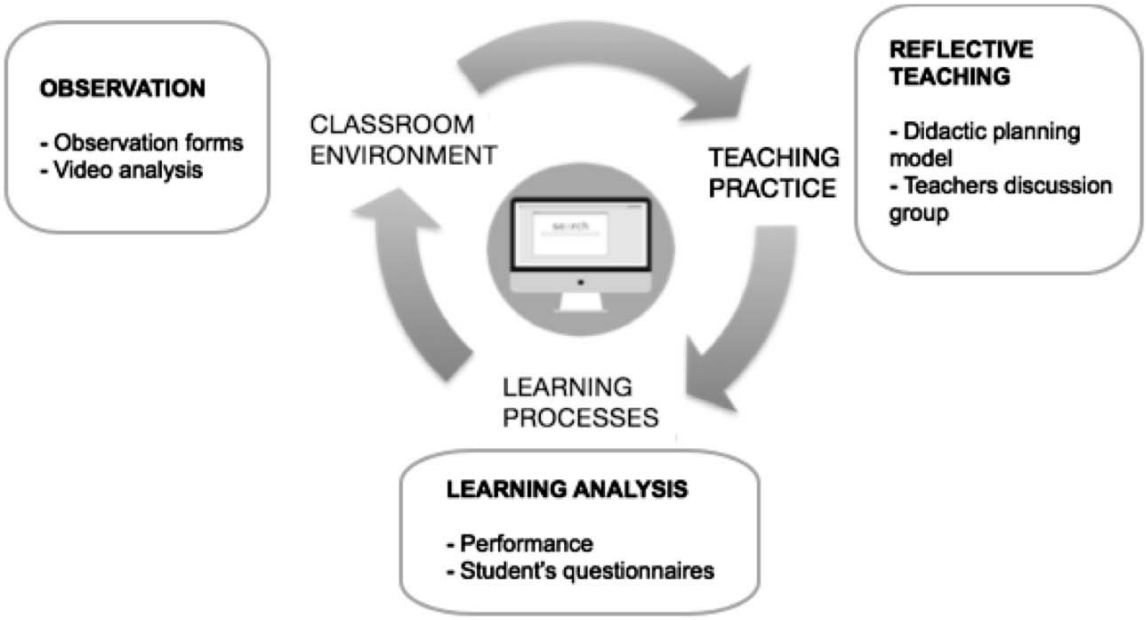

Fig. 2 Research's instruments

1.2 Observation

The observation has been carried out in all the classes following the same steps:

- Visits to the schools where the classroom observation would have taken place, in order to allow the researcher to know the teachers and the students.
- The parents of all the students taking part in the project signed a consent form.
- The teachers planned the activity that would have been observed. The activity had to include the use of digital technologies and had to be based on geography and history or Italian language, subjects that better suit the purpose of the survey.
- The researcher interviewed shortly the teacher before the observation. The teacher has been asked to describe the class context and to indicate any students with SEN or LD in that class.
- Video registration of the didactic activity was then observed by the researcher.
- The researcher then documented the observation with photographs and notes collected while compiling the observation grid, which allowed to record:
  - context data (school, class, observation date, observation time and school subject observed)
  - organisation of the space (position of school desks, blackboards and different technologies)
  - operating modes of the technologies (how the students approach the technologies, who uses the technologies, integration of the new technologies with traditional didactical instruments, use of technology during the tests)
  - organisation of the didactic work by the teacher
  - attitude of the teacher and attitude of the students towards the technologies they used
  - time organisation
  - use of technology by the students with LD; the goal is to observe if in a class equipped with technological devices, we obtain the positive effects identified by Singleton.

1.3 The video

In this study, we followed the model of the video for teachers' professional training (Santagata, 2014). Santagata describes an approach to teacher training based on the analysis of the teaching/learning process, thanks to videotaped lessons, and called it "Lesson analysis framework" (Santagata & Stürmer 2010, pp. 11-12).

The use of video registration is part of the research experimental plan that uses observation as a methodology that allows the researcher to describe and understand what he or she has analysed (Paparella, 1997). In this research, referring to the lesson analysis framework model, it was necessary to define the four fundamental aspects suggested by the model: objectives, type of videos, guide to watching and evaluation, in order to submit them to the teachers during

the discussion. In our case, the aim was to analyse how the learning setting can change with the use of technologies, which are the didactic practices used by the teacher in a digital classroom and how the role of the teacher and the role of the students change in a digital classroom. The videos submitted to the teachers are 15 minutes extracts from the lesson.

1.4 Activity plan

The lesson plan form that the teachers were given had a linear structure, and it was divided in the three main parts of the didactic activity (preparation, execution and revision). Moreover, this tool was very valuable when it comes to the documentation of the activities done, and it is very useful later, when it is time to reflect on the strategies and practices used during the activity. The form was given to the teachers before the classroom observation and was used as a scaffolding on which designing and realising the activity with the students planned for the day the researcher would go to school to observe the classes. The same form was later used to promote a discussion about this experience among the teachers.

1.5 Discussion groups

Discussion groups were not only used to collect data to understand the dynamics of the research but also ensured the teachers some helpful training activities. The teachers were encouraged to go beyond a first impression and were supported and guided during the analysis and observation of behaviour and decisions taken; the point was not to focus solely on the actions of the teacher in the video but to widen it on a systematic reflection on their own teaching style and the effect it had on students' learning. To ensure this, the discussion that followed the vision of the videotapes was focused on the points set in the description of the activity.

Discussion groups were organised in every school in which an observation took place, and every group was made up of the teachers who did the didactic activity the day of the observation, two researchers of the University of Perugia: one was the same who performed the observation in the class and the other led the discussion, other teachers who took part in the project and headmaster/mistress (only in some cases).

The analysis covered the following topics:

- How the students used the technologies
- Organisation of the work in class
- Who was in charge of the devices used
- Timing for the use of technologies in the classroom
- Training programs to promote basic computer skills to enable the students to use all the devices
- Perception of feelings of frustration from the students in case of malfunction of the technology.

1.6. Standardised tests

During both the initial and the final phases of the research (after the first half of the school year and at the end of the school year), the students faced two different standardised tests. The goal was to understand if the introduction of the technology has led to improvements in student performance.

In fact, the pretest was a written traditional test, while the last test was computer based.

In the first classes of the primary school, the writing evaluation test called "Io scrivo (I write)", evaluating and building writing skills (Re, et al., 2001), was used.

In the last classes of the primary school and in the secondary school, the test AMOS (skills and motivation in study: evaluation tests for students from age 8 to age 18) (Cornoldi, et al., 2005) was used.

Quantitative data analysis was elaborated using the software SPSS, calculating the statistically significant differences (t-test) between the mathematical average of number of words and the number of errors in written texts in the pretest's (M41.71 numbers of words and M6.9 percentage of errors) and posttest's (M48.82 numbers of words and M4.2 percentage of errors) phases, and the mathematic mean of the scores gotten in the test AMOS from each student.

1.7 Survey to the students

At the end of the research, all the students involved took part in an anonymous evaluation survey. The survey was online and was in a Google Form; the idea was to understand the students' opinion about the activity they did in class with the support of technology tools.

The survey consisted of four open-ended questions and two yes–no questions. The yes–no questions were analysed quantitatively, while the open-ended questions were analysed qualitatively, using the software NVivo10 for the lexicometry analysis of high-frequency words.

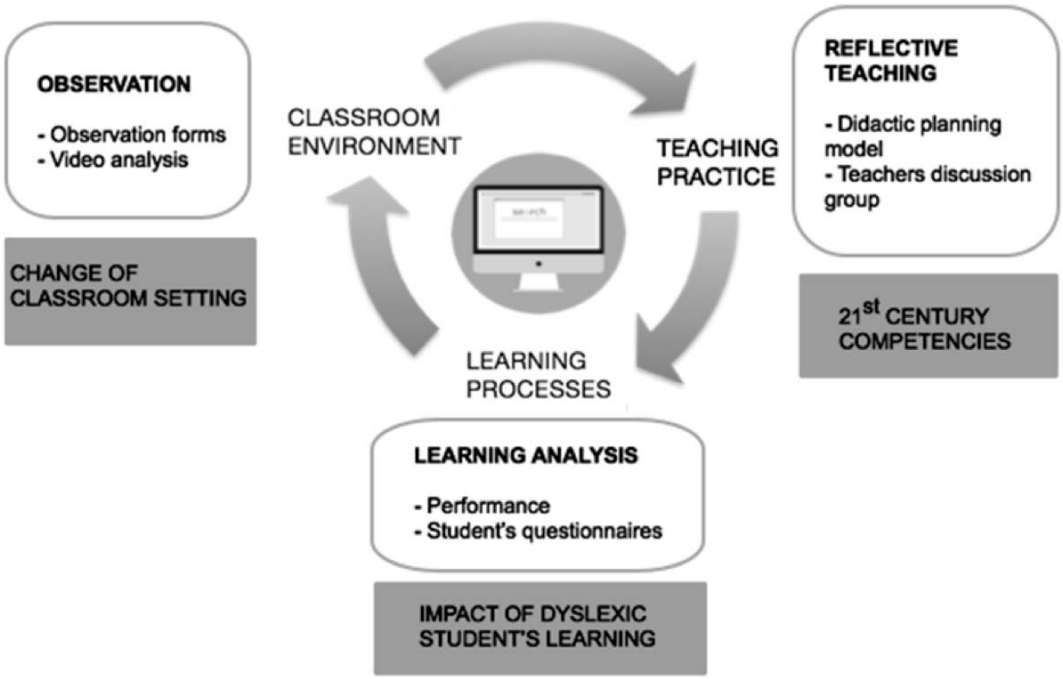

Fig. 3 Research results

2.Analysis of the results

The analysis of the results put in relation the collected information, trying to find the dominant trends, according to the three aspects analysed in the circular pattern shown before (Fig. 3).

In relation to the classroom context observed, the introduction of the technologies alters considerably the learning environment: there is a change in the classroom setting, there is a combined use of digital tools (student devices, e-board, software) and traditional tools (books, copybook, pens) and there is also an active participation of the student who can both share a lot of activities and compare experiences and mistakes, while the teacher can constantly monitor the activity.

About the teaching practices, with the new technologies in the classroom, the teachers tend to turn to competency-based teaching approach, an approach that stimulates eight key competences for active citizenship.

About the learning processes, the use of technologies encourages some elements and strategies related to the context (motivation, personalisation, feedback, attention) producing positive effects on student learning, including students with dyslexia.

2.1 How the learning environment changes?

The research points out that the introduction of technologies has profoundly changed the classroom setting, pushing the teachers to explore the potential of new technologies to develop the curriculum. From the observation made in the classrooms emerges that:

- The classroom seat arrangements change depending on the activity proposed. In most cases, the desks have an island arrangement that allows a large interaction between the e-board and the devices. The combined use of these tools allows sharing of the activities, comparison of experiences, auto-correction, reproduction of what the teacher has shown and sending messages between teacher and students and vice versa. New technologies and traditional instruments tend to coexist.
- The use of technologies by the students in most cases is mediated by the teacher. The students carry out the assignment, alone or in small groups; technology can be a source of stress for the students when there is a malfunction or when not used correctly.
- Multifunctional student devices adapt to the teaching strategy proposed by the teacher, and they can be used both in the lean forward mode (for writing activities) and in the lean backward mode (for reading activities); multifunctional student devices allow the integrated use of multiple applications (Word, MindMaple, Baby Flash, PowerPoint, ArtRage, etc.) and have multiple ways of interaction (touch, touch-pen, keyboard, mouse).

- The educational architecture is characterised by the alternation of guided discovery and teacher's monitoring; the teacher uses the technologies as a researcher assuming a monitoring role. The time of the activities with technologies increases, also because of dead times due to technical problems.

In the first classes of primary school, the use of technologies is still sporadic, and the children tend to play with the device. You may notice that also in the second classes of primary school, the use of the devices is sporadic (twice a week at the most). The kids are still very curious about these tools, and they want to play with them. In these cases, still the teacher is available to handle the devices, distributing them to the kids and taking care of them at the end of the day. In this phase, the teacher explains to the students how to turn the computer on and off and how to save a file. The work in class still tends to be individual or in some cases it can be in pairs. The daily use of the devices and the acquisition of advanced computer skills decrease the sense of frustration caused by computer malfunctioning and poor capacity of the students, as occurred in the second, third and fourth classes of the primary school. In the classes where the use of the devices is daily and systematic, the students do not show feelings of frustration when a device does not work. When the students show a better control of the devices, the teacher can allow them more autonomy. In the later classes, group work is preferred (Falcinelli & Gaggioli, 2016).

In the last classes of primary school, the devices are used every day and the students tend to stop playing with them. Analysing a video made on 17/02/2015 in a second class of the primary school, the researcher reports that "at least in three cases it happened that the work was lost, and the kid had to do the test again from the start, due to a disconnection of the device from the network. In all three cases the kids, after a moment of anger when they said 'I have to start all over again!', immediately restart the test". In the classrooms where the devices are used, the children have a daily interaction with the computer, which is seen by the students as a working tool at school, handled by the students who take them and put them back to their lockers where they can also charge their devices.

In the observation of 06/03/2015 in a fourth class, the researcher notes: "11:24 in the morning". The teacher draws the attention of the students by using a triangle (musical instrument) and announces that there is a part missing in the files that was sent. Some documents, the teacher says, sent from the teacher's workstation to the students' devices are damaged. There seems to be an incompatibility with some reading files the teacher had produced with the writing program Open Office. The teacher is helped by a student, the one who often finishes his work before the others. The teacher's helper looks very self-confident and shows me a little box containing some pen drives, used by the teacher to transfer the files to the students' computers when the file sent by the teacher does not arrive. Although the use of these tools is more advanced, the students still have computer training sessions where they deal with new advanced topics. In the discussion group of a second class of the primary school on 29/04/2015, the teachers reports that: "At the beginning we show the students on the e-board how to save or create a folder, and they try to do it on their computers, then you see that there are some kids who need more time to learn, because they forget the instructions. The kids use the computer or the tablet at home, but not for didactical purposes, they just want to watch videos, listen to some music and download images. They still see the tablet as a game and to bring them back to a didactic use is not so easy" (Gaggioli, 2018).

2.2.*The effects of ICT on the development of the eight key competences for active citizenship*

As you can see from the data, the use of technology not only changes the way of teaching and brings benefits to the students with dyslexia but also allows the students to research, create, share and interact, enriching their "skills baggage" as stated by the Recommendation of the European Parliament and Council in 2006 referring to the eight key competences for lifelong learning. "The Italian school system takes as a model the Reference Framework for the key competences for lifelong learning defined by the European Parliament and the Council (Recommendation of 18/12/2006): Communicating in mother tongue; Communicating in a foreign language; Mathematic, scientific and technological competence; Digital competence; Learning to learn; Social and civic competences; Sense of initiative and entrepreneurship; Cultural awareness and expression. This is the objective for a wide scientific and cultural debate on lifelong key competences which Italy is part of" (MIUR, 2012, pp. 13-15).

The digital classroom allows to express and interpret concepts, thoughts, feelings, facts and opinions both orally and in writing. The information is transmitted through the use of different languages (verbal, mathematical, scientific and symbolic) and different technical supports (paper, computer and multimedia) and the representation of events, concepts, standards, procedures, feelings and emotions counted on different languages (Publisher and Microsoft PowerPoint for the different forms of expression, Word for the text documents, mapping software, e-board software). The works produced by the students of a fourth class of the primary school are an important example.

The works produced by the students of a fourth class of the primary school are an important example.

The digital classroom allows to reach different languages and cultures. The language of technology is universal, and, in some cases, it needs just some information. The friendly mode by which you can use the devices makes them accessible also to those who do not know a foreign language. The mind mapping program, MindMaple, is an important example; it is in English and is used without difficulty by all the primary school students involved in the project. Furthermore, thanks to technology, it is possible to connect to other schools all over the world.

The digital classroom helps mastering numeracy, an understanding of the natural world and an ability to apply knowledge and technology to perceive human needs and stimulate problem-solving skills. Technology makes it possible to explicit the steps taken to face problematic situations, identifying the right sources, collecting and evaluating

data and suggesting solutions by using content and methods from the different school subjects. The maps, tables and the flowcharts you can create using a computer or on a e-board are important examples.

The digital classroom allows to make a critical usage of information and communications technology for work, leisure and communication. The work in class is transversal and multidisciplinary, and it invites the students to find and represent links and relationships between events and different concepts, detecting their systemic nature and analogies and differences, consistencies and inconsistencies, causes and effects and probabilistic nature. In all the classes observed, the work with technologies has never been about ICT but has involved all the school subjects.

The digital classroom allows to learn, that is the ability to effectively manage one's own learning, either individually or in groups. The use of technologies allows the students to organise their own learning by identifying, choosing and using different sources and different ways to get information and professional training (formal, not formal and informal), depending on the time available, the strategies and both the study and work method. The activity in class has a third final stage with a strong metacognitive value that requires the teachers to give the students the possibility to think about the procedures and the strategies they had activated during the suggested activity. The use of technology helps to explicit all the steps taken.

The digital classroom promotes the ability to participate effectively and constructively in one's social and working life and engage in active and democratic participation, especially in increasingly diverse societies. The cooperative learning and peer tutoring methods, used in the digital classrooms, encourage group interaction and the ability to understand different points of view, to valorise their abilities, to handle problems, to take part in common learning and to realise collective activities. In most classes, it has been observed this way of working.

The digital classroom promotes the ability to turn ideas into action through creativity, innovation and risk taking as well as ability to plan and manage projects. The individual work allows the students to fit actively in the social life. They can assert their rights and also acknowledge at the same time the rights of the others, the common opportunities, the limits, the rules and the responsibilities. The flipped classroom is an important example: when students have to explain a new topic, they know they have to do it clearly and diligently. This way of working has been observed in the last classes of the primary school and in the classes of the secondary school.

The digital classroom promotes the ability to appreciate the creative importance of ideas, experiences and emotions in a range of media such as music, literature and visual and performing arts. The creation of a multimedia product puts the students in the condition to realise projects concerning the development of their study and work activities, by using the knowledge they learned to set new goals and priorities, evaluating the possibilities, defining action strategies and verifying the results achieved. A lot of the works produced by the students are creative and rewarding, and the students show them with great enthusiasm.

2.3.*The positive effects of technology on students with dyslexia identified by Singleton*

Does the use of technology in classroom affect positively the performance of students with dyslexia? Analysing the tests done by the students of the second and third classes of the primary school, it emerges that the introduction of technology brings significant improvements in writing skills.

Comparing the pretest data with the posttest data, we can see a significant increase in the number of words used by the students: in fact, in the pretests, the average number of words used is 41.71, and in the posttests, the average number of words used is 48.82. However, an even more interesting datum is that in the posttests, not only the students write longer text but also the percentage of orthographic errors drops considerably, from 6.9% to 4.2%.

Instead, there are no statistically significant results about the AMOS test (study abilities). In this case, the scores of the pretest are lower than the scores of the posttest. In both the writing test and the study test, the students with dyslexia are in the average of the class; they make improvements in the writing test, and they have no changes in the study test. Beyond the individual performance, an interesting aspect is the inclusive condition that the technologies can guarantee within a class context. The study of the videos, recorded in the classes during the observation, has been analysed by the discussion groups with their teachers. The outcome of the work has been the subject of a lexicometric analysis, which allows to calculate the recurrence of the terms identified as unit of analysis, in line with the goals of the research, during the discussion groups.

The contents of the discussion groups have been audio registered, and subsequently, they have been integrally transcribed verbatim. For the operations of organisation, analysis and encoding, the software NVivo has been used, which allowed to do the first selection of the words most used by the students, taken from the first 100 terms longer than three letters. After that, the data have been grouped into macro categories depending on the different thematic cores. For this purpose, the study by Singleton (2009) on the positive effects of the ICT for students with LD has been taken as a reference. The five positive effects identified by the author were taken as the five points around which the data collected with different research tools have been organised.

This analysis confirms the presence of the five positive effects produced by the introduction of the technology in classroom, identified by Singleton (Emili & Gaggioli 2017), pointing out the role of the teacher, acting as guide and scaffolding, and so becoming a key point in the process of transformation of the learning actions. In the technological learning environment, the differentiation of the learning models is based predominantly on the collaboration between students.

These aspects find a real application in the classrooms, and they are an effective support for the students with dyslexia. Analysing the data, it emerges that customisation, individualisation and flexibility are the main concepts able to encourage inclusive teaching and express the potentialities and the criticalities that the use of technology in classroom can offer to all the students, including those with difficult or special educational needs.

Triangulating both the qualitative and quantitative data, it emerges that we have an improvement in the writing skills, also among students with dyslexia, thanks to the technologies that help them to have customised paths, an extension of the watchful times and an immediate feedback about the tasks done under the supervision of the teacher.

The analysis of the surveys shows the interest of the students in this activity. It emerges that on a scale of 1 to 5, the students like the activity in the classroom using the computer with an average of 4.4. To the question "What did you like most?" and "What did you like least?", the students said that they enjoyed the playful aspect of technology, the working mode in cooperative learning and also the painting and writing activities.

About the less-appreciated aspects, the majority of students said that they have appreciated all the activity.

Conclusions

The research has shown that the elements collected are in line with the Italian law and international research, both in the context of the technological classroom and in relation to the teaching and to students with dyslexia; suggesting a triadic reflection on all the elements connected to one another, it can offer an interpretation that can easily prompt guidelines for a didactic planning of an inclusive technological environment.

The digital classroom supports students with LD, because it increases personalisation and compensatory processes in the classroom.

The assistive technologies in a digital classroom supported by an inclusive didactic plan can be considered as scaffolding tools both in the processes of learning acquisition and personal growth.

From the results of the standardised tests emerges that the introduction of the technologies brings meaningful improvements to some abilities (writing) but not to others.

The interpretation of these data reflects the definition of compensatory strategy. When we talk about dyslexia and the use of technological tools, we know that the value of these tools is the ability to compensate the skills affected by the disorder. So, we talk about specific basic skills affected by the disorder. A student with reading difficulty finds a solution by employing a speech synthesis, and a student with dysgraphia or dysorthography finds a solution with a video-writing program with spell checker. Instead, when we talk about the study method, we refer to a set of basic skills that generate better performances, thanks to a combination of instrumental skills as reading and writing and other skills linked to the correct operation of the executive functions such as attention, memory, planning and other skills linked to the cognitive and metacognitive aspects. So, we can say that the use of computers is a dependent variable in the basic skills of writing, while in the more complex skills, the computer is an independent variable that is not directly related. Other variable to be appraised is the action of the teacher in class. An inclusive teacher can do the difference. In this perspective, the approach of the UDL, which serves as frame to an inclusive didactic planning, pushes the teachers to go towards a great personalisation of the learning. "Technology has the potential to move assessment from disjointed separate measures of student progress to an integrated system of assessments and personalised instruction to meet the needs of the learner. Technology can integrate more fully student classroom experiences, homework assignments, and formative and summative assessments, all of which are tied closely to academic standards" (National Education Technology Plan, 2017, pag. 63).

This research emphasises the importance of peer tutoring for student with LD, confirming studies of Mitchell and Hattie (Mitchell, 2014). "Positive effect have been noted for such factors as writing skill, reading comprehension, engagement in lesson, attitudes toward schoolwork and social interactions" (ibidem, pag.51).

In an attempt to answer the research's questions, this work outlines some new paths that investigate other specific abilities such as reading and reading comprehension of the text and also specific teaching strategies supported by the use of technology.

The Nobel Peace Prize winner Malala Yousafzai said in her speech to United Nations: "A child, a teacher, a book and a pen can change the world".

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