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Papert's Legacy on Digital Inclusion: a Research on K-8 Education

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To my awesome Family.

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INTRODUCTION

Definition of digital inclusion*: strategies and actions to ensure more equal access to digital technologies and Web facilities and to strengthen effective, meaningful and beneficial use for all members of the public in their day-to-day lives*[1].

The present work builds on a personal interest: as a teacher, I have always been keen on learning ICT more extensively, in order to experiment innovative teaching methodologies with my classes. The first opportunity to be involved in specific training on education technology came when I enrolled in a seminar on the Logo Programming Language at the Scuola-Città Pestalozzi in Florence. On this occasion, I met Andreas Formiconi, the professor leading the workshop. He would later become my teacher of didactic technologies laboratory and eventually my thesis advisor and mentor. The seminar, addressed to the teaching staff of the school and open to Primary Education Science students, aimed to offer an overview regarding coding in K-8 education. The class was based on a hands-on approach, in such a manner that everyone was set to work from the very beginning, in front of a computer. This represented my first experience with “the Turtle” and the Logo programming language.

The interest and the involvement on this subject increased, to the point that I started collaborating with prof. Formiconi to the English translation of his essay "Piccolo manuale di Librelogo", aimed to guide to the use of Papert’s Logo through an open source programming environment, called Librelogo. The more I was learning during the translation, the more I wanted to further deepen my knowledge on Papert’s thought and works, but I soon realized that such an important figure didn’t actually have a proper place in any of my pedagogy texts. It was evident there wasn’t a complete and exhaustive biography. Although he had been the father of coding for children and author of the Constructionism theory, at best his name was just briefly

[1] Encyclopedia of Information Science and Technology, Volume 1, Mehdi Khosrow-Pour, Mehdi Khosrowpour, publisher: Information Science Reference, 2008.

mentioned; it seemed that an inexplicable veil of oblivion descended on his work. And yet, Papert has still plenty to teach to the next generations: not only in terms of powerful ideas, but also for his outstanding humanity.

I therefore decided to devote myself to finding data regarding the scholar, in order to create a comprehensive memoir, in an attempt of making a reconstruction of his outstanding and remarkable life. Subsequently, I collected a lot of material that I later used in this present thesis. My sources were interviews, newspaper articles, videos; I also gathered some informal anecdotes told by his collaborators and friends, published in Gary Stager's site[2]. Reading about Papert's works and researching online information about his life and accomplishments, led me to a better understanding of the man behind the scientist. The very essence of his life unfolds in his extraordinary humanity and philanthropy. Since childhood, he found himself witnessing unrighteousness and racial inequities, such as apartheid. Alone against the system, he found ways to oppose to this unjust exclusion by organizing classes to teach reading and writing to black people of his neighbourhood. Throughout his life, he set an example for inclusiveness, dedicating himself to others through social and humanitarian projects. He foresaw, a lot ahead of time, that computers could create a space for social equity and would eventually enter into everybody's homes. His generous and altruistic personality inspired various movements from below, reaching out to the poorest strata of society, such as marginalized youth in America, where he resided for most of his life, but also in different parts of the world. Even today, his name is linked to the ideal of inclusiveness.

This dissertation is structured into four chapters.

The first one begins with a thorough biography of the life and works of Seymour Papert. The legacy he left to the next generations, his pedagogic theories and the movements born out of his ideas still live on today.

The second one analyzes the theoretical paradigms that inspired Papertian constructionism: constructivism and socio-constructivism. It also takes into

[2] http://dailypapert.com/about/

consideration a reflection regarding the misconception of digital natives and defines what digital divide is and how to overcome it.

Chapter three consists in an overview of the recent Italian and European legislation regarding technological skills, together with actions and programmes to contrast the digital divide.

The final part examines the three-year plan of the educational offer of all the Comprehensive Institutes in the province of Prato, to verify their adherence to European and Italian laws in relation to digital education. Investigating a local reality helped verifying the real implementations on digital skills and inclusiveness. The work also takes into account a specific institute, as a case study, to understand in detail the challenges that a school faces in terms of inclusion.

CHAPTER I

Life and legacy of Seymour Papert

1.1.1 Historic overview

In order to understand the roots of computational thinking for children it is necessary to take a step back in time and get acquainted with the mind behind it: the mathematician, pioneer of Artificial Intelligence, computer scientist and visionary educator Seymour Papert. This outstanding man lived in the time of the computer revolution, where the sudden, massive penetration of technology took place rapidly. In the Fifties, the competition for the space race with the Soviet Union had determined a superiority of the rival Country that in 1957 launched on space the first Russian man on the first manmade satellite, the Sputnik. In order to determine where the school system in the United States had failed and in a desperate attempt to regain technological ground over the Cold War enemy, in 1959 the Woods Hole Conference was held; it hosted the most brilliant minds of the time in terms of education, science and psychology, and was chaired by Jerome Bruner, theorist of the spiral curriculum. As a consequence of the conference works, a strong emphasis was given to science and maths, and the curriculum movement was implanted in the school. The need of a rational and scientific approach led to the definition of criteria of the curriculum reform, such as operationalizing the objectives, evaluating pre-knowledges, splitting the objectives into small sub-objectives, using the feedback during the process (Calvani, 1998).

Still, a little less than ten years later, the 1968 social conflict and student rebellion underlined the discontent towards an unfair system that privileged a small *élite* to the expenses of the majority. Some people had begun withdrawing children from school and homeschooling was the result of their disillusion and distrust, with a distressing feeling that the educative system was yielding its institutional role. The increasing disillusion over the school system made people look with increasing expectancy

towards the rising new technologies and expectancies on the Artificial Intelligence studies, and a hoped-for new turn in education.

Reality eventually demonstrated how computers can be limited, for instance, in the linguistic area: the task to capture different nuances of a language, such as sarcasm or a double sense, cannot be understood by the smartest of machines, even if the same computer can be programmed to become a chess champion. A computer can't substitute a human in terms of relationship, trust, empathy and care, therefore it cannot replace the role of a teacher, for example. But the revolution Papert had imagined was actually of ideas, not of technology, with two fundamental roles: the first one being heuristic, namely computers, as digital artifacts contribute to the emerging of ideas; whereas the second one is instrumental: computers, becoming cheaper and cheaper, will be spreading ideas and social relations into a larger society than the research labs in which they were built. Papert expressed this concept with the metaphor "computer as a pencil"(Kerr, 1991).

The scholar felt that computational environment would offer the solution and represent the future for education, he saw computers as "objects-to-think-with". In his Constructionism theory he envisioned computers as the digital artifacts with which the learners would construct their knowledge and skills, by creating the first programming language for children.

1.1.2 Seymour Papert's life, the upbringing

Seymour Aubrey Papert was born in Pretoria, South Africa, on the 29th of February of 1928, from a Jewish[3] family, his father[4] Jack was an entomologist who studied - and went actually searching for - the tsetse fly in a field research along the eastern coast of South Africa. This enterprise affected the whole family and young Seymour found himself on the road bush, making direct experience with the wild nature during long rides on half broken trucks, enjoying the excitement of experiential learning. At that time, before DDT was invented, it was paramount to protect people and livestock from this deadly insect by predicting its movements, so all his family, together with the father's assistant and several black workers would spend months traveling the most remote south-east coast of Africa[5]. Most of the time, especially during these jungle excursions, he and his family were the only white folks around, so it was just natural for Seymour to interact with everyone in the same way, without any form of prejudice. As Papert himself recalls crawling under heavy camp trucks, even before turning two, utterly fascinated – and eventually fell in love – with mechanics: car engines, the transmission system, the gearbox, and particularly the differential gear. Many years later this infant experience would make him write on the foreword of his well-known book *Mindstorms,* recalling his infant desire "to turn computers into instruments flexible enough so that many children can each create for themselves something like what the gears were for me" (Papert, 1980).

This eccentric upbringing constituted the perfect environment that made his creativity blossom. At around eleven years old, with two or three friends of his age, Seymour tried to organize evening classes for the black domestic servants, teaching them how to read and write. In the apartheid Era this activity was illegal and got him in serious trouble with the authorities. The boys soon found out that not only the school master, but also their families as well would disagree with this project. He used to question the adults about the real motives why black people were forbidden

[3] https://forward.com/culture/346666/remembering-seymour-papert-revolutionary-socialist-and-father-of-ai/
[4] https://pdfs.semanticscholar.org/0cc1/2978ec02fbf668c746f3cbfee68752569c2d.pdf
[5] http://www.ascd.org/ASCD/pdf/journals/ed_lead/el_199104_goldberg.pdf

to study at the same schools of white people, but the official response would offer lame incoherent reasons such as that black children would contaminate with possible sickness the white ones. His rational mind couldn't accept such an illogical reason and he would point out that it was then inexplicable why people wouldn't mind to be served by black servants in their own homes and let them nurse their own babies, if they were so afraid of the spreading of diseases. The anti-apartheid activities went on as the boy grew, to such extents that he was considered a dissident by the government and he was denied travel outside of South Africa.

1.1.3 The University years

Papert then studied philosophy at Witwatersrand University in Johannesburg, where he received a Bachelor of Arts degree in 1949, followed by a doctorate in mathematics three years afterwards. He was a prominent leader of the anti-apartheid movement through all the University years and math's seemed to him a more neutral subject to study at a time where he was putting his own life at a great risk for his activism. He felt strongly about equal rights and had the chance to meet Nelson Mandela before his imprisonment, and he was greatly inspired by the African leader to pursue a lifetime of social activism.

He completed a second doctorate in mathematics in 1952 thanks to a Commonwealth research scholarship that he obtained at St. John's College, Cambridge. Although he was withheld the right to have a passport, he found a way to flee to the United Kingdom. In his English years he was a prominent figure in the socialist circle and contributed solidly to the magazine *Socialist Review*.

1.1.4 The work with Piaget

Eventually, Papert attended the Henri Poincare Institute of Paris University to complete his research work. This new environment proved to be more stimulating and open than Cambridge, Paris in the Fifties was in fact the ultimate place for innovation in mathematics, but he was interested also in philosophy of mind, partly due to his previous studies in South Africa. So, he enjoyed sharing stimulating a wave of free thoughts and new challenges within the Bourbaki Group[6], a group of French mathematicians that introduced a new vision to the discipline indulging in a relaxed atmosphere of self-mockery and camaraderie jokes, surrounded by a secretive allure, following the École Normale's tradition. The Bourbaki school elaborated a uniform theory of mathematics, seen as a whole, not a combination of different sub disciplines, each one with its own vocabulary and development. The Bourbaki mathematicians recognized a series of building blocks which they called the "mother structures". These structures would later inspire Papert to develop the concept of microworlds (Papert, 1980).

A consequence of his joining this fascinating fellowship – considered the *avant-garde* in mathematics – was broadening his frequentation of circles of eclectic people, interested in the questions of the mind, like him. One of the most remarkable arguments for him, back in South Africa, had always been how it was possible that good, kind people he knew could also be so racist and narrow minded. That thought had driven him to try and understand how the mind could possibly work and eventually had led him to graduate in philosophy, in Johannesburg. These Parisian circles overlapped with people interested in Jean Piaget and with his being more and more involved in exploring the possible connections between mental processes and learning, he subsequently caught the attention of the Swiss epistemologist. The two met at a course that Piaget was lecturing at the Sorbonne.

In an interview published in the *Omny* magazine in 1985, Papert recalled his first encounter with Piaget, just about a month prior their first meeting, and remembered

[6] https://cosn.org/about/awards/seymour-papert-lifetime-achievement-award

having quite a violent fight with a friend about "how bad Piaget was". Papert disagreed about Piaget's assumptions on what children couldn't do just because they were not yet at the right stage. But when the two finally met, Piaget brought the conversation on Bertrand Russell and Jules-Henri Poincare. According to Russell, the essence of mathematics is that it can be reduced to logic. Poincare, however, thought that mathematical judgment was much more like the judgment of beauty in art than that of correctness and logic. Somehow, unexpectedly to a mesmerized Papert, Piaget brought children into the philosophical debate, and suddenly was he not only restricting, but actually promoting the child to the level of a philosopher.

Piaget took an interest in Papert's doctoral thesis on the understanding of topology as pure mathematics and invited him at the university of Geneva - at the International Centre of Genetic Epistemology - to work with him on a topic the two scholars had in common: the way children begin to understand and learn mathematic. Piaget at the time was seeking someone drawn in the philosophy of mathematics, rather than a psychologist. On the other hand, Papert acquired a strong interest in studying the learning process in childhood and discovering how learning takes place and can be enhanced. The collaboration, meant to last only one year, actually endured four years and had a conspicuous influence on Papert's work and thought, as he pointed out in the chapter titled The Conservation of Piaget, "when Piaget is poured into a new decade, much will change. Whether one has conservation of Piaget will depend on what one perceives as most important in the thinking of the great master. My own view is that the essential aspects of his work have not fallen by the wayside. On the contrary they are stronger and more relevant than ever" (Forman G, Pufall PB, 1988, p.3).

Papert was enormously inspired by his mentor's vision and reflection of the child, especially that children learn a great deal without even being taught. He was also profoundly grateful of those formative years of study and work with him, for the mentoring, the encouragement and the trust Piaget placed in him (Papert, 1980). Piaget is said to have commented about his *protégé*: "no one understands my work better than Seymour Papert"[7].

[7] https://cosn.org/about/awards/seymour-papert-lifetime-achievement-award

1.1.5 A peculiar encounter

In 1960, while Papert was attending a London symposium on Information Theory, he fortuitously met Professor Marvin Minsky, co-founder, with John McCarthy, of the Artificial Intelligence Group at MIT, the Massachusetts Institute of Technology. Minsky was utterly impressed with their very first meeting, and afterwards Papert jokingly recalled the very peculiar incident happened at the conference, the "worst nightmare of somebody coming to a meeting with a theorem"[8] (Papert, 1998): the speaker before him on stage announced the very same theorem he had postulated in his paper, and that person was Minsky. For the two computer scientists, this incredible and awkward coincidence turned to be a precious gift and an ongoing collaboration for many years to come, and, as Minsky once commented, they were so kindred spirits that they used to finish each other's sentences. Papert, on his side, remembered eventually how Marvin Minsky played a fundamental role as a source of inspiration and insights, describing him as the most important person in his intellectual life, the first one he learned from that computation could be more than just a theoretical science or practical art, but also the material from which to form "a powerful and personal vision of the world" (Papert, 1980).

Papert was invited to work in the United States by famed cyberneticist and neuro physiologist Warren McCulloch, but he had to wait for the release of his American visa, since his antiapartheid backgrounds were considered a potential threatening to the stability of the United States. In 1963 the scholar accepted another invitation, to join MIT as a research scientist in a cross-departmental research lab that was studying how computer systems could increase human abilities and this time he could leave for America. This represented a real cultural shock, as he literally moved "from one world to another" (Papert, 1980), as he left a small, bucolic village on the Alps near Geneva and was thrusted into a new urban world of skyscrapers, cybernetics and state-of-the-art computers - although at that time they still looked like barn-sized monsters - searching for possible ways to develop Piaget's ideas in this futuristic context. Since initially it wasn't on his mind to live on a permanent

[8] http://www.stager.org/omaet2004/papertbio.html

basis in the United States, at first he accepted a one year contract, but as the year ended, he was appointed as a tenured professorship in the Department of Mathematics and subsequently, four years later, he was made co-director with Minsky, when the Artificial Intelligence group formally became the MIT AI Laboratory.

Just short after his arrival at MIT, Papert became a pioneer on artificial intelligence, his co-operation and same like-mindedness with Minsky so strong that colleagues at MIT already recognized the binomial Minsky-Papert in researching programs in computation theory, human perception, child psychology and robotics. At his coming, Papert discovered that there still wasn't envisaged a specific area of research about children, so for the time being he concentrated his studies on theoretical models of intelligence and artificial intelligence. In an atmosphere of euphoric excitement, he felt to have landed into something like an enormous playground of computers and experienced the wonderful feeling of working and playing at the same time, spending countless nights in front of the PDP-1 computer he was assigned to, exploring "like a new born baby" all the possibilities. In this kind of ludic situation, in an explosion of creativity, he asked himself how a computer could offer a child the same joy and passion of learning he himself was living (Papert, 1980). "I was exhilarated by the tremendous power of problem solving that tool offered," he told the Portland Press Herald of Maine in 1997. "Within a day or two it became an obsession — to get computers in the hands of kids." Eventually, with Alan Kay he developed and shared the vision of providing schools with futuristic computers that would be used just like pencils, as tools one scribbles, write and draw with, and even for a broader variety of purposes.

During the following years, Papert led various school-based projects on computer programming and robotics experiences for students and teachers (Stager, 2013), that helped him test his constructionist theory put into practice. He had foreseen, a lot ahead of the times, that computers would be accessible to the masses, and he started to imagine a world where each child should and would possess a computer of his own with which he could explore and experiment, but in the Sixties it was hardly possible to make people believe in computer affordability as computers were tools

only big companies and privileged people could afford, let alone children. At those times, computers were as big as wardrobes and cost hundreds of thousands of dollars.

Despite people's skepticism, Papert followed his vision, imagining a learning environment where a child could use a computer for learning and enhancing creativity, to control it and program it, to write and make graphics. This way, the metacognitive thinking would be widened, because when the child would try to make the computer do something, he would have to think how he himself would think and do the action, and then make the computer do it, thus developing the thinking about thinking.

Declining Skinner's Behaviourist views, that referred to computers as learning machines able to program children's minds and eventually even replace teachers, Papert reversed this concept by stating that children should be the ones in control of the computer and program it with freedom and creativity. "Does the child program the computer or does the computer program the child?" was his famous provocative, but fundamental question to the education professionals, in opposition to the Behaviourist CAI technique (Computer Assisted Instruction). This revolutionary approach would be able to stimulate the centrality of the child in the learning process, whereas in the educational situations of those years it was always been seen as the complete opposite, with children being programmed by computers, given a predetermined path of exercises, as in the drill-and-practice method, with specific levels of difficulty. In the LOGO environment this is completely inverted (Papert, 1980).

1.1.6 Lego LOGO robotics

Papert is the mind that designed and created Mindstorms, the first programmable robotic construction kit, through a cooperation with the Lego Group. The name is due to a tribute of Papert's renowned book "Mindstorms. Children, Computer and Powerful Ideas", and it is a robot that children assemble and build. In 1984 Kjeld

Kirk Kristiansen[9], president and CEO of the Lego Group, watched a program on a Danish channel about Papert. The computer scientist was demonstrating his programming language LOGO for children and showing how easily they can learn to control "Turtles" robots using LOGO, thus making them move forward and backward, turn right or left a defined degree and draw. Kristiansen felt strongly about Papert's constructionism theory, seeing similarities of thought with his own vision at Lego and was immediately inspired by what he heard, so he arranged a meeting and discovered later that Papert himself had hoped to meet him in person in order to share his vision. In the history page of the Lego webpage we read that "in 1989, the department changes its name to LEGO Dacta, which later becomes LEGO Educational Division until it adopts the name it has today, LEGO Education. Being part of the LEGO Group, LEGO Education plays a decisive role in igniting pupil engagement in learning by giving them a hands-on experience that encourages learning through physical and digital creation"[10].

In 1989 Professor Seymour Papert received the title and was appointed by Kjed Kirk Kristiansen as "Professor of Learning Research", after the project he made on Lego-LOGO and received a sponsorship for the study of children's play and development. Particularly, the professor and his MIT team worked on the application of digital technology in children's play. Ten years later, the title was granted also to Mitchel Resnick, after his friend and mentor decided to retire.

1.1.7 Social projects

In the last twenty years of his life, after his naturalization as an American citizen, Papert lived in Maine where he established his Learning Barn, a small laboratory for learning research where he cultivated his ideas, too ahead of his time to be shared incautiously, concerning new methods of learning. The main scope of the Learning

[9] https://vimeo.com/143620419
[10] https://www.lego.com/en-us/lego-history/play-and-learning-10e53602a4b649d5a82658c0b968919d

Barn was to project futuristic methods and implement a vision of technology in the learning process.

In the late Nineties he dedicated his time and competence to social issues like the rehabilitation of teenagers convicted of serious crimes in a state's prison facility called the Maine Youth Center. In this deprived and hard setting, Papert and his team elaborated a unique learning environment, the CLL, Constructionist Learning Laboratory (Stager, 2013). As the name itself suggests, it was based on the Costructionism theory, that encourages and makes use of tinkering and invention, learning-by-making, hands-on projects, and personal computing. The CLL vision took his inspiration from Loris Malaguzzi's early childhood centres of the Reggio Emilia Approach, that sees the space of the classroom as the third teacher (in the triad parent/teacher/classroom), therefore the room was packed with creative and chaotic equipment of various nature scattered around: Lego, batteries, electrical wires, art supplies, clay, recycled materials, high tech materials, beanbag chairs. There was also a second room used as an atelier, for particular aims such as woodworking, photographs developing or filmmaking. "In many ways, CLL students needed to be nurtured and protected in ways not dissimilar to those in the infant and toddler centers in Reggio Emilia" (Stager, 2013).

As Gary Stager, the doctorate that worked at this project along with Papert, recalls, "our students had been reminded repeatedly of their incompetence, wickedness, worthlessness, dishonesty, duplicity or disorders. The punitive nature of their surroundings made nurturing impossible and they faced low expectations. Collaboration, creativity and communication, the most frequently cited 21st Century skills, are viewed as dangerous in a penal facility, yet our previous efforts prepared us to be amazed by what children know and can do… Papert was fond of the saying "Love is a better master of duty," and CLL students who read his book, THE CHILDREN'S MACHINE, cherished his statement, "nothing beautiful is forced." The only rule in the CLL was, "You must be doing something" (Stager, 2013).

Despite the many difficulties arisen, such as lack of personnel, prison bureaucracy and strict regulations, the intervention had a successful outcome and the students experienced a conspicuous learning, proving to be extremely capable, motivated and

some of them even enrolled in university. Not a single one of them was removed from the program due to disciplinary reasons.

In 1999 Papert founded the Seymour Papert Institute, a non-profit organization, whose aim was to implement new thoughts in education and technology, advising local and state governments, international institutions and communities[11].

In 2004, joining Nicholas Negroponte and Alan Key, he set up a non-profit organization for the realization of the OLPC program (One Laptop per Child), a spin-off project from the MIT Media Lab. The OLPC mission was contributing to the alphabetization and the removal of *digital divide* through producing and distributing affordable, low-cost, low-power connected portable computers to donate children in the developing world. The association produced over three million XO laptops, equipping children all over the world in more than 40 countries with these "schools-in-a-box" devices.

1.1.8 The accident

In 2006, while Papert was in Vietnam attending a conference on mathematical instruction, he was struck by a motorbike in the street near his Hanoi hotel, and fell into a month-long coma. After an emergency brain surgery at the French Hospital of Hanoi, he was transferred to the United States, where he had to be hospitalized for a long time, suffering from complications related to the accident, that led to various operations, including the replacement of a heart valve, damaged for septicemia. He spent the following ten years prior his death dealing with serious complications from the brain injury. Along with many other problems, unfortunately he developed a serious speech problem, and went through extensive care. To help his recovery, the hospital *équipe* used for his rehabilitation some of the very principles of experiential learning, which he had invented, to help his recovery.

[11] http://fundamentalchange.carolstrohecker.info/documents/PapertBioMay04.pdf

Seymour Papert died at 88 the 31st of July 2016 at his home in Blue Hill, Maine, from complications of kidney and bladder infections. He was survived by his wife Suzanne Massie, a Russia scholar with whom he collaborated on the Learning Barn and many international projects; his daughter, Artemis Papert; three stepchildren, Robert Massie IV, Susanna Massie Thomas, and Elizabeth Massie; and two siblings, Alan and Joan Papert.

1.1.9 Achievements and awards

During his career, Papert received several awards, a Guggenheim Fellowship in 1980, a distinguished professorship at the Maine University, the Marconi International Fellowship Award in 1981, the Software Publishers Association Lifetime Achievement Award in 1994, and the Smithsonian Computer World Award for Leadership in Education in 1997. Papert has been called by Marvin Minsky "the greatest living mathematics educator"[12]. The Newsweek magazine had named Papert as one in the nation's ten top innovators in education. When he was asked from a Newsweek journalist about the Nintendo grant of three million dollars he had just received, he bluntly commented "I think the schools do more harm than Nintendo" (Papert, 1990). Since he had been criticized for soliciting the Nintendo's funding to program video games learning tools, he dismissed his detractors by saying that "change in education isn't just going to come from ivory tower academics. It's going to come from all sectors; academia, yes, but also from industry, from toy makers - that's part of the culture of children."

In the preface to the Italian translation of Papert's book "The Connected family", Paolo Ferri[13] points out that Seymour Papert has been the greatest international scholar of children education linked to computer and digital technologies, though his name in Italy is renown mainly between professionals, whilst in the United States it has been vast, to the point that Papert was appointed counselor during the

[12] http://www.jewage.org/wiki/he/Article:Seymour_Papert_-_Biography
[13] http://www.senior.trool.it/sites/default/files/Papert%20S_0.pdf

presidencies of Carter and Clinton for programs that aimed to introduce new technologies in the primary schools.

Not merely this, he was also a great philosopher and pedagogue, an artificial intelligence pioneer, the inventor of the first programming language for children and the Maker Movement. He commented on his passionate love for life and learning in a humble, playful and candid enthusiasm, making the reader oblivious for a moment of the stature of the eminent scholar and acclaimed scientist, “I have always considered learning a hobby and have developed many insights into its nature by cultivating a sensitivity to how I go about doing it. Thus, I have perhaps engaged in deliberate learning of a wider range of material than most people. Examples of things I have learned in this spirit include chapters of science (like thermo-dynamics), reading Chinese characters, flying airplanes, cooking in various cuisines, performing circus arts such as juggling” (Papert, 1980, p. 211). “I wanted to do these things but also because I wondered what the learning would be like. Though I came to love all these hobbies for their own sake, part of my pleasure in them has always been that of observing myself learn and making up theories about how I do so” (Papert, 1994, p.83).

Today Papert is considered the greatest expert that could find a connection between children’s learning styles and technology with teaching and mathematical learning and the development of thinking in general.

1.1.10 Papert’s legacy

“While Papert’s innovation, scholarship and wisdom is widely recognized across the globe and among scientists, his half century of contributions is largely invisible. It is not that educators disagree with Papert’s theories or recommendations, they just ignore him entirely. This ‘idea aversion’ (a term of Papert’s) is manifest by Papert’s absence from teacher education texts, educational technology publications and

school reform literature"[14]. And yet his contribution to contemporary education is still vivid and actual.

To him we owe the creation of the LOGO language and the theorization of Constructionism and pedagogy of errors, he also actively worked and posit Artificial Intelligence Lab, MIT Media Lab, tinkering, digital inclusion, learning labs.

He was the mind that inspired his students and coworkers like Resnick, Harel, Stager and many others to conceive the idea of Scratch, Computer Clubhouses, the Maker Movement, MaMaMedia, SNAP! and MicroWorlds.

1.2.1 *Les bricoleurs*

"In describing bricoleur programmers, we have made analogies to sculptors, cooks, and painters. Bricoleurs are also like writers who don't use an outline but start with one idea, associate to another, and find a connection with a third. In the end, an essay "grown" through negotiation and association is not necessarily any less elegant or easy to read than one filled in from an outline, just as the final program produced by a bricoleur can be as elegant and organized as one written with the top-down approach" (Papert, Turkle, 1990).

Papert borrows this term from French anthropologist Claude Lévi-Strauss, who uses the word *bricolage* to show how primitive cultures apply a "science of concrete" (Hill Duin, Hansen, 1996), in other words they use things they have at their disposal, improvising, adapting and shaping tools to their specific needs. Bricolage is seen by Papert as a methodology of intellectual activities based on experimentation, on heuristic learning, proving that every scientific theory is built due to the *bricolage* model, as science itself is a concrete matter. Papert makes a distinction between planners, people who work by planning their steps, and bricoleurs, those who

[14] http://dailypapert.com/about/

progress by trial and error. The latter one is the category of persons that build their knowledge by trying and testing, improvising, tinkering, proceeding step by step in the creative process. Children learn in such a way, because their concreteness and spontaneity in the learning process has still not been tinned up.

1.2.2 The positiveness of errors

"There's a widespread reluctance to allow others to see how much confusion pervades one's thinking. We don't like to appear "ignorant" or "stupid" or just plain wrong. Of course, we all know that our own minds are full of messy confusion and that many others are in the same plight (…) although I have a relatively good base of intellectual security, I often catch myself in the act of covering over the confusion in my mind. I can't seem to help wanting to give certain people an impression of greater clarity than I have and, indeed, than I think anyone really has" (Papert, 1994, p.92).

In these words it's possible to capture a glimpse of Papert's humble, down-to-earth, incredible personality, a genius mind candidly confessing what everyone must feel at least once in their lives, and yet somehow it feels shameful to reveal, like a modern days taboo, a disgrace. Experiencing confusion, sense of inadequacy, fearing failure, are all social fears that we learn.

How can a mistake be positive? Everyone is familiar with the saying "you learn from your mistakes" and "practice makes perfect", as well as the awareness that being wrong is a part of learning, yet at school and in everyday life, making a mistake looks like a stigma, something wrong that has to be quickly erased and corrected, often times something to be ashamed of. Children are born with an instinct to learn, explore and know the world, they are insatiable, eager, infinitely curious, relentless with their desire to experiment, fearless to try even the hardest thing. Every novelty constitutes an exciting challenge they throw themselves into. So why, after crossing the school gate, the same kids become bored, tired, fearful and demotivated? As Papert points out, "for many children traditional school is a very dangerous place

because you can be humiliated, embarrassed, scared of being found out that you don't know how to do something"[15], especially since they are forced to think and behave only in an established way. After over 30 years, these words still ring a familiar bell to many students, sadly.

Children indeed learn very soon the fear to be wrong, to make mistakes, as they are seen as an extension of themselves. If they make a mistake, something in them must be wrong, too. We live in a negative error culture, so we learn to fear our mistakes since childhood. As wittily clarified by the words "Two Wrongs Don't Make a Right but Three Rights Do Make a Left" (Papert, 1996), in Papert's mind learning is not a matter of rights or wrongs, but a chance to change perspective that brings to a better understanding, because when the learners fear to be insufficient, that very fear will block the creativity and hinder the learning.

Kids tend to remove the error and forget about it, and yet errors are useful and interesting because they allow to understand, gain insight and produce new streams of thoughts. Coding is an excellent tool in this sense, because the process of debugging teaches that every process is an evolution, and programming means writing and debugging altogether, so it's perfectly normal, even for the experienced programmer, to proceed by trials and errors. There isn't a wright or wrong. The Logo programming language, in particular, offers an opportunity of growth by coming to terms with errors, because it visualizes them and what at first was not intended or foreseen in the mind of the child may easily guide to learn a new line of thoughts and strengthen skills, possibly leading to construct original new ideas as well. In the Turtle world "you don't have to think that you are stupid; you can think, *this dumb Turtle*, if you like"[16]. Sometimes errors give birth to the most interesting ideas. Therefore, they play an important part of the process of building knowledge, as they give the possibility to reflect on the problem, determine different solutions and enhance creativity and lateral thinking.

Teachers can renounce from their role of dispensers of knowledge and learn along with their students without hiding the fact that they don't always know the right

[15] http://dailypapert.com/march-8-2011/
[16] http://dailypapert.com/march-8-2011/

solutions, and in doing so, they teach a valuable lesson: adults as well as children can learn together by making mistakes and discovering them, by trying and testing new paths and different solutions, to evaluate what works best, to what extents an idea can venture and succeed. Both teachers and students can share their views, find the right instructions and debug their codes. Children learn that adults as well make errors and treat them with positivity, by learning from them with a constructive and friendly attitude.

1.2.3 Microworlds

As Hoyles and Lagrange point out (2010), we find an early definition of the term by Papert in his book Mindstorms, "...the Turtle defines a self-contained world in which certain questions are relevant and other are not… this idea can be developed by constructing many such "microworlds" (Papert, 1980, p.117), each with its own set of assumptions and constraints. Children get to know what it is like to explore the properties of a chosen microworld undisturbed by extraneous questions. In doing so they learn to transfer habits of exploration from their personal lives to the formal domain of scientific theory construction" (Papert, 1980, p.117).

Andrea DiSessa, the educational researcher and physicist who contributed with Papert at the development of the Logo language and the concept of MicroWorlds, defines the concept with these words: "a microworld is a type of computational document aimed at embedding important ideas in a form that students can readily explore. The best microworlds have an easy-to-understand set of operations that students can use to engage tasks of value to them, and in doing so, they come to understanding powerful underlying principles. You might come to understand ecology, for example, by building your own little creatures that compete with and are dependent on each other" (DiSessa, 2000, p.47).

Microworlds consist in a virtual reproduction of a real system, possibly through the medium of a computer. They are like tiny universes, simplified pieces of reality, bordered by protected fences, where to begin an exploration and create itineraries,

animations, simulations. In these safe places the learner discovers mathematical or scientific principles not because he is being taught to, but in a heuristic way, by experience, by trying different solutions to a problem, such as how to make the Turtle turn lead to the understanding of the concept of angle.

Microworlds are for Papert the keys to education. Like Piaget, Papert believes that learning is essentially based on the ability to grasp little bits of reality, like pieces of a bigger mosaic, through which is possible to gain a perspective on the complexities of a bigger world.

In a presentation given at ITT Key issues Conference at the University of Southern California in 1984[17], Papert explains that there are three possible ways to use computers: as tutorials (mechanized teacher), as tools (word processor, calculator), and in a third way, which is a totally different concept: as microworlds.

He continues by saying that one of the possible microworlds is represented by the Logo Turtle microworld. In it, children can manipulate the Turtle and explore around, moving it and making it draw squares, triangles, circles, repeating features and rotating objects, until they obtain the desired effect. In this environment, nothing is stupid or wrong or embarrassing, everything is perfectly safe, permitted and at their disposal to be tested, improved, pondered.

Then the author clarifies that generally, not just in the computer context, but perhaps in every kind of learning environment, it's a natural mechanism to confine oneself in a small, dynamic bit of reality to give oneself capacity of understanding a minuscule part of a topic, as an "incubator for powerful ideas". Then one will be ready to grasp a bigger amount of knowledge and put it in comparison with the greater complexity of the macroworld, just like infants learn a language in a microworld of "baby talk", and then eventually they will be ready to enlarge their communication in a macroworld. Papert explains that "Piaget has demonstrated that children learn fundamental mathematical ideas by first building their own, very much different (for example, preconservationist) mathematics. And children learn language by first learning their own ("baby talk") dialects. So, when we think of microworlds as

[17] http://dailypapert.com/wp-content/uploads/2016/08/papert_microWorlds_chapter.pdf

incubators for powerful ideas, we are trying to draw upon this effective strategy: We allow learners to learn the "official" physics by allowing them the freedom to invent many that will work in as many invented worlds" (Papert, 1980, pp.126-127).

In 1993 a new version of Logo is released as MicroWorlds. It operates with the Logo programming language, a dialect of Lisp programming language, and it includes a number of multitasking changes made both in the Logo environment and the Logo language. It also features more tools, like a shape editor, a melody maker, the ability to import graphics and sounds to allow the animation of multimedia projects, games, and simulations; several processes can be launched independently. After several upgrades, MicroWorlds is today available with the name of MicroWorlds EX.

1.2.4 Mathland versus Mathophobia

The word mathematics[18] comes from the Greek μάθημα (máthēma), which means "what one learns", "what one gets to know", therefore also "study" and "science". Papert reports that Plato once wrote at his door: "let only geometers enter" (Papert, 1980, p.38), pointing out that, in ancient times, philosophy and mathematic were strongly linked, and mathematics were viewed as part of an unmissable background. Yet, nowadays, especially in the Western countries, our tradition divides humanistic and scientific culture, with a growing hunch of what Papert calls endemic Mathophobia, whose consequences not only hinder the learning of math and sciences, but taint one's perception and self-esteem. The author strongly believes that computers can and will eventually play a fundamental part in breaking the line between these "two cultures".

When Papert presented Logo to a class of third graders, he noted that the children were able to create, from the very first time of playing with it, mathematical ideas at a greater level of complexity than expected from kids their age. A metaphor Papert used to repeat regards the fact that the majority of kids in a French class doesn't learn

[18] https://mirror.uncyc.org/wiki/Mathematics

French, but no one concludes that those children are not “frenchly minded”, or presumes they don’t have “a head for French”, because if those very children would be taken to France, they would learn French perfectly well. So, the problem entails the kind of teaching. In the same way, a Mathland has to be found in order to let children learn easily all the mathematical concepts. Therefore, the question is, how can we create a Mathland? In the same way kids are not forced to endless hours of theory in dance classes, otherwise even the most gifted dancers would be put off: they are just encouraged to stand up and try; so it should be the same with mathematics: we should just let them do something with it. Hence Papert spent years programming softwares and hardware to recreate a Mathland for children[19], as a playful, creative tool to learn.

In the Eighties the questions about the effect of computer on children were: “which people will be attracted to the world of computers, what talents will they bring, and what tastes and ideologies will they impose on the growing computer culture?” (Papert, 1980, p.29)

1.3.1 LOGO coding language and the Turtle geometry

At the end of the Sixties, Papert works with the MIT to the programming language LISP3 for the Artificial Intelligence project, and he experiences firsthand the excitement of learning and discovering about the new technologies, by playing and experimenting. Everything sounds like fun and no one knows enough to declare which are the “serious things” to do with a computer and which are not.

Feeling like a modern-day Robin Hood, he starts to think of ways to “steal” technology from privileged adults (military and industrial professionals), and donating it to every child in the world. The first step he envisions is removing the veil of mystery from the concept of the programming language, like many centuries

[19] https://curiositycommons.wordpress.com/participatory-learning/

ago ancient priests used the ability of read and write in unknown languages for themselves to keep people apart from knowledge and power (Papert, 1994).

Therefore, he sees the need to find a way to make programming accessible to the vast majority of people, and most importantly to children, and develops the idea of creating the program Logo, based on the concept that children can master coding if they learn by starting from a simple line of code, that can be enlarged and taken to an expert level. It is indeed a simple language with great potentiality to allow the drawing of simple objects and also complex designs: Logo is an instrument *low floor and high ceiling*, according to the South-African scientist's principle, that is the concept that allows the use to the inexperienced user, and also a very expert operator, to work with it satisfactorily and achieve sophisticated results. In other words, Logo can grow with the users, as their personal know-how and sophistication in programming increases.

Many Logo workers contributed in the birth and success of this project, but the primary inventors, along with Papert, were mainly Daniel Bobrow and Wallace Feurzeig. The idea of naming it Logo was Feurzeig's, that chose the Greek word 'λογος', (logos) which means a word, a thought, but a word which is very prominent.

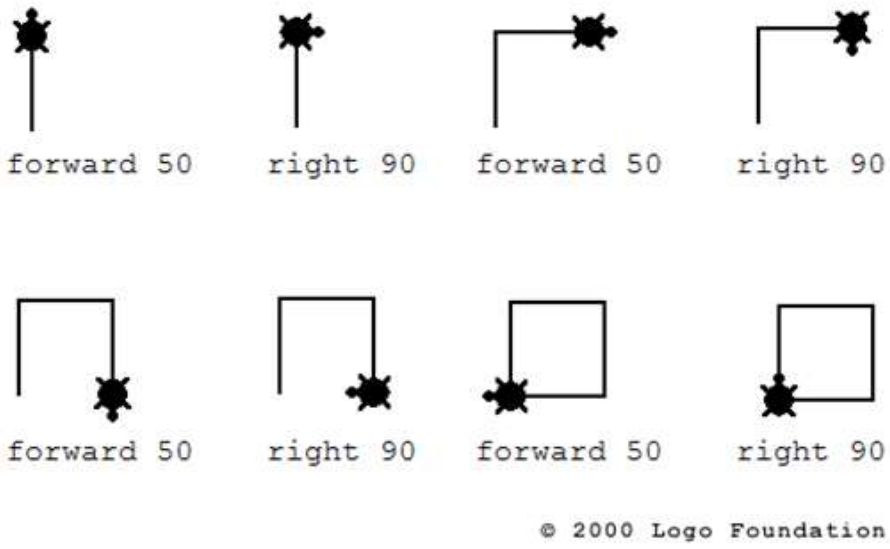
Far from training generations of programmers, Papert's objective is teaching computational thinking and problem solving by using coding and programming, so that children can play with the computer as an instrument, a tool in their hands. The machine teaches them to be mathematicians rather than teaching them about math. In this microworld the child is not required to learn a set of formal rules, but to foster enough insight to revel by making the Turtle move and draw. No straight instructions are provided because the learners are encouraged to use their own bodies to find out a possible solution.

The program is based on a series of commands, through lines of code, given to the cursor shaped as a small turtle. The idea of the Turtle came when Papert asked himself how to realize a code that would represent and describe physical activities, like walking and drawing. "My Turtle is a malleable creature. A child can give it any behavior it wants to. A turtle is a cute animal. Children seem to like it. It crops up a lot in mythology. It moves in a slow and deliberate way. In all sorts of ways, it's an

attractive thing. For me, it's a poetic image"[20]. The choice of a turtle is a tribute to a famous species of cybernetic animal made by English neurophysiologist Grey Walter, whose turtles had life-like behaviour patterns. Papert's turtles have no kind of behaviour, except the one of obeying direct and precise commands of a computer, to which they are tethered.

Children have them move by typing instructions at a computer terminal. While the turtle moves, it leaves a black track on the screen, just like it were a pencil, so that it's possible to draw pictures and geometrical shapes with it.

For example, a square can be drawn by using the following commands:



FORWARD 50

RIGHT 90

FORWARD 50

RIGHT 90

FORWARD 50

RIGHT 90

FORWARD 50

RIGHT 90

Papert calls it the Turtle Geometry.

[20] http://dailypapert.com/march-8-2011/

Originally, the Turtle was a little spherical robot that would move on a flat surface through the commands typed in a computer. It was almost as big as the children who played with it, connected with wires and twisted pairs to a remote computer that occupied the whole room. The pen inside the robot would leave a mark on paper according to the commands (PEN-UP, PEN-DOWN, FORWARD 50, RIGHT 90). Eventually it became a two-dimensional cursor on the screen, a digital pen inside the screen.

The LOGO environment contains the concepts of “bugs” and “debugging”, which mean that nothing is expected to work the very first time, but it’s a process of trials and errors. So, when someone starts programming, they will soon discover that they will seldom “get things right”, because mastering a program means to try many times, go back, look for bugs, and try again. It is a social activity as well, because often children want to talk and share about their creations and their problems with the other kids, asking for and offering help in the debugging process, reflecting together and trying out solutions between peers; the teacher himself is not a professional programmer, of course, so the line between learners and teachers can fade. This also is positive, since it maintains alive an enriching and motivating environment where everyone learns and teaches at the same time, fostering an egalitarian spirit of mutual collaboration. In Papert’s vision, computers play the important role of a transitional object, to mediate human relationships, creating bridges that unite and allow people with different interests, backgrounds and experiences to meet on the same level and find a common ground of interaction.

As seen before, in this Logo environment the error is seen as positive, because it’s a source of feedback and information, it gives chances to improve, to understand new alternatives of dealing with a problem, to find different solutions. For example, the child wants the Turtle to turn left, and instead it does something else: understanding why it did “its thing” is the proper way to make the child reason into getting it to obey him. But it also teaches the child the commands to make the Turtle behave like it has just done.

This mental procedure is metacognitive, as it teaches to think, to track down errors, to fear mistakes less and less, to use computers as “objects-to-think-with” (Papert, 1980), allowing to develop a different mindset.

Just like programming codes, children reach the result intended by breaking down the problem into small chunks and deal with one bit at a time, step by step, learning to think the way a computer would "think", in other words children apprehend that there is also a mechanical mode of thinking besides theirs, the computer's, thus grasping this truth: that at least two "styles of thinking" exist and are possible, and that one can choose his own preferred style. Every flaw is being faced by reviewing each passage and finding out the errors. This procedure allows children to focus on every tiny bit of code, to reflect upon every change made and questioning each fase results and as a consequence the problem is solved.

When the child decides where he wants the Turtle to move, he is thinking about his own real movements and pondering how he would move around in the space, then he transposes his thoughts from a three-dimensional reality (body geometry) to the two-dimensional asset of the screen (formal geometry).

So, the Turtle represents an interactive being that aids, as a transitional object, to understand mathematics and physics, for example the concept of angle or coordinate systems, thus promoting active learning. Nevertheless, Papert thinks about the Turtle not just as a vehicle for teaching the traditional curriculum, but also as a medium for Piagetian learning, that is in his mind, learning without curriculum: he sees Piaget "as the theorist of the kind of learning that happens without deliberate teaching" (Papert, 1980, p.31).

He explains that teaching without curriculum is not teaching randomly, spontaneously, but it means helping students build their own intellectual structures with the aid of tools that belong from our culture.

With Logo, Papert aspired to revolutionize the education world, to let children cross the bridge between concrete and formal thinking in a constructionist way, to be able to think in a metacognitive way. These original goals were rather ambitious and objectively they didn't meet Papert's intents and expectations. Especially in the school environment, teachers often used Logo to assign the same task to every student, limiting creativeness in order to evaluate them and grade them. Furthermore, computer companies made unrealistic promises, marketing Logo as a universal education panacea, ensuring that students would be able to learn by themselves

algebra or geometry in a matter of days, that it was the perfect “children language” to understand computers.

Nevertheless, Logo was the first and only software that gave children exposure to programming language and to computers, thousands of schools across America adopted it, and it became popular also outside the national borders, with many different countries overseas using it, it is estimated that millions of students throughout the world came in contact with it. Hundreds of Logo books and papers were published and computing magazines had a column about it. Today, after over thirty years Logo, although a niche product, is still amazingly used and implemented, considering how quickly technologies becomes obsolete.

Unlike many other newer coding programs for children, launched in the following decades, which are based on blocks, games and engaging characters, Logo is a no frill program, less based on playing and more on thinking and developing mathematical insights. And yet all modern coding software like Scratch were born thanks to Logo’s concept, although it must be said that they differ in many ways from the original, their playfulness and easiness may cause the false thinking that coding is a kind of entertaining game that requires no efforts and no reflection whatsoever.

1.3.2 The evolution of Logo

In the Seventies, after the first version of Logo was released, the Turtle was actually a real robot; only in the following decade, when affordable personal computers started to spread in people’s houses, Logo became a software and gained an immediate fame as at the time there was hardly much choice of educational software on the market. Therefore, many computer companies, such as IBM, Apple and Atari, supported Logo and distributed it in the schools[21].

[21] http://el.www.media.mit.edu/groups/logo-foundation/Logo/Logo.html

Logo would operate by inserting a floppy disk in a computer with a minimum of 64K of random-access memory. The package included two 5,25" floppy disks, the first disk containing the Logo interpreter and the second one contained utilities like useful routines and procedures for graphic, sprites and music, program examples, demos, games, application and tools like assembler, text editor, etc. Once launched, the program would produce a black screen where instructions could be written.

Today there are many implementations of Logo. Among these, LibreLogo is particularly interesting in realizing Papert's "low floors, high ceilings" concept; it is a free software written by Hungarian programmer Làszlo Németh in Python programming language. LibreLogo is a plugin included by default in LibreOffice Writer (from the version 4.0). It's available in the web site http://librelogo.org, which offers a small guide of Logo commands also in Italian. All the documentation so far are available only in Hungarian, and consist in a manual of examples composed by Németh himself and in an extensive manual written in 2013 by author Viktòria Lakò.

Németh had the brilliant intuition of producing images that can be integrated and visualized in a Writer document, as if they were imported. This ingeniousness allows to reproduce all Logo functionalities inside LibreOffice, actually expanding them. The use of LibreLogo is intuitive, it is written just like any other code, and it's run by a specific button in LibreLogo toolbar (Formiconi, 2018). The program simply runs by opening a new text document in Writer. By clicking on the green triangle button (Start) on the toolbar, the LibreLogo program will be executed. The turtle drawings can be resized, saved and manipulated by LibreOffice Writer. A click on the magic wand icon on the toolbar will help the user translate the English language Logo program into the language of the current document.

LibreLogo is still widely used and taught in Brazil, thanks to the work of Gilvan Vilarim, who wrote a LibreLogo manual in Portuguese and conducted a LibreLogo course at the digital inclusion conference SEMID; in Germany Mirek Hančl has included several LibreLogo worksheet templates, published by Cornelsen Verlag in 2019; in Hungary LibreLogo is used in several primary and secondary schools; in Italy, as part of the research project of the university, Andreas Formiconi began to

use it in the eTwinning platform, at eTwinning conferences and online seminars. Since 2016, Formiconi, as a University of Florence associate professor at the Statistic, Informatics and Applications faculty, is teaching LibreLogo to thousands of students of the Primary Education Sciences Faculty in Florence, in training to become kindergarten and primary school teachers, as well as in adult education classes. Formiconi is currently developing a manual in Italian, "Piccolo manuale di LibreLogo", inspired to Lakò's manual, in order to offer insight and help to anyone who wants to use LibreLogo. This book is a free PDF available online with the Creative commons Licence, it's presently being translated into English and consists in a work in progress: it's being implemented with more chapters that handle also pedagogical aspects, a part includes two chapters from Papert's book Mindstorms, "Mathofobia: the Fear of Learning", and "Turtle Geometry: A Mathematics Made for Learning".

1.3.3 Lego Mindstorms

As already stated, Mindstorms, the first programmable robotic construction kit, was created thanks to a cooperation with the Danish toy company Lego Group, in 1984. The first robots were inspired to the Lego Turtles, tethered to a computer with wires. So, the challenge for Papert – along with project developers Mitch Resnick and Steve Ocko - was to make "a Lego brick that could serve as the computer – a fully programmable brick"[22]. It had to be small, light, cheap and with no wires attached.

After the first prototype in the Media Lab in 1987, only in January 1998 Lego trademarked Mindstorms – a tribute to Papert's book *Mindstorms: Children, Computers, and Powerful Ideas*– and brought it to market. Mindstorms was inaugurated at the Royal College of Art in London; the official launch date came in September of that year. At the end of that very same year, it had sold out.

[22] http://hackeducation.com/2015/04/10/mindstorms

At present, this last product represents the third generation of Mindstorm robots, with the name of LEGO MINDSTORMS EV3, a 601 pieces kit that can be combined to create 17 different working interactive robots, vehicles or machines. Gears include an EV3 Intelligent brick with processor, Wi-Fi, USB port, Micro SD card reader, backlit buttons and 4 motor ports; 3 interactive servo motors; remote controls; infrared, touch and colour sensors; technic Lego bricks.

The robots are controlled by the remote control or by an app that can be easily downloaded on a smart phone. Robots can be made to walk, touch, see, talk, play games and complete tasks. Lego Mindstorms can also be used with these intuitive and easy to learn programming languages: C++, Java and Python[23].

1.3.4 Computer Clubhouse

The first Computer Clubhouse was opened in 1993 at The Computer Museum in collaboration with the MIT Media Lab, co-founded by Mitchel Resnick (former Papert's student and coworker) and Natalie Rusk at the Media Lab at the MIT. The idea started when the Computer Museum in Boston offered a robotic workshop, using LEGO-Logo robotics materials borrowed from the MIT Media Lab. Many kids would sneak into the museum every day in order to play with the computers. When the exibit was over, the children kept on coming, craving to play more. Natalie Rusk, education director at the computer museum, then searched for after-school centres in the Boston area where these children could fit in. But there was none, so she proposed Resnick to explore the possibility of creating a new type of learning centre, to which youth could come, independent from the museum and with a special focus on creating meaningful objects with technology. The aim was to create programs that would provide opportunities for youth to develop their own creative projects, to foster children's creativity to design, make things, craft works[24].

[23] https://education.lego.com/en-us/support/mindstorms-ev3/building-instructions
[24] https://web.media.mit.edu/~mres/papers/Clubhouse/clubhouse-origins.pdf

The educational philosophy that inspired this project is Papert's theory of Constructionism: an active process of learning through engaging in constructing personally meaningful products. Clubhouses offer a wide range of learning experiences, unavailable otherwise in the local communities, to support young students from disadvantaged backgrounds, with the goal of impacting as many lives as possible of youth, locally and globally. The kids, coming from diverse cultural backgrounds (African American, Asian and Latino), are encouraged to create their own artwork, animations, simulations, multimedia presentations, musical creations and robotic constructions. A lot of emphasis is put in using technological tools, but also in knowing how to construct meaningful things with those tools.

Through sponsorship from big IT companies, the project can sustain itself and provide a rich range of computing equipment and resources. The Computer Clubhouse is now an international network of 100 after-school learning centres for youth from low-income communities, spread along Europe, South America and India, reaching over than 25 thousands of youths in 19 different countries, and it is still developing.

This project has probably been one of the first attempts ever in the history of technology, specifically intended to tackle the digital gap between people who have access to the advantages of digital technology, especially in particular ethnic areas, and those who do not. Only later the politic world began to take a direct interest in this issue, that is three years after the opening of the first Clubhouse, when U.S. vice president Al Gore of Clinton administration, in 1996, used the term "digital divide" to define the gap between the *Information haves* and *Havenots* in K-12 education (kindergarten through 12^{tt} grade), during a speech aimed at raising awareness on this topic. In the year 2000, State Secretary Colin Powell talked about "digital apartheid", to emphasize the gap existing especially between certain ethnic groups.

1.3.5 Maker Movement pedagogy

The Maker Movement portrays an increasing trend of artists, hobbyists, tinkerers, hackers, engineers and digital artisans that use the DIY culture to realize robotics, traditional crafts or product designs. They started to develop the concept of making purposeful things with their own hands, for their own pleasure and convenience. The name is due to the founding of the Make magazine in 2005 and subsequently to the first Maker Faire the following year. Although the movement was born outside the schools, in recent years the idea of "making things", using inexpensive equipment and raw materials, is spreading among educators and teachers to embrace K-12 education, mainly in science, technology, engineering and mathematics - STEM, or STEAM when art is included - practices (Martin, 2015).

Although one might argue that crafting is an occupation as old as the world, this movement "as it is currently constructed has gained particular traction over the past five years. The *maker movement* refers broadly to the growing number of people who are engaged in the creative production of artifacts in their daily lives and who find physical and digital forums to share their processes and products with others" (Halverson and Sheridan, 2014). The authors underline that the innovation, compared to the past, is also characterized by the use of digital tools, by sharing designs and collaborating online, deploying common design standards to help sharing and promote easy and affordable access to hardware and software. In Hatch's words, "the real power of this revolution is its democratizing effects. Now, almost anyone can innovate. Now almost anyone can make. Now, with the tools available at a makerspace, anyone can change the world" (Hatch, 2014 in Halverson and Sheridan, 2014).

The new social networks and online communities are a driving force for the development of the identity and engagement of new users, while supporting and enriching each other through common experiences and failures exchange. There is a positive attitude towards problems and obstacles within the maker mindset, as they are seen as possibilities of getting insight and new perspectives that could lead to better solutions. This mindset reminds us of Papert's view about the positivity of

errors. The South African scientist is considered the father of the maker movement by Martinez and Stager (2013), who imply that the Constructionism theory supports the maker movement's main objective on the making of digital artifacts, through tinkering and debugging. Stager and Martinez affirm that a Papert's seminal paper, co-written in 1971 with Cynthia Solomon and called "Twenty Things to Do with a Computer", should be considered the seed of the modern "maker movement". Papert's Constructionism is based on formal and informal learning spaces, such as project-based science and problem-based learning, that stress the importance of learning through making. (Halverson, Sheridan, 2014). Moreover, the core experiences of the Fab Labs, *fabrication laboratories*, starting from the first Prison Fab Lab created by Papert with the collaboration of his doctorate Stager, are very close to the concept of the maker movement.

The idea to democratize access to technology, as well as traditional and analogic tools, is very close to the Open Source concept and shared learning[25]. Makers engage in designing and creating technology products or devices by working with discarded or broken electronic, plastic, silicon and any raw or recycled material with an open ended concept of work, and a strong focus on equity and sustainability. Abilities involved are often artistic and traditional hobby techniques, such as painting or carpentry, intertwined with digital skills, like laser cutting and 3D printing (Martin, 2015). The movement's core principles, explains Mark Hatch, CEO and cofounder of TechShop, as well as author of *The Maker Manifesto*, are to "encourage people to make, share, give, learn, play, participate, support and change. This is a human-centric ethos that embraces technology, but only to augment and supercharge a person's own creative talent rather than be superseded by a machine" (Halverson, Sheridan, 2014)

[25] https://creativeconomy.britishcouncil.org/guide/go-make-something-growth-maker-movement/

1.3.6 Scratch

The experience at Computer Clubhouses led to the invention of Scratch. Children at Clubhouses longed to create their own stories, videos and animations, but no program had been produced so far to help them develop their ideas. When Scratch was developed, it was first tested actually from the Clubhouses members.

Scratch was then released in 2003 by Mitchel Resnick, from the Lifelong Kindergarten Research Group at the MIT Media Lab. Former Papert's student and collaborator, Resnick reveals that the name Scratch was borrowed "from the way that hip-hop disk jockeys scratch with music. They take pieces of music and then combine them together in unexpected and creative ways"[26].

This free educational programming language provides a very active online community in which to play, create interactive stories and animations. The social networking forum allows kids around the globe to post hints or doubts, share media, projects and socialize with peers in a DIY approach. It has reached an enormous popularity, to such an extent that today it is the most used coding language in schools, especially with kids ranging between 8 to 16 years of age. It has been translated into more than seventy languages, and it is used in most parts of the world.

The idea behind Scratch was to create a coding software with an easy interface that would help absolute beginners and young children to code, without having to actually write a program, but using instead predetermined blocks of code from a palette interconnecting with each other as a jigsaw puzzle. Structures of multiple blocks are called scripts. This method is called a "drag and drop programming". The zero-code interface has got specific commands and unique functions, so, once assembled, they can be run by clicking on a green flag to see what the program does.

Despite its fame, its relative ease and broad consensus worldwide, Scratch has also got a few detractors who underline the sensation of a disillusionment regarding different aspects. Though initially written in a Smalltalk Open Source code, now

[26] https://en.scratch-wiki.info/wiki/Scratch

Scratch is programmed in ActionScript, with Adobe Flasher and Adobe Air language, that don't allow neither Linux nor tablet users to run the program: Adobe Air is a proprietary software, therefore subject to marketing strategies that exclude Linux; besides, Adobe Flasher can't be run in tablets. In addition, since it requires broadband technology, it can question the feasibility and digital inclusion. Software developer and analyst Ghisalberti[27] criticizes this choice that hinders the Open Source concept, thus disadvantaging so many users, and points out that Snap!, on the other hand, is a valid alternative, being written in Javascript and executable by any Internet Browser. Ghisalberti also stresses the importance of learning written codes, because the simplified process of mechanically dragging coloured blocks around the screen doesn't increase any logical thinking nor problem solving, especially taken account of the conspicuous discrepancy between visual coding as a learning tool and written coding as the normal programming procedure of adult professional settings. Getting used since childhood to reading, writing and debugging codes would indeed help form a computational thinking, especially with secondary school children.

Another handicap addressed to Scratch is that it appears to be way too limited for programming concepts and may lead to repetitiveness of dragging around preset building blocks; perhaps it is overmuch focused on a playful environment than on a learning and challenging setting (Sterling, 2016). Formiconi emphasizes this concept by asserting that "paradoxically, Scratch may be frustrating because everything seems so easy but soon it might get much harder. Because coding is hard. Like math. Making life much easier is not always a good idea. A number of studies revealed that a Scratch introduction to programming does not necessarily facilitate the transition to conventional coding languages" (Formiconi and Mancini, 2017).

[27] http://minimalprocedure.pragmas.org/writings/Coding/coding.html

1.3.7 Snap!

Snap!, formerly called Build Your Own Blocks (BYOB), is a visual educational programming language with the drag and drop coding blocks. It is developed by German lawyer and UC Berkley University researcher Jens Mönig in 2011, and it allows the creation of application programs by using graphics and guided support. It's an extended reimplementation of Scratch, with added complex features that had been left out by Scratch in an attempt to simplify the game and avoid confusing young users. Its more professional Development Environment allows to create and re-mix interactive games, animations, storytelling, while learning during the process about mathematical and computational ideas. Contrary to BYOB and Scratch, written in Squeak, Snap! is written in Javascript.

It contains added capabilities that make it eligible for high school and university students, it's very efficient to introduce young beginners to coding, it is intuitive and engaging, as the novices as well as the experts move in this language learning while exploring.

1.3.8 MaMaMedia

A further early effort to address and reduce the digital divide was made by another Papert's former student and assistant, learning sciences researcher Idit Harel. The scholar had been a distinguished PhD student and contributed with Papert to the elaboration of the Constructionism theory.

In 1995 Harel left the MIT and founded MaMaMedia in New York City, with the goal of empowering children, families and teachers, encouraging them to use the newly born web technology of Internet and the web, fostering digital literacy skills and helping them become life long learners. The name combines two well-known brands, "there is nothing more basic or essential to kids than 'Mama,' and it's easy to

say in any language," explains Harel; the name's second half, Media, pays homage to the site's MIT Media Lab heritage[28].

With the aid of a team of professionals like educators, web designers, artists and programmers, this constructionist hand on approach strives to teach children active learning and encourages them to express themselves by writing online stories, creating games and animated characters, producing their own media, having fun with digital art, safely exploring the web and interacting with an online community of kids. The aim is also to teach how to use browsers, gain a larger perspective by working and playing with many other peers from different backgrounds and environments, overcoming together technology matters, generating new ideas during the process.

MaMaMedia has been the first leading brand in children's Internet with more than five million registered members, and many millions of visiting users monthly.

[28] http://edition.cnn.com/TECH/computing/9904/06/mamamedia.idg/index.html

CHAPTER II

Theoretical overview

2.1.1 Constructivism and Social Constructivism

Jean Piaget's theory of cognitive development offers an explanation about the way children construct a conceptual structure of the world. The Swiss epistemologist dissents with the thought of intelligence as a fixed trait, and asserts that knowledge is a process which emerges through interaction with the environment.

Observing his own children learning and playing, Piaget assumes a stage theory of child cognitive development, in which he envisions four levels: sensorimotor stage (from ages zero to two), characterized by the egocentric thought, where the infants discover their environment through their own senses, actions and then language; preoperational stage (two to seven years old), in which children begin to distinguish themselves as distinct from the environment, but offer animistic explanations of the world; concrete operational stage (seven to eleven years old), where thought interacts with things, egocentrism is overcome and language is ruled by the acknowledgement of relationships; and the formal operational stage (eleven years old to fourteen), in which the person is capable of adult and abstract thinking, being able to postulate hypothesis and deductive reasoning (Cambi, 2005).

Just as the relationship between biological organisms and their living environment is observable in nature, the relationship between the subject's cognitive-conceptual structures is also formed through adaptation with his experiential environment. Santoianni and Striano (2003) point out that knowledge, in Piagetian Constructivism, is not a reflected image of the real world, but a construction produced by the cognitive activity of the subject in relation to reality. Mental development, therefore, envisages itself as an interpretative hypothesis of the world and adaptable with experience: as long as a belief is confirmed by experience, it is reinforced and preserved in the mental structure of the subject. When, on the other hand, it proves to be inadequate or erroneous before experiences that disprove it, *in toto* or in part, it is modified, restructured in a "constructive" process of readjustment that takes in the

new informations available. The subject, consequently, faced with a new learning, reinterprets reality through new data and elaborates an adaptation process aimed at reconstructing his cognitive structures.
Piaget defines these processes with the terms "assimilation" and "accommodation", according to his constructivist vision of learning: knowledge is not passively absorbed by the subject, but reworked and analyzed, that is, actively constructed in order to organize the subject's experiential world.
Differently from Piaget, who had not taken the social dimension of learning into consideration, Lev Vygotskij, the founding father of social constructivism, believes in social interaction as an integral part of learning, that he envisions as a social and cultural, rather than an individual, process.
He significantly influenced the world of education, starting from his socio-cultural approach, by stating that, through interaction with a teacher or a little more experienced peer, the child can complete a task that he or she could not have faced alone, thus overturning Piaget's idea of fixed and unforeseeable evolutionary stages.

Social constructivism is a highly effective method of teaching that all students can benefit from, since collaboration and social interaction are incorporated. This paradigm was formed after Piaget had already described his theories involving individual or cognitive constructivism.

The Zone of Proximal development, ZPD, represents the distance between the current level of development as determined by autonomous problem solving and the level of potential development as it is determined through problem solving under the guidance of an adult or in collaboration with their most capable peers (Vigotskiij, 1980). It is precisely the presence of the mate who provides a *scaffolding*, that is, a support, a scaffold, to allow the subject to learn more and go beyond his or her limits. This is the "place" where learning is built, through the social interactions that enable cognitive development to take place.

Cacciamani remarks that the Russian psychologist has also the merit of having conducted an interesting reflection, making a distinction between instruments, i.e. mediators turned inwards that modify the environment, and signs, means oriented inward, which allow to "better organize one's mental activity (remembering,

comparing, reporting, making decisions, etc.) aimed at solving a problem," a reflection very close to the current metacognitive debate (Cacciamani, 2002, p.28).

2.1.2 Learning by doing

This hands-on approach to learning encourages the individual's inquisitiveness and exploration drives, and it is strongly opposed to passive receiving. John Dewey was a pragmatist, educator, philosopher and social reformer, whose ideas inspired education and society not only of his time, but his influence has had a strong impact also over the years, on many learning theories such as constructivism, learner-centered theory and constructionism.

Cambi notes that Dewey's pedagogy is characterized by inspiration to pragmatism as a union between theory and practice, so that the central moment of learning becomes the student's "doing"; it is also intertwined with the research of experimental sciences and engaged in the construction of a philosophy of education linked to the democratic development of society and the formation of a citizen with a modern, scientific and open-minded mentality. Democracy and education should be actually linked to equip people to contribute to a better society, a duty that Dewey saw as a citizen's primary responsibility. These characteristics are the heart of Deweyan thought and the basis of the theoretical model of the "active school" (Cambi, 2005). Dewey argues that, for the most effective education, school shouldn't stay aside from the profound changes in society, on the contrary, it should be intimately connected to "social progress" so much so as to become a "miniature community, an embryo society".

Different kind of laboratories should be created to link school with meaningful experiences of craft production and work activities, such as weaving, carpentry and cooking. This way the child learns from direct personal experience trying out different roles and interacting with various curricula, as he gains a progressively clearer perspective of what his or her future role may be in society.

In Dewey's thought, the teacher's role should facilitate active learning starting from the real interests of the students and engaging them in significant experiences, to obtain the highest motivation and the most effective results, bearing in mind that every student is a unique learner with personal talents and drives.

2.1.3 Constructionism Theory

"The word *constructionism* is coined from two words. There is a psychological theory that I first learned to appreciate from Piaget, but which one also finds in Vygotsky and in other theorists. This theory says that knowledge is not transmitted like information in a pipeline. In fact, there is something called the theory of information that in many ways gives us exactly the wrong picture of education. Knowledge is not to be transmitted, it is *constructed*. Each individual must reconstruct knowledge. Of course, one does not necessarily do this alone. Everybody needs the help of other people and the support of a material environment, of a culture and society. But still, knowledge must be constructed -- and that's what Piaget meant by the term *constructivism*. Construc*tion*ism adds a second side to Piaget's idea of construc*tiv*ism. Constructivism is the idea that knowledge is something you build in your head. Constructionism reminds us that the best way to do that is to build something tangible -- something outside your head -- that is also personally meaningful" (Papert, 1990).

The concept of Constructionism could be easily exemplified with a catchy formula that evokes the Deweyan "learning by doing", such as "learning-by-making." And yet, although this theory has its roots in Dewey's thought of experimentation and authentic inquiry, there is a much richer and complex meaning to it.

In Papert's words, this theory also has the connotation of "construction set", where the term set is to be taken literally, like the Lego set, extending the definition to include the programming languages considered as "set" in which they prepare not only cakes, but also recipes and forms of practical mathematics. Construction takes place inside one's mind and it often occurs in a particularly brilliant way when it is

supported by the knowledge of something much more concrete: a Lego house or a company, a sand castle or a computer program, a poem or a theory of the universe. Concrete means that the product consists of a material construction and can be shown, discussed, examined, probed and admired (Papert, 1994).

Papert's epistemology is based on the "practice of error", on adjustment processes, on managing the indefiniteness. Therefore, there is a way to build a useful, shared knowledge, adapting and bending it to the subject's needs, it is practical and intentional knowledge, embodied in concrete contexts.

The South African mathematician remarks that his Costructionism paradigm includes a first aspect that is based on and recalls Piaget's Constructivist theory, where learning is seen as a building product of the mind; the mind then processes the information by accomodation and assimilation and it is not a mere transmission of knowledge, in opposition to Instructionism, that looks at the child as an empty vessel. So "it shares Constructivism's connotation of learning as "building knowledge structures" irrespective of the circumstances of the learning" (Papert and Harel, 1991:1). Since knowledge is not a passive process, it has to be built directly by the learner, through the interaction between experience and pre-knowledge.

The second aspect of Constructionism goes beyond Piaget's intuition when it affirms that learning takes place in a practical way, building knowledge through collective bricolage, in an environment where there is the chance to practically construct knowledge. It develops within a hands-on approach based on "cognitive artifacts", which are devices that facilitate learning, by making it visible and practical. Learning is not just a matter of mental procedures, because it's supported by hands-on and real constructions of meaningful projects, inasmuch as learners need to explore and tinker with their own hands reality and its laws; the student's role is central and his concrete activities make learning possible.

In this regard, it goes beyond Dewey's learning by doing theory, because it stresses the paramount importance of learning to create, to build something real and meaningful, rather than just learn to do something. The artifact may also be a verbal experience, as long as the craft has a significant goal, something interesting and remarkable enough to make its author want to talk about it.

Learning, in Constructionist terms, represents the active process to create and build something, therefore computers play a fundamental role in it: the active construction of artifacts, tangible and shareable objects or craftworks. The making of something real and concrete is the best way to prove that learning took place. Computers, in this vision, are perceived as the tools that enable learners to explore the world and its realities by actively constructing knowledge. They stand between the abstract and the concrete in many ways. Helping to visualize abstract things, the computer conveys thinking and reflection as a kind of transitional object or a stepping stone. In this manner, computers become very valuable, as they allow the users to externalize their intuitions, predictions and expectations by visualizing the problem, trying out and testing the possible solutions.

Papert's notion about the use of computer in education is seen as the greatest new vehicle ever invented for gaining powerful ideas, but it has to be understood and utilized just like a piano, with the consciousness that the music is not in the instrument, it just amplifies tremendously the way you can look at a subject (Key, 2017).

While other people of his time were imagining how computer could deliver information, instructions or provide entertainment for children, Papert was already imagining children in charge, capable of using this new technology, in order to express themselves and engage in complex thinking.

In Papert's view, computers play three different roles in terms of powerful ideas. They may have a neutral role, meaning that often massive ideas are independent of the existence of the computer. The liberator role is when the computer frees powerful ideas by making them mightier and accessible to a wide range of people. Finally, the third is the incubator role of powerful ideas, in the sense that some ideas come to light thanks to the presence of a computer (Bers, 2017).

Papert's Constructionist theory of learning consists in upholding connections between making things in the world and making things in one's head, by developing the Logo programming language, that is the first programming language designed bearing children in mind, to enable them to design, create and express themselves, also exploring with mathematical thoughts.

One of Papert's famous principles states that the mind cannot develop if it is limited just to store new knowledge inside it, conversely, it should organize the knowledge and invent better ways to use it in new, different ways. One means to do this, the computer scientist argues, is by programming computers, as instruments that help make formal thinking concrete and visible, tools to build one's knowledge and generate insight. For instance, many mathematical notions, like geometry, become visible and maneuverable on the screen of a computer, yielding possible formal learning concepts that require abstract thinking (Minsky, 1985).

2.1.4 Papert's reflections on Piaget

Papert can discuss about his vision of Piaget's theory from a very personal perspective, having worked side by side with him for years, he presents a different Piaget from the one people know about, a "revolutionary Piaget, whose epistemological ideas might expand known bounds of the human mind" (Papert, 1980).

Piaget asserts that every mental operation has two faces: *assimilation*, the process with which one absorbs the outside world into their own mental scheme, and *accomodation*, the change that takes place inside one's mental schemes after *adaptation*. School firstly reacted to the mass introduction of computers by assimilating them. But it didn't allow them to influence its own very core, it just saw computers through its mental lens of thinking and acting. It is indeed a characteristic of conservatory systems to let accomodation take place only when the possibilities of assimilation have faded (Papert, 1994).

As an epistemologist, when Piaget talks about the child in his developmental phase, he is also telling something about the development of knowledge. This concept brings us to a contrast between epistemologists and psychologists: the latter are driven by the laws that rule the student rather than what is being learned. Behaviourism psychologists study reinforcement schemes, motivational specialists examine schedules, Gestalt theorists investigate the form. Therefore if, according to

Piaget, separating the process of learning from learning itself is a mistake, in order to understand what a student apprehends about numbers, we should analyze numbers. Piaget taught us that we first need to understand how children interiorize the number through a more profound comprehension of what the number is. For him, studying learners and considering what they learn and think are two inseparable notions.

Piaget discriminates between "concrete thinking", which is already present in the sixth year of age and keeps on consolidating in the following years, and "formal thinking", that begin to form around the age of twelve. Papert doesn't completely agree with Piaget's stages of development theory, nevertheless he believes that they can be used as a scales to allow the thought that the computer can put into practice and personalize formal thinking. Seen from this perspective, the computer is not just playing the role of a formative tool, the only medium that ensures us the way to push the limit between concrete and formal thinking.

Papert operates a distinction between two different kinds of culture, the one that functions and works with computers, and the "pre computer culture" (whether in the Western world or African tribes). Computers give the users a chance to learn by programming, therefore by having a control on the thinking process, step by step, until the machines respond exactly the way it was intended and forecasted. The child does something important during this process, he is actively learning and he is experiencing knowledge through building something relevant and visible.

Differing with Piaget's distinction about concrete and formal thinking, Papert believes that computers can concretize and personalize formal thinking, hence helping anticipate the stage from child to adult thinking. In this perspective, it's not just a technological tool, but a powerful medium to bridge the gap between concrete and formal thinking. Computers seem to offer practical examples that lead to forming a knowledge previously seen as intangible and abstract. In his experience, Papert observes that "children who had learned to program computers could use very concrete computer models to think about thinking and to learn about learning and in doing so, enhance their powers as psychologists and epistemologists"(Papert, 1980, p.23).

2.1.5 Metacognition

The etymological meaning of the term metacognition derives from the Greek prefix *meta*-, beyond, above, and from the Latin word *cognitio*, to know; it therefore refers to the ability of reflecting on one's way of learning and reasoning, to investigate one's cognitive activity.
John H. Flavell, the developmental psychologist who first investigated its potential and offered a first definition, describes it as follows:

"Metacognition refers, among other things, to the active monitoring and consequent regulation and orchestration of these processes in relation to the cognitive objects or data on which they bear, usually in service of some concrete goal or objective" (Flavell, 1976, p. 232).

The author has the merit of having carried out the first effective researches on metacognition, in the psychological field, and of having contributed to spreading and investigating the concept of metacognition, intended as the subjects' ability of gaining awareness and control of their own mental processes.

Researches carried out in collaboration with Wellman in 1976 on metamemory, i.e. the knowledge and control of one's memorization processes, led to the development of a structured model in which four types of information intertwine to develop metacognitive knowledge: personal attributions, aka the ability to self-evaluate and predict one's performance in relation to the task required; characteristics of the task, i.e. the ability to identify the main information; strategies that can be used to face the task, which can be translated into the choice of suitable and effective tools for the situation; conditions of application of the task, in the sense of knowing how to manage the variables related to the task itself.

With regard to Flavell's pioneering researches, Brown (1987) took a step forward by highlighting a second meaning of the term metacognition: the strategic function of metacognitive control, understood as a series of complex mechanisms of regulation and control of one's cognitive functioning. Through the ability to problematize a

situation, the subject activates awareness while searching for a solution by implementing the planning, monitoring and strategy review processes.
In his work with his research team, Brown therefore attributes two meanings to metacognition: the knowledge of one's own and others' mental functioning and the ability to control and regulate it through active monitoring.
Brown's group also distinguishes two levels in which intelligence is organized, defining the first as an architectural level, which concerns the ability to store, process and recover information; the second is called executive, or metacognitive strictly speaking, tasked with organizing control processes and regulating complex cognitive tasks.

One of Papert's most famous quotes (and the title of one of his papers) is "You Can't Think About Thinking Without Thinking About Thinking About Something" (2005), which clearly expresses his sentiments towards metacognition. "Although he used the term 'epistemology' rather than 'metacognition', Papert based his educational beliefs on the concept of learners using *very concrete computer models to think about thinking and learn about learning and in doing so, enhance their powers as psychologists and as epistemologists*. Since then metacognition has entered the lexicon of educational psychologists and its meaning has broadened considerably" (Redman, Jones, 2007).

The Logo programming language was specifically aimed to fuel children's ability to use computer as tools in order to learn to learn, and programming in an environment where it would be possible to express their creativity and build significant artifacts.

In Papert's vision, the student, protagonist of his/her learning, is stimulated to test cognitive and metacognitive ability through the search of strategies to solve problems, the procedure to trials and errors, the verification of hypotheses and intuitions, the technique the "intellectual bricolage" according to which nothing is expected to work at once, the debugging with which to experiment with the heuristic modality that stimulates the metacognitive thinking (Capponi, 2009).

2.1.6 Computational Thinking: thinking like a scientist to solve problems

Seymour Papert tackled the subject in his book Mindstorms (1980), coining for the first time the term "computational thinking" by considering how the use of computation helps obtaining new knowledge, and how we can make computer enhance our thinking and augment our skills.

In 2006 Jeannette M. Wing of Carnegie Mellon University published the article "Computational Thinking", a much cited and commented paper in the following years, where she describes CT as a series of abilities capable to solve complex computer problems and applicable in different scenarios. According to the Author, CT should be considered as a fundamental competence, just as the printing press enhanced the paramount importance three Rs (reading, writing, reckoning), so computer science will render the need of CT obvious, not only to programmers and computer scientists, but as a way of reasoning, learning to solve problems, designing projects, debugging errors, understanding human thinking and processes.

As Wing claims, "computational thinking confronts the riddle of machine intelligence: what can humans do better than computers? And what can computers do better than humans? Most fundamentally it addresses the question: What is computable? Today, we know only parts of the answers to such questions" (Wing, 2006).

In this renowned essay, Wings enumerates the main characteristics of computational thinking:

- Conceptualizing, not programming: computer science is not about programming a computer. Thinking like a computer scientist means a lot more than programming a machine. It involves thinking at multiple levels of abstraction;
- Fundamental, not rote skills: a crucial skill is something everyone must know to function in modern society. Mechanic means routine. And yet, until computer science won't be able to solve the great challenge of Artificial

Intelligence and create computers that think like humans, thinking will be repetitive;

- The way humans, not computers, think: computational thinking is a mode used by humans to solve problems; it doesn't mean to try and make humans think as if they were computers; computers are boring and dull; humans are smart and creative. We humans make computers exciting, by using our intelligence to face challenges we wouldn't have dared to confront before the technological Era and we build systems with limited functions just by our imagination;
- Complements and combined mathematical and engineering thinking: computer science draws its thinking from mathematics, as its foundations lean on mathematics, and from engineering thinking, as we build systems that interact with the real world. Calculus limits force computer scientists to think computationally, not just mathematically. Building virtual worlds empowers us to design systems beyond the physical world;
- Ideas, not artifacts: what will influence our lives in the end will be the computational thinking, that we use to manage our daily lives, to communicate and interact with people, not just new software or hardware artifacts;
- For everyone, everywhere: computational thinking will be a reality when it will have such an integration with human endeavors, that it will vanish as an explicit philosophy.

The Computer Science Teachers Association and the International Society for Technology in Education (CSTA & ISTE, 2009, p. 1) have provided an operational list of definitions for Computational Thinking[29] as a problem-solving process that involves the following features, and many more:

- Formulating problems in a way that enables us to use a computer and other tools to help solve them;

[29] https://id.iste.org/docs/ct-documents/computational-thinking-operational-definition-flyer.pdf?sfvrsn=2

- Logically organizing and analyzing data;
- Representing data through abstractions such as models and simulations;
- Automating solutions through algorithmic thinking (a series of ordered steps);
- Identifying, analyzing, and implementing possible solutions with the goal of achieving the most efficient and effective combination of steps and resources;
- Generalizing and transferring this problem-solving process to a wide variety of problems.

"In general terms, computational thinking is regarded as a thought process entailed in designing solutions that can be executed by a computer, a human, or a combination of both. In spite of the wide variety of definitions in use, it is possible to identify a set of constituent core concepts recursively positioned under the CT umbrella, namely *abstraction*, *algorithmic thinking*, *automation*, *decomposition* and *generalization*. These in turn are related to a set of attitudes and skills (or practices), including *creating computational artifacts*, *testing* and *debugging*, *collaboration* and *creativity*, and the ability to *deal with open-ended problems"* (Bocconi, Chioccariello, Earp, 2018).

The authors just cited note that educational stakeholders are envisioning computational thinking, programming and algorithmic thinking as fundamental skills for the new millennium schools, just like numeracy and literacy; all over the world, a growing number of projects regarding coding have been included in national schools' curriculum, such as EUCode week, Hour of Code, Code.org, and the terms "programming" or "computational thinking" have been massively introduced into laws regarding education and in the school curriculum (for Italian schools, into the PTOF[30]).

In this respect, Tedre and Denning warn us about the risks of identifying coding with computational thinking: "Coding is just one part of the program construction process and not even the part that requires the most computational thinking. Many central concepts of coding—like iteration and selection—are not even central to computational thinking. The second risk is the implication that "coding" is the

[30] See Chapter III

essence of CT or CS. […] Coding skills are less and less relevant to the typical design challenges and design tools of modern computing. CT initiatives should try to avoid the "computing = programming" trap" (Tedre, Denning, 2016, p.126).

2.2.1 What is coding

The term *coding* means an organized and finished series of algorithms, instructions that are being given to the computer or a robot (computer operated mechanism) through a specific language, whose execution in sequence produces the resolution of a specific problem. An algorithm is a finished sequence of elementary steps to execute to get to the solution of a problem.

These programming languages are formal languages, with a series of precise set of instructions, syntactic and semantic rules, keywords and special characters. Code needs to be translated into binary code in order to interact with the computer, who speaks its own language, the "machine code", through a software that interprets the commands and then the computer can execute the code given. This machine language operates through the binary alphabet, via electric impulses (on-off), of zeros and ones sequences (bit). Every line of code has a command, and a document full of lines make a script, which is a sequence of lines of instructions that make a computer carry out a task.

Coding and programming are often used as synonyms, but they haven't quite the same meaning: programming means to program a machine or an application to run without errors, so it requires a lot more than just writing a code, the programmer deals with multiple tasks and ensures that the codes will run smoothly, creating solutions for problems that may never arise. Instead, to code means writing codes from one language to a machine-readable language.

Today coding for children should aim at the crucial role of computers in every aspect of contemporary life, at the ability of understanding and thinking laterally, in order to

learn different mindsets, not just at the need to train individuals capable of programming computers in a world that's enduring dramatic changes.

Amongst all kind of edutainment material, coding is based on metacognitive competences required for computational thinking, such as actively planning, searching for and selecting useful strategies, connecting new information to pre-knowledge, monitoring and evaluating thinking processes, simplifying complex actions into a conditional sequence.

Block coding has become popular in schools, thanks to its easy interface, smart graphics and intuitiveness. It is a visual programming language and it works by dragging and dropping coloured blocks that contain strings of prewritten codes, so it's a good starting point for very young learners (preschoolers) to familiarize with computer language, even though it doesn't really offer a real knowledge about coding. At a certain point, the learners need to move on a text-based code, in order to boost their skills on logic, metacognition, problem analysis, problem solving, decomposing problems into smaller bits, use of different strategies, looking for errors, just to name a few. In primary school and kindergarten there is a striving to teach this new subject (through the medium of robotic toys, block coding and coding unplugged).

A kind of coding that doesn't require any Internet connection, nor the use of electronic devices, is called unplugged. Teaching coding without the aid of a computer is probably the most effective way to enable students to grasp and master scientific thinking in a meaningful and practical way. Through playful activities with pen and paper, or on a larger scale using students' own bodies, the children learn to code with movements across a room. Few basic rules allow them to act and move as the cursor on a computer screen, while interiorizing the core of computational concepts. Unplugged coding games usually include impersonating two characters: one child is the programmer and the other plays the robot.

Every computer program is written with the syntactic rules of a programming language, there are actually dozens of coding languages (Java, Ruby, HTML, Python, C/C++, Perl…), each of them specialized to specific functions and to send the commands to the computer to execute operations and conditions given or not the

presence of specific variables. Programming languages, therefore, follow a grammar of their own, similar to any kind of languages, just like English, but they are more simple and "poor", less expressive and colourful that a natural idiom because computers obey instructions literally, they don't understand nuances of significance, sarcasm or double meaning. Their only power is having a strong processing power. Therefore, the only way to communicate with them is through extreme clarity, and precision of the commands, and in the absence of any sort of ambiguity. Contrarily to people, computers will do exactly what they are told to, so a line of code must be very accurate and say what to do, when to do it, in which conditions (if...then), when to stop doing it and so on, without leaving the choice to the computer, because the computer isn't able to choose on its own.

Coding may be very easy and at the same time very hard, as there are many different levels of expertise, just like there are children's books and academic books on a shelf. Learning to code is a process of trials and mistakes. Python, developed in the Eighties, is one of the most popular coding languages today, and it's incredibly versatile, moreover it's a free open source; it is used by the greatest companies such as NASA, Google, Netflix, Dropbox, Instagram and so on.

Like Python, the LOGO language is an interpreted programming language, therefore the execution of the commands is immediate and interactive, allowing the problem to divide into smaller bits in order to deal with one at a time. Every new procedure has got the same hierarchic value as the previous ones: Logo has got a low primitive language that can be enriched by the user with the invention of new words and new ideas. In addition to its easiness to be run, it is also powerful and doesn't require any programming preknowledge (Capponi, 2009).

2.2.2 Fancy paraphernalia: useful tools or useless fashion?

In the recent years, the concept of digital competence, together with the striving of teaching it in schools, is more and more current, due to the increased international awareness of the need to teach technological skills from childhood. Especially in the

last fifteen years, many digital tools for children have been created and launched on the market, as well as many robotic games and electronic devices.

While the importance of dealing with digital literacy since an early age is globally acknowledged, it seems that the toy and educational industries have found a gold mine in the field of digital learning and are getting a great income by selling the ultimate robot or edutainment set to families and schools. Their alluring promises of unquestionable success in the STEM subjects prompt individuals and education practitioners to buy the newest products that will be too soon replaced by more recent ones, following the marketing logic of consumerism and planned obsolescence.

Presently, there is momentum about coding and computer science in general, so it is advisable that school professionals should be aware that large multinational companies strive to sell them their latest products just for business reasons. The schools, however, in the hurry to fulfil the recommendations of the present regulations regarding digital competence, might lightly purchase the latest technological devices, ending up buying useless gift-wrapped products, if not harmful, in terms of creativity and environment sustainability. For instance, in order to let students experiment with tinkering, the only things that are basically needed are raw electric gears, like motors, wires, batteries, and some recycled material to boost children's imagination and inventiveness. And yet, available on the market to buy and suggested at school fairs, there is a large amount of preset, precut, cool and neat, ready to use, not to mention expensive, boardgames – obviously accompanied by paper and online instructions - that hinder the 'thinking outside the box's attitude.

Another example would be the coding unplugged experience: it is clearly possible to buy many different kinds of bombastic games with video cameras, shining mini robots and huge chessboard-like plastic tablecloths. And, of course, the instruction leaflet or on a specific app. Alternatively, it suffices to use a ruler, a pen, some coloured sellotape and a pair of scissors, to check the floor and just let children have fun by playing the part of the robots on the squares.

2.2.3 The misconception of the digital natives

The term “digital natives” was created and used for the first time in 2001 by Marc Prensky, in an attempt to define the generation born after 1980, surrounded by technology at home, such as personal computers, videogames, mobiles and Internet. The author defines it as a “native speaker” of multimedial languages, as if technology were their mothertongue, implying a particular multitasking skill that binds them in the ability of naturally using any device, distinguishing and filtering a large quantity of information from the Internet at just a glance and validating the reliability. They seem to be technically and mentally smarter than the previous generation, called the “digital immigrants”, as in a sort of radical transformation of their cognitive and learning styles. Maria Ranieri points out that this hypothesis is in reality denied by a vast quantity of international researches that show how the youngest generations often prove to be, in fact, naïve and unguarded in terms of recognizing, for instance, the truthfulness of documents found on the Web (Ranieri, 2011). Neuroscientist Manfred Spitzer notes that young people find it difficult to assess the importance of different sources and they easily tend to get confused when asked to distinguish between the authority of reliable sources and less authoritative ones, therefore they seem not able to judge the root of information (Spitzer, 2012).

In Italy, a survey conducted on 1,500 students (Calvani, Fini, Ranieri, 2010) demonstrates that many young people approach school already technologically literate, in terms of simple technical tasks; if, however, this result is interpreted in greater detail, it becomes evident that in general terms there is a low level of competence in the same individuals. A very similar result appears when analyzing a study in a different context like China, in the Hangzhou province: students’ digital competence levels are widely below expectations, especially on the cognitive and ethical side (Ranieri, 2011).

Perhaps it is time to dispel the commonplace belief that the “Google generation” is naturally fitted to learn and navigate without being taught to, as well as to expertly conduct searches in the Web. As Spitzer puts it, the authors of these researches are

more inclined to nickname the young ones as the “copy and paste generation” (Spitzer, 2012).

Ranieri, on the basis of the research she examined in her book “Le Insidie dell’Ovvio” (2011), concludes by pointing out three main elements. First of all, it does not seem feasible to generalize by opposing one generation of "digital natives" to another of "digital immigrants", since the age is not the only element that can determine a greater or lesser digital competence, but rather, at the most, a greater familiarity and a longer exposure time to the devices.

In addition, the expectations and requests that young people have regarding technologies to be used at school should be investigated more, because a growing number of studies indicates how much the need for digitization of the school does not emerge from the world of youth.

Finally, for a better understanding of the direction that the school should take in the path of digital education, it seems useful to reflect on the different levels of knowledge and competence in the new generations, working in synergy with research and training to support increased access and advanced skills (Ranieri, 2011).

In his book “Digital Dementz” (2012), Spitzer compares the brain to any other muscle in the body that, if not used, tends to atrophy. It has been discovered that this powerful organ changes according to how it is used: with learning, in fact, the synapses change and the brain's capabilities increase.

It is the individual himself who decides what to do with the countless information he comes into contact with, whether to superficially process it and set it aside, in which case less synapses will be activated, or analyze and investigate it further, causing the learning and development of new neural connections.

The use of Internet and Social Networks is indeed impoverishing language and research skills, leading to greater superficiality, up to the use of incorrect if not abusive behaviour, as well as addiction to the Net.

Just in order to carry out a school research, in the analogic Era it was necessary to consult books and encyclopedias, choose the parts to be reworked or transcribed on a sheet, synthesize different speeches and explanations; whereas today, to perform the same research, just a few clicks are enough to open infinite pages on the same topic, quickly scroll through the text, then copy and paste entire passages, thus jeopardizing the elaboration process, as well as the flattening of the mnemonic abilities.

Actually, Spitzer observes that since the purpose of digital media is to take away mental work from the user, they are not the right tools for learning, given that building knowledge requires work and effort, for the deeper you immerse into a topic, the more you elaborate it, the better you learn it.

In some countries whose schools have experienced a massive use of digital tools, such as South Korea, it was found, through an investigation by the Ministry of education, that 12 percent of students had experienced an Internet addiction; in Germany there is a similar situation, as cases of computer and Internet addiction are multiplying, to the point that some clinics, specialized in the treatment of this disorder, have been specifically established.

Over the past two decades, especially in the United States, scientific researches have been published on digital media that demonstrate how much the abuse of technology may have negative effects on school performance.

Spitzer notes that, despite the disheartening results, many schools (including kindergartens) continue to equip themselves with digital technology for educational purposes, therefore, although studies on the topic have been known for years, they are not taken into consideration.

The German neuropsychiatrist quotes a statement by Larry Cuban, a Stanford professor and former school superintendent: "a cycle begins with great promises from those who designed and perfected the technology, teachers begin to use the new tools, but there is no real academic progress. The usual diatribes on the lack of funds, the opposition of the teaching staff or the bureaucratic delays are immediately unleashed. But no one questions the claims of the advocates of the new technology.

However, as progress is slow in coming, the responsibility for the failure is ultimately blamed on the machines. A short time later, the school adopts the next generation of technological equipment and the cycle restarts from the beginning" (Spitzer, 2012, p. 79).

The widespread of technological devices, according to Spitzer, especially in the working world, is due to their usefulness: they allow you to receive and process data much faster and therefore to make better decisions. Instead, what can become dangerous is their constant use, at the limits of abuse, without balance and common sense: on many occasions an approach not mediated by technology is possible and sometimes preferable.

Regarding what schools can do about the issue, Calvani (2010) suggests to direct the focus towards a critical and reflective use of technology and multimedia, keeping in mind the ethical and social side. For instance, it is possible to raise and improve students' awareness of the reliability and relevance of sources, security on the web, correct and controlled use of privacy on social networks, co-construction of knowledge through tools that stimulate cognitive growth and sharing in safe environments, rather than a mechanical "cut and paste" use.

2.2.4 Digital divide versus digital inclusion. How to bridge the gap?

The digital divide refers to the inequality in access to information communication technology of individuals, groups or entire countries; the issue includes Internet coverage, availability of hardware, software, accessory equipment. This disparity particularly affects specific geographic areas or certain ethnic groups. Some of the contributing factors to digital divide include poverty and ineffective infrastructures as well as poor education.

Every school institution's objective should aim to help close this gap, so that every child may have access to the digital world in order to achieve academically and have equal opportunities to reach success throughout his or her life. Educating to boost this competence is one of the schools' tasks.

It is useful to remember that many resources and products are free to use and open-source. An open source software is a program whose source code has been made available for everyone to use, modify and enhance, under licenses that allow free redistribution, namely without charging a licensing fee for their work. The authors of the software, although holding the rights, allow free study and collaboration from independent developers, that must accept the terms of the licence, usually much milder than the proprietary ones that only publish the object code, keeping the source code secret in order to control the market.

The concept of the Open Source movement is to let every user, programmer or not, benefit from the software and its implementations, so that extensive revision helps reduce computer bugs and risks better than how a single team could master. Google Chrome, Mozilla FireFox, Apache OpenOffice and Android are all examples of open source platforms, free of charge and legally usable in any context: public, private, professional and corporate.

In the educational field there are also Open Source materials, available to teachers and students, such as:

EASY DIDA is a package of free and Open Source tools for easy teaching, complete with video tutorials and webinars to create video and audio lessons, concept maps, manage the IWB, produce text documents. It works on all operating systems, including Ubuntu or So.Di.Linux, Wiildos and all derived Ubuntu. It is aimed at all students, especially those dealing with specific learning disorders or special needs, cognitive or sensorineural disabilities (Muoio, 2018).
So.Di.Linux is a project born in 2003 from a collaboration between the Institute for Educational Technologies of the CNR with the funding of the AICA (Italian Association for Informatics and Automatic Calculation), aimed at the realization and dissemination of a series of Open Source teaching tools in the school world. The software is designed for teachers, from kindergarten to university. Installable in its various versions downloadable on any PC (even dated), it also avoids the scrapping of old school devices.

There are also online movements aimed to guiding and tutoring students through the learning of coding and enhance computational thinking in general, including:

The Hour of Code, designed by the Massachusetts Institute of Technology in Boston and firstly introduced to United States schools, has rapidly spread worldwide. It started as an hour introduction to computer science, it reaches out to expand problem-solving skills, logic and creativity. In Italy this project is known as "L'Ora del Codice"[31], and is sustained by Programma il futuro, endorsed by CINI

[31] https://programmailfuturo.it/progetto

(Consorzio Interuniversitario Nazionale per l'Informatica) and MIUR (Ministero dell'Università e della Ricerca).

CoderDojo, a volunteer-led movement, is organized in hundreds of free clubs around the globe, whose objective is teaching programming language to children aged seven to seventeen. The first CoderDojo was launched in 2011 in Ireland, and became immensely popular, especially now, being Open Source, it has become a global phenomenon. There are now almost two thousand verified Dojos in 93 countries, with new ones starting every day. Youngsters can learn coding, build a website, create an app or a game, and explore technology in a relaxed, positive and social environment. Each Dojo schedules its own playful activities, through peer learning and mutual exchange.

About the issue of Internet coverage, throughout the world it is reckoned that over 3,8 billion people are left out of the Web, particularly penalized are women, African countries and rural areas.

On the 29 June 2012, the Human Rights Council of the United Nations, with the approval of the resolution A/HCR/20/L.13, has defined Internet as a human fundamental right, as encompassed in the article 19 of the Universal Declaration of human and citizen rights. In this document the Web is depicted as "an issue of increasing interest and importance as the rapid pace of technological development enables individuals all over the world to use new information and communications technologies [...] the same rights that people have offline must also be protected online [...] calls upon all States to promote and facilitate access to the Internet [...] how the Internet can be an important tool for development and for exercising human rights"[32].

This powerful statement highlights the importance of guaranteeing free access to the Web in consideration of its enormous and extraordinary potential, through the adoption of specific national and international policies. The following pages show some passages taken from the most recent European Recommendations and from the

[32] https://ohchr.org

Italian legislation with reference to fighting inequality and fostering digital inclusion and competence.

CHAPTER III

European and national legislation

3.1.1 2015 Joint Report of the Council and the Commission on the implementation of the strategic framework for European cooperation in education and training (ET 2020)

In this report are analyzed the data of the Commission's 2014 Education and Training Monitor and the objectives to promote social cohesion, equality and non-discrimination. One of the main focuses is creating, with the aid of digital devices and digital competences, an inclusive and engaged learning for diverse learners, particularly by boosting the availability and quality of open and digital educational resources, such as public libraries, open adult education centres and open universities, in cooperation with European open source communities.

3.1.2 New Skills Agenda for Europe, European Commission 2016

Assuming the discouraging data that show that around a quarter of the European adult population struggles with reading and writing, and has poor numeracy and digital skills, the global skills agenda for Europe includes initiatives to enhance education for all European citizens develop, since childhood. Since the rapid transformation of society is causing many changes in the workplace, such as robotization and artificial intelligence related jobs, the demand for digital technology professionals has grown rapidly in the last years. Yet, the Agenda underlines, "digital skills are lacking in Europe at all levels. Furthermore, almost half the EU population lacks basic digital skills. Member States, business and individuals need to rise to the

challenge and invest more in digital skills formation (including coding / computer science) across the whole spectrum of education and training"[33].

3.1.3 The Digital Competence Framework for Citizens 2017

This model, DigComp 2.1, presents the latest version of the previous Framework, first published in 2013, in order to define digital learning outcomes (using action verbs, as in Bloom's taxonomy). Through eight proficiency levels for each competence following the structure and lexicon of the European Qualification Framework (EQF), DigComp has been developed by the European Commission Joint Research Centre (JRC). The different levels of expertise are explained using the metaphor of a person gradually learning to swim in the digital ocean.

3.1.4 Digital Education Action Plan 2018

The European Commission in 2018 has adopted the following plan[34], which includes eleven actions to enhance technology and digital competencies needed in the schools and in the workplace to help people, educational institutions and education systems better adapt in this time of rapid evolution and digital change.

Making better use of digital technology for teaching and learning

Action 1 – Support high broadband connectivity in schools, especially in disadvantaged and rural areas in all EU Member States.

[33] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018H0604(01)&from=EN
[34] https://ec.europa.eu/education/education-in-the-eu/digital-education-action-plan_en

Action 2 – Supporting schools digital capacity, with the free use of SELFIE, an online self-reflection tool on the use of digital technologies.

Action 3 – Provide a framework for Digitally Signed Qualifications, aligned with European, Qualifications Framework for Lifelong Learning (EQF) and the European Classification of Skills, Competences, Qualifications and Occupations (ESCO).

Developing digital competences and skills

Action 4 – Higher Education Hub, create a platform for online learning, blended mobility, virtual campuses and exchange of best practices among higher education institutions at all levels (students, researchers, educators).

Action 5 - Open Science Skills, offering specific training on open science in higher education institutions at all levels (students, researchers, educators).

Action 6 - EU Code Week in schools, disseminate and increase schools participation in EU Code Week.

Action 7 - Cybersecurity in Education, raise awareness and offer training for online safety and cyber hygiene, empowering people to use technology confidently and with safety.

Action 8 - Promoting digital and entrepreneurial skills for girls to reduce the gender gap in the technology and entrepreneurial sector.

Improving education through better data analysis and foresight

Action 9 - Build evidence on the uptake of ICT and digital skills in schools, by publishing a reference study assessing progress in mainstreaming ICT in education.

Action 10 – Launch artificial intelligence analytics to tackle specific problems and increase education policy; develop relevant toolkit and guidance for Member States.

Action 11 - Strategic foresight on key trends with Member State experts and making use of channels of EU-wide cooperation on education and training.

3.1.5 Council recommendation of 22nd May 2018 on key competences for lifelong learning

The first page of the document explains the reasons why the Council, 12 years after the publication of the first edition (18th December 2006), adopted a new Recommendation[35] on key competences to revise the old ones.
At the present time many professions have changed and technology has increasingly become part of every sphere of work and social life, as well as private. Presumably, most children starting their school now will practice professions that are currently unknown, so it will be necessary to invest heavily in skills and rethink education and lifelong learning systems. Furthermore, the latest data from the OECD PISA surveys offer poorly encouraging results: one in five students in the European Union do not have sufficient reading, mathematics and science skills. 63% of the EU population does not have sufficient digital skills, 44% scarce and even 19% null.

The document consists of two parts, the first one states the motivations that led to updating the competences, described in twenty points which are the premise to the eight fundamental objectives proposed for action by the Member States; the second one enumerates the eight key competences, expressed in knowledge, skills and essential attitudes related to the specific competence and the actions that Member States should take to sustain the right to education through the use of good practices.

Key competences are a combination of knowledge, skills and attitudes that individuals need to develop in life, in order to have access to all opportunities in active citizenship, lifelong learning and career throughout life.

Annex one, art.4, on key competences for lifelong learning framework recites:

Digital competence involves the confident, critical and responsible use of, and engagement with, digital technologies for learning, at work, and for participation

[35] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018H0604(01)&from=EN

in society. It includes information and data literacy, communication and collaboration, media literacy, digital content creation (including programming), safety (including digital well-being and competences related to cybersecurity), intellectual property related questions, problem solving and critical thinking.
Essential knowledge, skills and attitudes related to this competence
Individuals should understand how digital technologies can support communication, creativity and innovation, and be aware of their opportunities, limitations, effects and risks. They should understand the general principles, mechanisms and logic underlying evolving digital technologies and know the basic function and use of different devices, software, and networks. Individuals should take a critical approach to the validity, reliability and impact of information and data made available by digital means and be aware of the legal and ethical principles involved in engaging with digital technologies.
Individuals should be able to use digital technologies to support their active citizenship and social inclusion, collaboration with others, and creativity towards personal, social or commercial goals. Skills include the ability to use, access, filter, evaluate, create, program and share digital content. Individuals should be able to manage and protect information, content, data, and digital identities, as well as recognize and effectively engage with software, devices, artificial intelligence or robots.
Engagement with digital technologies and content requires a reflective and critical, yet curious, open-minded and forward-looking attitude to their evolution. It also requires an ethical, safe and responsible approach to the use of these tools.

The term "digital technologies" is now preferred to ICT (Information and Communication Technology), as it refers to a full range of devices, software or infrastructure. With the increased use of a wide variety of mobile devices and applications, it no longer makes sense to use words like 'computers' and 'the Internet', because they are present under the broader meaning of digital technologies.

3.2.1 How are the EU recommendations being adopted and realized in Italy?

The Italian Republic Constitution, Article 34, states:

La scuola è aperta a tutti.
L'istruzione inferiore, impartita per almeno otto anni, è obbligatoria e gratuita.
I capaci e meritevoli, anche se privi di mezzi, hanno diritto di raggiungere i gradi più alti degli studi.
La Repubblica rende effettivo questo diritto con borse di studio, assegni alle famiglie ed altre provvidenze, che devono essere attribuite per concorso[36].

[36] "The school is open to everyone. Lower education, taught for at least eight years, is compulsory and free. The capable and deserving, even if without means, have the right to reach the highest

Since 1946, the path to an inclusive school has always been the guiding thread of every legislative and educational intervention by the Italian school, which subsequently also poured into the aspect of digital inclusiveness, carried forward by European recommendations. In recent years many actions have been taken to ensure equal opportunities and a full exercise of citizenship, including digital citizenship. The PNSD[37] has developed a document summarizing the steps taken over lately. The state of the art in digital inclusion and competence has been promptly and accurately summarized and updated to 2015, in the document Piano Nazionale Scuola Digitale (PNSD), that retrace what has been realized and achieved since 2007.

3.2.2 Actions taken between 2007-2018

The aim of the National Plan for digital schools, started in 2007/2008, is to reduce the digital divide in the education institutions and is addressed to the ongoing training of teachers and their right to life long learning. The actions taken during these years are listed in the PNSD and consist mainly in achieving the following goals: enhancing the use of interactive multi-media boards to introduce digital media in education practice; fostering the so called Cl@sse 2.0 (cl@ssrom 2.0), to enhance the production of learning environments; Scuol@ 2.0 (school 2.0), in order to change the education strategy, ensuring that both curricular and extra-curricular activities would support a student focused learning (Ruggieri et al., 2013).

Action LIM (Lavagna Interattiva Multimediale, a.k.a. IWB), born in 2007, was aimed to the purchase of a large quantity of Interactive White Boards for the schools.

Action Cl@sse 2.0 was characterized by the catchphrase “no more classroom in the lab, but the lab in the classroom” had the main objective to trigger the realization of

degrees of studies. The Republic makes this right effective with scholarships, checks to families and other provisions, which must be awarded by competition”. [My translation]

[37] https://www.miur.gov.it/scuola-digitale

innovative learning environments. The project, beginning from 2009 and carried on in the following three years, 416 classes of different cycles, was financed for 8.5 million euros to the purchase of technological devices and around 2 million euros for support and training. Action Scuol@ 2.0 was launched in 2011 with an allocation of 4.5 million euros that allowed 14 institutes to explore an innovative line that united instructional design with new models of human resources[38].

Action School Digital Publishing (Editoria Digitale Scolastica) was initiated in 2010 with the aim of producing digital contents in 20 institutes, allocated between different cycles with a funding of around 4.4 million euros.

Agreements MIUR – Regions were initiated in 2012 to foster the digital innovation process in a more widespread way, and to guarantee a better cooperation between central and local levels of government. Investments reached 33 million euros, that allowed to entrust 1.931 interactive whiteboards (LIM), to form 905 Cl@sse 2.0 and 23 Scuol@ 2.0.

Action Digital School Centres (Centri Scolastici Digitali CSD) was born to meet the needs of schools in particularly disadvantaged areas, such as mountains or small islands (decreto-legge 179/2012), delivering technological infrastructures and connecting these areas to schools and urban areas.

Action wi-fi, between 2013 and 2014, 15 million euros were allocated to enhance wireless connections in the schools to finance 1,554 projects[39].

3.2.3 Program the future

This project has been launched in 2014 thanks to the agreement between the Ministry of University, Education and Research (MIUR) and the National Interuniversity Consortium for Informatics (CINI – a consortium made up of all Italian research

[38] https://www.istruzione.it/scuola_digitale/allegati/Materiali/pnsd-layout-30.10-WEB.pdf

[39] Ibidem.

universities active in Informatics) to change the way informatics is taught in Italian schools (Corradini et al., 2017).

Recognized as an European excellence in digital education, it is based on materials from Code.org organization, through the creation of a subdomain of Code.org for Italian users in order to allow the building of an online community of teachers.

The goal of "Programma il Futuro" consists in spreading the practice of coding in schools, equipping them with easy, fun and accessible tools to shape and inspire young minds. Italy was between the first Nations to introduce computer science concepts through coding, both with computers and unplugged. In the year 2018-19 more than 25,000 students, 35,000 teachers and 6,700 schools have joined from all over Italy. This action has been launched with the aim of equipping schools with simple, accessible and effective tools to empower students in computer science and computational thinking; the coding lessons, offered with a simple and intuitive approach, can be used by teachers of all subjects.

Two main paths are available on the official site, depending on the students' level of expertise: a basic one, with 21 different activities, one hour each, and an expert one, that develops basic computer science topics with additional lessons, spread over six regular courses and two quick ones. All the classes have been completely redesigned in October 2019.

Competition "Program a Story", call was open in 2019 to start the competition "Programma una Storia", the challenge consists in using programming environments at school to narrate a work of literature. Anyone can choose how to express the art with technology, to freely interpret the original work or just to be inspired by it[40].

[40] https://programmailfuturo.it/progetto/archivio/concorso-2019/introduzione

3.2.4 Piano Nazionale Scuola Digitale

The school reform approved by Italian Parliament with the Law 107/2015, *Reform of the national educational and training system and delegation for the reorganization of the existing legislative provisions*, is aimed, among many other topic it embraces, to enhancing the digital competences starting from the first cycle schools.

The National Plan for Digital Education (Piano Nazionale Scuola Digitale — PNSD) represents a document of intent promoted by MIUR to launch a complex and varied strategy for a comprehensive innovation of the Italian school and its new asset in the digital Era. It is also an essential pillar of "The Good School", as an operative vision that reflects the Government position in regards of a great challenge that the school system is facing[41]. The plan takes up the challenges of introducing new technologies in the schools, of sustaining and nurturing life long learning in each and every contest in life, both formal and life-wide learning. It also extends the concept of school to virtual learning environments.

The action is articulated in 35 points, here summarized:

- by the end of year 2020 every school must be connected with optical fiber, or at least broadband or ultra-broadband, internal wiring of all school areas (LAN/W-Lan) and connectivity, fast enough to allow the use of Cloud and multimedial learning;
- "augmented" classrooms, "School friendly" labs, Fab Labs, CLab (Contamination Labs), BYOD policy, challenge Prizes for digital school, plan for practical learning and Innovative School building;
- digital identity card for each student and teacher, through a single Authentication system (Single-Sign-On);
- digitalization of the school administration bureau, through the electronic register and the "School data" strategy;

[41] https://www.istruzione.it/scuola_digitale/allegati/Materiali/pnsd-layout-30.10-WEB.pdf

- construction of a curriculum for digital entrepreneurship, Girls in Tech & Science, Digital Career Plan, School-Work Alternation for the digital business;
- designing common frameworks for digital competences like DIGICOMP (framework for developing and understanding digital competence);
- enhancement of minimum standards and interoperability of online environments for teaching, promoting Open Educational Resources (OER), using school libraries as literacy environments for digital information resources;
- training of teaching and non-teaching staff, technical assistance for schools and specific training for new recruits;
- bringing computational thinking in primary schools and update the Technology Curriculum in secondary schools to include digital technologies;
- Stakeholders'club for digital school and the role of the "animatore digitale."

The "Digital Animator", in concrete, is a key figure that supports the school Manager and the Director of Administrative Services (DSGA) in the design and implementation of the digital innovation projects contained in the PNSD: he is a teacher of the school, never an external professional, being a person that requires a strong integration in the school, a knowledge of the PTOF and of the school community.

The Animator must manage and coordinate the diffusion of innovation at school and PNSD activities also envisaged in the plan in the three-year POF of his school. The three main points of his work are:

1. Internal training: stimulating internal training in schools in the areas of the PNSD, through the organization of training workshops (without necessarily being a trainer), promoting the animation and participation of the entire school community in training activities, such as those organized through training points;

2. Involvement of the school community: fostering participation and stimulating students' leadership in organizing workshops and other activities, including structured ones, on PNSD themes, also through training sessions open to families and other local actors, for the creation of a shared digital culture;
3. Creation of innovative solutions: identifying sustainable methodological and technological solutions to be disseminated within the school environments (e.g. use of particular teaching tools with which the school is equipped; the practice of a common methodology; information on existing innovations in other schools; a coding laboratory for all students), consistent with the analysis of the school needs, also in synergy with technical assistance activities conducted by other figures[42].

3.2.5 Indicazioni Nazionali e Nuovi Scenari

Six years after the publication of the National Indications for preschool curriculum and the first cycle, a new document has been adopted: Indicazioni Nazionali e Nuovi Scenari (National Indications and New Scenarios), presented by the Ministry of Education, University and of Research on February 22, 2018, to reflect about the issues identified on the previous Indications. The recent document does not represent an integration or a rewriting of the previous one, but a recalibration, in particular with respect to active citizenship, to a safer mastery of basic abilities, including language and digital skills.

The text offers an extensive definition of computational thinking, intended as a mental process that allows solving different kinds of common problems by planning a strategy, through chunking them into small bits, debugging and finding different solutions. This logical procedure, usually employed in computer science programming, can also be put to practice in the instructional design, for any kind of challenge, with thoughtful procedures. It’s basically an education to logical and

[42] https://www.istruzione.it/scuola_digitale/index.shtml

critical thinking, through problem posing and problem solving, that enhances metacognition and scientific competences.

This document refers also specifically to coding, as a way to foster a better understanding of the digital world around us. Regarding this topic, the paper stresses the fact that digital competence does not just concern technical abilities, such as knowing how to use spreadsheet, software, the Internet, but much more than that, it concerns the expertise of searching, filtering, pondering information conscientiously.

4.1.1 Comprehensive Institutes

The creation of the Comprehensive Institutes has a complex story, dating back from national law L.97/1994, issued for the protection of the citizens right to education, who were living in mountain or isolated areas; after the following DPR 233/98 that fixed dimensional limits of these newborn organizations, the Comprehensive Institutes have been founded. Initially, the objective of these laws were to contain a national emergency and to shape the school organization in the light of the profound innovations of the autonomy process renewal of the Bassanini law on autonomy (L. 59/97) and the Moratti law on the reformation of educational cycles (L. 53/2003).

In the academic year 2000-2001, a rapid spread of this new organized model had taken place in all the national, primarily due to the ongoing process of autonomy and the more practical feature of the new dimension, and together with a pedagogical vision of a united instructional path addressed to students from 3 to 14 years old.

Finally, law L.111/2011 gave the final word on the feasibility of Comprehensive Institutes by stating that they were to be developed to guarantee a pedagogical continuity between first cycle schools. Each of these organizations usually includes one - three kindergartens, three - four primary schools and one lower secondary school, depending on the density of population of the area. Each Institute is directed by one school headmaster, usually a former teacher, appointed by a national competition.

In the light of the school autonomy principle, law L.53/2003 and particularly Legislative Decree 59/2004 envisage the drawing up of a Formative Offer Triennial Plan (PTOF) that defines the identity of each and every Institute, its vision and mission, objectives, instructional design, resources and goals, particularly regarding the right of education and inclusion policies. The PTOF is prepared by the Teachers'

Board on the basis of the guidelines for the school's activities and the management and administration choices defined by the School Manager, subsequently approved by the Institute Council (Consiglio d'Istituto).

The ministry of education, in order to uphold schools and support them develop a neatly thought-out Plan[43], in 2018 has provided a reference structure that every institute can use and personalize for its purpose and modify to in order to make the PTOF correspond to the specific needs and peculiarities of each context:

SECTION 1 - *The school and its environment*

• Analysis of the context and needs of the territory
• Main characteristics of the school
• Survey of equipment and structural resources
• Professional resources

SECTION 2 - *Strategic choices*

• Priorities derived from the RAV
• Priority educational objectives
• Improvement Plan
• Main elements of innovation

SECTION 3 - *Educational offer*

• Expected learning outcomes
• Teachings and timetable
• School curriculum
• Work-related learning experience
• Curricular expansion initiatives
• Activities planned in relation to the National Digital School Plan
• Learning assessment
• School actions for school inclusion

[43] https://www.miur.gov.it/documents/20182/0/nota+17832+del+16_10_2018+%281%29.pdf/763ea629-97a4-4dbe-8f01-72b0f899936b?version=1.0&t=1539775111356

SECTION 4 - *Organization*

• Organizational model
• Offices organization and relations with users
• Activation of networks and conventions
• Teaching staff training plan
• Non-teaching ATA staff training plan

SECTION 5 - *Monitoring, verification and reporting* (soon to be published)

The national curriculum defines the hour plan for each subject, that must be taught a certain amount of hours each week, determined by the Ministry of Education. In addition, there is a 20 per cent of extracurricular study activities that every Institute can dispose of, and that flexibility of didactics must be specified in the educational offer plan.

The PTOF, outlined in consideration of an accurate analysis of formative needs on the basis of the socio-cultural context in which the school operates, constitutes a valid instrument of flexibility and allows the personalization of the formative offer as it highlights its specificity with respect to other schools of the same order and degree present in the territory. Moreover, it evaluates the teaching-learning process in order to improve quality; it provides students with homogeneous evaluation criteria; it explicits its commitment to users.

In line with the principle of transparency in administrative law, each institute must draw up its own PTOF, according to the school autonomy principles, and it publishes it on the school website and on the Ministry of Education portal (Scuola in Chiaro[44]). All the stakeholders can easily peruse the document online and check if the intents match the educational purposes declared: “educational institutions, in order to allow a comparative assessment by students and families, ensure full transparency and publicity of the three-year Offer Plans”, reads paragraph 17 of law L.107/2015.

[44] https://cercalatuascuola.istruzione.it/cercalatuascuola/

In order to self-evaluate the teaching-learning process, every Institute compiles a Self Assessment Report (Rapporto di Auto Valutazione) RAV[45], a whose management is entrusted to the School Manager, supported by a team of teachers that forms the Nucleo Interno di Valutazione (NIV).

The RAV document is introduced by Presidential Decree n. 80 of 28/03/2013, with the objective to improve the quality of the training offer, by assessing the efficiency and effectiveness of the education and training system.

The RAV document must include improvement objectives, so, in order to achieve the minimum targets outlined in the RAV, an Improvement Plan has to be developed, called Piano di Miglioramento PDM[46], and published on the ministerial website "Scuola in Chiaro".

PON projects are mentioned in the PTOF, but they are published in detail separately, on every Institute website. PONs, Programma Operativo Nazionale, are national operative programs that strive to enhance the application of UE Strategy 2020, in order to lead Europe out of the economic crisis and transforming it in a sustainable, inclusive and smart economy, with high levels of employment, productivity and social cohesion.

[45] https://www.istruzione.it/snv/allegati/2017/RAV_guida_autovalutazione_03_2017.pdf
[46] http://www.indire.it/progetto/supportomiglioramento/piano-di-miglioramento/

4.1.2 The research

According to a recent international survey (2018) of OECD[47] on *Teaching and Learning International Survey (TALIS)*, around one third of Italian school managers declared that the quality of education in their own school is hindered by a conspicuous deficiency in digital technology for instructional design. Despite all the actions taken nationally and internationally, OECD 2018 Programme for International Student Assessment (PISA) results[48] show a general lack of competence in reading, mathematics and science worldwide, Italian students are no exception. Worryingly, both boys and girls' performances are decreasing, compared to 2009 findings.

In the Italian overview it is noted that access to technology and connection has arisen to the level that "between 2012 and 2018, the average amount of time that 15-year-olds in Italy spent on the Internet, on a typical weekday, more than doubled, from less than two hours per day to about four hours per day (one of which was at school)[49]". Still, being connected or owning the latest device on the market doesn't necessarily mean having digital competences to navigate the Web and its perils: "students growing up with a great smartphone but a poor education will face real risks […] readers must constantly assess the quality and reliability of the information, based on implicit or explicit cues related to the content, format or source of the text"[50] (PISA 2018 Insights and interpretations).

What I am seeking to find out in the following study is whether the path towards digital inclusion today in Italy is adequate and followed by a real interest and strive of the local schools, in regard of national and European laws and Recommendations about digital inclusion and digital literacy. I searched to find to what extent the object of my research, a sample of chosen institutes in a small area, are making concrete and tangible steps in the direction of the digital curriculum and digital inclusion.

[47] http://www.oecd.org/education/talis/
[48] https://www.oecd.org/pisa/publications/pisa-2018-results.htm
[49] https://www.oecd.org/pisa/publications/PISA2018_CN_ITA.pdf
[50] https://www.oecd.org/pisa/PISA%202018%20Insights%20and%20Interpretations%20FINAL%20PDF.pdf

In particular, my aim was directed to discover if:

- digital competences are being taught in schools and how (digital PON projects, coding, eSafety, digital literacy);
- the schools are suitably equipped for digital education (devices, fast Wi-Fi, use of open resources, dissemination of good practices, training of teacher staff).

In order to define an answer, I chose to analyze the schools' panorama in Prato. A medium sized city in Tuscany, Prato is the third largest one in Central Italy, after Rome and Florence; it is located at about 20 miles from Florence and its population is a little below 200,000.

According to the City Council website[51], Prato schools count around 30,000 students, 8,000 of whom have foreign origins, therefore one of the peculiarities of this city is that it is the Italian province with the highest percentage of foreigners out of the total number of students enrolled. But also, another record concerns it at school level: Prato schools are among the first in Tuscany - a state-of-the-art region concerning digital inclusion and education - teaching projects aimed at inclusion, developing 180 PON projects presently (2014-2020). The overall budget corresponds to about 27 million euro allocated by the MIUR through the 2014-2020 National Operational Program (PON) with European Funds; in Prato 49 projects are currently being financed with 1.5 million euro[52].

Firstly, I analyzed the different PTOF statements about digital education of all Prato institutes, defined in the years 2019-2022, regarding digital teaching and digital inclusion. I particularly noted the projects carried out for the participations in digital PONs.

Eventually, I took into consideration the Self Assessment Report, namely Rapporto di Autovalutazione (RAV), of the mentioned institutions, to assess to what degree

[51] http://www.cittadiprato.it/EN/Sezioni/285/Prato-schools/
[52] https://firenzesettegiorni.it/economia/scuola-digitale-inclusiva-prato-al-primo-posto-in-toscana-con-180-progetti/

they are intentioned to increase the efforts and work on the digital area of their Improvement Plans (PDM).

Ultimately, I investigated one particular institute, as a case study, chosen between the ones that included technology and digital competence in their Piano di Miglioramento (Improvement Plan). This institute recently (November 2019) administered a comprehensive survey to all the teachers (see Annex 1), using a Google form, to determine how the digital curriculum is being taught to children aged three to fourteen in the Institute's schools.

I then interviewed the teacher in charge as digital animator of the selected institute, in order to understand to what extent the data reported in the questionnaire and the school PTOF match, what are the actual challenges in terms of improving the quality, training teachers, finding resources and creating a vertical curriculum for the digital competence and inclusion. I assumed that having a closer look on one particular reality would allow me to appreciate better the challenges and the multi-faceted dynamics of a post industrial, multiethnic city like Prato.

The methodology I resolved to adopt is the mixed method research, that combines in a complementary way of qualitative and quantitative assessment of data; the integration of these two approaches allow the use of different tools enriching the findings of results, through the complexity and depth of blended elements.

Caratteristica chiave delle strategie mixed method è quella di utilizzare sinergicamente approcci qualitativi e quantitativi in differenti momenti della medesima ricerca, allo scopo di trovare le migliori risposte possibili all'interrogativo che ha originato la ricerca stessa. I dati vengono raccolti con tecniche e strumenti tipici delle due tradizioni e analizzati insieme allo scopo di rendere nel modo migliore la complessità del fenomeno sotto esame e comprenderne le dinamiche che ne sono alla base. I risultati prodotti hanno per loro natura un maggiore grado di affidabilità poiché i vantaggi di un approccio compensano i limiti dell'altro[53] (Mortari, Ghirotto, 2019, p.246).

[53] The key characteristic of mixed method strategies is that of using synergistically qualitative and quantitative approaches at different times of the same research, in order to find the best possible answers to the question that originated the research itself. The data are collected with techniques and tools typical of the two traditions and analyzed together in order to make the complexity of the phenomenon under examination in the best possible way and understand its underlying dynamics. The results produced by their nature have a greater degree of reliability since the advantages of one approach compensate for the limits of the other. [My translation]

Being the first part of my research quantitative, I proceeded through the collection of data from a sample of schools, within a defined geographic territory, easily accessible and with measurable records published online.

In the second phase I used qualitative research methods, in a more exploratory way through a case study, a semi-structured interview (questions prepared *ex ante*, but leaving the interviewee free to wander).

4.1.3 List of Prato Comprehensive Institutes

In the province of Prato nineteen comprehensive institutes are located (from now on called I.C.), listed below, five of which are located in small municipalities:

1. Bartolini (Vaiano municipality)
2. Castellani
3. Cironi
4. Convenevole da Prato
5. Don Milani
6. Gandhi
7. Hack (Montemurlo municipality)
8. Il Pontormo (Carmignano municipality)
9. Lippi
10. Malaparte
11. Marco Polo
12. Mascagni
13. Mazzei (Poggio a Caiano municipality)
14. Mazzoni
15. Nord
16. Pacetti
17. Pertini (Vernio municipality)
18. Primo Levi
19. Puddu

Every I.C. elaborates a plan every three years, called PTOF (Triennial Formative offer Plan); in the next pages I extrapolated and marked out the passages about the digital offer and I checked if there is a mention about PDM (Improvement Plan).

I.C. Bartolini (Vaiano)

The institute declares its intention to implement labs, both physical and cloud, for students, teachers, families.

Labs with Internet connection: 8

Libraries with Internet connection: 4

Multimedia PC and Tablet equipment present in Labs: 100

4 main projects:

- Innovative school library to write blogs, articles and enjoying MLOL[54] use and overcome digital divide, by letting students use it in the afternoon for homework and significant activities with the support of specifically trained students and adults as educators.

- Creation of an augmented reality lab, on the model of Bruxelles Classroom lab;

- TEAL technologies for active learning;

- Innovative educational paths for active learning.

Teachers training: classes to enhance teachers' competences on computer sciences and methodologies.

Participation and/or candidacy to PON / FSE / PNSD FESR PROJECTS:

[54] https://toscana.medialibrary.it/home/cover.aspx

- n.9035: realization of a LAN/WLAN networks, technological equipment and multimedia environments.

No PDM regarding technologies

I.C. Castellani

The institute is working to improve Internet connection with ultra-wide band and Fiber.

2 projects for the secondary school and classes 4 and 5 of primary school:

- Cyberbullying prevention program;

- Empowering students and families to responsible use of new technologies and e-safety, particularly social networks and the Internet, risks and opportunities of the virtual world.

1 project for kindergarten and primary school:

- Developing computational thinking through coding in a ludic environment.

Teacher training: The analysis of the training needs of the teachers of the institute is based on a multi-year path.

Participation and/or candidacy to PON / FSE / PNSD FESR PROJECTS:

- n.9035: realization of a LAN/WLAN networks, technological equipment and multimedia environments;

- n.12810: infrastructure interventions for technological innovation, laboratories and for key competences learning;

- n.2669: development of logical and computational thinking, digital creativity and "digital citizenship" skills.

No PDM regarding technologies

I.C. Cironi

The institute is fully covered with ultra-wide band. The IWB cover 60% of classes, with the goal of having 80% in the next future.

PC e Tablet in the labs: 147

Classes 3.0: 2 (environment designed for cooperative learning, with mobile desks)

D.A.D.A: labs: 26

robotics classroom: 1

3D printer: 1

The Institute will implement classes 2.0 with new technologies and working online.

The secondary school is experimenting the platform Classroom, Gsuite apps and, in the first year classes, the BYOD methodology. In the next future there will be an implementation of these technologies for the classes 4 and 5 of primary school as well.

Participation and/or candidacy to PON / FSE / PNSD FESR PROJECTS:

- n.9035: realization of a LAN/WLAN networks, technological equipment and multimedia environments;

- n.12810: infrastructure interventions for technological innovation, laboratories and for key competences learning.

Complete survey on digital teaching made in November 2019 (Annex 1) to establish what and how is being taught in every class from kindergarten to secondary school.

PDM:

- Creation of a vertical digital curriculum by June 2021:

- Formalize the vertical digital school curriculum by giving it homogeneity of purpose with respect to National Indications, European key competences and digital skills (digicomp): identify the pillars of the vertical school curriculum.

- Target: Increase the number of classes working on media literacy, on the use of word processors and on coding by 5%, 3% and 2% respectively.

I.C. Convenevole da Prato

The institute is working to complete the structures and access points to the LAN / WIFI network and broadband. The Institute is implementing the IWB in all the classes and a mobile one for the kindergarten premises.

Two multimedia labs are going to be realized with mobile furniture, an interactive screen and tablets.

OPEN SOURCES: New hardware / software experiments are proposed in order to raise students' awareness of open-source software free solutions:

- Linux operative system (software)
- Libre Office suite (software)
- experimentation with Raspberry (hardware)
- printer 3D (hardware)
- Kahoot
- Geogebra
- Scratch
- Redooc
- Code.org

Creative labs are being run for computational thinking improvement (coding, making and robotics).

PROGRAMMA IL FUTURO project for primary school: This initiative, already begun, should be expanded using different platforms and languages, with or without the computer, suitable for all degrees of education.

CODING AND ROBOTICS: the unplugged courses, the interactions between block programming and cards (e.g. Scratch), the programming of 3D printers will be improved. New planned activities:

- coding with mouse drawing workshops in primary school;

- educational robotics workshops (in curricular hours in the kindergarten and primary school, in the afternoon for the secondary school);

- integration of educational robotics into curricular activities for secondary school.

The development of an e-learning platform (Google Suite for Education and WeSchool) is supporting teaching for the creation of online learning environments.

TEACHERS TRAINING: a part of the MIUR fund allocated for schools will cover the costs of training, dissemination and implementation of the PNSD.

Participation and/or candidacy to PON / FSE / PNSD FESR PROJECTS:

- n.9035: realization of a LAN/WLAN networks, technological equipment and multimedia environments;

- n.12810: infrastructure interventions for technological innovation, laboratories and for key competences learning;

- n.2669: development of logical and computational thinking, digital creativity and "digital citizenship" skills.

PDM:

- Enhancing the innovative environments of digital instructional design with which the Institute is equipped. Expected implementation deadline: June 2020, to be optimized in the three-year period. Expected results: Greater use of the IWB and ICT in general. Use of digital material also self-produced in addition to textbooks.

- Design / expand a section of the school website dedicated to teaching, in a direct and simple way for pupils. Timing: End of first quarter a.s. 2019/2020, to be updated on an ongoing basis.

- Administer a digital questionnaire to students to understand their preferences in the field of digital learning solutions and to better investigate their relationship with technology.

I.C. Don Milani

School’s digital venues: Computer Labs. Robotics Lab, Creative Atelier.

New technological tools (LIM, Tablet, Notebook, and new PCs) have been purchased for a digital, innovative and laboratory teaching activity.

CODING AND ROBOTICS: Tools used: Bee-Bot. Pro-Bot. Doc, EV3. Kahoot platform. Minecraft education game.

Participation and/or candidacy to PON / FSE / PNSD FESR PROJECTS:

- n.9035: realization of a LAN/WLAN networks, technological equipment and multimedia environments;

- n.12810: infrastructure interventions for technological innovation, laboratories and for key competences learning;

- n.2669: development of logical and computational thinking, digital creativity and "digital citizenship" skills.

No PDM regarding technologies.

I.C. Gandhi

The institute is still in need of complete network coverage.

Environments for integrated digital teaching: some classrooms 3.0 have been implemented recently. In the primary school a mobile lab with 31 iPads and multimedia screen has been set up. In the secondary school the computer lab is completely renovated, with a mobile lab with 26 tablets. IBW are installed in two primary schools, there still is need to purchase more to complete all classes.

PROJECTS:

- a new space increased by technology, with areas divided by work areas, which exploit the flexibility of spaces, furnishings and the mobility of technological devices.

- “Maker@3D printer in the first cycle schools". The research - action, carried out with the support and collaboration of INDIRE, aims to study the effects of the introduction of 3D printers both on students 'skills and on teachers' teaching practices.

CODING: the institute is involved in the Hour of code, Code week and various educational robotics workshops. The goal for the next three years is to extend the teaching of coding to all primary school classes, but also to those of infancy and secondary school.

Participation and/or candidacy to PON / FSE / PNSD FESR PROJECTS:

- n.9035: realization of a LAN/WLAN networks, technological equipment and multimedia environments;

- n.12810: infrastructure interventions for technological innovation, laboratories and for key competences learning;

- n.2669: development of logical and computational thinking, digital creativity and "digital citizenship" skills.

No PDM regarding technologies.

I.C. Hack (Montemurlo)

The institute is going to finance a digital action plan in the next three years, to cover:

- the purchase of digital devices and technological maintenance;

- a procedure to deal with problems deriving from an unaware use of the internet and digital technologies by students (e.g. Cyberbullying, Sexting, Violation of Privacy, Online Solicitation, etc.);

- an eSafety Policy, to regulate the use of ICT within the school itself (e.g. filters provision), provide measures to prevent different types of risk.

TEACHERS TRAINING: training courses for teaching staff to promote awareness and eSafety on the use of the Internet and digital technologies.

Participation and/or candidacy to PON / FSE / PNSD FESR PROJECTS:

- n.9035: realization of a LAN/WLAN networks, technological equipment and multimedia environments;

- n.2669: development of logical and computational thinking, digital creativity and "digital citizenship" skills.

No PDM regarding technologies.

I.C. Il Pontormo (Carmignano)

Implementation of virtual classes via Google-Class within Gsuite; cataloguing, sharing and dissemination of educational contents created by teachers and students; construction of online materials that can be directly used by students and teachers as cultural in-depth tools and as resources for daily teaching, possibly referable as entirely free disciplinary texts.

OPEN SOURCES: Promotion of Open Educational Resources (OER) and guidelines for the self-production of educational content.

Participation and/or candidacy to PON / FSE / PNSD FESR PROJECTS:

- n.12810: infrastructure interventions for technological innovation, laboratories and for key competences learning;

- n.2669: development of logical and computational thinking, digital creativity and "digital citizenship" skills.

No PDM regarding technologies.

I.C. Lippi

CODING AND ROBOTICS: the institute uses ludic coding instruments like Scratch and Apps like Swift Playground, Box Island. For younger children (kindergarten up to first 2 years of primary school) Bee-Bot, Blue-Bot and Pro.Bot will be used; for older primary school kids, Lego WeDo, Mind and Microbit; for secondary school, Ev3 and Arduino.

DIGITAL STORYTELLING: for primary school children, with the Storybird platform, for a virtual classroom lab.

Participation and/or candidacy to PON / FSE / PNSD FESR PROJECTS:

- n.9035: realization of a LAN/WLAN networks, technological equipment and multimedia environments;

- n.12810: infrastructure interventions for technological innovation, laboratories and for key competences learning;

- FSE PON-TO-2018-74 Creative and digital citizenship, call for Creative Ateliers for PNSD 5403 framework.

PDM:

- Increase the use of digital technologies in class.

- Acquiring greater awareness in the use of digital tools by pupils.

- Better tasks definition of the digital team.

- Maintain the efficiency of laboratories and digital devices and experiment with the recently activated Gsuite.

I.C. Malaparte

LAB with Internet connections: 8

IWB and SmartTV in the labs: 7

the institute is actively working to enhance the digital materials from 3 to 14 years old students.

DIFFICULTIES: not all teachers are adequately trained. The digital team is supporting them in the use of technology devices.

PROJECT: for the secondary school "classes 3.0" project transformed two classes into active research laboratories with ICT, use of the Cloud to store documents and the possibility of attending lessons via iPad and connected to Apple TV.

Participation and/or candidacy to PON / FSE / PNSD FESR PROJECTS:

- n.9035: realization of a LAN/WLAN networks, technological equipment and multimedia environments;

- n.12810: infrastructure interventions for technological innovation, laboratories and for key competences learning.

No PDM regarding technologies.

I.C. Marco Polo

The institute is providing to realize Internet wiring of all school venues (LAN / W-Lan), to create specific spaces for multimedial environments and researching in team with INDIRE of modell@zione 3D.

CODING: Implementation of coding activities within the National Digital School Plan - The Hour of Code.

Participation and/or candidacy to PON / FSE / PNSD FESR PROJECTS:

- n.9035: realization of a LAN/WLAN networks, technological equipment and multimedia environments;

- n.2669: development of logical and computational thinking, digital creativity and "digital citizenship" skills;

- FESR PON-TO-2017-3 realization of digital environments.

PDM:

-Improving the use of innovative tools and learning environments in teaching.

I.C. Mascagni

The institute employs Gsuite for Education, for the teaching staff and secondary school students of the “Zaino digitale” project. The aim is to try and involve all the other secondary students in participating.

Participation and/or candidacy to PON / FSE / PNSD FESR PROJECTS:

- n.12810: infrastructure interventions for technological innovation, laboratories and for key competences learning;

- FESR PON-TO-2015-47 inclusive digital learning.

PDM:

- Designing a Digital Institute Curriculum.

I.C. Mazzei (Poggio a Caiano)

The institute provided to realize the Internet wiring for all its venues. In all classrooms IWB are installed.

PROJECT:

- implementing augmented classrooms, through the enhancing digital devices;

- installing an i-Cloud platform, to respond to the specific needs of teachers, students and parents, with the inclusion of forums, links and useful resources, mailing lists, video chats and sections dedicated to the various disciplines of primary and secondary school;

- some of the secondary school classes are cl@ssi 2.0, with BYOD methodology.

Participation and/or candidacy to PON / FSE / PNSD FESR PROJECTS:

- n.9035: realization of a LAN/WLAN networks, technological equipment and multimedia environments;

- n.12810: infrastructure interventions for technological innovation, laboratories and for key competences learning.

PDM:

- Construction of a vertical curriculum for the achievement of digital skills.

- Identification of common criteria for the assessment of digital competence.

I.C. Mazzoni

The institute is providing for the realization of LAN / WLAN network infrastructures.

LABS: 28 pc with ultra-wide band and a 3D printer.

PROJECTS:

- cl@ssi 2.0, to equip with digital technologies in all secondary school classrooms. All the classes have an IWB.

- The hour of Code of Programma il Futuro.

CODING: Strawbees to create three dimentional objects; BBC Micro:bit platfom to enhance tinkering and making; Bee Bot, Dash and Dot for younger children; Mbot robot; Arduino platform, that allows to create prototypes using coding and electronics.

Participation and/or candidacy to PON / FSE / PNSD FESR PROJECTS:

- n.2669: development of logical and computational thinking, digital creativity and "digital citizenship" skills.

No PDM regarding technologies.

I.C. Nord

The institute is working to enhancing Internet connection, particularly in the Kindergarten areas.

CODING: The institute began the creation of a digital STEAM curriculum starting from activities documented by teachers of all school orders. Making, tinkering, coding, robotics and 3D printing activities are planned in the school curriculum from 3 to 14 years of age.

TEACHERS TRAINING: teachers must be supported in their ongoing training for effective and motivating digital teaching.

Participation and/or candidacy to PON / FSE / PNSD FESR PROJECTS:

- FSEPON-TO-2018-74 Creative and digital citizenship, call for Creative Ateliers for PNSD 5403 framework.

No PDM regarding technologies.

I.C. Pacetti

The institute is coordinating and managing the existing technological devices, and it is keen on participating in institutional events and projects regarding digital education.

Participation and/or candidacy to PON / FSE / PNSD FESR PROJECTS:

- n.9035: realization of a LAN/WLAN networks, technological equipment and multimedia environments;

- n.12810: infrastructure interventions for technological innovation, laboratories and for key competences learning.

No PDM regarding technologies.

I.C. Pertini (Vernio)

The institute has been working to the innovation process to gain new digital instruments. One primary school classroom is cl@sse 2.0, another class (Pluriclass) is digital centre.

TEACHERS TRAINING: activities have been carried out aimed at developing teachers' digital skills through the aid of specific software.

Participation and/or candidacy to PON / FSE / PNSD FESR PROJECTS:

- n.9035: realization of a LAN/WLAN networks, technological equipment and multimedia environments;

- n.12810: infrastructure interventions for technological innovation, laboratories and for key competences learning.

No PDM regarding technologies.

I.C. Primo Levi

The institute has received funds to realize the adaptation of LAN / WLAN network infrastructures and is expecting, in a short time, the internal wiring of all primary schools, in addition to the secondary school.

OPEN SOURCES: Mainly open-source software is installed on the technological equipment, such as Libre Office suite and Geogebra.

CODING: unplugged, pixel art; Bee-Bot.

PROJECTS:

- The Hour of Code: presentation of the European programming week promoted by Eu Code Week. Visual block programming, use of Web based programs for coding laboratory experiences;

- “Days” project, the Institute was identified as a provincial pole school for participation in the DAYS project. The "Digital Animators for Younger Schools - DAYS" project offered highly qualified training. Some teachers had the opportunity to acquire new and specific skills on the use of digital tools, through a transversal approach to school digitization and student training, in schools in the European Union.

TEACHERS TRAINING: It is expected to periodically repeat training / self-training activities.

Participation and/or candidacy to PON / FSE / PNSD FESR PROJECTS:

- n.9035: realization of a LAN/WLAN networks, technological equipment and multimedia environments;

- n.12810: infrastructure interventions for technological innovation, laboratories and for key competences learning;

- n.2669: development of logical and computational thinking, digital creativity and "digital citizenship" skills.

PDM:

- Support the digitization process, especially in primary school with the progressive inclusion of the digital register.

I.C. Puddu

The institute, part of a regional network for PNSD, commits to reinforce its learning environments with appropriate technologies and devices, in order to promote innovative models regarding information and communication languages.

PROJECTS: computer labs, for primary and secondary school, for digital competences learning. E-learning Moodle platform, for an active and cooperative learning process that includes students and teachers.

Participation and/or candidacy to PON / FSE / PNSD FESR PROJECTS: “Computational Thinking and digital citizenship candidacy”; Web realization and extension; “Creative Ateliers” digital learning environments; Innovative digital Libraries.

Participation and/or candidacy to PON / FSE / PNSD FESR PROJECTS:

- n.9035: realization of a LAN/WLAN networks, technological equipment and multimedia environments;

- n.12810: infrastructure interventions for technological innovation, laboratories and for key competences learning.

No PDM regarding technologies.

4.1.4 Analysis

Although aware of analyzing a small sample, my intent was to explore thoroughly and compare the results in detail, especially observing the extracts about IT equipment, strategic choices for the curriculum, for projects and for applying to PON[55] 2014-2020 calls (Programma Operativo Nazionale). These National Operative Programs aim to create an outstanding education and training system. I also checked the guidelines of each institution based on current legislation and recommendations of the European Union.

By comparing the results of the three-year plans of the educational offer, first of all it is noted that all the institutes, with the exception of just one, had published the updated PTOF online, related to the years 2019-2022, both on the school website and on the ministry, "Scuola in Chiaro". The institute in question, I.C. Puddu, has taken immediate steps to publish the current PTOF, following my warning about the missing document. The RAVs containing the Improvement Plan are complete and published both on the Schools' website and on the MIUR's Scuola in Chiaro.

In comparison to a few years ago, when each PTOF was drawn up in a diversified way, thus making it hard to navigate and compare them, these documents have changed a lot today, following the aforementioned note No. 17832 of 16/10/2018 issued by MIUR on the drafting of the three-year plans of the training offer. The institutes have in fact adhered to the drafting of a single structure comprising 4 main sections: the school and its context, the strategic choices, the education offer and the organization. It was therefore easier to find information regarding digital actions and teaching in the third section, which includes "Activities planned in relation to the National Digital School Plan".

Conversely, as far as research on digital PON membership is concerned, all the institutes have made public on their websites the projects they have applied to and those that have won. Yet, it was not immediately straightforward to find the data and

[55] https://www.istruzione.it/pon/ilpon.html

verify which were the projects, because each school has followed different logic and paths to visualize, name and list them in their sites.

Regarding connectivity, 9 institutes admitted difficulties still present in the coverage of an adequate network to support the Internet connection of students and staff. Most of these institutes declared that they have made major efforts in this direction and stated the intention to allocate part of the funding to provide schools with an ultra broadband, even if it is not specified how long. However, almost all (17) have joined digital PONs for the realization of a LAN / WLAN networks, equipment and multimedia environments, and 14 of them have applied for projects concerning infrastructure interventions for technological innovation, laboratories and learning key competences.

Only one institute explicitly addressed the problem of the digital divide (figure 6), concerning the students enrolled in its schools, and claimed how it intended to approach the issue, by setting up an innovative multimedia library open even after school hours. The venue can be used with the help of teachers expert in the subject, but also, in a more informal and friendly way, with the aid of specifically trained peers. Remarkably, no institute whatsoever even mentioned the gender divide on STEM and IT competences, although gender equality is a well known issue not only in Third World countries, as highlighted in the last PISA 2018 results: “amongst the 15-year-olds assessed by PISA, only 1% of girls reported that they want to work in ICT-related occupations, compared with 8% of boys who so reported, on average across OECD countries” (PISA 2018: Insights and Interpretations).

In most cases, there are no reliable quantitative data on the supply of digital tools, such as interactive whiteboards, tablets, computers in each class: only 3 Institutes listed their resources in detail, while other 3 institutes reported partial data in this regard. In any case, it is perceived that the supply does not yet seem to be fully achieved in each class, even if particular efforts are underlined for the setting of specific laboratories and for the supply of devices suitable for some experimental classes of secondary school, such as the cl@ssi 2.0 or 3.0. Concerning particular projects, such as education for the responsible and safe use of new technologies, the prevention and contrast of cyberbullying, and for boosting eSafety (figure 6), greater efforts are spent particularly for secondary school.

Coding and robotics (figure 6) are taught in 9 cases through the PON project titled "Development of logical and computational thinking, digital creativity and 'digital citizenship' skills". Notably, for preschool and primary schools, teachings are mainly carried out through the use of robots and educational games for learning, such as Blue-Bot and Bee-Bot, Minecraft, unplugged coding and Scratch. For secondary school, the most followed educational paths are laboratories with use of the 3D printer, Geogebra, Kahoot, BYOD, making and tinkering, Arduino.

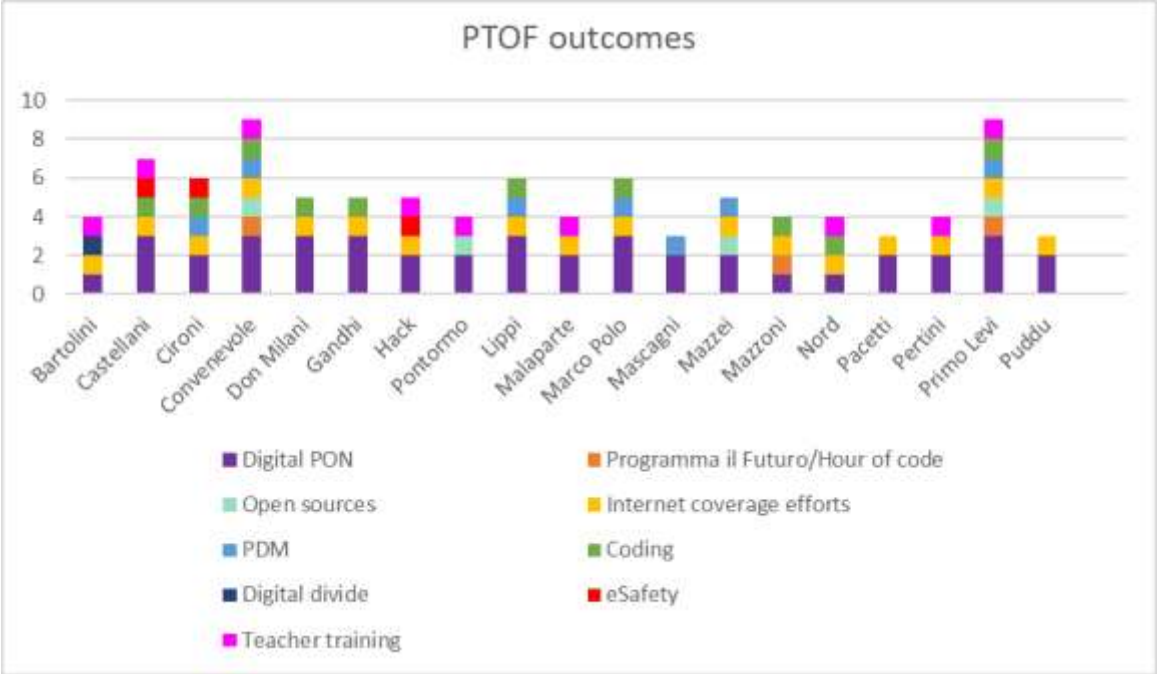
Only 3 institutes mentioned the use of open educational resources (figure 3). No institute has dedicated a page on its institutional website to illustrate and suggest links to open resources, in order to inform teachers, train students and support families with educational tools as an inclusive way of freely using software and sharing knowledge. At this regard, after a brief research on other schools' websites, I noticed that in other areas and regions of Italy there are institutes very considerate regarding this matter, which devoted a significant amount of space on their webpages.

Five institutions declared their participation to the Ministerial "Programma il Futuro" project and to the "Hour of Code" initiative (figure 5), without however specifying which schools and how many classes.

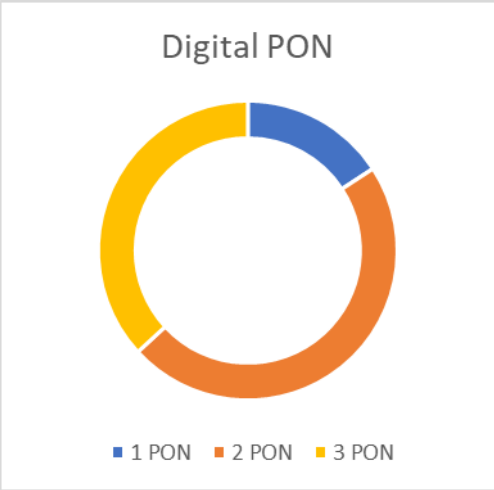
An adequate and complete training to raise teachers' awareness on digital skills is felt by 9 institutions as necessary and as a goal to be achieved in the next three years, although not specified in detail what need to be improved (figure 7).

Finally, it is an ending positive note to notice that all institutes have submitted their application to at least one PON project on digital skills, and 16 of them applied for 2 or 3 digital PONs (figure 2).

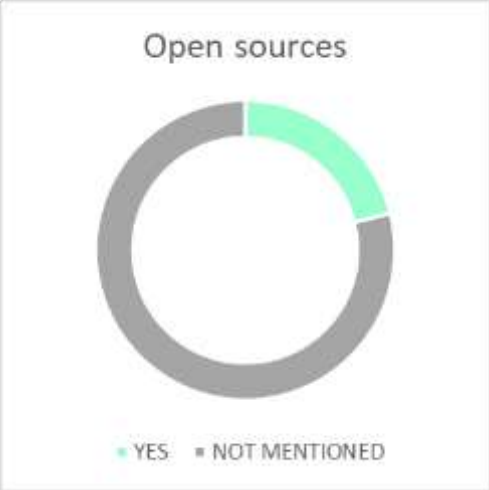
1) Comparison between the 19 Prato's Comprehensive Institutes



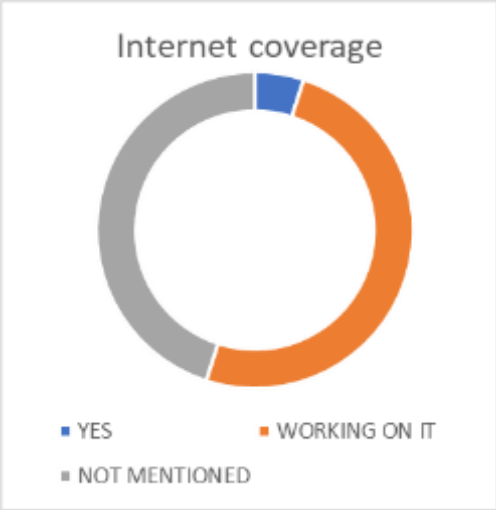
2) Digital PON



3) Open Sources

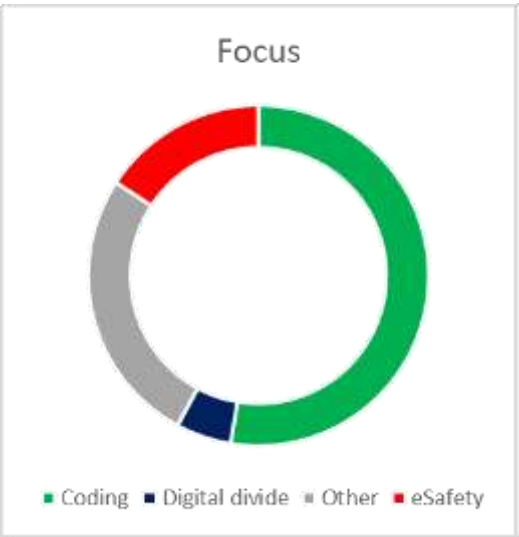


4) Intenet coverage



5) Programma il Futuro

6) Focus



7) Teacher training

4.1.5 Improvement plan (PDM) outcomes

Although most institutes have admitted their need for improvement in terms of instrumentation technologies, Internet connection and specific skills for their teachers and staff, only seven of them have stated their willingness and determination to commit and implement digital resources in the Improvement Plan within the Self-Assessment Report.

The statements reported below are in some cases very detailed and have set an accurate deadline to achieve what they are aiming for, in other cases they are more undefined in their objectives without setting any due date, in one particular case the goal is just the adoption of an electronic online register for the teachers, to replace the traditional paper one.

- **I.C. Cironi**: create a vertical digital curriculum and increase the number of classes working on media literacy, on word processors and on coding (deadline indicated).
- **I.C. Convenevole da Prato**: enhance the innovative environments of digital instructional design and the use of the IWB and ICT, self-produced digital material. Design a section of the institute's website dedicated to e-teaching. Administer a digital questionnaire to students to investigate their relationship with technology and learning preferences (deadline indicated).
- **I.C. Lippi**: increase the use and awareness of digital technologies. Better division of the digital team's tasks. Maintain the efficiency of laboratories, digital devices and experiment with the recently activated Gsuite (no deadline).
- **I.C. Marco Polo**: improve the use of innovative tools and learning environments in teaching (no deadline).
- **I.C. Mascagni**: design a digital institute curriculum (no deadline).
- **I.C. Mazzei**: construct a vertical curriculum for digital skills and identification of common criteria for the assessment of digital competence (no deadline).

- **I.C. Primo Levi**: support the digitization process with the progressive use of the digital register (no deadline).

8) PDM Improvement Plans

4.2.1 A case study: I.C. Cironi

Being the present one a qualitative phase, the criteria that guided the choice of the institute to analyze in detail respond to significance reasons, rather than representativeness. What interested me most at this stage was to highlight the experience and actions of a school that, although not yet fully digitized, is spending a lot of efforts on different fronts to increase its digital training offer.

My intention was to gain ad adequate understanding of digital inclusion and teaching in its peculiarity and originality of a single institute that stands out for various motives:

- it's amongst the seven institutes that declared in their Improvement Plan the intention to enhance its digital offer, being one of the few that defined a detailed and programmed working plan on digital competence, furthermore, setting precise deadlines for the achievements;

- it has recently completed and published online a detailed survey on the teaching of digital competence in all its schools, from 3 to 14 years of age (see Annex);

- it has been appointed "Innovative school" by the Ufficio Scolastico Regionale (Tuscany USR), for different reasons, in particular for new digital resources and their impact on education, social inclusion and intercultural dynamics;

- lastly, I have been working in this institute as a primary school teacher since I chose it last year, after my enrollment. I am a member of the Institute's Digital Team (as requested by the PNSD), and, as an English teacher, in my classes I have been teaching coding unplugged CLIL. Therefore, being a recent insider, I have a personal and close look from my vantage point of what is actually taught in primary schools' classrooms.

4.2.2 The survey

In November 2019 an online questionnaire, created by the school headmaster, has been distributed among all the Cironi institute teachers, from kindergarten to middle secondary school, in order to establish the kind of new technologies teaching (see Annex).

The answers amount to 78% of the total number of teachers on duty in the institute (enrolled and temporary workers, common place and support).

The teaching activities declared by the 89 teachers (on 101 enrolled in the institute) are distributed as follows:

In my classes...

6.7% I teach Scratch

38,2% I teach coding

12.4% I teach coding unplugged

14.6% I use Bee-Bots

16.9% I teach to use e-mails

10.1% I teach the use of individual Google drive

19.1% I teach what a file is, how to create it, how to save it

4.5% I teach to use Excel or other spreadsheet

7.9% I each to use Word processor

21.3% I teach to create PowerPoint presentations or other software

5.6% I teach educational robotics with the school kits

1.1% I teach the use of 3D printer

0% I teach how to create a blog

7.9% I teach how to share documents in Cloud

36% I teach Internet use awareness

3.4% I teach creative software for comics and digital storytelling

9% I teach geometry with Geogebra and similar software

43.8% I teach to search with Google and other search engines

11.2% I teach about fake news

2.2% I teach about media literacy

20.2% I teach about cyberbullying

42.7% I use IWB software with interactive activities

43.8% I use IWB for diversified activities by level

6.7% I use the mobile cart available in the school

23.6% I use educational platforms like Mentimeter, Kahoot, Edmodo

2.2% I use classroom communication apps like Classdojo

The survey contains many questions and attempts to describe the situation of teaching digital culture in school, class by class. The aim is to tackle possible issues that arise in order to structure a K-8 vertical digital curriculum, and define continuity from 3 to 14 years of age. As seen before, the Improvement Plan of the institute highlights the need of creating a vertical digital curriculum and increasing the number of classes working on media literacy, on the use of Word processors and coding.

The questionnaire, although useful and exhaustive, presents a few critical points, which are clarified below.

First of all, it seems that "*I teach Scratch", "I teach coding unplugged", "I use Bee-Bots"* are presented alternatively to *"I teach coding",* as if the three resources were different from coding itself. It seems that this statement may have arisen confusion, as in the case of kindergarten teachers: the four responses from kindergarten teachers do not differ much from each other: one teacher clicked both answers: *"I teach coding", "I use Bee-Bots"*, while the others only declared *"I use Bee-Bots"*. I then

asked the kindergarten trustee what coding that teacher might have referred to, but she confirmed that the only coding they do is with Bee-bots. Perhaps, the question could have been posed as: "*I teach coding with Scratch*", "*I teach coding with Bee-Bots*" etcetera. Maybe, some of primary or secondary teachers teach coding with different resources, in which case it would be interesting to learn which ones, allowing open answers.

Secondly, about primary school teachers' answers, another doubt concerns the different quantity and quality of the activities selected by the staff. Since all the questions begin with the premise with *"in the classes where I teach"*, my interpretation is that some teachers responded by imagining to list all the activities they carry out in the 5 primary school grades, and not only in just one year, while others responded by selecting only those activities that they are carrying out during this year with their current class. This explanation may justify the discrepancy of the amount of activities declared between primary school teachers.

To exemplify what I mean: *"I teach what a file is, how to create it, how to save it", "I teach the use of Word processor", "I teach to search with Google and other search engines", "I teach Internet use awareness", "I teach creative software for comics and digital storytelling":* considering that this statements were given by first grade primary school teachers, it makes one ponder if it's possible to teach all these skills to 6-year-olds, or maybe those teachers were referring to their teaching experiences previously done with older students?

"I use educational platforms like Mentimeter, Kahoot, Edmodo": is it practical in any class of primary school to use these platforms, specifically designed for teenagers who must register with their own account and have their own device at school? The doubt especially concerns Edmodo, which works in a very similar way to a Social Network like Facebook.

This is also the case of some third grade primary teacher, that affirmed *"I teach coding, I teach to use e-mail, I teach what a file is, how to create it, how to save it, I teach the use of Excel or other spreadsheet, I teach the use of Word processor, I teach to create PowerPoint presentations or other software, I teach Internet use awareness, I teach creative software for comics and digital storytelling, I teach*

geometry with Geogebra and similar software, I teach to search with Google and other search engines, I use IWB software with interactive activities, I use IWB for diversified activities by level, I use educational platforms like Mentimeter, Kahoot, Edmodo."

Finally, regarding secondary school, considering the quantity of teachers per class (including technology teachers, who teach mostly robotic and coding), the answers are in most cases wide-ranging and varied. It should also be taken into account that substitute teachers as well took this survey, therefore, they may refer to previous experiences done in other institutes, with different technological equipment and possibilities.

Certainly, the risks of an online closed-ended investigation are those of having answers that can draw some doubting, and in which some questions could be misplaced. For instance, it is not specified how long the teachings last and if measurable outcomes can be provided. Having played once or twice with Scratch just by dragging some coloured blocks of code means that the class has gained competence about what coding is about? Regardless of the form accuracy and the different sensitivity of each teacher, the results do not clarify, for example, how long the paths in question last, and which are the outcomes in terms of students' competence.

Therefore, it would be useful to have a follow up to this survey, in the form of cross-check tests given to the students, to verify if the teachings have produced the expected results. Otherwise, it is not feasible to assess the reliability of the responses.

4.2.3 The interview

As mentioned at the beginning of the chapter, I decided to have a closer look on this particular institute, I.C. Cironi, by means of analyzing objective data, such as the improvement plan and the teachers' survey on digital teaching. Simultaneously, my intention was to catch the vibe and capture what cannot be found in a chart: a personal, yet professional view on what is happening and evolving in terms of learning and teaching; an honest perspective regarding the challenges that the school is facing while dealing with digital inclusion.

This is the main reason that led me find the school's expert, the digital animator of the institute, and interview him. Andrea Bertini teaches Italian, history, geography and is also music specialist. His status inside the institute includes various leading roles (in addition to managing of digital team): coordinating the PTOF team, being a member of the Nucleo Interno di Valutazione. His commitment, passion and openness made him the ideal interlocutor for this interview. Prof. Bertini seamlessly agreed to be interviewed and gave his permission to release the following interview, translated into English.

Question: Can you tell about the secondary school digital teaching options (TT classrooms/tablets/classes 3.0)?

Answer: We have two 3.0 classes, which compared to 2.0 ones also have an environment designed for cooperative learning, with mobile workstations. They are given to teachers who make request (about half of the teaching staff asks for these classes), whereas the TT classrooms are used as language labs.

It is not always easy to prepare a lesson in a classroom 3.0 for various reasons, mainly because the timetables and rules in the schools are not always flexible. It is also true that there are resistances among us teachers, because sometimes it is easier to do a traditional teaching rather than to prepare lessons by organizing cooperative learning, managing roles, evaluating groups and individuals, using many devices at

the same time. Working like this means having to spend a lot of time at home, preparing and planning the activities. These types of classrooms are important because they motivate to do a certain type of work and make the students learn to collaborate actively, concentrating, respecting roles and controlling the noise. The kids are generally available to do their work at home, as well. The ideal is to meet in person and work together. If not possible, they can also work remotely with Google Drive and share the document.

Q: Which steps is the institute taking towards digital inclusion as opposed to digital divide? (We already established that no action is taken about gender divide)

A: The digital divide problem arose in September 2017 when classrooms 2.0 were launched in our institute, thus two experimental classes were formed. When enrolling their children for secondary school, students' parents could request to enter the experimentation, prior the purchase of a tablet.

When we got started, the first evident thing was that foreign pupils didn't enroll, so we questioned ourselves to understand the motives. We identified two main reasons of discrimination: the cost that the family has to face for the device, and the lack of clear communication. It was then obvious that improving our communication skills was paramount, and also to guarantee access to the digital classes, for example through the school solidarity fund (upon presentation of the ISEE[56] by the applicant family), and also by asking Tecno Sistemi (the firm who provides the school devices) to donate some free tablets. The following year, therefore, we put these actions into practice and we had an increase of applications, also from families of foreign origin. The cost of the devices, however, remains a discriminating aspect and a problem, because the school is unable to provide for everyone.

There are still many psychological resistances, for instance some families express the concern that kids would spend too much time in front of the screen. To these questions I usually answer by explaining that the educational system here at school is

[56] Equivalent Economic Situation Indicator
http://www.integrazionemigranti.gov.it/en/latest-news/news/Pages/ISEE.aspx

mixed (switching between paper notebook and digital instruments), but above all, I stress that the problem is not the use at school, but too much time spent on cellphones and video games at home, even from a very young age, and without parental control. Regarding safety concerns, we can reassure parents that our network is extremely secure. To those who raise the doubt that the use of technology can lead generations to rely too much on computers and stop using their own minds, I would argue that it is a bit of a contradiction of terms, because historically technology has developed thanks to human intelligence, it has made many jobs simpler and less dangerous. By necessity, the way of life changes; the way we see the world has a profound impact on the way of living. Of course, all excesses can make us stupid or dependent, so even the excessive use of technologies presents the same risks. However, we cannot escape their use. On the contrary, having them in class means educating kids to a wise use, making sure they manage them, so that they are not managed by them. We should keep this attitude for everything that comes into our lives, new technologies represent a tool that we can use in different ways.

Even among teachers I sometimes notice some resistance, connected to traditionalist views; for example, since they have always taught in a certain way, they don't see the reason to change method. Therefore, some teachers affirm that they see technology as a waste of time, as the real study should be made on books, "I have learned exhaustively this way and therefore they will". Others believe that teaching the use of technologies is not necessary because the pupils already know how to use them - while the opposite is true: at most, kids know how to download a video on their mobile phone, but when it comes to specific skills, particular training is required. This way of thinking does not depend on the teacher’s age, as it is a mentality presumption. In reality, it is unthinkable to teach like 30 years ago, as children live in a world very different from ours, surrounded by a thousand inputs.

We should ask ourselves why technologies are considered so fundamental in the medical field, while they are not considered equally important in education. The reason is because in surgery we recognize immediately their value, for example it is evident how a robot can perform an operation with extreme precision impossible for a human being. In education, however, learning is not as measurable, therefore there is a tendency to underestimate the importance of renovating methods and techniques.

Sometimes, the underlying reason of avoiding technologies in the classroom is the fear of making a bad impression with the pupils. Despite the training courses, many teachers feel a sense of inadequacy, the dread of not being able to face any unexpected technical problem during class, which makes them look incompetent in front of the students. They also worry about the frustration of wasting time, but above all to lose their students esteem.

Q: Has specific training been offered to the institute's teachers?

A: Only one on interactive whiteboards was mandatory, but over the years there always have been chances for training opportunities on the subject. It's just a matter of curiosity and attitude. Certainly, we face a lack of basic training, to the point that recently the school manager asked the staff to point out the most recurrent problems they deal with (even the most basic ones, e.g. "what to do if the connection goes away, or if a window opens and asks me to update the antivirus?") in order to activate specific courses. We still have a long way to go, but it is crucial to maintain an open mindset, to try to have fun and experiment new situations, to manage one's anxiety in front of new approaches, to let go of the need of control.

When a problem arises, we should take the chance of learning to solve it all together, teacher and pupils. The students won't judge us for this as good of bad teachers, on the contrary, if they happen to solve a technical problem, it should be considered a success, as it represents a form of gratification for the students. These tools boost self-esteem particularly with learning difficulties. This kind of pupils, in fact, often experience frustrating situations in traditional teaching, while, through the devices, they feel not only involved, but protagonist of the technological aspect of learning. They become group leaders, both for the technical part and for the use of the applications. This happens because they are already competent, being accustomed for years to use devices as compensatory tools in education. In this context, they can teach and tutor others, instead of the opposite way.

Q: Which are the goals towards the digital curriculum? Is there a gap between primary and secondary teaching on this subject?

A: We have just started the digital curriculum, there are many objectives on the table, and we have certainly noticed the gap between primary and secondary school, this year for example I saw it particularly. Children should be taught from primary school to create and save a file, to put it in a folder. These aspects and many more should already be addressed at primary level. The digital team will coordinate efforts to unite the curriculum, also involving teachers from classes 2.0.

Some primary school teachers have specific, even very in-depth knowledge. There is a small group of smart and motivated teachers that spent a lot of time getting to know Plickers, Minecraft, cooperative teaching, etc. They are a minority, though, as many other primary teachers need training.

Q: Can you talk about "La nostra scuola in MINECRAFT"? (Indire experimentation) Is there any documentation available to document the work?

A: I attended a Summer School in 2018, where I learned to use Minecraft, taught by very skilled young students, that assisted the course teachers. The educational version of the game Minecraft enables a top level teaching, it makes you realize how all disciplines are connected and intertwined. In the game you must work together, colliding, discussing, talking, coming to terms in order to make something. We built our virtual school starting from the planimetry, measuring all surfaces, even with Google Maps aid. All students built the same world, divided into groups, each one working on a different part of the school. The various groups would meet at connecting points, but before this happened, common rules would be established. A lot of confrontation is required in the decision process, a lot of lively quarreling and negotiating. Almost all team leaders are pupils with learning disabilities, who must connect the work of the different groups by reporting their own ideas and choices. It is extremely educational. During the game we encountered several connection problems, the signal suddenly fell. Even today there are still some problems related to the connection, also due to the many devices, personal and computers of the

school, which connect to the network. Despite this, the kids were brilliant and almost completed the project, that was presented at the end of the year, for the bicentenary of the birth of Pier Cironi. Stories have been created inside Minecraft with Renaissance historical characters, who tell their story through cartoons, questions, gifts to the visitor. The students also organized a treasure hunt with the characters of the Renaissance. The school was recreated by the centimeter, the common areas and even some classrooms were furnished.

Q: Concerning this institute, which are the digital challenges that you envision as a digital animator?

A: Working on STEMs: robotics is the most important discipline of the future, the school manager *in primis* wanted to invest in a dedicated classroom with recently purchased kits. Another priority is working on the digital curriculum. Few schools have it, and our school, which is innovative, should pursue it. It is important to inspire all teachers to train in the use new technologies. The goal is training and preparing the new generations for the future that awaits them, to have a critical mentality, to use appropriate tools to the world in which they will live, bearing in mind that most of the jobs our students will do when they grow up don't exist yet.

Q: Is it challenging for you to dedicate so much time to digital projects, as a teacher of humanistic subjects?

A: Over time I have been able to verify that the school results are either better or the same, if I lose an hour of lessons per week the results of the students do not change. Indeed, that hour, spent on Minecraft, is functional to the following one, because the kids are happy and grateful for the opportunity given, so they feel a great sense of duty to behave and be focused on the teaching. As teachers, we have to "play" on this: the pupils respect us for this, and they understand that the game is not an end in itself. They learn to relate and confront with each other, it is such a novelty to play with friends in class, extremely engaging, so what comes next doubles the effort and

the commitment. Spending two hours doing grammar is not worth it, because after a quarter of an hour nobody would pay attention anymore, anyway.

CONCLUSIONS

You learn the deepest way when something happens that makes you fall in love with a particular piece of knowledge.

Seymour Papert

The journey that led me on the trail of the extraordinary existence of Seymour Papert, eventually prompted me to look for a nexus, a heritage that he left to the world. His contemporaries, mainly collaborators from the MIT initially, pedagogists and computer scientists, over the years have taken up his legacy, in an effort to continue the work he had begun. It was not merely a question of refining programming languages aimed at children's education, such as Resnick's ideation of Scratch. Above all, the accomplishment was about carrying out social projects addressed to the most marginalized strata of society, creating movements to increase inclusion, promoting participation in the digital age. Many of these projects were inspired by Papert's example and his Contructionism: Prison Fab Lab, One Laptop per Child, the Maker Movement, etc.

Much ahead of time, Papert understood the necessity of digital inclusion, strived to equip children from all over the world with devices and fought to enhance their computer alphabetization. The first Computer Clubhouse opened in 1993 as one of the first attempts ever in the history of technology, intended to tackle the digital gap, especially in particular deprived areas. Later on, the political world began to take a direct interest in this issue: three years after the opening of the first Clubhouse, U.S. vice president Al Gore used the term "digital divide" in K-12 education, during a speech aimed at raising awareness on this topic.

Recently, in 2012, the Human Rights Council of the United Nations has defined Internet a human fundamental right: being a new means of communication, information and trading, it represents a tool of inclusion and participation to exercise human rights.

Today, the road to digital inclusion is traced by numerous regulations and guidelines on the subject, nationally, at European level and worldwide. There is a growing awareness of the need to reduce the digital divide as much as possible, starting with creating knowledge and opportunities in the school, together with new ways of guaranteeing the educational right of all pupils, as enshrined in the Constitution.

The question of my dissertation, with which I started my research, was whether the path to digital inclusion in Italy is really felt by local schools, in accordance with national and European laws. My aim was to discover if schools are taking a suitable path, followed by a real interest and adequate commitment. I have considered to what extent is the school preparing to ensure inclusion for all its students, with a particular focus on the most vulnerable sections of society. The research led me towards the analysis of the three-year training plans drawn up by all the institutes of a sampled city in northern central Italy, Prato. The 19 institutions taken into consideration have shown an attention to the issue of inclusivity: all of them spent a lot of efforts primarily dealing with the issue of poor connectivity, as many acknowledged the lack of an effective connection network. And yet, it is relevant that only one has explicitly referred to the digital divide, while not even one even mentioned gender divide. Concerning teacher training issues, several schools admitted a deficiency, and sought a greater commitment, but did not go into details about it, or set a deadline for achieving these objectives.

In all PTOF, digital PONs were pursued to equip institutes with an adequate training offer to the needs of the contemporary school. Most schools are taking the proper steps to fill in the technological gaps, but at the same time, it seems that their pledge is limited to the PON they applied to, to purchase devices, or to have more wireless coverage. Alternatively, the goal of other PONs is to finance extracurricular activities with a digital expert.

The current situation, appraising what is declared in the PTOF, is quite positive, but it is important to take into account that the institutes didn’t clarify several tasks. Instead, many topics were just mentioned, or it wasn’t explained how many classes they included. Occasionally, it seemed as their point was merely listing projects to give the institute prestige; there remains the suspicion that the projects listed are aimed at a narrow minority of students. Considering the aims of the PTOF

documents, that is informing and reporting stakeholders about the school's objectives and strivings, generally, the given information doesn't seem to be accurate and transparent enough.

Even as regard to the PDM, which should assume precise objectives and intentions, only two of the seven institutions that focused on the digital target, expressed a deadline. This fact appears quite indicative and suggests that vagueness may lead to an equally inconsistent commitment, when it comes to achieving clear results.

In the analysis of a case study, I found some interesting elements and a real effort to achieve specific and measurable goals, both with regard to the points accurately defined in the improvement plan, and for the survey created to verify the teachings given in the three schools (infant school, primary and secondary). In my opinion, a follow up to the inquiry should be pursued, as a cross-test to assess the skills acquired by the students in order to verify the effectiveness of the declared teachings. However not completely exhaustive, this survey represents an important and concrete first step made by the institute, a precise action aimed at measuring and quantifying the training offer on digital skills, especially in view of the imminent construction of a vertical digital curriculum, as for the PDM's objective.

The interview with the digital animator confirmed the institute's plan to maintain a high level of digital skills and an aim for a cutting-edge educational quality, not self-referential, but effective and transparent. About digital inclusion, the school resources don't allow the purchase of a tablet for every student, leaving the expense to families. This way, not all children are able to apply for digital classrooms. Although it is possible to ask for the school solidarity fund, not every parent is keen to request it.

Another variable appears to be made up of teaching staff and the training they are offered. As the school expert testifies, digital training opportunities (excluding the hours of technology provided by law) are entrusted to personal initiative, competence and passion of the individual teachers.

Nevertheless, if we consider the fact that every teacher is torn between the duty to carry on with their program and accomplish the many school projects and initiatives, it is understandable that many, especially if not expert on digital skills, are less likely to use technology to convey teaching. Issues such as eSafety, prevention of

cyberbullying, browsing on search engines to discern authoritative sources from fake news, are interdisciplinary activities. This kind of teaching requires time, dedication and it is not attributable to disciplinary teaching; the risk is that it can be totally disregarded, if left to the goodwill of single teachers. Secondary school teachers, in particular, do not dispose of many teaching hours per class, therefore they may find it even more challenging to dedicate part of their teaching time to enhance digital literacy.

The institute educational project does not provide specific teachings in terms of technological skills, so it is not clear what pertains to one teacher and what to the other, bearing in mind that in primary school two teachers are usually in charge of the classroom, respectively to humanistic subjects and to scientific ones.

Given these considerations, it is clear that a vertical digital curriculum needs to be built in the schools, and the institute taken into account as a case study is doing exactly this planning in this school year.

It would be interesting to explore the issue of primary teachers' training on digital competence, from university classes to formative agencies, considering the different kind of background, educational and academic programmes that Italian teachers have (old "Magistrale" diploma, different university degrees). The path to become a primary school teacher was very different a few years ago, one just needed a secondary school diploma (Istituto Magistrale) to enrol in a national competition and be subsequently appointed as a tenured teacher.

The limitations of the study mainly concerned the first phase, regarding the difficulty of quantifying for each institute, and each school inside them, the technological equipment, the type of teaching, the length of time and for which classes it is offered. Even the training and individual competences of the teaching staff were not indicated in the PTOF.

I believe that the present work may possibly constitute an inception of a larger future study and it could benefit from a follow up investigation, for instance by interviewing all the digital animators of the province of Prato. This way, it would be possible to verify if what is stated in the educational offer plan of the institutes matches with the educational practices, and what is actually being implemented in

the individual classes. A comparison with other school realities, in Italy and abroad, could also offer more cues on the actions needed to contrast digital divide.

I would like to conclude with a metaphor to portray the path I have undertaken and completed with this work: the writing of this thesis has been a journey, which has granted me the privilege of discovering unknown lands; wandering, I found new ways of thinking and met fellow travellers. Along the way, I pondered ideas and observed the world through new horizons; the goal at times seemed to get farther and darker. Yet, a thin but resistant Arianna's thread always guided my steps: the teachings I received during these five years of study at university, the words of wise professors, the example of tutors and colleagues, the endorsement and trust of my mentor, a man who has inherited Papert's legacy and now shares it with society's marginalized, by setting up a school for young immigrants and refugees in Florence, thus providing for shelter and education.

AFTERWORD

It takes an e-village to raise a child.

While the closing sentences of this thesis are written down, the whole world is going through a critical and exceptionally serious time, due to the recent outbreak of the new Covid-19 virus. The situation has escalated rapidly, particularly in Italy, in such a way that the Italian government is taking draconian measures to contain the spread of the disease. Initially, on 4th March 2020, it was decided to close down all schools and universities for ten days, with a limited lockdown in the north area. However, just a few days later, Prime Minister Conte signed the Dpcm 9th March 2020[57], taking even more drastic actions, with the previous north-only quarantine zone extended to all the Italian territory. Theaters, cinemas, sporting events have been closed down; travel restrictions have been imposed to all citizens in the Country. Schools and universities are kept closed until the 3rd April 2020, for the time being. After only three months since its detection in China, on 11th March 2020 the virus has been officially classified as a pandemic by the World Health Organization[58] and other nations across Europe are following the same Italian measures.

Currently, people all over the world are being prompted to consider smart work, and a few are already carrying out their job from home. In Italy, the Ministry for Technological Innovation and Digitalization has launched a "digital solidarity" campaign[59], in order to raise awareness and prompt societies, multinationals, volunteer associations to give help. The call is for everyone, private or public enterprise, capable of making a difference, by donating their services in support of the population on lock down. As Education Minister Azzolina underlined in the note prot. N.278 of 6th March 2020, "resta però la necessità di favorire, in via straordinaria

[57] https://www.slideshare.net/Palazzo_Chigi/dpcm-9-marzo-2020
[58] https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020
[59] https://innovazione.gov.it/coronavirus-la-digitalizzazione-a-supporto-delle-zone-rosse/

ed emergenziale, in tutte le situazioni ove ciò sia possibile, il diritto all'istruzione attraverso modalità di apprendimento a distanza"[60].

In light of these facts, the educational system is taking up the challenge to maintain education alive, by activating online teaching, through a variety of platforms; in addition, applications for video conference are being tested to recreate virtual classrooms. In the middle of all the epidemiological emergency turmoil, schools are facing the great and pressing commitment to answer to every pupil and student's educational right, from primary school to university. School managers are trying to find useful solutions to facilitate the process and coordinate teaching staff. Although many platforms offer the possibility of e-learning, it is clear that the schools are not prepared for such a revolutionary step, nor trained for the massive and exclusive use of online learning. Smart working is indeed an entirely different question when it comes to teaching, as it involves caring and building relationships, especially with younger students. Learning needs time and space to think and rest, reflect together, co-build knowledge, tutor and be tutored by others. It doesn't just involve a web cam and a Wi-Fi connection. This forced isolation hampers the learning process. The thought, furthermore, immediately goes to those most fragile pupils, who already struggle in the classroom and in their homework. In these cases, the digital divide risks accentuating existing situations of inequality and family hardship.

As a teacher, I am witnessing from some colleagues expressions of inadequacy for a task that is still unclear how to perform, struggling without specific training, proper devices or connection at home. But I also notice that most of them are making tireless efforts to overcome their own digital gap for the sake of their students at home.

For my part, I will dedicate my time, endeavour and knowledge to observe and document these coming weeks and months of distant learning experimentation as part of a future research work, conscious of the exceptionally significant moment.

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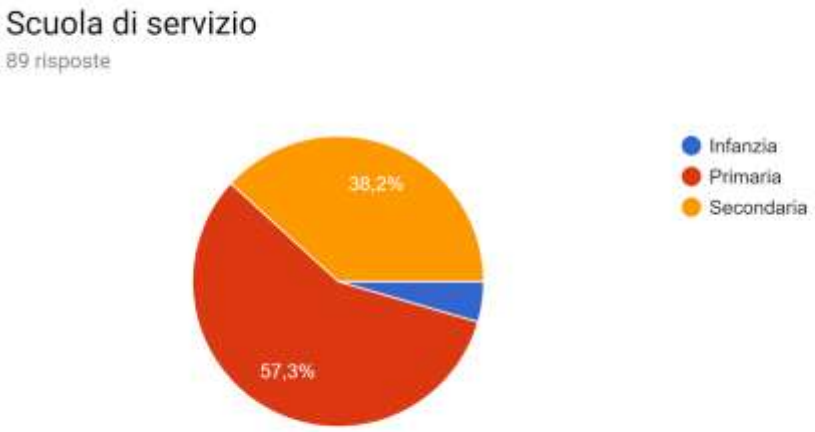
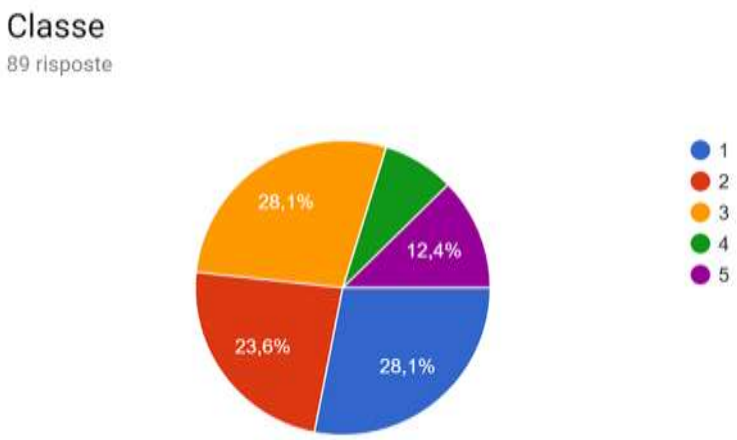
60 https://www.miur.gov.it/documents/20182/0/Nota+prot.+278+del+6+marzo+2020.pdf/89baad3a-55ff-da81-f5a4-01afd0a0f1d3?version=1.0&t=1583528222434
However, there is a need to promote, as an extraordinary and emergency measure, in all situations where this is possible, the right to education through distance learning. [My translation]

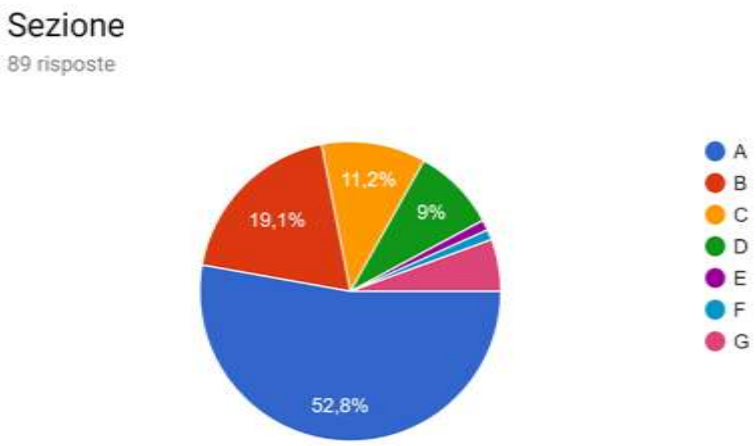
La rilevazione sul curricolo digitale ha rilevato i seguenti dati

Totale delle risposte registrate fino al 5 novembre 2019 (scadenza): 89

Le risposte sono così distribuite:

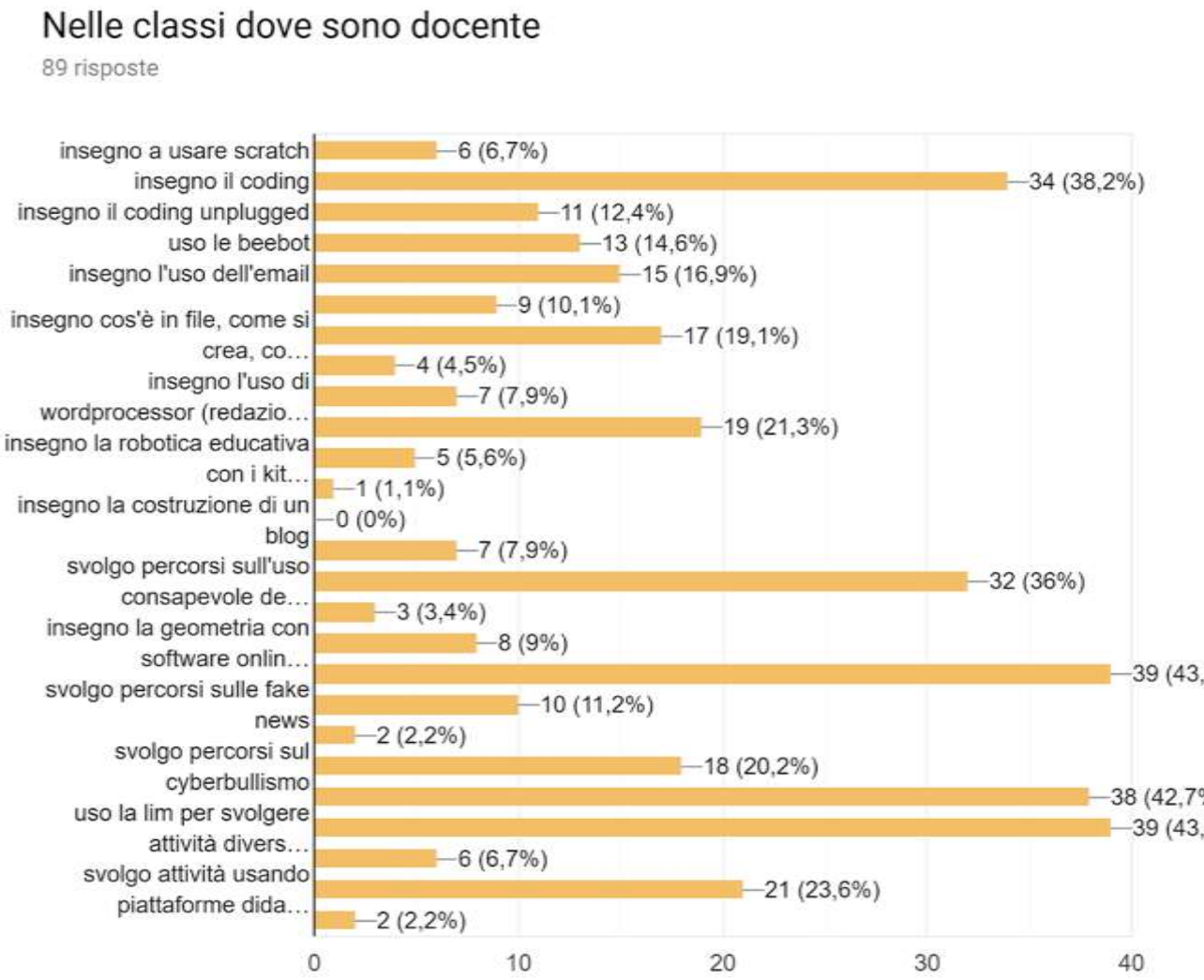






Le risposte si attestano sul 78% del totale dei docenti in servizio (di ruolo e precari annuali, posto comune e sostegno).

Le attività dichiarate dai docenti sono distribuite come segue:



L'ordinamento delle risposte per sezione fornisce il quadro "reale e istantaneo" del curricolo digitale verticale di istituto:

Scuola di servizio	Nelle classi dove sono docente	Classe	Sezione
Infanzia	insegno il coding, uso le beebot	1	B
Infanzia	uso le beebot	2	B
Infanzia	uso le beebot	3	A

Infanzia	uso le beebot	5	A
Primaria	insegno il coding, uso le beebot, insegno l'uso di software creativi online per storie a fumetti o similari, strutturo lezioni usando il software della lim per attività anche interattive, uso la lim per svolgere attività diversificate per livello, uso il carrello mobile dei computer disponibile nel plesso	1	A
Primaria	insegno il coding, insegno il coding unplugged, strutturo lezioni usando il software della lim per attività anche interattive, uso la lim per svolgere attività diversificate per livello	1	A
Primaria	insegno il coding	1	A
Primaria	uso la lim per svolgere attività diversificate per livello	1	B
Primaria	insegno il coding, uso il carrello mobile dei computer disponibile nel plesso	1	A
Primaria	insegno il coding, uso le beebot, insegno la robotica educativa con i kit di istituto, svolgo percorsi sull'uso consapevole della rete internet, insegno la ricerca con google o altri motori di ricerca, strutturo lezioni usando il software della lim per attività anche interattive, uso la lim per svolgere attività diversificate per livello	1	B
Primaria	insegno cos'è in file, come si crea, come si salva, insegno l'uso di wordprocessor (redazione documenti), svolgo percorsi sull'uso consapevole della rete internet, insegno la ricerca con google o altri motori di ricerca	1	A
Primaria	insegno il coding, svolgo attività usando piattaforme didattico-ludiche (tipo: mentimeter, kahoot, edmodo)	1	A
Primaria	insegno il coding, uso le beebot, strutturo lezioni usando il software della lim per attività anche interattive	1	A
Primaria	insegno il coding, insegno il coding unplugged, uso le beebot	1	A
Primaria	strutturo lezioni usando il software della lim per attività anche interattive, uso la lim per svolgere attività diversificate per livello	1	A
Primaria	svolgo percorsi sull'uso consapevole della rete internet, strutturo lezioni usando il software della lim per attività anche interattive, uso la lim per svolgere attività diversificate per livello	1	A
Primaria	insegno il coding, insegno il coding unplugged, uso le beebot, strutturo lezioni usando il software della lim per attività anche interattive, uso la lim per svolgere attività diversificate per livello, uso il carrello mobile dei computer disponibile nel plesso	1	A
Primaria	uso la lim per svolgere attività diversificate per livello	2	A
Primaria	insegno il coding unplugged, strutturo lezioni usando il software della lim per attività anche interattive, uso la lim per svolgere attività diversificate per livello	2	A
Primaria	insegno il coding	2	A
Primaria	strutturo lezioni usando il software della lim per attività anche interattive, uso la lim per svolgere attività diversificate per livello	2	B

Primaria	svolgo percorsi sull'uso consapevole della rete internet, insegno la ricerca con google o altri motori di ricerca	2	A
Primaria	insegno il coding unplugged, strutturo lezioni usando il software della lim per attività anche interattive, uso la lim per svolgere attività diversificate per livello	2	A
Primaria	uso la lim per svolgere attività diversificate per livello	2	A
Primaria	insegno il coding, strutturo lezioni usando il software della lim per attività anche interattive, uso la lim per svolgere attività diversificate per livello	2	A
Primaria	svolgo percorsi sull'uso consapevole della rete internet, insegno la ricerca con google o altri motori di ricerca	2	A
Primaria	insegno il coding, insegno il coding unplugged, uso le beebot, insegno la robotica educativa con i kit di istituto	2	A
Primaria	insegno il coding, insegno il coding unplugged, uso le beebot, insegno la robotica educativa con i kit di istituto	2	B
Primaria	insegno il coding, insegno il coding unplugged, uso le beebot, insegno la robotica educativa con i kit di istituto	2	A
Primaria	insegno la ricerca con google o altri motori di ricerca, strutturo lezioni usando il software della lim per attività anche interattive, uso la lim per svolgere attività diversificate per livello, svolgo attività usando piattaforme didattico-ludiche (tipo: mentimeter, kahoot, edmodo), svolto attività trasversali usando piattaforme per lo sviluppo delle competenze relazionali (tipo: classdojo)	3	A
Primaria	svolgo percorsi sull'uso consapevole della rete internet, insegno la ricerca con google o altri motori di ricerca, uso la lim per svolgere attività diversificate per livello	3	A
Primaria	strutturo lezioni usando il software della lim per attività anche interattive, uso la lim per svolgere attività diversificate per livello	3	A
Primaria	svolgo percorsi sull'uso consapevole della rete internet, strutturo lezioni usando il software della lim per attività anche interattive	3	A
Primaria	insegno la ricerca con google o altri motori di ricerca, strutturo lezioni usando il software della lim per attività anche interattive, uso la lim per svolgere attività diversificate per livello	3	B
Primaria	uso la lim per svolgere attività diversificate per livello	3	A
Primaria	uso la lim per svolgere attività diversificate per livello	3	A
Primaria	strutturo lezioni usando il software della lim per attività anche interattive, uso la lim per svolgere attività diversificate per livello	3	B
Primaria	insegno il coding, insegno l'uso dell'email, insegno cos'è in file, come si crea, come si salva, insegno l'uso di excel o altro foglio di calcolo, insegno l'uso di wordprocessor (redazione documenti), insegno la costruzione di presentazioni con powerpoint o altri software, svolgo percorsi sull'uso consapevole della rete internet, insegno l'uso di software creativi online per storie a fumetti o similari, insegno la geometria con software online e offline tipo geogebra,	3	A

	insegno la ricerca con google o altri motori di ricerca, strutturo lezioni usando il software della lim per attività anche interattive, uso la lim per svolgere attività diversificate per livello, svolgo attività usando piattaforme didattico-ludiche (tipo: mentimeter, kahoot, edmodo)		
Primaria	svolgo percorsi sull'uso consapevole della rete internet, insegno la ricerca con google o altri motori di ricerca	4	A
Primaria	insegno a usare scratch, insegno il coding, insegno il coding unplugged, insegno la geometria con software online e offline tipo geogebra, svolgo percorsi sul cyberbullismo, strutturo lezioni usando il software della lim per attività anche interattive, uso la lim per svolgere attività diversificate per livello, uso il carrello mobile dei computer disponibile nel plesso, svolgo attività usando piattaforme didattico-ludiche (tipo: mentimeter, kahoot, edmodo)	4	A
Primaria	insegno il coding, insegno il coding unplugged, uso le beebot, insegno cos'è in file, come si crea, come si salva, insegno la costruzione di presentazioni con powerpoint o altri software, insegno la ricerca con google o altri motori di ricerca, svolgo percorsi sul cyberbullismo, strutturo lezioni usando il software della lim per attività anche interattive, uso la lim per svolgere attività diversificate per livello, uso il carrello mobile dei computer disponibile nel plesso, svolgo attività usando piattaforme didattico-ludiche (tipo: mentimeter, kahoot, edmodo)	4	A
Primaria	strutturo lezioni usando il software della lim per attività anche interattive	4	B
Primaria	insegno il coding, insegno la ricerca con google o altri motori di ricerca	4	A
Primaria	insegno il coding, insegno la geometria con software online e offline tipo geogebra, strutturo lezioni usando il software della lim per attività anche interattive	4	A
Primaria	insegno il coding, svolgo percorsi sull'uso consapevole della rete internet, strutturo lezioni usando il software della lim per attività anche interattive, uso la lim per svolgere attività diversificate per livello	4	A
Primaria	insegno il coding, svolgo attività usando piattaforme didattico-ludiche (tipo: mentimeter, kahoot, edmodo)	5	A
Primaria	insegno cos'è in file, come si crea, come si salva, insegno la costruzione di presentazioni con powerpoint o altri software, svolgo percorsi sull'uso consapevole della rete internet, insegno la ricerca con google o altri motori di ricerca, uso la lim per svolgere attività diversificate per livello	5	A
Primaria	insegno il coding, uso la lim per svolgere attività diversificate per livello	5	A
Primaria	insegno il coding, uso la lim per svolgere attività diversificate per livello	5	A
Primaria	svolgo percorsi sull'uso consapevole della rete internet, insegno la geometria con software online e offline tipo geogebra, insegno la ricerca con google o altri motori di ricerca, svolgo percorsi sul cyberbullismo, strutturo lezioni usando il software della lim per attività anche interattive, uso la lim per	5	A

	svolgere attività diversificate per livello		
Primaria	svolgo attività usando piattaforme didattico-ludiche (tipo: mentimeter, kahoot, edmodo)	5	A
Primaria	svolgo percorsi sull'uso consapevole della rete internet, insegno la ricerca con google o altri motori di ricerca, strutturo lezioni usando il software della lim per attività anche interattive, uso la lim per svolgere attività diversificate per livello	5	B
Primaria	insegno il coding, svolgo percorsi sull'uso consapevole della rete internet, svolgo percorsi sul cyberbullismo, uso la lim per svolgere attività diversificate per livello, uso il carrello mobile dei computer disponibile nel plesso	5	A
Primaria	insegno il coding unplugged	5	A
Primaria	insegno il coding, svolgo percorsi sull'uso consapevole della rete internet, insegno la ricerca con google o altri motori di ricerca, strutturo lezioni usando il software della lim per attività anche interattive, uso la lim per svolgere attività diversificate per livello	5	B
Secondaria	insegno l'uso dell'email, insegno l'uso di googledrive individuale, insegno cos'è in file, come si crea, come si salva, insegno la ricerca con google o altri motori di ricerca, strutturo lezioni usando il software della lim per attività anche interattive, svolgo attività usando piattaforme didattico-ludiche (tipo: mentimeter, kahoot, edmodo)	1	G
Secondaria	insegno a usare scratch, insegno il coding, insegno l'uso dell'email, insegno l'uso di googledrive individuale, insegno cos'è in file, come si crea, come si salva, insegno la costruzione di presentazioni con powerpoint o altri software, insegno la condivisione di documenti in cloud, svolgo percorsi sull'uso consapevole della rete internet, insegno la geometria con software online e offline tipo geogebra, insegno la ricerca con google o altri motori di ricerca, svolgo percorsi sulle fake news, strutturo lezioni usando il software della lim per attività anche interattive, svolgo attività usando piattaforme didattico-ludiche (tipo: mentimeter, kahoot, edmodo)	1	D
Secondaria	insegno il coding, insegno l'uso dell'email, insegno l'uso di googledrive individuale, insegno cos'è in file, come si crea, come si salva, insegno l'uso di excel o altro foglio di calcolo, insegno la costruzione di presentazioni con powerpoint o altri software, insegno la condivisione di documenti in cloud, insegno la geometria con software online e offline tipo geogebra, svolgo attività usando piattaforme didattico-ludiche (tipo: mentimeter, kahoot, edmodo)	1	C
Secondaria	insegno il coding, insegno cos'è in file, come si crea, come si salva, insegno l'uso di excel o altro foglio di calcolo, insegno la costruzione di presentazioni con powerpoint o altri software, svolgo percorsi sull'uso consapevole della rete internet, svolgo percorsi sul cyberbullismo, svolgo attività usando piattaforme didattico-ludiche (tipo: mentimeter, kahoot, edmodo)	1	C
Secondaria	insegno l'uso dell'email, insegno cos'è in file, come si crea, come si salva,	1	C

	insegno l'uso di wordprocessor (redazione documenti), insegno la costruzione di presentazioni con powerpoint o altri software, insegno la condivisione di documenti in cloud, svolgo percorsi sull'uso consapevole della rete internet, insegno la ricerca con google o altri motori di ricerca, svolgo percorsi sul cyberbullismo, uso la lim per svolgere attività diversificate per livello		
Secondaria	svolgo percorsi sull'uso consapevole della rete internet, insegno la ricerca con google o altri motori di ricerca	1	A
Secondaria	insegno il coding, insegno la costruzione di presentazioni con powerpoint o altri software, svolgo percorsi sull'uso consapevole della rete internet, insegno la ricerca con google o altri motori di ricerca, svolgo percorsi sul cyberbullismo, strutturo lezioni usando il software della lim per attività anche interattive	1	A
Secondaria	insegno l'uso dell'email, svolgo percorsi sull'uso consapevole della rete internet, insegno la ricerca con google o altri motori di ricerca, svolgo percorsi sulle fake news, strutturo lezioni usando il software della lim per attività anche interattive, svolgo attività usando piattaforme didattico-ludiche (tipo: mentimeter, kahoot, edmodo)	1	C
Secondaria	insegno l'uso dell'email, insegno cos'è in file, come si crea, come si salva, insegno la costruzione di presentazioni con powerpoint o altri software, insegno la ricerca con google o altri motori di ricerca	1	D
Secondaria	insegno a usare scratch, insegno il coding, insegno l'uso di googledrive individuale, insegno l'uso di wordprocessor (redazione documenti), svolgo percorsi sull'uso consapevole della rete internet, insegno la ricerca con google o altri motori di ricerca, strutturo lezioni usando il software della lim per attività anche interattive	1	G
Secondaria	svolgo attività usando piattaforme didattico-ludiche (tipo: mentimeter, kahoot, edmodo)	1	D
Secondaria	insegno cos'è in file, come si crea, come si salva, svolgo percorsi sull'uso consapevole della rete internet, insegno la ricerca con google o altri motori di ricerca, svolgo percorsi sul cyberbullismo, uso la lim per svolgere attività diversificate per livello, svolgo attività usando piattaforme didattico-ludiche (tipo: mentimeter, kahoot, edmodo)	2	G
Secondaria	insegno a usare scratch, insegno il coding, insegno l'uso dell'email, insegno l'uso di googledrive individuale, insegno cos'è in file, come si crea, come si salva, insegno l'uso di excel o altro foglio di calcolo, insegno la costruzione di presentazioni con powerpoint o altri software, insegno la condivisione di documenti in cloud, insegno la geometria con software online e offline tipo geogebra, svolgo attività usando piattaforme didattico-ludiche (tipo: mentimeter, kahoot, edmodo)	2	C
Secondaria	svolgo percorsi sul cyberbullismo, strutturo lezioni usando il software della lim per attività anche interattive, uso la lim per svolgere attività diversificate per livello	2	F
Secondaria	svolgo percorsi sull'uso consapevole della rete internet, insegno la ricerca con	2	D

	google o altri motori di ricerca, svolgo percorsi sul cyberbullismo		
Secondaria	insegno la costruzione di presentazioni con powerpoint o altri software, svolgo percorsi sull'uso consapevole della rete internet, insegno la ricerca con google o altri motori di ricerca, svolgo percorsi sul cyberbullismo	2	D
Secondaria	insegno l'uso di googledrive individuale, insegno cos'è in file, come si crea, come si salva, insegno la costruzione di presentazioni con powerpoint o altri software, svolgo percorsi sulle fake news, svolgo percorsi sul cyberbullismo	2	G
Secondaria	insegno l'uso dell'email, insegno la costruzione di presentazioni con powerpoint o altri software, svolgo percorsi sull'uso consapevole della rete internet, insegno la ricerca con google o altri motori di ricerca, svolgo percorsi sulle fake news, strutturo lezioni usando il software della lim per attività anche interattive, svolgo attività usando piattaforme didattico-ludiche (tipo: mentimeter, kahoot, edmodo)	2	C
Secondaria	strutturo lezioni usando il software della lim per attività anche interattive	2	G
Secondaria	insegno la ricerca con google o altri motori di ricerca, svolgo attività usando piattaforme didattico-ludiche (tipo: mentimeter, kahoot, edmodo)	3	D
Secondaria	insegno l'uso di googledrive individuale, insegno l'uso di software creativi online per storie a fumetti o similari, insegno la ricerca con google o altri motori di ricerca, strutturo lezioni usando il software della lim per attività anche interattive	3	C
Secondaria	uso la lim per svolgere attività diversificate per livello	3	B
Secondaria	insegno l'uso dell'email, insegno l'uso di googledrive individuale, insegno cos'è in file, come si crea, come si salva, insegno l'uso di wordprocessor (redazione documenti), insegno la costruzione di presentazioni con powerpoint o altri software, insegno la condivisione di documenti in cloud, svolgo percorsi sull'uso consapevole della rete internet, insegno la ricerca con google o altri motori di ricerca, svolgo percorsi sulle fake news, svolgo percorsi sulla media literacy, svolgo percorsi sul cyberbullismo	3	C
Secondaria	insegno a usare scratch, insegno il coding, insegno l'uso dell'email, insegno cos'è in file, come si crea, come si salva, insegno la costruzione di presentazioni con powerpoint o altri software, insegno la robotica educativa con i kit di istituto, insegno l'uso della stampante 3D, insegno la ricerca con google o altri motori di ricerca, svolgo percorsi sulle fake news, strutturo lezioni usando il software della lim per attività anche interattive, uso la lim per svolgere attività diversificate per livello	3	B
Secondaria	insegno a usare scratch, insegno il coding, insegno la geometria con software online e offline tipo geogebra	3	C
Secondaria	insegno la condivisione di documenti in cloud, svolgo percorsi sull'uso consapevole della rete internet, insegno la ricerca con google o altri motori di ricerca, svolgo percorsi sulle fake news, svolgo percorsi sul cyberbullismo, uso la lim per svolgere attività diversificate per livello	3	E

Secondaria	svolgo percorsi sull'uso consapevole della rete internet, insegno la ricerca con google o altri motori di ricerca, svolgo percorsi sul cyberbullismo, svolgo attività usando piattaforme didattico-ludiche (tipo: mentimeter, kahoot, edmodo)	3	C
Secondaria	insegno l'uso dell'email, insegno la costruzione di presentazioni con powerpoint o altri software, svolgo percorsi sull'uso consapevole della rete internet, insegno la ricerca con google o altri motori di ricerca	3	B
Secondaria	insegno l'uso dell'email, insegno l'uso di googledrive individuale, insegno cos'è in file, come si crea, come si salva, insegno l'uso di wordprocessor (redazione documenti), insegno la costruzione di presentazioni con powerpoint o altri software, insegno la condivisione di documenti in cloud, svolgo percorsi sull'uso consapevole della rete internet, insegno la ricerca con google o altri motori di ricerca, svolgo percorsi sulle fake news, svolgo percorsi sulla media literacy, svolgo percorsi sul cyberbullismo, uso la lim per svolgere attività diversificate per livello, svolgo attività usando piattaforme didattico-ludiche (tipo: mentimeter, kahoot, edmodo), svolto attività trasversali usando piattaforme per lo sviluppo delle competenze relazionali (tipo: classdojo)	3	B
Secondaria	insegno l'uso dell'email, insegno la costruzione di presentazioni con powerpoint o altri software, svolgo percorsi sull'uso consapevole della rete internet, insegno la ricerca con google o altri motori di ricerca, svolgo percorsi sulle fake news, svolgo percorsi sul cyberbullismo, strutturo lezioni usando il software della lim per attività anche interattive, svolgo attività usando piattaforme didattico-ludiche (tipo: mentimeter, kahoot, edmodo)	3	B
Secondaria	strutturo lezioni usando il software della lim per attività anche interattive, uso la lim per svolgere attività diversificate per livello	3	A
Secondaria	insegno la ricerca con google o altri motori di ricerca	3	D
Secondaria	insegno la ricerca con google o altri motori di ricerca	3	B
Secondaria	insegno l'uso dell'email, insegno cos'è in file, come si crea, come si salva, insegno l'uso di wordprocessor (redazione documenti), insegno la costruzione di presentazioni con powerpoint o altri software, insegno la ricerca con google o altri motori di ricerca, svolgo percorsi sulle fake news, svolgo percorsi sul cyberbullismo, strutturo lezioni usando il software della lim per attività anche interattive, svolgo attività usando piattaforme didattico-ludiche (tipo: mentimeter, kahoot, edmodo)	3	D

Considerazioni

Di fatto l’istituto lavora in verticale su molti aspetti del curricolo e dell’apprendimento digitale:

- 44% dei docenti dichiara di lavorare con la Lim in modalità non frontale e analoga percentuale di usare il software dedicato della Lim per attività didattiche
- Il 43% dichiara di insegnare a fare ricerche con i motori di ricerca online
- Fra il 38% e il 36% dei docenti dichiara di "insegnare il coding" e di lavorare con gli alunni sull'uso consapevole di internet
- Le percentuali si dimezzano se si parla di usare piattaforme didattiche online (23%), di insegnare a creare presentazioni con software dedicati (21%).
- Solo il 19% dei docenti dichiara di insegnare/spiegare agli alunni cos'è un file e come va gestito, appena il 17% spiega cos'è una email.
- Le percentuali cadono vertiginosamente quando si tratta di spiegare cosa sono le fake news (11%), di introdurre al corretto uso di un wordprocessor (8%), di lavorare con scratch (6.7%) e di attuare la robotica educativa (5.6%)
- Bassissime le percentuali di docenti che dichiarano di lavorare in classe sulla media literacy: 2%, e con la stampante 3d: 1,1%.
- Stando alla rilevazione, nessun docente utilizza il blog (0%) come strumento didattico per e con gli alunni

Priorità

Formalizzare il curricolo digitale verticale di istituto conferendogli omogeneità di intenti rispetto alle indicazioni nazionali, alle competenze chiave europee e alle competenze digitali (digicomp): identificare le colonne portanti del curricolo verticale di istituto

Traguardo

Aumentare il numero di classi in cui si lavora sulla media literacy, sull'uso di wordprocessor e sul coding rispettivamente del 5%, 3% e 2%

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UNIVERSITÀ
DEGLI STUDI
FIRENZE
SCIFOPSI
DIPARTIMENTO DI
SCIENZE DELLA FORMAZIONE
E PSICOLOGIA

Corso di Studi in Scienze della Formazione Primaria

Relazione finale di tirocinio

Tirocinante **Claudia Baiata**

Tutor scolastici **Adriana Vidulich; Mariarita Palazzo**

Tutor universitario **Silvia Innocenti Becchi**

LO SPAZIO E IL TEMPO DELLA FORMAZIONE

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1. Bilancio complessivo

Ripercorrendo mentalmente questi ultimi anni di formazione e tirocinio, posso affermare che il mio percorso accademico e lavorativo in questo periodo si è svolto in un crescendo di riflessioni, cambiamenti e maturazione.

Nella mia vita, soprattutto sul piano lavorativo, in generale ho sempre cercato nuovi stimoli e occasioni di crescita personale e professionale. Questa continua ricerca mi ha portato negli anni ad affrontare nuove e diversificate esperienze lavorative in vari campi, dal settore privato a quello pubblico, al mondo del volontariato, in Italia e all'estero. È con questo atteggiamento mentale che ho avvertito, circa cinque anni fa, la spinta e la necessità di riprendere gli studi, mettendomi alla prova in un nuovo ambito che ha sempre richiamato la mia attenzione e interesse. Nuovo, ma anche familiare: sono, infatti, "figlia d'arte", se è lecito definirmi così. Il lavoro di insegnante - dal nido d'infanzia fino alle aule universitarie - rientra nella tradizione della mia famiglia da generazioni. Sono cresciuta tra libri, riviste pedagogiche e didattiche, correzioni di quaderni e compiti di alunni, ascoltando conversazioni,

confronti, racconti, discussioni, critiche, inerenti problematiche e sfide dell'insegnamento ai bambini e ai ragazzi dei diversi ordini scolastici. Tra le motivazioni che mi hanno spinto a intraprendere questo corso di studi e questa professione come insegnante di scuola primaria, sicuramente c'è il privilegio di osservare e contribuire alla maturazione mentale ed emotiva dei ragazzi in un arco di tempo molto lungo e ricco di cambiamenti. Sono convinta che gli insegnamenti ricevuti in questi anni di formazione non rimarranno solo fondamenti teorici, ma potranno avere una ricaduta effettiva nella pratica.

È stato un percorso lungo, formativo, in cui ho conosciuto tante persone appassionate al loro lavoro, che mi hanno arricchito e ispirato, sia all'interno della facoltà, professori, tutor e compagni di studio, che all'interno delle aule scolastiche, colleghi e colleghe, alunne e alunni. È grazie all'interazione e al confronto quotidiano che la mia crescita professionale e universitaria è avvenuta gradualmente, attraverso la conquista del sapere, saper fare e saper essere.

Oggi, mentre scrivo queste pagine, sono giunta contemporaneamente alla parte conclusiva della mia tesi di laurea; ma soprattutto ho compiuto e concluso, in questi anni universitari, un altro percorso di studi, parallelo, di preparazione al concorso magistrale, che mi ha portato a vincere il ruolo che da quasi due anni orgogliosamente ricopro: insegnante di scuola primaria. La consapevolezza di quanto sia delicato ed articolato il mestiere dell'insegnante è stata forse una delle prime cose che ho imparato con la mia prima classe, perché si esercita un potere effettivo, si ha una grande influenza su giovani menti, si diventa un modello, si attua una sorta di imprinting. Molte dunque sono le responsabilità che questa professione comporta: la conoscenza dei limiti personali, l'impegno a migliorarsi, la cura continua della propria formazione life long learning.

Il mio primo contatto con l'insegnamento è iniziato col percorso di tirocinio, al secondo anno di facoltà. Fin dall'inizio, nella scelta dell'istituto comprensivo presso cui svolgere il tirocinio, ho preso la decisione di cambiare ogni anno classe, al fine di osservare diverse realtà e stili educativi, per avere una panoramica quanto più variegata del mondo scolastico. Si è rivelata un'ottima strategia, a mio avviso, in quanto mi ha permesso di ponderare diversi metodi e modalità dei docenti, ma anche verificare l'eterogeneità delle classi e le diverse dinamiche relazionali. Per natura sono curiosa e non mi sono mai accontentata del "si è sempre fatto così"; quindi ho trovato utilissimo mettere a confronto le strategie educative e modalità organizzative

delle diverse scuole. Le tutor a cui sono stata affidata mi hanno accolto con affetto e hanno sempre dedicato del tempo per spiegarmi le regole, le usanze e le particolarità della classe.

La prima annualità (65 ore di tirocinio diretto e 10 di tirocinio indiretto) ha costituito la prima occasione per conoscere l'organizzazione complessiva della scuola, comprenderne le modalità di lavoro e la progettualità educativa. Dopo lo studio teorico, finalmente si è presentata l'occasione di confrontarmi con la realtà della scuola e la quotidianità della didattica. Ricordo l'emozione con cui ho varcato per la prima volta i cancelli della scuola, quasi travolta da una folla di bambini che si accalcavano e si lanciavano su per le scale al suono della prima campanella. Quell'entusiasmo e quell'energia così travolgenti, appunto, ancora oggi mi elettrizzano. Ricordo anche la sensazione, mentre mi presentavo alla mia classe, di non sapere bene come parlare a bambini di quell'età, mentre notavo che per loro era naturale relazionarsi e riempirmi di domande. Nel giro di pochi minuti, eravamo già in confidenza.

Nella scuola primaria ho fatto esperienza dell'arrivo in classe di una bambina NAI, appena arrivata dal Pakistan, che non conosceva la lingua italiana. In quell'occasione ho notato quanto fosse importante stabilire da subito un buon rapporto di conoscenza con i nuovi compagni e mi sono fatta carico in prima persona dell'accoglienza della bambina. È stupefacente quanto sia facile per i bambini fare amicizia, nonostante la barriera linguistica e culturale, è stato sufficiente aiutare i bambini a rompere il ghiaccio durante i primi minuti. Di questa esperienza ho fatto tesoro successivamente, quando ho iniziato a lavorare ed è stato inserito nella mia classe un bambino NAI di origine cinese.

Del primo anno di tirocinio alla scuola primaria ho un buon ricordo, sono stata accolta molto bene dalla tutor e di lei ho apprezzato la grande esperienza e sicurezza nel gestire la classe. Quella era la mia prima preoccupazione, soprattutto inizialmente: non riuscire a stabilire un rapporto basato sulla fiducia, il rispetto, la comprensione con i miei alunni. Ho notato nello specifico la capacità della maestra di accogliere in classe i bambini fin dall'ingresso in aula, guardandoli negli occhi uno ad uno, ponendo loro delle domande personali per metterli a loro agio e cominciare la giornata come tra amici. Ancora oggi, spesso, quando inizio la mia giornata in classe, ripenso al suo stile e provo a relazionarmi così anch'io.

Nel secondo anno di tirocinio (105 ore tra primaria e infanzia, e 20 ore di tirocinio indiretto) il tempo passato in aula e quello dedicato alla riflessione sono praticamente raddoppiati, e con loro le occasioni di crescita, apprendimento e conoscenza reciproca con le nuove tutor. Grazie al maggior tempo speso in aula, è risultato più facile inserirsi nelle classi e avere l'occasione di preparare alcune attività didattiche e ludiche. Ho deciso di cambiare istituto comprensivo per le suddette ragioni, trovando dunque un ambiente completamente diverso alla scuola dell'infanzia. Nonostante gli spazi fisici della scuola fossero abbastanza ridotti, le insegnanti erano riuscite a creare un ambiente di apprendimento sereno, stimolante e piacevole. Il gruppo di bambini (5 anni) era ben coeso e le due colleghe, seppur molto diverse per carattere e stile educativo, mi sono sempre apparse affiatate e in sintonia nelle scelte educative. Ho imparato molto dalla loro professionalità. Grazie all'ottimo rapporto instaurato con entrambe le insegnanti della sezione, sono stata incoraggiata a mettermi in gioco e a gestire alcune routine. Tra le mie proposte, ho portato un teatro *kamishibai* costruito con alcune compagne di corso per il laboratorio di letteratura italiana, e ho messo in scena una storia.

Anche la scuola primaria aveva delle caratteristiche peculiari: una struttura molto piccola, con una sola sezione, dalla prima alla quinta, l'atmosfera familiare. Tutti i bambini mangiano nelle loro classi e per uscire in giardino basta aprire la portafinestra. Per contro, la situazione della classe che ho trovato era un po' più complessa rispetto all'anno precedente, infatti fin dall'inizio dalle due insegnanti di classe (una di ruolo e una supplente appena arrivata) mi è stato richiesto di dare il mio apporto. In questa situazione mi sono sentita più utile e mi sono resa conto di quanto sia difficile, ma importante, saper gestire le relazioni umane. Spesso mi è capitato di essere "utilizzata" per dare una mano ai bambini con difficoltà di apprendimento,

Il terzo anno di tirocinio prevedeva 30 ore di corso con la tutor universitaria, con una nuova tutor universitaria, la dott.ssa Balestri, visto che la professoressa Bellandi era andata in pensione, e 120 ore tra primaria e infanzia. Anche in questa occasione ho chiesto di cambiare classe e tutor scolastica; sono quindi approdata in una quarta, dove ho trovato una classe molto esuberante e propositiva. Con la tutor scolastica si è instaurato fin dall'inizio un rapporto di grande intesa e stima, mi sono sentita subito accolta come parte del team di insegnanti. Il clima instaurato con il gruppo classe è stato molto positivo e disteso, ho avuto la percezione netta che i bambini si sentissero

accolti e liberi di esprimersi. Grazie all'apertura dimostrata dalle tutor, ho potuto comprendere in profondità diversi aspetti della vita di classe, specialmente alcune situazioni problematiche, come il caso di una bambina con mutismo selettivo, per la quale è stato necessario operare in modo individualizzato.

In diverse occasioni ho partecipato attivamente alla didattica. Quando ho realizzato la mia prima lezione di storia, mi sono documentata ampiamente e ho preparato due mappe concettuali, di cui una facilitata per i bambini con difficoltà di apprendimento; sono stata letteralmente sommersa dalle domande di tutti, alcune delle quali erano così complesse che, con la tutor, abbiamo deciso di far svolgere una ricerca per approfondire l'argomento. Su richiesta della tutor, ho preparato la mia prima verifica scritta; ricordo ancora i dilemmi iniziali, il timore di non riuscire a calibrare la difficoltà del test sulle capacità reali dei bambini. Sono grata di quell'esperienza e di altre come quella avvenute successivamente, perché queste sono competenze che non si insegnano all'università, ma occorre viverle in prima persona avendo davanti una classe reale e considerando l'argomento appreso. Anche questo mi è stato utilissimo quando ho iniziato ad insegnare.

La quarta annualità di tirocinio ha conciso con la mia nomina in ruolo da concorso. Visto che col mio nuovo lavoro mi era più difficile assentarmi, ho dovuto chiedere di essere assegnata ad un corso di tirocinio indiretto che si svolgesse di sabato. Ho quindi cambiato un'altra volta tutor e gruppo, ma sono stata veramente fortunata per aver trovato una tutor e un gruppo splendidi ad accogliermi. Fin dalla mia iscrizione alla facoltà di Scienze della Formazione Primaria, avevo iniziato a prepararmi per i successivi concorsi. Ricordo che spesso, quando mi preparavo per un esame universitario, studiavo anche i testi facoltativi perché attinenti alle prove concorsuali. In un caso in particolare, ho chiesto di ripetere la frequenza di un laboratorio di didattica già frequentato e al quale avevo avuto la valutazione di 30/30, solo per prepararmi meglio sull'argomento. Il laboratorio in questione, gestito dal professor Calvani e dalla professoressa Menichetti, era complesso e richiedeva molto impegno. Eppure, dal mio punto di vista, era così formativo che ho voluto ripetere la preparazione perché la ritenevo un'occasione d'oro. In particolare, il laboratorio chiedeva non solo di preparare, ma anche di correggere gli elaborati altrui (progetti didattici). Ecco, ritengo che soprattutto la seconda parte abbia contribuito a formarmi uno spirito critico e riflessivo sulla parte metodologico didattica. Ancora oggi sono grata per la possibilità di aver frequentato nuovamente il corso. Ho avuto professori

molto validi e le materie di insegnamento mi hanno preparato per vincere entrambi i concorsi nella scuola pubblica (primaria e dell'infanzia), e anche il concorso nella scuola dell'infanzia comunale.

Dicevo, dunque, che l'ultimo anno di tirocinio l'ho svolto come docente di ruolo di una classe quarta primaria per le materie di italiano, arte e inglese; mi è inoltre stata assegnata un'altra classe per l'insegnamento della lingua inglese. Ancora una volta ho avuto la fortuna di essere assegnata ad una tutor eccezionale, che mi ha sempre incoraggiato e supportato, specialmente nei momenti più faticosi. È innegabile, infatti, che ci sono stati momenti di difficoltà e scoraggiamento, il compito che avevo davanti era arduo abbastanza per chiunque si fosse trovato alla prima supplenza, in aggiunta avevo il carico di due classi, il carico di lavoro dell'anno di prova e gli impegni universitari (esami e laboratori a frequenza obbligatoria). È stato un anno faticoso, ma anche soddisfacente, perché ho visto le mie classi crescere insieme a me, affrontare e superare tutta una serie di ostacoli, sia dal punto di vista dell'apprendimento che relazionali.

Un mio grande rammarico è quello di non essere stata selezionata per il Progetto Erasmus Traineeship, che mi avrebbe offerto la possibilità di fare il tirocinio alla scuola Europea di Bruxelles o alla scuola primaria Vic, in Catalogna, per le quali avevo fatto regolare domanda; ero l'unica candidata della selezione ad avere tutti i requisiti richiesti: certificazioni di lingua inglese, francese e spagnola, esami sostenuti nei tempi richiesti e con votazioni al di sopra della media. Quando ho fatto domanda, ho chiesto delucidazioni sul tirocinio, ponendo un dubbio circa una dicitura nel bando di concorso. In seguito alla mia richiesta, l'ufficio Erasmus dell'area di Scienze della Formazione si è reso conto di un errore procedurale da loro commesso, e ha ritirato il bando per poi ripubblicarlo successivamente, ma riservandolo a studenti di un'altra coorte rispetto alla mia. Al dispiacere di essere esclusa si è aggiunto il fatto che il bando è andato deserto, mentre per me si sarebbe trattato di cogliere un'occasione unica e irripetibile.

Un'occasione che invece ho potuto cogliere, che mi è tornata molto utile dopo la mia immissione in ruolo, è stata quella di partecipare al tirocinio eTwinning. Conoscere la piattaforma e partecipare a due progetti internazionali con le mie due quarte è stato molto formativo e utile, soprattutto sul piano interculturale. Le mie classi hanno avuto la possibilità di conoscere tanti compagni sparsi per l'Europa e di sentirsi vicini e simili. In particolare, il progetto *penpals* con una scuola in Turchia ha

contribuito a sfatare alcuni pregiudizi che i bambini avevano nei riguardi di una cultura islamica. Con piacere ho notato quanto sia stato arricchente per loro comprendere la bellezza e il fascino di questo Paese, grazie agli scambi di lettere e regalini con i ragazzi, alle foto e ai video che ci siamo mandati, alla gioia di conoscersi tramite la video conferenza. Anche il secondo progetto eTwinning ha coinvolto entrambe le classi quarte a me assegnate lo scorso anno. Si è trattato di un percorso interdisciplinare, che coinvolgeva le discipline di arte e inglese: gli alunni hanno realizzato cartoline di auguri natalizi, scritti in inglese, poi inviati a compagni di scuola sparsi per tutta l'Europa. Al contempo, anche le altre classi europee realizzavano lo stesso prodotto, che ci hanno spedito prima delle vacanze di Natale. Ho scoperto che in tutto l'istituto pochi insegnanti conoscono eTwinning, e pochissimi sono iscritti nella piattaforma, per cui credo che sia stato importante fare formazione all'università, fare iscrivere gli studenti in piattaforma e far loro provare a realizzare un progetto internazionale.

Se devo individuare i miei punti di forza, credo che siano la sensibilità personale e la capacità di affrontare situazioni particolari e momenti di criticità, la relazione comunicativa. Gradualmente sto imparando anche a gestire la progettazione degli interventi didattici, riuscendo ad "improvvisare" a seconda delle necessità. Non sempre è possibile, infatti, seguire il copione prefissato. I bambini, in questa fascia di età, hanno delle esigenze anche fisiche di cui bisogna tenere conto; ad esempio, la stanchezza.

Ho anche affinato la qualità dei miei feedback, piuttosto che esprimere generici "bravo, bene" (Orsi, 2017), ho imparato ad offrire commenti e spunti di riflessione personalizzati.


eTwinning
Christmas Cards Exchange

2. Effetti sulla persona

Questa esperienza è stata estremamente positiva e formativa, senza di essa non avrei saputo come rapportarmi e come iniziare il mio percorso lavorativo, quando mi sono state affidate due quarte. Grazie alle precedenti esperienze svolte proprio in una quarta primaria, ho utilizzato le competenze acquisite e gli esempi osservati, sia in termini relazionali, che metodologico-didattici. In particolare, l'ultimo anno di tirocinio effettuato in una quarta primaria, fortunatamente affiancavo una validissima insegnante di materie umanistiche, stesse materie che mi sono state assegnate per il mio anno di ruolo. Nessun testo scolastico e nessun insegnante può sostituire l'esperienza maturata in classe, l'osservazione di una giornata a scuola, con situazioni di vita reali, dove gli spazi e i tempi devono essere preorganizzati, in cui conta la relazione con ogni bambino e con il gruppo nel suo complesso, la definizione del contesto, gli infiniti perché, anche destabilizzanti, dei bambini, la loro sensibilità e fragilità, ma anche la loro forza e determinazione. Credo che il terzo anno di tirocinio abbia rappresentato per me un momento di svolta, soprattutto in termini di fiducia nelle mie possibilità.

Grazie alla maestra Adriana, che in seguito alla mia immissione in ruolo è diventata una collega, ho avuto la possibilità di muovere i miei primi passi nella classe come una "vera" insegnante. Lei, infatti, mi ha presentato ai bambini come una collega esperta di inglese, e non come una tirocinante. Questa situazione ha fatto sì che la classe mi considerasse come una loro maestra e si affidasse a me senza pregiudizi. Negli anni precedenti, infatti, avevo avuto la sensazione che gli alunni mi vedessero più come una di loro, nelle vesti di una studentessa che si trova lì per imparare, non per insegnare. Dunque, fin dai primi giorni, con molta naturalezza la tutor Adriana mi ha coinvolto nella lettura ad alta voce, attività che svolge tutte le mattine. Il libro che leggeva quell'anno alla classe è un classico della letteratura per l'infanzia, Pippi Calzelunghe, a mio parere un'ottima scelta anche dal punto di vista del tema della parità di genere. Avevo, in passato, letto per anni delle storie a bambini molto più piccoli (al nido d'infanzia), quindi sono abituata ad un modo di leggere teatrale e coinvolgente, quasi mimico, in cui la prossemica e l'uso delle immagini sono essenziali per far comprendere parole nuove. Ho, quindi, sfruttato la mia esperienza pregressa come educatrice e gli anni di recitazione con la mia compagnia teatrale per leggere in modo espressivo e coinvolgente. In questo modo, si è creato un legame

emotivo fin da subito e sono stata percepita come la "loro" maestra. La mia tutor mi ha coinvolta molto anche nell'insegnamento della lingua inglese e ho provato a parlare sempre in inglese con i bambini. All'inizio la difficoltà è stata quella di ricordarmi di scegliere le parole più semplici e, quando possibile, simili all'italiano ("elegant", "intelligent" o "error", al posto di "smart", "clever" o "mistake") e di preferire il tempo presente, in modo da ridurre le difficoltà di comprensione al minimo. Mi sono anche resa conto di parlare troppo velocemente e che spesso era necessario ripetere la frase, magari riformulandola; ho inoltre imparato a fermarmi per avere frequenti feedback dalla classe e assicurarmi di essere compresa.

Ho notato, in questi anni, che raramente si parla in inglese durante la lezione di lingua straniera, e quindi i bambini arrivano in classe quinta senza essere abituati all'ascolto. Questo determina, in alcuni casi, frustrazione e disagio quando vengono esposti alla lingua, perché vorrebbero capire tutte le parole e si sentono in difficoltà. Ciò avviene, a mio avviso, perché hanno visto l'inglese come una "materia" da studiare, mentre l'apprendimento dovrebbe essere naturale[61] e seguire lo stesso percorso con cui hanno imparato la loro lingua madre: il neonato è esposto alla lingua continuativamente, in modo ludico, la madre e il padre si rivolgono a lui come se capisse e aspettandosi una reazione; utilizzando il *motherese* creano un'interazione e un'intesa emotiva molto forte e di accettazione. Il bambino ascolta e in seguito ripete i suoni modulati con dei ritmi, con la musica, e successivamente risponde con gesti o movimenti. Quando è pronto, inizia a comunicare anche con parole o brevi frasi, e la reazione del *caregiver* è estasiata e incoraggiante. In nessun caso l'adulto corregge l'errore, che si correggerà da solo con il tempo.

Ancora oggi mi fermo spesso per rassicurare la classe e per spiegare loro che l'inglese si dovrebbe imparare come hanno imparato l'italiano: non è importante capire subito tutto, spesso basta afferrare una o due parole all'interno di una frase per intuire l'argomento. Non importano gli errori, l'importante è riuscire a comunicare. È OK essere approssimativi! Non tutti i discenti sono soddisfatti da questa modalità, perché, a seconda degli stili di apprendimento e delle diverse personalità, per qualcuno può sembrare caotico e si sentono confusi se non riescono a capire tutto. Mi viene in mente un bambino, in particolare, bravissimo nei compiti scritti, ma che

[61] http://www.sdkrashen.com/content/books/principles_and_practice.pdf

andava subito in crisi nella lezione orale, al punto da rifiutarsi anche di cantare insieme agli altri delle semplici canzoni.

Durante la pratica lavorativa, mi sono accorta che le aspettative della scuola e dei genitori concernono l'attuazione di un programma, di un libro di testo, con esercizi scritti di grammatica, per la preparazione delle prove Invalsi.

Sono molto grata anche per il percorso di tirocinio indiretto, che ha accompagnato tutto l'iter formativo. Negli anni sono stata assegnata a tre tutor diverse, quindi mi è mancata la possibilità di essere accompagnata nel percorso dalla stessa figura, ma questa discontinuità ha anche rappresentato un punto di forza, in quanto ho avuto modo di osservare il lavoro di persone molto preparate e valide, con sensibilità e personalità diverse, dalla quali ho appreso moltissimo. Soprattutto nell'ultimo anno, quando mi sono unita al terzo gruppo di tirocinio, ho sentito fin da subito accettazione e un senso di appartenenza, da parte di tutti. Il clima generale era molto disteso e accogliente, grazie alla straordinaria personalità della dott.ssa Innocenti Becchi, che si relazionava con tutti con molto rispetto e dolcezza. Come non contraccambiare? La immagino così anche quando insegna, autentica nel suo calore umano e, anche se non l'ho mai vista all'opera con i bambini, il suo esempio con noi studenti adulti mi ha insegnato molto più di tante insegnanti che ho osservato alla scuola primaria. Durante gli incontri, veniva sempre dedicato molto spazio per raccontare e commentare situazioni che succedevano durante il tirocinio diretto, in particolare in alcune occasioni sono emerse determinate dinamiche di classe e di sezione particolari e anche drammatiche, che alcuni dei miei compagni di corso hanno testimoniato. Devo ammettere che sarebbe stato molto difficile affrontare e discutere di questi temi se la nostra tutor non avesse precedentemente saputo creare l'ambiente emotivo adatto per far sentire tutto il gruppo accolto in un ambiente protetto. Forse è stato proprio durante gli incontri di tirocinio indiretto che ho potuto apprezzare quanto sia necessario curare la parte emotiva dell'insegnamento: se la tutor non avesse coltivato il rapporto con ciascuno di noi, forse alcuni non si sarebbero sentiti a proprio agio nel condividere e chiedere aiuto. È stato, in un certo senso, come immedesimarsi nel ruolo degli studenti di una classe di giovani studenti, in cui l'insegnante forma magicamente – col suo esempio e modo di essere - ponti e legami, fino a creare un gruppo, una forte coesione, un senso di appartenenza. Così vorrei essere io per la mia classe e per quelle che mi saranno affidate in futuro. Allo stesso tempo, spero di trovare nel mio percorso colleghe e colleghi con cui

condividere ansie e dubbi senza il timore di essere fraintesa o giudicata. Il contributo e il sostegno del team è fondamentale, specialmente nelle professioni di aiuto, dove lo stress e il rischio *burn out* possono essere presenti.

3. Valutazione della formazione conseguita

Credo che la maggior parte delle persone sia convinta che occorra una maggiore competenza per insegnare a studenti più grandi di età, perché i programmi sono più approfonditi. Fin dall'inizio del mio percorso universitario ho avuto la sensazione che, al contrario, occorra molta preparazione e competenza non solo disciplinare, ma anche psicologica e metodologico didattica per insegnare a bambini piccoli. È, infatti, essenziale padroneggiare i contenuti disciplinari talmente bene da riuscire a semplificare e rendere accessibile il sapere a livelli diversi (la crescita da 6 a 11 anni passa attraverso diverse fasi di sviluppo), senza trascurare l'emotività, gli stili di apprendimento e il vissuto di ogni alunno. La relazione affettiva con l'insegnante e il giusto clima di classe sono determinanti per l'apprendimento, e non si può mai prescindere da esse, specialmente per quanto riguarda bambini così piccoli.
Questa facoltà ha strutturato un piano di studi molto rigido, per cui è possibile solo un esame a scelta; pur concordando con l'esigenza di una formazione completa sul piano della conoscenza disciplinare, metodologico didattica e psicologica, avrei preferito avere più libertà in merito alla scelta di alcuni esami. La maggior parte degli esami che ho sostenuto aveva un programma ben strutturato e ne ho apprezzato gli insegnamenti, in particolare quelli di storia, linguistica e didattica. Per quanto riguarda esami di cultura scientifica, come matematica, fisica e chimica, concordo con il fatto che per migliorare le competenze STEM degli allievi (vedi risultati OCSE-PISA[62]) sia necessario migliorare quelle dei loro insegnanti. Devo tuttavia evidenziare il fatto che le competenze di partenza degli studenti universitari sono molto diverse (per chi proviene dal liceo scientifico, si tratta praticamente di un ripasso del programma già studiato, mentre per chi ha una maturità di tipo umanistico sarebbe necessario un programma propedeutico, che spieghi la disciplina dalle basi), ma non ne viene tenuto conto. Infatti, all'università avviene esattamente

[62] https://www.oecd.org/pisa/

il contrario di ciò che viene richiesto a noi in qualità di maestri: conoscere la situazione iniziale di ogni alunno e partire dalle loro preconoscenze. Inoltre, il programma dei suddetti esami ha poca attinenza con ciò che andremo ad insegnare, quindi, pur concordando con il fatto che "per insegnare uno bisogna sapere cento", forse alcuni aspetti andrebbero rivisti e resi più vicini alle esigenze formative dei futuri docenti. Per fare un esempio, ho trovato più utile e coinvolgente lo studio per l'esame di storia e didattica della matematica (per il quale trovo molteplici riscontri nella pratica in classe) piuttosto che l'esame di matematica per la formazione di base, il cui programma prevedeva lo studio di integrali e derivate. Ancora, per quanto riguarda l'esame di fisica, ho trovato molto utile la parte di astronomia, che potrebbe essere ampliata rispetto al resto del programma.

Anche per quanto riguarda gli esami di inglese, le competenze in entrata dei singoli studenti iscritti a questa facoltà variano notevolmente. Considerando che il livello di uscita da una scuola secondaria di secondo grado dovrebbe corrispondere ad un B2, il livello degli esami di inglese in questa facoltà è fin troppo basso. Ma la realtà in Italia è ben diversa, in quanto pochi studenti escono dalla maturità con una reale competenza B2; quindi, a mio parere, occorrerebbero corsi differenziati per livello di competenza. Il Centro Linguistico di Ateneo (CLA) offre dei corsi con insegnanti madrelingua, di grande qualità, ad un costo molto vantaggioso. Me ne sono avvalsa in passato, e posso confermare che sono di ottimo livello, anche per il basso numero di studenti per classe. Sarebbe sufficiente richiedere la frequenza di questi corsi a chi è sprovvisto di una certificazione di lingua inglese rilasciata da un ente riconosciuto dal MIUR.

Come già accennato, alcuni laboratori sono stati particolarmente utili per accrescere le mie competenze didattiche e relazionali, il lavoro e il confronto tra gruppi affina le capacità sociali tanto essenziali nella professione. Una riflessione critica che potrei esprimere è quella che, come elaborato finale, molto spesso viene chiesta la stesura di un progetto didattico. Ebbene, nella pratica didattica ho verificato che difficilmente si lavora per progetti come quelli elaborati nei gruppi di laboratorio universitario. Noto un certo scollamento dall'insegnamento reale, specialmente per quanto concerne la parte valutativa, per cui ancora una volta il tirocinio diretto si dimostra essenziale per comprendere la realtà scolastica. Per questo motivo, credo che sarebbe opportuno che i docenti di laboratorio fossero tutti insegnanti di scuola

primaria, o che abbiamo avuto una consolidata esperienza di insegnamento nella scuola primaria.

Gli esami di didattica e pedagogia sono stati molto utili per la mia preparazione, unitamente agli incontri di tirocinio diretto, in cui l'osservazione di un tutor esperto, in una situazione didattica, permette il confronto con le più recenti teorie psicopedagogiche. Inoltre, gli incontri di tirocinio indiretto hanno permesso la riflessione collettiva e anche la critica su determinati aspetti osservati.

Sicuramente ho dovuto imparare a fermarmi spesso per raccogliere le domande dei bambini e assicurarmi che tutti avessero compreso. Il complimento migliore l'ho ricevuto da una alunna, quando mi ha detto "io mi trovo meglio a studiare con il tuo metodo". Mi sono resa cono che in realtà non avevo mai esplicitamente illustrato alla classe un metodo di lavoro, ma – per lo meno alcuni di loro – lo avevano compreso e interiorizzato. Cerco sempre di presentare un argomento sotto diverse angolazioni, tenendo conto dei diversi stili di apprendimento, in modo da includere tutti e permettere la riflessione metacognitiva.

La gestione della classe è certamente un aspetto in cui è essenziale esperire la situazione reale. Nessun testo universitario può sostituire la realtà scolastica, per cui ritengo che le numerose ore svolte di tirocinio sono state fondamentali per acquisire le basi di partenza per imparare a guidare la classe. Forse il tirocinio diretto potrebbe essere istituito fin dal primo anno di frequenza universitaria, in modo che le ore possano aumentare. La gestione della classe è una tematica importante, che in genere crea qualche ansia e difficoltà nei primi anni di insegnamento. Ricordo che durante il mio anno di prova, uno dei corsi obbligatori di formazione verteva proprio su questo argomento. Ma più che un corso, credo che sia l'esperienza ad aiutare in questo senso. Con gli anni si imparano tanti trucchi del mestiere, per creare un buon clima di collaborazione nella classe, ottenere l'attenzione e catturare l'interesse dei bambini. Posso già notare un cambiamento notevole nella mia capacità di gestire le diverse situazioni, solo con due anni di insegnamento alle spalle. Eppure, in questi due anni sono accadute cose che non avrei pensato di affrontare: una classe che scoppia in lacrime durante la lezione, poche settimane dal mio arrivo, al ricordo della loro maestra venuta a mancare l'anno precedente; un rapporto conflittuale tra due compagni di classe che rasenta il bullismo; la morte della mamma di un'alunna.

4. Scuola dell'infanzia e scuola primaria

Nella scuola dell'infanzia, sezione dei tre anni, ho proposto un percorso dal titolo "Emozioni in gioco". Mi ero procurata alcuni libri per questa fascia di età in biblioteca, sul tema delle emozioni, tra cui "Il litigio", di Claude Boujon (2014), che ha catturato particolarmente l'interesse dei bambini e sul quale ho quindi scelto di sviluppare l'attività. Due conigli, vicini di tana, iniziano a litigare per questioni di poco conto. Quando una volpe cerca di catturarli, imparano presto l'importanza dell'amicizia e della solidarietà.

Ho preparato il setting scegliendo un momento tranquillo, dopo la *routine* della colazione. Seduti in cerchio, nell'angolo morbido della sezione, ho introdotto l'argomento chiedendo di ricordare dei momenti, a casa o a scuola, in cui ci sentiamo sorpresi, tristi, allegri, arrabbiati, sorpresi, impauriti. Per ogni emozione ho incoraggiato a descrivere con le espressioni facciali e con il corpo e indovinare a turno le diverse emozioni mimate dai compagni, associandole a diverse esperienze quotidiane. Successivamente ho iniziato la lettura animata del libro "Il litigio" e poi ho proposto una seconda lettura in cui i bambini, avendo familiarizzato con la storia, erano chiamati ad aiutare la narrazione in prima persona, indicando le illustrazioni, nominando i personaggi, mimando le espressioni del viso e riconoscendone le emozioni primarie.

Nella seconda fase del progetto ho invogliato i bambini a cimentarsi con la pasta di sale colorata (preparata al momento insieme a loro) per creare i personaggi della storia, scegliendo liberamente diversi colori a disposizione. Al termine dell'attività ho concluso con una riflessione in *circle time* sulle emozioni che proviamo quotidianamente, in particolare quelle legate ai piccoli conflitti tra i bambini. Questa parte finale ha avuto anche la funzione di verifica orale, attraverso la ricostruzione collettiva della storia: abbiamo sfogliato insieme le pagine e ho registrato i commenti e le esclamazioni dei bambini, per verificare la comprensione della storia e il riconoscimento delle emozioni.

Della scuola primaria, invece, mi piacerebbe raccontare il percorso di prevenzione e contrasto al bullismo che si è svolto durante lo scorso anno in tutte le classi quarte primarie e le classi seconde della secondaria di primo grado dell'istituto comprensivo nel quale lavoro. Il nostro istituto ha, infatti, aderito ad un progetto di ampio respiro,

denominato KiVa[63]. Si tratta di un programma Evidence-Based ideato in Finlandia, che prevede una specifica formazione e un monitoraggio costante da parte dell'associazione Ebico Onlus che lo diffonde in Italia. Snodandosi attraverso dieci lezioni, l'obiettivo del percorso è stato quello di creare consapevolezza riguardo al tema del bullismo e migliorare le abilità sociali, raggiungendo una maggiore coesione e collaborazione all'interno del gruppo classe.

Vorrei descrivere un'attività avvenuta durante la sesta lezione KiVa. Insieme con la mia collega di classe ho predisposto in una zona delle sedie, radunate in modo da rappresentare dei bambini in ruoli diversi durante una situazione di bullismo. Ad esempio, una sedia rovesciata per terra rappresenta la vittima del bullismo. Due o tre sedie, una sopra l'altra, simboleggiano il gruppetto formato dal bullo e dai suoi assistenti. Alcune sedie in semicerchio rispecchiano il gruppo dei sostenitori. A una certa distanza, il gruppo di sedie degli osservatori.

Abbiamo fatto avvicinare i bambini, facendoci aiutare nella disposizione delle sedie, dopo averne spiegato il significato. Tutti hanno voluto collaborare attivamente. In questo modo, abbiamo reso visibili le relazioni interpersonali, le emozioni e le dinamiche di potere all'interno di un gruppo. Dopo aver osservato tutti insieme in silenzio la scena, abbiamo chiesto ad ognuno di sedersi in posti diversi o sdraiarsi accanto alla sedia rovesciata, per provare a calarsi in alcuni dei ruoli descritti. Lo scopo dell'attività è stato quello di condividere il vissuto emotivo di ciascuno, a seconda della sedia che occupava. Successivamente abbiamo chiesto ai bambini di aggiungere qualche sedia per rappresentare il ruolo dei difensori della vittima e provare a sedersi anche lì. Alcune domande guida hanno aiutato la riflessione: come potrebbe cambiare il ruolo della vittima dopo l'arrivo dei difensori? Che effetto ha il loro arrivo sul clima della scena? Il bullo sembra meno pericoloso ora? Il dialogo e il confronto di opinioni che ne sono scaturiti hanno portato a considerazioni profonde e sensate da parte degli allievi.

Le lezioni KiVa sono proseguite e terminate nei mesi successivi, e apparentemente non sembrava cambiato niente all'interno della classe, ma la realtà ha dimostrato che il seme piantato stava germogliando. Forse, il momento più emozionante è stato quando, verso la fine dell'anno, sono riuscita a gestire insieme alla classe una

[63] www.kivaprogram.net/it/

situazione molto difficile creatasi tra due compagni: D., un bambino che aveva da lungo tempo preso di mira K., una bambina di origine pakistana, con difficoltà di accettazione da parte della classe. In quel particolare frangente, D. le aveva passato un biglietto scritto in inglese, “I kill you, K.”. Dopo i primi momenti di pianto disperato da una parte, e astio mascherato da deliberata indifferenza dall’altra, ho chiesto aiuto alla classe per la risoluzione del conflitto. Ho ricordato loro che lo stesso D., quando si era unito alla classe in seconda, era stato escluso e deriso da diversi bambini e questo dolore, ancora presente, faceva scaturire rabbia e desiderio di rivalsa. A queste parole, D. ha cominciato a tremare e a piangere convulsamente, mentre alcuni bambini, dopo aver confessato di averlo schernito in passato, andavano a chiedergli perdono e a consolarlo. Si è verificato un *break-through* massivo e collettivo, in cui vittima e bullo si sono chiesti reciprocamente scusa e perdonati a vicenda per episodi che affondavano nel passato. La parte più emozionante è avvenuta nel momento in cui tutti i bambini hanno cercato un modo per contribuire alla pacificazione, con trasporto e profonda empatia. In quel momento, ho compreso che il percorso svolto durante l’anno era stato interiorizzato e aveva dato i suoi frutti.
Successivamente ho avuto la fortunata occasione di conoscere e confrontarmi con gli stessi ideatori del progetto. Quando, infatti, una delegazione di ricercatori dell’università di Turku (Finlandia) è venuta in visita a Prato, ho considerato un onore il fatto che venissero a vedere proprio il nostro istituto e mi sono offerta di ospitarli nella mia classe per mostrare loro lo svolgimento di una lezione KiVa in una scuola italiana. Il giorno della visita eravamo tutti molto emozionati, i bambini *in primis*, ma poi ci siamo trovati davanti ai ricercatori: due donne giovanissime e molto alla mano, che hanno osservato attentamente la lezione, aiutate da un’interprete che era con loro. Sono rimaste molto sorprese dalla capacità della classe di riflettere e dibattere sul tema del bullismo - oltre al fatto che un gruppo di bambine aveva spontaneamente inscenato una recita sul tema - e hanno dato un riscontro molto positivo.

5. Suggerimento a un compagno

Considerando la mia positiva esperienza, consiglierei senz’altro l’opzione di cambiare istituto comprensivo ogni anno per il tirocinio, o per lo meno cambiare il

plesso, al fine di farsi un'idea complessiva più ampia dell'insegnamento, degli stili didattici e dei diversi panorami scolastici. Facendo così, ho infatti scoperto che sono possibili tante scelte da compiere in ambito educativo, non esiste una sola strada giusta. Il rischio di osservare un'unica docente e un unico ambiente scolastico è quello di ricevere una sorta di imprinting, secondo cui si potrebbe continuare a replicare un unico modello che, per quanto possa essere valido, non potrà sempre essere la giusta opzione nei diversi contesti. Comprendo che se si è trovato un luogo familiare, accogliente, specialmente se si è instaurato un ottimo rapporto con la classe e la tutor scolastica, è forte la paura di cambiare e finire in un ambiente non all'altezza, ma nella vita professionale sarà necessario avere molto spirito di adattamento, soprattutto nel periodo delle supplenze. L'apertura mentale deve essere sempre prerogativa di chi vuole imparare, e anche di chi si accinge ad insegnare.

Di conseguenza, suggerirei di vivere con fiducia questa importante esperienza, senza perdere la fiducia nel caso ci si trovi davanti ad un docente poco motivato o poco inclusivo. È una situazione che può capitare, dalla quale si possono comunque trarre buoni insegnamenti, cercando sempre il confronto e la riflessione con i compagni e la tutor universitaria. A volte sono proprio le esperienze negative a farci crescere e comprendere meglio cosa significhi diventare un buon insegnante.

Sottolineerei dunque l'importanza degli incontri di tirocinio indiretto, del rapporto di fiducia da costruire con la propria tutor universitaria, alla quale rivolgersi per qualsiasi tipo di dubbio o perplessità, soprattutto nel caso in cui si presentino problemi con la tutor scolastica.

Infine, consiglierei a chi intraprende questo percorso di avere curiosità, di fare domande, di entrare a scuola con spirito di osservazione, per cogliere le tante sfumature di questa professione, per capire veramente cosa significhi essere un maestro. Potrebbe essere utile tenere una sorta di diario di bordo, sul quale segnare gli avvenimenti più significativi e ciò che si apprende giorno per giorno: potrebbe essere un buon modo di imparare ad utilizzare i vari tipi di tecniche di osservazione, così importanti nella professione di docente. È un mestiere che non si finisce mai di imparare, se si ha l'umiltà di riconoscere i propri limiti e lavorare su di essi.

6. Esprimi una valutazione complessiva sul tirocinio

Indubbiamente l'esperienza è più che positiva, direi necessaria per questo corso di studi. Credo, anzi, che varrebbe la pena iniziare il tirocinio fin dal primo anno, e pianificare il percorso in modo tale da osservare ogni anno una classe diversa della scuola primaria, dalla prima alla quinta. Si potrebbe, quindi, rendere obbligatorio il tirocinio in tutte le cinque classi, così da avere una visione complessiva del percorso scolastico. Un'altra modifica che apporterei sarebbe quella di dare la possibilità, per quanto riguarda la scuola primaria, di avere entrambi i docenti di classe come tutor. In questo modo, si avrebbe la possibilità di raddoppiare le occasioni di osservare sia l'insegnamento di discipline di area umanistica, che scientifica, e non si verificherebbero problemi di incompatibilità di orario per gli studenti lavoratori. Per quanto riguarda la mia personale esperienza di studentessa lavoratrice, infatti, ho avuto qualche difficoltà a sincronizzare il mio orario di tirocinio con quello lavorativo (ero dipendente comunale con un contratto di 36 ore settimanali).

VALUTAZIONE ANALITICA

7. Rapporti con la scuola

Ho avuto poche occasioni di partecipare ad incontri collegiali, dal momento che durante i primi anni non era un'attività prevista, e in seguito ho avuto la sensazione che non fosse gradito avere ospiti all'interno degli incontri collegiali. Invece, ho avuto il privilegio di partecipare ad alcuni incontri di programmazione, a corsi di formazione sulla metodologia CLIL e su un programma di prevenzione e contrasto al bullismo, KiVa. L'ultimo anno di tirocinio, essendo contemporaneamente anche il mio primo anno di ruolo, ho ovviamente partecipato a tutti gli incontri collegiali previsti, gestito i colloqui individuali con le famiglie e le assemblee di classe. Mi è anche capitato di essere presente in classe quando è stato chiamato lo psicologo della scuola per osservare la situazione relazionale in classe, e in particolar modo, la bambina con mutismo selettivo. È un'opportunità offerta dall'istituto per supportare le insegnanti in presenza di situazioni in cui appoggiarsi al consulto di un

professionista. Lo psicologo ha anche uno sportello di ascolto presso la sede principale dell'istituto.

Personalmente ritengo che sarebbero da privilegiare occasioni di programmazione delle attività con la propria tutor scolastica, in modo da intensificare il coinvolgimento del tirocinante nell'insegnamento delle discipline e nella comprensione di varie dinamiche di classe.

Credo, infine, che sarebbe molto utile partecipare alla pianificazione di un test di valutazione da somministrare alla classe al fine di un apprendimento. Personalmente, sono stata incoraggiata dalla mia tutor a preparare un'attività di storia da presentare alla classe e, in seguito, a costruire un test di valutazione dell'apprendimento. Questo compito, solo all'apparenza facile, mi ha fatto comprendere la complessità del momento valutativo, a cominciare dalla differenziazione della prova per alunni con difficoltà di apprendimento. Inoltre, è stato necessario riflettere sulla difficoltà di garantire una valutazione oggettiva e formativa, in grado di rendere consapevoli gli allievi dei loro progressi, ma allo stesso tempo evitare che diano troppa importanza ad un voto numerico, il quale non può raccontare, né riassumere l'impegno, le differenze di ciascuno, le sfide affrontate e il vissuto personale di ognuno.

8. Fase documentativa

Durante questi cinque anni di formazione universitaria, e soprattutto grazie alla preparazione per i concorsi per l'insegnamento, ho acquisito sempre maggiore familiarità con la normativa scolastica e con i principali paradigmi psicopedagogici, attraverso libri di testo, ricerca bibliografica per esami e laboratori, articoli scientifici. Un documento di imprescindibile importanza è costituito dalle Indicazioni Nazionali per il curricolo della scuola dell'infanzia e del primo ciclo d'istruzione, redatte nel 2012, e il loro aggiornamento del 2018[64]. Superata la concezione di programma ministeriale, le Indicazioni offrono una traccia operativa, un quadro di riferimento per le istituzioni scolastiche. Perseguono gli "obiettivi generali, gli obiettivi di apprendimento e i relativi traguardi per lo sviluppo delle competenze dei bambini e dei ragazzi per ciascuna disciplina o campo di esperienza […] Sono un

[64] www.indicazioninazionali.it/wp-content/uploads/2018/08/Indicazioni-nazionali-e-nuovi-scenari.pdf

testo aperto, che la comunità professionale è chiamata ad assumere e contestualizzare"[65]. In esse viene anche riportata e commentata la definizione ufficiale delle competenze-chiave per l'apprendimento permanente, elaborate dal Parlamento europeo e dal Consiglio dell'Unione europea del 2006.

All'interno del documento si possono trovare tutte le tematiche centrali del pensiero pedagogico contemporaneo: la centralità dello studente e il suo diritto costituzionale all'apprendimento; la valorizzazione e il sostegno di ogni forma di diversità, disabilità o svantaggio, nonché delle identità e radici culturali di ciascuno; il perseguimento di una cittadinanza europea; la personalizzazione e individualizzazione dei percorsi di apprendimento; la formazione verticale (life long learning) e orizzontale (corresponsabilità educativa con la famiglia e raccordo con le altre agenzie formative extrascolastiche presenti sul territorio); il diritto all'orientamento e ad una valutazione trasparente ed equa; il processo di autonomia scolastica; l'interdisciplinarietà del sapere e l'uso consapevole dell'ambiente di apprendimento.

Per quanto riguarda la parte normativa, il grosso della mia preparazione è dovuto al lavoro di ricerca per la preparazione al concorso magistrale, per cui ho reperito le leggi più recenti in materia di inclusione scolastica, disabilità e bisogni educativi speciali, valutazione, alunni di origine straniera, e altro ancora. Lo studio dei testi normativi e dei loro commenti mi è stato molto utile non solo in classe, ma anche per una comprensione più approfondita delle scelte che si operano ad esempio nella stesura del Piano triennale dell'offerta formativa, del Piano di Miglioramento e del Rapporto di Autovalutazione. L'esame di diritto, sostenuto durante il quinto anno, purtroppo verteva unicamente sul diritto amministrativo, a mio avviso sarebbe auspicabile, invece, una preparazione più incentrata sulla legislazione scolastica e le avvertenze generali, diritti e doveri del lavoratore dipendente, in particolare nella scuola. Ho appreso con piacere la notizia che dal prossimo anno l'esame sarà incentrato sulla legislazione scolastica.

[65] http://www.indicazioninazionali.it/2018/08/26/indicazioni-2012/

9. Strumenti utilizzati

Ho imparato durante il tirocinio ad utilizzare la LIM, ma ho dovuto aspettare il terzo anno perché negli anni precedenti le classi non erano attrezzate con questo strumento. Anche la docente da cui ho imparato l'uso non se ne serviva spesso, ma non trovo che sia una mancanza, visto che venivano privilegiati il dialogo e il confronto, il lavoro a gruppi e la produzione di artefatti significativi per l'apprendimento (ad esempio, invece di vedere un video sulla scrittura degli Assiri, l'insegnante ha proposto un'attività con la creta e bacchette di legno per imparare in modo esperienziale la scrittura cuneiforme).
Uno strumento che invece mi sarebbe stato utile imparare da una collega durante il tirocinio sarebbero stati software, applicazioni e programmi specifici per bambini con difficoltà di apprendimento, ad esempio con DSA.
Durante l'ultimo anno di tirocinio indiretto ho imparato a conoscere e creare mappe mentali e concettuali, strumenti di grande importanza didattica per tutti gli alunni, in particolare per quelli con difficoltà di apprendimento. Inizialmente, trovavo online delle mappe già pronte con le quali mi aiutavo nella spiegazione di un nuovo argomento nelle classi in cui svolgevo tirocinio.
Oggi, nella classe con cui lavoro, creo insieme ai bambini le mappe e in seguito, dopo che hanno familiarizzato con il concetto di mappa e con l'argomento, li divido in piccoli gruppi e faccio costruire loro una mappa, arricchendola con disegni.
Come già detto in precedenza, durante il tirocinio ho imparato a costruire un test di valutazione, ritengo che sarebbe utile per un tirocinante partecipare anche alla somministrazione e tabulazione delle prove di curricolo e delle prove Invalsi.

10. Aspetti metodologici e comunicativi

Relativamente all'esperienza svolta presso la scuola dell'infanzia, solo durante il primo anno ho osservato due maestre di sezione con un'impostazione metodologica direttiva e uno stile relazionale distaccato, poco attento alle esigenze dei bambini. Per fare un esempio evidente, le attività di pittura erano gestite in modo tale che solo un bambino alla volta si doveva avvicinare al tavolo, sotto la guida dell'insegnante, e colorare rapidamente una scheda prestampata del colore "giusto" all'interno del

riquadro stabilito. Non veniva neanche concessa la possibilità di immergere il pennello nella tempera, di miscelare il colore o risciacquarlo. Il foglio veniva subito messo ad asciugare e si passava al bambino seguente. Il risultato di questa operazione era, come ci si potrebbe aspettare, una produzione seriale di prodotti pressoché identici tra loro e banali. Ma soprattutto veniva negata la libertà di espressione e l'autonomia personale.

In più di una occasione mi sono sentita lontana dall'agire professionale osservato. Il confronto con la mia precedente esperienza lavorativa nei nidi d'infanzia comunali fiorentini mi suggeriva la necessità di un rapporto più umano e un approccio più calato verso la centralità del bambino. Questo concetto implica un profondo rispetto della sua individualità e dei suoi tempi di apprendimento, con l'obiettivo di lasciare libero ognuno di sperimentare a suo piacimento con colori, suoni, materiale grezzo, non strutturato, per favorire il piacere della scoperta e dell'invenzione. Solo per fare un paragone, al nido si va a piccoli gruppi in una stanza attrezzata, l'atelier, in cui tutto è predisposto per manipolare, setacciare, impastare, colorare. Ad esempio, si fa pittura a dita, con rulli, spugne, timbri, pennelli; si colora su muro, su oggetti reali e tridimensionali; i colori sono scelti e miscelati dagli stessi bambini, che, come ultima fase dell'attività, rimettono a posto autonomamente, dopo aver lavato bicchieri e strumenti. Non esistono schede da colorare in serie, i bambini sono liberi di scegliere cosa e quanto fare, senza vincoli tranne quello della loro fantasia.

Rilevare queste criticità e differenze è stato prezioso, in quanto ha offerto riflessioni con i colleghi di studio, per comprendere e confrontare diversi metodi didattici e modalità relazionali, soprattutto nello scambio di opinioni con il gruppo di tirocinio indiretto, sapientemente gestito dalla mia prima tutor, dott.ssa Bellandi.

Abbiamo riflettuto e commentato insieme riguardo alla grande differenza tra nidi e scuole dell'infanzia che ho frequentato, dal momento che mi interrogavo sui motivi che generano una vera e propria regressione nell'autonomia e nella ricchezza delle esperienze, invece di un avanzamento. Senza dubbio gioca un ruolo importante il rapporto numerico adulto/bambino. Nei nidi d'infanzia, infatti, per le attività di metà mattina, si formano piccoli gruppi da 4-6 bambini, in modo tale che i tempi siano dilatati, gli spazi contenitivi e le possibilità di sperimentare e creare in tranquillità al massimo. Per contro, nella scuola dell'infanzia, l'insegnante è solo con 25 bambini, e le ore di compresenza sono ridotte al momento del pranzo, quando in realtà non

sarebbero neanche necessarie, vista la presenza degli operatori scolastici. Dunque, risulta un'impresa difficile offrire a ciascun bambino la possibilità offerta in un nido.
Fortunatamente, si è trattato dell'unica esperienza negativa in tutto il percorso di tirocinio. Negli anni successivi, ho affiancato maestre "sufficientemente buone" (secondo l'accezione che ne dà Winnicot), che hanno creato un clima sereno, fatto di cura e rispetto (Federighi, Boffo, 2014), in cui i bambini potevano sperimentare nel rispetto dei loro ritmi di crescita, relazionarsi tra di loro e con gli adulti, e crescere nell'autonomia personale.
Nei primi due anni di tirocinio, le tutor della scuola primaria che ho affiancato utilizzavano una metodologia di insegnamento prevalentemente di lezione frontale, alternata alla lezione dialogica e partecipativa. Mentre per quanto riguarda l'ultimo anno, sia per quanto riguarda la scuola dell'infanzia che per la primaria, ho osservato anche modalità relazionali e metodologiche più in linea con il pensiero pedagogico contemporaneo, quali la lezione dialogica, il cooperative learning, il peer tutoring.

11. Alunni con bisogni educativi speciali (BES)

Come previsto dal regolamento di tirocinio, dal terzo anno si deve scegliere una classe o una sezione in cui siano presenti alunni con BES. Nella classe della scuola primaria era presente un'alunna con mutismo selettivo e un alunno con sindrome dello spettro autistico.
La bambina, di origine cinese con mutismo selettivo, proveniva da un'altra scuola ed era stata derisa per la sua pronuncia di alcune parole italiane; forse lo sgradito scherzo era diventato troppo pesante da sopportare, forse altre dinamiche erano entrate in gioco, come conseguenza lei aveva smesso completamente di parlare a scuola. Era stato quindi deciso il trasferimento in questo plesso. Trascorreva la giornata scolastica assumendo un atteggiamento impassibile, ma attento, seduta immobile al suo banco anche durante la ricreazione. Il pomeriggio dopo le 4 e mezza, varcati i cancelli scolastici, A. riprendeva a parlare in cinese e a relazionarsi normalmente con la sua famiglia. Durante le attività che ho progettato, ho utilizzato degli *escamotage* per rendere inclusiva ed efficace la lezione, ad esempio il gioco della morra cinese "Rock, paper, scissors" per cui A. poteva partecipare giocando a

coppie, anche senza utilizzare il linguaggio vocale. Oppure, per le attività in palestra, il Total Physical Response[66].

In classe era presente anche S., un bambino con sindrome dello spettro autistico a basso funzionamento. Ho imparato molto osservandolo in classe con la sua insegnante di sostegno, una collega molto preparata che ricopre il ruolo di funzione strumentale per l'area BES. Le sue mansioni comprendono il coordinamento del dipartimento H dell'istituto e la redazione del Piano annuale dell'inclusività. La docente aveva predisposto un laboratorio per S., secondo il quale il bambino partecipava alla vita di classe pur seguendo un percorso individualizzato, per l'apprendimento della lettura. Il posto di S. era in un banco disposto ad isola insieme ad altri due compagni e la sua insegnante. Ogni giorno, al momento della ricreazione, per un'ora circa, la collega predisponeva un percorso ludico motorio in palestra, sfruttando parte della ricreazione e parte dell'orario di lezione, in modo tale da coinvolgere sempre un piccolo gruppo di alunni, a rotazione, per "giocare" con S. Tutti i compagni di classe erano sempre molto contenti di partecipare, e in questo modo si evitava di portare fuori da solo il bambino per lo svolgimento di attività specifiche a lui dedicate, come ho invece visto fare in altre scuole.

12. Progetti e interventi didattici MARC

L'esperienza MARC[67] è stata molto positiva e soddisfacente, anche se ha rappresentato un compito sfidante. La classe in cui ho girato il video MARC era entusiasta di essere ripresa e tutti i genitori hanno dato il permesso scritto per i video, inoltre l'insegnante ha usato il device che le ho dato per filmarmi con sufficiente competenza, quindi, anche dal punto di vista tecnico (luce, inquadrature, audio) non si sono presentati problemi.

Quando ho deciso l'attività che avrei registrato si è presentato subito un interrogativo, riguardante i criteri di valutazione che richiedevano un cospicuo intervento verbale (richiedeva di introdurre l'argomento con i bambini, attivare le preconoscenze, presentare le informazioni in modo problematizzante eccetera). Io,

[66] http://research.iaun.ac.ir/pd/shafiee-nahrkhalaji/pdfs/UploadFile_5989.pdf

[67] http://www.qualitaformazionemaestri.it/index.php/tirocinio/marc

invece, avevo deciso di utilizzare al minimo il *Teacher Talking Time*, privilegiando lo *Student Talking Time*[68], la teatralità, il *Total Physical Response*. Infatti, avendo deciso di fare una lezione utilizzando unicamente la lingua inglese e il linguaggio non verbale, parlare troppo avrebbe creato un'inevitabile incomprensione in quella fascia di età. La mia intenzione era quindi di iniziare la lezione, mettendo subito la classe in grado di usare i nuovi vocaboli e di agire in situazione. Temevo di svolgere un'attività che non avrebbe seguito i parametri richiesti, e di essere penalizzata nella valutazione del prodotto realizzato.

Mi sono dunque rivolta alla mia tutor universitaria, dottoressa Balestri, e alla mia docente di inglese, professoressa Mancini, per chiedere un loro parere in merito. Entrambe hanno sostenuto la mia ipotesi di lavoro e mi hanno incoraggiato a osare, a percorrere una nuova strada, che poi si è dimostrata molto emozionante. Credo che la realizzazione del video MARC abbia rappresentato il compito più complesso all'interno del percorso di tirocinio, ma anche il più soddisfacente. Il motivo della difficoltà, credo, risiede nel fatto che fosse la prima volta in cui mi veniva richiesto di documentare con un video una mia performance professionale. Non è una modalità alla quale siamo abituati, credo, in Italia; nella scuola non ho mai osservato la pratica della videoregistrazione. Se non se ne comprendono le motivazioni può essere percepito in modo negativo, come uno strumento di giudizio della propria prestazione, per cui può intimidire il docente. L'insegnante forse è abituato a valutare, più che ad essere valutato. Ma, condividendo i termini e ponendosi in un'ottica scientifica, diventa spunto per il confronto e la crescita personale e professionale. Personalmente, ero un po' preoccupata per la mia performance. Quando mi sono rivista nel video ero molto soddisfatta del risultato, ma ho notato alcune cose che avrei potuto fare diversamente. Credo che il punto di forza del MARC risieda proprio in questo, nel poter riflettere anche a distanza di tempo sulla propria prestazione, rafforzando il pensiero metacognitivo.

Il risultato finale è stato sorprendente: i bambini, pur essendo alla prima esperienza di lezione *All in English*, si sono messi in gioco e sono entrati nel ruolo, complici la didattica ludica, l'imitazione di compagni più esperti, la voglia di recitare. Anche A., una bambina con mutismo selettivo, ha partecipato all'attività, muovendosi cautamente e facendosi guidare per mano da alcune compagne a cui avevo

[68] https://www.teachingenglish.org.uk/article/stt

precedentemente chiesto di coinvolgerla. Grazie al T.P.R. e alla recitazione mimica, ha probabilmente sentito di potersi esprimere in una modalità a lei congeniale, usando il linguaggio corporeo.

Concludendo, il percorso compiuto sulla strada dell'insegnamento, tra gli anni di tirocinio e i miei primi due anni come docente di ruolo, mi ha offerto la possibilità di osservare il lavoro di alcune valide docenti, i loro diversi stili educativi e relazionali. Di conseguenza ho potuto mettermi alla prova in prima persona, osare e tentare nuovi metodi e strategie didattiche, anche grazie all'appoggio delle tutor; il sostegno e la fiducia del mio dirigente scolastico, un professionista stimato e lungimirante, mi hanno permesso di realizzare iniziative innovative e sperimentali. Nel confronto con le colleghe e con i compagni universitari, giorno dopo giorno, unitamente alla pratica sul campo, ho gradualmente acquisito sicurezza, imparato l'importanza della relazione serena con i bambini, della fiducia e del rispetto reciproco, come basi fondamentali dell'educazione e dell'apprendimento.

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