ROBOTICS AND ARTIFICIAL INTELLIGENCE IN INCLUSIVE EDUCATION. A CASE STUDY WITH THE NARRATIVE APPROACH

ROBOTICA E INTELLIGENZA ARTIFICIALE NELL'EDUCAZIONE INCLUSIVA. UN CASO DI STUDIO CON L'APPROCCIO NARRATIVO

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ABSTRACT

AI is an emerging field, subject of a wide-ranging debate concerning the interdisciplinarity and the need for a pedagogical approach oriented towards the training of educational professionals on the issues and methods of new inclusive, ethical and transparent environments. The contribution reports on the most significant aspects related to the use of educational robotics in the context of a PCTO and inclusive pathways within framework agreements with other institutions.

L'IA è un settore emergente, oggetto di un ampio dibattito vertente sulla connessa interdisciplinarità e sulla necessità di un approccio pedagogico orientato alla formazione di professionalità educative sui temi e i metodi di nuovi ambienti inclusivi, etici e trasparenti.
Il contributo riporta gli aspetti più significativi connessi all'impiego della robotica educativa nell'ambito di un PCTO e di percorsi inclusivi nell'ambito di accordi quadro con altre istituzioni.

KEYWORDS
Educational robotics, artificial intelligence, digital education, inclusion, narrative didactic approach

Robotica educativa, intelligenza artificiale, educazione digitale, inclusione, approccio didattico narrativo

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1. Artificial Intelligence and education in national and international strategic perspective[1]

"Artificial intelligence (AI) - i.e. digital models, algorithms and technologies that reproduce perception, reasoning, interaction and learning - nowadays has matured to the point of being a central factor in the digital transformation of society". This important observation is shared in the document «Strategic Programme for Artificial Intelligence (AI) 2022-2024", result of the joint work of the Ministry for Universities and Research, the Ministry for Economic Development, and the Ministry for Technological Innovation and Digital Transition. This paper confirms the broad pervasiveness of the debate on AI, an acronym that today identifies an extremely complex world that is deeply integrated with our society.

Frequently, national and international documents refer to education as a necessity, a need, and a fundamental right to actively participate in and consciously lead the transformations of our time, identifying the course for a governance of processes concerning AI.

Educating to AI and with AI is not simply a technological activity: it is a complex didactic approach that requires a careful redesigning of curricula so that technological learning is harmonised in the light of unavoidable pedagogical implications. This method oriented towards the recognition of the role of the person, of the tool and of the multidimensional paths in which to find development hypotheses and problem-solving, always balancing the circularity of complex relationships that cannot be assimilated to simplistic deterministic drifts.

Critical considerations that the European Commission addresses in the Action Plan for Digital Education (2021-2027), in the Ethical Guidelines for Educators on the Use of Artificial Intelligence (AI), and in Data in Teaching and Learning are: "(AI) is becoming ubiquitous in our economy and society. Naturally, it has reached our schools as well. AI in education is no longer a distant future. It is already changing the way schools, universities and educators work and our children learn. It is making educational settings more responsive by helping teachers address each learner's specific needs. It is fast becoming a staple in personalised tutoring and in assessment. And it is increasingly showing its potential to provide valuable insights in student development. The impact of AI on our education and training systems is undeniable, and will grow further in the future".

[1] This article is due to the collaboration and reflective research of the authors. Paragraphs "Artificial Intelligence and education in national and international strategic perspective"; "Educational robotics" are attributable to Francesca Salis; paragraphs "Educational technology and school: normative and methodological insights into the role of the teacher"; "A qualitative exploration of robotics and artificial intelligence education" are attributable to Veronica Punzo and paragraph "Conclusions" is attributable to both authors.

The theme of reflection underlying pedagogical action concerns several priority factors: the effectiveness of training proposals in global terms and in the specific inclusive declinations; the actual impact on teachers' professionalism and students' learning; the detailed and objective analysis of the strengths and weaknesses of the approach, with a view to possible improvement actions in relation to teaching, learning and assessment practices. The analysis of the impact of AI on education is still limited and it is therefore important to maintain a vigilant and critical attitude.

The task of research is to interpret the potentialities of a future that is already present, an incubator of new paradigms, attentive to the alienating risks of technologization that often is suffered as a passive acquisition of routines. The technological tool should implement the ability to combine and recombine new and previous capacities through trajectories guided by creativity, collaboration, and awareness.

Approaching computational thinking not only trains in solving skills but also makes one an active participant in the conception and design processes of new technologies and robotic programming activities. What characterises educational research, its specific object with respect to other research perspectives, is the study of the formative processes that develop in the transactions between the person and the environment and through which intelligent experimental problem-solving processes are produced, generating knowledge, experiences and orientations suited to the sudden adaptation needs that today's society demands.

The methodological approach can be characterised by the analysis of the transformations that education and training co-generate. The research, therefore, is called upon to identify a pedagogical perspective that allows us to understand the characteristics of our time, in order to build new trajectories through a "rediscovery of authentic human rationality, linked to a living subjectivity, which is not closed in singularity but constantly and problematically open to the world and to other subjectivities and launched towards a never ending final conquest of a life that is truly worthy because it is founded on the satisfaction and well-being of all men" (Bertolini, 1988, pp. 48-49).

The theme of digital competence, which is fundamental in the educational reflection of the new millennium, runs through the evolution of contemporary society, which is changing with exponential acceleration even in its multiple denominations; from information society to knowledge society, to network society (Calvani, Fini, & Ranieri, 2010). We are experiencing a cultural revolution in the field of education, instruction and training that increasingly demands a new literacy about the contents of cognitive technologies and the profound mutations that mark the processes and styles of teaching and learning in every sphere of human experience (Raffaghelli, 2017).

"There is therefore a need to redefine new literacies that are characterised by being dynamic, that is, that do not allow themselves to be caged in grids or standards that risk continuing to serve the interests of the market; capable of interacting with socio-materiality and interpreting its fluid contours; sustained by a robust culture of information that is articulated in the competence to select data, collect and store them, retrieve them efficiently, and assess their credibility; inspired by an ethics of responsibility that translates into coherent (digital) citizenship behaviour" (Panciroli, Rivoltella, Gabbrielli, & Zawacki Richter, 2020). Thinking critically means questioning the very goal of efficiency and choosing for action to be guided by other, not necessarily antithetical, values. This means widening our gaze more to the logics than to the tools, reconceptualising a critical sense of awareness regarding digital capitalism, how it orients frames of thought and behaviour, and how to position ourselves in relation to it and the social practices it promotes. The problem for contemporary *Media Education*, therefore, is the logics that today preside over the circulation of content and the definition of behaviour (Rivoltella, 2017).

2. Educational technology and school: normative and methodological insights into the role of the teacher

D.P.R. 275/1999 introduced educational technologies among the didactic and methodological proposals in schools; since then, the social and technological context has swirled and with it the school context, which has also been transformed by the pandemic and by the distance in in didactics.

The inalienable role of ICT and the need to structure and disseminate adequate training aimed at everyone on the conscious use of technologies also appear in the so-called "*Buona Scuola"* reform (Law 107/2015) in which there is a clear invitation to school institutions to strengthen the educational offer and project activities, to achieve the educational objectives identified as priorities (Art. 1, co. 7).

Actions #4 and #6 of the National Digital School Plan (PNSD) speak of digital skills, BYOD, coding, and computational thinking; action #15 adds to the classes characterised by specialisations, the offer of pathways on making, educational robotics, and the internet of things for the application and active use of technological and online dynamics. Digital innovation represents a great opportunity for schools in that it allows them to go beyond the traditional concept of the classroom, to create an open, flexible learning space that evolves learning environments towards personalised pathways in which students become protagonists, to build a sense of citizenship and to realise the three priorities of Europe 2020 which envisage "smart, sustainable, inclusive growth" (Europe 2020 Strategy) and which has highlighted how technology offers unprecedented opportunities to improve quality, access, and equity in education and training.

The contamination and connection of alternative strategies for education are linked to the inclusive dimension of education as a virtual and virtuous place for valuing and respecting all conditions.

It is precisely for this reason, however, that the scientific debate on educational technologies also focuses on the training of teachers to renew constant reflection on their actions and adopt educational proposals that are based precisely on the use of mediators and devices governed by technological and robotic programming.

“No educational passage can disregard an intensive teacher-student interaction and technology cannot be distracted from this fundamental human relationship” (PNSD, p. 7); computers and technologies in general only represent a didactic mediator at the service of teacher and student for the synergic construction of didactic activities.

Where characterised by educational design, robotics experiences in schools represent an innovative operational proposal for the activation of inclusive dynamics. Unfortunately, many experiences conducted in the field of technology and robotic programming see teachers as spectators of episodic experiences in which the robot is exhibited in the school space without the prior identification of aims and objectives, thus nullifying, in fact, its potential benefits.

A fundamental aspect of achieving authentic inclusive teaching starts precisely from the recognition of diversity, each one in need of valorisation for the full development of its specific capacities and potential, as a result of which processes of individualisation and personalisation can be designed and put into practice under the banner of synergy between authentically dynamic learning modes for the active participation of each pupil and student.

The realisation of educational research should, therefore, pass through the exploration of a new pedagogical approach oriented towards the training of educational professionalism on AI themes and methods as well as the development of inclusive, ethical and transparent quality systems. Reflecting on the combination of the evolution of AI and the search for a new and sustainable digital literacy requires a special scientific awareness in order for educational robotics to be recognised as a multidisciplinary educational and inclusive potential.

For the teacher, technologies are a professional organiser: their use, if supported by openness to change, allows for critical self-assessment of one's practices, lesson design techniques, lesson management and evaluation. Thanks to correctly oriented technology, the teacher implements an awareness of his or her own professional action by preparing to modify obsolete, albeit widespread, methodological perspectives and teaching practices. When this happens, the

professional profile is strengthened in the constructivist and innovative perspective.

3. Educational robotics

Robotics is defined as an interdisciplinary science that, originating as a branch of mechatronic engineering, combines computer science, psychology, linguistics, automation, mechanics, and biology, dealing with the design and development of robots. The multiple uses of robotics involve a very wide range of activities: industrial, medical, domestic, military, space, service, and entertainment.

Educational robotics, included among school activities by Directive 93/2009 and increasingly widespread globally, is the proposal of educational activities based on the use of robots.

Educational robotics originated from Papert's[2] theorisations and then grew and established itself as a discipline and methodology for the construction of knowledge as an educational process at the centre of which is the student, constructor of his own learning, which becomes more effective when it is supported by real artefacts through which to concretise cognitive aspects. Papert's constructionism introduces the construct of cognitive artefacts, i.e. objects and devices that facilitate the development of specific learning: "Human beings, regardless of age, need to have concrete materials at their disposal so that the knowledge they acquire is as close to reality as possible" (Papert, 1986).

The LOGO language, originally, and the many kits available for experimenting with robotics offer simple and intuitive learning environments that enable creativity to be activated and developed to a considerable extent, building new possibilities and new uses for the robot.

Initially, it was believed that educational robotics meant the study of how to teach robotics to students (Menegatti, Moro, Sella, & Perona, 2012, p. 11); today it is well established that it is a real vehicle of motivation, a new tool for the study of any discipline, a catalyst for attention, motivation and interest, a real learning opportunity even for students with difficulties in attention and management of social relationships.

Educational robotics allows open-ended experiences, in which the student "can work as far as his curiosity and abilities take him" (Menegatti, Moro, Sella, &

[2] We began to talk about technology in schools in 1970 with the introduction by Seymour Papert of a new and creative mathematical language to facilitate the teaching of mathematics at school, called «LOGO». The first applications of the LOGO language were through the use of small «Turtles» robots, which, controlled by a keyboard connected to the computer, carried out simple instructions and, thanks to a pen incorporated in them, were able to draw the geometry of their simple movements on paper. Over the years, LOGO has become one of the most popular programming languages in schools for personal computers and a learning environment.

Perona, 2012, p. 13); thus, students learn quickly and often understand problems more autonomously, even offering alternative solutions to those thought up by the teacher, creating with the latter a relationship of mutual help and cooperation.

The ability to propose repetitive tasks precisely, flexibility, interactivity, and humanoid appearance (including body movement) are particularly functional elements of the use of robots in education (Cheng, Sun, & Chen, 2018).

The presence of the robot enriches the educational relationship with a new multidisciplinary language, creates a space of strong imagination and creativity, encourages, and fosters social skills and the valorisation of individual differences, enhancing the cooperative-learning dimension in application to a problem-solving context proposed by the teacher (Marcianò, 2007).

The project experiences of educational robotics that place the disabled person at the centre value technology as an invisible vector of inclusion, a tool for designing and carrying out activities that accompany and guide without preclusions. According to the type and degree of interaction with the human being, robots can be distinguished in:

- Assistive Robotics: they assist the disabled person through physical interaction and help them interact with standard, traditional objects and toys;
- Socially Assistive Robotics: create close and effective interaction with the human user, assisting in rehabilitation and learning contexts;
- Cognitive Companions: interact and cooperate with humans by acting as adaptive companions of the user.

This contribution shares a case study that, among the many resources of robotics, involves NAO, a humanoid robot of approximately 60 cm and with 25 degrees of freedom, capable of independently and autonomously moving the joints of the arms, legs, neck, and trunk.

NAO has position sensors, inertial units to adjust the balance, sonar for obstacle recognition, webcams for facial recognition, microphones for acquiring and recognising sounds and voices from outside, and loudspeakers to emit sounds and voices.

The interaction that NAO establishes with students through interactive play enables it to test their reactions, characterising it as a Socially Assistive Robot. NAO is designed specifically for educational, and entertainment uses; it can be connected to the computer via Wi-Fi and is programmable to perform choreography or to interact with people by proposing or solving quizzes, telling interactive stories, or recognising words and images and reacting accordingly.

4. A qualitative exploration of robotics and artificial intelligence education

The investigation presented in this paper uses the unstructured narrative interview as a tool for analysing social reality and understanding the phenomena and connections of meaning reported by the narrators, as it allows social events to be reconstructed from the point of view of the people who tell their stories (Muylaert et al, 2014).

Narrative interviewing can be defined as an "interview aimed at collecting stories" (Atkinson, 2002) with the objective of collecting data rather than quantifying and generalising the results (Poggio, 2004); for this reason, it can be regarded as "a qualitative, ethnographic, and field research method for gathering information on the subjective essence of one person's entire life" (Atkinson, 2007, p. 225).

The exploratory investigation, with a qualitative approach, was conducted on a sample of privileged witnesses working in the school environment, aimed at acquiring specific information on the use of AI and robots in education.

The proposed case study refers to the PCTO pathway active at the I.I.S Marconi-Pieralisi of Jesi called *Robot Therapy* conducted in partnership with the Fondazione Ospedale Salesi Onlus with the aim to provide young patients of the Salesi with educational support to medical treatment by implementing the motivation and active participation of children through interaction with the humanoid robot NAO programmed for the purpose by the students of classes 4˚ and 5˚.

The interviews with Tommaso Cioncolini, teacher PCTO coordinator at I.I.S. Marconi-Pieralisi; Giuliano Fattorini, teacher in charge of the Robot Therapy pathway, national level trainer in workshops for teachers of all levels and consultant to non-profit organisations in social solidarity programmes; and Dr. Silvia Grigioni Faggi, headmaster of an I.C. with experience in educational robotics activities were carried out in February and March of the current school year.

A small group of teachers from a C.I., attending a training course taught by Prof. Fattorini, also participated in the research by filling out a questionnaire.

The method of analysis adopted is based on the identification within each interview of the key words characterizing the thematic cores, detecting through cross-sectional analysis possible links and recurrences.

The narrative fragments of the interviewees outline the perceptions that emerged concerning the themes investigated.

> The impact of educational robotics from the perspective of the narrative teaching approach (key words no. 1 and 5)

The main applications of robotics, in the distinction between a transmissive and a constructivist didactic strategy, highlight the importance of the workshop dimension that generates in students a strong motivation, even when robotics is initially presented as an engaging game.

The type of motivation that develops is not extrinsic, i.e. imposed from the outside through rewards or punishments, but intrinsic, i.e. it stems from the results obtained that are perceived as the direct outcome of one's own personal commitment.
In this way, learning becomes concretely significant (Ausubel, 1978) because it allows one to make sense of knowledge by favouring the integration of new information with that already possessed and the use of the same in different contexts and situations, developing the capacity for problem-solving, critical thinking and meta-reflection.
In an educational robotics experience, particular importance is attached to the metacognitive and narrative phase aimed not so much at verifying the acquisition of predetermined content as at developing the cognitive skills and flexibility necessary for solving broad classes of cognitive problems. These are higher skills such as the ability to identify problems and devise solution hypotheses, to observe with a critical and open mind, and to activate reflexive self-regulation and adaptation processes.
The application of robotics in school contexts leads to the emergence of explorative and collaborative teaching/learning strategies, complementing each other and with discovery guided by the teacher who also and above all intervenes in relation to error management. The interviewees also emphasise that in the application of robotics, the interdisciplinary dimension is a priority that is not ascribable to a single discipline, but ascribable to a contamination of languages and approaches.

The activity of our students concerned the programming of the robot, providing the Salesi with the different programmes; the classes involved were classes 4˚ and 5˚ initially of the mechatronics address and, later, of the electronics and computer science addresses. The experience required a full immersion of more than 80 hours for the students to acquire the necessary know-how to govern all the programmes required to operate NAO, with my supervision as a teacher. (Fattorini G., teacher)

NAO can be set up with object-oriented programming; if students have good computer skills, it is easier for them to adopt a philosophy of problem-solving and analysis, but it is equally important for working with a humanoid robot to have knowledge of kinematics. (Fattorini G., teacher)

A transformation is triggered, and the student becomes a mentor in the team; cooperative-learning is activated in which each one can and must contribute his or her speciality to help solve a problem. (Cioncolini T., teacher)

The construction of knowledge engages the teacher in the presentation of cognitive elements of the disciplines by stimulating experiences carried out in peer education mode, accompanying the students in a dialogic and metacognitive

cooperative-learning process. Inclusive planning for the classroom imposes the teachers' responsibility to identify strategies that are sensitive to differences in mutual coexistence. Central, therefore, is the design and negotiation in the field to balance the interaction between students stimulated by elements arising from intrinsic and authentic motivation. Narrative action designed as an integrating backdrop places action in a specific context of time and space, expresses intentions and motivations, investigates cause/effect and reciprocity relationships, and attributes culturally recognised and recognisable meanings (Salis, 2016). Pedagogically oriented storytelling in support of learning takes the form of a real opportunity to strengthen self-esteem and activate the process of self-efficacy (Bandura, 1995).
The circularity inherent in the didactic narrative approach activates the zone of proximal development (Vygotsky, 1980) and allows participants to intersect their own space with that of others, traversing the discussion with words that meet, i.e., have a socialising purpose and lead to the construction or consolidation of the relationship, and words that narrate, i.e., more content centred.

The experience conducted with NAO in the PCTO Robot Therapy pathway confronts the young people with the possibility of intersecting their specific competences and the different specialities of their fields of study. This creates forms of socialisation that unite because everyone brings their own support, and everyone works together as a team. A sartorial dimension then emerges because what the team experiments in the laboratory at school, with an almost artisanal spirit, must then be tested in the hospital; it is up to the students to solve the malfunctioning report that. (Cioncolini T., teacher)

By programming the machine, the students experience the awareness of being able to control it and the responsibility of making it perform its task, almost placing themselves in the role of teacher towards it. (Grigioni Faggi S., headmaster)

Error assumes a great value in the relationship with artificial intelligence; from error springs the ability to generate progress without frustration, rather by stimulating effective research. (Grigioni Faggi S., headmaster)

The impact of educational robotics on the inclusive dimension of learning (key words no. 1 and 4)

The interviewees' attention is focused on some fundamental dimensions of learning: cognitive, emotional-motivational, social-relational and inclusive.
In this sense, for the interviewees, the motivational and emotional dimensions become particularly relevant, because the high degree of attractiveness of the

robot manages to increase the levels of attention and concentration, favouring creativity.

The Salesi Foundation decided to draw up an action protocol based on the results achieved with the use of NAO in the paediatric oncology ward. It has been documented that the use of the robots induces a sense of tranquillity and confidence in the child so that sedation is not needed to prepare the child for entry into the operating theatre. Over the years, we have filmed moments of NAO play during which children laugh and joke while their parents cry with emotion. Based on this evidence, many other hospitals have initiated the same practices of using humanoid robots. (Fattorini G., teacher)

Educational robotics has an undoubtedly inclusive vocation, mainly due to the flexibility of its approaches and the possibility of customising learning experiences (De Rossi, 2008). The narrative fragment below, for example, highlights how the use of a humanoid robot is adapted to the setting, the subjective specificity of each student, the narrative background, and the specific cognitive objective proposed.

There was total empathy in the interaction with NAO of some disabled students from the I.C. where headmaster Grigioni Faggi was on duty. With A., a student with Autism Spectrum Disorders, we employed NAO to improve attention and decrease the use of stereotypies. A.'s teachers had previously observed that his concentration was catalysed by the presence of music and that verbal language improved if, instead of speaking, A. sang. A.'s participation, however, changed depending on who was leading the activity and the type of music proposed. We therefore programmed NAO to perform a matching of the preferences expressed by the pupil through a series of stimulus questions. Having identified his favourite artist, NAO, who could also be programmed to sing and dance, taught A. the words of one of his songs and, together, they perfected the performance until A. was able to intervene from the exact point at which NAO stopped. A. became attentive thanks to the operational synergy developed with the robot, which later also guided him in performing other tasks.
With L., a student with Down Syndrome, we improved verbal language. By programming NAO to detect a gradually increasing percentage of correction in the pronunciation of selected words and sentences, L.'s progress was spurred by the desire to gain the appreciation of the robot in whose regard he had developed a great interest and attachment. In the perspective of personalisation, when the students with disabilities had reached a relationship of trust with the robot, they were given the task of presenting NAO to the class. I remember the care that the children expressed towards NAO even outside the scheduled activities; at school they kept NAO inside a closed room for fear that it would be taken away or

damaged and often both students wanted to check with the support teacher that the robot was still there and make sure they could play together again. (Fattorini G., teacher)

The emotional-relational sphere can be realised not only through play, but also in an ethical dimension.

The core of a PCTO convention is service learning, i.e. a pedagogical proposal that unites Service, citizenship, solidarity actions, and volunteering for the community, and Learning, the acquisition of professional, methodological, social, and didactic skills. The PCTO course developed with the Salesi Foundation is completely different from all the previous experiences conducted to date by our institute and in the area. What emerges is the strong drive represented by the presence of service learning, by the fact that this pathway operates in a special environment, such as a hospital. The boys know the purpose of this project and perceive that the activity they carry out has not only an economic benefit but a socially relevant value, giving them the perception that technical skills can be dedicated to social purposes. The children are exposed to the experience of solidarity and caring for others. There is a very strong humanistic afflatus when the youngsters see how children affected by the disease find benefit from interacting with NAO. The cold matter of the technique takes on warmth, takes on feeling, and there is also a bit of satisfaction on the part of our students because they see a different, new appreciation compared to the classic use of the technique. (Cioncolini T., teacher)

Showing the students the physical places where NAO would be employed got them very excited. With the student team, we also programmed NAO to accompany the children to the operating theatre. The students went into those spaces to map out the movements the robot would make. The head doctor of the hospital had them dressed and sterilised; the experience of those actions, even the perception of the typical smells of that environment, greatly moved the boys who understood the importance of what they were doing. Even the most talkative ones kept quiet. (Fattorini G., teacher)

The impact of educational robotics on digital education (key words no. 1 and 3)

Referring to the Recommendation of the European Council (2018) and studies on AI literacy (Heck, Weisel, & Kullmann, 2019; Long & Magerko, 2020), the interviewees point out that educational robotics experiences develop a plurality of competencies, in particular competences in science, technology, and engineering, but also in logic and even language skills.

The students have to programme the robot to make it interact with the children and therefore also develop mathematical, computer, electronic and mechatronic skills. When the Salesi Foundation also bought PEPPER, the students had to

develop new logical and computational languages, they were competent and resolute, and very creative because they could not test the new programmes delivered at school. (Fattorini G., teacher)

The impact of educational robotics on artificial intelligence literacy (key words no. 1 and 2)

On the specific topic of AI education through robotics, the interviewees agree that there is a need for adequate training in school contexts and point out opportunities and criticalities.

In my experience as a trainer, I find that the winning formula is based on the combination of teacher training and the leadership model that the headmaster proposes; there are realities in which the school structure itself is at the forefront of attention to environmental sustainability. In these environments, the headmaster is indeed able to call the teachers to greater responsibility by generating in them adequate motivation also for the construction of learning environments and the application of methodologies incorporating the use of technology. (Fattorini G., teacher)

The novelty of the tool that NAO represented required prior training of teachers. The new tool was then integrated into the teaching of learning objectives so we either used NAO, e.g., to do mathematics or NAO itself was the object of learning. The goal to be achieved in the long term is to incorporate NAO into the system, i.e. to carry out appropriate training for teachers preparatory to the introduction of a new approach with the language of robotics, to promote learning in all disciplines, as a problem-solving experience. (Grigioni Faggi S., headmaster)

It remains essential, if one wants to tackle an educational robotics project, that there is a core group of highly motivated teachers and a pilot class on which to drop the teaching activity, or internal ways of selecting leading teachers, and passion often passes through identification. In my experience as a trainer, the teachers who spontaneously became passionate are those who felt the need to educate their students in the conscious use of technology, recognising that they too are deficient, just like their students, or those who shared a personal history of the experience of the fragility associated with special educational needs. (Fattorini G., teacher)

After an initial qualitative exploration on a small sample of privileged witnesses, a quantitative exploration followed with semi-structured questionnaires administered online in anonymised form to seven teachers of a I.C. attending a training course held by Prof. Fattorini.
The questionnaire, like the narrative interviews, was proposed to the participants in order to explain in a narrative key the experiences to date and future prospects

in relation to the use of educational robotics in relation to the dimension of inclusion for the effective realisation of a school of differences.
The data that emerged concerned the response to six questions:
- How can school environments be stimulated to study coding?
- How can robotics be integrated into education?
- How is it possible to encourage the rapid learning of languages linked to the robot stimulus?
- How is the educational relationship enriched in the light of the new languages linked to the robot stimulus?
- What is your perception of the importance of robotics as a learning tool for all children, including students with disabilities?
- How does the commitment and presence of teachers change in relation to the possibilities offered by the presence of a high-tech robot?
The questionnaires filled in return the perception of educational robotics as a formidable tool for developing group cooperation: students are called upon to achieve pre-established objectives under the supervision of their teacher who can modulate the required results in relation to the gradual growth of their problem-solving skills.
There is also an urgent need to focus on methods, not technologies. In the opinion of the teachers surveyed, it is methods and not technologies that make the difference in learning and in the consequent creation of a positive classroom climate.
Teachers, therefore, perceive the importance of focusing their training on the didactically effective use of technologies that can also consider the appropriate management of the emotional dimension in order to positively pursue educational success.

5. Conclusions

The considerations shared in this contribution photograph one of the many possible experiences among the implementation scenarios involving educational robotics in multidisciplinary interventions. The speed with which technologies are advancing, in fact, continually unveils new and different ways of interaction between the person's constituent spheres and the contextual dimension. The quantity and variety of artefacts raises the commitment to progressive literacy because technology and educational robotics in particular represent both an important opportunity and a cultural imperative for quality improvement, a transversal index of collective social well-being. Focusing the discourse on the school environment, the elective scenario of the analysis conducted here, the challenge is not only to urge students and teachers to a conscious and contextualised use of educational technologies, such as robotics, but to work synergistically for the creation of a truly inclusive learning environment, “a place

of communication and entertainment" (Calvani, 2001). The full inclusion of students with disabilities is a goal that the school of autonomy pursues through intense and articulated planning, making the most of internal professionalism and the resources offered by the territory and the new stimuli connected to contemporaneity and its products. Therefore, the use of educational robotics in schools must aim at transparency, modifiability and accessibility, becoming truly educational with the customisation of interventions. The use of technological devices, in fact, enters into relation with the subjectivity of the student included in the environment in ever new and variously pervasive ways: identifying the constant direction of intervention in a constantly changing interaction is the real challenge for the development of educational robotics.

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