ARTIFICIAL INTELLIGENCE AS A TOOL FOR INCLUSION AT SCHOOL: AN ACTION RESEARCH EXPERIENCE IN PNRR ORIENTATION PATHS

L'INTELLIGENZA ARTIFICIALE COME STRUMENTO DI INCLUSIONE A SCUOLA: UN'ESPERIENZA DI RICERCA-AZIONE NEI PERCORSI DI ORIENTAMENTO PNRR

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ABSTRACT

Artificial intelligence is revolutionizing many areas and aspects of daily life, including the educational sector, making it necessary to reflect on the impact that these tools could have on the teaching and learning process. Therefore, the research aims to explore the opinions of a group of secondary school students on the use of artificial intelligence and machine learning to promote educational inclusion.

L'intelligenza artificiale sta rivoluzionando molti ambiti e aspetti della vita quotidiana, incluso l'ambito educativo, rendendo necessaria una riflessione sull'impatto che tali strumenti tecnologici potrebbero avere sul processo di insegnamento e di apprendimento.
Pertanto, la ricerca mira a esplorare le opinioni di un gruppo di studenti delle scuole secondarie sull'utilizzo dell'intelligenza artificiale e del machine learning per promuovere l'inclusione scolastica.

KEYWORDS

Artificial Intelligence; Inclusion; Orientation Paths
Intelligenza Artificiale; Inclusione; Percorsi di Orientamento

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Introduction

It is now widely believed that today's students will interact, in their future work, with Artificial Intelligence in ways that we do not know today. To support this thesis, a study conducted in 2017 by the Institute For The Future believes that 85% of the jobs that will exist in 2030 have not yet been invented, suggesting that the future, not too far from the one we live in today , will be characterized by professions that have never existed before (Bork, et al., 2017).

According to research, by 2030 every complex organization will be characterized by the constant use of technologies such as artificial intelligence, robotics, virtual reality, augmented reality, radically transforming our lives and the way we work.

The great digital revolution that we have been experiencing for some time (Smith, Dorf, 1992) redefines interactions with machines (Gibson, 1977), becoming increasingly efficient and reaching levels of "usability" (Norman, 2019; Norman, 2004; Krug, 2001) very high and as never achieved before, helping - among other things - human beings to overcome their limitations (Di Tore et al., 2022; Di Tore, 2022). As Toffler had already suggested in the 1980s, technologies generate new educational dynamics, in which prosumers become the active protagonists in the creation of digital content. In accepting these suggestions, Hi-Tech companies respond increasingly better to the idea of creating "invisible computers", considering the "best technology as the one that cannot be seen" (Norman, 2005). "Meta-Welt in which body?" asks Sibilio (Sibilio et al. 2023), specifying that technology works and will always work better as an extension of people and that if used in the right ways it could help manage and organize daily activities better (Di Tore, P.A., 2022).

However, in order for these revolutions to be effectively absorbed by citizens, it is essential to guarantee in-depth knowledge of the operating methods, potential and dangers, otherwise we would run the risk of being used by technology and not vice versa (Di Tore, 2016).

In this regard, the DESI (Digital Economy and Society Index) 2022 Report of the European Commission places Italy in 18th place out of 27 EU member states. Although Italy's digitalisation score has increased significantly in the last five years (2017-2022), showing a good level of connectivity and a good diffusion of cloud services, the average still remains low, stopping at 49.3% - considering that the European Commission's objective is to reach 80% by 2030, currently in Europe the average stands at 52.%, with Spain reaching 60.8%, France reaching 53.3% and Germany reaches 52.9% -.

However, as regards Italy, the indicator to pay attention to in the Report is the one relating to "Human Capital" which detects a delay in basic digital skills and ICT graduates (European Commission, 2022). The school, in this sense, is called to adapt programs to the new needs dictated by these technologies, in fact, as specified in the OECD Report (2018) The Future of Education and Skills: Education 2030:

"There is a growing demand on schools to prepare students for more rapid economic and social changes, for jobs that have not yet been created, for technologies that have not yet been invented, and for solving social problems that did not exist in the past".

In this context, Rousseau's thought appears prophetic:

"Living is the job I want to teach him. Coming out of my hands, he will not, I agree, be a magistrate, soldier, or priest; he will be first of all a man: everything that a man must be, he will be able to be, if necessary, like anyone; and however much fortune may make him change his condition, he will always find himself in his favor" (Emilio, Book I).

Teaching how to live today no longer means transmitting knowledge and content skills, but means eliciting new skills that include not only digital literacy but also life skills and soft skills, i.e. all those transversal skills that fall within the emotional, cognitive and relational spheres and that range from the ability to manage emotions to the ability to adopt flexible and/or creative thoughts in solving complex situations/problems and knowing how to effectively communicate one's decisions. School curricula, therefore, are increasingly organized into interdisciplinary activities (Martini, 2020; Druga et al., 2019) called to include Artificial Intelligence in their design to improve learning, but also to learn how it works and use it in an I criticize technology and the network (Sabuncuoglu, 2020).

In this context, the constant interaction with technologies, including the selection and processing of information (Sciotto et al. 2003), would lead to talking about a "postdigital" perspective (Jandrić, et al., 2018). This perspective, in fact, is not limited to technological innovation, but considers digitalization as a phenomenon that has already occurred, thus generating new educational, cultural, political and economic challenges and opportunities (Jandrić, et al., 2018).

1. Research methodology

1.1 Objective

This contribution aims to explore the ways in which artificial intelligence can be used within the school environment. The main objective of the research is to investigate the opinions of secondary school students participating in the PNRR

Orientation courses of the University of Sannio. The study aims to understand how students perceive the use of artificial intelligence and machine learning and how such tools could foster an inclusive and accessible school environment for all. In fact, the widespread use of artificial intelligence in various areas of daily life requires reflection on the impact that this technology could have on teaching and learning processes.

Therefore, through a thematic analysis of students' opinions, we aim to identify the challenges, opportunities and possible best practices of using artificial intelligence at school.

1.2 Participants and context in which the research is delimited

In this research, 185 students were involved, residing in the provinces of Avellino and Benevento, of which 56.8% were female, 42.7% were male and 0.5 identified as neutral (Average 0.578 ; Standard Deviation 0.504). 82.2% of students attend the third grade and 17.8% attend the fourth grade of secondary school.

Specifically, the students who participated in the research took part in the PNRR orientation courses held by the University of Sannio in collaboration with the local secondary schools. During the orientation, organized by the Department of Science and Technology of the Sannita University, the activities were divided into different modules, such as "Biotechnologies for Biomedicine", "Learning by doing: working with the naturalist and the geologist", "Nutritionist for a day", "Nutrition and well-being", for a total of 9 hours per module. During the three hours of the lesson "Knowledge society and inclusion: training reflection for inclusive educational action"

Students were asked to reflect on the themes of artificial intelligence and inclusion and ultimately create an inclusive product or service using an open source artificial intelligence called Teachable Machine.

1.3 Methods, materials and procedures

The questions were structured in the following way: collection of personal information relating to gender, class attended and school address; structured closed-ended questions (positive; negative; neutral); a question on a Likert scale from 1 to 5 (where 1 indicates not at all agree and 5 indicates completely agree).

For closed-ended questions, the frequency in percentage, the average rating and the Standard Deviation are reported. Specifically, the open-ended questions were

organized based on the frequency and percentage of words present in the students' answers.

To conduct the thematic analysis, the open source tools Word Cloud Generator and Dylan Text Tool were used. Word Cloud Generator was used to evaluate the frequency and percentage of words in the students' responses, however, Dylan Text Tool was used to analyze the Gulpease Index of the responses, in order to provide information on the readability and complexity of the language used by the students.

It should be noted that the completion of the questionnaire is consecutive to the attendance of teaching activities carried out in "distance" mode and the hours were distributed as follows: 1 hour of frontal teaching on the topics of inclusive teaching and 2 hours of laboratory activities in which the students, as a team, they built machine learning programs with the open source program Teachble Machine.

The Teachable Machine is a tool created by Google that allows you to train a machine using generative artificial intelligence. This tool allows them to train AI models using user-provided data, such as images or sounds, to create personalized and inclusive experiences for a variety of users.

Through group work, students have the opportunity to collaborate, share ideas and skills, and develop innovative solutions that can improve the lives of people with different abilities and backgrounds. Following the group activity, the students were asked individually a series of questions aimed at investigating their opinions on artificial intelligence and on the activity presented.

1.4 Results and discussion

During the orientation process, the students, divided into groups, carried out around 20 activities with the aim of making a product or service accessible using the Teachable Machine tool. However, one group work in particular captured the essence of the whole activity.

In this project, a group of students leveraged the Teachable Machine tool to train a machine to recognize and interpret sign language signs. This type of activity aims to encourage critical and creative thinking, bringing students closer to understanding how artificial intelligence can be applied to solve real problems and promote inclusion through innovative solutions (Orientation Guidelines, 2022).

The questions presented to the students following the group work are the following:

• Do you believe that intelligence can change people's lives?

• "How can Artificial Intelligence change people's lives?

• "What would you ask a virtual tutor teacher?"

• "What are the risks of Artificial Intelligence?

• "What are the opportunities of Artificial Intelligence?"

• "How useful do you think the activity with Teachble Machine was for understanding how artificial intelligences learn?"

• "Would you like to learn more about how Artificial Intelligence works?"

• "Synthesize an activity that they would have liked to carry out at school with the use of Artificial Intelligence"

From the closed-ended question "do you believe that intelligence can change people's lives?" it is noted that 83.8% respond affirmatively, 2.7% respond negatively and 13.5% say they do not know how to answer.

To the question "How can Artificial Intelligence change people's lives?" 65.4% respond positively, 3.2% respond negatively and 31.4% do not express their opinion on the matter (see Graph. 1).
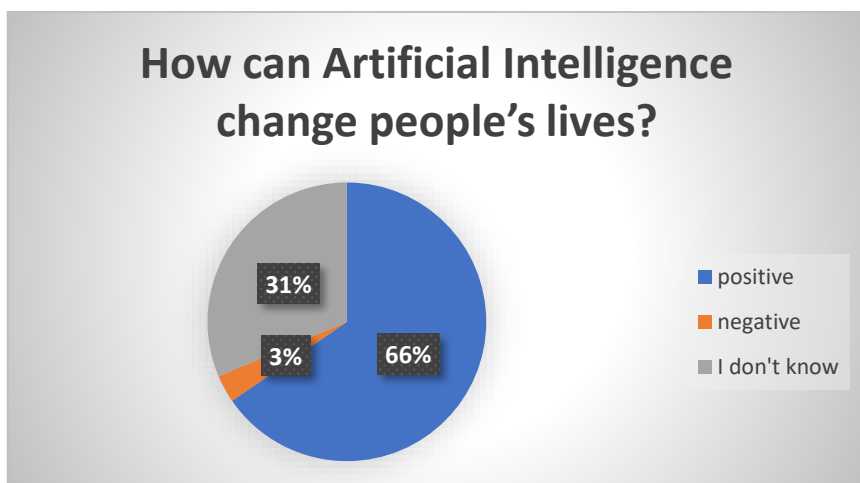
Graph. 1 (How can Artificial Intelligence change people's lives?)

It is noted that in the open-ended question "What would you ask a virtual tutor teacher?" the words most used by students are "I don't know" and "deeper" some disciplinary topics (see Table 1).

Word (1123)	Frequency	Percentuale
intelligenza	48	4.27%
artificiale	43	3.83%
(non) saprei	39	3.47%
(spiegare) meglio	16	1.43%
utilizzare	12	1.07%
(come) funziona	9	0.80%
approfondire	7	0.62%
virtuale	7	0.62%
(approfondire) argomenti	12	1.07%

Table 1 (What would you ask a virtual tutor teacher?)

When asked "What are the risks of Artificial Intelligence", many students believe that this technology can take over people's lives, increasing the risk of job losses and violations of people's privacy (see Table 2).

Word (1757)	Frequency	%
intelligenza	39	2.22%
artificiale	30	1.71%
rischi	20	1.14%
sopravvento	19	1.08%
lavoro	17	0.97%

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perdita	16	0.91%
dati	14	0.80%
privacy	13	0.74%
uomo	13	0.74%

Table 2 (What are the risks of Artificial Intelligence?)

To the question "What are the opportunities of Artificial Intelligence?" the most used words are "new", opportunity", "improve" which would indicate the advantage that these technologies could bring to people's lives in terms of services, products and work (see Table 3).

Word (1719)	**Frequency**	**%**
intelligenza	29	1.69%
artificiale	27	1.57%
opportunità	22	1.28%
servizi	17	0.99%
prodotti	14	0.82%
migliorare	13	0.76%
nuove	12	0.70%
persone	12	0.70%
lavoro	12	0.70%

Table 3 (What are the opportunities of Artificial Intelligence?)

However, as regards the satisfaction of the proposed teaching activity, to the question "How useful do you think the activity with Teachble Machine was in understanding how artificial intelligences learn?" it seems that the majority of participants found the Teachable Machine activity useful for understanding how artificial intelligences learn, with an average rating of 3.6 out of 5 (mean 3.35; SD 1.01). However, there were also some lower ratings, indicating that some

participants may not have found the activity as effective. However, it should be noted that to the question "Would you like to learn more about the functioning of Artificial Intelligence?" 65.4% respond positively, 8.1% respond negatively and 26.5% do not express their opinion on the matter (see Graph. 2).
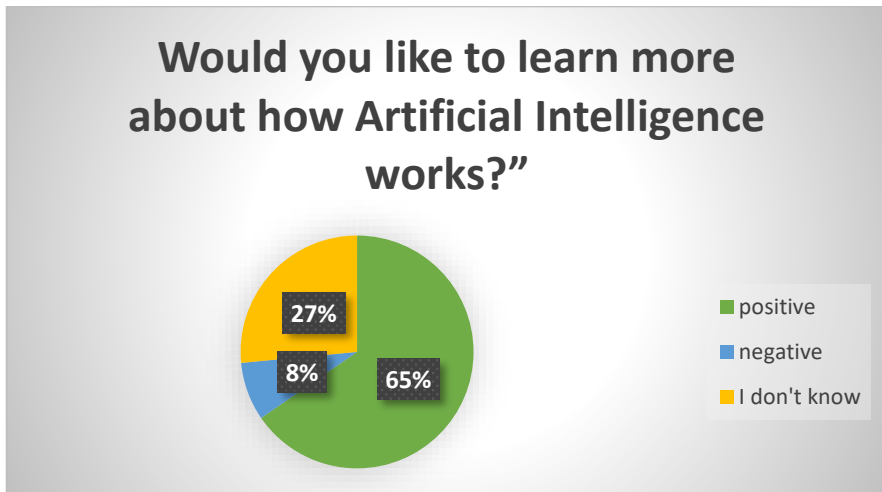
Graph. 2 (Would you like to learn more about how Artificial Intelligence works?)

Finally, students were asked to "Synthesize an activity they would like to carry out at school with the use of Artificial Intelligence" and the proposals put forward by the students include the use of educational chatbots capable of providing personalized feedback, interactive lessons and educational games. The responses show a strong interest in carrying out practical activities, working in groups and experimenting with innovative teaching methods and tools.

It is noted that the Global READ-IT index is equal to 97.6%, with a Gulpease index equal to 66.3% which would indicate that the answers elaborated by the students have good readability, revealing generally well-structured and understandable answers (see Table 4).

indice di leggibilità	livello di difficoltà	
READ-IT Base	1,6%	
READ-IT Lessicale	9,1%	
READ-IT Sintattico	32,2%	
READ-IT Globale	97,6%	
indice di leggibilità	**livello di semplicità**	
GULPEASE	66,3	

DyLan TextTools v2.1.9

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Table 4 (Gulpease Index)

Conclusions

The research highlights students' opinions regarding Artificial Intelligence, focusing on the risks and opportunities this technology presents. Students recognize the significant impact of AI on society and are aware that the future will be increasingly characterized by these technologies. The survey just presented shows that:

• 83.8% of students believe that Artificial Intelligence can actually change people's lives. Only a small percentage (2.7%) respond negatively, while the remaining 13.5% are undecided.

• 65.4% of students see AI as an opportunity to improve services, products and job opportunities. Only 3.2% respond negatively, while 31.4% do not express a specific opinion.

• Students demonstrate a strong desire to experience hands-on, engaging AI learning, such as using educational chatbots.

• Most students found the Teachable Machine activity helpful in understanding how artificial intelligence works, with an average rating of 3.6 out of 5. However, some lower ratings indicate that some participants may not have found the activity equally effective.

• 65.4% of students are interested in learning more about how Artificial Intelligence works, while only 8.1% respond negatively.

• Students suggested various activities they would like to do at school using AI, such as the use of educational chatbots, interactive lessons and educational games.

The results of this research show that students recognize that Artificial Intelligence is significantly impacting society and are aware that the future will be increasingly characterized by such technologies and appear to be informed of the potential risks and opportunities associated. The loss of jobs was expressed as a potential risk, but on the other hand they are confident that Artificial Intelligence will bring improvements in the quality of people's lives. The majority of students evaluated the activity with Teachble Machine positively, stating that they particularly appreciated the tool and the activity proposed in order to understand how machine learning works.

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