



# Artificial Intelligence at School: educating beyond taboo or technicality

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## ABSTRACT

In recent years, Artificial Intelligence has been used in the educational field in various international experimentations. We can identify two basic ways of integrating AI into the world of education:

1. Artificial Intelligence as a topic to be dealt with in the classroom, to develop knowledge, skills and awareness in the citizens of the future;
2. Artificial Intelligence as a tool for analyzing, enhancing and improving the learning process.

The most explored approach is definitely the second one, since there are taboo attitudes towards the introduction of AI as a subject in schools. However, the importance of working on this issue can be summarized in a few main educational needs: a citizen participating in the society in which he or she lives should be able to discuss the ethical aspects of AI, what an AI algorithm should or should not do; a citizen should be able to understand the basics of how AI works; a citizen should have the ability to recognize the risks and potential of these tools.

Keywords: AI Education, Citizenship, Gamification.

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## Introduction

We live in a world increasingly connected and permeated by digital technologies and devices. As Luciano Floridi proposes, it no longer even makes sense to ask ourselves whether we are online (connected) or offline (disconnected), as we can say we are living onlife: the digital is part of our everyday experience, as it can no longer be distinguished or separated from the reality we perceive and interact with.

Within this life, Artificial Intelligence (or AI) is assuming a predominant role.

Within this onlife dimension AI is assuming a predominant role and this phenomenon needs to be well managed to avoid the risk for our generation and future generations of losing the human dimension.

The ‘onlife’ manifesto (Floridi, 2013) that Luciano Floridi wrote with other scholars from various disciplines assigns a task to education in paragraph 4.5. we read:

*Rethinking and developing new forms of education are certainly among the most exciting challenges of our time. There are great opportunities, but also a serious risk of missing them. [...] The difficulty is further exacerbated by the mental constrain imposed by the overbearing presence of the book for so many centuries, which makes it hard to consider alternative forms of education (think for example of the written assessment procedure); and by the omnipresence of ICTs, which constantly distract our reflection into believing that the real issue concerns which technical solutions are or will be more feasible to manage learning processes involving digital natives, when in fact the fundamental problem is not how but what: what kind of knowledge will be required and expected when living onlife.”*

At an international level, many papers have been produced. We are aware that AI is developing rapidly and will change our lives for the better, improving healthcare, increasing the efficiency of agriculture, contributing to climate change mitigation and our adaptation to it, improving the efficiency of production systems through predictive maintenance, increasing the security of European citizens, and in many other ways that we can only begin to imagine. At the same time, we are also aware that AI poses a number of potential risks to our private lives and also possible uses for criminal purposes. So, thinking about future goals for education, the OECD asked itself:

- “What knowledge, skills, attitudes and values will today's students need to shape and prosper their world in 2030?”
- “How can educational systems develop these knowledge, skills, attitudes and values effectively?”

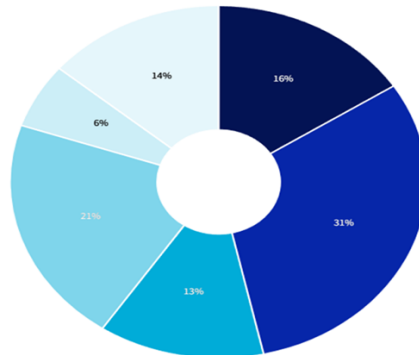
We mean for student’s “agency”, as Bandura (2006) said, the ability to act actively, consciously and transformatively in one's context, as opposed to mere reactive behaviour.

In April 2023, the EdWeek Research Center conducted a survey asking teachers and headmasters about the impact AI-based technologies will have on learning and teaching over the next five years in the education of K-12 pupils. The results show that 47% have a negative opinion of such tools and 14% show neutral views on the subject. It is interesting to perceive that there is a 6% who do not know what these platforms are and presumably will not use them as a teaching tool or, at least, will have difficulties in applying them.



In your view, what kind of impact will artificial intelligence platforms such as ChatGPT have on K-12 teaching and learning over the next five years?

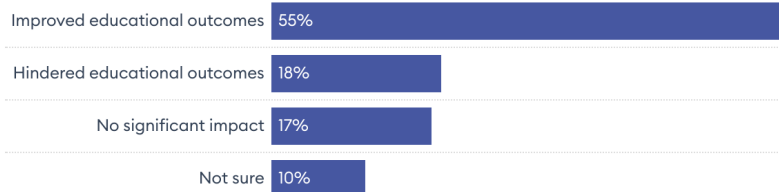
- Very negative
- Somewhat negative
- Neutral/no impact
- Somewhat positive
- Very positive
- I don't know what AI platforms are



\*Results show responses from teachers, principals, and district leaders  
SOURCE: EdWeek Research Center survey, April 2023

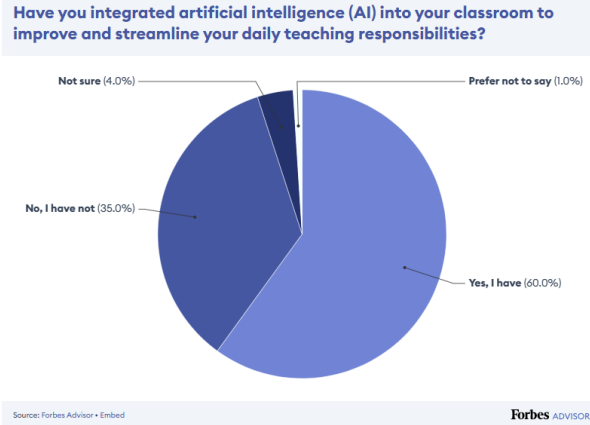
While in the previous research the respondents were in-service teachers and headmasters, the Forbes survey conducted in 2023 included five hundred aspiring trainee teachers. These, as the data show, reveal a different reality where the results highlight confidence in AI-based tools, with 55% believing that such technologies improve educational outcomes and only 18% having a negative opinion of them.

### In your opinion, how has AI influenced the teaching and learning process in classrooms?

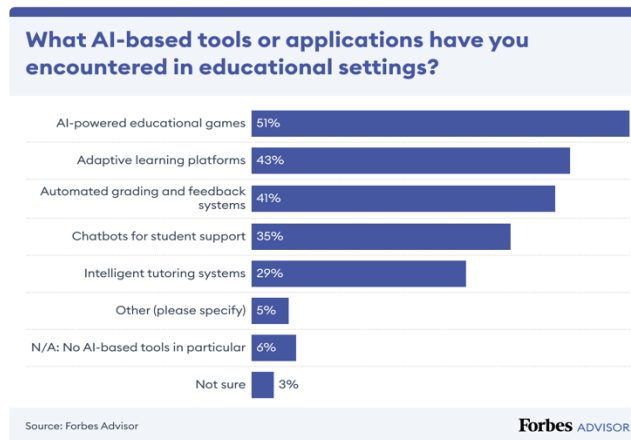


Source: Forbes Advisor

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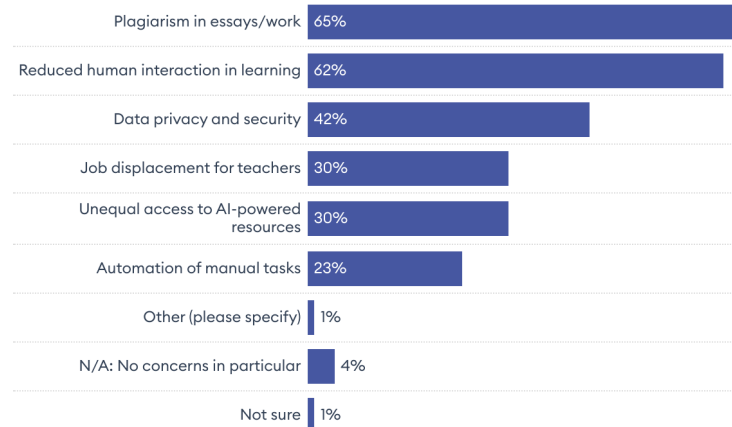
From this consensus, 60% have used AI to improve, but also modernize, their way of ‘doing school’. The technologies employed were not limited to just one type, but the range was wide. While more than half used AI powered educational games, there was extensive use of adaptive learning systems and automated evaluation systems. Also relevant is the use of chatbots such as ChatGPT.



Analyzing the main concerns about the use of AI in education we can see that plagiarism involves, among the fears presented, 65% of the respondents. This is also due to the fact that anti-plagiarism system that recognizes the fake creativity of AI powered systems. Surely if we were in possession of such technology, we could say that the percentage would be much lower. Today, however, by being able to obtain unpublished, but plagiarized, work in a matter of minutes, this concern has good reason to exist. Far more sci-fi is the second concern that sees the fear of a reduction of teacher-learner interaction, forgetting that AI systems are tools and as such involve human action first.



### What concerns do you have about the use of AI in education?

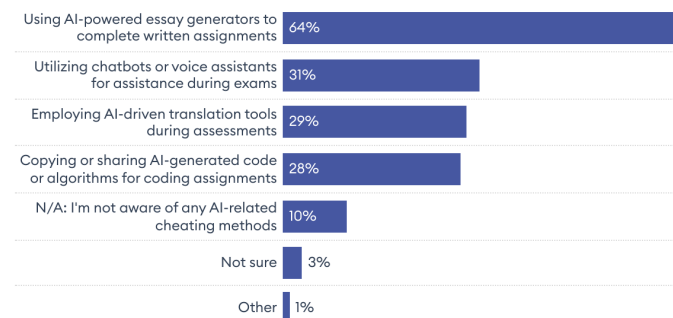


Source: Forbes Advisor

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The fears presented are confirmed by this further survey on the ways considered most in use to bypass the rules during an exam or an assigned task.

### Which of the following AI-related cheating methods do you believe are most prevalent in your educational institution, if any?



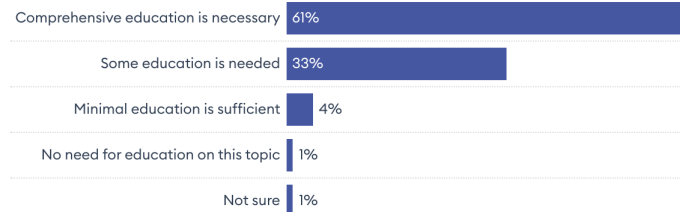
Source: Forbes Advisor

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The entire sample interviewed undoubtedly agrees on the need for education, not necessarily all-inclusive. Educating in the ethical, and I would add conscious, use of the tool is a necessary part of the new educational processes.



### To what extent do you think students should be educated about the ethical use of AI in their academic work?

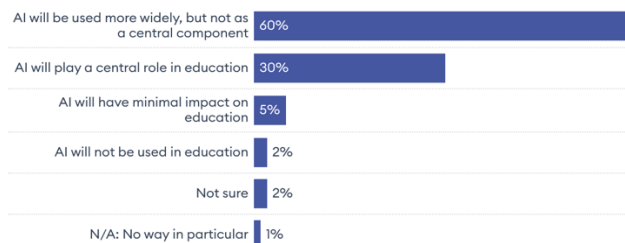


Source: Forbes Advisor

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Lastly, 90% believe that AI will play a role in education over the next ten years. Even if the majority is not convinced of the centrality of this role, they believe that this technology will still be present in the educational institution as a tool to serve the teacher and the class group.

### How do you envision AI evolving in educational settings over the next decade?



Source: Forbes Advisor

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### *How are schools in Italy doing?*

So, the question we started with in this research was: how are schools in Italy doing? Well, we could see that there are two basic ways of integrating AI into the world of education: 1. Artificial Intelligence as a tool for analyzing, enhancing and improving the learning process 2. Artificial Intelligence as a topic to be dealt with in the classroom, to develop knowledge, skills and awareness in the citizens of the future.

Let us go deeper into the path that sees AI as a tool for analyzing, enhancing and improving learning processes. This is certainly the most explored way of integrating AI into school and into education in general. This happens through three basic systems: Intelligent Tutoring Systems (ITS); Dialogue Based Tutoring System (DBTS); Exploratory Learning Environments (ELE).

ITS: Intelligent Tutoring Systems were the first AI systems designed and tested in the school world: they usually provide step-by-step, individualized tutoring for each student through the topics of a



well-structured discipline (e.g. mathematics, literature, etc.). Systems of this type are based on the answers provided by the student: acquiring a large amount of data of this type from many students makes it possible to train algorithms that are then able to adjust the level of difficulty of the tests, to provide appropriate hints and to personalize the student's learning path, trying to ensure that the learner is able to learn in the best possible way. (Ritter, Carlson, SandBothe, Fancsali, 2015) (Ventura, Chang, Foltz, 2018)

DBTS: The Dialogue Based Tutoring Systems base the interaction with the learner on conversation: the user is then guided through the learning process by chatting with a virtual tutor. This type of pedagogical approach could be considered Socratic: starting with a learning objective, the tutor proposes an initial question, thus eliciting an initial response from the learner, which is immediately graded and leads to the generation of feedback, advice or further questions useful for improving the answer given and the knowledge of the study topic (Holmes, Bialik, Fadel, 2019). ELE: Exploratory Learning Environments offer free exploration and manipulation of a virtual educational environment that then allows the construction of knowledge by the learner. Feedback and misconceptions are also provided in these systems to support the learner within the environment. A very interesting example of Exploratory Learning Environments is the game ECHOES, designed for the development of social skills in children with autism (Bernardini, Porayska-Pomsta, Smith, 2014).

Less explored is AI as a topic to be dealt with in the classroom, to develop knowledge skills and awareness in the citizens of the future. This way is necessary for three main educational needs:

A citizen should be able to discuss about the society in which he or she lives should be able to discuss the potential of AI, the ethical aspects, what an AI algorithm should or should not do. In particular he/she should be able to discuss about: virtual assistants, ethics, human-centred concern, algorithm training, the AI potential ecc. (Luckin, 2018). A citizen should know that a citizen should be able to understand the basics of how AI works, so as to consciously use the commercial system and platforms that surround us, while also having the ability to recognize the risks and potential of these tools. Going deeper he/she should be able to understand that: AI is not intelligent, it cannot learn from errors as human do; AI is devoid of agency, as Floridi said, we're dealing with an "Agere sine intelligere"; AI is not creative: it cannot deal with a problem in an alternative way, it is only executive and therefore depends on human training; AI has no moral sense: it cannot independently assess the justice or injustice of an argument (Floridi, 2021).

A student should be able to design simple, ethical AI systems, because among today's students we have: not only the future designers of AI algorithms, but also those who will occupy governance roles in the public sector and will thus have to act for the public good in a global dimension. So it is interesting to ask: Given the importance of AI as a topic to be dealt with at school, why is this way still little explored? What do teachers think about it?

Summarizing the outcomes of these research we can conclude that today's in-service teachers have a negative opinion of AI and therefore consider the introduction of AI-based tools or talking about it as taboo. This implies low interest, limited information and increased prejudice. On the contrary, practising educators show a lot of confidence in the tool for improving educational outcomes. However, this entails the risk of limiting themselves to technical use of the tool, thus falling into technicality.



But the attitude of teachers is not the only problem in proposing AI as a topic to be addressed in the classroom.

The other issue, of far greater importance, is how to do it?

### ***How to make students future AI-aware Citizens. The example of the “Liceo Scientifico Leopardi” in Recanati***

During the month of February 2020, Lorenzo Cesaretti (Cesaretti, 2021) gave four lessons to thirty students at the Liceo Leopardi in Recanati. The aim is not only to provide the technical basics to those who want to start studying AI, but also to raise the students' awareness of how machine learning algorithms work.

The method employed by Cesaretti as educator to design the educational path was the “project-based learning” developed by Papert and Resnick (Papert, 2021; Resnick, 2017). This method consists of a set of practices characterized by a specific focus on the collaborative design of operational solutions. Learning is considered most effective when the learner designs and constructs something meaningful. We can summarize the four lessons of the educator in four basic points: the Project, The How-To, The Final Product and Ethical Reflection. After a brainstorming moment students decided to create an AI-powered Android smartphone application. The initial approach to the AI world was to understand what an AI is and then, through their own experiences, propose examples of applications and objects characterised by this technology in their daily lives. The second step consisted in ‘playing’ with AI with the AutoDraw platform, which enables the user to recognise simple doodle shapes and transform them into well-defined and accurate drawings. The educator then explained the principles of machine learning and succeeded in debunking AI by making it understandable and removing the veil of magic it has when observed from the outside. As Andrew Huang says ‘Technology is not Magic’ (Cfr. Bitmark Inc., 2019).

The final product was the design of a prototype ‘Google Home Assistant’ for smartphones, using both a deterministic programming approach and a machine learning approach based on statistics. The final step of the work was an ethical reflection on the main implications of artificial intelligence. This was only made possible by knowing how an AI works, even if only on the surface. It was shown how AI systems are only tools that, although amazing, remain at the service of humans. It is necessary to contribute to the growth of the citizen at school by educating them to be free from whatever technology can enslave them through ignorance.



## Conclusion

At the end of this research, three suggestions emerge to us that can finally bring AI into schools both as a tool and as a topic of discourse. The first suggestion is to use approaches based on the centrality of the student in the learning process. Project-based learning and the construction of AI-enhanced applications will improve the technical and realistic understanding of AI for the students. This kind of applications will also enable the learner to improve his or her learning processes together with the acquisition of a greater critical sense given by the purposeful use of these tools. This will enable learners to consciously participate in discussions on moral and ethical aspects of the use of AI (Riotta, 2021). The second suggestion is to consider the importance of teacher training, to overcome 'ideological' attitudes that lead either to demonize AI or to exalt a merely technical use of it, for limited learning objectives, without in-depth critical study. This requires, also for teachers, experiences of: knowledge; practice; reflection. Finally, the third suggestion is to adopt an interdisciplinary approach by involving technology experts, Psychologists, pedagogists, philosophers, educators.

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