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Artificial Intelligence and Educational Personalization: a first reflection between planning and educational experience

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Abstract: The education in the 21rst century must answer to the needs of society changing very fast, in which the requested competences are more and more complex and personalized. The AI offers powerful devices to face this challenge, creating adaptive and tailored routes for each student. AI is changing the teaching's personalization, just because the potentiality of the devices to analyze big data, to fit to the individual needs, determines for the users very highly personalized.
This paper explores the intersection between AI and personalization, highlighting how technology can be used to build experiences more satisfying in different contexts, especially linked to education and didactics.
This paper examines the foundations of personalization through AI, the benefits for the users and the ethical challenges linked to these systems.

Keywords: Artificial Intelligence; Personalization; Teaching.

1. Introduction

The topic of Artificial Intelligence is becoming the central debate of contemporary cultural and scientific research, as well as its political applications. Pedagogical and didactic research, obviously, is working in various directions to clarify the relationships between Arificial Intelligence and pedagogical and didactic action. The studies are still initial, but already very promising and important (Rivoltella, 2023) but the real problem, in my opinion, is to focus on the relationship between personalization and Artificial Intelligence. In this short contribution I will attempt to analyze this relationship which represents one of the most significant moments of contemporary educational research, also in relation to what will be the ethical challenges of Artificial Intelligence when it becomes a fundamental tool for the best quality of learning and a possible high quality inclusion.

2. Personalization and new challenges of Artificial Intelligence.

Artificial intelligence (AI) is a rapidly evolving discipline that includes the use of algorithms and mathematical models to allow machines to learn, adapt and make decisions without direct human intervention (Russell & Norvig, 2016). One of the most promising application areas of AI is personalization, which refers to the ability of systems to adapt to the user's individual needs and preferences. Through data

analysis, AI-based technologies can predict future behavior and suggest content, products or services that best match users' desires (Gartner, 2020).

The adoption of AI in the field of personalization has proven particularly effective in contexts such as e-commerce, where platforms can suggest items based on previous purchases, or in social media, where algorithms determine the content that appears in users' feeds (Smith, 2019). AI personalization is possible thanks to predictive models such as machine learning (ML), which relies on learning from data to continuously refine the quality of the suggestions offered.

The benefits of AI personalization are evident in several areas. First of all, it improves the user experience, since it allows us to respond more precisely and promptly to their needs, saving time and increasing satisfaction. In a commercial context, companies that implement personalization can benefit from greater consumer engagement and increased sales (Eisenmann, 2018).

Additionally, personalization can improve operational efficiency by optimizing asset management and reducing advertising costs through more targeted campaigns.

However, the use of AI for personalization raises important ethical questions. One of the main concerns is related to data privacy. Since AI systems rely on personal data collected from users, there is a risk that this information could be misused or exposed to security breaches (Zeng, 2021). Furthermore, there is a danger of creating filter bubbles, where users are only exposed to content that confirms their pre-existing beliefs, limiting the variety and diversity of information they have access to (Pariser, 2011).

Another concern is the potential impact of personalization on users' autonomous decisions. If AI algorithms influence users' choices too heavily, they could reduce their ability to make informed decisions, making them more vulnerable to manipulation (O'Neil, 2016). Addressing these risks requires transparency policies and rigorous regulations to ensure that the use of AI respects users' rights and promotes a healthy digital environment.

The introduction of artificial intelligence (AI) into schools and universities is changing the educational landscape, offering significant opportunities for personalizing teachers' work.

The personalization of teaching work via AI can bring advantages in terms of time management, improvement of teaching effectiveness and support in the design of training activities. However, it is important to also consider the challenges that this approach brings.

One of the areas in which AI can support teachers is the management of administrative tasks, which are often burdensome and time-consuming. AI-powered tools can automate student assessment, attendance management and lesson planning, allowing teachers to focus more on actual teaching. AI systems can also analyze student progress in real time and provide automatic feedback on assignments and tests, reducing the workload associated with marking and monitoring progress (Baker & Siemens, 2014).

Online learning platforms that integrate AI, such as learning management platforms (LMS), offer predictive analytics tools that allow teachers to monitor student performance and identify gaps in learning before they become problematic. These systems are able to adapt in real time to students' needs, suggesting complementary activities or personalized learning paths, which contribute to optimizing teaching (Siemens, 2013).

Personalization of the educational path is another crucial aspect in which AI can play a fundamental role. Through the analysis of data collected during educational activities, AI systems can identify each student's strengths and areas for improvement, suggesting content and teaching methods tailored to each individual. For example, in a personalized learning context, AI could suggest review exercises for a student who has shown difficulty in a particular topic or propose advanced readings for another student who has demonstrated a quick understanding of a concept (Baker et al., 2019).

Furthermore, AI can help teachers in designing lessons, suggesting teaching resources, pedagogical approaches or interactive activities that best meet students' needs. This type of personalization not only improves the effectiveness of teaching, but also stimulates inclusion, since students with different abilities and learning styles can receive tailored support, reducing educational inequalities (Rose & Meyer, 2002).

Despite its many benefits, integrating AI into the educational context raises several challenges, especially in relation to data management and transparency. One of the main issues concerns the privacy and protection of sensitive student data. The use of AI systems that collect and analyze information about students must be governed by clear regulations, which guarantee data security and prevent abuse or unauthorized use of the information collected (Zeng, 2021).

Another ethical issue concerns technological dependence. While AI can improve the efficiency and personalization of teaching, it is essential that teachers do not become overly dependent on these tools, risking compromising the value of the human relationship in teaching.

Technology should be a support, not a substitute for direct pedagogical interaction, which remains a fundamental aspect of the educational process (Schwab, 2016). Finally, the transparency of algorithms and the interpretability of decisions made by AI are other crucial issues.

Educators need to be able to understand how data is processed and how algorithms arrive at certain suggestions or conclusions. This requires designing AI systems that are not only effective, but also transparent and understandable to users (O'Neil, 2016).

3. Risks and opportunities in the educational context

The potential available today, thanks to the use of artificial intelligence, is manifold. You can personalize the learning path, check the level of preparation to build a tailor-made work plan with the student, allow even those who do not have particular artistic talents to express their creativity, adapt the level of the lesson for students with special needs or for those who do not yet speak our language well.

Generative artificial intelligences can work for inclusion if well managed, leaving the teacher more free time to develop relationships with students, for the education of so-called soft skills, and to form a new role for an empowered student, accustomed to continuous critical reflection on his own learning process.

The topic of AI creativity is at the center of public attention, the process would absolutely require typically human forms of intelligence and sensitivity.

However, there are numerous opinions of those who think the opposite, that is, that artificial systems are already producing works - whether in fiction, music, painting or design - that have nothing to envy of those produced by human ingenuity.

In technology, with new applications, the amount of data that can be processed changes, so we will have great potential to manage with critical thinking (absent in robots) and awareness.

The role of the school will be decisive in the coming years. The opportunity to make these technologies known and offer to the new generations that many activities that exist today will no longer exist tomorrow is fundamental.

Guglielmo Tamburrini, addresses the ethical dilemmas that emerge from the use of robotics and artificial intelligence (AI) such as human responsibility in relation to the decisions and actions of machines, the impact of AI on society, and the ethical challenges that arise from it.

Regarding the operational autonomy of machines, we need to ask ourselves which decisions, which influence the physical well-being and rights of people, can be entrusted to autonomous machines.

All this puts human responsibility at the center again: to what extent should humans retain control over the decisions made by AI?

We need to be aware of our limits and therefore know how to manage the limitations in our ability to explain and predict the behavior of robots that learn and interact with other systems. (Machine ethics. Moral dilemmas for robotics and artificial intelligence 2020) Luciano Floridi raises several specific ethical implications regarding AI.

The digital revolution offers extraordinary opportunities, but also doubts and concerns. It is essential to understand technological transformations to guide them in a socially fair and environmentally sustainable direction.

For example, the importance of transparency and understanding of AI technologies is crucial. Only through greater understanding can we avoid mistakes and guide the development of digital technologies ethically.

We need to share ideas and work together to address ethical challenges.

AI can have a significant impact not only technologically, but also culturally and politically, so digital could be responsible for all of this too. It is necessary to develop a code of ethics that can guide its responsible use and applications. (Floridi, 2022)

Floridi again maintains that AI represents an unprecedented divorce between intelligence, understood as the ability to think, and the ability to act effectively.

It is essential to understand the technological transformations taking place in order to guide the digital revolution in a direction that is socially fair and environmentally sustainable, which is precisely why a collective effort of intelligence is needed to face the ethical challenges of AI, sharing ideas and working together to develop a philosophy of our time. We will have extraordinary opportunities that we can exploit for the benefit of humanity and the planet.

In teaching, not only the traditional methodology is transforming but also the role of the teacher and the way students learn.

AI in the digital age is seen as a tool capable of improving the educational experience, making the teaching process more dynamic, inclusive and personalized.

In such delicate educational contexts as those of nursery and primary schools, where students are in a phase of cognitive and relational development, the use of AI is not limited to offering technological support, but acts as a bridge between technology and pedagogy, facilitating the interaction and involvement of students in a stimulating way.

Through specific applications, digital learning platforms and virtual assistants, AI can support the teacher in monitoring the progress of each pupil and in identifying difficulties or special educational needs early.

One of the main advantages is the ability to adapt to the pace and needs of each individual child, providing personalized learning tailored to each child's skills and abilities. This not only improves scholastic performance, but also promotes inclusion and active participation, allowing everyone to access educational tools based on their individual needs.

The European AI Bureau was established to ensure the correct implementation and oversight of the law, and to promote a climate of international cooperation on the ethical use of AI, highlighting Europe's leading role on a global scale.

Furthermore, a voluntary pact, the AI Pact, has been introduced to encourage companies to comply with the obligations in advance, ensuring a gradual and coordinated transition towards the application of the regulation. (https://digital-strategy.ec.europa.eu/it/policies/regulatory-framework-ai consulted on 9 November 2024)

In summer 2023, 55 schools in Friuli Venezia Giulia, led by the Liceo Classico "Jacopo Stellini" of Udine, started a collaboration to develop guidelines on the use of Generative Artificial Intelligence (AIg) in teaching.

This project, which lasted the entire school year, involved managers, teachers and students in participatory research aimed at ethically and responsibly integrating AI into schools.

Schools have chosen to adopt AI to prepare students for emerging skills and an evolving technological environment. The final ebook leads to the promotion of various main objectives which include:

1. Preparing for the Future: develop AI skills to face future work challenges.
2. Promotion of Creativity and Innovation: exploit the potential of AIg to create art, music and texts.
3. Teaching Effectiveness: improve teaching through advanced tools, such as virtual tutors and automated assessments.
4. Ethical Awareness: raise students' awareness of the ethical aspects and risks of technology.
5. Integration with the Labor Market: train useful skills for future professions that will require familiarity with AIg.

(https://www.agendadigitale.eu/scuola-digitale/uso-dellia-a-scuola-le-prime-linee-guida-dal-friuli-venezia-giulia/ consulted on 9 November 2024)

Lombardy also presented its first guidelines on the use of artificial intelligence in schools, an innovative project in Italy.

The conference "The art of learning" saw the participation of the Minister of Education Valditara and the governor Attilio Fontana, who underlined the importance of educating young people about this technology which is already relevant in the present, with particular attention to ethical aspects. The guidelines, developed by a committee of ten experts, propose a practical and open approach, intended to encourage the active contribution of teachers. According to Education Councilor Simona Tironi, these indications encourage inclusive and personalized teaching, adapting the materials to the students' abilities. The document addresses various topics, including lesson preparation, the use of AI in the classroom and support for

individual study, both in class and at home. Minister Valditara emphasized that, while never replacing teachers, AI can support learning and contribute to educational success. The pilot project is already active in three schools in Lombardy, in Milan, Colico and Cologno Monzese, with prospects for expansion if the results are positive.

(https://www.ansa.it/sito/notizie/cronaca/2024/11/04/lombardia-da-le-linee-guida-sullai-a-scuola-e-prima-in-italia_091888b0-e608-4f4e-a682-2ea9582bbbcb.html consulted on 10 November 2024).

Artificial intelligence has the potential to revolutionize the way we personalize the digital experience, making services more responsive to individual needs.

However, it is essential to balance the benefits of personalization with the management of ethical risks and privacy.

With appropriate regulation and thoughtful design, AI can help create personalized experiences that respect the freedom and safety of users, while maintaining the effectiveness and efficiency of the technologies in play.

4. Conclusions

Artificial Intelligence can be considered as a support on which to refer for the search for new theories and new opportunities for cultural growth.

The hypothesis, therefore, of mixed teaching can determine significant transformations to create a specific inclusive school.

Mixed teaching that can involve the various sensorial dimensions in a digital perspective and, in particular, linked to Artificial Intelligence, as teaching seems to be able to develop in the contemporary world, constitutes a decisive moment for developing the student's creativity using traditional and innovative methodologies.

The theme of distance education (Vertecchi, 2021) is therefore linked in this text to the development of creative learning that develops tradition in the characteristics of the digital world and artificial intelligence. Precisely from this perspective we can better understand the question of inclusion. In the school of autonomy, in fact, a differentiation of learning develops which, however, does not determine a hierarchy of talents and a substantial differentiation of people.

A solution, therefore, of an inclusive school model would consist in the fact that everyone's talent should be enhanced while maintaining the diversity of learning and training processes (D'Alonzo & Monauni, 2021).

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Sitography

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