

THE IMPACT OF ARTIFICIAL INTELLIGENCE TECHNOLOGIES ON SCHOOL ORIENTATION ACCORDING TO AN INCLUSIVE PERSPECTIVE

L'IMPATTO DELLE TECNOLOGIE DI INTELLIGENZA ARTIFICIALE NELL'ORIENTAMENTO SCOLASTICO IN OTTICA INCLUSIVA

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ABSTRACT

School orientation is a crucial moment in every student's growth path, where the choice of the suitable training becomes increasingly complex. Artificial Intelligence emerges as a new paradigm that can transform school orientation, offering new opportunities for personalization. The aim of this paper is to analyse the use of AI technologies in school orientation and their impact on the educational, training and employment processes of students.

L'orientamento scolastico rappresenta un momento cruciale nella crescita di ogni studente, dove la scelta del percorso formativo diventa sempre più complessa. L'Intelligenza Artificiale emerge come un nuovo paradigma capace di trasformare l'orientamento scolastico, offrendo nuove opportunità di personalizzazione. Lo scopo di questo articolo è analizzare l'uso delle tecnologie IA nell'orientamento scolastico e il loro impatto sui processi educativi, formativi e lavorativi degli studenti.

KEYWORDS

School orientation, Artificial intelligence, Socio-economic disparities, Gender differences, Inclusion.

Orientamento scolastico, Intelligenza Artificiale, Differenze socio-economiche, Differenze di genere, Inclusione.

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Introduction

According to the National Guidelines for Lifelong Guidance (2013), school orientation is not only *"the tool for managing the transition between school, training and labour market, but it assumes a permanent value in the life of each person. This allows their development and support in the selection and decision-making processes with the aim of promoting active employment, economic growth and social inclusion"*. Through the definition of orientation at the regulatory level, we aim to focus on its relevance not only in terms of guiding to the best choice, but also in terms of self-perception and self-realization.

The construct of orientation, in the Italian school environment, offers to each student the opportunity to know himself and to make conscious choices, as well as being a fundamental tool to contrast early school leaving and youth hardship. Through a holistic approach, orientation embraces the totality of the individual, considering him in his integrality and following his evolution throughout his life. Therefore, as proposed by the Guidelines for permanent orientation, educational action is not limited to the professional aspect of orientation, but also and above all to the formative one, promoting the development of cognitive, logical-methodological and transversal skills. At the same time, these skills are fundamental not only for acquiring a sense of entrepreneurship and initiative, but also for playing a key role in the development of active citizenship. Through orientation activities aimed at the totality of the individual, students have the opportunity to develop their own empowerment in a perspective of self-efficacy, in which they acquire confidence in themselves and their potential, necessary to achieve their life goals. According with an interdisciplinary perspective, this contribution carries out a critical analysis of the orientation in relation to the technological innovation that contemporary society is facing in recent years. However, the concept of orientation must be understood in a wider perspective, not limiting itself exclusively to the transition between school and the labour market, but extending it to all stages of the individual's life. Through the activity of orientation, the person has the chance to orient himself effectively for each specific situation of his life. This is essential to provide the appropriate tools to deal with the several stages of life and with problems that may arise. As already mentioned, the concept of orientation is often associated with the transition from a grade of school to another or with the entry into the working world, but it is not merely a transitional phase: it is a continuous process, with a wider meaning, that starts from childhood and reaches adult life, embracing the totality of the individual. This allows promoting a deeper self-understanding, facilitating self-determination, key elements to face the challenges related to life in constant change (Marcarini, 2012).

Through the critical analysis of the state of the art regarding technological innovation strictly linked to school orientation, will be investigated digital tools based on artificial intelligence that have the right potential to be implemented in the orientation of students, increasing their specificity and inclusiveness.

The present paper aims to consider e to look at school orientation according to an inclusive perspective, through a pedagogical analysis focused on gender equality and the need to counter stereotypes that produce disadvantage and undermine socio-cultural inclusion. Through the examination of today's scientific material, using qualitative and quantitative methodologies, we want to outline and define a reference trajectory that can positively influence the guidance practices used in schools. In particular, the focus is on the use of digital technologies and artificial intelligence as productive tools to make orientation truly accessible and attentive to every student.

1. School orientation as a tool for the self-perception

The emerging results carried out from the exploration of scientific literature highlight a strong incidence of the gender stereotype within the choices made by students in relation to studies and the choice of future career. According to studies conducted by the MIUR in 2017, there is a strong differentiation between students and students in relation to the choice of secondary school, most likely influenced by gender stereotypes, the social or family context (Biemmi, 2020). In fact, 60.6% of girls choose a high school course and 89% of them prefer the Human Sciences, while 70% of boys prefer technical studies. According to Save The Children's Report on Gender Stereotypes in Relation to STEM Subjects (2024), nowadays society presents a persistent disparity between girls and boys in choosing their own future path. The continuous perception that males are more inclined towards scientific and technological careers goes to counter the evidence that attests equal skills and competences between girls and boys in STEM subjects. However, while this is a fact, differences in opportunities persist, leading inevitably to negative repercussions on one's self-esteem and perception of one's abilities. At the same time, according to a study carried out by Eurostat in 2019 (Openpolis, 2022), a clear gender gap persists in Europe regarding university choice for STEM. With regard to the Italian question, it is reported that every 1,000 graduates in STEM between 20 and 29 years, 13.30 are female while 19.40 are male, further accentuating the issue of gender inequality. The inequality of access is accentuated by the remuneration matter, in which in the relative positions of women, compared to those of men, there are inconsistencies of a salary type (Biemmi, 2020). In this regard, it is of

fundamental importance to implement an orientation not only informative, but also formative, based on the enhancement of the individual through an emancipatory action aimed at self-realization and self-affirmation. With orientation activities, it is possible to provide the appropriate tools to foster the development of the person by promoting decision-making autonomy, necessary for lifelong learning (Chiusaroli, 2023). Therefore, to prefer a multilateral approach, a joint strategy among all the members that become part of each person's life, in which each of them plays a fundamental role for a qualitative growth and a correct development of the person. Acting for the common well-being, where school and family have the obligation to support and encourage female and male students in the transitional lifetime, important to make correct choices, which are fitted to their abilities. The collaboration between all members is fundamental, in which family and school possess key information helpful for the orientation support: information both personal and in terms of skills (El Haji & Azmani, 2020). Often and however, the motivations that lie in gender gaps are also long-standing in family culture, too often difficult to change (Parricchi, 2023). According to this, with the increase of digital technology and artificial intelligence, it is possible to benefit from these tools in terms of orientation, through which the student can also use them independently, and through which it can achieve a greater awareness of himself and of his potential.

1. Big Data in the orientation practices

In recent years, there has been a significant transformation of the socio-economic scene, with the acceleration of digitalization in all its sectors. This change has led to a growing demand in the labour market for skills in STEM disciplines, representing a particular challenge for women, who are thus at risk of being disadvantaged in the labour market, lacking the appropriate skills. This matter threatens to increase existing inequalities, where women risk not being able to have equal access to employment. To ensure that this does not happen, school and especially the wider society has the task of improving orientation activities to offer equal opportunities to all. Implementing the use of Artificial Intelligence and Big Data can give an appropriate chance to provide everyone the same opportunity and to take into account every specificity of the individual, adopting a personalized methodology. To overcome such stereotypes, and to make a more inclusive orientation, It is possible to use applications based on artificial intelligence through Machine Learning algorithms that allow to acquire detailed information regarding the characteristics of each student (Mikrat et alii, 2022) enhancing his uniqueness and

specificity. Through the Machine Learning and the Deep Learning it is not only possible to encourage the interaction between man and machine, but it provides the student with the opportunity to get to a deeper knowledge of their abilities, as well as to encourage personalized tutoring, where the person interacts and interrogates the machine, getting an immediate feedback (Panciroli & Revolver, 2023). The analysis of the reference scientific material shows how the use of technologies based on Big Data is necessary to manage the large number of data and variables to be taken into account during the school orientation course (Ouatik et al, 2021). The need to use digital technologies, that are able to acquire a large amount of information and manage them, it is fundamental to be capable of consider every aspect of the individual, managing at the same time to capture latent or lacking characteristics of the person. It is difficult to carry out orientation activities that are efficient and effective for each student because of the specificity of the individual and the large number of information that must be taken into account. At the same time, even if you can accomplish the difficult challenge of identifying the peculiarities of each, it is difficult to do so in a very short time. Focusing interests, motivation, strengths and weaknesses takes a long time (Mikrat et alii, 2022), and the use of Big Data is an appropriate method thanks to its ability to respond to the 3V rule: Volume, Variety and Speed (Ouatik & Erritali, 2021). Through them, you have the opportunity to overcome the problem or still bring great benefits in terms of time and data management. In fact, these studies have identified some technologies such as Neural Network, Naïve Bayes, Random Forest Tree and Support Vector Machine (SVM) as useful tools in the school orientation path, especially to optimize the time in relation to the large number of data. Through the machine learning, these technologies also provide the chance of probability prediction, as well as making decisions about perception and logical-formal reasoning. According to the OECD, it is essential to base the orientation action as an activity that will counteract all forms of discrimination, not only in terms of gender difference, but also in terms of socio-cultural (Biemmi, 2020). At the same time, the student needs to be supported during the development and the construction of self-perception and self-efficacy, which represent important prerogatives to promote the full development and of the individual. From the comparative analysis of technologies, useful to gain a more inclusive and performing orientation, it emerges that Naïve Bayes is the most appropriate instrument in terms of accuracy and execution time. It can foster an approach focused on the characteristics of the individual and on the way by which he can interact with the orientation action in its entirety (Ouatik et al, 2021).

Conclusions

School orientation is a complex and multifactorial process, which plays a crucial role in the individual and professional development of the student. The strengthening of this educational practice goes beyond mere information, reaching a broader and more inclusive vision that embraces the totality of the individual and supports self-determination. Making the right choices for your future life path is not confined to the future occupation category, but it is essential to achieve a psycho-physical well-being indispensable for your personal and professional development (Mikrat et alii, 2022). Promoting the right orientation in terms of growth and development of the individual is indispensable for the achievement of his social well-being.

The constant technological evolution of recent years represents a turning point for building educational interventions in which the centrality of the person is the crucial point. Benefiting from these technologies is fundamental and indispensable for implementing inclusive and personalised guidance activities. The emerging of Artificial Intelligence matter is transforming the social context in its entirety, making improvements but bringing with it many challenges. The task of the school and of all members that are part of the educational journey is to encourage the use of these new technologies to better benefit in terms of innovation. The use of algorithms capable of analysing a large number of data related to the performance of students, their interests and preferences, provide valuable information on the specifics of the student, providing the opportunity to create educational and professional paths fitted to their abilities and ambitions. At the same time, it offers the opportunity to identify hidden talents and to promote greater equity in access to educational and professional opportunities, offering everyone the opportunity to know and recognize himself. Beginning from these assumptions, it is necessary to recognize the continuous evolution of digital technology and artificial intelligence, therefore, the present paper aims to outline new research perspectives in terms of digital technologies and artificial intelligence used during school orientation processes. The traditional approach, although it offers everyone the opportunity to discover new horizons of life, often fails to capture the specificity of the individual with all its nuances. Therefore, the adoption of innovative technologies emerges as a new possible path to address these issues, providing support both to those involved in guidance and to those who benefit from it.

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