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Artificial intelligence and gender stereotypes: reflections, perpectives and digital innovation for inclusion at school

Intelligenza artificiale e stereotipi di genere: riflessioni, prospettive e innovazione digitale per l'inclusione a scuola

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Abstract
This article describes the experience conducted by 152 trainee teachers who, within the practical exercises of the Laboratory of Teaching of Education and the Anthropological Area, within the Specialization Course for Educational Support Activities for Students with Disabilities (TFA support VIII cycle, Upper Secondary School) at the University of Foggia, have planned and implemented a multimedia project with the aim of carrying out a reflection on the concept of gender stereotyping in light of the advent of new technologies and, in particular, artificial intelligence, proposing digital innovation project perspectives that can be pursued within the world of school to promote inclusion.
Starting from an analysis of the needs related to the problems related to the presence of prejudices and gender stereotypes in today's society, and in particular in the youth world, the experience conducted has on the one hand offered food for thought on the impact that Artificial Intelligence has on the different aspects of our lives and on the gender discrimination perpetuated by it, on the other hand it proposes an inclusive and sustainable design model, based on the use of Artificial Intelligence and new digital and multimedia technologies, aimed at promoting inclusion by breaking down gender stereotypes through study and knowledge.
The digital product obtained from this study, initially designed and created in a laboratory format by the teachers in training, was then submitted to their students, configuring itself as a tool that can contribute to the fight against gender inequalities, promote inclusion at school and be accessible, informative, flexible and engaging for all students.

Keywords: Artificial Intelligence; Gender Stereotypes; Inclusion; Digital Innovation.

Riassunto
Questo articolo descrive l'esperienza condotta da 152 docenti in formazione che, all'interno delle esercitazioni pratiche del Laboratorio di Didattica delle Educazioni e dell'Area Antropologica, all'interno del Corso di Specializzazione per le Attività di Sostegno Didattico per Studenti con Disabilità (TFA sostegno VIII ciclo, Scuola Secondaria di Secondo Grado) presso l'Università degli Studi di Foggia, hanno pianificato e realizzato un progetto multimediale con l'obiettivo di operare una riflessione sul concetto di stereotipia di genere alla luce dell'avvento di nuove tecnologie e, in particolare, dell'intelligenza artificiale, proponendo prosepettive progettuali di innovazione digitale perseguibili all'interno del mondo della scuola per favorire l'inclusione.
Partendo da un'analisi dei bisogni legati alle problematiche relative alla presenza di pregiudizi e stereotipi di genere nella società odierna, e in modo particolare nel mondo giovanile, l'esperienza condotta ha offerto da una parte spunti di riflessione sull'impatto che l'Intelligenza Artificiale ha nei confronti dei diversi aspetti della nostra vita e sulla discriminazione di genere da essa perpetuata, d'altro canto propone un modello progettuale inclusivo e sostenibile, basato sull'utilizzo dell'Intelligenza Artificiale e delle nuove tecnologie digitali e multimediali, finalizzato a promuovere l'inclusione abbattendo gli stereotipi di genere attraverso lo studio e la conoscenza.
Il prodotto digitale ottenuto da questo studio, dapprima progettato e realizzato in forma laboratoriale dagli insegnanti in formazione, è stato poi sottoposto ai loro studenti, configurandosi come uno strumento che può contribuire alla lotta alle disuguaglianze di genere, promuovere l'inclusione ed essere accessibile, informativo, flessibile e coinvolgente per tutti gli studenti.

Parole chiave: Intelligenza Artificiale, Stereotipi Di Genere, Inclusione, Innovazione Digitale.

1. Stereotypes, digital technologies and teacher training

Differences between individuals can lead to the birth and spread of stereotypes and prejudices, which could lead to attitudes and behaviors that lead to marginalization and differential treatment of minorities that share specific characteristics.

The reasons can be multiple: race, gender, culture, religion and disability; furthermore, discrimination can manifest itself in different social contexts: work, political, educational, school, etc.

In this perspective, inclusion aims to guarantee each individual full integration into society, promoting the development of a sense of belonging, eliminating all forms of discrimination, respecting individual diversity, and creating a fair environment full of opportunities for all.

The concept of *stereotype* has ancient roots: in 1795, the famous typographer Firmin Didot developed a method for duplicating and printing typographic compositions (Falchetti, 2020). This process, known as stereotyping, made it possible to obtain identical copies of an image in a simple and automated way. Similarly, on a conceptual level, humans operate mentally and emotionally when they create a mental image of something or someone for the purpose of judging.

In Psychology, the term stereotype refers to mental schemas or generalized and simplified cognitive representations that people create about groups of individuals or social categories. These mental representations are influenced by beliefs and expectations and often lead to the formation of distorted judgments or discrimination.

In social sciences, the term stereotype was introduced around 1920 by the American journalist and politician Walter Lippmann (Jansen, 2013). According to his studies on prejudice, the media play a significant role in the formation of stereotypes themselves, as people passively accept what is transmitted, without examining the facts in light of other perspectives or possibilities.

In the field of social psychology, Hamilton et al. (1986) describe the stereotype as a cognitive structure that contains an individual's knowledge, beliefs and expectations regarding a particular human group.

Stereotypes are therefore generalized concepts that we tend to formulate based on superficial and easily perceptible attributes such as race, gender, age, sexual orientation, religious or ethnic affiliation.

These mental schemes are a natural way to simplify complex information and make decisions quickly, moreover, stereotypes allow us to easily attribute the general characteristics of a group of people to all its members, without considering the individual characteristics of each one (De Caroli, 2005).

But evaluations that emerge from stereotypes are often responsible for prejudice and discrimination. For example, an individual belonging to a stigmatized group, such as an ethnic or sexual minority, may be wrongly judged based on the stereotypes associated with his group rather than on his personal merits.

The social context heavily influences an individual's knowledge, beliefs and expectations regarding what is other than himself, and numerous studies demonstrate how the influences of new emerging technologies, especially artificial intelligence, can strongly fuel these biases (Himana, 2023; Hoffman & Podgurski, 2019; Rosso, 2023).

Training future teachers on topics of such great social impact is certainly one of the challenges that today's school must face in order to train the future citizens of tomorrow.

Today's teachers must therefore be able to read the new digital languages with a view to building an inclusive school open to all, know them, calibrate them and use them while respecting differences to promote true and authentic knowledge (Piccione et al., 2021; Di Martino, 2024).

This article reports a careful work of sharing and cooperation carried out by 152 teachers in training within the Laboratory of Teaching of Education and the Anthropological Area, within the Specialization Course for Educational Support Activities for Students with Disabilities (TFA support VIII cycle, Upper Secondary School) at the University of Foggia which intends to reflect and make people reflect on the concept of gender stereotyping in light of the advent of new technologies and, in particular, artificial intelligence, proposing project perspectives of digital innovation that can be pursued within the world of education to promote inclusion at school.

2. How Artificial Intelligence can influence gender stereotyping

The World Health Organization (WHO) (2021) interprets the concept of gender as a construction based on social parameters that concern the behavior, actions and roles assigned to a certain sex (World Health Organization, 2021).

The American Psychological Association (APA) defines it as «social, cultural, and psychological characteristics associated with being male or female» (Bradley et al., 2020).

Both definitions, therefore, recognize that gender is not an intrinsic biological characteristic, but is a social construct.

Philosopher Judith Butler, a scholar in the field of gender studies, argues that it is a social performance, an act that people do to conform to society's expectations (Butler, 1988). Individuals tend to generalize about behaviors associated with different genders, such as the idea that women are delicate and emotional and men are more prone to aggressive behavior (Harris & Jenkins, 2006; Plant et al., 2000).

These generalizations contribute to the formation of specific patterns of behavior and biases that persist today.

Gender biases are prejudices or stereotypes that influence our perceptions and decisions and can manifest themselves in various contexts, such as work, education, social life and even language. One of the most common gender biases is the assignment of roles and characteristics: an example is associating women with caring skills and empathy while men with leadership skills and assertiveness.

These stereotypes are deeply rooted in social beliefs and expectations and have complex and multifactorial roots, closely linked to the family context, the culture of belonging, education, peer relationships and society as a whole. These influences contribute to the formation of ideas and expectations that human beings develop from an early age about themselves, others and the world, based on preconceptions.

It is worrying to note that they are internalized from early childhood, assimilated unconsciously by both boys and girls, and persist into adulthood.

These are culturally shaped and constructed ideas that guide our interpretation and evaluation of the world, individuals and events through two distinct categorizations: one associated with the masculine and one with the feminine. These classifications are not equated, rather they are articulated on a hierarchy that emphasizes the predominance of the masculine pole over the feminine one (Biemmi, 2010).

In the current context, strongly influenced by the effects and influences of technology, these biases can be found in the interactions between users and artificial intelligence tools.

Gross (2023), among many experts on the relationship between gender stereotypes and Artificial Intelligence, conducted a study to understand gender views in ChatGPT.

ChatGPT, developed by OpenAI, is a virtual assistant based on artificial intelligence and machine learning, designed to understand and respond to a wide range of questions and requests from a human user.

During the practical exercises planned for the Laboratory of Teaching of Education and the Anthropological Area, within the Specialization Course for Educational Support Activities for Students with Disabilities (TFA support VIII cycle, Upper Secondary School) at the University of Foggia, 152 teachers in training studied the functioning of a digital software available free online, created to generate images with the use of artificial intelligence: https://www.bing.com/create.

The aim of this laboratory work was to study the results obtained from the creation of images obtained by inserting into the search nouns and adjectives of common or epicene gender, that is, which have a single invariable form for the masculine and feminine for which the gender can be reconstructed only from the possible presence of the article or, in some cases, from the presence of an adjective.

The research carried out is shown in table 1:

Research n. 1	emotional teacher	Figures 1 and 2
Research n. 2	influential teacher	Figures 3 and 4
Research n. 3	sociable teacher	Figures 5 and 6
Research n. 4	uncompromising teacher	Figures 7 and 8
Research n. 5	educational figure	Figures 9 and 10

Tab. 1: Searches performed using the site https://www.bing.com/create

The search results are reported iconically in figures 1, 2, 3, 4, 5, 6, 7 and 8.

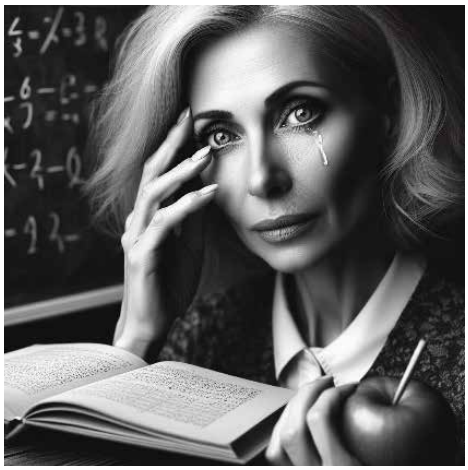
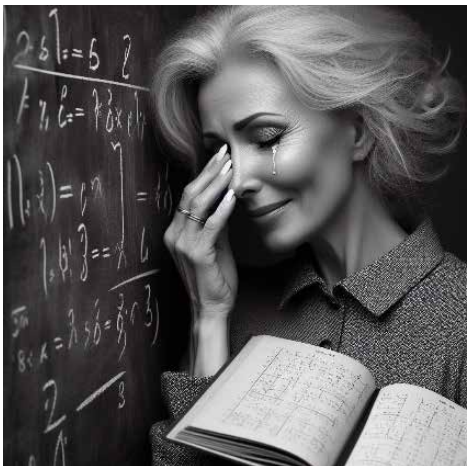

Fig.1 and 2: Search result: emotional teacher (www.bing.com/create)

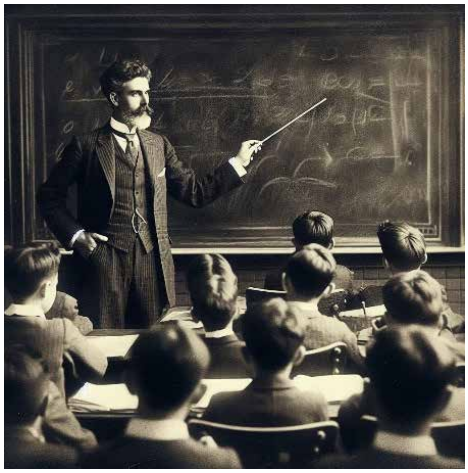
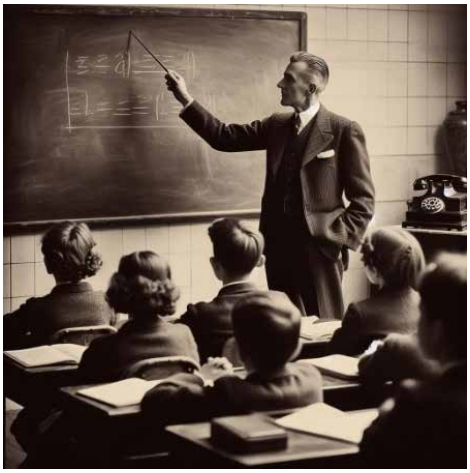

Fig. 3 and 4: Search result: influential teacher (www.bing.com/create)

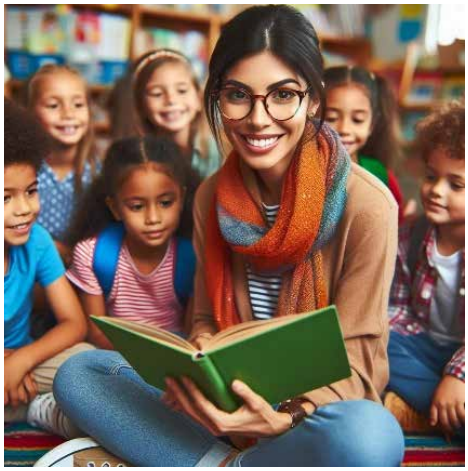


Fig. 5 and 6: Search result: sociable teacher (www.bing.com/create)

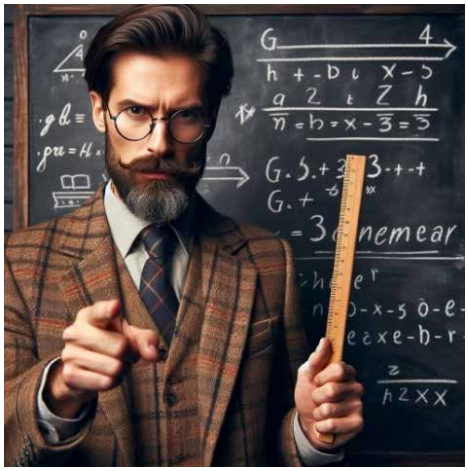
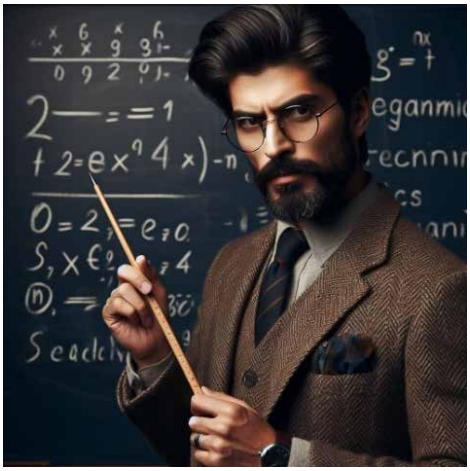

Fig. 7 and 8: Search result: uncompromising teacher (www.bing.com/create)


Fig. 9 and 10: Search result: educational figure (www.bing.com/create)

The results obtained show how AI tools have performative, and sometimes manipulative, effects when it comes to gender, reinforcing prejudices.

A crucial aspect is that decisions made during the development of software, including those related to data management and the writing of algorithms, are influenced by the perspectives and opinions of human programmers. If they have gender biases, conscious or not, these biases can emerge in the development process and end up affecting the functioning of artificial intelligence.

In short, it is important to recognize that AI is not immune to bias and can reflect and perpetuate stereotypes that are harmful to the progress of society.

3. A multimedia project to promote inclusion by breaking down gender stereotypes through study and knowledge

3.1 The organization of the project

As part of the practicle exercises for the Laboratory of Teaching in Education and the Anthropological Area, under the Specialization Course for Educational Support Activities for Students with Disabilities (TFA Support VIII cycle, Upper Secondary School) at the University of Foggia, trainee teachers developed a multimedia project focusing on gender inequalities fron an inclusive perspective.

The project was later presented to students in the classrooms where these teachers had conducted their internships.

Its primary goal was to educate and raise awarness about gender inequalities while fostering an inclusive environment, with particular attention to individuals with Special Educational Needs.

The project targeted a diverse audience, including Italian and foreign students, as well as those with visual or hearing impairments.

To ensure accessibility, it employed simple and clear language while addressing complex topics.

The initiative leveraged virtual reality, featuring an Interactive Multimedia Monitor where an avatar, acting as a digital alter ego, guided users through topics on gender stereotypes using AI-generated images (https://www.bing.com/create).

This inclusivity was further enhanced through digital content that:

– was translated into six languages (Italian, English, French, German, Spanish and Albanian);
– offered both written and audio formats, making it accessible to visually or hearing-impaired students.

The project succeeded thanks to collaboration between language teachers, native speakers and graduates in foreign languages, which enriched its linguistic and cultural diversity.

The digital tools used were:

– Procreate: graphics editor app, to create illustrations and animations (https://procreate.com);
– Canva: graphic design tool, for designing graphics and presenting content visually (https://www.canva.com);
– Bing Create: a platform for generating AI-based "Disney Pixar"-style images (https://www.bing.com/create);
– QR-generator: a platform to create QR codes for easy and interactive access to digital content (https://the-qrcode-generator.com).

The contents related to inequalities due to gender stereotypes, organized in steps, are reported in table 2:

Steps		Activity names	QR-codes
1	**Introduction**	Let my introduce myself	Figure 11
2	**History, culture and hierarchies**	Best wishes and sons	Figure 13
3	**Anti Feminism and Women's Empowerment**	Ladies, the knife grinder has arrived	Figure 15
4	**Definition of masculinity and femininity**	Pink is for girls	Figure 17
5	**Emotions**	Emotions	Figure 19
6	**The world of work**	Equal pay	Figure 21

Tab. 2: Organization of multimedia project contents

3.2 Content and virtual representation with the use of artificial intelligence

The project begins with the introduction of a virtual teacher (Figures 11 and 12), who gradually guides students in understanding how stereotypes primarily stem form social beliefs and expectations. These factor, which are complex and multifaceted, are deeply rooted in family contexts, cultural backgrounds, educational methods, peer relationships and society as a whole.

ITALIAN ALBANIAN FRENCH ENGLISH SPANISH GERMAN

Fig. 11: QR-codes – Step 1

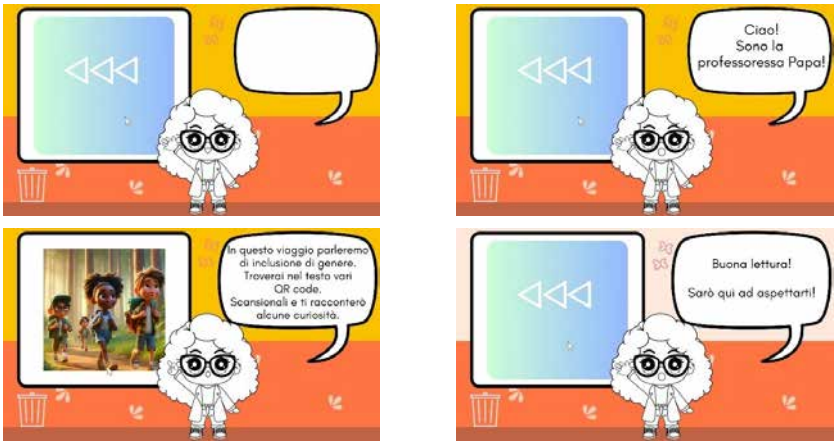

Fig.12**:** Virtual frames in Italian Language – Step 1

These influences shape ideas and expectations froman early age, starting with perceptions of oneself and later extending to others and the world, often based entirely on preconceived notions (figures 13 and 14).

ITALIAN ALBANIAN FRENCH ENGLISH SPANISH GERMAN

Fig. 13: QR-codes – Step 2

Fig.14: Virtual frames in Italian Language – Step 2

The project pays particular attention to the historical representation of women, highlighting how they have often been portrayed negatively. For example, in ancient societies, Eve was blamed for persuading

Adam to disobey God's will (Ercolani, 2013). Greek culture confined women to domestic roles, symbolized by items like sieves or grids presented at marriage to represent their household duties (figures 15 and 16).

Similarly, Roman society placed women under the authority of the *pater familias*, who controlled all family decisions, including choosing husbands for daughters, treating women almost as objects (Ercolani, 2013).

During the 18th century, women began to recognize the imbalance between the sexes, giving rise to movements that challenged their subordinate roles (Saraceno, 1994).

Feminism as a formal movement emerged in the late 19th century, driven by the suffragette movement in England, which fought for women's right to vote and equal opportunities, including education (Offen, 1988; Pieroni Bortolotti, 1963).

The Enlightenment period laid the groundwork for modern feminism by advocating equality among individuals regardless of birth, although societal structures remained patriarchal, limiting women's roles. By the 20th century, fascist and Nazi regimes reinforced anti-feminist policies, confining women to domestic roles and praising their reproductive abilities, while condemning efforts toward emancipation (Civita & Massaro, 2011).

ITALIAN ALBANIAN FRENCH ENGLISH SPANISH GERMAN

Fig. 15: QR-codes – Step 3

Fig.16: Virtual frames in Italian Language – Step 3

The project also explores how gender pedagogy addresses the stereotypes reinforced through education. It notes that women are often depicted as caregivers or informal educators (figures 9 and 10), which reflects long-standing associations dating back to ancient Greece. While pedagogy traditionally focused on children, it is, in fact, an interdisciplinary field that encompasses education across all life stages, integrating insights from psychology, sociology, and anthropology.

Gender pedagogy critically examines how educational models perpetuate stereotypes. In Italy, this discipline began to gain prominence in the 1970s, thanks to works like *Dalla parte delle bambine* by Elena

Gianini Belotti (1973), which analyzed how gender stereotypes influenced girls' education, and *Male by obligation* (1974) by Carta Ravaioli, which explored the constraints of masculinity. These studies emphasize how societal norms influence even seemingly trivial choices, like the toys or colors assigned to boys and girls. Such early conditioning shapes their roles in adulthood and perpetuates inequality (Figures 17 and 18).

ITALIAN ALBANIAN FRENCH ENGLISH SPANISH GERMAN

Fig.17: QR-codes – Step 4

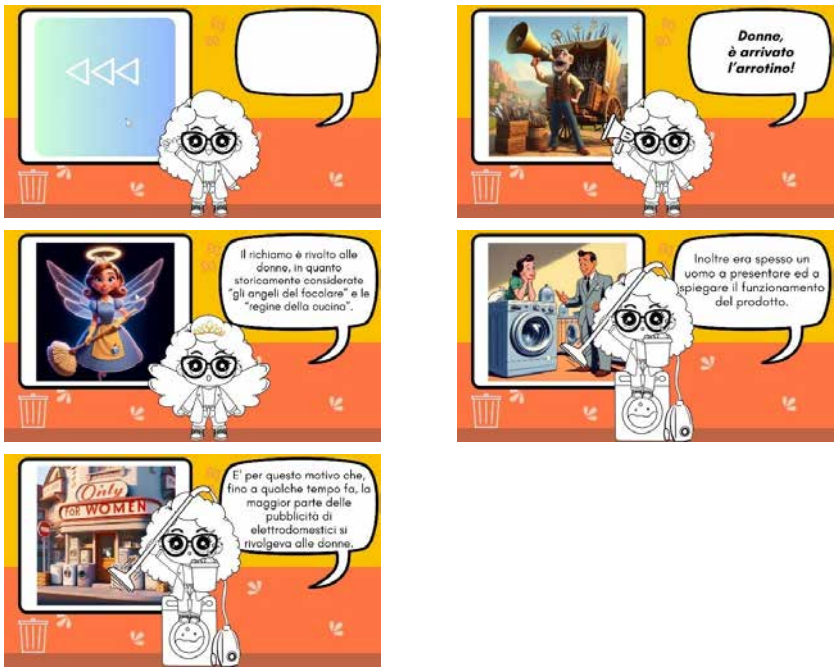

Fig. 18: Virtual frames in Italian Language – Step 4

Parents and educators often unconsciously reinforce gender norms, steering boys toward physical activities and girls toward nurturing or symbolic play. Pedagogy must identify these subtle cues to address and mitigate their long-term impact. For instance, Psychology shows that emotions are universal, but adults often shape children's emotional expression according to gender expectations (Figures 19 and 20).

ITALIAN ALBANIAN FRENCH ENGLISH SPANISH GERMAN

Fig. 19: QR-codes – Step 5

Fig.20: Virtual frames in Italian Language – Step 5

Suppressing certain emotions in childhood, such as anger, can lead to significant issues in adulthood, including a higher risk of depression and difficulty asserting oneself in unjust situations.

The project concludes by addressing the underrepresentation of women in STEM (Science, Technology, Engineering, and Mathematics) fields. Despite advancements, stereotypes continue to portray STEM as more suitable for men, affecting women's educational and career choices. The Global Gender Gap Report 2022 highlights that, while women outnumber men in higher education, only one-third of STEM graduates in Europe are women, and this disparity extends to professional leadership roles (figures 21 and 22).

To bridge this gap, societal change is essential.

ITALIAN ALBANIAN FRENCH ENGLISH SPANISH GERMAN

Fig. 21: QR-codes – Step 5

Fig.22: Virtual frames in Italian Language – Step 5

Companies must adopt inclusive hiring practices to encourage gender diversity in traditionally male-dominated fields. Additionally, welfare policies can support these efforts by fostering equitable work environments that promote women's participation in STEM and leadership positions.

This challenge is not unique to Italy but is a European issue. Studies show that many girls are interested in STEM but face societal barriers that discourage their involvement. Overcoming these barriers requires joint efforts in education, society, and the workplace to dismantle stereotypes and ensure equal opportunities for all.

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4. Conclusion and Perspectives

It is important to arrive at a deconstruction of standardized models, inherited from previous eras, in which the social context was completely different. The world of school and training more generally play a fundamental role in this sense.

Special attention to gender education must be the basis for real inclusion.

Despite the considerable progress made over the centuries, gender equality in all areas of private and social life is still a distant goal and respect for women's rights is lagging behind worldwide. Such equality implies that the interests, needs and priorities of both women and men are taken into account. This does not mean that women and men will become identical, but that rights, responsibilities and opportunities will not depend on gender.

Education must take place from the earliest years, through educational models that do not bring with them cultural legacies that limit, still, the natural development of each person's personality. Offering a wide range of toys, limiting judgments on the requests of boys and girls and encouraging them to explore their desires can lead to an enrichment of their growth and can also be advantageous in terms of learning. Allowing girls to practice physical sports and develop logical or scientific skills will not make them "less feminine", but more complete human beings.

Furthermore, education that rejects "negative emotions" in girls and teaches them to be patient and accommodating can increase the risk that they will ignore signs of abuse or violence in adulthood. This common thread that connects education to the dynamics of gender violence highlights the importance of addressing disparities also in the emotional education of children from the earliest years of life. Fighting gender bias requires awareness, recognizing one's own prejudices and actively working to overcome them.

In an inclusive reality, we try to adapt the educational environment to the needs of students, so that everyone can participate fully in social life and benefit fully from the school experience. In the current context, for example, children in Italian classes come from all over the world and the challenges that must be faced are always different. We need to achieve positive inclusion for all students, through the proposal of innovative multicultural and multilingual teaching strategies and methodologies.

It is essential to start from the idea that inclusion is not a static objective, but rather a dynamic process

that involves every single community, school or educational reality. This path can never be said to be concluded, since it must adapt and progress based on the individual needs of students, their diversity and abilities. Therefore, it is necessary to create a flexible educational space and a dedicated and sustainable program over time, which can be modified and improved continuously to guarantee respect for the differences of each person, be they gender, race or religion.

In the workplace, distinctions are no longer as clear-cut as they once were. A little girl may dream of becoming an astronaut, but if she were to achieve this desire, she would still be an exception to the rule. In the collective imagination, in fact, it is still difficult to abandon cultural legacies tied to tradition. We must continue to oppose the manifestations that imply patriarchal values and still show male supremacy.

Ultimately, we cannot and do not want to prevent a little girl from becoming a ballerina or following in the footsteps of her mother (or female role model), just as we cannot and do not want to prevent a little boy from taking other adult men as an example. Instead, we need to overcome the legacies that (unknowingly or not) still dominate modern society and allow everyone to have the same opportunities to plan their future according to their own inclinations and talents and not according to gender expectations.

The multimedia project, also created thanks to the use of artificial intelligence, represents a contribution to the fight against gender inequalities and the promotion of inclusion. It was designed to be accessible, informative and engaging for all students. The use of innovative tools and software available free online has allowed the creation of a digital product that we hope can be used as an educational resource and to raise awareness of the topic (Bonvini, 2024).

Artificial Intelligence (AI) in education is emerging as a transformative tool to promote inclusion and equity by addressing challenges related to diversity and inequality.

Though a socio-technical approach, AI systems can be designed to integrate diverse perspectives and representative data, ensuring equitable access to educational opportunities for all learners (Zowghi and da Rimini, 2023).

These technolgies enable personalized learning pathways tailored to individual needs, supporting students with varying abilities, linguistic background or cultural contexts.

For example, adaptive learning systems can provide customized content, while language-processing tools can assist non-native speakers or students with disabilities (Bhatti et al., 2024). Such applications hel reduce barriers to learning, fostering environments where everyone can thrive.

Embedding principles of diversity and inclusion throughout the entire lifecycle of AI development is essential to maximize its potential. This involves engaging stakeholders from diverse backgrounds, ensuring fair representation in datasets and continuously monitoring systems for biases that could perpetuate inequities (Shams et al., 2023).

Moreover, integrating AI literacy into education empowers students and educator to understand and critically evaluate the role of AI, enhancing their agency in using these tools effectively (Rice & Dunn, 2023).

By aligning AI development with ethical frameworks and regulatory standards, the AI in education can drive not only academic success but also broader social inclusion, creating a foundation for a more equitable future (Zowghi & Bano, 2024).

The work produced in these experience about AI and Gender Stereotypes could have potential if adapted, in fact it can be used to address any other topic of interest and and can help create a climate of well-being at school by fully responding to today's students' needs (Dato et al. 2021).

Thanks to the flexible structure, it is possible to modify the language and style based on the audience to which it is addressed, and to create personalized content that is tailored to the specific needs of different groups of students, making the project a versatile tool for education and awareness.

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Conflict of interests

The authors declare no conflict of interest.

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