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DIGITAL DISCRIMINATION RISKS IN THE TRANSFORMATION OF HIGHER EDUCATION

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Abstract. Digital discrimination is a form of discrimination that occurs in a digital environment or through the application of automated solutions, often based on artificial intelligence, which creates conditions for unfair, unethical, or simply different treatment based on selected data on certain feature. In conditions of the digital transformation of higher education, multiculturalism, and globalization, higher education institutions face the challenge of ensuring equity and equal treatment for all staff and students in both traditional and digital environments. This report examines the potential for the emergence of digital discrimination in applying various digital educational approaches and forms in higher education, commenting on the need to prepare plans and programs to prevent digital discrimination in an academic environment.

Keywords: digital discrimination; digital divide; higher education

Introduction

Modern educational systems are now leveraging open knowledge, student-centered teaching approaches, and dynamic, flexible organization of the learning process. They are taking advantage of global technology to provide updated educational services in a highly competitive market.

For European higher education institutions, the challenges are significantly greater due to a progressively aging population. Universities and colleges are competing for the attention and choice of a limited number of students. The primary „weapons "in this race are independent ratings, algorithmically objective assessments of the quality of education and educational achievements, and alluring customized education offers based on modern digital technologies.

However, digital transformation in higher education is not a panacea and often creates conditions for negative effects and impacts that were not predicted and cannot yet be adequately measured (Beloev et al. 2023) One of the phenomena accompanying the digital transformation of society, especially in higher education, is the unjust treatment or exclusion of individuals or groups

based on their digital access, skills, or experiences or the so called "digital discrimination".

Digital discrimination is a form of discrimination that occurs in a digital environment or through the application of automated solutions, often based on artificial intelligence, which creates conditions for unfair, unethical, or simply different treatment based on selected data on certain feature. At the heart of digital discrimination are the clear indicators of the digital gap and inequity. Policymakers are aware of this issue, and they are attempting to tackle social inequalities by bridging the digital divide (Ragnedda 2018). The concept of the digital divide, especially in its early stages, has often been oversimplified, wrongly suggesting a one-dimensional gap that is primarily based on the mere possession of technological resources or access to ICTs. These analyses tend to focus solely on economic factors, overlooking other crucial issues related to social structure activities. It represents the initial level of the digital divide (Ragnedda and Muschert 2013) which is mainly refered to the level of e-inclusion (Livingstone & Helsper 2007; Witte & Mannon 2010), but the digital discrimination was still not addressed. It requires bridging the digital divide by improving infrastructure, affordability, and digital literacy programs to ensure equal access to digital resources for all individuals and communities. To understand the impact of the digital discrimination in the era of digital transformation we should first comment the nature of discrimination and the most common variety of its manifestation in digital environment.

Most nations have adopted commonly recognized acts prohibiting discrimination in their national law, e.g., the International Covenant on Civil and Political Rights, the European Convention for the Protection of Human Rights, International Convention on the Elimination of All Forms of Racial Discrimination, Convention on the Elimination of All Forms of Discrimination against Women etc. However, there is no universally accepted definition of discrimination. Indeed, it is a shared form of socio-cultural understanding and perception conceptualized through historical circumstances, events, and other considerations. Furthermost existing national and transnational legislation consists of a non-exhaustive list of criteria or features (e.g., race, gender, sexual orientation) based on which discrimination is forbidden.

Therefore, the definition of discrimination explains possible human actions, behaviors, or their impacts on certain individuals or groups, relating to the disadvantage or more favorable treatment based on their membership in particular social groups defined by those criteria. Legal systems typically distinguish between two main types of discrimination (Altman 2016). In order to understand the nature of discrimination and its virtual manifestation we need clearly to describe the essential features and typology of this social-cultural phenomena.

Discrimination, as a result of intentional human behavior and perceptions, undermines the fundamental principle of human rights, which states that all

individuals are equal in dignity and entitled to the same fundamental rights. This principle is present in every major human rights document. The earliest attempts to define discrimination focused on the unequal treatment of members of different minority groups, such as Blacks, Muslims, Jews, immigrants, and women – groups that have historically been mistreated or neglected by the majority due to certain identifiable characteristics.

The term itself is used to describe how prejudices present in society can be reproduced or exacerbated in digital environments, affecting marginalized and underrepresented groups. The formal introduction and widespread adoption of the term will be part of an ongoing dialogue reflecting an evolving understanding of how digital technologies intersect with social inequalities. Discussions regarding digital discrimination, under various terms, have been taking place in scientific papers, political discussions, and technical critiques for many years.

By analyzing discrimination, we can break it down into its causes, actions, and consequences. Within the theoretical framework of discrimination, there are two basic concepts that define the types of discrimination – the first is called "direct," and the second is the opposite – "indirect" (Khaitan, 2015). However, modern technologies have generally changed the classification of traditionally known forms of discrimination. With the rapid development of ICT and its integration into all aspects of public life, the digital transformation of entire systems and processes, and the rapid advancement of artificial intelligence (AI), new forms of discrimination are emerging (Kozov, Ivanova, Atanasova 2024).

Digital discrimination forms and factors

The term "digital discrimination" has evolved over time, reflecting growing awareness and concern about inequalities in the digital realm. It refers to "direct or indirect discriminatory acts that are based on the automatic decisions made by algorithms" (Wihbey 2015) when decisions are delegated to algorithms, such as those that use artificial intelligence techniques such as machine learning (Criado et al. 2019). As the authors stated the literature on digital discrimination often mentions algorithmic bias. Although algorithm bias plays a significant role in digital discrimination, it does not always directly result in digital discrimination. If we look at the historical development of digital discrimination, it makes the most sense to tie it to key stages of global digitalization

– *Early Computing Era (1940s – 1970s):* during this period, computing was primarily limited to large mainframe computers used by governments, corporations, and academic institutions. Discrimination was not explicitly tied to digital technologies but reflected broader social inequalities, such as racial segregation in access to computing resources and employment opportunities in the computing field;

– *Emergence of Personal Computing (1980s – 1990s)*: the advent of personal computers and the internet led to increased accessibility to computing technologies.

However, disparities in access to technology persisted, with marginalized communities, including racial minorities and low-income individuals, facing barriers to adoption due to factors such as cost, education, and infrastructure;

– *Digital Divide (Late 1990s – 2000s*): the concept of the "digital divide" gained prominence, highlighting disparities in access to technology and digital skills between different demographic groups. Efforts were made to bridge the digital divide through initiatives such as public libraries providing internet access, community technology centers, and government programs to subsidize computer ownership;

– *Social Media and Online Platforms (2000s – Present):* the rise of social media and online platforms introduced new forms of digital discrimination, including cyberbullying, online harassment, and algorithmic bias. Marginalized groups, including women, racial minorities, and LGBTQ+ individuals, have faced discrimination, harassment, and hate speech in online spaces. Algorithms used by platforms for content curation and management are often criticized for the targeting which is existing inequalities.

– *Algorithmic Discrimination and AI (2010s – Present):* The increasing use of algorithms and artificial intelligence (AI) in decision-making processes has raised concerns about algorithmic discrimination. Examples include biased algorithms in hiring, education and assessment, lending, bank assessment and evaluation of credibility, criminal justice systems etc. which have disproportionately impacted marginalized communities. Nowdays efforts are underway to address algorithmic bias and promote fairness and transparency, and accountability in algorithmic systems through introducing regulatory frameworks and for algorithm audits and bias detection.

We must note that the development of the regulatory framework worldwide drastically lags behind technological development, producing new ethical and moral dilemmas that the public consciousness has difficulty comprehending. However, when technological development overtakes the possibility of scientific breakthroughs being ethically conceptualized, an unpredictable potential for new forms of discrimination related to access and uses of technology also emerges. Throughout history, digital discrimination has intersected with various forms of social inequality, including race, gender, socio-economic status, disability, and other identity characteristics. This gives us the reason to refer the most often met cases of digital discrimination. It is crucial to distinguish between bias and actual discrimination (Criado et al. 2019). There is hardly any public system undergoing digital transformation that is not at risk of digital discrimination, especially as algorithmically based machine decisions may contain discriminatory elements, whether intentional or unintentional evaluation criteria. However, machine learning and solutions are far from exhausting forms of digital discrimination. The most often met forms that are subject of new efforts for international and state regulations refers to the variety of cases such as:

– *Access Discrimination*: unequal distribution of digital infrastructure, such as internet connectivity, devices, and technology resources. This can result in a digital divide, where certain communities or individuals are left behind due to limited access to digital tools and resources;

– *Skills Discrimination*: Digital discrimination can also occur because of digital literacy and skills disparities. It refers to the unequal opportunities for individuals to acquire the necessary knowledge and skills to use digital technologies effectively. Those lacking digital literacy may face barriers to accessing information, employment opportunities, and social participation. There are, indeed, clear differences in terms of Internet usage and digital skills within the same area (Selwyn 2004; Van Dijk 2005)

– *Content Discrimination*: Content discrimination refers to the bias or exclusion of certain individuals or groups in digital platforms, services, or algorithms. This can occur through the filtering or prioritizing of content based on factors such as race, gender, or socioeconomic status. This can lead to limited exposure to diverse perspectives and reinforce existing inequalities.

– *Algorithmic Discrimination*: Algorithms used in various digital systems can perpetuate discrimination by making biased decisions based on race, gender, or socioeconomic status. These algorithms can reinforce existing inequalities and perpetuate discriminatory outcomes in hiring, lending, and criminal justice areas.

– *Privacy Discrimination*: Privacy discrimination refers to the differential treatment of individuals based on their privacy concerns or preferences. Certain individuals or groups may be disproportionately impacted by data collection, surveillance, or targeted advertising practices, leading to privacy violations and potential harm.

Addressing digital discrimination requires comprehensive efforts to identify the key factors that affect social systems and raise discriminative potential. We define this potential by the likelihood and the influence of certain factors to evoke or strengthen the occurrence of digital discrimination. In the range of such factors of great importance are the geographical disparities in the social-economic development of the regions and states because inevitably this affects the quality and the investment made in new communication infrastructure and reliable connectivity. Such discrepancies result in the digital divide, for instance, between urban and rural areas in the EU. The poor or slow development of ICT infrastructure not only limits access to online resources but also to all kinds of digitalized services, including education.

The access to digital technology can be influenced by socioeconomic factors, such as income level or affordability. With possible lower-than-average incomes, individuals or communities may struggle to afford devices or even pay for telecommunication services that provide internet access. Limited access to digital technology can have a significant impact on educational opportunities. For

example, during the COVID-19 pandemic, students without access to computers or the internet encountered challenges in completing online assignments, accessing educational resources, and participating in remote learning. On the other hand, older individuals or those from older generations face barriers in accessing and using digital technologies due to the lack of familiarity or digital literacy, which finally results in social exclusion from social networking life as well as from access to online administrative services, or e-commerce, and other digital benefits.

Access discrimination can have significant consequences, limiting individuals' access to information, education, employment, government services, and social connections. Addressing access discrimination involves bridging the digital divide through improving infrastructure, affordability, and digital literacy programs to ensure equal access to digital resources for everyone. Various factors contribute to access discrimination in the context of digital inequality, and these factors may differ based on the specific context and region. In this paper, we cannot provide an exhaustive list of the factors because their dynamics follow the socio-economic and technological development trends of the areas and countries. Still, among the most important we mention listed above are also the language and localization, which refers to the limited availability of digital content in local languages and the lack of localization and translation services that can exclude individuals from accessing information and services online. Government policies and regulations can either facilitate or hinder access to digital resources. Restrictive regulations, censorship, or lack of supportive policies also limit individuals' access to information and online services.

The lessons learned from the pandemic demonstrated that one of the most vulnerable social ecosystems in terms of digital discrimination is the educational one, where access to teaching and learning facilities, tools and resources was crucial for the provision of educational services as well as for the quality of education.

Digital discrimination risks and potential in higher education

In academic and policy-making circles, recognition of digital discrimination has led to calls for more inclusive development of technologies, policies to ensure equitable access to digital resources, and research on the social implications from the technologies. Traditional discrimination in higher education typically refers to historical forms of bias and inequality based on factors such as race, gender, ethnicity, socioeconomic status, and disability. This discrimination can manifest in various ways, including unequal access to educational opportunities, biased admissions processes, limited support for underrepresented groups, and inequitable treatment within academic environments. On the other hand, digital discrimination in higher education refers to discrimination that occurs in the context of online or technology-mediated learning environments. This type of discrimination can take several forms:

– Not all students have equal access to technology or the internet, which can create disparities in their ability to participate fully in digital learning experiences;

– Some students may face challenges navigating complex digital platforms or may not have the necessary technical skills to succeed in online courses;

– Automated systems used in educational settings, such as learning management systems (LMS) or algorithmic grading tools, may exhibit bias that disproportionately affects certain groups of students, based on factors like race, gender, or socio-economic status;

– Students' digital activities and data may be subject to surveillance or monitoring, which can disproportionately impact marginalized groups and contribute to feelings of exclusion or discrimination;

– Digital environments can facilitate forms of harassment, bullying, or discrimination that target individuals based on their identity characteristics;

– Discrimination can occur in higher education when automated systems and algorithms are used in processes such as admissions, course placement, grading, and scholarship allocation. While these algorithms aim to streamline decision-making and eliminate human bias, they can unintentionally perpetuate or worsen existing inequalities if not carefully designed and implemented. Algorithms rely on data to make decisions, and if this data is biased or incomplete, it can lead to discriminatory outcomes. For example, historical data may reflect past biases in admissions decisions or academic performance assessments, perpetuating disparities based on race, gender, socio-economic status, or other factors.

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– If algorithms reinforce existing patterns of inequality, they can create a feedback loop where disadvantaged groups continue to be marginalized. For example, if an algorithm consistently selects applicants from privileged backgrounds, it may perpetuate disparities in access to education and opportunities.

– Algorithms may produce unintended consequences that disproportionately affect certain groups. For instance, an algorithm designed to predict academic success may inadvertently penalize students with learning disabilities or neurodivergent traits.

– Digital discrimination through the use of anti-plagiarism software can occur if these tools are not implemented or used carefully. Some software may utilize algorithms to assign similarity scores to submitted work. If these algorithms are biased, they may disproportionately penalize certain groups of students, such as non-native speakers or students from different cultural backgrounds whose writing styles may differ from the software's normative expectations. Anti-plagiarism software may struggle to accurately detect paraphrased or synthesized content, leading to

false positives or inaccurate similarity reports. This can disproportionately affect students who may rely more heavily on paraphrasing or synthesis in their writing.

By addressing these potential challenges and implementing appropriate mitigation strategies, institutions can harness the benefits of anti-plagiarism software while minimizing the risk of digital discrimination against certain student groups. Preventing digital discrimination in higher education requires addressing various preconditions to ensure equitable access, opportunity, and treatment for all students. Here are some key preconditions:

– Equitable access to technology;

– Digital literacy education;

– Accessible digital platforms and content: designing with accessibility features that accommodate diverse learning needs and disabilities, such as screen readers, captions, alternative formats, and intuitive user interfaces;

– Anti-bias training and awareness for educators and administrators to recognize and address unconscious biases, stereotypes, and discriminatory practices that may manifest in digital learning environments.

– Transparent algorithms and data practices: to mitigate potential biases and ensure fair treatment of all students;

– Digital privacy and security: establishing robust policies and procedures to safeguard students' digital privacy rights and protect their personal data with clear consent mechanisms, data encryption, secure authentication methods, and compliance with relevant privacy regulations;

– Inclusive design principles dapted to the needs of students from diverse backgrounds, abilities, and learning preferences;

– Incorporating culturally responsive teaching strategies and content that reflect the experiences, perspectives, and identities of students from different cultural, linguistic, and socio-economic backgrounds.

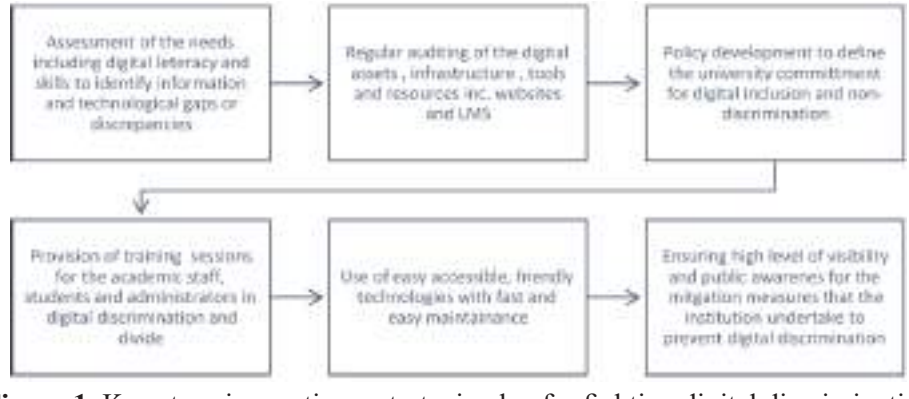

Figure 1. Key steps in creating a strategic plan for fighting digital discrimination

By addressing these preconditions, higher education institutions can work towards preventing digital discrimination and creating more equitable, inclusive, and supportive learning environments for all students. This is achievable by undertaking simple strategic steps shown below (fig.1). By taking these steps, higher education institutions can leverage technology to support fair and equitable decision-making while minimizing the risk of digital discrimination.

Conclusion

The development of such institutional anti-digital discrimination plan or strategy requires a comprehensive approach that addresses various aspects of digital practices and policies within the organization. Crucial for the viability of the plan is to: undertake assessment of the current practices or internal digital auditing to identify any potential areas where digital discrimination may occur; to involve all interested parties e.g., students, faculty, staff, administrators, and relevant external partners, in the development of the anti-digital discrimination plan; to develop institutional policy and procedures and regular update in synchronicity with the technological improvements and to establish clear accessibility standards and guidelines for digital content, platforms, and technologies used within the institution; to provide regular trainings and awareness programs for faculty, staff, and students to raise awareness about digital discrimination; to ensure that assessment and evaluation processes are fair and equitable for all students, regardless of their native language, by addressing biases in grading and evaluation.

However, AI also introduces new forms of discrimination, particularly through algorithmic bias. Biases present in training data or inherent in algorithmic decision-making processes can result in discriminatory outcomes, perpetuating or exacerbating existing inequalities. Addressing digital discrimination in AI requires navigating complex ethical and regulatory challenges. Regulations and guidelines may need to be updated or developed to ensure that AI systems are fair, transparent, and accountable, and that they do not disproportionately harm marginalized groups. AI-driven automation has the potential to reshape labor markets and exacerbate economic inequalities. Ensuring equitable access to AI technologies and opportunities for participation in AI development and decision-making processes is crucial for mitigating digital discrimination. Efforts are needed to address disparities in access to AI education, training, and resources, particularly for underrepresented groups in STEM fields. Digital discrimination in AI has global implications, as AI technologies are increasingly integrated into various aspects of society, including healthcare, education, finance, and governance. Addressing digital discrimination requires international cooperation and collaboration to develop inclusive and responsible AI policies and practices. In summary, while AI holds great promise for advancing society, it also poses significant challenges in terms of digital discrimination. Addressing these challenges requires a multi-faceted approach that

involves stakeholders from diverse backgrounds and disciplines working together to develop ethical, equitable, and responsible AI systems in higher education and all other related ecosystems. The digital future of higher education is shaped by ongoing technological advancements, changing educational paradigms, and evolving societal needs.

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