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## A Critical Review of the Dominance of Algorithms in the Formation of Students' Social Realities in the Modern Era

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**Abstrak:** Perkembangan teknologi digital telah mentransformasi pengalaman sosial, interaksi, dan distribusi pengetahuan, dengan algoritma berperan sebagai mekanisme kuasa yang membentuk persepsi, perilaku, dan makna sosial. Algoritma bukan sekadar alat teknis, melainkan mediator pengalaman yang memengaruhi cara manusia memahami dunia, sebagaimana ditekankan Heidegger sebagai mode of revealing dan Don Ihde sebagai mediator pengalaman. Secara normatif, Amartya Sen menekankan pentingnya kemampuan kritis (capabilities) individu untuk menilai dan menegosiasikan pengaruh algoritma demi kebebasan dan keadilan. Penelitian ini menggunakan sintesis literatur ilmiah untuk menelaah dominasi algoritma dan implikasinya terhadap kebebasan, nilai kemanusiaan, dan pendidikan. Hasil kajian menunjukkan bahwa dominasi algoritma berpotensi membatasi kebebasan individu melalui penyempitan pilihan informasi, mengikis nilai kemanusiaan melalui dehumanisasi dalam interaksi digital serta menuntut transformasi pendidikan dalam bentuk penguatan literasi digital yang kritis dan reflektif. Oleh karena itu, pendidikan perlu menumbuhkan otonomi intelektual. Kesadaran etis dan kemampuan evaluatif agar individu mampu berpartisipasi aktif dalam ekosistem digital yang di dominasi algoritma, bukan sekedar konsumen pasif informasi.

**Kata Kunci:** *Algoritma, Literasi Digital, Pendidikan, Realitas Sosial*

**Abstract:** The development of digital technology has transformed social experiences, interactions, and the distribution of knowledge, with algorithms acting as mechanisms of power that shape perceptions, behaviours, and social meanings. Algorithms are not merely technical tools, but rather mediators of experience that influence how humans understand the world, as emphasized by Heidegger as a mode of revealing and Don Ihde as a mediator of experience. Normatively, Amartya Sen emphasizes the importance of individual critical capabilities to assess and negotiate the influence of algorithms for the sake of freedom and justice. This study uses a synthesis of scientific literature to examine the dominance of algorithms and their implications for freedom, human values, and education. The results of the study indicate that the dominance of algorithms has the potential to limit individual freedom by narrowing information choices, eroding human values through dehumanization in digital interactions, and demanding educational transformation in the form of strengthening critical and reflective digital literacy. Therefore, education needs to foster intellectual autonomy, ethical awareness, and evaluative abilities so that individuals can actively participate in the digital ecosystem dominated by algorithms, rather than simply being passive consumers of information.

**Keywords:** *Algorithms, Digital Literacy, Education, Social Reality*

## INTRODUCTION

The development of digital technology over the past two decades has transformed nearly every aspect of human life, from how we communicate and obtain information to how we build social relationships and shape our identities. This transformation has intensified as social media, artificial intelligence, and algorithmic systems have become central to modern society, particularly for students growing up as the digital generation. Today's students live in an environment heavily influenced by the internet and social media platforms like TikTok, Instagram, YouTube and others that operate through algorithmic mechanisms. In their daily lives, students not only use technology as a means of communication but also utilise digital spaces to learn, seek entertainment, build social relationships, express themselves, and even shape their perspectives on the social world. This situation demonstrates that the social lives of modern students cannot be separated from the algorithmic systems that continuously regulate their digital experiences.

This change marks the birth of a new social reality shaped through human interaction with digital technology. While previously humans gained social experience directly through family, school, and community environments, today most students' social experiences are obtained through virtual spaces controlled by algorithmic systems. Digital space is no longer just a communication medium; it has become the primary arena for shaping the opinions, identities, lifestyles, and even social values of the younger generation. Research by Jung & Kim (2025) shows that artificial intelligence and algorithms are reshaping information, social interaction patterns, and human experiences, making technology no longer merely a tool but the foundation of modern digital life.

In the context of students, algorithms operate through personalisation systems that analyse user behaviour based on searches, viewing, comments, usage duration, and daily digital interactions (Hastuti et al., 2025). This data is then used to continuously recommend specific content, ensuring that students receive information selected by the digital system (Akpinar & Fazelpour, 2025). As a result, students' social experiences in cyberspace are no longer formed naturally but are constructed through hidden algorithmic logic. When students open social media, the content they see is not a neutral representation of the real world, but rather the result of algorithmic selection based on the platform's interests. Content deemed likely to increase interaction and attention will be displayed more often than educational or reflective content.

This phenomenon demonstrates that algorithms function not only as technical systems but also as power mechanisms that shape how students understand reality. The more frequently students interact with certain types of content, the more the algorithms narrow the information space they receive. As a result, students tend to live in a homogenous digital space and are limited to certain preferences. The dominance of algorithms in digital media is fundamentally not neutral because algorithms carry specific interests related to the economics, politics, and ideology of digital platforms. Lamprou & Dekoulou (2025) explain that the dominance of algorithms in the production and distribution of media content raises philosophical and social issues related to information integrity, authenticity, and ethical governance.

Research by Chueca & Cerro (2024) shows that information filtering reinforces polarisation and shifts the guiding role from humans to technical structures. In the context of students, this condition has serious implications because adolescence is a crucial phase in the formation of identity, character, and critical thinking skills. When

students continuously receive personalized information, they risk narrowing their social perspectives and difficulty distinguishing between objective reality and the digital reality constructed by algorithms. Various studies also reveal that algorithms act as “invisible architects” that organize digital experiences, select information, and shape patterns of social interaction (Han et al., 2022). In the context of social media, algorithms create personalized information spaces that, in turn, indirectly encourage the formation of “filter bubbles” and echo chambers (Liu et al., 2020; Daus, 2024).

In everyday life, this phenomenon is evident in students' tendency to follow certain trends on social media. Viral content, continuously recommended by algorithms, often shapes new social standards for lifestyle, ways of thinking, physical appearance, and even patterns of social interaction. Students are then encouraged to conform to popular digital standards in order to gain social recognition in cyberspace (García, 2024). The phenomenon of social validation through likes, views, comments, and followers demonstrates that algorithms not only control the distribution of information but also shape students' social identities. As a result, students' understanding of social reality is heavily influenced by the logic of popularity, virality, and virtual recognition.

Another emerging phenomenon is the growing culture of fear of missing out (FOMO), digital dependency, and a tendency to consume instant information. Students are constantly encouraged to follow the latest trends to stay relevant in their digital social environment. In the long term, this condition can affect students' psychological health, such as the emergence of social anxiety, low self-confidence, and pressure to always appear perfect in the digital space (Cristina et al., 2024). On the other hand, the dominance of algorithms also impacts the educational process and students' intellectual development. The culture of consuming information quickly through short videos and automatic recommendations has led students to become increasingly accustomed to receiving information instantly without in-depth reflection. This condition has the potential to reduce critical, analytical, and evaluative thinking skills, as students increasingly consume information selected by the system rather than explore knowledge independently.

Furthermore, low levels of critical digital literacy leave students susceptible to hoaxes, opinion manipulation, digital propaganda, and unverified information. This phenomenon requires critical analysis given the dominance of algorithms, with serious implications for autonomy, freedom, and human values. When algorithms are neither transparent nor accountable, individuals risk losing control over decisions that affect their life choices (Aysolmaz et al., 2023). At the same time, technology companies are gaining a dominant position as actors influencing public behaviour and opinion, making digital platforms a new arena for modern power relations. This means that the issue of algorithms has transcended the technical realm and evolved into an ethical, political, and philosophical question related to the formation of modern society's social reality.

Although various studies have discussed algorithms in digital media, most studies still focus on technical aspects, media communication, and digital politics. Studies that specifically examine the dominance of algorithms in shaping students' social realities from the perspective of the philosophy of technology and the humanization of education are still relatively limited. Therefore, this article seeks to fill this gap through a critical approach that positions students as the primary subjects in the dynamics of modern digital society. Theoretically, this study is based on Martin Heidegger's thinking on technology as a mode of revealing, Don Ihde's on technology as a mediator of experience, and Amartya Sen's capabilities approach, which emphasizes

the importance of individual freedom and critical thinking.

Don Ihde asserts that technology always mediates human relationships with the world, so that modern human social experiences are never truly free from technological influence. Meanwhile, Amartya Sen emphasises the importance of individual substantive freedom to think and make conscious life choices. Drawing on this framework, this article critically examines the role of algorithms in shaping students' social reality in the modern era. This study explores algorithms as mechanisms of power, their role in constructing knowledge and social relations, and their implications for students' freedom, identity, and humanity. Furthermore, this study emphasises the importance of strengthening critical digital literacy so that students are not merely consumers of technology but can become conscious, reflective, and critical subjects in confronting the dominance of algorithms in the modern digital space.

### METHOD

This study uses a qualitative approach and a literature review method, a systematic process of searching, selecting, reading, and reviewing various written sources, such as scientific journals, books, proceedings, and relevant publications on algorithm dominance and social reality. This study is based on the synthesis of scientific literature (Hart, 1998), so the literature analysis is not only descriptive but also critical, emphasizing the synthesis, evaluation, and integration of knowledge to build an in-depth conceptualization. This study synthesizes the literature on how various studies explain the process of constructing social reality in the digital environment, particularly the role of algorithms in shaping perceptions, interactions, and knowledge.

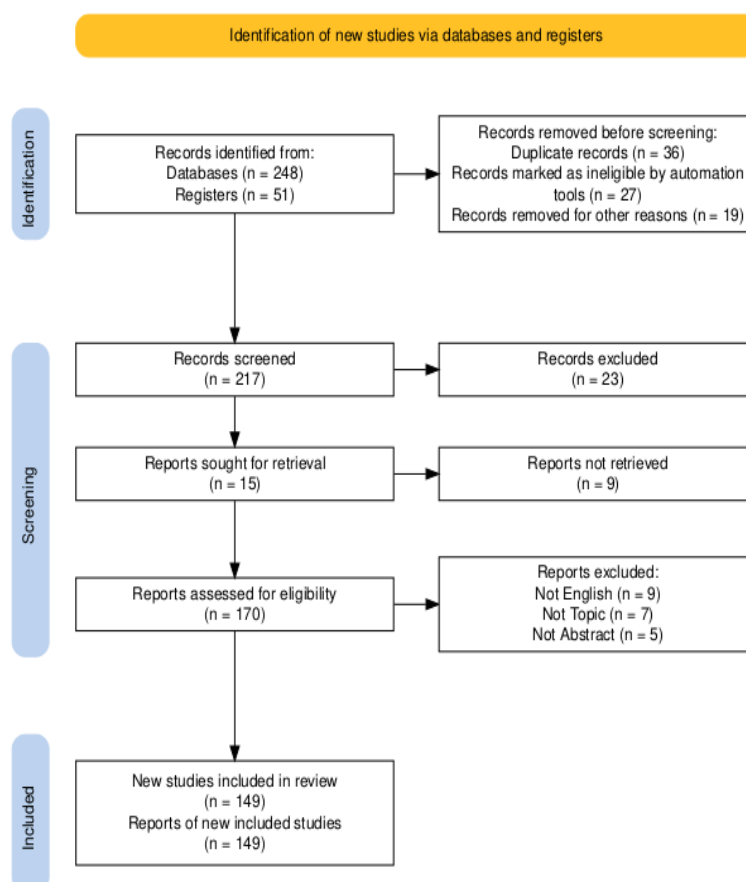
Theoretically, this study draws on the perspective of Berger & Luckmann, (1966), who view social reality as a product of construction through interaction and meaning-making processes. This perspective helps us understand how algorithms shape the social reality of digital use. Furthermore, this analysis is strengthened by the insights of Heidegger, Don Ihde, and Amartya Sen, which help examine the dimensions of technology, experience, and individual freedom. All data were obtained from documents and literature, so this study did not require a physical research location. Data collection and analysis were carried out in stages of reduction, presentation, and conclusion, to produce a comprehensive, critical, and theoretical understanding of the problem under study.

This research used an interactive data analysis model developed by Saldana (Miles et al., 2014). Qualitative data analysis was carried out interactively and continuously until saturation was reached. The analysis process included data condensation, data display, and conclusion drawing/verification. Data condensation involved selecting, focusing, simplifying, and grouping data relevant to the research focus. Next, the data were presented in a thematic narrative to facilitate researchers' understanding of patterns, relationships, and trends. The final stage was carried out through drawing and critically verifying conclusions continuously to obtain valid, in-depth, and objective findings. This qualitative descriptive research aims to provide a systematic, factual, and accurate picture of the dominance of algorithms in shaping students' social reality in the digital era, including its implications for freedom of thought, social interaction patterns, and human values.

## RESULTS AND DISCUSSION

### Results

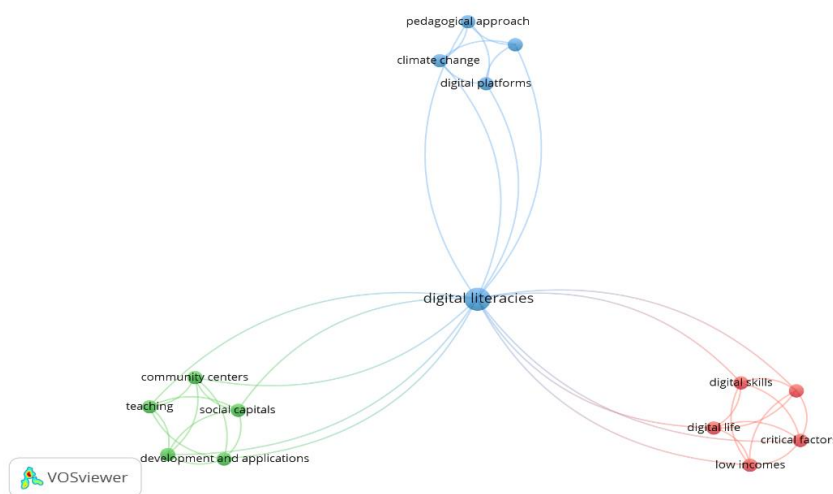
Prior to the selection process, researchers determined the scope and characteristics of the literature being reviewed. The literature used focused on algorithmic dominance, social reality, and digital media. The selected articles were scientific publications that discussed the role of algorithms in shaping perceptions, social interactions, and knowledge construction from technological, social, and educational perspectives. Inclusion criteria included articles relevant to the topic, with a clear abstract, written in English, and published in a reputable scientific journal. Irrelevant articles, those lacking full access, or those not meeting academic standards were eliminated.



**Figure 1. Prism Diagram**

The prism diagram above illustrates the systematic literature selection process. During the identification stage, 299 articles were obtained from the Scopus database and registry. These were then reduced due to duplication, automated selection, and other technical reasons, leaving 217 articles for screening. During the screening stage, 23 articles were eliminated based on title and abstract, and 9 were inaccessible, leaving 170 for eligibility assessment. During the eligibility stage, 21 articles were excluded for not being in English, being off-topic, or not having an abstract. Ultimately, 149 articles were deemed to meet the criteria and included in the literature review. This diagram

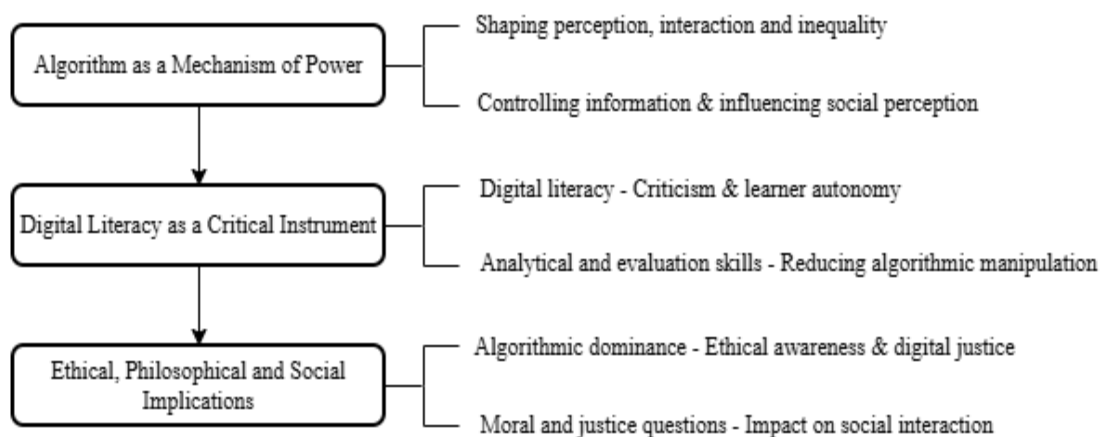
demonstrates the rigorous, transparent, and multi-layered selection process to ensure the quality of the study.



**Figure 2. Conceptual Map of Digital Literacy and the Influence of Algorithms**

After reviewing 149 Scopus documents with the keyword "Digital Society" and analysing them with VOSviewer, 61 relevant articles were identified as the basis for this study. The conceptual network visualisation positions digital literacy as a central node connecting education, technology, society, and digital life. From a critical perspective of algorithmic dominance, digital literacy is key to interpreting, assessing, and challenging the flow of information controlled by algorithms. The blue cluster shows the influence of algorithms on education and ecological awareness, the green cluster on community empowerment and social capital, and the red cluster on inequality in access to quality of life and social welfare. The visualisation results emphasise digital literacy as a strategic tool for addressing the challenges of the modern Digital Society.

Critically, digital literacy is not merely a technical skill, but a strategic tool for recognising, assessing, and negotiating the influence of algorithms in shaping modern social reality. In a Digital Society, digital literacy is essential for individuals and communities to navigate algorithmic dominance, prevent social manipulation, and strengthen digital capacity for more just and equitable social well-being.



**Figure 3. The Concept of Algorithmic Dominance in Modern Social**

### *Discussion*

The role of algorithms in regulating the flow of information and digital experiences marks a shift in power from humans to technical structures that are not always transparent. Social reality is now largely determined by the logic of algorithms that operate behind the scenes, influencing knowledge, perceptions, and social relations without our awareness. This situation demands a critical examination of how algorithms produce power, how education responds through digital literacy, and the ethical and philosophical implications of technological dominance in modern society.

This discussion seeks to position algorithms as objects of pedagogical study to ensure that technological interventions do not reduce human agency but rather strengthen the critical capacity of digital citizens to understand, assess, and negotiate new power structures shaped by algorithmic logic.

#### **1. Algorithms as a Mechanism of Power in Social Reality**

Algorithms operate as a digital power regime that not only determines what is visible and what is hidden, but also shapes social reality by constructing knowledge, social perceptions, and structures of injustice through the delegation of authority to unaccountable technical systems (Wong Mark, 2022; Micó-Sanz et al., 2023). The dominance of algorithms shifts control of information from humans to technical logic, creating invisible architects who regulate how knowledge is produced, accessed, and experienced by society (Orso, 2020). In Heidegger's (1977), perspective, technology is a mode of revaluing that shapes how humans understand the world, where the dominance of modern algorithms is not just a tool but an active mediator that structures social and educational reality, establishing norms, priorities, and boundaries of cognitive experience (Rice et al., 2020).

The phenomenon of filter bubbles and self-filtering, which restrict access to information, creates a digital ecosystem that shapes learning styles and increases the risk of cognitive polarization (Edwards & Straker, 2025). Exposure to information that aligns with individual perspectives emphasizes the need for a cross-disciplinary approach to understanding digital society (Serpa & Jos, 2024). The dominance of algorithms demonstrates that without equitable technology design, digitalization not only deepens educational inequality but also hinders the creation of a fair, flexible learning system capable of fostering students' cognitive autonomy (Jiménez-Lara et al., 2021; Reinertsen, 2020).

From an ethical and social perspective, algorithmic dominance can reinforce inequality and marginalization, as technology companies that control algorithms gain power to determine the flow of information, including in education (Smit et al., 2025). Inequality in internet access and digital literacy further exacerbates civil society organisations' inability to effectively use digital tools (Flores-López & Flores-Crespo, 2024). Digital inclusion (e-inclusion) demands that education go beyond information transfer, equipping individuals with the critical capacity to assess, question, and negotiate the influence of technology and algorithms in shaping the information society, thus enabling education to act as a counterweight to the opaque power of algorithms (Vallvé, 2022; Zdjelar & Hrustek, 2021).

In the face of algorithmic dominance, digital literacy becomes a strategic instrument in reconstructing a more critical social reality. Digital literacy functions not merely as a technical skill, but as the ability to understand that the reality individuals face has been mediated and constructed by algorithms. Therefore, students do not

simply accept digital reality but can critique, interpret, and reconstruct social understanding more autonomously.

## **2. Algorithms and Digital Literacy as Critical Instruments**

In the digital ecosystem, algorithms are no longer merely technical instructions but rather selection mechanisms grounded in reality and that reduce human subjectivity. Education becomes a critical space for maintaining autonomous thinking and ethical awareness (Bork-hüffer & Ergler, 2025). Algorithms determine what we see and think by regulating access and directing exposure, shaping user thinking and preferences. The digital skills gap further strengthens algorithms' position as determinants of access to knowledge, making digital literacy a crucial tool for assessing and overcoming technical biases (Drabowicz, 2021; Karipidis, 2023). In an educational context, digital literacy must teach reflective skills to understand algorithmic operation, data processing, and bias. These skills are developed through critical analysis of digital content, comparison of algorithmic results, and discussions related to digital media use, enabling students to evaluate the influence of algorithms on their information and perceptions.

Amartya Sen (1999), in his book "Development as Freedom", states that true development is the expansion of capabilities, namely the real opportunity to live freely and with dignity. In the digital era, this requires digital literacy so that individuals can understand and manage the influence of algorithms. Furthermore, Amartya Sen (2009), in "The Idea of Justice," emphasises that justice is not measured solely by access, but by the individual's actual ability to understand, assess, and direct their lives. In the digital context, digital literacy is a critical tool that enables individuals to recognise real injustices and assess the influence of algorithms. Thus, digital literacy is key to maintaining substantive freedom in an increasingly technical information ecosystem.

Chika Anyanwu (2019), argues that the use of information technology should be assessed based on an individual's ability to use digital literacy critically and meaningfully, as a form of digital justice that goes beyond simply providing device access. This approach is crucial for reducing the digital divide and ensuring social well-being, as the ability to use technology is not merely a technical aspect, but rather key to avoiding the risk of being left behind, especially for less skilled individuals or groups, although digital training can improve technological capabilities (Project, 2024; Kar, 2024). Furthermore, technology supports learning by enabling users to utilise various digital resources to hone digital literacy and think critically about information influenced by algorithms, actively and consciously (Muthuraman, 2021).

In this context, integrating algorithms and digital literacy as critical tools demands a paradigm shift in education. The curriculum should not be limited to teaching how to use technology, as such an approach only renders students passive users in an algorithmic ecosystem (Saputra & Karsiwan, 2024). Education needs to foster critical thinking skills about technology, including understanding data flows and the implications and power relations hidden behind them (Ahyani, 2014; Karsiwan et al., 2023). From the perspective of social justice, as proposed by Amartya Sen, access without capability actually creates new inequalities, making digital freedom a privilege for those with critical literacy, while others remain marginalised. Without critical awareness, digital education only produces technical skills, without fostering digital independence and freedom.

### 3. Algoritma Ethical and Social Implications of Algorithmic Dominance

The dominance of algorithms mediates the experience and distribution of digital information widely, giving rise to complex ethical, philosophical, and social implications regarding who benefits, who is marginalised, and how critical public awareness and digital education are formed (Barbas & Tréré, 2024). Research by Woods et al. (2023), shows that digital media, especially social media, not only conveys information but also organises and selects content through algorithms, thereby shaping users' experiences, interactions, and social perceptions in subtle ways. This condition raises ethical and social questions about the distribution of benefits and disadvantages and the extent to which critical public awareness can develop in the digital ecosystem.

Digital algorithms on social media platforms like TikTok and Instagram shape user experiences and behaviours through personalised content curation that influences social interactions (Özgür & Özkul, 2020; Botasheva et al., 2022). In practice, these mechanisms contribute to the formation of filter bubbles, the spread of disinformation, and social polarisation, demonstrating the social implications of information control and perception manipulation in the digital public sphere. Just as Structural-Functional Theory views society as a system comprising interdependent parts, social media is seen as a new institution or structure that influences social balance and order within the educational ecosystem (Sari & Karsiwan, 2025; Smaldino, Sharon E, 2008). Philosophically, Don Ihde asserts that Technology is not merely a tool but a mediator that shapes how humans experience, understand, and interact with the world. This consequence demands education to instil critical literacy so that individuals can realise the ethical, social, and existential impacts of its use, in Lim (2019). In *Technology and the Lifeworld*, Don Ihde (1990) emphasises that Technology influences human perception, interaction and understanding of reality, so it cannot be viewed as a neutral entity.

More specifically, modern technology, including digital algorithms, shapes experiences and access to information, and the dominance of algorithms carries social implications, influencing perception, decision-making, and the distribution of knowledge. Therefore, education needs to systematically integrate critical literacy and reflection into the curriculum, learning processes, and school culture through case-based learning, discussions, and assessments that emphasise thinking processes. Literacy is not merely a competency; it is a culture of continuous learning.

Thus, the dominance of algorithms presents complex moral, social, and pedagogical implications, demanding a comprehensive and reflective education. Digital literacy curricula must go beyond technical skills to emphasise reflective and philosophical skills to understand technology as an active mediator. Critical education enables individuals to question, assess, and manage the influence of algorithms in everyday life, while simultaneously developing autonomous critical thinking.

### CONCLUSION

The dominance of algorithms has restructured the modern social order by determining the focus of attention, regulating the distribution of knowledge, and shaping collective perceptions. Algorithms are not merely technical instruments, but hidden power actors that mediate experiences, social interactions, and the construction of knowledge, often beyond human oversight. In this context, education plays a strategic role in developing digital literacy as a critical and reflective capacity that enables individuals to reject epistemic passivity, analyse the distortions in structured

information, and intervene in the digital brushstrokes. Thus, education not only transmits knowledge but also fosters intellectual independence, ethical awareness, and epistemic negotiation skills in a digital ecosystem dominated by algorithms.

In the paradigm of algorithmic dominance that shapes their social reality through digital information curation, social media interaction patterns, and the formation of opinions, identities, and perspectives on knowledge, algorithmic systems heavily influence these processes. This situation indicates that students' social realities are no longer formed neutrally but are instead shaped by invisible mechanisms for selecting information. This results in the potential for information inequality, the strengthening of perceptual biases, and a reduction in the autonomy of thought in the learning process and social interactions. Therefore, education is a crucial tool for developing critical awareness, enabling students to understand, confront, and negotiate the influence of algorithms in shaping social reality in the modern era.

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