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# AWARE AND CRITICAL NAVIGATION IN THE MEDIA LANDSCAPE: (UN)BIASED ALGORITHMS AND THE NEED FOR NEW MEDIA LITERACY IN THE ERA OF ARTIFICIAL INTELLIGENCE AND DIGITAL MEDIA

**Aneta Risteska**

## ABSTRACT

As technology advances rapidly, media literacy education plays a crucial role in supplying individuals with the skills and knowledge to navigate the complex media landscape. The article examines the ethical implications of AI algorithms highlighting the importance of critical awareness among users. AI-driven recommendation systems have considerable influence over individuals' information consumption and worldview, which requires media literacy education to foster a deep understanding of biases, limitations and potential risks associated with these algorithms. This paper points to the need for ethical behaviour to govern AI algorithms, ensuring transparency, accountability and fairness in content curation. Additionally, the article brings examples that indicate how algorithms work and what consequences they can leave in our social life and actions if we do not create them according to certain ethical values, or if we consume their messages without critical awareness. New media literacy education should empower individuals to make informed decisions about their privacy and develop a critical stance toward data collection practices. Concepts such as informed consent, data anonymity, and the implications of targeted advertising should be addressed in media literacy education. Furthermore, the paper emphasizes the responsibilities of media literacy educators themselves. Teachers and institutions must ensure that media literacy programs promote inclusivity, diversity, and a global vision. By incorporating ethical frameworks into the curriculum, educators can cultivate responsible digital citizenship and encourage critical thinking about the social impact of AI and digital media. Media literacy education in the context of AI and digital media must address the ethical dimensions inherent in these technologies. By equipping individuals with the necessary tools to critically analyse algorithms, navigate data privacy concerns, and foster responsible digital citizenship, media literacy education can facilitate an informed and ethical engagement with AI and digital media.


Keywords: ethical aspects, algorithms, human rights, artificial intelligence, new media literacy education, digital media

## INTRODUCTION

Never closer to information, and never further from the truth. At a time of unstoppable growth of the adoption of digital technology in all pores of life, it becomes inevitable to conclude that with the growth of the availability of information, the need for suspicion and skepticism towards every consumed information grows in direct proportion. If we do not check its quality today and absorb the false information, tomorrow we may have consequences, an information hangover that produces fog and uncertainty about the contexts for us, and for the senders of the message - an accomplished goal or manipulation.

All this points to the urgent need for a new role of media literacy among all generations. Its main intention is to create the ground and conditions for a critical reflection of the information consumed and an awareness of the labile ethical legs of the algorithms that can nurture different aspirations and biases. The purpose of this article is to consider the reasons for the need for a new approach to media literacy that will be in harmony with the current development of power, but also the dangers that artificial intelligence can present, and at the same time offer opportunities through which the impact that unfiltered information can cause will be amortized, being an unwanted reflection in daily activities.

For this purpose, a qualitative review of part of the existing findings and knowledge will be shown, through publications, articles, studies, and research that refer to the need and importance of integrating media literacy in different layers of our lives, in order to be closer to a reflection that will manifest objectivity. Primarily, we would underline the need to integrate digital, or even more narrowly, algorithmic literacy, as an important part of media literacy.

This paper explores the necessity of cultivating new responsible aspects of media literacy education in the context of artificial intelligence (AI) and digital media, emphasizing the need for responsible and informed engagement with these technologies. AI-driven recommendation systems have a significant impact on individuals' information consumption and worldview, requiring media literacy education to foster a deep understanding of the biases, limitations, and potential risks associated with algorithms. Therefore, the paper emphasizes the importance of vigilance and critical awareness among users. Next, this article explores ethical considerations related to privacy and data security in digital media. Media literacy education has a crucial role in preparing individuals to make informed decisions about their privacy and to develop a critical attitude toward data collection practices.

This article will examine some aspects of algorithms and suggest why it becomes necessary for teachers to be aware of the impact of algorithms and work to promote algorithmic literacy in their students. The digital landscape of fake news increasingly requires new literacy skills and critical awareness to read, write, and use media and technology to empower civic participation and social transformation. It is becoming increasingly important for educators to teach students how to think critically about the media and technology that surrounds us.

The curriculum for media and information literacy and teacher training for media education is constantly updated around the world. It becomes crucially important to create and develop a critical response to the new information and communication technologies that are embedded in all aspects of society. Only through the application of a critical media literacy framework can students at all grade levels learn to critically analyse messages. As long as we use our critical thinking and media literacy skills, we can continue to enjoy the media landscape, as long as we protect ourselves from being manipulated and targeted by it.

## HOW MUCH DO WE KNOW ABOUT ALGORITHMS?

With the rapid development of technology, algorithmic literacy is becoming an extremely important segment of digital media literacy. It can help us understand how algorithms work and how they affect our lives. Currently, numerous studies point to the fact that a relatively small number of people have a satisfactory knowledge of algorithms. This creates digital inequality, and therefore it is important to start as soon as possible with a greater adoption of information and knowledge about algorithmic literacy.

But at the same time, we should be aware that computer algorithms constantly (will) change and we will all have to be ready for lifelong education, for upgrading. Only in this way will we be able to become more aware of the work of algorithmic formulas that have the power to change our behaviour and our relationship with each other, which in turn is significantly reflected in the creation of strongly opposed social groups that find less and less points of commonality and cooperation.

Algorithms represent finite sequences of rigorous instructions that have an input and an output. Most commonly, algorithms recommend (e.g. YouTube suggestions) or filter (e.g. Twitter feed) content. They use individual and aggregated behavioural data to personalize a wide variety of content, such as news, information searches, advertisements and videos to maximize engagement (and revenue) for the provider and/or platform.

But algorithms also passively spread misinformation and other forms of false or misleading content. They are, very often, proactively manipulated by highly media-literate people to amplify this content through coordinated engagement (e.g. commenting or sharing). ”The nature of algorithms in digital media is thought to enhance cognitive biases, which can generate new biases, reinforce existing beliefs, and make critical thinking more difficult. The uneven distribution of algorithmic awareness must be addressed directly by media literacy initiatives, not seen as an”optional extra“ (Jordan Hill, Organization for Economic Co-operation and Development (OECD), Unpacking Algorithmic Literacy).

Hill argues that algorithmic literacy is an essential skill for citizens in the 21st century. He defines algorithmic literacy as the ability to understand how algorithms work, to critically evaluate the outputs of algorithms, and to use algorithms responsibly.

He argues that algorithmic literacy is important for several reasons. First, algorithms are increasingly used in a wide range of areas, such as decision-making, social media, and advertising. Second, algorithms can have a significant impact on people’s lives, both positive and negative. Third, the way algorithms work is often complex and opaque, which can make it difficult for people to understand how they are being affected.

Hill identifies four key components of algorithmic literacy.

Understanding how algorithms work: This includes understanding the basic concepts of algorithms, such as loops, conditionals, and functions. It also includes understanding how algorithms are used to solve problems and make decisions.

Critically evaluating the outputs of algorithms: This includes being able to identify potential biases and errors in algorithms. It also includes being able to assess the reliability and validity of the outputs of algorithms.

Using algorithms responsibly: This includes being aware of the potential risks and benefits of using algorithms. It also includes being able to use algorithms in a way that is ethical and fair.

Creating algorithms: This includes being able to design and implement algorithms. It also includes being able to evaluate the effectiveness of algorithms. Hill argues that algorithmic literacy can be taught through a variety of methods, such as formal education, informal learning, and professional development. He also argues that there is a need for more research on how to best teach algorithmic literacy.

During the research he also came across two main definitions of "algorithm literacy" from Shin, Rasul and Fotiadis (2021), who define it as "a set of capabilities used to organize and apply algorithmic curation, control and active practices relevant when managing one's AI environment," and the second one is from Dogruel et al (2021), who say that algorithmically literate individuals "are able to apply strategies that allow them to modify predefined settings in algorithmically curated environments, such as in their social media newsfeeds or search engines, to change algorithms' outputs, compare the results of different algorithmic decisions, and protect their privacy".

These definitions, he is saying, are complementary and focus on the digital media environment. „They rely on individuals being aware of algorithms, understanding how they work, and being able to critically evaluate algorithmic decision-making. This also means having the skills to cope with, and potentially influence, what algorithms show them. This might include both explicit and implicit actions to curate algorithms, such as the manual personalization of the tools a platform offers, or adjustment of browsing behaviour. Conceptually, there is nothing to prevent algorithm education being integrated as an essential part of digital media literacy, rather than seen as a separate literacy," (The Media & Learning Association (MLA).

Hill urged that three things should be done.

„Firstly, evidence has shown that pre-service teachers often express low levels of confidence in their understanding of social media as a tool to engage in debate, as well as knowledge of the role of algorithms and data. Systematic attention to the content of teacher training is required.

Secondly, research still lacks valid skills scales to design and evaluate robust algorithm education interventions. By now, many media literacy resources and competency frameworks refer to algorithms, and some are specific to algorithm education. Defining valid ways of measuring algorithmic awareness, understanding and capabilities can enhance impact.

Thirdly, one of the unique challenges with teaching algorithm education is the opacity of algorithms themselves. Regulations targeting greater algorithmic transparency are part of ongoing work by policymakers in many OECD countries but must be stepped up. By increasing transparency of algorithms in digital media, children and youth can be truly empowered to critically analyse them".

Naturally, he said, all of the above requires enhancing collaboration between media literacy stakeholders, teachers, librarians, policymakers, researchers and others, to ensure algorithm education is meaningfully integrated into practice. We interpret and interact with algorithms in different ways, based upon our individual awareness of algorithms, our personal technical expertise, whether we have access to the algorithm's code and the complexity of an algorithm's underlying code. Algorithmic culture has become a larger part of our everyday lives and it influences the choices and decisions that we make on an everyday basis (Lloyd, 2019).

For those with a deeper understanding of algorithmic interactions, two definitions emerge. The first definition is given by the individuals who create algorithms. For mathematicians, programmers, engineers and alike, algorithms are viewed as a computer function that provides a desired output based on a series of inputs (Lloyd, 2019).

Algorithms are viewed less positively by media theorists, sociologists and others who study algorithms from an outsider's perspective who believe that algorithms contain inherent cultural biases and that they lack accountability and transparency for the decisions they make whose impact can range from mundane to life-changing (Lloyd, 2019; O'Neil, 2016).

AI algorithms are extraordinarily difficult for external researchers to understand and analyse for several reasons. Algorithms falling under the umbrella of AI have been described as a "black box" because, in most cases, the source code for the algorithm is proprietary and not available to the public (Burrell, 2016; Lloyd, 2019). Burrell (2016) breaks down the opaque nature of algorithms into three distinct categories: intentional opacity, opacity due to technical illiteracy, and opacity due to scale. The prevalence of algorithms demands that we develop awareness, understanding, and opinions about them.

Many college students recognize the role algorithms play in choosing content and targeted ads, however, they are less aware of the use of algorithms in other areas of their lives and the way that data collection affects them; most importantly, they feel helpless to make change (Head et al., 2020).

We also need to teach that algorithms are not neutral. Like other technologies, they are made and used by humans.

They "reflect and promulgate certain ideologies and have impacts and influences in the full range of human society. Cautions about algorithmic decision-making have identified the far-reaching implications for bias, fairness, privacy, and democratic processes" (Ridley & Pawlick-Potts, 2021, p. 2). In some domains, algorithms have the potential to unfairly disrupt lives, sway public opinion, and build divisions between members of society. Although we often "scarcely notice or question these data-based operations, yet they are not neutral, they shape particular social realities for us and should be debated" (Lomberg & Kapsch, 2019, p. 2).

Algorithmic literacy has several dimensions.

The two most important are awareness (knowing that an algorithm is in use, what algorithms are used for, and in what contexts they are used) and knowledge (understanding how they work, their capabilities and goals, and their implications for users) (Dogruel et al., 2021; Hargittai et al., 2020). Other aspects that should also be investigated include attitudes about algorithms and evaluation of their effects including ethics and social and political implications, as well as actions taken in response to the other dimensions.

## ALGORITHMS AND HUMAN RIGHTS

What information is most often available on our Facebook newsfeed? What determines a person's risk profile, or what profile gives us the best chance of getting health insurance or employment? Or to be judged as potential criminals or terrorists?

These questions are raised by the Council of Europe Study, entitled "Algorithms and human rights - a study on the human rights dimensions of automatic data processing techniques and possible regulatory implications," published in 2018.

In the pursuit of safeguarding human rights and dignity in the face of rapid technological change, the experts who worked on this study identified a number of human rights issues driven by the growing role of algorithms in decision-making.

"Automatic data processing techniques, such as algorithms, enable Internet users to search for and access information, but they are also increasingly used in decision-making processes that were previously entirely within human competence. Algorithms can be used in preparation for human decisions or make them automatically. In fact, the lines between human and automated decision-making are often blurred," the study's introduction explains.

The authors of the study demonstrate with examples how the use of automatic data processing techniques can threaten the right to a fair trial with the presumption of innocence, the right to privacy, freedom of expression and freedom of association, the right to enjoy all human rights and fundamental freedoms without discrimination, labour rights, the right to free elections, and even governance itself. The study also seeks to identify regulatory options that Member States can consider to reduce harmful effects or promote good practices and suggests measures in the areas of research, due diligence, accountability, transparency, and awareness.

And precisely, one of the conclusions of the study is that it is necessary to raise public awareness and encourage public discourse on these topics. It is necessary, say the authors, to use all available means to inform the general public so that users can critically understand the logic and functioning of the algorithms and react to them.

"This could include, but should not be limited to, media and information literacy campaigns," the study concluded, adding that institutions using algorithmic processes should also be encouraged to provide easily accessible explanations of the procedures the algorithms follow.

Here are a few most important directions from the publication "Algorithms and human rights, Study on the human rights dimensions of automated data processing techniques and possible regulatory implications," related to critical understanding of the algorithms:

"Algorithms are increasingly used in decision-making processes, that were previously entirely in the remit of human beings". This means that algorithms are now making decisions that have a significant impact on our lives, such as whether we are granted a loan, whether we are hired for a job, or whether we are accepted into a school. It is important to have a critical understanding of how these algorithms work so that we can ensure that they are not discriminating against us or violating our human rights.

"The opacity of algorithms is a major obstacle to their critical understanding". This means that it is often difficult to understand how algorithms work, even for experts. This can make it difficult to identify potential biases or discrimination in algorithms and to challenge decisions that are made by algorithms.

There is a need for greater transparency and accountability in the use of algorithms". This means that we need to be able to access information about how algorithms work so that we can understand their impact on our lives. We also need to be able to hold those who use algorithms accountable for their decisions.

Algorithms can be used to manipulate our behavior. For example, an algorithm used to recommend products on a website might show us products that are more likely to appeal to us, even if we don't really need them. This can lead to us making impulse purchases that we later regret. It is important to be aware of the potential risks of algorithms and to demand greater transparency and accountability in their use. We need to ensure that algorithms are not used to discriminate against us or violate our human rights.

Algorithms very often can be used to invade our privacy. For example, an algorithm used to target advertising might collect data about our browsing history and use it to show us ads that are relevant to our interests. This can be a privacy concern, especially if the data is collected without our knowledge or consent.

Another European Commission Study on media literacy and online empowerment issues raised by algorithm-driven media services, (Luxembourg, Publications Office of the European Union), also pays serious attention to the impact of algorithms on the spread of misinformation online.

This Report illustrates this finding with an example from 2018, a period when a YouTube video was published in which several women with headscarves can be seen, who look as if they are drowning in the sea, and all of this was filmed by a television crew. The narrator of the video, in Czech language, suggests that it is a staged scene of "migrants drowning at sea," and rhetorically asks the question: Is this a hoax?

The video was shared on dozens of Czech websites, on Facebook and Twitter, claiming that the migrant crisis is a hoax and that the journalists who cover it are, in fact, engaged in propaganda. The story spread across Europe and had 1.2 million views on various social media platforms. But fact-checkers from the AFP news agency debunked the story and proved that the footage was actually a scene for a documentary about the events in Turkey in 1922.

*Algorithm:* a computable function that can be implemented on computer systems. Machine learn-ing algorithms can also update their behaviour in response to experience (input data) and perfor-mance metrics (Osoba and Welser IV, 2017).

*Echo chambers:* the result of selecting a set of friends and information that adhere to one's sys-tem of beliefs thereby forming polarised groups (Del Vicario et al., 2016).

*Filter bubble:* the results of algorithms that create "a unique universe of information for each of us which fundamentally alters the way we encounter ideas and information" (Pariser, 2011)

Algorithms have brought numerous benefits to consumers, media companies, and advertisers. Traditionally, news and media consumers would be dependent on the generic content selected by media companies (newspapers or TV broadcasting) or they would have to specify precise and unambiguous queries in a media database. Algorithms automate personalisation and enable the targeting of media content. Search algorithms, for instance, such as those used by Google, customise the information based on the recipient's needs, desires, and contacts in online social networks (Bozdag, 2013). Algorithms used for content filters, such as those used to produce Twitter or Facebook timelines, prioritize information based on the history of the user's interaction with similar content by having liked, shared, subscribed, and commented on it (Bozdag, 2013).

The study highlights that amid the concerns about the proliferation of disinformation in the aftermath of the Brexit referendum campaign or the migrant crisis, many have highlighted the negative side effects of algorithms in the consumption and distribution of online news and media. „In the UK, for example, the Digital, Culture, Media and Sport (DCMS) Committee that has investigated disinformation and fake news following the Cambridge Analytica data scandal expressed concern over the "relentless targeting of hyper-partisan views, which play to the fears and prejudices of people, in order to influence their voting plans" (British Broadcasting Corporation, 2018). Much of this attention has focused on the creation of 'filter bubbles' or 'echo chambers', in which, fuelled by strong network effects and human confirmation bias, people may be exposed to an overrepresentation of news or opinionated content aligned with their existing views".

When reviewing the available literature and practices in that context, three approaches have been identified: 1) approaches that aim to increase the transparency of algorithms and awareness of them; 2) approaches aimed at verifying information; and 3) approaches that aim to develop a broader media literacy of individuals in order to effectively interpret media content and information provided to them by using algorithms.

One approach focuses on increasing the transparency of the use and functioning of algorithms in order to increase users' awareness of how information is presented to them on platforms. Despite the fact that algorithmically driven content curation has increasingly become a common feature in search engines and on social media platforms (DeVito et al., 2017), research on this topic to date is rather limited (Hamilton et al., 2014) and was primarily conducted in the US context. It is also possible that recent high-profile debates about algorithm-driven media (such as those relating to the role of social media in the US 2016 election) have increased public awareness since early research has been conducted. The

research that has been conducted to date has presented mixed results. Eslami et al. (2015) performed a qualitative laboratory study of 40 representative (US) Facebook users and find that "more than half of the participants (62.5 percent) were not aware of the News Feed curation". Similarly, a survey of 147 college students conducted by Powers (2017) finds that most did not know whether and how Google and Facebook track user data and apply editorial judgments to deliver personalised results. Further, a survey of 208 Facebook users conducted by Rader and Gray (2015) found that respondents overwhelmingly (75 per cent) believed they did not see everything in their News Feed, implying that the respondents did believe some form of curating was happening.

Reducing the vulnerability of those who use social networks as sources of news and information (and who are potential targets of disinformation campaigns) is a necessary part of the solution to the problems associated with algorithm-based media services, the study points out. This can be done by improving the skills needed by users to critically understand the information they encounter and interact on the Internet, consistent with the traditional understanding of media literacy applied to the Internet environment.

One challenge in this regard also indicated in the conclusions of the study, is that activities aimed at fostering media literacy skills are based on the assumption that users will know when to use these skills. The problem is that users themselves are often unaware of their own cognitive biases, so this is an area where the behavioural sciences need to get involved.

| Process | Problems and harms | Sources |
|---|---|---|
| **Manipulation of the media** | Disinformation, growing distrust in the media and further radicalisation | Marwick and Lewis (2017) |
| **Invasive data use** | Intrusion privacy violation, decisional interference | Solove (2006) |
| **Attention economy** | Distraction, loss of productivity | Marotta and Acquisti (2017) |
| **Computational gatekeepers of media** | Lack of visibility, information asymmetry and hidden influence | Tufekci (2015) |
| **AI use in social decisions** | Sample size disparity, hacked reward functions, cultural differences, confounding covariates | Osoba and Welser IV (2017) |

*Typology of concerns and harms around algorithmic decisions for media provision (Study on media literacy and online empowerment issues raised by algorithm-driven media services SMART 2017/0081)*

This study teaches us that the "research methods employed so far have also mostly been small scale, e.g. in the form of experiments (Eslami et al., 2016) and target group surveys (Powers, 2017). Making robust inferences about algorithm awareness is therefore difficult, especially since this awareness might differ per user group. Furthermore, current research has overwhelmingly taken place in the US context, and awareness in the EU context might be different. Also, studies on algorithm awareness have mostly focused on Facebook, rather than examining algorithms on other platforms, such as Google. One challenge for future research is the

fact that often neither the user nor the researcher has access to the actual code in order to review and test the effects of different inputs (Hamilton et al., 2014). In light of this lack of clear understanding on the part of the public, there have been a number of calls to increase the transparency of platforms as part of an effort to increase the ability for users to understand the way that information has been filtered and presented to them. The European Commission has indicated that "greater transparency is also needed for users to understand how the information presented to them is filtered, shaped or personalised, especially when this information forms the basis of purchasing decisions or influences their participation in civic or democratic life" (European Commission, 2015).

This point has also been made by stakeholders working in the field (Hildebrandt and Gutwirth, 2008; Hildebrandt, 2012). On the one hand, calls have been made to increase the transparency of algorithms by publishing the code underlying the algorithm. While this is unlikely to be useful to a large part of the user base who lack the technical skills, this may enable greater transparency by allowing independent experts to study and unpack the operations of the algorithms and communicate this to a non-technical audience of users and stakeholders.

On the other hand, "transparency" does not necessarily mean that users are aware of the technical operation of algorithms, but rather cultivating an "informed skepticism" and understanding that algorithmic processes may be determining the outcomes they experience in their daily life (in this case, the media to which they are exposed) (Osoba and Welser, 2017)".

| Dimension | Description |
|---|---|
| **Awareness** | Users are aware that algorithms are used in a way or another in the provision of media services and that there might be implications for the content they see, even if these are not clear to the user |
| **Understanding** | User understands that algorithms are used in the provision of media services and has (basic) understanding of how this shapes the content they see. This would allow for the user to make informed decisions about whether passively using the services in question and at what risk (e.g. navigating with caution, keeping the risk in mind even if not able to detect what is disinformation and what is not) |
| **Knowledge** | Users have a sufficient level of understanding/mastery of how algorithms work to act on algorithms by actively adapting their behaviour (inputs) to change the outcome (e.g. actively selecting content to increase their exposure to diverse media sources) |
| **Action** | Users are able to actively design, engage with or use algorithms for their own purposes when navigating the media landscape |

*Example dimensions of algorithmic literacy, Source: RAND Europe.*

All this points to the need to constantly update the definitions of media literacy in order for users to build their skills for treating media content in the most appropriate way. The study also says that a more holistic understanding of the media environment is necessary.

Media literacy has been posited as a way to help users become more sophisticated (news) "consumers" when encountering false or misleading information (Anderson and Rainie, 2017; Allcott and Gentzkow, 2017). Hobbs has identified this as the "need to move beyond tool-oriented focus, which conflates having access to media and technology with the skilful use of it" (Hobbs, 2010).

No standard definition of media literacy is in use across the sector, and those proposed in the literature will often differ, involving elements such as information literacy (for example, finding and sourcing information online and library skills) and critical media (social justice) perspectives (Huguet et al., 2019).

To illustrate this, there are some definitions below.

According to Bulger and Davison (2018), media literacy is traditionally "conceived as a process or set of skills based on critical thinking" and is commonly operationalised as a set of skills that enhances and enforces critical engagement with messages produced by the media and other senders of information. The EU Media Literacy Expert Group (MLEG) defines media literacy as including "all technical, cognitive, social, civic and creative capacities that allow a citizen to access, have a critical understanding of the media and interact with it" (European Audio-visual Observatory, 2016). Frau-Meigs (2017), in accordance with UNESCO (2007), uses a composite definition of media literacy as "Media and Information Literacy" (MIL), which sees media literacy as being grounded in the multidisciplinary fields of education, information, and communication sciences. In the same vein, a recent report published by the European Audiovisual Observatory identified five main categories of media literacy skills (European Audiovisual Observatory, 2016: 41):

- creativity: such as creating, building, and generating media content;
- critical thinking: such as understanding how the media industry works and how media messages are constructed; questioning the motivations of content producers in order to make informed choices about content selection and use; recognising different types of media content and evaluating content for truthfulness, reliability, and value for money; recognising and managing online security and safety risks;
- intercultural dialogue: such as challenging radicalisation and hate speech;
- media use: such as the ability to search, find and navigate, and use media content and services;
- participation and interaction: interaction, engagement, and participation in the economic, social, creative, and cultural aspects of society through the media and promoting democratic participation and fundamental rights

The study shows us the results of the consultation in the following areas: challenges stemming from the use of algorithm-driven media services, issues associated with the use of these services, and possible responses to address the identified challenges.

Related to challenges stemming from the use of algorithm-driven media respondents were asked whether they agreed that the use of algorithm-driven media may lead to a series of negative consequences. These consequences were selected on the basis of a literature review conducted by the research team earlier in the project.

| | Strongly Agree | Agree | Neither | Disagree | Strongly Disagree | N |
|---|---|---|---|---|---|---|
| **Limited exposure of users to alternative or competing views** | 23 | 20 | 4 | 2 | 0 | 49 |
| **Ideological polarisation** | 21 | 24 | 3 | 0 | 0 | 48 |
| **Reinforcement of people's existing biases with which they interpret or process information** | 22 | 24 | 2 | 0 | 0 | 48 |
| **Mistrust of the media and institutions** | 11 | 18 | 14 | 5 | 0 | 48 |
| **Weakening of the traditional media model (and/or associated functions such as fact-checking)** | 12 | 22 | 8 | 5 | 1 | 48 |
| **Suppression of a large diversity of voices or opinions** | 11 | 14 | 13 | 9 | 1 | 48 |
| **Pressure on people to engage with and share content that 'performs' well irrespective of quality/veracity (such as inaccurate news stories or clickbait)** | 16 | 15 | 11 | 4 | 1 | 47 |
| **Easy dissemination of disinformation** | 21 | 22 | 5 | 1 | 0 | 49 |
| **Increased acceptance of disinformation** | 13 | 18 | 13 | 5 | 0 | 49 |

The results show that the majority of respondents agreed that each of the proposed consequences may result from the use of algorithm-driven media. In particular, the vast majority of respondents agreed that the use of these media can give rise to the following: 1) reinforcement of people's existing biases with which they interpret or process information; 2) ideological polarization; 3) easy dissemination of disinformation; and 4) Increased acceptance of disinformation.

The report says that the respondents also offered additional examples of the consequences of the use of algorithm-driven media. These included 1) increased difficulty for small-scale community groups to be visible and share their ideas, 2) increased inequalities as "hard-to-reach" audiences may not get the same opportunities or information, 3) decreasing cultural diversity in audio-visual consumption and less chance of "stumbling upon" something on the Internet, 4) undermining of local content, and 5) intrusions of people's privacy.

# THE POWER AND BIAS OF ALGORITHMS (ALGORITHMIC IMPACT ASSESSMENT)

It is becoming clear that algorithms are playing an ever-increasing role in the way that we understand and interact with our world.

Every one of us can testify the situation when we have been communicating with a friend about a very specific topic and shortly afterward we have found ourselves inundated with related ads on Facebook, Gmail, and YouTube. Algorithms are everywhere. We use an algorithm when we are finding the fastest path to work. Smart speakers, email accounts, and chat programs are listening in on our conversations so they can advertise to us. Netflix and YouTube aim to maximize our viewing time and have little concern about whether or not we like the content.

Due to insufficient research, but also due to insufficient interest, we are taught to think that algorithms are complex and beyond our control. Changing this reality will mean the synchronization and partnership of many serious social actors, because it becomes essential to understand the processes of designing algorithms, and how we are affected by them.

The era of artificial intelligence and algorithm demands it from us. And this is a confirmation that the field of media literacy will have to be constantly expanded, in order for the young people, as well as all other target groups, to be ready for the present moment, but also for the future.

That will mean looking for answers to questions like: How do we assess the impact of algorithms? How can we stop their unethical use? How will algorithms change the world, that is, will justice, fairness, objectivity, truth - be values that will dominate the pedestal?

Understandably, ethical concerns will increasingly arise from how AI programming affects the individual to how the individual can affect the AI. A more pronounced use of artificial intelligence will bring situations that will mean controlling or manipulating both technological and non-technological spaces.

It is becoming more and more certain that information can be manipulated so that the user can happen to see no ideas other than those dictated by the coder. To eliminate bias in algorithms, all stakeholders from developers to elected officials need to work together to identify, mitigate and fix the impacts on our lives.

A WIRED article points out the increasingly common flaws and biased nature of algorithms, citing several examples. The opacity within AI algorithms can mask biases and make it difficult or impossible to establish accountability (O'Neil, 2016). This creates many moral and ethical ramifications.

The researches point out examples as: A Michigan man wrongly accused of fraud had to file for bankruptcy; automated screening tools disproportionately harm people of colour who want to buy a home or rent an apartment; Black Facebook users were subjected to more abuse than white users. Other automated systems have improperly rated teachers, graded students, and flagged people with dark skin more often for cheating on tests.

But the defiance towards this spontaneity or nature of algorithms does not rest. The text by author Khari Johnson states that efforts are now being made to better understand how AI works and to hold users accountable. For example, New York's City Council adopted a law requiring audits of algorithms used by employers in hiring or promotion. The law, the first of its kind in the nation, requires employers to bring in outsiders to assess whether an algorithm exhibits bias based on sex, race, or ethnicity. Employers also must tell job applicants who live in New York when artificial intelligence plays a role in deciding who gets hired or promoted.

In Washington, DC, members of Congress are drafting a bill that would require businesses to evaluate automated decision-making systems used in areas such as health care, housing, employment, or education, and report the findings to the Federal Trade Commission; three of the FTC's five members support stronger regulation of algorithms. An AI Bill of Rights proposed last month by the White House calls for disclosing when AI makes decisions that impact a person's civil rights, and it says AI systems should be "carefully audited" for accuracy and bias, among other things.

Elsewhere, European Union lawmakers are considering legislation requiring the inspection of AI deemed high-risk and creating a public registry of high-risk systems. Countries including China, Canada, Germany, and the UK have also taken steps to regulate AI in recent years.

Julia Stoyanovich, an associate professor at New York University who served on the New York City Automated Decision Systems Task Force, says she and students recently examined a hiring tool and found it assigned people different personality scores based on the software program with which they created their résumé. Other studies have found that hiring algorithms favour applicants based on where they went to school, their accent, whether they wear glasses, or whether there's a bookshelf in the background.

Some proponents of greater scrutiny favour mandatory audits of algorithms similar to the audits of companies' financials, says Stoyanovich. „Others prefer "impact assessments" akin to environmental impact reports. Both groups agree that the field desperately needs standards for how such reviews should be conducted and what they should include. Without standards, businesses could engage in "ethics washing" by arranging for favourable audits. Proponents say the reviews won't solve all problems associated with algorithms, but they would help hold the makers and users of AI legally accountable".

A forthcoming report by the Algorithmic Justice League (AJL), a private non-profit, recommends requiring disclosure when an AI model is used and creating a public repository of incidents where AI caused harm. The repository could help auditors spot potential problems with algorithms, and help regulators investigate or fine repeat offenders.

The Wired text points out that UCLA law professor Andrew Selbst was one of the first to suggest impact assessments for algorithms.

In a paper forthcoming in the Harvard Journal of Law & Technology, Selbst champions documentation because we do not yet fully understand how AI harms people. Research into algorithmic harm is only a few years old, and very little is known about AI's impact on different groups.

"We need to know how the many subjective decisions that go into building a model lead to the observed results, and why those decisions were thought justified at the time, just to have a chance at disentangling everything when something goes wrong," the paper reads. "Algorithmic impact assessments cannot solve all algorithmic harms, but they can put the field and regulators in better positions to avoid the harms in the first place and to act on them once we know more."

Khari Johnson is saying that „throughout the past year, people with experience documenting how AI can cause harm have highlighted the steps they feel are necessary for audits and impact assessments to succeed and how they can fail. Some draw lessons from initial efforts to regulate AI around the world and past efforts to protect people or the environment from dangerous technology".

According to Greenlining Institute Report (2021), "Algorithmic bias occurs when an algorithmic decision creates unfair outcomes that unjustifiably and arbitrarily privilege certain groups over others." Based on the big data, AI could predict our life expectancy based on our zip codes and economical status. The report outlined how algorithms are used to decide who gets "access to affordable credit, jobs, education, government resources, health care and investment" (Greenlining Institute Report, 2021).

„Schools use algorithms to grade student's essays or to check for plagiarism. Colleges use algorithms to identify at-risk students or to determine the likelihood of a student accepting an admission offer. The Problem Algorithms that predict student achievement can punish students at low-performing schools and reinforce educational disparities.

Grading Algorithms in the UK Gives Lower Grades to Lower-Income Students (дали ова е наслов?) In 2020, the COVID-19 pandemic forced schools in England to cancel final exams nationwide, making it difficult to give out final grades and determine college placements. As a result, England's Office of Qualifications and Examinations Regulation (Ofqual) turned to an algorithm to calculate student grades. To calculate grades, the algorithm relied on teachers' prediction of that student's final grades, their academic performance and, critically, a school's historical performance data.

The algorithm lowered 40% of teacher-provided grades in calculating the final results. An analysis of the algorithm found that the algorithm was more likely to give lower grades for lower-income students and those who did not attend smaller private schools. After a large public outcry, Ofqual scrapped the algorithmic grades and students received their teacher-assigned grades.

The Ofqual algorithm is another example of a mismatch between the outcome an algorithm is supposed to predict and what it actually predicts. Ofqual's algorithm did not really determine a student's actual achievement throughout the year but rather predicted how well students in a particular school "should" do. The algorithm's focus on historical school performance as a predictor meant high-achieving students in poorly performing schools were more likely to have their grades lowered. Ofqual's grading algorithm also raises questions about the ethics of assigning grades to students based on their school quality rather than more personal measures of achievement. In addition, the algorithm gave greater weight to teacher grades in schools with small class sizes, giving students at private schools an unfair leg up".

The Conclusion of this Report is that Algorithms and automated decisions are powerful, pervasive, and often unfair, inaccurate, and discriminatory. Even tech giants like Facebook, Microsoft, and Google have joined privacy and consumer advocates to ask state legislatures to establish new rules and regulations for algorithms and AI.

This push for legislative action presents an opportunity to not only develop policies that minimize unfair algorithmic discrimination, but also to create a system where decision-makers optimize algorithms for equity and inclusion, design them in ways that drive investments to the most vulnerable communities, and use them to build a better and more equal society.

## THE IMPORTANCE OF PREPARING YOUTH WITH TOOLS FOR CRITICAL ANALYSIS OF ALGORITHMS AND NAVIGATION

"The increasing use of algorithms in decision-making raises a number of ethical concerns, including concerns about the quality and fairness of the data used, the transparency of the algorithms, the accountability for their actions, and the potential for bias and discrimination" (p. 1, "The Ethics of Algorithms: Mapping the Debate").

The perception we have of the world never stops being influenced by media discourse, broadcasted ideas, and published thoughts in a constant social, political, or economic construction of reality.

There is a consensus in the literature that the purpose of education, specifically media literacy education is to provide people with the habits of inquiry and skills of expression they need to be critical thinkers, effective communicators, and active citizens in the world.

But traditional media and information literacy is becoming inadequate, and the algorithmic literacy is necessary to effectively navigate and participate in the complex information environment.

Algorithms create a media environment that calls for different or at least additional media literacy skills, what Nichols and LeBlanc calls "non-local, non-representational, and non-human relations" understanding (2021, p. 395). Literacy practices must address the entire media environment, which includes the algorithm itself, the technology/platform, user behaviour, and the sociocultural influences and effects.

"Digital literacy involves understanding the social and cultural contexts of digital media, and the ways in which these media are used to construct and represent identities, relationships, and values. Digital literacy also involves understanding the ethical implications of digital media use, and the potential for these media to be used to harm or exploit others" (p. 2, Buckingham David).

Sayifa Noble (2018), author of Algorithms of Oppression, found that algorithms perpetuate and reflect the bias of their programmers. There is a cyclical relationship between the user and the algorithm, in that they influence and feed each other. As a code-based program, however, "control is held by those who build and deploy algorithms, not those who use them" or are affected by them (Ridley & Pawlick-Potts, 2021). Case

in point, as a human construct, algorithms cannot predict all outcomes, thereby resulting in unanticipated consequences that can and do have disastrous results, particularly when used as predictive analytics (Nichols & LeBlanc, 2021).

Therefore, the need for critical media literacy becomes a priority. Educators, on the other hand, will need to expand their knowledge to prepare young people to take bolder and more active actions to eradicate social injustice that algorithms can reflect or worsen when it already exists in the actions of some actors in the communities themselves.

Media literacy education should not just be about teaching people how to critically analyse media, but also about teaching people how to use media effectively and ethically, (Renee Hobbs and Amy Jensen, (p. 3).

Advancing algorithmic literacy among young people will mean creating solid ground for responsible digital citizenship. Thus, a new type of literacy needs to be added to media and digital literacies – algorithmic literacy. Information literacy education must be adopted across the curriculum because improved information literacy will strengthen student's engagement with technology academically and socially. To retain this knowledge, student learning must be scaffolded and iterative.

To practice literacy in the 21st century is to be able to understand the interconnected nature between text, technology, social structures, economic, and political influences, and the role of digital communication in our online (and offline) lives. Digital literacy requires people to be able to consume and create, but also requires people to be critical of what they are consuming... the next phase in technological literacy is to incorporate the role of algorithms and algorithmically-run platforms, (Koenig, 2020, p. 2).

Awareness of algorithmic decision-making is fundamental to contemporary information literacies, which is understood as critical engagements with information. Yet...there is a need to go beyond awareness in order to connect individual responsibilities, collective responsibilities and corporate interests and to facilitate an understanding of information as co-constituted with the socio-material conditions that enable it, (Haider & Sundin, 2021, p. 140).

Algorithms like those used by Google and Netflix are designed to take in our queries and observe our actions, using this data to answer our questions, anticipate our needs, and recommend items or media we might enjoy. Because search engines are the "public face" of algorithms, we tend to think of them as tools and evaluate them primarily based on their usefulness. A good algorithm returns the information we want or expect, while a bad one does not. This perception, however, sidesteps the rhetorical dimension of algorithms. In spite of their neutral appearance, algorithms "take their forms from the builders and makers as well as the social systems out of which those people produce their algorithms. Algorithms are machinations of human beings' intentions and the equations designed to achieve those intentions, (Gallagher, 2020, p. 2). As a result of this human connection, even the best intentioned "builders and makers" produce algorithms that reflect values and beliefs, including racial, economic, sexual, etc. biases. With respect to search engines, such biases often take the form of search results that promote misinformation, exploit women and marginalized groups, or perpetuate stereotypes, as a result of foregrounding the most profitable content.

When we teach students about information literacy we must also prepare them to consider how algorithms function as rhetorical actors. Haider and Sundin (2021) explain "[i]nformation literacy today inherently implies the creation of meaning from information shaped in relation to and by algorithmic systems that employ different forms of predictive analytics" (p. 131), suggesting that central to any discussion of information literacy is also attention to algorithmic awareness and the ways that algorithmics are also rhetorical. As "our world (online and off!) is increasingly mediated, filtered, personalized, and predicted by algorithms" it is necessary to teach students how to "appraise, interrogate, and analyse the roles algorithms play in structuring our information seeking and use" (Gardner, 2019). Moreover, "if we define information literacy as the ability to critically and reflectively locate, evaluate, and incorporate information–something we ask students to do in nearly every writing class–then the role of algorithms in that process must not be overlooked" (Bakke, 2020, p. 2). We know that engagement with technological information is shaped by past usage and response to this usage, therefore it is important for students to develop not simply information literacy skills, but also algorithmic literacy skills–or awareness. Much of this awareness lies in metacognition, self-reflection, and meaning-making: acts that enable students to make sense of their own lived experiences with technology. Moreover, these are skills that students need in order to succeed academically, professionally, and socially.

The prevalence of artificial intelligence, biased algorithms, surveillance capitalism (Zuboff, 2019), and disinformation amplify the need for students to develop critical skills regarding how digital media influences their lives. Low algorithmic awareness makes one more susceptible to data-driven manipulation, more likely to spread misinformation and more accepting of stereotypes (Mohamed, 2020; Pariser, 2019).

This article has intention to boost educators to respond to this information literacy deficit. Having youths critically engage with the seen and unseen impacts of algorithmic bias, discrimination, and harm must be centralized and validated across multiple learning spaces if we are to prepare students to be ethical users of technology. Ultimately, future pedagogical research in information literacy must expand beyond the walls of the general education curriculum, and infiltrate all levels of life and, like the boundlessness of the internet has infiltrated all aspects of our daily lives. Young people are already cognizant of the ways technology can be helpful, but there is also a need to educate them on the ways that technology, particularly algorithms, are harmful, discriminatory and biased.

## CONCLUSION: NEED FOR NEW DIGITAL AND CRITICAL MEDIA LITERACY

Better teacher training has been found to improve the benefits that students receive from the use of technology reducing the digital divide (Starkley et al., 2016; Warcheauer et al., 2016). Reich (2020) recommends that educators immerse themselves in new technologies and teach students how to use new technologies, rather than continuing to teach in old ways and using technology as a tool. A similar strategy is recommended for increasing artificial intelligence literacy among students. To increase artificial intelligence literacy, Reich (2020) advocates that students learn about how AI functions and ethical considerations when working with AI rather than just learning how to use AI-based programs (Ng et al., 2021). In order to prepare students for a world filled with algorithms and AI educators will first need to understand these technologies so that they can provide effective artificial intelligence literacy instruction.

The impact of algorithms and artificial intelligence will continue to grow. They have the ability to make our lives easier, but algorithms have also been shown to reflect the worst human qualities, including callousness when making life-impacting decisions, and the pursuit of profit above all else. Educators will need to adapt to the changing climate brought on by algorithms and also teach students the algorithmic literacy skills that are necessary to understand the influence of algorithms.

The prevalence of algorithms in daily life and the expanding role of algorithms in societal decision making and governance has led to a call for teaching algorithmic literacy as a specific part of media and digital literacy.

Teachers and instructors need to develop lesson plans that inform about algorithms and engage critical thinking and discussion about their role in our lives. Nevertheless, this is a challenging topic.

The need for algorithmic literacy arises from two key and equally important perspectives: control and empowerment. Building algorithmic literacy "is needed to acknowledge both the technology's power (control) over people and power (empowerment) for people" (Ridley & Pawlick-Potts, 2021, p. 5). On one hand, this literacy can help us embrace the possibilities and promises, and on the other, to exercise control over where and when they act upon us. Importantly, current digital and information literacy does not provide algorithmic literacy (Ridley & Pawlick-Potts, 2021, p. 1). Yet this is key, write Gran et al. (2021), because "knowing more about the structural forces that shape the Web is not just an online navigational skill, but a necessary condition managing information as an informed citizen" (p. 1790). Informed citizens will recognize and be able to articulate that "what is at stake then with the rise of 'algorithm machines' is new forms of algorithmic power that are reshaping how social and economic systems work" (Kitchin, 2017, p. 16).

Teaching algorithmic literacy, like media literacy, becomes an urgent matter of preventing digital divides and halting the enculturation of bias into applications that potentially impact many lives cognitively, emotionally, and yes, even physically. Zarouali et al. (2021) speak directly to the concerns of media literacy researchers:

On the one hand, being aware of algorithmic recommendations on online platforms might encourage online users to make more critical reflections and decisions regarding the content they are being presented on these platforms. On the other, a lack of algorithmic awareness might contribute to major societal problems, such as the spread of mis- and disinformation, the proliferation of filter bubbles, an increased susceptibility to data-driven manipulation, and the reinforcement of stereotypes, inequalities and discrimination. (p. 2)

Ridley and Pawlick-Potts (2021), summarize why this particular literacy is so important in an educational context: "Algorithms are not a technology like AI or, more generally, computers. Algorithms provide a structure that frames—and constrains—how we express ourselves. They are a way of seeing and acting in the world", (p. 18).

What is needed is curricula and practices that address the sociocultural and ethical aspects of algorithms. Just with intentionally designed instruction that moves beyond traditional literacy practices, students will gain the reflectivity necessary to be active, socially aware, and social justice-minded individuals in society.

## REFERENCE LIST / LITERATURE:


- Study on media literacy and online empowerment issues raised by algorithm-driven media services, Luxembourg. Publications Office of the European Union, 2019
- Algorithms and human rights, Study on the human rights dimensions of automated data processing techniques and possible regulatory implications", published by the Council of Europe in 2019. The study was commissioned by the European Commission to understand the challenges posed by algorithms and automated decision-making to human rights and to explore possible regulatory solutions
- Johnson, K. (2021, December 2). The movement to hold AI accountable gains more steam." Wired. Retrieved: https://www.wired.com/story/movement-hold-ai-accountable-gains-steam/.
- Greenlining Institute. (2021). Algorithmic Bias explained. Retrieved: https://greenlining.org/wp-content/uploads/2021/04/Greenlining-Institute-Algorithmic-Bias-Explained-Report-Feb-2021.pdf
- Koenig, A. (2020). The algorithms know me and I know them: using student journals to uncover algorithmic literacy awareness. Computers and Composition, 58, 102611
- Gallagher, J. R. (2020). The ethics of writing for algorithmic audiences. Computers and Composition, 57, 102583
- Bakke, A. (2020). Everyday googling: results of an observational study and applications for teaching algorithmic literacy. Computers and Composition, 57, 102577
- Haider, J., & Sundin, O. (2021). Information literacy as a site for anticipation: temporal tactics for infrastructural meaning-making and algorhythm awareness. Journal of Documentation
- Gardner, C. C. (2019). Teaching algorithmic bias in a credit-bearing course. International Information & Library Review, 51(4), 321-327
- O'Neil, C. (2016). Weapons of math destruction: How big data increases inequality and threatens democracy. Broadway Books
- Lloyd, A. (2019). Chasing Frankenstein's monster: Information literacy in the black box society. Journal of Documentation, 75(6), 1475–1485. https://doi.org/10.1108/JD-02-2019-0035
- Burrell, J. (2016). How the machine 'thinks': Understanding opacity in machine learning algorithms. Big Data & Society, 3(1), 205395171562251. https://doi.org/10.1177/2053951715622512
- Reich, J. (2020). Failure to disrupt: Why technology alone can't transform education. Harvard University Press.
- Kitchin, R. (2017) Thinking critically about and researching algorithms. Information, Communication & Society, 20(1), 14-29. https://doi.org/10.1080/1369118X.2016.1154087

- Ridley, M., & Pawlick-Potts, D. (2021). Algorithmic literacy and the role for libraries. Information Technology and Libraries, 40(2). https://doi.org/10.6017/ital.v40i2.12963
- Dogruel, L. (2021). What is algorithm literacy? In M. Taddicken & C. Schumann (Eds.), Algorithms and Communication (pp. 67-94). SSOAR Open Access Repository. https://www.ssoar.info/ssoar/handle/document/75898
- Lomborg, S., & Kapsch, P. H. (2020). Decoding algorithms. Media, Culture & Society, 42(5), 745-761. https://doi.org/10.1177%2F0163443719855301
- Head, A. J., Fister, B., & MacMillan, M. (2020). Information literacy in the age of algorithms: Student experiences with news and information, and the need for change. Project Information Literacy. https://projectinfolit.org/pubs/algorithm-study/pil_algorithm-study_2020-01-15.pdf
- Nichols, T. P., & LeBlanc, R. J. (2021). Media education and the limits of "literacy": Ecological orientations to performative platforms. Curriculum Inquiry, 51(4), 389-412. https://doi.org/10.1080/03626784.2020.1865104
- Ridley, M., & Pawlick-Potts, D. (2021, June). Algorithmic literacy and the role for libraries. Information Technology and Libraries, 40(2), 1-15. https://doi.org/10.6017/ital.v40i2.12963
- Noble, S. U. (2018). Algorithms of oppression: How search engines reinforce racism. New York University Press.
- Zuboff, S. (2019) The age of surveillance capitalism. Public Affairs
- Mohamed, S., Png, MT. & Isaac, W. (2020). Decolonial AI: Decolonial Theory as Sociotechnical Foresight in Artificial Intelligence. Philos. Technol. 33, 659–684. https://doi.org/10.1007/s13347-020-00405-8
- Pariser, E. (2011). The filter bubble: What the Internet is hiding from you. Viking/Penguin Press.
- Jeff Share, Tatevik Mamikonyan, Eduardo Lopez (2019): Critical Media Literacy in Teacher Education, Theory, and Practice
- Buckingham, D. Defining digital literacy: What do young people need to know about digital media, (2015)
- Renee Hobbs and Amy Jensen, The Past, Present, and Future of Media Literacy Education, (2009)
- Mittelstadt, B. D., Allo, P., Taddeo, M., Wachter, S., & Floridi, L. (2016). The ethics of algorithms: Mapping the debate. Big Data & Society
- Web sites: media-and-learning.eu, ic4ml.org, wired.com

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