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# Young People Learning About Algorithms: Five Profiles Spanning From Ineptitude to Enchantment

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## Abstract

This article focuses on young people's understanding of algorithms and their learning methods. While many younger individuals are deeply familiar with digital media, it is erroneous to assume that this familiarity is equivalent to operational or critical knowledge. Given that algorithm awareness has only recently become a topic of debate, daily life practices and knowledge processes need further study, particularly through the lens of audiences. The analysis is based on 42 interviews carried out as part of a project on young people, news, and digital citizenship in Portugal. From the analysis, we came up with five profiles that include different ways of understanding and learning about algorithms: ethereal, ambivalent, unfamiliar, negative, and positive perspectives. Preliminary findings reveal strategies youth employ to bypass the influence of algorithms, with a dominant perspective of learning through the proximity contexts: alone, with social media (TikTok and Instagram), with peers/family, and few cases mentioning school, that surprisingly, is almost absent as a learning atmosphere. Given the newness of the collective awareness of the power of algorithms, the presented scenario claims that we need for a more structural and institutional learning context and response, which could help prevent recurring scenarios akin to digital "bowling alone."

## Keywords

algorithms; digital inclusion; digital natives; digital rights; learning processes; young people

## 1. Introduction

This article reflects on how young audiences acquire knowledge about algorithms and their understanding of them. Given the awareness around the algorithmisation of life, it has recently become a topic of debate. Practices and the knowledge processes of daily life need further study, particularly through the lens of

audiences, focusing on how young people regard and deal with algorithms (Mathieu & Pruulmann-Vengerfeldt, 2020; Swart, 2021). While algorithms are commonly understood as a set of step-by-step instructions to accomplish a task or solve a problem based on past data, it is also true that socially and from the point of view of audiences, this definition might be considered simplistic.

Swart (2021, p. 3) pinpoints that "algorithms are understood through use" and that it is somewhat more relevant to explore citizens' algorithmic experiences instead of what citizens "should know about algorithms….The concept of experience helps us to conceptualise algorithmic literacy as a form of knowledge that is not just rational, but also tacit, intuitive, situated, and lived." Schwartz and Mahnke (2021) emphasised the continuous and dynamic interaction between algorithmic tools and human agency, pointing to the active role of citizens concerning the effects of algorithms. Therefore, audiences' experiences of algorithms must be better understood (Lomborg & Kapsch, 2020; Swart, 2021) to overcome digital inequalities and create conditions for citizens to benefit from digital advances. The current media-saturated environment demands that citizens process a critical understanding of the digital and, particularly, of algorithmic contexts engrained in daily life (despite its prevalence since the previous century).

This is particularly difficult to understand if we agree that media options imply non-linear negotiations between media power and everyday life (Mathieu & Møller Hartley, 2021). Thus, cross-referencing artificial intelligence (AI) with audiences must go beyond the enchanted vision of AI's potential (which we do not ignore). However, it is relevant to reflect on the socio-political challenges, the ramifications for people, educational policy, and power (Lindgren, 2024). That said, although AI may be developed under ethical principles, these may lose importance when production and economic pressures come into play, disregarding adverse effects (Lindgren, 2024). So, when avoiding a media-centric view, people cannot excuse themselves by blaming technology itself (Bruns, 2019). Algorithms, "those esoteric computational structures," exert daily their power over users (Terranova, 2022, p. 126) who "consciously or unconsciously follow their instructions," recommendations, and content (Gran et al., 2020, p. 1).

### *1.1. Learning Opportunities and Challenges, Socialisation, and Digital Rights*

Many of the younger population are intimately familiar with digital media, seeing it as a tool for interaction with peers, identity building and expression, finding information, and having other social relationships. For example, Amaral et al. (2023) point out that 9 out of 10 young Portuguese adults (18–30 years) use mobile apps daily, and their usage involves personal context. However, it is a fallacy to consider familiarity equivalent to operational or critical knowledge or digital and social integration. Increasing digital presence in daily activities does not necessarily mean digital inclusion, algorithmic knowledge, or awareness (Gran et al., 2020). Inequalities, including digital, are structural (Brites & Castro, 2022; Helsper, 2021; Kennedy et al., 2021); they have hidden digital deserted environments (Brites & Castro, 2022) that challenge the erroneous—digitally enthusiastic—idea of the existence of digital natives (Brites & Castro, 2022; Helsper, 2021; Helsper & Eynon, 2013). This idea that youths are digital natives overlooks their varied social, educational, and cultural backgrounds, which have to be studied and analysed when considering their relationship with digital media.

When we consider young people and their use of technology, it "requires users to engage critically with the information they're seeing" (boyd, 2014, p. 180). However, "when we assume that youth will just absorb all

things digital through exposure, we absolve ourselves of our responsibility to help teenagers develop the necessary skills" (boyd, 2014, pp. 180–181). The argument is valid regarding challenges posed by algorithms, which are not neutral (boyd, 2014). We are now at a stage characterised by the recovery of "bowling alone" (Putnam, 2000), in our era centred not on TV but on the vast, fragmented, omnipresent, and algorithmised digital media and associated self-learning processes. Given the complexity of digital structures/platforms, the proposition that self-learning is sufficient and the only valued item must be considered with caution. Perhaps, more than ever, the perspective of bowling alone should be reconsidered to a demand for bowling with others in the online sphere (with equals and with more skilled mediators).

Ideally, a self-regulated learner starts by establishing goals and an action plan to achieve learning objectives (Schloemer & Brenan, 2006). Self-regulated learning theory (Zimmerman, 2002) is associated with the last decade's lifelong learning discourse (Steffens, 2008). This is an important premise for living in our ever-changing world. However, it is insufficient to ensure that citizens can access knowledge to thrive in this ever-complex information society. The introduction of information and communications technologies at school and home brought to light the role adults and youngsters have in society (Steffens, 2008), namely for social participation and democracy (Gran et al., 2020). Bearing this in a media-saturated society, why are there so few learning opportunities on how to deal with its emerging changes and complexities?

Given that the discussion about the algorithm and its implications for audiences is so recent, it is also relevant to question learning methods identified and used by young people. The expression "do it yourself" (DIY) and the promotion of a "maker culture" (Marsh et al., 2018, p. 1) have gained prominence through the impact that digital technologies have on our lives and the opening up of new means of empowerment (Gibbons & Snake-Beings, 2018). More than 20 years from the start of this millennium, the question is no longer just centred on the enthusiasm for what digital gives us as a value. Instead, it concerns whether this side of DIY remains sufficiently empowering or if it cements unregulated and unsupported processes of self-education. Above all, it delves into the perspectives of considering algorithmic processes more as friends or human-like entities (with greater emotional involvement) or as tools in relations between a servant and a master (Jang et al., 2023). Thus, the authors point out that it is important to know more about anthropomorphism's role and the differences people reveal in their relationship with machines. Learning opportunities are fundamental, especially on emerging topics with a huge presence, impact, and influence on citizens' everyday lives. Topics such as AI and algorithms remain unclear outside the "expert system" (de Bruijn et al., 2022, p. 1). Therefore, in this pressing subject, it is crucial to better understand how algorithmic contexts are identified, used, and learnt.

Oswell (2013) considers family, peer group, and school as the main socialisation institutions. Nevertheless, with the increasing presence of media in everyday life, media has become a key socialisation structure. Bronfenbrenner's (1979) suggestions about four interrelational structures are still relevant and challenged by the exponential of the media systems. In this century, the microsystem (specific environments, such as school); mesosystem (comprising relationships between environments, for example, school and family); exosystem (bringing together one or more environments that are not in direct relations with the affected individual, but still affect them, such as the political system); and the macrosystem (having to do with different cultures or subcultures and made up of the other systems, the previous ones) are increasingly intersecting with and influenced by digital-based media systems, which are becoming more dominant.

Today, the family environment is still a central institution through which young people socialise, meaning that these spaces are also spaces for informal learning, including about technology (Oswell, 2013; Seddighi et al., 2022). As the family environment and socialisation intersect with the digital innovation used at home when parents use and share technologies with their children, these are influenced by parents' algorithms (and vice-versa), namely when they use the same devices (Edgerly et al., 2018). This implies that learning contexts can be diverse, according to the family's educational and social contexts, along with individual skills. Schools are likewise facing considerable challenges in the digital age. In any case, the school has been a space for facilitating student pro-activity (Tomé, 2016) and backing knowledge demands not provided by other structures. Still, schools face difficulties with the increasing digital impacts and generational gaps. Often, school curricula disregard algorithms from core educational subjects, contributing to digital inequality.

To achieve digital inclusion, media literacy is essential; we need to leave behind the idea of digital natives and consider the varying levels of access that people have to technology (Brites & Castro, 2022; Helsper, 2021; Helsper & Eynon, 2013). Understanding the contexts in which people use algorithms is crucial, as is examining prebunking and debunking processes and their implications for diversity, especially considering that algorithms often limit diversity. This view is not unrelated to the fact that "literacy is a [digital] right. It is implicit in the right to education. It is recognised as a right, explicitly for both children and adults…included in key international declarations" (UNESCO, 2006, p. 136). These foundations are not possible to consider without further self-regulation ideas. Digital rights include access, use, content creation, protection, and participation in the digital sphere. In the algorithm era, these can be deeply compromised if we ignore or devalue the need for support through the creation of opportunities.

## 2. Methodological Design and Context

The article stems from the project YouNDigital–Youth, News and Digital Citizenship (https://youndigital.com), where 42 online semi-structured interviews were applied to young people (aged between 15–24; M = 21 and F = 21) living in Portugal. The interviewees were recruited through 94 institutions, associations, collectives, political parties, and NGOs, and through the non-probabilistic snowball sampling technique referred by other participants or contacts close to the research team. This qualitative and non-representative sample was structured to ensure a diverse set of interviewees, not only in terms of age and gender but also in terms of nationality and socio-economic origin. We intended precisely to capture different forms and profiles of (dis)engagement with news and algorithms in vivid and diverse life contexts. Additionally, the project team has a high record of experience working with children and young people and is familiar with ethical procedures. This project was submitted to the university's ethics committee. It is also supported by a document elaborated by the research team with the ethical standards for the entire research process of the project, including informed consents, which cover procedures so that the young people interviewed would be aware of what their participation involved for them when agreeing to be interviewed. The consent forms were signed by the guardians of the young people up to the age of 18 and by all the young people (aged 18–24). Before the interview began, the content of the consent forms was discussed with them. Furthermore, the questions and follow-ups were conducted carefully, avoiding stigmatising the young people. Names and information capable of identifying the interviewees were concealed. No personal pictures or video recordings were collected.

The interviews were supported by Zoom and lasted between 60 and 120 minutes. With one interview per participant, and to capture the audience's views within the context of the interview (Mathieu & Brites, 2014), we included in the script an activity inspired by Q-sort methodology (Schrøder, 2012), centred on influences (people, events, and contexts) that stimulate news consumption, and a second part dedicated to AI algorithms, datafication, and filter bubbles. The Q-sort-inspired activity (Figure 1) had 11 cards, of which only three were prefilled. However, their use was not mandatory as we wanted to ensure interviewees had a completely bottom-up and reflexive experience.

With a think-aloud protocol, the interviewees were asked to identify and classify people, themes, and subjects that played a role in their information-seeking routines, rating them as very important, indifferent, and not very important. The analyses presented in this article are focused on the results of part of the interview with questions based on concrete exercises and illustrative visual materials (e.g., Figure 2). Some of these were created by the team specially for use in the interview, drawing from real experiences of such arid topics.

For this article, we focused on data related to three exercises/questions: (a) A set of three print screens that reproduce Google search findings on the keyword "Marvel," carried out by a man and a woman in their 50s, and a young woman in her 20s (Figure 2); (b) an internet cartoon in which a daughter explains to the father that what he is reading on the computer is false information, with the father doubting that because the information corroborates his perspectives, about a post-truth circumstance; and (c) starting from the metaphoric example of comparing always eating the same meal or diversifying meal choices, as a point of departure for reflecting on diversity subjects and the algorithms. The interviewees answered follow-up questions such as: Have you ever heard of algorithms? In what context? Who told you about them? And, can you explain what an algorithm is to you?

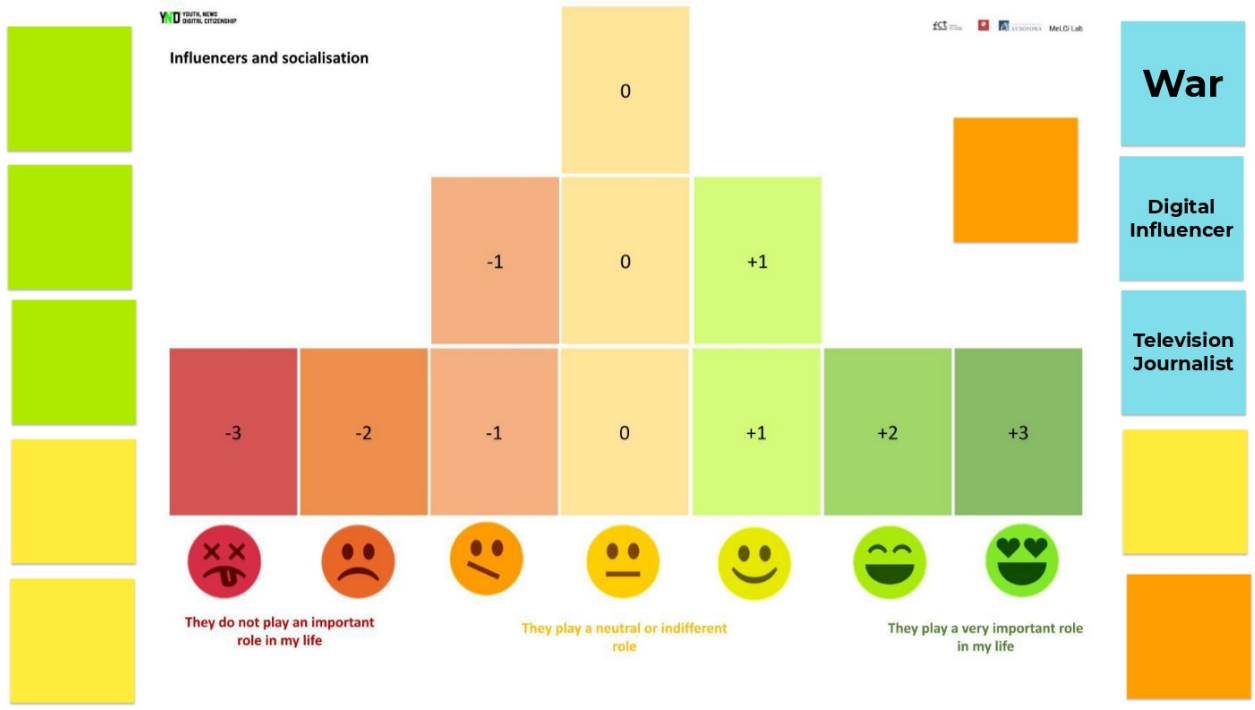


**Figure 1.** The Q-sort-inspired initial exercise, with prefilled cards with war, digital influencer, and TV journalist. Note: An original version of the figure was shown to interviewees in Portuguese.

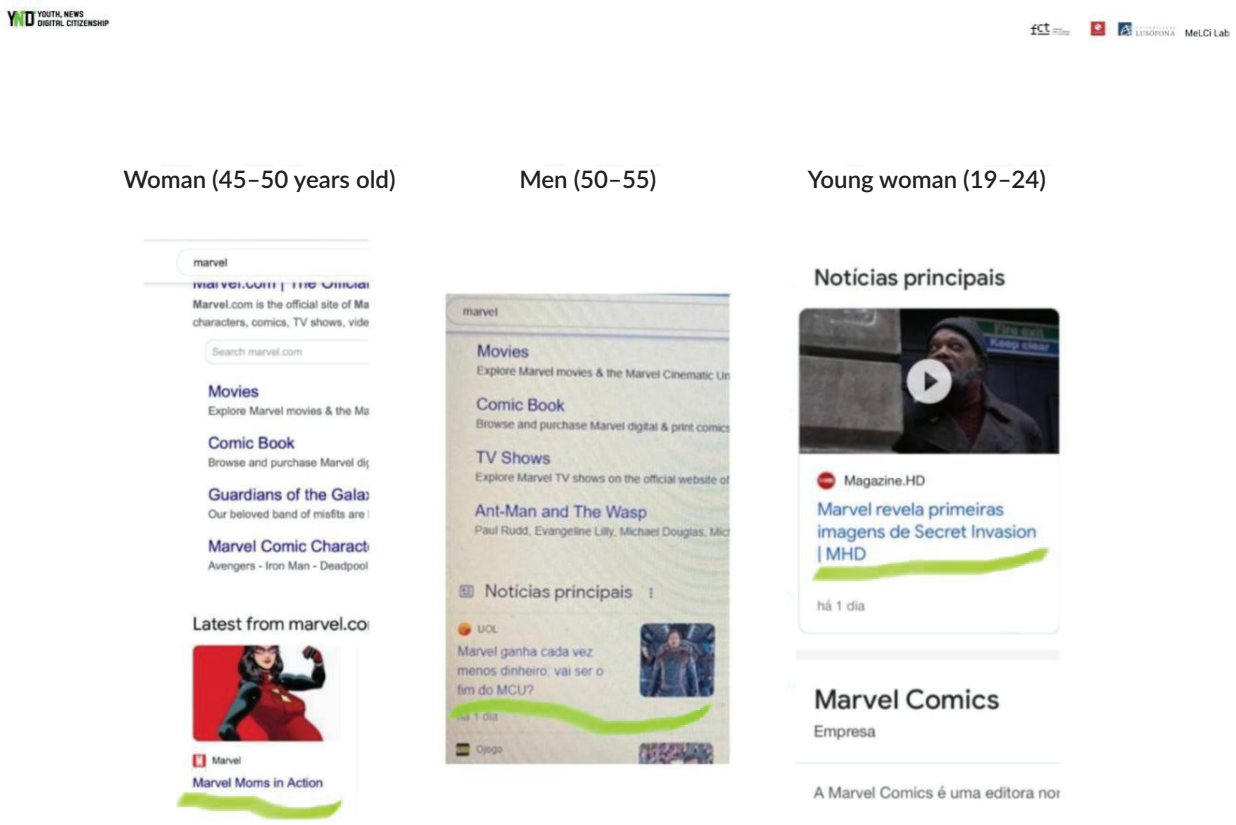


**Figure 2.** An example of one of the visual exercises used during the interview: Three print screens that reproduce Google search findings on the keyword "Marvel." Note: An original version of the figure was shown to interviewees in Portuguese.

Bearing in mind that we wanted to identify profiles based on their interaction with algorithms, which, to our knowledge, had not yet been empirically explored, we followed a set of procedures inspired by Stokes' (2003) proposal. We looked for patterns to arrive at profiles with similar practices and attitudes towards algorithms, including learning processes. We first analysed at a micro-level, looking at each interview and which categories emerged, making it possible to systematise what each person expressed. Then, we combined the individual elements in the collective, drawing up profiles (Ganito, 2010). Instead of considering the traditional model of drawing up profiles according to predetermined variables such as gender, age, and schooling, we started with their testimonials. The typologies were, therefore, created and emerged from the data. Afterwards, because contexts are significant, we proceeded to typify the groups by looking at their family, school, and cultural backgrounds (Brites, 2015).

In the following sections, we try to capture daily contexts with algorithms and self-learning processes among young audiences. We reflect on the following research questions:

RQ1: What is the youth's knowledge about algorithms?

RQ2: How are algorithms learned?

## 3. From Awkward to Enchanting

First-hand results show how young people employ strategies to bypass the influence and power of algorithms. The analyses point to five profiles that intersect knowledge of algorithms, learning contexts, and, finally, the implications these dynamics have, precisely, on the diversity exercised in these young people's day-to-day lives. Table 1 summarises the profiles and their participants.

**Table 1.** Five profiles and their participants.

| Profile | Description | Participants' gender and nationality | Participants activity |
|---|---|---|---|
| The algorithm is an ethereal entity endowed with human faculties of action and decision (Profile 1) | This group has a broad understanding of algorithms. However, they are unfamiliar with the technical details. They learn in family and friend contexts and by themselves, namely through TikTok. | M = 3 and F = 6; Portuguese = 7 and Brazilians = 2 | Diogo (18 years old) is taking a middle school vocational course in automotive mechatronics and doing an internship in the field.<br>Carolina (15), Gabriel (17), and Filipa (17) are high school students.<br>Samuel (17), Adriana (19), and Alice (21) are undergraduate students.<br>Tamiris (24) has a degree and works in a digital nomad accommodation.<br>Lara (21) is a master's student. |
| I am not sure I know how these things work (Profile 2) | This profile encompasses individuals who find algorithms challenging—revealing an ambivalent perspective. They mostly learn by themselves, through Instagram and TikTok, and with friends. | M = 7 and F = 8; 14 Portuguese = and Brazilian = 1 | Rita (15), António (16), Madalena (16), Rita (16), and Sara (16) are high school students.<br>Duarte (21) finished high school and works as a mechanic.<br>Mário (24) finished high school and would like to work in IT.<br>Martim (19), Catarina (20), Filipe (20), Laura (22), and Matilde (23) are undergraduate students.<br>Manuel (22) has a degree and works as a physiotherapist.<br>Luísa (24) has a degree and works as a journalist.<br>Bernardo (23) is a master's student. |
| Never heard of it or do not know (Profile 3) | This group is not familiar with algorithms. Some have never heard of the algorithm. | M = 5 and F = 1; Bissau-Guineans = 2 and Portuguese = 4 | Amadu (15) and Omar (16) are middle school students.<br>Henrique (15) is a high school student.<br>Lúcia (17) attends a high school vocational course, studying to be a hairdresser.<br>André (20) finished high school, is unemployed, and doing voluntary work.<br>Rafael (21) finished high school and works in a clothes shop. |

**Table 1.** (Cont.) Five profiles and their participants.

| Profile | Description | Participants' gender and nationality | Participants activity |
|---|---|---|---|
| The algorithm is essentially negative (Profile 4) | This profile encompasses young people who believe algorithms represent a danger to society. They learn about them at school, even if these learning processes are mostly technical, with family, friends, and on an individual basis. | M = 2 and F = 3; Brazilian = 1 and Portuguese = 4 | Pedro (18) and Pilar (19) are undergraduate students.<br>Joana (22), Bruna (23), and João (23) are master's students. |
| There is no problem if the algorithm gives us what we want (Profile 5) | This group points to the advantages of the algorithm. For them, the problem is not the algorithm but people who do not try to understand it and prefer to keep complaining about it. | M = 4 and F = 3; Portuguese = 7 | Raquel (18) finished high school and did not know what she was going to do next.<br>Sofia (18), Luís (19), Gonçalo (19), Ana (20), and Alexandre (22) are undergraduate students.<br>José (24) is a master's student. |

### *3.1. Profile 1: The Algorithm Is an Ethereal Entity Endowed With Human Faculties of Action and Decision*

Overall, this group seems to have a basic understanding of algorithms but is unfamiliar with the core technical details. They see them as distant servant-to-master/human relations, similar to the findings of Jang et al. (2023). The interviewees point out that algorithms have unquestionable decision powers (as an ethereal entity, talented with human faculties) with the filtering and content personalisation delivered to each user based on previous searches and interests. Some mentioned that TikTok is particularly dependent on algorithms to personalise content for each user, disregarding this aspect in other platforms they also use:

> I think it's a tool produced by artificial intelligence, but of course, nowadays artificial intelligence is much more evolved and…it filters, it makes its bubble….It can generate prejudice because you don't know….You're afraid of the new because you don't have contact with the new. (Tamiris, F, 24, graduate, living and working in a digital nomads accommodation)

They mention fears and potential problems but distance themselves from them (the pronoun is used to reinforce the idea of distance), as Diogo points out. This profile positions the algorithm as something only understood by some persons (family and friends are essential models) and validated as reliable sources of knowledge:

> It was my brother who told me about them because my brother took a computer technician course. And he told me: "Be careful with algorithms; they can be good, but at the same time bad, depending on your point of view and the research you do." I never understood it, and I didn't look into it either,

> and as far as I know, from what I've learnt, the algorithm is something that is made, but which can be modified over time, for each user. (Diogo, M, 18, middle school mechanic)

As we have been pointing out, the contexts for learning about the algorithm are mainly found in spheres of proximity, such as family and friends, and on their own. In Tamiris's case, learning is mostly unidirectional, positioning herself as the recipient of information from family and friends:

> With my family and with my friends, because they're quite geeky. So they explained a lot to me about, I don't know...not, like, acronyms and how to make an algorithm, not like that. Because I wouldn't understand, because I'm a bit disconnected from technology. (F, 24, living and working in a digital nomad housing)

Despite claiming technological detachment (the distance factor), Tamiris mentioned using ChatGPT a lot in daily life and even showed the app's shortcut in her browser. When asked how she finds content that does not appear in her social media feed, she shows interest but lacks knowledge: "I don't know what to do. I don't know how to set myself up as an internet user, you know?" On the other hand, Carolina (F, 15, high school student) is not sure but states that she learnt on her own through social media as a self-taught learner: "I think I've heard more on social media explaining what it is."

While seeing algorithms as superior entities, this profile poses challenges for a deeper and daily learning process. It comprises mostly young people (with a wide age range) with an educational level in line with their ages, showing passive attitudes towards the challenges posed by the algorithm. Some interviewees expressed concern that algorithms can lead to an individualised, distanced, and hostile attitude toward diversity. They associate the algorithm with situations related to fake news and commercial purposes, such as targeting adverts based on users' interests and navigation.

### *3.2. Profile 2: I Am Not Sure I Know How These Things Work*

Being dominant in terms of respondents, this ambivalent profile includes those who believe algorithms are not easy to understand and those who doubt their knowledge about them. Compared to Profile 1, they mostly rely on their self-learning processes (Instagram and TikTok), followed by friends' support, in a third level by family, and, at last, school. Diving deeper into their answers allows us to navigate their digital knowledge and examine their intergenerational relationships, as well as the daily implications of diversity. The answers reveal low levels of knowledge and internalised prejudices and stereotypes, particularly related to older generations. They consider people from older generations to have a lower understanding of technology and online information.

Their statements regarding the relevance of the algorithm were often ambivalent. Some think this is positive, while others believe it can limit exposure to different perspectives. Others do not have an opinion yet recognise the influence of algorithms but do not know exactly how they work: "A machine? I don't know what an algorithm is. Is it a number? A system? I can't even visualise what an algorithm would be" (Luísa, F, 24, journalist).

Despite lacking precise knowledge of how algorithms operate, young people in this profile mention actions taken to circumvent the algorithms and the information delivered to them. For example, Filipe (M, 20,

undergraduate student) stops visiting websites and unfollowing pages that portray fake news or irrelevant content, which happens mostly on Instagram. He believes this has to do with algorithms but does not recognise exactly why he correlates these two ideas. He does not know what an algorithm is but believes that his online navigation can influence it. He understands that algorithms collect information from users, tailoring their searches and narrowing them to what the algorithm thinks the user likes, which is also influenced by gender and age.

This group has different ways of learning, the most expressive is self-learning in digital spaces:

> I started to feel that a lot in TikTok. I started to realise that it was very refined to the point where what I wanted, I would receive. I'd have a conversation with someone, sometimes even in real life, which is still something that scares me to this day, and I still can't understand it 100%, or a message conversation, and suddenly a TikTok on the subject would appear. And then I began to realise the influence of the algorithm; at the time, on Twitter [now X] and Google, I didn't understand so much. Then, I started to do more research and realised what the algorithm was. Then there was also a documentary [*The Social Dilemma*]. (Martim, M, 19, undergraduate student)

Catarina (F, 20, undergraduate student) asserts that she does not talk to anyone about algorithms except when she has doubts. Still, clarifications offered by family or friends lack depth. Although the learning initiatives at school exist, they are limited, as António (M, 16, high school student) mentions: "Algorithms? I'm already learning that at school, but…we haven't learnt much yet."

As already mentioned, this group has an uncertain interpretation of algorithms, namely the possibilities in favour of the diversity of information and ways of overcoming the power of the algorithm. Their learning is centred on the process of conversation, bringing to light 20th-century conversational behaviours (Eliasoph, 1998, 2000; Jacobs et al., 2009) to the curation of news: "I don't think I ever access news with different perspectives, I just try to speak with people" (Madalena, F, 16, high school student).

Being the dominant group in quantitative terms, it can be of concern that their responses indicate that self-learning processes are dominant, above all on platforms and with friends. Though learning with family and at school is not absent, older people are seen as unskilled in these matters.

### *3.3. Profile 3: Never Heard of It or Do not Know*

This is a coherent and differentiated group of young people who lack algorithmic competencies. Some have never heard of the algorithm (the interview was the first time they learnt about it, bringing out the educational value of this type of interview; Brites, 2015), while others had a very vague notion (they did not know or were not sure about it).

Due to this possibility, the interview included explanatory moments to proceed more adequately with the script. It was discussed how algorithms are affected and affect search results and social network feeds. For some interviewees, this is positive for finding relevant information, while others showed concerns about the lack of diversity of content. This profile includes young people with greater difficulties at school, school-year repeaters and early school leavers, and cases of those who started work early in less qualified

jobs. Lúcia (F, 17) attends a professional school, studying to be a hairdresser, and Rafael (M, 20) has finished high school and works in a clothes shop. André (M, 21), who is unemployed, doing voluntary work, and is involved with several NGOs, completed high school in the field of tourism and is looking for work. The same goes for Mário (M, 24), who is not working and would like to have a job in IT.

In this group, unlike others, the school is highlighted as the place where they talk about digital issues, very much from a technical perspective, disconnected from the social contexts related to the problems that may arise. Namely regarding diversity, as Omar (M, 16, middle school student) recalls:

> We [at school] talked a lot about the internet in those two years that I started studying ICT…a lot about online search, and the risks of the internet, which can lead you down bad paths, even to prison. Or…to a good life.

However, part of their learning is done with friends, including those who have the same level of difficulties (Brites & Castro, 2022), creating learning interactions:

> I have a friend, this was at the beginning of the war, who showed me a piece of news that I immediately realised was false. It was about the war, saying that Ukraine was bombing Russia. And that never happened. I immediately saw that it was false, so I went to see it. I went to ask my parents, and they knew it was false. And that it was Russia that had faked it, and he thought it was Ukraine. (Henrique, M, 15, high school student)

The algorithmic influence raises even more concern when decisions are based on Google's algorithm page ranking. "Whenever I don't see anything on social networks, my idea is always to search on Google until I find the thing I want to know about," says Lúcia. In her case, self-learning emphasises weak decisions as a means of learning something.

This profile, perhaps the most challenging for society and formal school contexts, also brings up the negative and unequal spiral in mixed educational, social, political, and economic extents in which some people live (Brites & Castro, 2022; Helsper, 2021; Kennedy et al., 2021). As inequalities become more evident and deeper, societies face structural, political, and social polarisation, which can be exacerbated in the digital context.

### *3.4. Profile 4: The Algorithm Is Essentially Negative*

These young people learn about these matters equally at school, with family and friends, and individually. This profile includes more educated youth with secondary or university degrees who believe algorithms threaten society. In their criticisms, they are mostly concerned with other people and society in general, although some recognise that algorithms can have positive aspects. They most emphasised that algorithms have a negative impact, particularly regarding privacy issues and lack of personal information on the internet. In addition, algorithms can perpetuate prejudices, impact politics, and limit access to information outside one's bubble of interest.

This profile contrasts with Profile 2 because they do not outline taking individual actions in response to the issues they associate with algorithms. They rarely mention changes in their daily habits due to algorithmic

contexts: "I'm concerned about what our society is becoming. In the sense that we're becoming 'zombies' " (Pedro, 18, about to become an undergraduate student).

Bruna (F, 23, master student) relates her apprehension to mental health and mentioned speaking to her psychologist about it: "Sometimes I get tired of the internet….It seems like I'm kind of hostage to it, like, to the social network and the bubble I live in."

Believing that the algorithm is targeted and ends up being selfish in the bias it imposes, these young people see daily uses of digital information and have concerns about how the algorithm can limit people's perspectives, namely in news consumption.

### *3.5. Profile 5: There Is No Problem If the Algorithm Gives Us What We Want*

In contrast to Profile 4, these interviewees strongly point to the positive advantages of the algorithm. For them, the problem is not the algorithm per se, but people who do not try to understand them, preferring to keep complaining about it. As a consequence, they trust the algorithms' utility. They recognise that their opinion is against the flow and might not be understood by others, so they react by saying that everyone is free to have their own opinion about the algorithms. This is the case of Sofia (F, 18, undergraduate student), who summarises the issue by stating: "We are all free to have our own opinion."

This profile favours getting tailored content (particularly on social networks like TikTok). They learn independently and with friends, and in some cases, by gaining insight from their studies (e.g., a computer engineering course). These interviewees value the utility of algorithms as positive but criticise those who misuse them or fail to adapt positively to their use:

> They're there, but I'm glad they're there. I don't have a problem with it. I have more of a problem with people not being awake enough to realise and counteract what they're being presented with. That's more of a problem for me. People don't invest their energy and time in thinking that this is a spectacular tool, it has nice things, it has some problematic things, but we can't do anything about it. (José, M, 24, master student)

We found no substantial differences between males' and females' self-confidence, signifying a change in the classic view of authors such as Young (1996), who points out that women tend to speak less of technical aspects than men and give less controversial arguments, opting for more informative issues:

> I realise that, for example, if I Google Marvel and then go to TikTok, I'll only get scenes about Marvel….I think this algorithm situation…it's extremely advantageous. I don't understand what the problem is [laughs]….I know people who say, "Oh, I'm being monitored, my mobile phone is listening to me"….Although there's always that problem, for example, if I want to look up how to make a bomb on YouTube, then I go to TikTok, and I get, like, those more Nazi organisations, I don't know what. I realise there's a problem there, but it's like this. So I think the algorithm is good in my opinion. (Sofia, F, 18, undergraduate student)

This group learns by doing, and unlike the previous groups, their knowledge is closely related to their areas of study and translated by more robust know-how. They see themselves as knowledgeable and able to

pass on this proficiency to others. We can also find, in some accounts, that they consider themselves highly skilled:

> I try to educate my friends about these areas [digital and algorithms]. I like to hang out with intelligent people and have intelligent and constructive conversations. I don't hang out with the typical testosterone, football, gym guy with nothing going on inside his head. I have no patience with that kind of person; I like to have intelligent, productive conversations. (Gonçalo, M, 19, undergraduate student)

> On YouTube, people have been talking about algorithms for ages because there's this situation where…the person is not banned, but their videos stop appearing in recommendations and other people's algorithms. So I already had that knowledge centuries before TikTok and stuff like that came along. (Sofia, F, 18, undergraduate student)

Since this profile is so in tune with the possibilities offered by the algorithm, we might assume this does not raise any problems from the point of view of a critical reading of the processes, understanding data, platformisation, and digital capacities. However, critical thinking about what is presented to them online is required, and this does not necessarily have to do with the scarcity or strong evidence of technical skills.

## 4. Conclusion and Future Perspectives

Analysing young people's everyday experiences and practices with algorithms—with emphasis on (RQ1) knowledge about algorithms and (RQ2) associated processes of learning—we distinguish five profiles anchored in everyday experience with algorithms: ethereal, ambivalent, unfamiliar, negative, and positive perspectives. The first profile considers the algorithm as a superior ethereal entity. Understanding algorithms as a superior divinity (with human faculties) aggravates learning processes that span between this technologically superior entity and the spheres of proximity (family and friends), as well as informal places of learning. In the second profile (the predominant group in quantitative terms), it can be of concern when the answers suggest that self-learning processes are predominant through user-generated platforms and friends. This profile also introduces other pressing issues regarding prejudices emerging from a polarised and less tolerant society, for example, towards older generations and those seen as less capable of mastering the digital world. The third profile represents the more vulnerable in the sample, those on the margins of society. It, therefore, implies a greater effort here to minimise similar scenarios that reinforce structural inequalities. Another challenge is that although school is an important source of knowledge, learning focuses more on technical aspects, and teaching/learning processes do not critically assess our data-driven and complex society. This school component is also found in the fourth profile, along with family and friends. These young people also exhibit a negative view of algorithms. On the contrary, young people in the last profile are the most fascinated with the possibilities provided by the algorithm, particularly for selecting information that matches their interests. Thus evidencing more technical knowledge than critical thinking.

The complexity of the algorithm and the lack of learning opportunities mean that even the youngest cannot be recognised as tech gurus, thus corroborating that the idea of digital natives is outdated, as already contested by some authors (Brites & Castro, 2022; Helsper, 2021; Helsper & Eynon, 2013). This also reinforces that more comprehensive knowledge is in the hands of a few, as we found in Profile 5, particularly among those

interviewees who have studied in the subject area (de Bruijn et al., 2022). In Profile 2, this lack of knowledge is mentioned by those who are not sure if they understand what algorithms are. They want to be more literate, so they learn by themselves and with friends. Given this, issues of digital exclusion should not be envisioned from the perspective of having or not having access. It is also a form of digital exclusion/inequality at a different and more critical level than that of knowledge/skills, as discussed in Profiles 1, 2, and 3.

Learning processes are limited and far from the challenges raised by citizens' daily life experiences in an increasingly digital society, and, therefore, they are more complex to decode. Learning processes are mainly associated with reliable close relationships (family and friends), including the person themselves—digitally bowling alone, going well beyond Putnam's (2000) democratic concerns about TV. School learning structures, as the data shows, are almost absent from all profiles. In the latter case, the exception is Profile 3, which is essentially the most troublesome and where the school has a learning offer based on technical issues and digital risks, ignoring that knowing about algorithms is no longer compatible with only knowing more about ICT. The lack of knowledge in this group was so evident that the interview became a learning moment (Brites, 2015). Most of the identified self-learning processes are not directly connected with the necessity for or the enthusiastic embrace of DIY contexts (Marsh et al., 2018). Rather, they focus on knowledge acquisition and improving algorithmic knowledge and awareness (Gran et al., 2020).

Regardless of the profile, even those that mention possible risks and criticise algorithms do not indicate changes in their behaviour or media consumption routines. In general, algorithms are considered as something both close to and distant from their lives. They are close because they are embedded in their digital routines and socialisation practices; however, they are not close enough to cause them to change their behaviour. This can be problematic for effective digital inclusion and for ensuring that they benefit from these digital advances; furthermore, this issue is no longer limited to vulnerable groups (Brites & Castro, 2022).

The relationship described in this article between knowledge of algorithms and (self-)learning contexts is challenged by algorithms being identified as a valued feature and young people not recognising that algorithms can be biased and that they can narrow one's perspective. In both cases, the algorithm reinforces one's opinion, excluding those outside one's sphere. The algorithm is understood as a reliable gatekeeper and curator that does a silent but effective job. From the perspective of critical media literacy, this rationale is not without its challenges because the responses also reveal some parsimony—more than expected—in critically thinking about what the algorithms present.

Given these findings, this study raises possibilities for additional research within this project by creating synergies with other present and future studies. Further research could explore particularly the gender dimensions, which, in this case, surprisingly appear without significant gaps contrary to what Young (1996) found at the turn of the last century. Nevertheless, how algorithms impact news perceptions and consumption from the gender dimension is likewise a topic that needs to be researched in greater detail. The results also indicate pathways for creating training programs focused on strategies for dealing with algorithms and reflections based on statements made during the interviews, for example, "My mobile phone is listening to me." The social and educational emergency raised by Profile 3 is pressing, especially when polarization is also evident in communities where the weight of low digital skills is greater. It was with great surprise that we realised that they rarely mention school. When they do, it often reveals that the educational

offer is outdated in these subjects and focused on basic aspects of ICT. The results also imply that schools need to strengthen their role. This is only possible through training as these subjects go beyond traditional ICT and require knowledge anchored in the everyday (digital) challenges and opportunities. Another facet that requires greater thoroughness is the observation of diversity issues—how they imply and are implied by the algorithm—and the strategies to deal with them. Hence, the need to strengthen the school's position in this area needs careful attention from policymakers. A field so relevant to daily life requires more than a random and soft learning process with social networks, friends, and family.

Results also indicate what mechanisms youth activate to circumvent the power of the algorithm and suggest a positive side: they facilitate access to what matters to them personally. However, we cannot overlook diversity and related issues arising from the expansion of the digital world, by disregarding human and digital rights towards media and digital literacies (UNESCO, 2006). In other words, despite the opacity and complexity of technology, we cannot forget that human rights to information and access to education have to be followed, even when we seem to be facing scenarios for which there are still many rules and supporting legislation. Otherwise, we will not be able to avoid the digital landscape being locked in a very problematic black box.

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## Conflict of Interests

The authors declare no conflict of interests.

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