How does Information Pollution Challenge Children's Right to Information Access?

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Abstract

In this contribution, we discuss how information pollution affects a critical yet understudied user group: children. We begin by stressing the importance of taking into account the unique characteristics of children's search context, which can be defined in terms of various factors, from children's age, abilities, skills, and cognitive development to the fuzzy line separating learning and fun. Based on our experience, we describe the importance of good design in assisting children in the different roles they play as searchers so that they can recognize and distinguish harmful and helpful content. We, therefore, propose broadening the notion of relevance to explicitly consider young searchers' demand for useful, readable, safe, and trustworthy online information, which is even stronger than that of adults. We then discuss guidelines for effectively engaging teachers, parents, and children in the design, introduction, and use of search tools to support young users not only in accessing the information available online but also taking advantage of and learning safely from it. The child focus not only helps us move forward to help a target group but, more importantly, it is a great starting point for further investigating a broad range of information pollution issues.

Keywords

Children, Web search, Information Pollution, Information Retrieval

1. Introduction

In this article, we address a latent issue: ***children's right to information access*** [1, 2][1]. Many digital resources, and ultimately potential information, are available on the internet for users of different ages, making the internet an integral part of modern life [3]. Danovitch [4] illustrates how children as young as 4 could turn to their tablets for a YouTube video, whereas 6-year-olds could ask voice-controlled digital assistants for facts about nature. Indeed, search engines, apps, and other platforms accessed via internet-based devices connect children to a sometimes overwhelming amount of resources (and therefore information) that can potentially influence

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[1]Here, we adopt UNICEF's broad definition of children, encompassing individuals up to 18 years old.

their development [4]. Still, in this digital age, it is not possible to overlook the fact that not every online resource children interact with is linked to genuine information [5].

To control the scope, we frame our discussion on ***information pollution*** within the context inherent from children using general ***search engines***, like Google, to conduct inquiry tasks. Meel and Vishwakarma [6] define *information pollution* as "how the contents on the web are being contaminated intentionally or sometimes unintentionally". Specifically, the authors emphasize that false information, negatively affects society at large, and may take the form of fake reviews, fake news, satire, or hoaxes [6]. In light of the user group that is the focus of this work, online resources evoking hate or violence, as well as those being a conduit for cyberbullying [7], that negatively impact children exposed to it [8], can and should actively be considered part of the definition of information pollution too[9].

When children use search engines to seek information, they may encounter resources that do not match their needs or interests leading to frustration and confusion [10, 11]. Perhaps inadvertently, they may also find misleading resources or resources unsuitable to the context of the online inquiry (e.g., for leisure vs learning). In practice, misleading information can present harmful products or ideas whereas unsuitable resources might prove to be a distraction from the information the child seeks. Furthermore, unsuitable resources could refer to those that do not match children's age or development, including content that is violent, sexual, or otherwise inappropriate [12]. While many search engines have filters and controls in place to try and prevent this type of resource from appearing among retrieved results in SERPs, they are not always efficient: children continue to be exposed to harmful resources they might not know how to cope with, along with resources they might not be able to comprehend; they can also encounter failed searches due to over filtering [13, 12].

There is no denying that the use of search engines can be a valuable aid for children [14]. While it is fundamental for children to become self-sufficient to independently tackle information pollution in its many forms, they need to have adequate guidance to allow them to navigate this context using the search engines they favor [15], rather than dedicated apps or specialized sites. Parents and caregivers must be aware of the importance of training children in how they seek information online to reach the resources they need and avoid potential dangers. Monitoring and supervising children's search engine use, setting appropriate boundaries and limitations, and teaching children how to assess online information critically to discern relevant vs. irrelevant resources, as well as genuine from polluted information, have become crucial. Caregivers, like teachers and parents, need more awareness of the potential perils of resources readily accessible via search engines, as well as how to support children in reaching readable and useful answers when they search within the universe of digital content [16]. In other words, the adults in their lives have to help children develop the competences they need to "actively learn and participate in the digitally rich society" [17].

In the rest of this paper, we examine information pollution and its impact on children's web search from multiple perspectives. We acknowledge that as children develop, they might be affected by and respond to different perspectives of information pollution in a variety of manners. Consequently, we share the underpinnings of information pollution and its connection to children regularly using search engines, and leave an in-depth discussion centered on children at specific stages of development for future work.

In the end, ensuring a safe and positive online experience for children needs expert guidance.

It is crucial for researchers and industry practitioners in the realm of information retrieval systems and other systems and platforms children use, including social media platforms like Instagram, YouTube, and Tik Tok, to consider the potential impacts on children and take steps to protect them when developing and implementing these systems. By considering the well-being of children and taking steps to promote a safe online experience, we can help ensure that the internet is a positive and enriching resource for all.

2. The importance of considering the context of a child

Internet is part of a child's environment from an early age [18, 4]. Modeling the adults they live and interact with, toddlers start using their parents' devices to go online using a broad range of apps available. If the risk of access to the online world was a concern before, it is becoming increasingly prevalent as the age of the first access decreases. This is especially worrisome when it comes to search engines, which children are known to prefer as their first stop for information discovery [4, 10]. As a result, the concept of information pollution must be defined and dynamically adjusted in light of the goal of their search activities and the environment in which they take place. Many elements must be considered, including motivation and intent of the search, as well as whether the task is assigned by teachers, is a component of a school assignment, was prompted by a personal interest falling under the leisure dimension, or is a combination of all of the above. Family background, age, personality, expectations, skills, and other elements affect children's ability to critically examine retrieved material in relation to the task at hand. All play a role in establishing what constitutes information pollution and how information pollution affects children searching online.

The findings from [19] reveal how children deem the protection of their privacy as an important feature when designing a search companion, someone to keep them safe when searching and protecting them from harmful material. Safety online seems to be a choice shared by children and adults and this needs to be accounted for when devising interventions to support children in their online search experience. Searching as learning and learning to search are essential digital competencies children need to acquire in order to fully develop into active citizens and members of society in the future. Naturally, adults and society at large tend to assume a protective behavior, aiming at preserving children from being exposed to different forms of harmful information pollution. This is an understandable reaction, yet it could result in children growing into young adults who are completely unprepared to face the complexities and dangers caused by information pollution. A much more effective strategy would be to introduce children to the reality of searching online and showing them how to recognize helpful reputable sources as opposed to harmful or useless ones. Training children by offering them the right support at the right time is what the authors of [20] advocate too.

3. The importance of a good design

We turn to the Child Computer Interaction (CCI) community and their effort towards designing for user experience with and for children. In line with the "child as protagonist" principle [21], we find a growing literature reporting the active roles children can play in the different

stages of collaborative design from informant to evaluator as well as an active member of inter-generational research teams [22]. The core idea here is that children are the experts when describing how and why their peers search for education and leisure and as such should be listened to and acknowledged in their contribution to the design effort. Good design is grounded on deep usage research to provide a deep understanding of users' needs, habits, and expectations, in addition to enabling designers to extract user requirements to guide them all the way toward prototyping and evaluation. Children can greatly contribute by sharing their perceptions of how existing search technology works and so enabling researchers to make sense of their mental models in terms of expectations, barriers, and misconceptions to be dealt with by the new tools to be. The adults in the loop, including caregivers (e.g. teachers and parents) and researchers, play a vital role in ensuring healthy and active children's participation. Not only they will act as facilitators and motivators in keeping children engaged with the collaborative design activities they have devised, but with their guidance and example, they provide natural scaffolding to enable children to safely explore the search space and avoid pollution while learning how to do so in the future independently.

4. The importance of re-thinking relevance

When discussing information pollution in the context of web search we need to be precise about some concepts: relevant/irrelevant resources and genuine/polluted information. Traditionally, search systems only consider relevant/irrelevant. Then it is up to the adults seeking information to check the reliability of the retrieved resources, regardless of their position in the SERPs. Children, on the other hand, tend to trust the system and are already challenged in discerning relevant and non-relevant resources. This makes it even more difficult for them to recognize that they might encounter intended or unintended harmful information in the SERPs they browse, also considering their lack of experience in judging and consulting online material.

The guidance and support of the "more knowledgeable other" [23], whether that be a caregiver or a peer more well-versed on how to deal with information pollution, is crucial (§ 5). Still, we want children of all ages to become self-sufficient; that is empowered to recognize, deal with, and/or bypass information pollution regardless of the purpose of the search (i.e., leisure vs. learning). Looking into children's natural sense of relevance we see that situational relevance and the motivational/affective "inherent characteristics of relevance behavior" (in [24]) are those that better capture the way children assess the quality of retrieved results when performing a search task assigned by their teacher, who is providing extrinsic motivation for it. The motivational/affective dimension keeps the child intrinsically engaged with the search and involved with the selection of relevant results. In [25, 26], the authors explore how primary school children perceive relevance by having them engage with a drawing exercise to reveal the qualities they associate with good and bad search results. Children embraced the angel and evil dichotomy as a strong binary representation of good and bad information, with the angel hinting at trustworthy and safe information versus the evil standing for harmful material that should be avoided at all costs. Material featuring implicit or explicit bullying or violence could fall under this second category because it is not only inappropriate and unhelpful for young searchers, but it may also be harmful because it may encourage violent and antisocial

behaviour. Equally fitting is the “Switched on and off bulb - Light or darkness" pair where one child made an explicit reference to “reliable and non-reliable" material, either shedding light or bringing confusion, a clear reference to information pollution and its confusing negative effects on children’s search experience. Dealing with information with the right reading level and age-appropriate is the suggestion made by another child who portrayed a single icon, "Arrow up", to be used to discriminate between results suitable for children, and those for adults, and thus keep them visually separated

The presence of emotions also seems to affect the way children search. Landoni et al. [27] report how emotions in titles and snippets triggered a satisfying search experience and so enabled children to discover more relevant material. Due to the possible correlation between emotional intelligence and fake news detection; that is “individuals who are better able to disregard the emotionally charged content of such items, better equipped to assess the veracity of the information" [28], it becomes imperative for search engines to account for an effective dimension of relevance as an attempt to mitigate information pollution. It emerges from a recent study that trust plays an important role in children’s decision of using an available recommendation for relevant resources retrieved in response to their online inquiries [29], giving us a hint of their concerns in terms of reputable sources and who is suggesting them. Walsh-Moorman and Hovick add that to identify credible resources, fourth graders in the US leverage the concept of expertise, encompassing “education (e.g., advanced degrees, experience, and knowledge" [30]. At the same time, the authors conclude that, in practice, source authority of online resources is not something that young searchers deal with, as it is impacted by their vocabulary skills, background knowledge, and life experiences. This completes a picture of how relevance needs to be revisited to account for the avoidance of information pollution together with the priority given to readable and reputable sources with an emotional flavor [12, 11].

5. The importance of a good guideline

Children turn to search engines for resources and in turn information; they do so both for leisure-related reasons, as well as for learning. In the classroom, children are often restricted to access curated educational resources [13], which protects them–to a degree–from the harms of information pollution. As Pilgrim mentions [13], children should be equipped to access online resources “in the wild". Unfortunately, research studies conducted over the last few years evince that it is hardly the case. For example, Loos et al. [31] report that when exposed to a particular website about ”The Pacific Northwest Tree Octopus", only 7% of study participants (from the Netherlands, aged 13), were able to identify this site as a hoax; this percentage is even lower from the 11% of US study participants in the same age group. Similar findings resulted from the study conducted by Pilgrim et al. [32] who showed that less than 20% of the more than 300 first-to-fifth grades involved in a study were able to identify credible websites correctly, i.e., those not addressing fake news; most participants were “unable to verbalize ways to examine credibility" [32]. The issue of source reliability analysis is the focus of the findings reported in [30]. The authors noted fourth graders depend upon their reading skills to establish text authority and resource credibility. This is a concern, given that online resources are rarely at a level that young children can read and understand [12, 11].

The aforementioned findings suggest that children require better guidance, as they develop and acquire more digital skills so that they can be better equipped to deal with information pollution. Researchers across various disciplines, not just computer science, agree that there is a need to design better digital and media literacy curricula across all school grades so that children can be prepared to best deal with information pollution and in turn mitigate related harms [33, 34, 35, 36, 37].

At the same time, Howard et al. [9] fittingly claim that "digital, media, and information literacy skills alone do not provide a foolproof solution" to counterpart information pollution. The authors suggest that the burden cannot be on children alone. Instead, it is key to turn to parents, caregivers, and teachers, who can maintain an open dialogue and "promote critical thinking among children" [9]. In [38], the authors propose the EMILIA guidelines for adopting search tools in the classroom that can be extended to all children's caregivers. Mentoring and monitoring are two of the tasks indicated as fundamental to help children to conduct the search task and avoid information pollution. The mentoring, in particular, needs to be continuous: at the beginning, providing instructions about the searching process, and as time goes on, teaching children how to address errors or interpret retrieved resources (and the risk of those that are not genuine) by reasoning together.

We cannot overlook, however, that caregivers and teachers also struggle with how to effectively utilize search engines [16, 39]. Furthermore, they have difficulty with dealing with information pollution–in general, adults are hardly better than young children and teenagers when it comes to either identifying fake news or dealing with information pollution [40, 41, 42]. This is a concern; as teachers and caregivers are the ones meant to help children navigate today's complex digital ecosystem.

6. Concluding remarks

Information pollution on web search and its mitigation is a non-trivial problem. With this work, we have aimed to add to the discussion about the various facets of information pollution; in particular, the impact of information pollution on children and web search–a task children undertake daily. We brought attention to the need of involving children as co-designers of technologies and curricula that can ultimately help them confront information pollution. Along the way, we invited the research community to revisit the concept of relevance to account for children's view of this concept and how it contrasts with information pollution. We have also discussed the importance of guidance on this matter, particularly by the adults in children's lives, e.g., parents and educators, who might themselves struggle with recognizing and dealing with information pollution and therefore exacerbating this concern.

Children are a unique user group, one that could be considered 'unbiased' in how they judge and interact with search engines and more so, with how they see the world. Empowering them so that they can seek, critically examine, and in the end find information from the resources search engines retrieve, i.e., deal with information pollution and discern helpful vs, harmful resources to ease their path towards relevant information, is imperative, as that is a skill they will need to thrive as digital citizens [43, 44]. Studying the problem of this user group unbiased by external factors, and meaningfully reacting to it, would enable researchers and practitioners

to then extend solutions that can aid other user groups.

It is imperative to recognize that issues caused by information pollution are not restricted to search engines. There are plenty of other points of access to online information–from recommender systems to social platforms like Facebook, Instagram, and TikTok that are impacted by information pollution and that have a direct reach into children, particularly teenagers [45, 46, 47, 48, 49]. In a recent study focused on credible information access via TikTok on adult users, Cajas [50] reiterated the importance of advancing research work focused on younger children and teenagers on this topic as "it is unclear how they may have evaluated the information they were presented with. They may not know many facts about the world yet, they may not have developed their personalities and views, or simply may look at TikTok in a different light." This evinces a need to continue to advance research and discourse in this important area while supporting this vulnerable user group. This will require algorithms to detect the broad ranges of information pollution and studies to capture how children perceive and react to (different aspects of) information pollution, interfaces tailored for young users that implicitly and explicitly can serve as conduits for interventions to help children improve how they engage with information pollution in the long term, in addition to curriculum bringing awareness to the perils and opportunities for children of all ages when engaging with information access systems [51, 52, 9, 33, 53, 54].

References

[1] M. Koren, The right to information: A human right of children, IFLA journal 23 (1997) 57–59.

[2] A. Third, D. Bellerose, U. Dawkins, E. Keltie, K. Pihl, Children's rights in the digital age: A download from children around the world, 2014.

[3] Better internet for kids - bik portal - bik community, 2022. URL: https://www.betterinternetforkids.eu/policy/better-internet.

[4] J. H. Danovitch, Growing up with google: How children's understanding and use of internet-based devices relates to cognitive development, Human Behavior and Emerging Technologies 1 (2019) 81–90.

[5] M. Petrocchi, M. Viviani, Report on the 2nd workshop on reducing online misinformation through credible information retrieval (romcir 2022) at ecir 2022 (2022).

[6] P. Meel, D. K. Vishwakarma, Fake news, rumor, information pollution in social media and web: A contemporary survey of state-of-the-arts, challenges and opportunities, Expert Systems with Applications 153 (2020) 112986.

[7] A. Maftei, A.-C. Holman, I.-A. Merlici, Using fake news as means of cyber-bullying: The link with compulsive internet use and online moral disengagement, Computers in Human Behavior 127 (2022) 107032.

[8] R. M. Simpson, 'won't somebody please think of the children?'hate speech, harm, and childhood, Law and Philosophy 38 (2019) 79–108.

[9] P. N. Howard, L.-M. Neudert, N. Prakash, S. Vosloo, Digital misinformation/disinformation and children, UNICEF. Retrieved on February 20 (2021) 2021.

[10] I. Madrazo Azpiazu, N. Dragovic, M. S. Pera, J. A. Fails, Online searching and learning:

Yum and other search tools for children and teachers, Information Retrieval Journal 20 (2017) 524–545.
[11] D. Bilal, L.-M. Huang, Readability and word complexity of serps snippets and web pages on children's search queries: Google vs bing, Aslib Journal of Information Management (2019).
[12] O. Anuyah, A. Milton, M. Green, M. S. Pera, An empirical analysis of search engines' response to web search queries associated with the classroom setting, Aslib Journal of Information Management (2020).
[13] J. Pilgrim, Are we preparing students for the web in the wild? an analysis of features of websites for children, The Journal of Literacy and Technology 20 (2019) 97–124.
[14] A. Large, J. Beheshti, The web as a classroom resource: Reactions from the users, Journal of the American Society for Information Science 51 (2000) 1069–1080.
[15] E. Foss, A. Druin, R. Brewer, P. Lo, L. Sanchez, E. Golub, H. Hutchinson, Children's search roles at home: Implications for designers, researchers, educators, and parents, Journal of the American Society for Information Science and Technology 63 (2012) 558–573.
[16] E. Murgia, M. Landoni, T. Huibers, M. S. Pera, Teachers in a searchable world: Findings from an introductory survey, in: ATEE Spring Conference, Springer, 2022, pp. 197–208.
[17] J. Richardson, E. Milovidov, Digital citizenship education handbook: Being online, well-being online, and rights online, Council of Europe, 2022. URL: https://rm.coe.int/prems-003222-gbr-2511-handbook-for-schools-16x24-2022-web-bat-1-/1680a67cab.
[18] N. Elias, I. Sulkin, Youtube viewers in diapers: An exploration of factors associated with amount of toddlers' online viewing, Cyberpsychology: Journal of Psychosocial Research on Cyberspace 11 (2017).
[19] M. Landoni, D. Matteri, E. Murgia, T. Huibers, M. S. Pera, Sonny, cerca! evaluating the impact of using a vocal assistant to search at school, in: International conference of the cross-language evaluation forum for European languages, Springer, 2019, pp. 101–113.
[20] M. Landoni, M. Aliannejadi, T. Huibers, E. Murgia, M. S. Pera, Right way, right time: Towards a better comprehension of young students' needs when looking for relevant search results, in: Proceedings of the 29th ACM Conference on User Modeling, Adaptation and Personalization, 2021, pp. 256–261.
[21] O. S. Iversen, R. C. Smith, C. Dindler, Child as protagonist: Expanding the role of children in participatory design, in: Proceedings of the 2017 conference on interaction design and children, 2017, pp. 27–37.
[22] K. Knudtzon, A. Druin, N. Kaplan, K. Summers, Y. Chisik, R. Kulkarni, S. Moulthrop, H. Weeks, B. Bederson, Starting an intergenerational technology design team: a case study, in: Proceedings of the 2003 conference on Interaction design and children, 2003, pp. 51–58.
[23] M. D. Ekstrand, M. S. Pera, K. L. Wright, Seeking information with a more knowledgeable other, Interactions 30 (2023) 70–73.
[24] P. Borlund, The concept of relevance in ir, Journal of the American Society for information Science and Technology 54 (2003) 913–925.
[25] M. Landoni, T. Huibers, E. Murgia, M. Aliannejadi, M. S. Pera, Somewhere over the rainbow: Exploring the sense for relevance in children, in: European Conference on Cognitive Ergonomics 2021, 2021, pp. 1–5.
[26] M. Aliannejadi, M. Landoni, T. Huibers, E. Murgia, M. S. Pera, Children's perspective on

how emojis help them to recognise relevant results: Do actions speak louder than words?, in: Proceedings of the 2021 Conference on Human Information Interaction and Retrieval, 2021, pp. 301–305.
[27] M. Landoni, M. S. Pera, E. Murgia, T. Huibers, Inside out: Exploring the emotional side of search engines in the classroom, in: Proceedings of the 28th ACM conference on user modeling, adaptation and personalization, 2020, pp. 136–144.
[28] S. Preston, A. Anderson, D. J. Robertson, M. P. Shephard, N. Huhe, Detecting fake news on facebook: The role of emotional intelligence, Plos one 16 (2021) e0246757.
[29] M. S. Pera, E. Murgia, M. Landoni, T. Huibers, With a little help from my friends: Use of recommendations at school, in: 2019 ACM Conference on Recommender Systems Late-breaking Results, ACM RecSys LBR 2019, CEUR, 2019, pp. 61–65.
[30] E. Walsh-Moorman, K. Hovick, "this is crazy… she's real": How fourth-grade readers establish source authority, The Reading Teacher 74 (2021) 559–568.
[31] E. Loos, L. Ivan, D. Leu, "save the pacific northwest tree octopus": a hoax revisited. or: how vulnerable are school children to fake news?, Information and Learning Science (2018).
[32] J. Pilgrim, S. Vasinda, Fake news and the "wild wide web": A study of elementary students' reliability reasoning, Societies 11 (2021) 121.
[33] G. Polizzi, R. Taylor, Misinformation, digital literacy and the school curriculum (2019).
[34] S. Diepeveen, M. Pinet, User perspectives on digital literacy as a response to misinformation, Development Policy Review 40 (2022) e12671.
[35] S. S. Lim, K. R. Tan, Front liners fighting fake news: Global perspectives on mobilising young people as media literacy advocates, Journal of Children and Media 14 (2020) 529–535.
[36] S. von Gillern, B. Gleason, A. Hutchison, Digital citizenship, media literacy, and the acts framework, The Reading Teacher 76 (2022) 145–158.
[37] E. Hodgin, J. Kahne, Misinformation in the information age: What teachers can do to support students, Social Education 82 (2018) 208–212.
[38] Ethical implications for children's use of search tools in an educational setting, International Journal of Child-Computer Interaction 32 (2022) 100386.
[39] M. D. Ekstrand, K. L. Wright, M. S. Pera, Enhancing classroom instruction with online news, Aslib Journal of Information Management 72 (2020) 725–744.
[40] F. Spezzano, A. Shrestha, J. A. Fails, B. W. Stone, That's fake news! reliability of news when provided title, image, source bias & full article, Proceedings of the ACM on Human-Computer Interaction 5 (2021) 1–19.
[41] H. Seo, M. Blomberg, D. Altschwager, H. T. Vu, Vulnerable populations and misinformation: A mixed-methods approach to underserved older adults' online information assessment, New Media & Society 23 (2021) 2012–2033.
[42] S. M. Jones-Jang, T. Mortensen, J. Liu, Does media literacy help identification of fake news? information literacy helps, but other literacies don't, American Behavioral Scientist 65 (2021) 371–388.
[43] K. Johnston, K. Highfield, F. Hadley, Supporting young children as digital citizens: The importance of shared understandings of technology to support integration in play-based learning, British Journal of Educational Technology 49 (2018) 896–910.
[44] A. R. Lauricella, J. Herdzina, M. Robb, Early childhood educators' teaching of digital citizenship competencies, Computers & Education 158 (2020) 103989.

[45] E. Loos, J. Nijenhuis, Consuming fake news: A matter of age? the perception of political fake news stories in facebook ads, in: International Conference on Human-Computer Interaction, Springer, 2020, pp. 69–88.
[46] D. Zimmermann, C. Noll, L. Gräßer, K.-U. Hugger, L. M. Braun, T. Nowak, K. Kaspar, Influencers on youtube: a quantitative study on young people's use and perception of videos about political and societal topics, Current Psychology (2020) 1–17.
[47] R. Arul, K. Vishnu, A. Eleyan, A. K. Bashir, The authenticity of information on social media, IEEE Technology Policy and Ethics 5 (2020) 1–6.
[48] C. Papapicco, I. Lamanna, F. D'Errico, Adolescents' vulnerability to fake news and to racial hoaxes: A qualitative analysis on italian sample, Multimodal Technologies and Interaction 6 (2022) 20.
[49] E.-A. Dumitru, Testing children and adolescents' ability to identify fake news: A combined design of quasi-experiment and group discussions, Societies 10 (2020) 71.
[50] M. Cajas Manangon, How do people appraise to what extent TikTok videos are informative? Exploring the processes and factors that play a role in the evaluations of informational content on TikTok, Master's thesis, The University of Bergen, 2021.
[51] F. Aprin, I.-A. Chounta, H. U. Hoppe, "see the image in different contexts": Using reverse image search to support the identification of fake news in instagram-like social media, in: International Conference on Intelligent Tutoring Systems, Springer, 2022, pp. 264–275.
[52] C. Sweet, The failure of skepticism: Rethinking information literacy and political polarization in a post-truth era, 2019. URL: https://works.bepress.com/christopher_sweet/40/.
[53] H. Xiang, J. Zhou, Z. Wang, Reducing younger and older adults' engagement with covid-19 misinformation: The effects of accuracy nudge and exogenous cues, International Journal of Human–Computer Interaction (2023) 1–16.
[54] E.-A. Dumitru, L. Ivan, E. Loos, A generational approach to fight fake news: In search of effective media literacy training and interventions, in: International Conference on Human-Computer Interaction, Springer, 2022, pp. 291–310.