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Exploring Hindering and Facilitating Mechanisms of Digital Awareness and the Role of Intra- and Interpersonal Factors via a Scoping Review of Research

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ABSTRACT

Our current society requires individuals to be sufficiently digitally literate, and these individuals can be labelled as digital citizens—(success)fully participating in and operating on different levels of our society, such as in public, work, and/or private lives. With our increasingly digitally mediated society, identifying hindering and facilitating mechanisms and intra- and interpersonal factors provides us insight into the influential factors to become digital aware and/or to increase the quality of the awareness—with subsequent consequences for society and education. Via a scoping review of the last nine years and covering 42 articles, these mechanisms and individual factors are reported on in existing research about digital literacy and digital citizenship—reasoning that these mechanisms and factors also influence digital awareness. Facilitating mechanisms and intrapersonal factors (e.g., skills, knowledge) were mentioned more often than hindering mechanisms (e.g., disengagement) and interpersonal factors (e.g., communication). Method sections included fewer factors than introductions, allowing for sufficient delimitation of research. Overall, there was a cognitive dominance of facilitators/hindrances and intrapersonal factors. Overlap exists between hindrances and facilitators; these can be considered two ends of a spectrum (e.g., disengagement and engagement). Furthermore, the interplay of hindrances and facilitators and intrapersonal factors calls for more research to reveal unique contributions of each factor.

Keywords: Digital Awareness; Digital Literacy; Digital Citizenship; Lifelong Learning; Intrapersonal Factors; Interpersonal Factors

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1. Introduction

With an increasingly digitally-mediated society, individuals need to master specific skills and/or competencies to participate in different levels of our society. The introduction of the concept of digital awareness has necessitated further conceptual development of the concept—primarily due to the increased use of this term in government policies as well as the dynamicity of digital literacy and digital citizenship^[1]. The current study explores how mechanisms facilitating and/or hindering digital literacy and digital citizenship can facilitate and/or hinder digital awareness. In addition, the individual plays a large role in using and/or interacting with digital technologies—as these digital technologies become part of an individual’s daily life. As a result, individual factors—more specifically intra- and interpersonal factors such as motivation and interaction respectively^[2,3]—need to be taken into consideration. Via a scoping review of existing research covering the topics of digital literacy and digital citizenship from the last nine years—these facilitating and hindering mechanisms and individual factors (intra- and interpersonal factors) are listed and thematically discussed in light of digital awareness^[1].

1.1. Digital Literacy and Digital Citizenship

Nowadays, an individual has to be sufficiently digital literate to participate in society prior to be labelled a digital citizen^[4-6]. Digital technologies are increasingly used in individuals’ public, work, and/or private lives—for a range of purposes^[5]. Whilst a myriad of definitions have been proposed, the definition of/for digital literacy is viewed as more than an accumulation of technical skills: “the ability to understand and use information in multiple formats from a wide range of sources when it is presented via [digital technologies]...” (p. 6)^[7]. With a plethora of definitions, frameworks, and related terms (sometimes referred to as literacies or dimensions; see e.g., Martínez-Bravo et al.^[8], UNESCO^[9,10]), attempts have been made to eradicate different terms on the topic of digital literacy^[8]. A meta-overview of eleven key terms from research of the last 50 years was conducted to achieve conceptual convergence. Within their sample, they found two co-existing perspectives on digital literacy: (a) a focus on skills or competencies for

using digital technologies, and (b) a focus on teaching and/or learning and the necessary strategies. The authors emphasized the integration of digital literacy with other concepts—in line with the attempt made with the current paper.

Digital literacy can be viewed as a prerequisite for digital citizenship^[11], albeit both concepts can encompass similar activities and/or acts. An interdisciplinary approach—as emphasized by Martínez-Bravo et al.^[8] but also supported in previous work^[1] and in the current work—views digital literacy as a process and, in turn, indicates that digital citizenship can be viewed as a process as well. Digital citizenship is described as “the centrality of digital infrastructure in contemporary social interactions, the implications for people’s identities and forms of belonging, and the active self-creation of citizenship in digital environments” (p. 20)^[12]. Furthermore, a frequently used conceptualization of digital citizenship includes three overarching goals with nine elements: respect (digital access, digital etiquette, and digital law), educate (digital commerce, digital communication, and digital literacy), and protect (digital health and welfare, digital rights and responsibility, and digital safety/ security^[13]). These nine elements lead and assist digital experiences (predominantly focused on positive experiences), (re)shape a digital citizen, and emphasize the awareness of consequences of actions to other (groups of) individuals.

1.2. Digital Awareness

Awareness is required for digital literacy and citizenship, in particular, digital awareness. Digital awareness can be defined as: “the degree to which an individual critically recognizes and reflects upon the declarative, structural, procedural, and conditional knowledge and understanding of the use of digital technologies in and across one’s public, work, and private lives” (p. 51)^[1]. A dichotomy—being or not being digital aware—turns into a spectrum once an individual is digital aware. This spectrum ranges from a low quality awareness (e.g., awareness of superficial characteristics) to a high quality awareness (e.g., awareness of underlying structures, functionalities, future implications and/or transfer)—creating diversity and dynamicity amongst individuals who can be labelled as digital aware, in particular in the era of AI^[14].

1.3. Individual Factors as Prerequisites

Digital awareness as well as digital literacy are conceptualized as *more* than the ability to use technologies or digital tools effectively^[1,15] and might require a “special kind of mindset or thinking” (p. 18)^[15]. It goes beyond demographic aspects such as gender and land of origin^[16]. In a similar vein, digital citizenship is increasingly perceived as a process of self-creation and self-assertion^[12,17], especially when political resources become increasingly individualized^[18]. In addition, the individual subsumes a (large) and *active* role in this process^[19]. In other words, individual factors play a crucial role in engaging with and using technologies or digital tools. These individual factors can be described as intrinsic factors (i.e., *intrapersonal* factors) and/or external factors (i.e., *interpersonal* factors^[2,3]).

1.3.1. Intrapersonal Factors

Examples of intrapersonal factors are motivation, perception of benefits and/or barriers, and self-efficacy (amongst others;^[20–22]). These factors are known to be related to digital literacy and digital citizenship. More specifically, Internet self-efficacy is listed among the strongest predictors of digital citizenship^[23]. If an individual is interested in digital sources or digital technologies, one might engage more often in or with them. Interest is expressed in, for example, liking to work with digital sources and/or digital technologies, and recognizing potential in them^[22]. An individual can also weigh the perceived benefits and barriers to facilitate or hinder engagement with digital technologies, for example, when an individual switches financial institutions^[21], decides to buy a new laptop, download a specific application on a mobile phone, or use AI for various activities^[24].

In particular, self-efficacy is an essential determinant in both informal and formal learning^[22] and digital citizenship^[23], and is used to understand an individual’s confidence and beliefs about their capabilities to perform tasks^[20]. Self-efficacy is known to affect choices of activities, invested effort, and interests^[25]. In this line of reasoning, self-efficacy can affect engagement with technologies—thus affecting digital literacy^[22,26]. Research has shown that both self-efficacy and digital literacy are linked: self-efficacious individuals frequently have a better under-

standing of how to use information technology (i.e., tend to be more digital literate^[22]). The *quality* of engaging in digital sources and/or digital technologies is more essential for self-efficacy than *quantity*^[27]. Furthermore, self-efficacy facilitates interactions, such as downloading materials and sending emails to others^[22]. Thus, self-efficacy—as an intrapersonal factor—also affects interpersonal factors.

1.3.2. Interpersonal Factors

Interpersonal factors are frequently associated with other people and pertain to interactions, such as social support, norms, and autonomy during/for interactions^[2]. These interactions can be viewed as a by-product or consequence of an individual’s intrapersonal factors^[3]. Technologies or digital tools mediate interpersonal communication and connect individuals that may never meet face-to-face^[6,28] in individuals’ public, work, and/or private lives^[5]. For example, communication via social media (e.g., Facebook, Twitter) can help individuals network, present themselves (e.g., to construct their identity^[29]), and/or communicate with people^[30] for a range of purposes (e.g., to share ideas, exchange personal advice or expertise, and to express companionship). Interpersonal factors include verbal and non-verbal communication^[31]—based on the premise of viewing communication as an exchange of symbols^[32]. With the increased mediation by technologies or digital tools, communication includes both verbal and non-verbal cues (such as verbal cues, and emojis or emoticons respectively^[31,33]). When non-verbal and verbal cues are conflicting, verbal cues are preferred over non-verbal cues—with consequences for meaning making in and/or by technologies or digital tools^[31].

1.4. Research Aim

The current scoping review was conducted to further develop the concept of digital awareness by discussing hindering and facilitating mechanisms of digital literacy and citizenship to, for example, inform policymakers and educators. In addition, the role of the individual is substantial in digitally mediated contexts, and by reporting on individual characteristics, insight is gained into the involved characteristics for digital awareness. Existing literature was used to report on and discuss hindering and facilitat-

ing mechanisms and individual factors (i.e., intra- and interpersonal factors). As a result, the research aims at two main research questions, extended with one sub-question per main question:

Research question 1 (RQ1): Which mechanisms hinder or facilitate digital literacy and/or digital citizenship?

Sub question 1a (RQ1a): How do these mechanisms influence digital awareness?

Research question 2 (RQ2): Which individual factors—divided into intra- and interpersonal factors—are mentioned in research on the topics of digital literacy and digital citizenship?

Sub question 2a (RQ2a): How do these individual factors influence digital awareness?

2. Method

2.1. Search Strategy

The methodology is similar to the one adopted in Brummer ^[1], albeit with a different focus and subset of articles. The search databases ERIC, SocINDEX, Communication & Mass Media Complete, and Library, Information Science & Technology Abstracts (LISTA) were used to extract (a) full text or final stage (b) peer-reviewed English articles reporting on (c) quantitative research (manually filtered) published in the last nine years (November 2015 to August 2024). The aforementioned databases covered educational, sociological, and media studies research—crucial fields for digital literacy and digital citizenship. The search was conducted with the following search string for topics: ('digital' OR 'digitalization') AND ('aware*' OR 'resilien*' OR 'liter*' OR 'illiterate' OR 'citizen*'). All inclusion criteria are listed in **Appendix A**.

The initial search provided 1,359 hits, and after applying the in- and exclusion criteria and removing duplicates, resulted in 42 articles suitable for analysis (see

Appendix B, Figure A1 for the PRISMA flowchart). The **Supplementary Materials** display PRISMA (**Files S1, S2**) and AMSTAR checklist (**File S3**) to provide continuous monitoring of sufficient quality.

2.2. Coding of Variables

A coding scheme was developed to code relevant variables for the research questions. The variables were organized in methodological and study characteristics (not included in this scoping review), facilitators and hindrances of digital literacy and/or digital citizenship, and individual factors—divided into intra- and interpersonal factors, and the location of this information in the article (i.e., introduction and/or method). The main argument for the latter distinction was that the theoretical foundation in the introduction might include a wide range of intrapersonal factors, whereas the method section can be viewed as the actual implementation of one (or more of) those individual factors. The facilitators and hindrances, as well as individual factors, were openly coded, and thematically clustered afterwards. Exact frequencies will not be reported on, due to emphasizing the conceptual meaning rather than its occurrence. The individual factors are divided into (a) *intra-* and *interpersonal* factors (italics added for emphasis), and (b) whether it was mentioned in the introduction or in the method (or both). The author independently retrieved and processed the articles. During this process(ing), no automation tools were used. If applicable, the descriptive statistics were conducted in SPSS version 27.

3. Results

3.1. Facilitating and Hindering Mechanisms (RQ1)

Table 1 lists the facilitating and hindering mechanisms mentioned in the included articles.

Table 1. Facilitators and Hindrances Included in the Scoping Review.

	Mechanism *			
	Facilitating	Hindering	Both	None
Frequency (%)	31 (73.8)	19 (45.2%)	19 (45.2)	10 (23.8)

* The percentages of the mechanisms can overlap.

3.1.1. Facilitators

In general, facilitators included the (increased) use of and access to information and communication technologies (ICTs) ^[34,35], or the use of digital devices or technologies ^[36]. The infrastructure necessary for digital literacy and/or digital citizenship was emphasized ^[37,38]. More specifically, Scheurs et al. ^[37] mentioned being able to afford technology and, in a similar vein, Son et al. ^[38] addressed having a budget for using digital technologies.

Furthermore, possession of the necessary (technical) skills and digital competence is crucial ^[39,40]—accompanied by possessing relevant other literacies such as media literacy ^[41] and information literacy ^[42] or strategies ^[43]. In particular, Kim ^[43] mentioned the necessary strategies when individuals use digital technologies, such as cognitive strategies (e.g., rehearsal, elaboration, and organization), meta-cognitive strategies (e.g., planning, monitoring, and regulating strategies), and resource management strategies (e.g., time and effort management, peer learning, and help-seeking). With these strategies, the role of critical thinking became apparent as Grncharovska et al. ^[44] mentioned: “...become critically aware of the impact that media and digital technology have on the way we learn, think, create and express...” (p. 109) ^[44]. Casero-Ripollés ^[45] refers to critical capacity in that matter. The necessary awareness has been addressed by Jwaifell ^[46], emphasizing the complex interplay of various skills, strategies and motivational aspects.

Other facilitators mentioned in the sample were individuals’ (active) engagement and reflection ^[47,48], or an individual’s attitude ^[42,49,50]. More specifically, Dashtestani and Hojatpanah ^[49] mentioned a relationship between attitudes about and towards technology and the participants’ computer literacy levels. Duradoni et al. ^[50] addressed the role of attitude in combination with self-efficacy. Despite the fact that the authors primarily address Internet self-efficacy, the attitude towards technology can be assumed to play a crucial role. The work by Jan ^[51] highlighted the role of ‘the right’ attitude towards using digital technologies. In turn, several factors influence an individual’s attitude towards technology, such as digital technology ownership and usage, demographic factors, and age. Also Anisimova ^[42] and Dashtestani and Hojatpanah ^[49] briefly mentioned the role of attitudes. More specifically, Anisimova ^[42]

claimed: “A person’s attitude to innovative technologies is on a par with informational, computer, communicative and media literacy” (p. 233) ^[42].

Existing frameworks have been proposed as facilitators. For example, the Technology Acceptance Model (TAM) has been used—pertaining to the cognition-attitude-behavior causality ^[39]. The nine elements of digital citizenship were viewed as facilitators ^[52]. More specifically, these elements emphasize the roles of, for example, ethical principles for a legal, safe, and responsible use of digital technologies for “personal and social evolution within cyberspace” (p. 205) ^[34]. The facilitators are thematically displayed in **Appendix C, Table A1**.

3.1.2. Hindrances

Most hindrances can be listed as the opposite of a facilitator, in particular for foundational requirements such as infrastructure and access to a variety of technologies or digital tools ^[37,44,49], including an inappropriate use of digital resources ^[53], high costs or lack of funds ^[37,49,54], and the frequency of using technologies or digital tools ^[45]. Furthermore, disability was listed as a significant indicator for access to and use of technology ^[55]—resonating with the digital divide ^[52].

Indirectly, demographic factors such as age, gender, education and income ^[45,47,55,56] influence the access and use of a variety of technologies and digital tools—highlighting the complexity of being a digital citizen in the current time. In a similar vein, the lack of skills or literacies—such as digital literacy ^[49,53], computer literacy ^[49], and technical and cognitive abilities ^[45]—directly obstructs the use of technologies or digital tools. In an educational context, the skills of both students and teachers need to be considered ^[38].

Negative and/or harmful experiences in digital contexts were listed as a hindrance ^[47,49,50]. Issues related to cyber and identity fraud, cyberbullying ^[52] or more generally referred to as cybercrimes ^[57], and online abuse or harassment ^[47] might obstruct individuals in their access to and/or use of technologies or digital tools. In particular, in terms of online abuse, women tend to be targeted more than men. Technologies or digital tools are perceived as “another barrier to participation for some women” (p. 21) ^[47]—besides negative interactions and/or concerns about unpleasant

experiences. Women also tend to experience a lack of time and expertise. Negative and/or harmful experiences might lead to an inability to handle and manage technologies or digital tools and, in turn, individuals might believe fake and/or invalidated information^[57]—enunciating the crucial role of critical thinking. In addition, a lack of understanding of the benefits of technology adoption for and during the learning process might lead to hesitant use from teachers^[54]. As a result, adopting technologies or digital tools is less likely to occur.

Additional barriers can be found in beliefs about and views of (digital) technology^[49,58]. For example, perceptions about technology shape the use of technologies or digital tools^[58]. In particular, perceptions about the role of technology in the learning process: the use of technology refrains positive student development and, as a result, the use of technology in classrooms is nil or minimal. Addi-

tional barriers mentioned in this article are: (a) the teachers'/ instructors' unwillingness to adjust pedagogies (motivation), (b) the overestimation of individuals' ability to use digital technologies, (c) the individuals' overconfidence in readiness to use digital technologies, and (d) issues with self-efficacy. Furthermore, digital technologies were believed—by some teachers/ instructors—to contribute to a myopic view of the world^[58]. Insufficient training, unclear explanations and evaluations, and lack of coordination and vision hinder digital literacy and/or digital citizenship^[44]. The hindrances are thematically displayed in **Appendix D, Table A2**.

3.2. Individual Factors (RQ2)

Table 2 lists the frequencies and percentages of intra- and interpersonal factors in the current research.

Table 2. Frequencies (%) for Intra- and Interpersonal Factors Included in the Scoping Review.

Individual factor	Frequency in introduction (%)	Frequency in method (%)
Intrapersonal	38 (90.5%)	36 (85.7%)
Interpersonal	28 (66.7%)	18 (42.9%)

3.2.1. Intrapersonal Factors (Introduction)

The intrapersonal factors listed most often in the introduction were generally-phrased skills—either technical, writing, or soft skills (sometimes referred to as cognitive skills). For example, a range of skills seems relevant, such as skills for accessing information and various (digital) literacy skills^[59]. Skills, embedded in the definition of digital literacy rather than a stand-alone definition or concept, were mentioned^[48]. Furthermore, authors mentioned (more) specific skills, such as reflection^[48], problem-solving^[49], or (rational) decision-making^[60]—pertaining to learning (i.e., lifelong learning)^[53]. Other aspects were mentioned as well: fluency^[35,61]. More specifically, telecollaboration benefits linguistic fluency^[61], and digital fluency requires some sort of: “must address the continuously evolving needs of the information age students” (p. 1)^[35]. The authors position digital fluency besides digital etiquette to constitute digital citizenship. Digital fluency is equated with digital nativity; however, they discussed an essential distinction between the two concepts. Whereas digital nativity is an age-related factor that cannot be acquired, dig-

ital fluency can be acquired by training—the latter being crucial for a lifelong learning imperative^[53].

Attitudes/ beliefs and literacy (or literacies) were frequently mentioned in the introductions of the articles in the current sample. These attitudes were directed towards illegal downloads, digital citizenship, and religious beliefs^[56,62]. Literacy/ literacies often refer to something digital, such as software literacy, technological literacy, and/or multimodal literacy^[48,59]. Also, other literacies—such as health literacy and media and information literacy—occurred in the current sample^[60]. The role of critical thinking, critical skills, critical agency, or critical consciousness was frequently addressed. For example, the role of critical thinking is relevant for/in digital citizenship, and centres activities around rational and critical decisions^[60]. Furthermore, education plays a crucial role in developing competencies, in particular, for the safe use of technologies and digital tools^[63].

Intrapersonal factors related to ethical, legal and moral concerns or behaviours were mentioned by Elcicek et al.^[34] and Teimouri et al.^[64]. More specifically, characteristics of ethical digital citizens were listed^[64]—referring

to an existing framework of digital citizenship^[13]. In a similar vein, the nine areas of existing work^[13] were addressed, including an individual's responsibility for actions and deeds^[64]. These responsibilities were endorsed: individuals need to learn how to use digital platforms for social, business, and educational activities (i.e., public, work, and/or private lives)^[5] in a responsible and safe manner^[35].

Motivation-related intrapersonal factors were generally mentioned by Schreurs et al.^[37], Phillips & Lee^[40], Jan^[51], Surmelioglu & Seferoglu^[56], amongst others. Specific features of motivation were focused on engagement^[65], outcome expectations^[50], and perceived usefulness^[39]. Engagement—or rather disengagement—in digital platforms or technology-rich environments should distinguish personal and educational engagement^[65]. Furthermore, technology can be perceived as a barrier to student engagement because it can be considered a distraction rather than a facilitator^[58]. Besides motivation, metacognition-related intrapersonal factors such as planning, monitoring, and self-assessment^[43,48] play a role. For example, the role of learning strategies, including meta-cognitive strategies, can be seen as facilitators for digital literacy^[43].

In terms of personality or identity (development), the role of personality for digital footprints was mentioned by Surmelioglu and Seferoglu^[56]—besides aspects such as political and world views, religious beliefs, and education. In a similar vein, personal qualities were crucial for digital literacy^[48]. Besides personality, psychological, mental, physical or emotional well-being were also mentioned as intrapersonal factors^[35,36,66]. More specifically, the well-being of individuals in the information age increasingly depends on technologies^[35]. Moreover, physical and psychological well-being were addressed when using and/or engaging in (digital) technology^[66]—enunciating, for example, the contribution of training for safe and responsible use of technologies^[35].

The intrapersonal factors pertaining to self-efficacy^[58,60] or autonomy^[60,61] appear crucial for digital literacy and/or citizenship—even from a young age^[67]. This self-efficacy can involve various technologies, such as computer and/or online self-efficacy^[50]. A sense of confidence in integrating technologies or digital tools in classrooms^[61] directly impacts their use, meeting foundational requirements for digital literacy and/or citizenship.

3.2.2. Intrapersonal Factors (Method)

In a similar vein, skills, literacies and perceptions (or views) were often mentioned in the method section. For example, Dedeali and Dasdemir^[52] mentioned the role of 21st-century skills (e.g., being creative and innovative and entrepreneurial and self-managing) and the need to include these skills in curricula. More specifically, knowledge—in terms of gender gaps—has been examined^[47]. The gendered knowledge gaps in online information spaces were used to design a study to teach girls online skills. The remaining intrapersonal factors—including their position in the article and corresponding references—are listed in **Appendix E, Table A3**.

3.2.3. Interpersonal Factors (Introduction)

The interpersonal factors listed most often in the introduction have to do with communicating^[68], (social) interacting^[69], and collaborating^[47]. The interpersonal nature of communication pertained to the digital communication as a mediator for citizenship practices and, more specifically, for interacting with political parties^[63]. Interactions—with a difference in the nature of the interaction—have a pivotal role in education: “[...] the electronic storybook is widely used for students to enhance their reading levels to allow more interaction with content” (p. 211)^[69], but the authors also emphasized the increased use of digital technologies in our society—and, therefore, emphasized the persuasiveness of modern interaction. The concept of collaboration in reading education was highlighted: “developing relationships with others to work together” (p. 34)^[47]. At a more overarching level, the elements of digital literacy also provide a source of interpersonal factors, with collaboration being a part of the elements^[38].

Social or digital networking, or social media use, can be listed as interpersonal factors (see Casero-Ripollés^[45] and Surmelioglu & Seferoglu^[56]) with its increased popularity^[70]. Specific examples include public speaking (e.g., debates)^[45] and social sharings^[56]. Contrary to the more active interpersonal factors listed before, consuming content can be considered passive^[45]. Despite the emphasis on communication, interactions and collaboration, interpersonal factors addressed less often were the intercultural nature of communication and/or collaboration^[61]; human

dignity needed for communication, interaction or collaboration^[55]; and community building^[36]. Despite an emphasis on communication, the context in which the communication takes place remains crucial: “the ball is in the court of educators and parents” (p. 2)^[35]—highlighting the role of familial and/or educational communication, interaction and/or collaboration.

3.2.4. Interpersonal Factors (Method)

Communicating was most often mentioned in the method section, followed by collaborating and (social) networking—in a similar vein as in the introduction. Peer learning was mentioned least often^[43]. **Appendix F, Table A4** lists the remaining interpersonal factors.

4. Discussion

Our digitally-mediated society requires individuals to be digitally literate in order to become a digital citizen^[11]. Whilst becoming digitally literate, or a digital citizen, one needs to become digitally aware^[1]. Being and not being digitally aware is a dichotomy, meaning that you are aware or not. However, once an individual is digitally aware, the concept is viewed as a process-oriented and dynamic concept—in line with conceptualizations of digital literacy and digital citizenship as processes. This view fits a lifelong learning imperative^[6] that is still embedded in individuals’ public, work, and private lives^[5]. From the sample of 42 articles, facilitating and hindering mechanisms of digital literacy and digital citizenship were explored—alongside individual factors—divided into intra- and interpersonal factors. These mechanisms and individual factors are reasoned to be influential for digital awareness.

4.1. Facilitating and Hindering Mechanisms and Digital Awareness (RQ1)

4.1.1. Facilitators

Facilitating mechanisms can pertain to mechanisms related to foundational (pre)requisites, such as access to the instructional and material support and to technologies or tools, and mechanisms extending these (pre)requisites. Previous research emphasized that access to technologies

or digital tools is a crucial prerequisite for digital literacy and digital citizenship^[11] and, therefore, also for digital awareness^[1]. However, using technologies or digital tools does not necessarily mean the individual is digitally aware, and even if an individual is considered digitally aware, the *quality* of the awareness might be different. To further exacerbate the concept, digital awareness can arise, and its quality can be improved *without* having access to technologies or digital tools. In particular, when the individual is aware of underlying structures and/or usages and/or is able to transfer knowledge and skills to new situations and, as a result, derive future implications that are supported with valid arguments, the actual use of that specific technology is not needed, albeit it supports the development of digital awareness.

The nine elements of digital citizenship^[13] can also be listed as facilitators of digital literacy and/or digital citizenship. For example, if an individual can use technologies in a legal, safe, and responsible way, one can carefully assume the individual is digitally aware or improves the quality of their awareness regarding these aspects—corroborating findings from Eckert et al.^[47], Dedebali & Dasedemir^[52], and Baterna et al.^[57]. Individuals are ‘confronted’ with most elements on a daily basis (e.g., digital communication, digital literacy, digital etiquette) as a result of using digital technologies for a range of purposes in their daily lives^[5]. Frequent use of these technologies or digital tools is a relevant starting point for digital awareness. In addition, elements can shape an individual’s attention: digital commerce can extend the awareness to aspects related to online shopping, the programming structure of web shops, or the guarantee that specific payment services are protected from scam or even fake and/or invalidated information^[57]. In a similar vein, digital law encompasses more than the digital responsibility for deeds and actions, such as violation of copyrights and agreed terms and piracy, and the legal actions following that violation. This can be transferred to ethics and human dignity online, as emphasized by Eckert et al.^[47] and Alqahtani et al.^[55] amongst others in the current review.

In educational settings, corresponding with an individual’s public lives^[5], instructors are perceived as facilitators of digital literacy and/or digital citizenship, especially if instructors are (actively) engaged and en-

thusiastic. Also with digital awareness, an instructor can function as facilitator by, for example, setting an example or providing instruction or training about specific aspects, such as different types of knowledge and understanding (declarative, structural, procedural, and conditional), causes and consequences, risks and opportunities, and/or future implications^[1]—closely related to elements from Ribble^[13] and more recent frameworks or conceptualizations^[14,71–73]. This means that instructors require a baseline digital awareness, starting with openness to (the use of) technologies or digital tools and are ready to actively engage in them. Furthermore, the user's attitudes, skills, and habits of mind seem to influence the *use* of digital devices or technologies^[42,51] and, with that line of reasoning, indirectly influence digital awareness. Active involvement with or engagement in technologies or digital tools shapes individuals' digital citizenship^[19] and can be extended to other contexts, such as formal education and the daily context at home. Moreover, in individuals' public lives, functional parenting styles and active—rather than passive—involvement can influence digital awareness by setting an example, or by explicitly teaching (their) children how to use and work with digital technologies. As an extension of that, these styles are or this involvement is also applicable for families, or social and/or cultural groups, with the latter emphasized by Hauck^[61]. Thus, digital awareness can be taught or trained. One source of instruction can be (a) strategies, such as cognitive, metacognitive, and resource management strategies, or (b) a focus on aspects related to engagement, reflection, and critical thinking—resonating with frameworks or conceptualizations^[14,72] to meet a life-long learning imperative^[1,6,71,73].

4.1.2. Hindrances

The lack of infrastructure, access, and use of technologies or digital tools may hinder individuals from becoming digitally aware, but does not completely exclude it. In a similar vein, disability—or more generally, the/a digital divide—might negatively impact individuals' ability to become digitally aware, especially when the mastery of appropriately using digital technologies is prohibited, besides a lack of instruction or training. Negative beliefs and views of digital technologies are viewed as barriers and hinder the use of and engagement with those technologies.

For example, in an educational setting, the instructors' beliefs—for example, that technology (a) refrains positive developments in or from their students and (b) contributes to a myopic worldview^[58]—may result in avoiding digital technologies in the classroom. In a similar vein, parents have a crucial role in shaping children's digital wellbeing by, for example, managing screen time and engaging with digital activities^[74]. As a result, a situation that requires digital awareness is absent for the learner or child and, as a result, cannot improve the quality of one's digital awareness. Also, negative experiences with digital technologies may hinder digital awareness—such as pop-up errors, not properly working digital devices or services, or abuse of digital devices, services, or information^[47,57]—because the individual might experience discomfort, lack motivation, and/or insufficient training to reflect upon the experience or might stop using the technology altogether. Whereas the consequences of these experiences may hinder future implications of technologies or digital tools, they can increase an individual's digital awareness.

One crucial hindrance encompasses the rapidly changing nature of technologies and/or digital tools^[75]. With new digital technologies/tools on the market, individuals need to learn how to use these tools and implement them in their daily lives. If new technologies arise and/or digital technologies change, individuals need to decide if and what they want to adjust (e.g., declarative, structural, procedural, and conditional knowledge). In other words, individuals—such as educators and parents—need to keep up with the changes, and for some individuals, this will be easier than for others. Individuals—who can be labelled as being digitally aware—need to have knowledge of the changes and reflect upon what, besides the other aspects of digital awareness, and training or education can help them foster that.

4.2. Individual Factors for Digital Awareness (RQ2)

The individual plays a large role in becoming digitally aware, or improving the quality of their awareness. Technical skills and digital competence are necessary to increase the quality of digital awareness—serving both as (pre)requisites if the individual possesses insufficient skills or competence. The emphasis is predominantly on *intra-*

personal rather than *interpersonal* factors: the individual ‘interacts’ with the technology or digital tool rather than with other individuals—albeit only a certain degree of interactivity might be allowed by the technology or digital tool. This claim can loosely be supported by the variety and plethora of intrapersonal factors listed in the current sample compared to the interpersonal factors. For example, in situations that require interactions with other individuals—mediated and redefined by technologies^[6]—both intra- and interpersonal factors play a role. An example is when teachers actively use technology in the classroom (e.g., for online quizzes, online discussion forums). Other students can—in the latter example—interact with other students and/or the teacher by posting and/or answering questions. In this situation, the individual—who posts the message—brings intrapersonal factors to that situation and the individuals who read the message also bring intrapersonal factors to that situation. In addition, *interpersonal* factors apply to both sides but are the by-product of the *intrapersonal* factors^[3]. Awareness in this situation can arise as a consequence of many aspects, such as from sharing, commenting, liking, and/or reading other messages. Other individuals or contexts can influence an individual’s digital awareness, whereas in situations in which an individual is only interacting with technologies—without the (in)direct influence of other individuals—the individual is self-reliant to become digitally aware and/or to improve the quality of one’s awareness. Differences exist between the individual factors mentioned in the introduction and method section. More factors were addressed in the introduction, as part of the theoretical foundations, than in the method section. This might imply that the broader—and perhaps a more complex—context is explained in the introduction, but that the research itself is more delimited by methodological decisions to allow for valid conclusions and implications.

4.2.1. Intrapersonal Factors

In accordance with previous work from Jan^[51], digital awareness may require a specific way of thinking but can be viewed as a consequence of the collection of individuals’ attitudes and skills. Some individuals are more prone to pick up this line of thinking and, therefore, are more prone to become digital aware and/or to improve the quality of their awareness—tying it to beliefs, attitudes, and

mindset. Digital awareness relies heavily on an individual’s intrapersonal factors, such as general skills—present in the current sample as general and technical skills—and specific strategies—such as reflection, problem-solving, and (rational) decision-making. Digital awareness requires individuals to reflect on a broad range of aspects, including knowledge, understanding, future implications, and transferability of the aforementioned (amongst other aspects). However, when an individual is digitally unaware, one can become aware by reflecting upon what knowledge and skills the individual possesses. In addition, if an individual is labelled as digitally aware, reflection is necessary to improve the quality of their awareness—to allow for, for example, transfer to other contexts. Furthermore, factors such as sufficient fluency—that might be perceived as a trainable concept—in handling technologies by adjusting knowledge and understanding to meet specific goals also contribute positively to the quality of one’s awareness.

In the current sample, the intrapersonal factor attitude was mostly described as being directed towards something (e.g., illegal downloads, digital citizenship, literacy/ literacies; see e.g., Surmelioglu & Seferoglu^[56] and Erdem & Koçyigit^[62]). These attitudes encompass essential factors that—as previously discussed—have the potential to facilitate and/or hinder digital awareness. An attitude becomes apparent in its valence (i.e., judgment of goodness/badness, phrased as positive or negative, respectively) and strength (magnitude of valence, such as small and large)^[76]. In the current society, with many aspects of public, work, and private lives are mediated and redefined by digital technologies^[6], attitudes can be directed towards a range of aspects, such as knowledge and understanding, necessary skills, the digital technologies, consequences of use, and risks and opportunities, but also to creating digital identities such as digital footprints^[56]. Negative attitudes might refrain individuals from becoming digitally aware; however, they can provide direction to one’s digital awareness in a similar vein as negative experiences do.

Motivation can be considered a major facilitator or hindrance of digital awareness; it can partly determine whether or not individuals engage in activities that require digital devices and, therefore, influence digital awareness. Motivation might move individuals to directly and consciously look for ways to increase knowledge and un-

derstanding, to use or engage with new digital technologies, and gain experience with underlying structures and functionalities—in line with ethical and responsible use of technologies^[34]. In a similar vein, metacognition plays a crucial role because it determines to what extent an individual is able to plan, monitor, and/or self-assess their knowledge and understanding. A crucial prerequisite is critical thinking^[44,45]: the extent to which an individual is *able to* critically recognize, monitor, and reflect. In conclusion, when designing learning contexts, intrapersonal factors need to be considered to allow for sufficient engagement in technologies or digital tools.

4.2.2. Interpersonal Factors

Interpersonal factors are related to others and frequently associated with interactions. Communication, (social) interaction, and collaboration were present in the current sample. Because interpersonal factors can be considered a by-product of intrapersonal factors^[3] and communication is increasingly mediated by technologies or digital tools, digital awareness arises on multiple levels. The individual has to recognize how the digital technology mediates one's communication and what effect this has on the individual and on the other (group of) individual(s). This mediation—encompassing the knowledge and understanding of (in)correct usage, consequences for different (groups of) users, (dis)advantages, and risks and opportunities—pertains to an individual's digital awareness. The diversity of the aforementioned aspects—and corresponding interactions within and between the aspects, intrapersonal factors, and context- and content-dependent factors—make the concept of digital awareness unique for each individual; however, some of these interactions are shared between (groups of) individuals. Groups of individuals, such as social or cultural groups (e.g., friend groups, families, communities), share intrapersonal factors that influence interpersonal factors. For example, parenting styles influence how children use digital technologies by stimulating transparency in the use of digital technologies (e.g., on social media). As a result, they can influence their own and their children's digital awareness. Another example is teachers' attitudes and beliefs—listed as intrapersonal factors for themselves. This means that the digital awareness reaches further than the individual and, perhaps, becomes a shared awareness. Taken together, interpersonal factors can

impact engagement in technologies or digital tools and, as a result, influence digital awareness.

In practice, teachers need knowledge of relevant intra- and interpersonal factors and, in some cases, support the development of these factors (e.g., self-efficacy, digital collaboration) when using technologies. By default, teachers often deal with heterogeneity in student classrooms on an individual level. As a result, in practice, many teachers 'have been working with' various individual factors, perhaps without realizing this. In particular, when students use technologies or tools, a starting point can be that teachers become aware of the interplay of various individual factors from students whilst using technologies or tools. Caution is warranted because most teachers are not researchers and, therefore, the theoretical foundations of the aforementioned interplays might not be part of readily available knowledge.

4.3. Limitations and Recommendations

First, the persistent lack of consensus in related terms (e.g., literacies or dimensions of digital literacy) has implications for conceptualizing digital awareness. Introducing a new concept that includes all or most terms requires re-examination of existing research—as achieved in the current study—to connect the concept to existing frameworks^[1], but with the broad range of terminologies and conceptualizations, development of the concept of digital awareness runs the risk of having either (a) an overly detailed conceptualization and further implementation to match all those existing terminologies and conceptualizations, or (b) an overly general conceptualization without practicality. Consistency in terminology and conceptualization of digital awareness—and the related concepts of digital literacy and digital citizenship—is of continued importance. An additional limitation pertains to the single-coder approach adopted in this research. This creates susceptibility to subjectivity and bias. Whereas the focus was on conceptual development of digital awareness—a concept derived by the author—multiple coders will be recommended for future research. In the same line of reasoning, despite the fact that scoping reviews do not necessitate a critical appraisal of biases^[77], this critical appraisal might need to be included in future research.

Second, the interconnections between the facilitating and hindering mechanisms prove to be challenging. Some

facilitators are also considered hindrances. For example, access to technologies or digital tools—a basic prerequisite for digital literacy, digital citizenship, and digital awareness—is considered a facilitator; however, the *lack* of access is considered a hindrance. In a similar vein, material and/or instructional support has been listed as a facilitator, as opposed to the *lack* of material and/or instructional support, which can be listed as a hindrance. Whether a mechanism is listed as a facilitator for one (group of) individual(s), it can be a hindrance for others. Furthermore, there is also a link between the facilitating and hindering mechanisms *and* individual factors. For example, the necessary strategies or engagement—both listed as facilitators—are also intrapersonal factors. These dual roles—(a) hindering and facilitating as opposing factors and (b) between hindrances/facilitators and individual factors—create a tension in the conceptualization of digital awareness. Future research can address this tension by distinguishing between methodological and conceptual decisions (e.g., by clearly stating what function the factor has in the research: as a facilitator [and/or hindrance] or as an individual factor). Moreover, this tension necessitates more research into the type of model digital awareness actually is, as emphasized by indicators of a multi-layered and multidimensional nature of digital awareness.

Third, the complexity that individuals bring to the situation resembles a more realistic representation in practice, but this complexity was not fully represented and captured. Intra- and interpersonal factors interact to varying degrees, such as peer learning promotes metacognitive skills (see e.g., Casero-Ripollés^[45]). These interactions have not been addressed in detail. The current research remains a simplified rendering despite a careful attempt to grasp this complexity. Future research should be aware of this simplified rendering by reflecting upon limitations, or by tapping into the complex interplay of facilitators, hindrances, and individual factors.

5. Conclusions

With digital awareness, similar facilitators and hindrances can be identified: access to technologies or digital tools alongside knowledge and skills to interact with those. Cognitive skills (technical skills) were mentioned, albeit motivational and metacognitive skills or aspects were listed (self-efficacy, monitoring). The role of critical thinking

became apparent within each of these domains of skills, alongside the necessity for an individual to play an *active* role in engaging with technologies or digital tools. The discrepancy between individual factors listed in the introduction and method section allowed for acknowledging the larger and complex context of individual factors whilst—at the same time—delimiting research. Both intra- and interpersonal factors are relevant for digital awareness and should be considered for designing learning contexts.

Supplementary Materials

The supporting information can be downloaded at <https://ojs.bilpub.com/files/JELE-818-Supplementary-Materials-File.zip>. File S1: PRISMA Abstract Checklist. File S2: PRISMA Checklist. File S3: Completed AMSTAR for the Current Scoping Review.

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Institutional Review Board Statement

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Data Availability Statement

The data can be requested at the first author.

Conflicts of Interest

The author declares no conflict of interest.

Appendix A. Inclusion Criteria for the Scoping Review

Limitations were not constituted by demographic information, gender, race, country, and school systems. In the current review, articles were included that met the fol-

lowing criteria:

1. Studies involving general education and/or work-related practices.
 2. Studies involving special needs education and/or work-related practices (e.g., dyslexia, deaf/blindness, and/or attention deficits).
 3. Quantitative outcomes were reported for individuals and/or groups.
 4. Studies with a primarily goal focused on digital literacy and/or digital citizenship.
- The following exclusion criteria were used to narrow the scope:
1. Studies primarily focused on user experience with a digital device/ technology (e.g., to test if a specific mobile application matches its purpose).
 2. Studies primarily focused on awareness measured with/ by a digital device/ technology (e.g., tracking awareness of breast cancer by using a mobile application).
 3. Qualitative outcomes were reported for individuals and/or groups.
 4. Research that used digital technologies or tools (or digital literacy/ citizenship) as a *means* for other goals (e.g., goals related to health, language, teaching & learning [with exception of language], and other [such as income, parenting, tourism]).
 5. Reviews (systematic reviews, literature, meta-analyses, frameworks, [re]conceptualizations).
 6. Grey literature (dissertations, theses, book [chapters], conference papers).

Appendix B

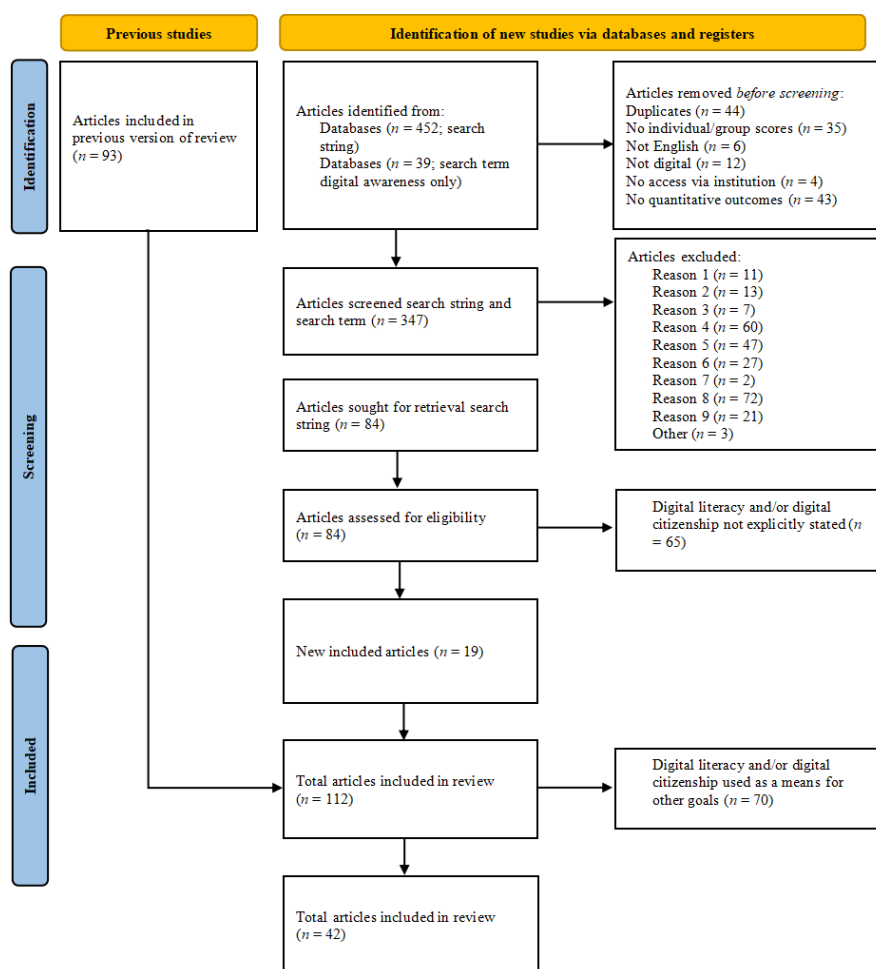


Figure A1. PRISMA 2020 Flow Diagram for Updated Reviews.

Source: Page, M.J., McKenzie, J.E., Bossuyt, P.M., et al., 2021. The PRISMA 2020 Statement: An Updated Guideline for Reporting Systematic Reviews. British Medical Journal. 372, 71. DOI: <https://doi.org/10.1136/bmj.n71>

Appendix C

Table A1. The (Remaining) Facilitators of Digital Literacy and Digital Citizenship.

Facilitator *	Example Author(s)
Infrastructure, access to and use of technologies and investments (including experience and time)	Takavarasha et al. ^[35] , Machackova et al. ^[36] , Son et al. ^[38] , Liu et al. ^[39] , Casero-Ripollés ^[45] , Sivrikaya ^[48] , Dashtestani & Hojatpanah ^[49] , Duradoni et al. ^[50] , Jan ^[51] , Mishra ^[53] , Baterna et al. ^[57] , Hamutoglu et al. ^[70]
Education, training and guidance	Son et al. ^[38] , Casero-Ripollés ^[45] , Jwaifell ^[46] , Eckert et al. ^[47] , Dashtestani & Hojatpanah ^[49] , Mack et al. ^[54] , Hauck ^[61] , Erdem & Koçyiğit ^[62] , Teimouri et al. ^[63] , Moreno de Diezmas, et al. ^[78] , Sulianta et al. ^[79]
Specific skills and/or literacies	Elcicek et al. ^[34] , Takavarasha et al. ^[35] , Machackova et al. ^[36] , Mugheri ^[41] , Anisimova ^[42] , Dashtestani & Hojatpanah ^[49] , Duradoni et al. ^[50] , Jan ^[51] , Mishra ^[53] , Erdem & Koçyiğit ^[62] , Moreno de Diezmas & Manzano ^[78]
Self-regulated learning characteristics	Sivrikaya ^[48] , Duradoni et al. ^[50] , Mishra ^[53] , English ^[58] , Erdem & Koçyiğit ^[62]
Areas for/ of awareness	Elcicek et al. ^[34] , Takavarasha et al. ^[35] , Phillips & Lee ^[40] , Sivrikaya ^[48] , Mishra ^[53] , Mack et al. ^[54] , Erdem & Koçyiğit ^[62] , Alturki & Alharbi ^[68] , Moreno de Diezmas & Manzano ^[78]
Other factors or non-specified factors (e.g., sensation seeking, enjoyment, well-being)	Takavarasha et al. ^[35] , Machackova et al. ^[36] , Sivrikaya ^[48] , Dashtestani & Hojatpanah ^[49] , Duradoni et al. ^[50] , Erdem & Koçyiğit ^[62]
Interpersonal factors	Takavarasha et al. ^[35] , Schreurs et al. ^[47] , Hamutoglu et al. ^[70]
Demographic factors	Casero-Ripollés ^[45] , Dashtestani & Hojatpanah ^[49] , Alqahtani et al. ^[55]

* Presented in a random order. A more specific overview can be requested with the author.

Appendix D

Table A2. The (Remaining) Hindrances of Digital Literacy and Digital Citizenship.

Hindrances *	Example Author(s)
(Lack of) Infrastructure, access, and variety of technologies and digital tools	Takavarasha et al. ^[35] , Machackova et al. ^[36] , Schreurs et al. ^[37] , Son et al. ^[38] , Grncharovska et al. ^[44] , Casero-Ripollés ^[45] , Dashtestani & Hojatpanah ^[49] , Mishra ^[53] , Mack et al. ^[54]
(Lack of) Skills, literacies, awareness, and evaluation	Takavarasha et al. ^[35] , Machackova et al. ^[36] , Schreurs et al. ^[37] , Son et al. ^[38] , Mugheri ^[41] , Grncharovska et al. ^[44] , Casero-Ripollés ^[45] , Dashtestani & Hojatpanah ^[49] , Duradoni et al. ^[50] , Mishra ^[53] , Mack et al. ^[54] , English ^[58] , Erdem & Koçyiğit ^[62]
Negative or harmful experiences	Machackova et al. ^[36] , Anisimova ^[42] , Eckert et al. ^[47] , Dedebeali & Dasdemir ^[52] , Mack et al. ^[54] , Surmelioglu & Seferoglu ^[56] , Baterna et al. ^[57] , Alturki & Alharbi ^[68]
Negative feelings/emotions and perceptions, or motivation	Schreurs et al. ^[37] , Son et al. ^[38] , Mugheri ^[41] , Eckert et al. ^[47] , Dashtestani & Hojatpanah ^[49] , Duradoni et al. ^[50] , Mack et al. ^[54] , English ^[58]
Indirect (e.g., demographic: race, gender, age) or other factors	Schreurs et al. ^[37] , Son et al. ^[38] , Grncharovska et al. ^[44] , Casero-Ripollés ^[45] , Dashtestani & Hojatpanah ^[49] , Mack et al. ^[54] , Alqahtani et al. ^[55] , Surmelioglu & Seferoglu ^[56]

* Presented in a random order. A more specific overview can be requested with the author.

Appendix E

Table A3. Intrapersonal Factors and Corresponding Sources.

Intrapersonal Factor *	Men- tioned in		Reference(s)	
	I	M	Introduction	Method
Students' attitudes/beliefs towards the technologies or digital tools	X	X	Son et al. ^[38] , Phillips & Lee ^[40] , Anisimova ^[42] , Sivrikaya ^[48] , Dashtestani & Hojatpanah ^[49] , Duradoni et al. ^[50] , Jan ^[51] , Mishra ^[53] , Mack et al. ^[54] , Alqahtani et al. ^[55] , Surmelioglu & Seferoglu ^[56] , Kim & Choi ^[60] , Erdem & Koçyiğit ^[62] , Muñoz-Repiso et al. ^[67]	Anisimova ^[42] , Sivrikaya ^[48] , Jan ^[51] , Mishra ^[53] , Hamutoglu et al. ^[70] , Moreno de Diezmas & Manzano ^[78]
(Self-)knowledge/ understanding	X	X	Son et al. ^[38] , Jwaifell ^[46] , Eckert et al. ^[47] , Sivrikaya ^[48] , Duradoni et al. ^[50] , Jan ^[51] , Mishra ^[53] , Moreno de Diezmas & Manzano ^[78]	Grncharovska et al. ^[44] , Jwaifell ^[46] , Eckert et al. ^[47] , Erdem & Koçyiğit ^[62] , Moreno de Diezmas & Manzano ^[78]

Table A3. Cont.

Intrapersonal Factor *	Mentioned in		Reference(s)	
	I	M	Introduction	Method
Skills/ ability (e.g., learning, teaching; generally phrased; basic; technical; soft; writing)	X	X	Elcicek et al. ^[34] , Takavarasha et al. ^[35] , Machackova et al. ^[36] , Son et al. ^[38] , Liu et al. ^[39] , Mugheri ^[41] , Grncharovska et al. ^[44] , Casero-Ripollés ^[45] , Sivrikaya ^[48] , Dashtestani & Hojatpanah ^[49] , Duradoni et al. ^[50] , Jan ^[51] , Mishra ^[53] , Surmelioglu & Seferoglu ^[56] , Çam & Kiyici ^[59] , Kim & Choi ^[60] , Erdem & Koçyiğit ^[62] , Teimouri et al. ^[63] , Muñoz-Repiso et al. ^[67] , Hamutoglu et al. ^[70] , Moreno de Diezmas & Manzano ^[78] , Alaleeli et al. ^[80]	Machackova et al. ^[36] , Liu et al. ^[39] , Kim ^[43] , Eckert et al. ^[47] , Sivrikaya ^[48] , Çam & Kiyici ^[59] , Kim & Choi ^[60] , Erdem & Koçyiğit ^[62] , Hamutoglu et al. ^[70] , Alaleeli & Alnajjar ^[80]
(Rational) Decision-making	X		Kim & Choi ^[60]	
(Digital) Fluency	X		Takavarasha et al. ^[35] , Erdem & Koçyiğit ^[62]	
(Self-)evaluation (content)		X		Baterna et al. ^[57] , Erdem & Koçyiğit ^[62]
(Self-)awareness	X	X	Liu et al. ^[39] , Jwaifell ^[46] , Sivrikaya ^[48] , Erdem & Koçyiğit ^[62] , Clark & Simpson ^[65] , Moreno de Diezmas & Manzano ^[78] , Dede-bali et al. ^[81]	Takavarasha et al. ^[35] , Surmelioglu & Seferoglu ^[56] , Kim & Choi ^[60] , Erdem & Koçyiğit ^[62] , Dede-bali ^[81]
Strategies (e.g., cognitive, metacognitive, time management, learning, reflection, problem-solving)	X	X	Son et al. ^[38] , Kim ^[43] , Casero-Ripollés ^[45] , Sivrikaya ^[48]	Kim ^[43] , Mack et al. ^[54] , Hollandsworth et al. ^[82]
Learning needs	X		Takavarasha et al. ^[35]	
Competence level	X	X	Takavarasha et al. ^[35] , Erdem & Koçyiğit ^[62] , Teimouri et al. ^[63]	Hollandsworth et al. ^[82]
Critical thinking (or skills/ agency)	X	X	Takavarasha et al. ^[35] , Casero-Ripollés ^[45] , Jan ^[51] , English ^[58] , Kim & Choi ^[60] , Erdem & Koçyiğit ^[62] , Muñoz-Repiso et al. ^[67] , Moreno de Diezmas & Manzano ^[78]	Kim ^[43] , English ^[58] , Kara ^[64]
Literacy (e.g., digital, information, visual, software, technological, computer, health insurance, media)	X	X	Takavarasha et al. ^[35] , Machackova et al. ^[36] , Son et al. ^[38] , Phillips & Lee ^[40] , Anisimova ^[42] , Sivrikaya ^[48] , Dashtestani & Hojatpanah ^[49] , Jan ^[51] , Mishra ^[53] , Çam & Kiyici ^[59] , Kim & Choi ^[60] , Teimouri et al. ^[63] , Muñoz-Repiso et al. ^[67] , Hamutoglu et al. ^[70] , Alaleeli & Alnajjar ^[80]	Machackova et al. ^[36] , Son et al. ^[38] , Anisimova ^[42] , Kim ^[43] , Sivrikaya ^[48] , Dashtestani & Hojatpanah ^[49] , Jan ^[51] , Çam & Kiyici ^[59] , Teimouri et al. ^[63] , Hamutoglu et al. ^[70] , Alaleeli & Alnajjar ^[80] , Hollandsworth et al. ^[82]
Performance or academic success	X	X	Elcicek et al. ^[34] , Duradoni et al. ^[50]	Hamutoglu et al. ^[70]
Ethical, legal and moral concerns/ behaviours (e.g., digital etiquette, safety, responsibility)	X	X	Elcicek et al. ^[34] , Takavarasha et al. ^[35] , Machackova et al. ^[36] , Duradoni et al. ^[50] , Dede-bali & Dasedemir ^[52] , Kim & Choi ^[60] , Teimouri et al. ^[63] , Kara ^[64] , Nordin et al. ^[66] , Moreno de Diezmas & Manzano ^[78]	Machackova et al. ^[36] , Jwaifell ^[46] , Duradoni et al. ^[50] , Teimouri et al. ^[63] , Nordin et al. ^[66]
Metacognition (e.g., planning, monitoring, self-assessment)	X	X	Kim ^[43] , Sivrikaya ^[48]	Erdem & Koçyiğit ^[62]
Motivation (e.g., willingness, intentional, desire to improve, goal directed, interests, [perceived] usefulness, engagement)	X	X	Schreurs et al. ^[37] , Liu et al. ^[39] , Phillips & Lee ^[40] , Duradoni et al. ^[50] , Jan ^[51] , Kara ^[64] , Clark & Simpson ^[65]	Liu et al. ^[39] , Anisimova ^[42] , Eckert et al. ^[47] , Dashtestani & Hojatpanah ^[49] , Alsalem ^[69]
Self-efficacy/ confidence, autonomy (including empowerment, initiative taking)	X	X	Casero-Ripollés ^[45] , Eckert et al. ^[47] , Duradoni et al. ^[50] , English ^[58] , Kim & Choi ^[60] , Erdem & Koçyiğit ^[62] , Teimouri et al. ^[63] , Clark & Simpson ^[65] , Muñoz-Repiso et al. ^[67]	Takavarasha et al. ^[35] , Duradoni et al. ^[50] , English ^[58] , Kim & Choi ^[60] , Teimouri et al. ^[63] , Clark & Simpson ^[65] , Hollandsworth et al. ^[82]
(Inter)Cultural understanding/ awareness	X	X	Takavarasha et al. ^[35]	Hollandsworth et al. ^[82]
Personality/ personal disposition/ qualities, identity (formation)	X		Sivrikaya ^[48] , Surmelioglu & Seferoglu ^[56]	
Wellbeing (e.g., psychological/ mental, physical/ emotional/ personal, physical)	X	X	Takavarasha et al. ^[35] , Machackova et al. ^[36] , Nordin et al. ^[66]	Machackova et al. ^[36] , Nordin et al. ^[66]
Creativity or creation	X	X	Takavarasha et al. ^[35] , Machackova et al. ^[36] , Son et al. ^[38]	Machackova et al. ^[36] , Grncharovska et al. ^[44] , Baterna et al. ^[57] , Hollandsworth et al. ^[82]

Table A3. *Cont.*

Intrapersonal Factor *	Mentioned in		Reference(s)	
	I	M	Introduction	Method
(Self-)perception/ view(s)/ perspective(s) (including self-paragement, opinions, thoughts)	X	X	Eckert et al. ^[47] , Sivrikaya ^[48] , Dashtestani & Hojatpanah ^[49] , Duradoni et al. ^[50] , Surmelioglu & Seferoglu ^[56] , Kara ^[64] , Hollandsworth et al. ^[82]	Elcicek et al. ^[34] , Son et al. ^[38] , Dashtestani & Hojatpanah ^[49] , Duradoni et al. ^[50] , Dedebali & Dasdemir ^[52] , Mishra ^[53] , Mack et al. ^[54] , Kara ^[64]
Adaptable, resilience	X		Clark & Simpson ^[65]	
Learning styles	X		Grncharovska et al. ^[44]	
Sensation seeking	X	X	Machackova et al. ^[36]	Machackova et al. ^[36]
Frustration, concern, stress	X	X	Duradoni et al. ^[50]	Duradoni et al. ^[50]
Tolerance, coping	X		Kim & Choi ^[60] , Hollandsworth et al. ^[82]	
Satisfaction	X		Elcicek et al. ^[34]	
Emotions/ feelings	X	X	Hollandsworth et al. ^[82]	Hollandsworth et al. ^[82]
Professional characteristics	X		Mishra ^[53]	
Lifelong learning	X		Mishra ^[53]	
Soft skills	X		Takavarasha et al. ^[35]	
Demographic labels (e.g., age, race, gender, educational level, socio-economic status)	X	X	Schreurs et al. ^[37] , Casero-Ripollés ^[45] , Dashtestani & Hojatpanah ^[49] , Mack et al. ^[54] , Alqahtani et al. ^[55]	Schreurs et al. ^[37] , Casero-Ripollés ^[45] , Dashtestani & Hojatpanah ^[49] , Mishra ^[53]

* Presented in a random order. I = Introduction. M = Method.

Appendix F

Table A4. *Interpersonal Factors and Corresponding Sources.*

Interpersonal Factor *	Mentioned in		Reference(s)	
	I	M	Introduction	Method
Communicating/ communication	X	X	Machackova et al. ^[36] , Son et al. ^[38] , Kim ^[43] , Jwaifell ^[46] , Sivrikaya ^[48] , Duradoni et al. ^[50] , Dedebali & Dasdemir ^[52] , Alqahtani et al. ^[55] , Clark & Simpson ^[60] , Kara ^[64] , Clark & Simpson ^[65] , Muñoz-Repiso et al. ^[67] , Alturki & Alharbi ^[68] , Hamutoglu et al. ^[70] , Alaleeli & Alnajjar ^[80]	Elcicek et al. ^[34] , Son et al. ^[38] , Kim ^[43] , Grncharovska et al. ^[44] , Jwaifell ^[46] , Dedebali & Dasdemir ^[52] , Alqahtani et al. ^[55] , Clark & Simpson ^[60] , Clark & Simpson ^[65] , Alturki & Alharbi ^[68] , Alaleeli & Alnajjar ^[80]
(Social) Interacting, expressions	X	X	Elcicek et al. ^[34] , Takavarasha et al. ^[35] , Machackova et al. ^[36] , Liu et al. ^[39] , Phillips & Lee ^[40] , Casero-Ripollés ^[45] , Sivrikaya ^[48] , Mack et al. ^[54] , Surmelioglu & Seferoglu ^[56] , Baterna et al. ^[57] , Kara ^[64] , Clark & Simpson ^[65] , Alsalem ^[69]	Clark & Simpson ^[65]
(Tele)Collaborating, cooperation, teamwork	X	X	Takavarasha et al. ^[35] , Son et al. ^[38] , Phillips & Lee ^[40] , Kim ^[43] , Eckert et al. ^[47] , Clark & Simpson ^[60]	Hollandsworth et al. ^[82]
Relationship(-building)/ social capital	X	X	Phillips & Lee ^[40] , Hollandsworth et al. ^[82]	Kim ^[43] , Clark & Simpson ^[60]
(Social or digital) Network(ing/s)/ social media use (including public speaking)	X	X	Casero-Ripollés ^[45] , Mack et al. ^[54] , Surmelioglu & Seferoglu ^[56] , Hamutoglu et al. ^[70]	Son et al. ^[38] , Anisimova ^[41] , Casero-Ripollés ^[45] , Erdem & Koçyiğit ^[62] , Kara ^[64]
Community/ group (parents, friend, family), connecting, teamwork	X	X	Machackova et al. ^[36] , Kim ^[43] , Teimouri et al. ^[63]	Takavarasha et al. ^[35] , Alqahtani et al. ^[55]
Human dignity, respect and protection of others	X		Alqahtani et al. ^[55] , Clark & Simpson ^[60]	
consuming content	X		Casero-Ripollés ^[45]	
Other: online fights, reasons when disagreeing with something online	X		Nordin et al. ^[66]	
Intercultural communication and/or collaboration	X		Erdem & Koçyiğit ^[62]	
Peer learning	X	X		Kim ^[43]

* Presented in a random order. I = Introduction. M = Method.

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