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Factors Influencing Digital Inequality: A Scoping Review

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Research Paper

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ABSTRACT

Two decades have passed since seminal work on the dimensions of digital inequality (DI) appeared. Since that time, digital inequalities have grown and taken on different forms. However, the research on conceptualizing and measuring DI has not progressed significantly. Particularly, there is a lack of robust theories to tackle the growing societal problem of DI, which is closely linked to a complex set of individual and institutional factors. Along these lines, by following a five-stage scoping review process, the current landscape of DI is mapped in this work. In addition, the key factors influencing DI are identified. As a result, a robust base for the development of a conceptual framework for further DI research is provided. The proposed framework can be validated empirically and also used to investigate the DI phenomenon in various contexts and levels.

Keywords: digital inequality, DI, digital divide, conceptual framework, inequality, scoping review, factors

INTRODUCTION

For more than two decades, digital inequality (DI) has been a problem for researchers and policymakers concerned about the disadvantages faced by people with unequal access and benefits from technologies. The increasing DI gap and its growing and widespread implication for society demand a holistic understanding and conceptualization, particularly in the current era (Imran, 2022). The term "digital inequality" has evolved beyond a binary logic of the digital divide (DD) between "haves" and "have-nots" with respect to people's access and proficiency with information technologies. DI points to not only the disparity in people's access to and proficiency with ICtT but also exacerbates social injustices brought about by technology, which prevents some people from taking advantage of the opportunities presented by those technologies (DiMaggio et al.,

2004). Over the years, DI has transformed into a more complex phenomenon that includes differences in the material, cultural, cognitive and social resources required to receive the optimum value from technology (Hsieh et al., 2008; DiMaggio & Hargittai, 2001; Graham & Smith, 2011). The evolution of DI has been further compounded with advanced technological breakthroughs in artificial intelligence, machine learning and internet of things, which Heeks (2022) termed as "adverse digital incorporation". This phenomenon creating further divide in respect of outcomes and value for the less advantaged group.

This revitalized perspective of DI is essential to comprehensively cover aspects that would help minimize, if not eliminate, the growing problem of the digital society where the socio-economically challenged population are prevented from participating in the 21st century's information society fully. This current paper is influenced by prior work, such as DiMaggio and Hargittai (2001), which argued that research within this sphere should encompass all forms of digital inequality including equipment, autonomy, skill, support, and scope of use. Yet, the current understanding is not enough to effectively operationalize and deploy the DI concept to thoroughly investigate the phenomena in multiple contexts.

Thus, it became clear that the first-level explanation for DI, which centered on the gap between those with access and those without (Rogers, 2001), was insufficient. The second level of contemporary scholarly study that looked at DI included digital competence to participate effectively in an increasingly digitized world. A third level was also added to examine the digital technologies' advantages, effects, and outcomes (Gomez, 2021).

Two decades have passed since the seminal article by DiMaggio and Hargittai (2001) was published on multiple dimensions of DI. It is now time to take stock and consider what has been accomplished and how we reconcile the conceptualizations and empirical evidence that have been obtained. The requirement for a thorough understanding of DI has been emphasized in a broader theoretical context and a wider range of questions has been raised about its impact on social inequality (DiMaggio et al., 2004). The recent COVID-19 pandemic experience has further amplified the need to address this critical issue (Zheng & Walsham, 2021; Guo & Wan, 2022; Mathrani et al., 2021). The interest amongst IS, particularly ICT4D researchers, is also growing. However, only a small portion of IS literature has reviewed DI frameworks or theories.

Against this background, this work aimed to provide an encompassing perspective that links important prior work to provide a base for further work in the field.

This paper is structured as follows. In the next section two, the scoping review method is described. Then, in section three, the findings by mapping the current landscape of DI research are presented, followed by the factors influencing DI. The last section provides the conclusion and future implication of this research.

METHOD

While there are several approaches to synthesizing the extant literature (see Grant and Booth (2009)), it was decided to follow the direction of a scoping review. Such an approach is appropriate in this work as it covers some preliminary evaluation of the extent and possible size of the body of the research material that is already available including ongoing research (Grant & Booth, 2009). This work followed five steps of a scoping review framework suggested by Arksey and O'Malley (2005). A scoping review attempts to map the key concepts behind a research area including its main sources and the type of evidence available, which can be conducted as a stand-alone project especially when the area is complex or prior comprehensive reviews are unavailable (Mays, Roberts, & Popay, 2001 as cited in Arksey & O'Malley, 2005). Despite the fact that there is a need to comprehensively cover available literature to understand the research landscape, the depth of the scoping reviews differs according to their purpose (Arksey & O'Malley, 2005). For this work, the review covers published articles from 2000 to 2022. This period is appropriate as the study aims to check what has been done since the multiple dimensions of digital inequality were revealed by DiMaggio and Hargittai (2001) two decades ago. The steps are enumerated below:

Stage 1: Identifying the research question

RQ: What is the current research landscape pertaining to models of DI and the primary factors shown to influence DI?

Stage 2: Identifying relevant studies

Following a bottom-up data-driven approach, the factors influencing DI were first identified from multiple bodies of knowledge considering the broad scope of the phenomena. This scoping review initially considered six electronic databases, namely, ProQuest, Scopus, ScienceDirect, JSTOR,

IEEE, and ACM. Initially, no restrictions were imposed to filter the subject. A consistent search string query with Boolean operators was utilized, which included "digital inequality" OR "digital divide" OR "digital exclusion" and a vast number of articles was found. Because of the sheer number of articles captured in the initial search, the search string was revised to filter the articles that specifically examined DI theories, frameworks, or models. As understanding of the literature grew, subtle revisions were integrated into the search terms and the team finally decided to formalize the search string to include: "digital inequality framework" OR "digital divide framework" OR "digital inequality model" OR "digital divide model" OR "digital inequality theory" OR "digital divide theory". Moreover, the search query was formatted to the specific requirements of each database, and additional filtering was carried out to consider the document type and resource availability. The search yielded 71 articles – 10 articles from ProQuest, 34 from Scopus, 4 from ScienceDirect, 14 from JSTOR, 7 from ACM, and 2 from IEEE. Furthermore, a 'snowball' technique was also applied in which citations within articles were searched if they appeared relevant (Hepplestone et al., 2011). An additional 38 articles were considered after the snowball step. In total, there were 109 articles considered for the initial search, of which 21 were removed due to duplication.

Stage 3: Study selection

The resultant 88 articles from the prior stage were screened further. Papers were included only if they were in from scholarly journals and conference proceedings. and published in the English language. All articles were stored in Zotero[1], a stand-alone and web-based reference management software. The bibliographic information and accompanying articles were exported to NVivo[2], a qualitative data analysis tool, for coding and subsequent analysis. A manual search was also performed of the title, keywords, and abstract to ascertain the relevance of the included studies. Papers were excluded that dealt with the topic generally but did not present empirical evidence of essential factor(s), framework, model, or theory. Finally, 72 articles were selected.

[2] See https://www.qsrinternational.com/nvivo-qualitative-data-analysis-software/home

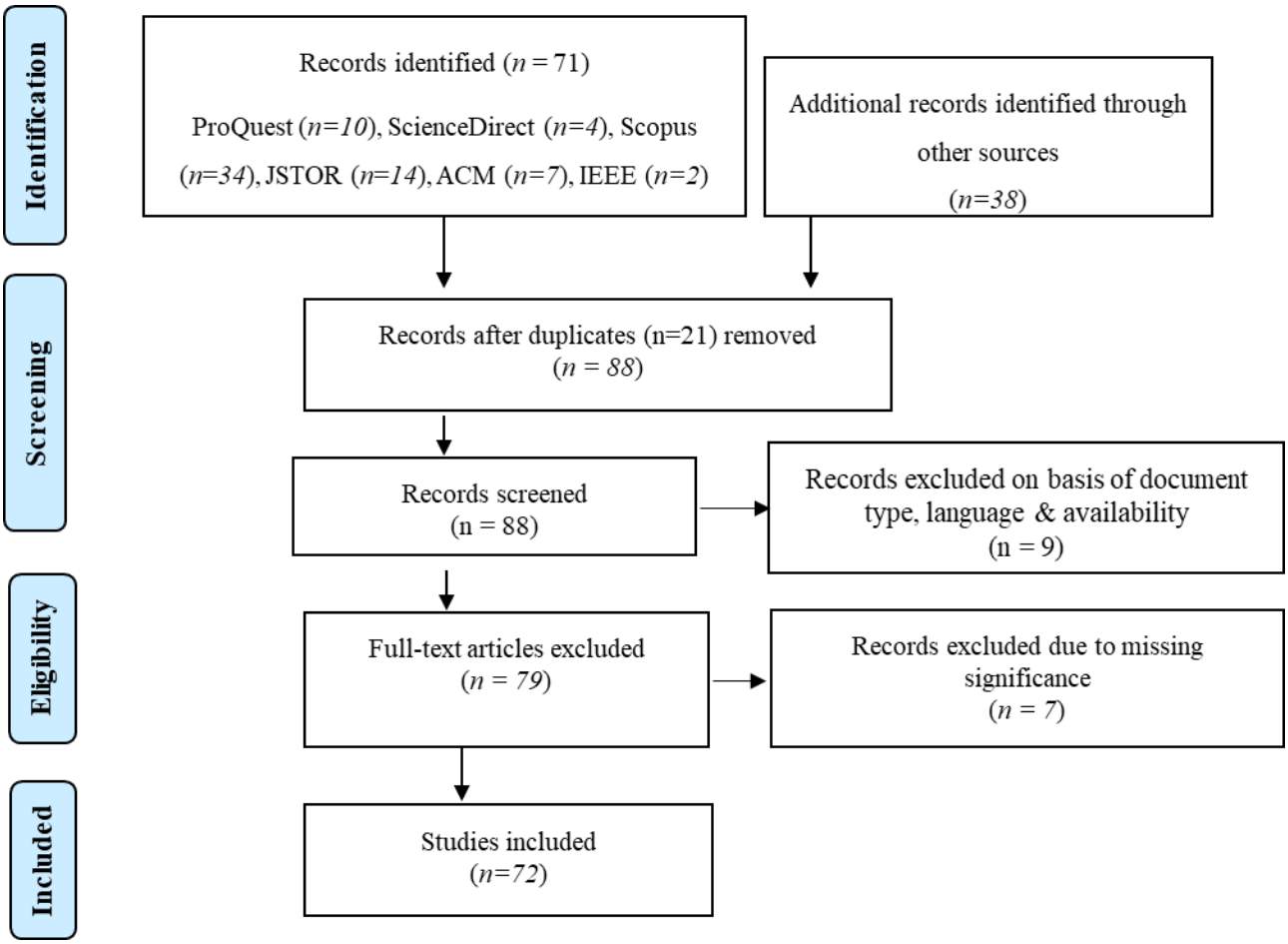

Figure 1. Selection process.

Stage 4: Charting and coding the data

After initial screening, all relevant articles were selected for full-text review. The coding criteria were initially guided by the research questions with a particular focus on factor(s), framework(s), model(s), and theory in relation to DI. File classification was employed by using both Zotero and NVivo to provide classification based on bibliographic attributes. Likewise, case classification was also used to provide categorization according to attributes, such as research type, methodology, use of theory or published framework, study sector, sampling, and context/locale.

Stage 5: Collating, summarizing, and reporting results

In this stage collating, summarizing, and reporting of the review results occurred. Although our work appeared similar to a systematic literature review it does not aim to "synthesize" evidence or aggregate findings from different studies (Arksey & O'Malley, 2005). Rather, a narrative account

of the existing literature is presented through thematic analysis with minimal attention to the comparative weight and type of evidence. The coded information permitted the development of relevant themes and categories and descriptive analysis that informed our encompassing framework.

FINDINGS AND DISCUSSION

Current landscape of research focusing on DI factors

DI has been examined in various ways in the sample of the selected studies. In this section presented, a snapshot of the review, in general, was presented, in terms of the spread and classification of articles, disciplines covered, and trends in research progression since the year 2000.

Figure 2 shows the distribution of the papers according to a relevance rating assigned by the authors. A rating of High (22%) refers for articles that have investigated DI and frameworks, theories, or models directly with clearly explicated variables of concern. Papers were rated as Mid (21%) if they are relevant to the topic in this paper but focused only on one or a few aspects related to DI. Lastly, papers were rated Low (57%) if they have not directly examined DI but have some aspects that are relevant to further our understanding.

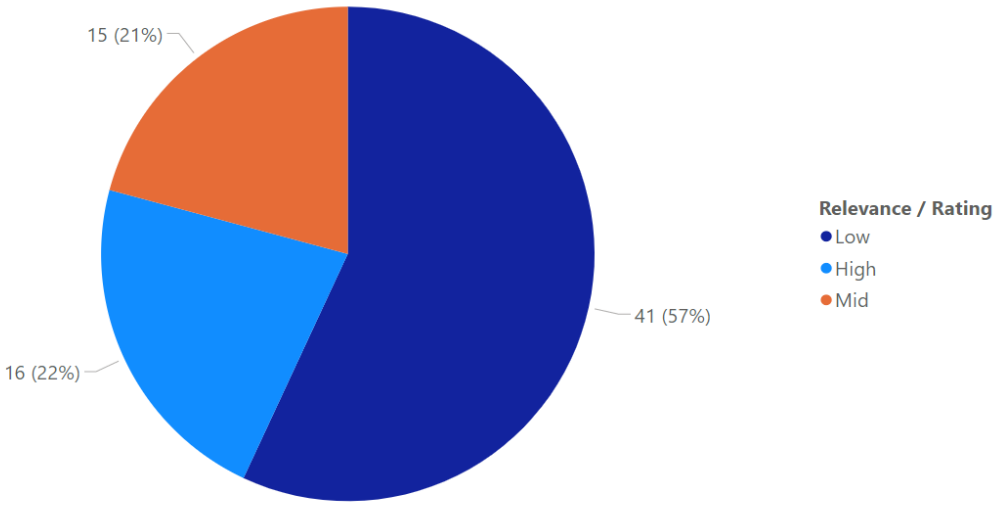

Figure 2. Relevance rating for papers reviewed.

Figure 3 depicts that 33 out of 72 papers belong to the Information Systems (IS) discipline, followed by 11 for Social Science and smaller numbers for others. This result indicates that DI is relevant across multiple disciplines.

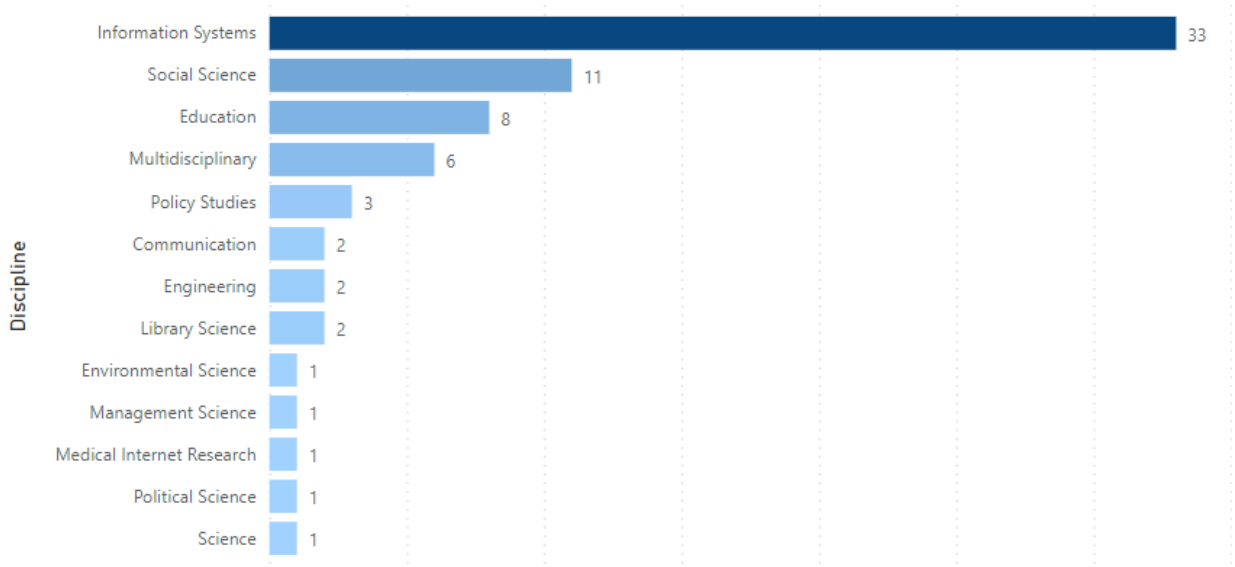

Figure 3. Articles sorted by discipline.

Figure 4 illustrates the yearly trend of the published articles with a strong emphasis on DI frameworks, theories, or models across disciplines. As observed, 2021 had the greatest number of papers published and is dominated by the IS discipline.

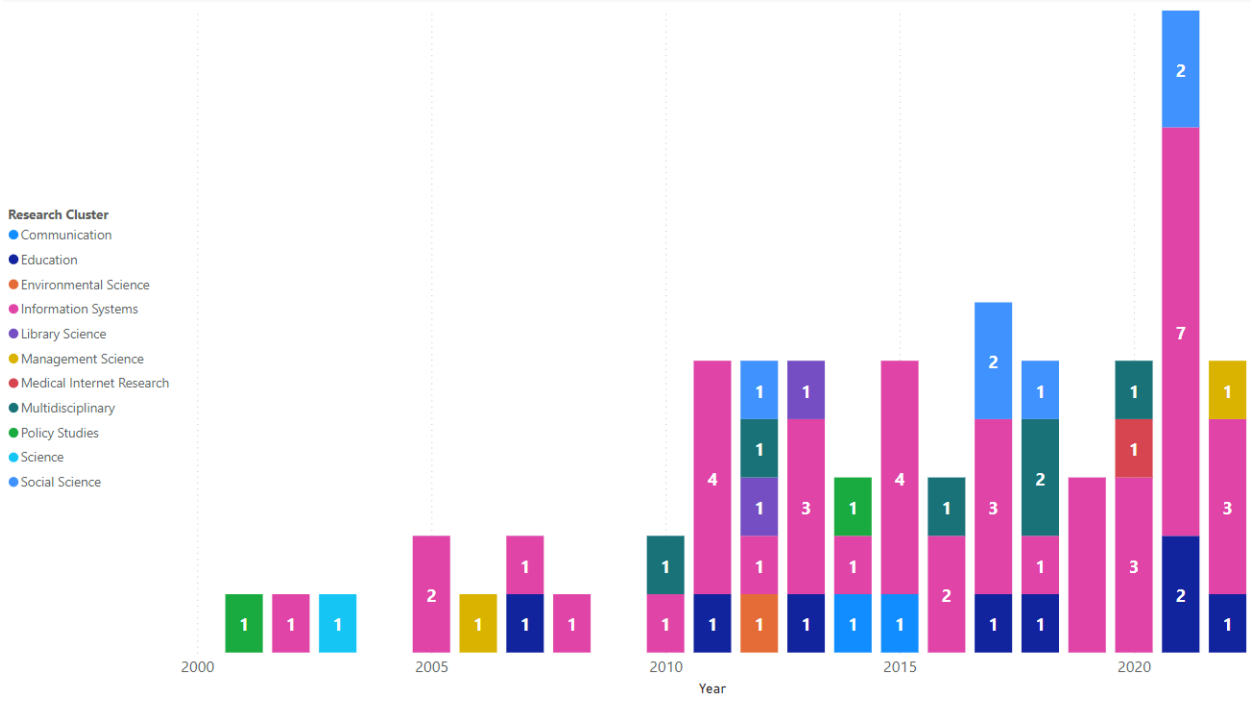

Figure 4. Yearly distribution of papers per discipline.

Table 1 shows the coverage of articles in the "AIS basket of Eight" for IS journals[3]. Of the 72 papers reviewed, 6 articles were from the basket of eight IS Journals. This entails a lack of focus and rigorous scholarly work within IS in this important area of concern.

Table 1. Relevant DI articles in the AIS IS basket of eight journals.

Basket of IS Journals	**Author, Year**	**Focus of study/ Factors discussed**
Journal of the Association for Information Systems	Riggins & Dewan (2005)	ICT Adoption Cycle (innovations-access-use); Inequality types (1st order DD, 2nd order DD)
MIS Quarterly	Hsieh et al. (2008)	Attitude (utilitarian & hedonic), Subjective Norms (family, friends, relatives, peers, government), Perceived behavioral

[3] The top eight journals in Information Systems - https://aisnet.org/page/SeniorScholarBasket

		control (self-efficacy, perceived ease of use, and availability), Exposure to Innovation
	Srivastava & Shainesh (2015)	Knowledge, Technology, Institutions, Obsessive customer empathy, Belief in the transformative power of ICT, Efficient network orchestration, Accessibility, Affordability, Service mechanisms
Information Systems Research	Hsieh et al., (2011)	Habitus (intrinsic & extrinsic), Cultural Capital (knowledge & self-efficacy), Social Capital, Economic Capital, Ownership, Training Programs, Trust in Government
	Wei et al. (2011)	Availability, Usage, Culture, Training Quality, Gender, Self-efficacy, Knowledge, Skills
Journal of Management Information Systems	Pick & Azari (2011)	Government support, Legal framework, Social openness, Business/technology investment, Socioeconomic level, Technology utilization

Focus of DI studies

This section consolidates findings from studies based on the focus of the study, where DI was utilized or used as an analytical framework.

DI in Government Services

Seven of the 72 papers fell into the category dealing with how government services are affected or influenced by DI (Dodel, 2016; Srivastava & Shainesh, 2015), correctional institutions (Reisdorf & Rikard, 2018), government support and openness (Jing et al., 2006; Pick & Azari, 2011), and citizens participation (Hui et al., 2013; Perez-Morote et al., 2020).

The study by Perez-Morote et al. (2020) compared the growth of governments' efforts to increase the citizen e-participation in public policy, as measured by the UN's e-participation index, to national background variables specified by the DI theory at the country level. The findings support the strong relationship between the e-participation index and the countries' economic development and technological infrastructure. However, it was also shown that affluent older populations, rurality, gender, political freedom, and democracy have no significant influence. Pick and Azari

(2011) revealed a crucial pathway of relationships among the variables of government support and openness, investment in business and technology, socioeconomic level, and technology use. By considering the practical implications of their findings, it was suggested that national governments should boost the use of technology by promoting open democracies, press freedom, and high-quality legal systems, as well as making ICT a priority.

A study from the perspective of United States correctional systems (Reisdorf & Rikard, 2018) found that despite the world's increasing reliance on digital technologies, most state correctional systems still exclusively focus on offline /problems. This study created a new model of digital rehabilitation fusing the existing models of rehabilitation and re-entry with freshly created DI theories. Such a model permits systematic research into the degree to which the digital world might aid in a more effective homecoming process by conceptualizing the corresponding domains and resources across three realms—prison, re-entry, and digital.

Dodel (2016) showed that socioeconomic class, characteristics of the DI (years of internet use and daily frequency of use), and ownership of electronic means of payment are important predictors of the use of e-services in the Uruguayan context. The population of Uruguayans that does not use the internet frequently is typically one that is considerably less privileged. The authors concluded that in the context of social and technological inequality, investing in e-government services is rather detrimental.

Table 2. Factors influencing DI emerging from this category of studies.

Table 2. Factors influencing DI in relation to government services.

Factors	**Sub -factors**	**Studies**
National context and regulatory environment	National context, public policies, political freedom and democracy, government support, openness, investment in business and technology, high-quality legal systems, press freedom, making ICT a priority	Dodel (2016); Reisdorf and Rikard (2018); Pick and Azari (2011); Hui et al. (2013); Srivastava and Shainesh (2015); Büchi and Vogler (2017)
Technology access and use	Technological infrastructure, ownership of electronic means, technology use	Adhikar et al. (2021); Adhikari et al. (2017); Goedhart et al. (2019); Jing et al. (2006); Loh

		and Chib (2021); Perez-Morote et al. (2020); Pick and Azari (2011); Hui et al. (2013); Srivastava and Shainesh (2015); Selvabaskar et al. (2016)
Socio-economic status and Demographics	Gender, socioeconomic level, education level, age, user's characteristics	Dodel (2016); Pick and Azari (2011)

DI in Education

The topics covered under this theme include online learning during the pandemic resulting in educational ramifications), technology-mediated teaching and learning (Adhikari et al., 2021; Gamji et al., 2021; Williams, 2012), gaps in student engagement (Adhikari et al., 2021; Rizk & Davies, 2021), and inequality in school resources (Valadez & Duran, 2007).

Valadez and Duran (2007) concurred with previous findings that students in high-resource schools are more likely to use IT for more experimental and creative purposes than their counterparts in low-resource schools. They concurred with DiMaggio and Hargittai (2001) that unequal access to IT resources indicates unequal opportunities for teachers to gain knowledge and skills that will improve their professional practice and social life.

Gamji et al. (2021) investigated the knowledge sharing of educators in Nigeria by using web 2.0 platforms. The authors revealed that educators were well aware of and utilized Web 2.0 tools for sharing information to augment their academic activities amidst challenges, such as the high cost of data, slow network interconnectivity, and unstable power supply. Drawing on the theories of interaction ritual chains (IRC) and cultural capital (CC), Rizk and Davies (2021) argued that while print literacy has historically been a contributor to educational inequalities, classrooms using digital technology are making inequalities worse despite the potential to bridge gaps in student engagement caused by traditional print media.

A unique angle in understanding DI and education was pursued by Williams (2012) through "informatics moments" in people's everyday life as they sought help in a public library to access

digital resources. According to Williams, many of these informatics moments are also correlated with social capital: individuals seek assistance from those who are nearby, approachable, and familiar and work together within their networks. Anxious society's (and individual's) adjustment to a diverse digital age may be sped up by grasping informatics moments. Such a phenomenon bridges the gap of inequality through the cultivation of social capital.

Adhikar et al. (2017, 2021) investigated the educational transformation in the context of technology-supported teaching and learning through BYOD. By using the socio-cultural ecological framework for mobile learning as the analytical lens, the study's approach expands on the three-level digital divide paradigm. The framework offered methodological guidance to explain DI, while the ability to cross-examine correlations between numerous sources of social cognitive abilities connected to a person's information literacy, motivational, and behavioral components was also demonstrated. More specifically, it shows how changes in personal and behavioral characteristics, skill development, and knowledge acquisition affect self-efficacy levels due to BYOD. Table 3 shows factors influencing DI related to education.

Table 3. Factors influencing DI related to education.

Factors	**Sub factors**	**Studies**
Technology access and use	Resource, access, slow network interconnectivity, cost, unstable power supply	Valadez and Duran (2007)
Knowledge and skill	Knowledge and practical skill, awareness. information literacy, skill development, knowledge acquisition	Adhikari et al. (2021); Gamji et al. (2021)
Social and cultural capital	Social capital, networks	Adhikar et al. (2017, 2021)
Personal behavioral characteristics	Anxiety, social cognitive abilities, motivation, behaviour, self-efficacy	Williams (2012)

DI in vulnerable and marginalized sectors

Several studies examined DI in the context of marginalized groups and communities (Graham &

Smith, 2011; Pei & Crooks, 2020), and the vulnerable (i.e. elderly, persons with disability, youth, and indigenous) (Goedhart et al., 2019; Holgersson et al., 2019; McMahon et al., 2014; Robinson, 2018).

By applying a participatory research method to regulatory hearings on telecommunications services in Canada's far north, the study of McMahon et al. (2014) revealed strategies that can facilitate healthy discourse between policy-makers and Indigenous peoples for regulatory decision-making. The authors revealed that engagement gave the Indigenous organizations experience in advocating for digital policy. Generally, Indigenous communications and technology development, as well as knowledge possessed by Indigenous peoples, are found to have an influence on regulatory action.

The study of Goedhart et al. (2019) examined DI from the perspective of mothers with a low socio-economic position. The reported findings indicated how a variety of factors including poverty, maternity, the complexity of ICT, and first-generation immigrant status, influence access. The mothers' needs are complex and go beyond the simple provision of ICT equipment. Importantly, social services should be tailored to include ICT education. Hence, the authors recommended that authorities focus on changing internet information services to benefit mothers. Similarly, the study of Holgersson et al. (2019) revealed the positive long-term effects of participating in the training and education of elderly citizens for digital inclusion.

In a study about identity work and emotion management of youth, Robinson (2018) revealed how a youth's ability to play and win a game (identity curation) is influenced by his/her access to digital resources. Even as they try to imitate the tactics and strategies of their continuously connected peers, these teenagers pay a price for their intermittent connectivity. Due to the abundance of social media and communication platforms available on highly resourced teenagers' mobile devices, under-resourced youths must live in a social world that bridges the gap between the physical and the digital and where the social life is moved fluidly between these two domains.

The plight of resource-constrained communities are highlighted when DI is examined (Pei & Crooks, 2020). The authors argued that the common notion of DI as a lens to examine the marginalized appears to be attenuated because it only considers valorized goods, skills, and uses while ignoring the start-up, maintenance, and affective costs that are accompanied by digital access. As such, they posited that a theoretical adjustment to the framework is necessary to account

for the said costs. Table 4 presents a summarized view of the factors influencing DI within marginalized communities.

Table 4. Factors influencing DI within marginalized communities.

Factors	**Sub factors**	**Studies**
Technology access and use	Access, mobile devices, social media and communication platforms, connectivity, internet information services, complexity of ICT	Graham and Smith (2011); Pei and Crooks (2020)
National context and regulatory environment	Regulatory hearings on telecommunications services, digital policy	McMahon et al. (2014)
Knowledge and skill	Ability, training, and education	Adhikar et al. (2021)
Social and cultural capital	Social life, Indigenous culture and communications, social services	Holgersson et al. (2019)
Personal behavioral characteristics	Self-identity, emotion	Robinson (2018)
Socio-economic status and Demographics	Socio-economic position, poverty, maternity, first-generation immigrant status	Goedhart et al. (2019)

DI in households

This theme includes studies that examine DI from a household level including ICT and electronics penetration (Guha & Mukerji, 2021; Kissling et al., 2012), and household expenditures on ICT (Smith & Graham, 2012).

The study of Smith and Graham (2012) displayed that household values influence ICT expenditure. Conversely, the traditional DI perspective about disadvantaged status and race did not significantly influence expenditures on online activities in their study. The practice framework used in this work strongly emphasizes value, utility, and benefit as the main drivers of ICT

adoption. For example, younger households and men use more internet than older people and women, respectively, and mobile use amongst minorities is more prevalent than among whites.

According to Guha and Mukerji (2021) DI is a reflection of socio-economic disparity. In this work, it was revealed that differential access by households is shaped by both demand (economic circumstances, social category, job profile, age, and educational status) and supply (availability of electricity, the mobile network, and the degree of urbanization) side factors.

The study of Kissling et al. (2012) described a typology of re-use operating models for electrical and electronic equipment. From the 4 models assessed, it was shown that the "Close the Digital Divide" model pursued a non-profit purpose and provided marginalized people access to affordable household appliances, the Internet, and ICT products, as well as the creation of career and educational opportunities. Table 5 consolidates the factors examined that relate to households.

Table 5. Factors related to households.

Factors	**Sub factors**	**Studies es**
Socio-economic status and Demographics	Higher incomes, levels of education, race, age, job profile, degree of urbanization	Guha and Mukerji (2021)
Technology access and use	Availability (electricity/mobile), affordability	Kissling et al. (2012)
Purpose	Value, utility, and benefit, career and educational opportunities	Smith and Graham (2012)

DI in e-Commerce

The work of Buhtz et al. (2014) presented a conceptualization to better understand DI in the context of e-commerce. The authors examined how people from various socioeconomic backgrounds differ in their online buying habits by using clickstream data. Their findings revealed that despite equal access, the socioeconomically privileged/underprivileged use e-commerce in quite different ways. Their findings further suggest that while e-commerce has the potential to help narrow socioeconomic gaps, this potential has not yet been utilized.

Table 6 presents factors related to e-commerce and DI.

Table 6. Factors relating to e-commerce.

Factors	**Sub factors**	**Studies es**
Socio-economic status and Demographics	Socioeconomic backgrounds	Buhtz et al. (2014)

DI and gender

This theme covered DI studies in relation to gender in teaching and learning (Fuller et al., 2015; Yu, 2018), gender perspective on jobs (Gomez-Herrera & Köszegi, 2022), gender divide (Huang et al., 2013; Stoilescu & McDougall, 2011), computer anxiety among women, women's development (Mancilla & Ramos, 2021).

Situated within the gender divide framework, the study conducted by Huang et al (2013) examined the impact of computer anxiety in influencing female college students' impressions of Web 2.0 learning apps. Drawing on UTAUT, it was found that women were less confident utilizing Web 2.0 applications than men. However, no such difference was detected while using social networking or video-sharing platforms. This result indicates that certain features of Web 2.0 applications may help to lessen gender differences in college students' intentions to utilize specific information technology for educational purposes.

A similar study on the digital gender divide investigated the digital inclusion experience in women's daily lives, how they acquired ICT skills, used ICT in their daily lives, and whether this procedure led to greater development chances for them (Mancilla & Ramos, 2021). It was revealed that when vulnerable women use ICT, they frequently prioritize taking care of family requirements over their own needs, such as helping kids with their homework or keeping an eye on their teenagers' online activity. Hence, policies to be crafted in relation to improving digital inclusion to increase women's development opportunities were recommended. Another work investigated the challenges of undergraduate computer science programs from the lens of the digital gender divide. Drawing on Kelly's (2008) three layers of the digital divide (resources, teaching, and knowledge relevant to a particular culture), Stoilescu and McDougall (2011) looked at gender-

specific barriers which revealed that the third layer of inequality is extremely prevalent and has an unsettling effect, whereas the first layer is difficult to identify, and the second layer is simple to detect. Table 7 summarizes the factors considered by studies in this theme.

Table 7. Factors related to gender influencing DI.

Factors	**Sub factors**	**Studies**
Technology access and use	Resources	Micheli et al. (2018)
Knowledge and skill	Development opportunities, ICT skills	Fuller et al. (2015); Gomez-Herrera and Koszegi (2022)
Social and cultural capital	Knowledge relevant to culture	Yu (2018)
Personal behavioral characteristics	Computer anxiety	Huang et al. (2013)
Socio-economic status and Demographics	Socio-economic position, poverty, maternity, first-generation immigrant status, daily lives, family requirements, gender divide	Goedhart et al. (2019) Martinez-Mancilla and Gonzalez-Ramos (2021) Stoilescu and McDougall (2011)

DI and social media

Some contemporary issues on DI are arising from social media. Studies on this theme examine social media for political participation (Büchi & Vogler, 2017; Malinen et al., 2020; Perez-Morote et al., 2020; Zhou, 2017), and alternative income generation (Wyche et al., 2013).

A work by Malinen et al. (2020) examined how DI determined social media users' aspirations to influence others. The authors suggested that online political discourse exhibits DI. This discourse is dominated by younger adults and highly educated people, who are typically more skillful, with the aim of influencing others' perceptions. This suggests that the digital public sphere continues to

be significantly shaped by DI. The analysis demonstrated that demographic factors have contributed to the development of digital skills, which has resulted in diverse outcomes, in terms of people's ability to influence. Malinen et al. (2020) claimed that in addition to the first-level divisions, the motivation of social media use is a significant component in the establishment of second- and third-level divides, while also the significance of structural variables and diverse skills was underlined. Following access, a user's motivation establishes the objectives for using social media and the desired consequences. Therefore, motivation is an important element not just when deciding whether to start using social media, but also when considering how to utilize it. However, they contend that motivation is more than just a matter of personal taste because structural forces influence these goals at all levels of DI.

An interesting take on DI from the experience of Chinese activism exposed the phenomenon of censorship (Zhou, 2017). The study discovered that users' perceived importance of the media in activism, media censorship, and coping mechanisms are significant factors in preventing individuals from effectively using ICT for activism, in addition to strategic skills and goals. On top of that, it was demonstrated that when adapting the framework to a particular society, researchers should localize the framework by considering unique political, social, cultural, and psychological elements. The two elements, perceived importance and censorship coping literacy, in the Chinese scenario amplify the existing skill and motivational disparities that could induce new divides to be added on top of the existing divides. DI can therefore be widened by specific social and political circumstances in each environment, rather than being restricted to ICT infrastructure and individual literacy.

Table 8 shows factors that influence DI from the studies that focused on social media.

Table 8. Factors related to social media influencing DI.

Factors	**Sub factors**	**Studies**
National context and regulatory environment	Structural forces, censorship, unique political circumstances	Büchi & Vogler (2017); Perez-Morote et al. (2020); Zhou (2017)

Knowledge and skill	Highly educated, coping literacy, skills	Gamji et al. (2021)
Social and cultural capital	Unique social and cultural elements, social circumstances in each environment	Malinen et al. (2020);
Personal behavioral characteristics	Unique psychological elements, motivational disparities	Gadjanova et al. (2022)
Socio-economic status and Demographics	Demographic factors	Selvabaskar et al. (2016)
Purpose	Desired consequences, perceived importance, goals	Wyche et al. (2013)

Factors influencing DI

In this section, the factors emerging from various studies were aggregated along with the previously established five dimensions of DI proposed by DiMaggio and Hargittai (2001): equipment, autonomy of use, skill, social support, and purpose. by). Since its conception, DI has evolved into a more complicated phenomenon over time. Table 9 provides a summary of all the factors found in this review. The most closely matching category from DiMaggio and Hargittai (2001), if any, is shown in brackets in the left-hand column.

Table 9. Summary of factors influencing DI.

Factor	Description	Studies
National context and regulatory environment (new)	This factor includes contextual and regulatory sub factors that influence DI, such as public policies, political freedom and democracy, government support and openness, investment in business and technology, high-quality legal	Guha and Mukerji (2021); Holgersson et al. (2019); Hsieh et al. (2005); Hsieh et al. (2008); Warschauer (2003)

	systems, press freedom, making ICT a priority, structural forces, censorship and unique political circumstances	
Technology Access (equipment)	This is the most important tangible factor which includes technological infrastructure, hardware and software equipment, access and availability of digital resources, autonomy, ownership of electronic means, resources, mobile devices, social media and communication platforms, connectivity, internet information services and the complexity of ICT	Buhtz et al. (2014); DiMaggio and Hargittai (2001); Dodel (2016); Fuller et al. (2015); Gamji et al. (2021); Gao and Zhang (2015); Guha and Mukerji (2021); Gui and Buchi (2021); Holgersson et al. (2019); Hsieh et al. (2008); Kissling et al. (2012); Loh and Chib (2021); Srivastava and Shainesh (2015); Hui et al. (2013)
Social and cultural capital (Social support)	Social and cultural capital builds a reliable ladder to ascend the digital pyramid. The factor includes networks, social life, Indigenous culture and communications, social support services, knowledge relevant to a particular culture	DiMaggio and Hargittai (2001); Fuller et al. (2015); Graham and Smith (2011); Gui and Buchi (2021); Holgersson et al. (2019); Kvasny (2002)
Socio-economic status & demographics (new)	A person's socioeconomic position might include aspects of their quality of life as well as the possibilities and privileges that are available to them in society. It includes incomes, socioeconomic backgrounds, lifestyle, family requirements, maternity, first-generation immigrant status, levels of education, daily lives, family requirements, power, professional standing, and self-perceived social status and class. This factor	Buhtz et al. (2014); Dodel (2016); Gamji et al. (2021); Guha and Mukerji (2021); Gui and Buchi (2021); Hale (2013); Hilbert (2010); Hsieh et al. (2011); Malinen et al. (2020); Mancilla and Ramos (2021)

	also covers other characteristics of human beings. Demographic factors including age, gender, level of education	
Knowledge (Education, awareness & Skill) (skill)	Knowledge factor covers sub factors associated with education, awareness, digital skill, ability, digital and information literacy, exposure to technologies and innovation, practical skill, knowledge acquisition, training and education, development opportunities	DiMaggio and Hargittai (2001); Dodel (2016); Fuller et al. (2015); Gao and Zhang (2015); Graham and Smith (2011); Holgersson et al. (2019); Hsieh et al. (2005); Huang et al. (2013); Malinen et al. (2020); Hui et al. (2013); Zhou (2017)
Personal behavioural characteristics (new)	This factor covers personal behavioral characteristics such as beliefs, attitudes, mindset, motivation, thoughts, or feelings that an individual possesses that can influence behaviour towards technology. It also covers computer anxiety, cognitive abilities, self-efficacy, emotion and unique psychological elements possessed by an individual	Fuller et al. (2015); Gao and Zhang (2015); Graham and Smith (2011); Hale (2013); Hsieh et al. (2008); Huang et al. (2013); Micheli et al. (2018); Srivastava and Shainesh (2015); Hui et al. (2013); Zhou (2017)

Purpose (purpose)	Value, utility, and benefit, desired consequences, perceived importance, goals, belief in transformative power of ICT	DiMaggio and Hargittai (2001); Srivastava and Shainesh (2015); Smith and Graham (2011)

The dimensions and factors appeared to be expanding due to the increasing complexity surrounding the DI phenomena and due to the changing and overwhelming reign of the digital world, particularly in the current era of the fourth industrial revolution (van Dijk, 2020), where power, position, social status, and social media play a role in DI.

Moving from the scattered and narrowly focused discourse of DI, it can be argued that the integration of various underlying factors is critical to provide a holistic understanding and evaluation of DI. The proposed framework presented in Figure 5 includes the seven overarching factors that emerged from our analysis. Each of these factors also covers several sub-factors that should be examined to capture DI influences in their entirety. The discussion on the evaluation of instruments for each factor is beyond the scope of this work and could be developed later based on established studies on related concepts and further empirical studies.

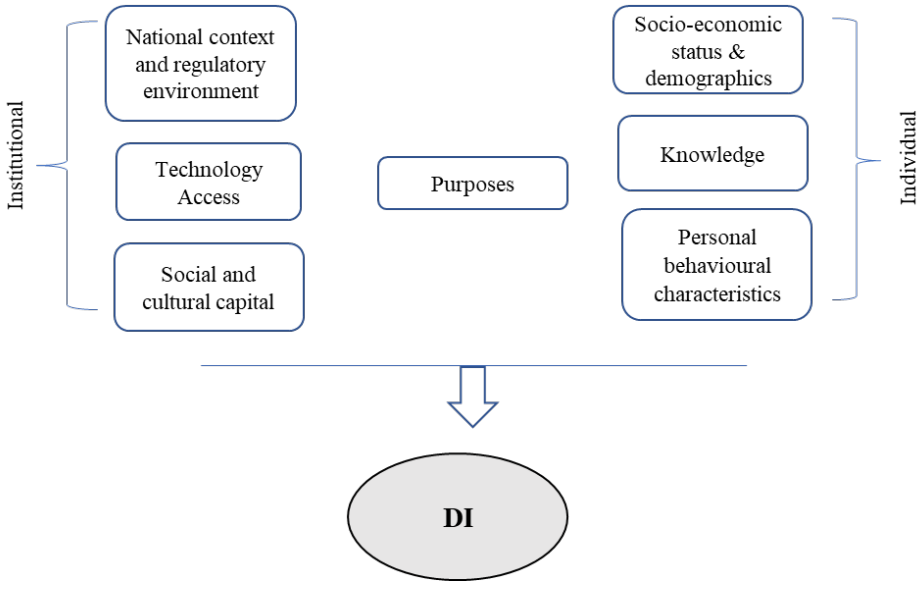

Figure 5. Factors influencing DI.

This initial framework could be the basis or starting point for further conceptualization and conversation amongst IS researchers and other disciplinary researchers.

CONCLUSION

The current landscape of DI research encompasses varying perspectives and domains. Previously espoused conceptions of the notion of DI are still in play. However, there has been some notable progression, particularly in looking at DI outside the traditional lens of the disparity between the "haves and have-nots" to ICT access and infrastructure. The current research has looked at the wide spectrum of DI among those who are currently online and disconnected. Notably, a number of these investigations appear to provide potential solutions for reducing gaps and finding interventions to address inequality. While the majority of the reported works in the literature has focused on analysis at the individual level, the institutional influences that play a role in linking various characteristics and outcomes have been also analyzed. The proposed new conceptual framework depicts a more comprehensive and holistic approach than prior studies. The framework indicates that DI should be viewed as a multi-faceted phenomenon encompassing multiple factors. Future research could build on this initial framework and include outcomes and consequences in the same model, leading to operationalization in practice to bridge the DI gap.

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