Addressing Digital Divide through Digital Literacy Training Programs: A Systematic Literature Review

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Abstract

Digital literacy training programs (DLTPs) are influential in developing digital skills to help build a more inclusive and participatory ecosystem. This study reviews 86 studies related to DLTPs for marginalised populations in developed and developing countries. It aims to understand (a) the profile of DLTPs, (b) the digital competences incorporated in the training curriculum and (c) tangible outcomes of Internet use post-training. The review indicated that developed countries focus more on developing digital literacy in elderly populations. In contrast, the focus still lies on developing digital literacy among people with low skills and education levels in developing countries. The training curricula focus mainly on developing information-seeking and communication competencies, besides the basic operations of digital devices. Most of the studies reported an increase in the personal-level outcomes around health, leisure and self-actualisation achieved post-training. This study can help policymakers, practitioners, and educational researchers improve the scope and quality of educational programs and contribute to people's digital empowerment and well-being.

Keywords

Digital Literacy; Training Program; Marginalised; Digital Divide; Internet Outcomes; Literature Review

I. Introduction

With the rising importance of information and communication technologies (ICTs), digital skills training plays an essential role in accomplishing the SDG target 4.4 by developing the relevant digital skills amongst people to gain appropriate employment, job or business (UNESCO, 2014). According to a European Commission (2016) report, digital skills are needed in all types of jobs, including those that are not immediately related to digitisation, such as farming, construction, and vocational skills. Digital literacy pertains to an individual's ability to locate, analyse, and draft clear information when writing and expressing it over various digital platforms (Bawden David, 2008; Boechler et al., 2015; Buckingham, 2010, 2015; Feerrar, 2019). It has become mandatory for lifelong learning and democratic digital citizenship (El Mawas & Muntean, 2018; Lasić Lazić et al., 2020). It relates to individuals' socialisation and digital inclusion in the society (Gómez, 2020).

However, in spite of the widespread adoption of digital technologies, digital inequalities persist in terms of ICT access, usage and skills, and outcomes, threatening the sustainable development of civil society (Khan et al., 2020; van Deursen & van Dijk, 2014; Van Dijk, 2012). Of the estimated 3.7 billion unconnected people, most are women, girls and people living in remote and rural areas with low education and incomes (Agovino, 2019). Intriguingly, the issue is not only about providing access to ICTs; instead, it is how digital technologies are used and empower an individual's life. The type of tangible outcomes that Internet use may yield is a research area still developing (Helsper et al., 2015). It is wavering to assume that digitally literate users will achieve tangible outcomes of Internet use; therefore, the nature of relations between skills, online participation, and offline tangible outcomes should be studied as factors that may differ among different socio-demographics across domains and fields of activity. This gap ultimately results in decreased living standards and social welfare (Avgerou & Madon, 2005).

Digital literacy training programs (DLTPs hereafter) prove helpful in mitigating the digital skills gap to help create an inclusive and participatory ecosystem (Matli & Ngoepe, 2020; Patankar et al., 2017). They are critical in keeping people's knowledge, competencies, and abilities up to date (Aleandri & Refrigeri, 2013). In 2006, the European Union recognised digital competence as one of the most important competences for Lifelong Learning in education, training and employment (Chiarle, 2017). The DIGCOMP Project by European Commission (Ala-Mutka, 2011; Redecker, 2017), the Krumsvik model (Norway), the TPACK model by the USA (Mishra & Koehler, 2006), the JISC model by the UK, the ISTE Standards by the USA, and the P21 model by the USA are among the primary models of digital literacy development (for more details, see (Pérez-Escoda et al., 2019). Therefore, digital literacy is now at the core of most skill development training programs – vocational and work-based training (UNESCO, 2017). Even the curriculum policies are placing greater emphasis on the competencies that learners are expected to develop throughout the learning process across specific subjects or disciplines and that they will need to succeed in academics, as well as for personal growth, work opportunities, and participation in a knowledge-based society (Dooley et al., 2016). However, limited studies on specific digital literacy education and training issues exist. The present study examines the offerings available to marginalised populations against frameworks such as DigiComp and their relationship to standards, expectations and cross-sector collaboration.

a. Prior Literature Review

Using the explanatory approach of literature review and case studies, de Pontes & Talamo (2009) proposed significant training in information skills and highlighted the need to develop more DLTPs that channel digital learning and inspire people to acquire information skills. Verhoeven et al. (2020) conducted a meta-review to examine the distinctive outcomes of a wide range of computer training programs supporting children's literacy at school level. Findings concluded that, on average, computers positively affect children's learning, and the results could be better if interventions became part of an integrated learning method in the classroom. Furthermore,

highlighting the problem of non-adoption of ICTs, especially among the elderly, Nguyen et al. (2014) discussed the challenges older people face during ICT training in developing countries. They highlighted that more focus should be on improving communication skills and recommended organising a more home-based intervention for ICT training. A few more reviews of the elderly population are available, but they are limited to e-health literacy (Allen et al., 2011; Arsenijevic et al., 2020; Hong et al., 2017). Furthermore, Fourie and Krauss (2011) drew attention to the importance of ICT for development (ICT4D) literature and critical social theory to research digital literacy training for teachers in the rural and developing contexts. Several such reviews exist related to the teacher's training for professional development (for instance, Abdul Razzak (2013); Ernest et al. (2013); Glenn and Carrier (1986); Jenkins (2010); Lewin et al. (2009); Okiror et al. (2017)).

The above-discussed studies conclude that an individual should be digitally literate to become a competent student, an efficient employee, or an active citizen. Consequently, the actual implications of DLTPs in bringing digital empowerment to marginalised people are increasingly important to digital divide research.

b. Research goals

The extant literature on digital skills appears to be divided between conceptual critiques and reports mostly on projects and programs that have attempted to nurture these abilities and attributes. The critiques focus on the prevalent ambiguity and inconsistency in the use of terms and concepts, dearth of methodology or conceptual clarity in the development of skills and attitudes; the indifference to the context in which skills are developed; and the paucity of research showing generalisable results across depending on the context (Lankshear & Knobel, 2008). Several studies based on case studies or empirical approaches concentrated on specific populations and contexts already exist. However, none has undertaken the systematic literature review (SLR) approach to comprehend and synthesise the literature on DLTPs aimed at the digital empowerment of marginalised people. The present study attempts to fill this gap and provides a comprehensive overview of the literature on DLTPs designed and implemented to develop DL amongst marginalised populations. More specifically, we focus on the various digital competences given attention in a training curriculum and accordingly encapsulate the tangible outcomes that result from internet use by the learners post-training and how these outcomes relate to specific sociodemographic groups. To this end, UNESCO's Digital Literacy Global Framework DLGF (Law et al., 2018)will be used to undertake a thorough mapping of the digital competence incorporated under DLTPs' course curricula and Helsper's framework (Helsper et al., 2015) to evaluate the coherence between types of tangible outcomes achieved by the learners post-training.

This will be useful for developing a broader understanding of how effective are DLTPs in digitally empowering the marginalised populations. We argue that future researchers must address these issues more comprehensively if the pedagogical possibilities of the current focus on digital skills and attributes are to be realised. This review is justified considering the need for universal digital empowerment, as digital empowerment is conceded as a fundamental right in a digital society.

Table 1 lists the guiding research questions and the motivations behind each one:

Research questions	Motivation
RQ1: What is the profile of DLTPs targeted to empower the marginalised populations?	Discover the types of the target population, geographical coverage, context and implementing bodies involved in mitigating the digital inequality.
RQ2: Which key digital competences are primarily focused on the curriculum of DLTPs?	We intend to map digital competences to identify the skills which are not paid adequate attention to but serve to be a core skill to become an active citizen of the networked society.
RQ3: What type of tangible outcomes of Internet use do the learners post-training report?	It is essential to cover a broader spectrum of outcomes to understand how trained and marginalised populations benefit in different ways from going online.

Table 1 Research questions
Source: Compiled by authors

c. Contribution of the study

Following are the significant contributions of the study:

- Existing research has provided information on various facets of the digital divide phenomena. It expanded beyond disparities in access, skills and attitudes to disparities in outcomes of Internet use. By giving an overview of the DLTPs, this study contributes to the digital inclusion literature by providing their population profiles, geographic coverage and the implementing agencies involved in the process. It can help scholars close the gap (related to policies, training initiatives and tailored design) to bridge the digital gap in new ways.
- Using the UNESCO's Digital Literacy Global Framework DLGF), this study undertakes a thorough mapping of the digital competence areas targeted under the DLTPs' curriculum. This will aid in our comprehension of the similarities and differences between the adopted training curricula and the integration of 21st-century competencies with specific context to marginalised populations. Using Helsper's framework (Helsper et al., 2015), this study explores how previous studies reported the type of tangible outcomes of Internet use achieved by the trainees post-training. This will enable us to evaluate the coherence between types of tangible outcomes achieved by the learners post-training.

II. Methodology

This systematic review used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) procedure (Moher et al., 2015) since it enables synthesising scientific literature accurately and reliably. This framework was chosen in order to make the research transparent and repeatable.

a. Search strategy

The keyword search was performed on five databases- Web of Science, Scopus, Taylor & Francis, Education Research and Information Centre (ERIC) and Science Direct - peer-reviewed and widely recognised social sciences databases (Aghaei Chadegani et al., 2013; Gavel & Iselid, 2008). Nonetheless, it is difficult to ensure that all available studies are considered (Marcos-Pablos & García-Peñalvo, 2018); this potential validity risk was mitigated by not using a single search technique. The keywords were divided into two groups. The first group of keywords included terms related to DLTPs, such as "digital literacy program", "digital literacy project", "ict training", "basic

computer training", "computer literacy program", "computer skills training". The second group of keywords included the various aspects related to the program, such as "effective", "success", "outcomes", "implement", "monitor", "sustenance". All these keywords were included to yield best possible results from the DLTP literature. Authors used Boolean operators to combine each search term from the first group with each search term from the second group to create search queries. Only studies with the above-mentioned search terms in the title, abstract, and keywords were included in the analysis. The authors did not place any limitations on the length of time.

b. Inclusion and exclusion criteria

Several criteria were used to find the most relevant studies. Table 2 and Table 3 mention a separate list for exclusion criteria to avoid mixing irrelevant information.

Data type	Inclusion criteria	Reason
Quality	Peer-reviewed	To assure that our results come from high-quality journals
Population	Populations excluded from mainstream due to gender issues, age, language, geography, education, physical ability or immigration status.	Very few studies relate to the populations excluded from the mainstream. The criterion attempts to fill this gap.
Study type	Both (primary and secondary)	In order to answer RQ1, only primary response-based studies were considered. However, to answer RQ2 and RQ3, both studies were considered relevant to gather adequate information.
Setting	Both (rural and urban)	To understand the worldviews, challenges and strategies followed in both the settings as per their development level. This will allow for an accurate interpretation of the research.
Focus	DLTPs	To synthesise the literature and explore factors determining the effectiveness of DLTPs

Table 2 Inclusion criteria for the study
Source: Compiled by authors

Data type	Exclusion criteria	Reason
Area	Studies focused predominantly on the computer science aspects (e.g., programming or technology).	Since the study focuses on basic digital literacy, computer science's programming or technological aspects may deviate from the scope of the study.
Study focus	Studies focused on the design and commercialisation of new technology.	To avoid shifting the primary focus of this study from DLTPs and their effectiveness in the case of marginalised populations.
Setting	Studies focused on DLTPs conducted in formal institutionalised settings	Several review studies target populations such as students from primary and secondary education, teacher's training programs, nursing staff and doctors. This criterion attempts to fill this gap.

Training domain	Studies focusing on the digital training from the perspective of health conditions associated with older age, e.g., aphasia	This study focuses on basic digital literacy rather than a specific domain like health-oriented digital literacy.
Study type	Newsletters, news releases, excerpts, reports, memoranda, editorials and viewpoints.	To avoid biases of the individual opinions.
Language	Studies not written in English	Lack of understanding of different languages encouraged authors to exclude them.
Duplicate	Duplicated Studies	To avoid replication of work.

Table 3 Exclusion criteria for the study
Source: Compiled by authors

c. Study selection

The authors screened all studies based on their titles and were ruled out if they did not deal with the DLTPs or if the training was organised within formal settings such as schools or colleges. After the initial screening was done, abstracts were filtered to exclude studies that were irrelevant or unable to provide an answer to the RQs. Finally, full-text reviews were conducted to verify that all study on DLTPs and their effective implementation were included.

d. Selection results

Figure 1 depicts the PRISMA flow diagram, which summarises the search results and selection procedure for all studies under consideration. The initial keyword search identified 7199 studies on different databases. After removing 5156 duplicate studies, 1628 studies were left for review. After checking the studies against the inclusion/exclusion criteria, 56 studies were left to read. Following the suggestions of Bezerra et al. (2014), forward and backwards snowballing identified an additional 30 studies, respectively, bringing the total number of studies included in this SLR to 86.

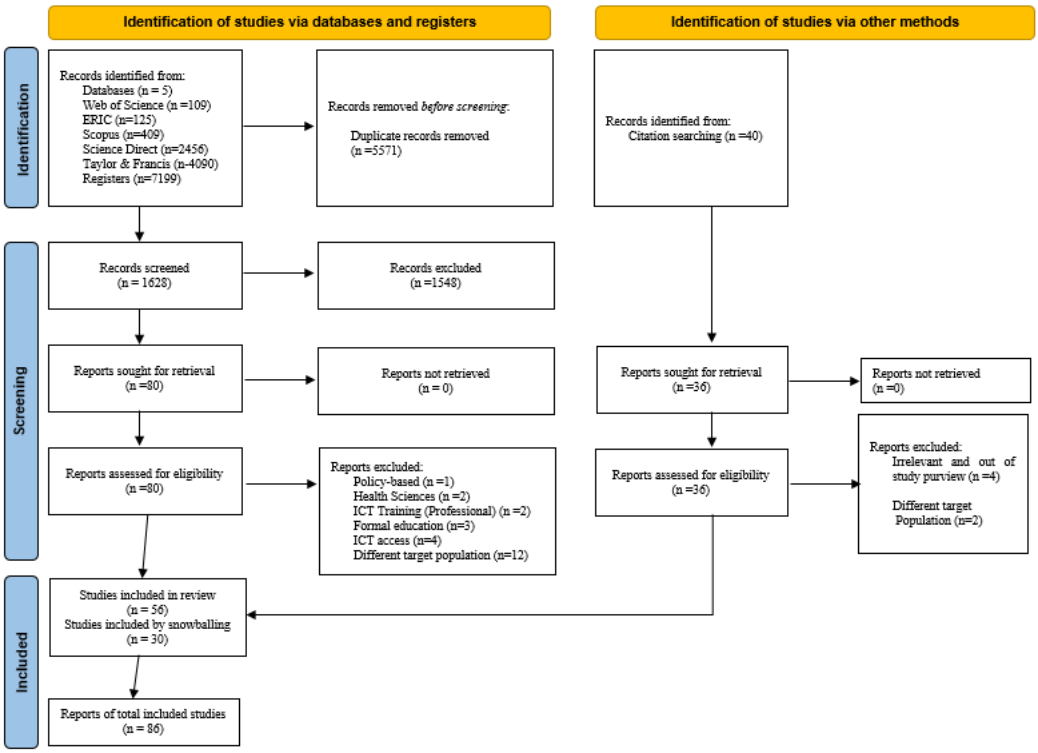


Figure 1PRISMA framework (Adapted from Page et al. (2021))

e. Quality Assessment criteria

Quality assessment enables the selection of noteworthy studies that are appropriate for answering the research objectives. Quality assessment criteria with a "quality score" of "3" are present in Table 4. Studies that met this quality score were included in the review.

Criteria	Score
1. Are the research question/objective/ hypothesis mentioned?	If eligible, then Score=1; Otherwise=0
2. Does the study design mentioned?	If eligible, then Score=1; Otherwise=0
3. Does the study meet the inclusion and exclusion criteria set for the study?	If eligible, then Score=1; Otherwise=0

Table 4 Quality assessment criteria
Source: Compiled by authors

f. Data extraction process

he authors created a detailed data extraction form (DEF) in the spreadsheet format to reduce any bias in the data extraction process. DEF is primarily used to retrieve and store data for each selected study. When used correctly, it allows for a detailed, thorough, clear, and consistent approach to the data extraction process in an SLR study. DEF (see Table 5) was carefully reviewed, improved, and decided upon by the authors before beginning the data extraction process. Additionally, we conducted a bibliometric analysis of studies subjected to the final data extraction process.

RQ	Type of data	Data item	Data description
RQ1	Quantitative	-Program Country type - Target Population -Geographic coverage of Programs -Implementing bodies	The profile of DLTPs includes the country where the program was launched, the population targeted for training, the geographic coverage of the program, and the type of body that implemented the program.
RQ2	Qualitative and qualitative	Course syllabus	The different ICT-related concepts and learning activities included in the course.
RQ3	Qualitative and quantitative	Training outcomes	What was the impact of the training on the trainees' life

Table 5 Description of the data extraction form
Source: Compiled by authors

III. Results

a. Study characteristics

The selected studies determine how existing research on DLTPs for marginalised populations was structured. The number of publications in this context has grown in the past few years from only one study in 1986 to 14 Studies in 2019. Among the 86 included studies in the sample, 86.05% (74 studies) comprised articles, 12.79% (11 studies) comprised conference papers and 1.16% (1 study) comprised book chapters. Concerning the study type, 83.72% (72 studies) constitute primary-data sources, while 16.28% (14 studies) constitute secondary-data resources. Regarding top publication outlets, the study sample indicates that the leading journal in terms of publication count is Educational gerontology (7 studies). Publishing houses such as Taylor & Francis have published the majority of the studies (35 studies, 40.7%), Science Direct (11 studies, 12.79%), and Springer (8 studies, 9.3%). In the included studies, the highly cited Studies are: "Who over 65 is online? Elderly's dispositions toward information communication technology" with 309 citations written by Kerryellen Vroman (University of New Hampshire, United States). It is followed by the "Digital inclusion projects in developing countries: Processes of institutionalisation" with 222 citations written by Shirin Madon (London School of Economics, UK) and "Older adults, computer training, and the systems approach: A formula for success" with 220 citations written by Christopher B. Mayhorn (North Caroline State University, United States).

b. Answering the research questions

The data collected in our data extraction forms was used to answer the study questions. The number of qualifying studies that responded to each RQ is shown in Table 6.

RQs	No. of studies (out of 86 studies)	%
RQ1	72	83.72
RQ2	33	38.37
RQ3	46	53.49

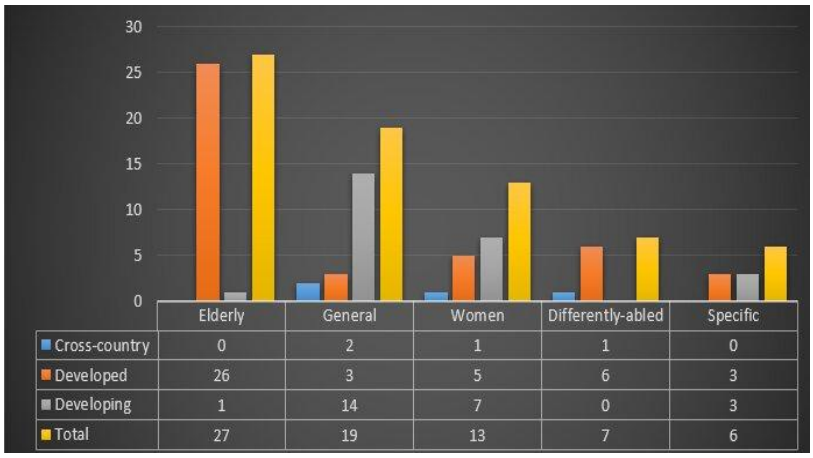
Table 6 Number of relevant studies for RQs
Source: Compiled by authors

RQ1. What is the profile of DLTPs targeted to empower marginalised populations?

RQ1 focuses on understanding the profile of DLTPs for marginalised populations from various aspects such as program country, target population, scope, setting, and implementing bodies. Only primary studies (n=72, 83.72%) were eligible to answer this question. Each study was read thoroughly, and the related details were extracted and summarised.

c. Program Country type and Target Population

Figure 2 illustrates the cataloguing of studies based on a program country type and target population as mentioned in the studies. The results indicate that out of 72 included studies, 59.72% of studies (43 studies) were conducted over programs running in developed countries compared to 34.72% of studies (25 studies) conducted in developing countries. 5.55% of studies (4 studies) were cross-cultural in design. It was observed that studies conducted in developed countries (43 studies) give considerable attention to elderly populations (25 studies, 60.47%). Differently-abled (6 studies, 13.95%), women (5 studies, 11.63%), general (3 studies, 6.98%) and specific (3 studies, 6.98%) populations then follow it. On the contrary, studies conducted in developing countries (25 studies, inclusive of underdeveloped countries) give considerable attention to general populations (14 studies, 56%), followed by women (7 studies, 28%) and some specific population groups (3 studies, 12%) such as migrants, refugees and returning citizens. Only one study (4%) focused on the elderly population, while none was found on the differently-abled. Furthermore, cross-cultural studies have overall covered all populations, including general (2 studies, 50%), women (1 study, 25%) and differently-abled (1 study, 25%).



	Elderly	General	Women	Differently-abled	Specific
Cross-country	0	2	1	1	0
Developed	26	3	5	6	3
Developing	1	14	7	0	3
Total	27	19	13	7	6

Figure 2 Study classification based on target populations and country type

d. Geographic coverage of DLTPs

Figure 3 represents that DLTPs work primarily on local or state, national, and international levels. The classification revealed that out of 86 selected studies, 70.83% (51 studies) were related to DLTPs working at the local or state level, and approx. 27.78% of studies (20 studies) were related to DLTPs working at the national level, and only 1.39% of studies (1 study) were based on DLTPs working at the international level. Notably, most DLTPs run in rural settings, which indicates the presence of a rural-urban digital divide.

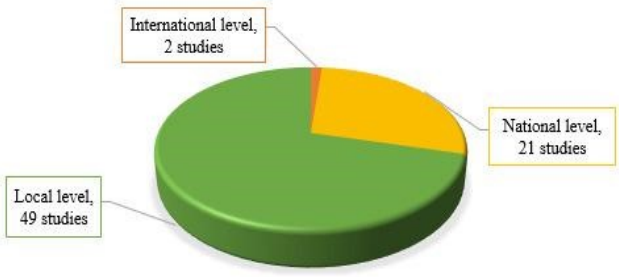


Figure 3 Geographic coverage of DLTPs

e. Implementing bodies

Figure 4 represents the various types of bodies that work to develop digital literacy skills amongst the marginalised populations. The classification of implementing bodies was based on the operationalisation used. Studies that mentioned that the DLTP was implemented or funded by a government or a public university were characterised as a 'public' body. In contrast, studies that mentioned the DLTP was implemented or funded by a private university or any other professional organisation were characterised as a 'private' body. Local bodies or civic organisations' programs are listed under 'civil society organisation'. Out of 72 included studies, 72.22% (52 studies) indicate that the public sector actively promotes digital literacy amongst marginalised populations. Moreover, 19.44% of studies (19 studies) reflect that several civil society organisations are coming forward to help marginalised populations learn and connect to the digital world. In addition, 8.33% of studies (6 studies) also mention where big corporations like Microsoft contribute as part of their corporate social responsibility. However, their share seems to be less.

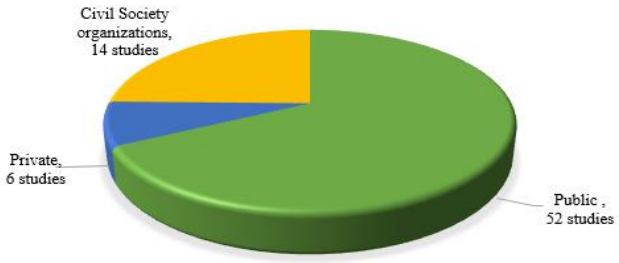


Figure 4 Implementing bodies

RQ2. Which key digital competences are primarily focused on the curriculum of DLTPs?

Out of the 86 studies selected for review purposes, 38.37% (33 studies) were eligible to answer RQ2. Those studies that mentioned the course curriculum for the DLTPs were selected for review. A thorough screening of the course content was done. Mapping the different types of activities mentioned in the course curriculum and related skills and competences were done using UNESCO's DLGF (Law et al., 2018).

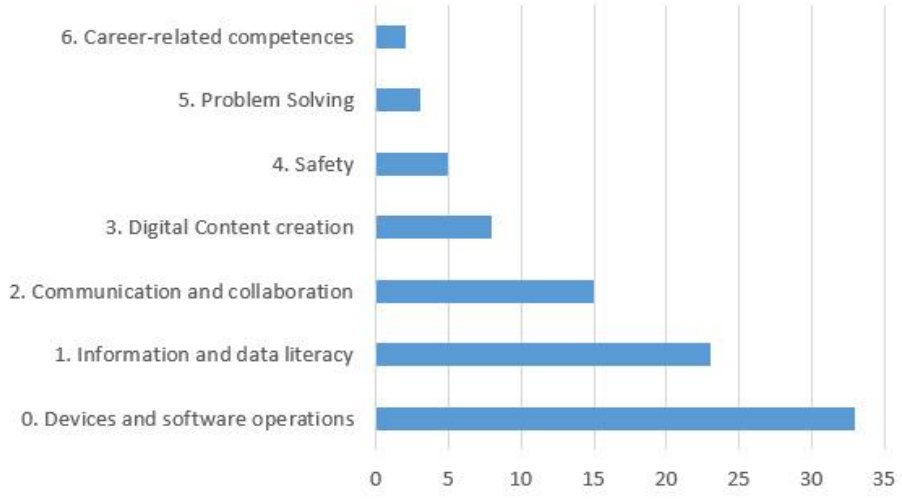


Figure 5 Digital competence areas focused on DLTPs

All studies focused on the basic operations, identification and use of required devices and technologies (see Figure 5). The most frequently reported competences and skills were information and data literacy (23 studies, 69.7%) and communication and collaboration (15 studies, 45.45%). In contrast, a little less attention is paid to competences like digital content creation (8 studies, 24.24%), safety (5 studies, 15.15%), problem-solving (3 studies, 9.09%) and career-related competencies (2 studies, 6.06%). It was not easy to map activities like accessing educational resources, health services, online financial services, e-governance services, games or other leisure activities on computers. However, since it involves interacting with digital technologies, such activities were mapped upon DLGF Indicator 2.3 Engaging in citizenship through digital technologies.

RQ3. What are the tangible outcomes of Internet use reported in the extant literature?

53.49% of studies (46 studies) were eligible to answer this question. The studies were read in full and tangible outcomes of Internet use were extracted. The conceptualisation for tangible outcomes of Internet use provided by Helsper et al. (2015) is used to map the tangible outcomes

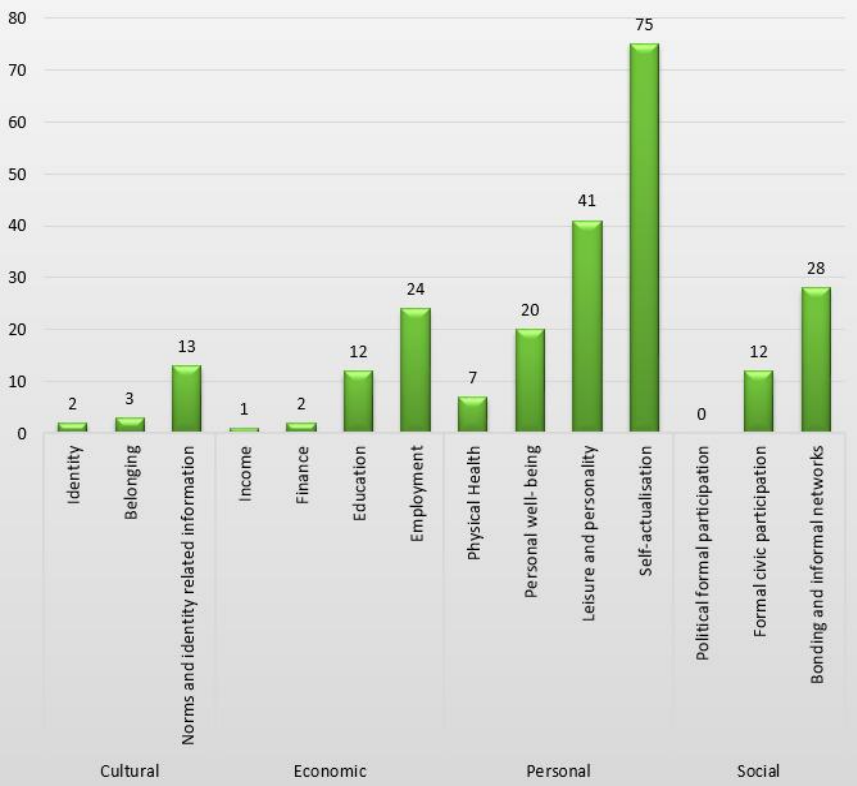


Figure 6 Outcomes in the fields of resources and their sub-fields of resources

Figure 6 illustrates the tangible outcomes achieved post-training based on Internet usage. Personal (35 studies, 76.05%) and social (19 studies, 41.3%) outcomes form a big part of the Internet outcomes studies, followed by economic (19 studies, 41.3%) and cultural outcomes (11 studies, 23.91%). Social outcomes of Internet use result in enhanced bonding and interactions with family and friends and building new relationships online that continue offline. Employment and education are the most typical economic outcomes. These results are consistent with the previous study findings (for e.g., (Helsper et al., 2015; Scheerder et al., 2019; van Deursen, Helsper, et al., 2014; van Deursen, van Dijk, et al., 2014). Personal outcomes related to leisure and personality, health, well-being, and self-actualisation because of online participation are remarkable. Cultural resource-related outcomes are observed in very few studies. In the study conducted on 300 older people, Czaja et al. (2018) reported low level of loneliness, increased perceived social support and well-being, indicating a decline in social isolation. There was also an increase in computer self-efficacy, proficiency, and comfort with computers. Similar findings are reported by (Arthanat et al., 2019; Czaja et al., 2018; Ferreira et al., 2015; Francis et al., 2019; Irizarry et al., 2002). Studies conducted on differently-abled by (Li-Tsang et al., 2007) and (Patty et al., 2018) revealed that the training programme positively affected differently abled with improved digital skills and well-being. However, the effect can also be amplified with support from caregivers and field professionals. In his study (Lee, 2004), women reported productively expanding their business, besides realising enhanced self-efficacy and self-esteem. Similar findings were reported by other studies (e.g. Khan & Ghadially, 2009; Miwa et al., 2017; Mukherjee et al., 2019; Zyskowski, 2020). Our findings are strikingly similar to those of a prior review research by Scheerder et al. (2017).

IV. Discussions and implications

a. Interpretation of findings for each RQ

RQ1. What is the profile of DLTPs targeted to empower the marginalised populations?

The literature shows that most DLTPs are predominantly local in their scope and are limited in their reachability to a small number of community people. Half of the world's population is still offline (ITU, 2019); therefore, there are numerous opportunities to improve the effectiveness of DLTPs. The review indicates that developed countries focus more on developing digital literacy in elderly populations. In contrast, the focus still lies on developing digital literacy in general populations with low skills and literacy levels in developing countries.

While continued efforts have been taken up to bring socially excluded differently-abled people into the mainstream, studies reflect that these populations are well-researched primarily in developed countries, suggesting the need for developing countries to come forward and create people-specific DLTPs for different sets of people, including differently-abled, illiterate, and so on. Furthermore, understanding the need for digital literacy training for mobile marginalised groups such as labourers, migrants, prisoners, and refugees becomes pertinent, especially after the COVID-19 pandemic; otherwise, there is a strong risk of deepening inequality and excluding individuals who are not digitally connected (United Nations, 2021). This demands further research on marginalised to understand their digital literacy needs and the various concerns and challenges related to their digital empowerment.

Educational institutions, public and private organisations, and non-governmental organisations (NGOs) are working to close the digital skills gap by encouraging the exchange, replication, and upscaling best practices in digital careers, certification, and raising awareness (European Commission, 2019). However, their effectiveness is contingent on carefully prepared techniques that take into account the context and demands of the participants. (Maceviciute & Wilson, 2018).

RQ2. Which key digital competences are primarily focused in the curriculum of DLTPs?

In terms of digital competences, the programs revealed many commonalities. It became apparent from Figure 5 that there was a significant emphasis on developing the information and data literacy competences throughout the curriculum, besides basic operations of digital tools and technologies. As highlighted in several digital literacy frameworks (Carretero et al., 2017b; Christine Redecker, 2019; Ferrari, 2013; Law et al., 2018; Pérez-Escoda & Fernández-Villavicencio, 2016; Vuorikari et al., 2016, 2022), these abilities are essential for articulating the users' information needs, locating and retrieving digital data, information, and content, determining the reliability of the source and content, and the ability to store, manage and organise the data or content. According to Pade-Khene (2018), digital literacy encompasses the operational ability to use ICTs and embedded civic literacy and responsiveness literacy. Nonetheless, the focus on learning information-seeking skills can prove extremely useful for forcibly displaced people and migrants. They can access topics that can help them accommodate their new host country. However, such information can be most effective when the delivered content is contextual, localised, and presented in the languages the refugees and migrants are most familiar with (UNESCO, 2018).

Very few training courses focused on how to 'evaluate' the information meaningfully. This heightens the prospect of spreading misinformation and high cyber-security risks (Seo et al., 2021). Moreover, there is a lack of focus on 'netiquettes' which are the standards for Internet users for appropriate online behaviour and building progressive human relationships. This may negatively impact digital citizenship (Loader, 2007; Scheuermann & Taylor, 1997).

Previous research observed that insufficient attention is given to creating and editing digital content to express through digital mediums, integrating and re-elaborating digital content,

copyright and licences, and programming (Bawden & Robinson, 2009; Eshet-Alkali & Amichai-Hamburger, 2004; van Deursen & van Dijk, 2010). Such competences are ignored while training marginalised populations, considering their education, employment and livelihood needs. Moreover, 'safety skills' mainly were disregarded. The focus on specific skills varies from program to program, country to country, and context to context. However, throughout the programs, there was a focus on developing digital skills to enable user participation online.Prioritising high-level skills may not be possible at this nascent stage, but digital competences such as 'safety skills' and 'problem-solving skills' must be included in the DLTPs. According to the World Bank's report (2018), "it is not enough to train learners to use computers: to navigate a rapidly changing world, they have to interact effectively, think creatively, and solve problems." Nevertheless, defining the purpose and function of 21st-century competences within the curriculum is perhaps one of the most contentious challenges surrounding their implementation. Some of the difficult questions raised when contemplating the integration of digital competences in training curricula include what training should highlight as its fundamental outcome measures (Dede 2010b) and how to explicitly and consciously address the discussion and debate of digital competences in the development of curriculum design (Chalkiadaki, 2018). As suggested by Voogt and Roblin (2012), digital competences can either: (a) be added to the existing curriculum as different subjects or additional content within traditional subjects or (b) be incorporated as cross-curricular competences that both form the basis of academic subjects, or (c) be part of a new curriculum in which the traditional framework of academic subjects is modified, and schools are recognised as learning communities (Gordon et al. 2009). Most frameworks propose incorporating digital skills throughout the curriculum because of the complexity and cross-disciplinary nature of digital skills. Thus, a generic curriculum meeting the skills needs of populations is obsolete, and that different curricula on digital literacy must be developed to meet different skill demands of the digital society (L. Noll & Wilkins, 2002).

In practise, digital competences range from the fundamental to the advanced. Several digital literacy frameworks are available that stakeholders, including policymakers and educators, can benefit from and be motivated by selecting what best suits their needs. For instance, the digital skills toolkit developed by ITU (2018) is a valuable reference to equip policymakers and other stakeholders with practical guidance for developing DLTPs tailored to individual country needs and their respective populations.

RQ3. What are the tangible outcomes of Internet use reported in the extant literature?

Figure 6 represents how internet usage plays a diversified role in many marginalised people's economic, social, educational, and cultural lives. The binary split between those who have access and those who do not is the first level of the digital divide (Newhagen & Bucy, 2003) and presents a restricted picture of digital inequality (Ragnedda & Muschert, 2015). The second-level digital divide refers to the various support, motivation, capacities, and skills required to safely and confidently traverse the Internet (Brandtzæg, 2010; Chen & Wellman, 2004; Dimaggio et al., 2004; Selwyn, 2004; van Dijk, 2005; Zillien & Hargittai, 2009). These disparities differ in frequency, types of activities, duration of use, and content (Hargittai & Hinnant, 2008). In recent years, scholars have been paying attention to the third level of the digital divide (Ragnedda, 2017; van Deursen & Helsper, 2015), highlighting discrepancies in the benefits derived from different degrees of Internet access and usage.

Researchers have found that where material access is unevenly distributed, the first- and second-level digital divide significantly impacts offline outcomes (Tewathia et al., 2020). The structural inequality observed in society results in a gap in outcomes achieved from Internet use. People with higher sociodemographic and economic backgrounds achieve more Internet outcomes related to education and employment based on their usage patterns. In contrast, people with low sociodemographic and economic backgrounds achieve more Internet outcomes such as

strengthened social bonds, informal networking and personal well-being (van Deursen et al., 2014). Even physical health significantly impacts the extent of tangible outcomes achieved out of Internet use (Cho & Kim, 2021). Moreover, digital natives (young adults) learn and acquire digital skills at a faster pace as compared to digital immigrants (elderly) (Prensky, 2001) and thus follows the variation in outcomes.Such discrepancies in Internet outcomes are expected to have far-reaching implications in reinforcing existing social inequities. Furthermore, research on Internet outcomes exposes the actual costs of being online, which may motivate policymakers to develop regulations that promote more equitable Internet use.

In sum, internet access or digital literacy skills can aggrandise an individual's access to digital capital (van Dijk, 2005), eliminating the risk of offline inequalities amongst marginalised populations. In addition, by offering programmes and initiatives to promote Internet usage, increase digital skills, and boost web accessibility and incentives, the government can close the third-level digital divide, i.e., the opportunity divide (Yates et al., 2010). In this line, (Helsper et al., 2015) recommend that more qualitative research should be used to investigate the cognitive, emotive, and intangible aspects of how digital interaction translates into real-world benefits.

b. Research synthesis

Results suggest that DLTP research on marginalised populations requires careful synthesis. The review results are synthesised as an overview in Figure 7. The way DLTPs are structured and operated significantly impacts their ability to bring about social change and lessen inequality across multiple domains of participation among socioeconomic and demographic groups. The findings of this study indicate a few ways to improve such program initiatives. When developing a training program, a careful examination of digital literacies is necessary to understand at the national level how to mobilise and build on what populations must acquire and learn from their broader socio-cultural participation and affinities (Knobel & Lankshear, 2006). Policies must define standards and expectations in national curriculum guidelines by adopting a solid vision and fostering cross-sector collaboration. A developmental curriculum contributes to fully developing the learner's potential, emphasises what 'doable' is, and is necessary to expand on previous work. However, when deciding on a course curriculum for marginalised people, it is essential to evaluate both their general (DigComp skills for everyday use) and specific (DigComp competences for work and job-seeking) Internet needs and then tailor the learning and training program accordingly (Guitert et al., 2020). Therefore, low-level digital competences should be introduced in the curriculum for novice or beginners. These may include operational skills, information and data literacy, communication and collaboration, and safety skills. On the other hand, high-level competence such as problem-solving must be introduced into the curriculum for the intermediate and advanced level learners. These may include competences such as digital content creation, problem-solving and career-related competences. Follow-up training programs can prove advantageous in applying, improving, developing, and reinforcing what has been learned. Moreover, synchronising assessment methods and desired outcomes is of paramount importance in evaluating the effectiveness of DLTPs. After completing the training and education program, the Internet user or trainee should achieve tangible outcomes of online access and activities, which is the intended expectation of any DLTP. Drawing on the literature findings from many countries and local situations, we assume that such implications pertain to varied DLTP initiatives, even if the local, regional and national contexts differ.

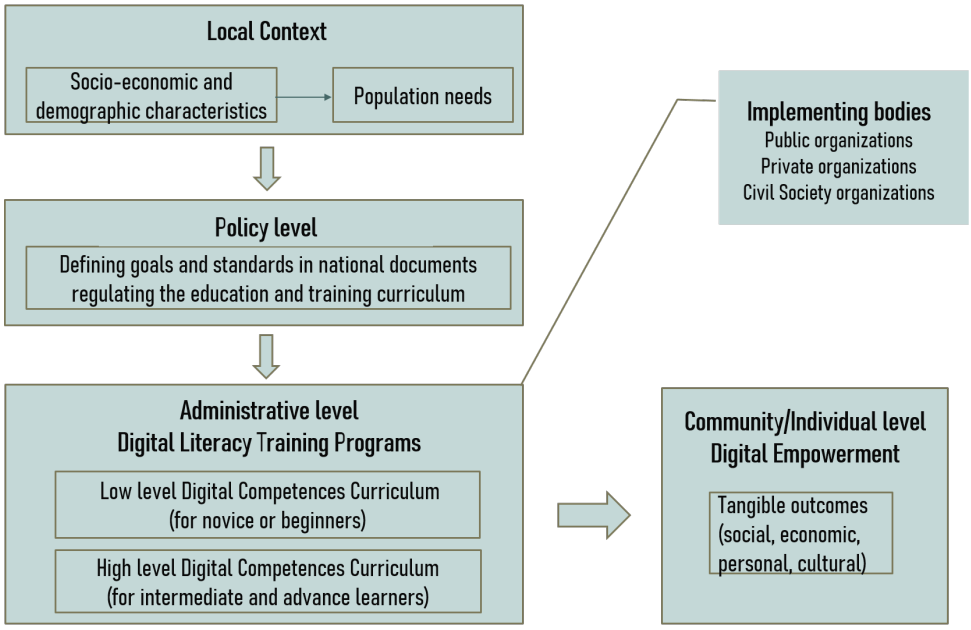


Figure 7 A synthesis of review results of DLTP literature

V. Research gaps and future directions

Digital literacy is an evolving need that has recently caught several researchers' attention. It has emerged as the most productive and contributing area in digital behavioural research. Prior research has well documented the concept of digital literacy, its levels and determinants, and how training and education interventions can improve digital knowledge. This review contributes to the field of digital literacy research by identifying trends and themes. The literature keeps the training and education needs of the marginalised populations in the background context, hence laying forward the scholarly work since its inception. However, we highlight some gaps in the digital literacy studies and make recommendations for further research. Adopting Paul and Criado (2020), we offer a section outlining future research possibilities in this topic, focusing on the three dimensions of theory, techniques, and settings.

a. Theory

Digital literacy is directly linked with the development of human and social capital. Theories such as the UTAUT (Venkatesh et al., 2003), TPB (Ajzen, 2012), and TAM (Davis, 1989) have been widely used to explore the determinants of an individual's technology adoption behaviour. The researchers have used the Social Cognitive and Social Capital theories to describe digital education interventions (Kuo et al., 2013; Petty & Loboda, 2010; Warburton et al., 2013). However, the theoretical foundations explaining anomalies in individual digital behaviour have received less attention. Trust, perceived risk, privacy, attitudes, self-efficacy, gender bias, and other sociodemographics can all influence the relationship between digital knowledge and digital behaviour. A set of behaviour theories that can best explain specific digital behaviours should be given special attention. Adopting such perspectives can prove helpful in exploring how ICTs can promote social exclusion. This insight could point to how digital literacy training could be designed to help people develop habits for good digital behaviour. Furthermore, training programs developed without referring to training theories are less than optimal (Rogers et al., 2001). Future research can examine DLTPs using solid theoretical underpinnings to derive meaningful

interpretations regarding the program's effectiveness. As a result, the following research question is proposed:

RQ: Which theories can best explain the relationship between digital literacy and digital behaviour?

b. Methods

Due to the heterogeneous nature of digital literacy levels, multiple approaches are required to track the linked parameters (Hargittai, 2009). For education and training, there is a need to have a reference framework of what it means to be digital literate in an increasingly globalised and digital world (Carretero et al., 2017). International organisations such as European Commission and UNESCO have formulated several such frameworks (e.g., Carretero et al., 2017a, 2017b; Law et al., 2018; Martin, 2006). DLGF may not serve as a one-size-fits-all digital competence framework and address the intricacies, inadequacies, and research gaps in alignment with the 2030 Agenda for Sustainable Development (Shulla et al., 2020). Thus, the need is to develop and validate digital literacy assessment tools while keeping in mind the different "contexts" and "target populations" (Lyons et al., 2019).

Besides, studies indicate the need to identify the key performance indicators (KPIs) for developing an effective evaluative mechanism for assessing the sustainability and scalability of DLTPs. The KPIs focus on aspects of institutional, individual, or program performance that are crucial to the success of programs (Radovanović et al., 2020). To suggest that more cross-cultural research studies can advance our knowledge beyond our immediate environment, embracing a universal perspective on digital behaviour.

According to van Deursen and Helsper (2015), further investigation into comprehending and developing measures for tangible outcomes of Internet use in marginalised populations will prove fruitful. To this end, longitudinal studies can provide insights to observe tangible outcomes at individual and group levels.

Moreover, there is insufficient evidence in the literature to infer that DLTPs are always beneficial in reaching ideal digital behaviour (Detlor & Julien, 2020). It is not easy to assess the effectiveness of DLTPs and develop a low-cost program without a benefit-to-cost analysis. As a result, more explanations of the cost-benefit component of DLTPs are required.

Based on the above arguments, the following research questions are proposed:

- How can digital literacy be assessed across the globe?
- In a universal framework, how can digital literacy be defined or understood?
- How to measure tangible outcomes of Internet use?
- How can the success of DLTPs be measured?
- How beneficial is digital literacy training in comparison to the costs of participation?

c. Context

Literature has explained digital literacy in knowledge, skills, behaviour, perception, motivation, self-efficacy, and other factors. Researchers define the phrase differently, leaving them without a standard foundation. Empirical investigations and educational programs will be of limited value until the academic community agrees on a definition of digital literacy. Socio-cultural, psychological, and personal contexts necessitate deep investigation. Scholars may broaden the research scope by presenting both constructs in a specific context.

Digital literacy research has a stronghold in Western countries. Although the literature suggests that digital illiteracy exists even in developed countries, including the Netherlands (van Deursen,

2020), the situation is even worse in developing countries. Because of the differences in context, the impact of digital literacy initiatives may vary between countries. The contextual diversity could be attributed to differences in knowledge, skills, perception, motivation, behaviour, self-efficacy, and other factors. Scholars may broaden the research scope by presenting constructs in a specific context.

DLTPs have been implemented in multiple settings worldwide, including schools, colleges, workplaces, and diverse subgroups of the population. Digital literacy requirements and concerns differ depending on demographic factors (Tirado-Morueta et al., 2018). Only a few researchers have attempted to assess the effectiveness of DLTPs, considering the learners' characteristics and the specific digital behaviour they intend to develop (e.g., information-seeking, online transaction, content writing). Therefore, research on non-western countries and cross-country analysis should be expanded to include diverse perspectives and assess the effectiveness of DLTPs (Nawaz & Kundi, 2010). However, empirical investigations and training programs will be of limited value until the academic community agrees on a definition of digital literacy. Researchers define the phrase 'digital literacy' differently, leaving them without a standard foundation. Future research in a single country, cross-country, and multi-national contexts will be critical in establishing programs that meet country-specific needs. Moreover, there is a lack of studies examining the significance of DLTPs from the gender perspective. Studies focusing on the intersectional analysis of gender problems can bring more insights (Sáinz et al., 2008). As a result, the following research questions are proposed:

- How does digital literacy relate to sociodemographic characteristics across different population cohorts?
- How well do people in developing nations understand digital literacy?
- What is the level of digital literacy among different groups of people, and which ones are more vulnerable?
- What are the most successful digital education programmes for people of different ages?

VI. Conclusion and study limitation

This systematic review aimed to examine prior literature on the tailoring capabilities and mechanisms of DLTPs designed for marginalised populations. 7199 studies were retrieved from five distinct research databases during the research process. After applying inclusion and exclusion criteria and a quality assessment to keep only relevant works for the research topic, the number of studies was reduced to 86. Bridging the digital divide is essential for the long-term viability of digitalised society. DLTPs are crucial instruments for addressing the digital divide and inclusion issues. This study explored the profile of DLTPs, and digital competences incorporated in the DLTP curriculum and accordingly encapsulated the tangible outcomes of internet use achieved post-training. This review will help researchers and policymakers determine the best mechanism for developing and assessing DLTPs. Governments, educational institutions, and corporations must unite and make significant investments to address the digital skills crisis, defined as a gap between required and available digital skills. Furthermore, the findings can improve DLTPs that are not delivering concrete results and develop approaches to make teaching and learning processes effective and outcome-based.

Some limitations should be considered when evaluating the review findings. First, the study results are based on the applied research method, which includes the selection of keywords and databases. The application of the search terms to study titles, abstracts, and keywords limits the scope of the search results. Second, the focus on peer-reviewed journal or conference proceedings publications is also a restriction. Other publications such as books and grey literature that

contribute to research could be considered in field-specific reviews. Finally, this study only examined English-language studies, skipping other significant languages such as China, German, French, Spanish and others. This language choice could lead to cultural and other biases.

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