



# Digitalization in Vulnerable Populations: A Systematic Review in Latin America

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## Abstract

The present systematic review seeks to collect and analyze relevant academic approaches to the effects of digitalization on the populations that live in vulnerable contexts in Latin America with the purpose of examining to which extent the ongoing universalization of information and communication technologies has the potential to improve the lives of the most disadvantaged in this region. For this aim, both theoretical as well as empirical studies on these populations were considered, as long as they were from Latin America with the aim of listening to the voice of those involved, thus avoiding assigning understandings of the phenomenon and solutions that are alien to the characteristics of the region. Five databases (SCOPUS, Web of Science, ERIC, Communication & Mass Media Complete and Dialnet) were consulted for the period 2001–2021. The analysis of the studies that met the inclusion criteria led to identifying seven themes that point to specific needs that must be met to advance development for the populations under study and that are useful for generating hypotheses for future effective interventions. Among them, some stand out: the specific demands of indigenous communities in the political agendas, the increasingly noticed opportunity for political empowerment through e-government, the development of a sense of belonging through technology, the potential of a digitally-mediated construction of personal identity, and the lack of enough consideration of cultural and situational factors that led to limited results in the implementation of digital public policies.

**Keywords** Digitalization · Vulnerable population · Latin America · Digital divide · Digital education · Systematic review

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## 1 Introduction

The number of studies on the relationship between digitalization and development has exponentially increased in the last two decades due to the very nature of the ever-expanding digitalization process (Barberá-Gregori & Suárez-Guerrero, 2021; Cobo, 2019; Orr et al., 2019; Prats, 2013; Ramírez-Montoya & Lugo-Ocando, 2020; Schrape, 2019; Tadeu, 2020). This increase has accelerated in recent years as technologies penetrate all population strata, and their use not only spreads almost universally but also acquires an unprecedented intensity (Smahel, 2020). The digital mediation of everyday activities calls for an effort to more deeply understand the phenomenon of digitalization and to measure its impact on the different dimensions—educational-moral, political-economic, and social—of human life.

This study focuses on the poorest sector of the population, on the excluded, on the most vulnerable and disadvantaged people because, for these groups, it is especially urgent to assess the extent to which digitalization can improve their lives and to identify the political-structural and individual-personal conditions that make it possible and their particular dynamics. In addition, this study focuses on the region of Latin America, where the existing literature on this subject is notoriously scarce (Mariscal & Renteria, 2013; Paredes-Labra, 2019), in contrast to the abundant population living in vulnerable conditions there.

Outside the Latin American context, the few systematic reviews (SR) on this issue published in the literature have focused on eHealth literacy in underserved adult populations (immigrant women, the elderly, low-income, unemployed, and underemployed people, and Afro-American and Hispanic populations) in the rural areas of the United States (Chesser et al., 2016), on how health applications are perceived and used in contexts with limited resources (Botswana, Kenya, Thailand, Nigeria, India, Ghana, Tanzania and Peru) (McHenry et al., 2019), or on the marginal participation of older women in jobs in the Information and Communications Technology (ICT) sector (Maresova et al., 2020). This list also includes the study by Camilli-Trujillo & Römer-Pieretti (2017), who, despite addressing critical, media and digital literacy for the empowerment of vulnerable groups, does not focus specifically on Latin America.

Considering the above and the fact that digitalization inequities distance vulnerable groups from their rights, this study aims at analyzing how digitalization affects the most vulnerable sector of the Latin American population. For this purpose, a systematic literature review of research conducted in Latin American countries was performed in order to listen directly to the voices of the affected people, avoiding imposing understandings of the phenomenon and proposals for solutions that either derive from foreign contexts or are unfamiliar with the peculiarities of this region (Gascó-Hernández et al., 2006), since the deep inequalities of Latin American economies and societies cannot be overcome through a mechanistic process of ICT application. The contribution of this piece lies in this particular focus, which cannot be found in previous research, and is guided by the following research questions: what are the main themes that can be identified in research on digitalization that focuses on the populations living in poverty in Latin America between 2001 and 2021? What are the political implications of these studies or, in other words, the recommended ways of approaching the digitalization of these populations to better adjust public policies and political mechanisms so that ICTs and the digitalization process can be harnessed to benefit the most disadvantaged and support human development?

According to Álvarez et al. (2021), the Digital Ecosystem Development Index (2018), which consists of eight pillars (digital services infrastructure, digital services connectivity, digitalization of households, digitalization of the production, competitive intensity within

the digital ecosystem, development of digital industries, production factors in the digital ecosystem, and regulatory framework and public policies), shows that Latin America and the Caribbean rank intermediately in digital development, with an index of 49.92 on a scale of 100, slightly above Asia–Pacific (49.16) but considerably far from and, therefore, lagging behind Europe and North America. This situation has worsened with COVID-19, which, according to the World Bank, has hit the Latin America and Caribbean (LAC) region harder than any other region in the world and has brought the need for a resilient and inclusive recovery into sharp focus (Drees-Gross & Zhang, 2021).

In this context, this study is an initial exploration of the state of the art within a larger project aimed at studying digitalization in vulnerable populations in three contexts—urban, rural and border locations—of Latin America, and how it affects three dimensions of personal, professional and public life: education, business and law. With this horizon, the main aim of this study is to conduct a SR of articles published between 2001 and 2021 on the digitalization of Latin American populations in vulnerable contexts to examine their findings and to reveal similarities and discrepancies. The specific aims of this study are to (1) identify scientific documents on the digitalization of Latin American populations in disadvantaged contexts; (2) describe the main contextual characteristics of these documents; and (3) critically analyze their findings, limitations and research lines proposed in them.

## 2 Method

A SR is a documentary research method that consists of reviewing the scientific literature on a topic to offer conclusions for evidence-based decision-making (Higgins & Thomas, 2021). Below, the research phases are described; together with planned and rigorous strategies, they have allowed the integration and critical analysis of the primary documents.

Phase 1. Research question. The question that guided this SR was structured following the Patient-Intervention-Comparison-Outcome (PICO) method (Page et al., 2021): What have been the main findings of indexed scientific production on the digitalization of vulnerable Latin American populations?

Phase 2. Inclusion and exclusion criteria. The following inclusion criteria were used: (a) empirical and theoretical studies (b) full-text (c) written in Spanish, English or Portuguese (d) published in scientific journals, (e) between 2001 and 2021, (f) referring to Latin American populations living in vulnerable contexts, understanding vulnerability as a condition that makes a citizen fragile, helpless or defenseless due to social, cultural, economic, psychological, age and/or gender differences (Helsper & Smahel, 2020). The following exclusion criteria were used: (a) studies unrelated to the field of education (b) whose explicit object of study was not poor and vulnerable populations, and (c) whose objective was not to address the digitalization of vulnerable populations even if their results approached this topic.

Phase 3. Literature review and document search. The following descriptors were used for searching the documents: «digital», «ICT» and «technology» combined with «divide», «gap», «inclusion», «at risk», «inequality», «poverty» and «vulnerab\*». All terms were searched on the title, abstract or keywords. These terms were chosen based on previous research related to the topic (Autor, 2017; González-Zabala et al., 2018; Martínez-Bravo et al., 2020).

The literature review was performed in five databases: two general (SCOPUS and *Web of Science*) and two field-specific (Education Resources Information Center, focused on

Education, and Communication & Mass Media Complete, focused on Communication) databases, as well as Dialnet because this database compiles documents published primarily in Spanish or addressing Hispanic issues. The search strings are outlined in Fig. 1.

Phase 4. Literature review process: phases and flow chart. A study coding manual was prepared (authors, year of publication, title, journal, abstract, objectives of the study, research questions, methodological design, main results, conclusions, limitations and future perspectives) to establish common search and document analysis criteria. All data were gathered in an Excel file shared on Google Drive. Initially, each researcher reviewed one or two databases and the documents not initially found in full text were retrieved by other research group members. Subsequently, one of the researchers compiled all the information, eliminating duplicate records. During the process, the researchers justified in detail why the studies should or should not be included in this systematic literature review, consulting the group whenever in doubt.

Figure 2 shows the review process and its phases, which met the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Page et al., 2021). Of a total of 1055 documents found in the first round, 843 were excluded, leaving 212 papers for reading. In the second round, of these 212 studies, another 131 were excluded; as a result, 81 manuscripts were revised; in the third and final round, another 11 were excluded; therefore, the final sample consisted of 70 documents (Appendix).

Phase 5. Coding system and synthesis of results. The final 70 documents were analyzed using a coding system consisting of extrinsic variables referring to the year of publication, the research center(s) that conducted the study and its geographical location(s), and

| SCOPUS  | Communication & Mass Media Complete   | WOS   | ERIC  |
|---|---|---|---|
| <p>[TITLE(digital) AND TITLE-ABS-KEY("at risk") AND PUBYEAR &gt; 2000 AND PUBYEAR &lt; 2022 AND (LIMIT-TO (DOCTYPE,"ar"))]</p> <p>The same search string was repeated for the following index terms:</p> <p>DIGITAL (TITLE) + DIVIDE (TITLE-ABS-KEY)<br/>                     DIGITAL (TITLE) + GAP (TITLE-ABS-KEY)<br/>                     DIGITAL (TITLE) + INCLUSION (TITLE-ABS-KEY)<br/>                     DIGITAL (TITLE) + INEQUALITY (TITLE-ABS-KEY)<br/>                     DIGITAL (TITLE) + POVERTY (TITLE-ABS-KEY)<br/>                     DIGITAL (TITLE) + VULNERAB* (TITLE-ABS-KEY)</p> <p>ICT (TITLE) + DIVIDE (TITLE-ABS-KEY)<br/>                     ICT (TITLE) + GAP (TITLE-ABS-KEY)<br/>                     ICT (TITLE) + INCLUSION (TITLE-ABS-KEY)<br/>                     ICT (TITLE) + AT RISK (TITLE-ABS-KEY)<br/>                     ICT (TITLE) + INEQUALITY (TITLE-ABS-KEY)<br/>                     ICT (TITLE) + POVERTY (TITLE-ABS-KEY)<br/>                     ICT (TITLE) + VULNERAB* (TITLE-ABS-KEY)</p> <p>TECHNOLOGY (TITLE) + DIVIDE (TITLE-ABS-KEY)<br/>                     TECHNOLOGY (TITLE) + GAP (TITLE-ABS-KEY)<br/>                     TECHNOLOGY (TITLE) + INCLUSION (TITLE-ABS-KEY)<br/>                     TECHNOLOGY (TITLE) + AT RISK (TITLE-ABS-KEY)<br/>                     TECHNOLOGY (TITLE) + INEQUALITY (TITLE-ABS-KEY)<br/>                     TECHNOLOGY (TITLE) + POVERTY (TITLE-ABS-KEY)<br/>                     TECHNOLOGY (TITLE) + VULNERAB* (TITLE-ABS-KEY)</p> <p>Then, each search was filtered by "Country/territory", selecting Latin American countries, and lastly, by "Language", selecting articles in English, Spanish or Portuguese</p> | <p>TI DIGITAL AND AB "AT RISK"</p> <p>The same search string was repeated for the following index terms:</p> <p>DIGITAL (TI) + DIVIDE (ABS)<br/>                     DIGITAL (TI) + GAP (ABS)<br/>                     DIGITAL (TI) + INCLUSION (ABS)<br/>                     DIGITAL (TI) + INEQUALITY (ABS)<br/>                     DIGITAL (TI) + POVERTY (ABS)<br/>                     DIGITAL (TI) + VULNERAB* (ABS)</p> <p>ICT (TI) + DIVIDE (ABS)<br/>                     ICT (TI) + GAP (ABS)<br/>                     ICT (TI) + INCLUSION (ABS)<br/>                     ICT (TI) + AT RISK (ABS)<br/>                     ICT (TI) + INEQUALITY (ABS)<br/>                     ICT (TI) + POVERTY (ABS)<br/>                     ICT (TI) + VULNERAB*(ABS)</p> <p>TECHNOLOGY (TI) + DIVIDE (ABS)<br/>                     TECHNOLOGY (TI) + GAP (ABS)<br/>                     TECHNOLOGY (TI) + INCLUSION (ABS)<br/>                     TECHNOLOGY (TI) + AT RISK (ABS)<br/>                     TECHNOLOGY (TI) + INEQUALITY (ABS)<br/>                     TECHNOLOGY (TI) + POVERTY (ABS)<br/>                     TECHNOLOGY (TI) + VULNERAB* (ABS)</p> <p>Then, each search was filtered by full-text article and year of publication</p> | <p>[TITLE(digital) AND TITLE(inequality) AND PUBYEAR &gt; 2000 AND PUBYEAR &lt; 2022 AND (LIMIT-TO (DOCTYPE,"ar"))]</p> <p>The same search string was repeated for the following index terms:</p> <p>DIGITAL (TI) + AT RISK (TI)<br/>                     DIGITAL (TI) + VULNERAB* (TI)<br/>                     DIGITAL (TI) + POVERTY (TI)</p> <p>ICT (TI) + INEQUALITY (TI)<br/>                     ICT (TI) + AT RISK (TI)<br/>                     ICT (TI) + VULNERAB* (TI)<br/>                     ICT (TI) + POVERTY (TI)</p> <p>DIGITAL GAP (TI)<br/>                     DIGITAL INCLUSION (TI)<br/>                     DIGITAL DIVIDE (TI)</p> <p>Each search was filtered by research area, selecting "Education &amp; Educational Research", and by language (English, Spanish or Portuguese)</p> | <p>[TITLE(digital) AND TITLE(inequality) AND PUBYEAR &gt; 2000 AND PUBYEAR &lt; 2022 AND (LIMIT-TO (DOCTYPE,"ar"))]</p> <p>The same search string was repeated for the following index terms:</p> <p>DIGITAL (TI) + AT RISK (TI)<br/>                     DIGITAL + VULNERAB* (TI)<br/>                     DIGITAL (TI) + POVERTY (TI)</p> <p>ICT (TI) + INEQUALITY (TI)<br/>                     ICT (TI) + AT RISK (TI)<br/>                     ICT (TI) + VULNERAB* (TI)<br/>                     ICT (TI) + POVERTY (TI)</p> <p>INFORMATION AND COMMUNICATION TECHNOLOG* (TI) + POVERTY (TI)<br/>                     INFORMATION AND COMMUNICATION TECHNOLOG* (TI) + INEQUALITY (TI)<br/>                     INFORMATION AND COMMUNICATION TECHNOLOG* (TI) + POVERTY (TI)<br/>                     INFORMATION AND COMMUNICATION TECHNOLOG* (TI) + VULNERAB* (TI)<br/>                     INFORMATION AND COMMUNICATION TECHNOLOG* (TI) + AT RISK (TI)</p> <p>TECHNOLOGY (TI) + POVERTY (TI)<br/>                     TECHNOLOGY (TI) + AT RISK (TI)<br/>                     TECHNOLOGY (TI) + INEQUALITY (TI)<br/>                     TECHNOLOGY (TI) + VULNERAB* (TI)</p> <p>DIGITAL GAP (TI)<br/>                     DIGITAL INCLUSION (TI)<br/>                     DIGITAL DIVIDE (TI)</p> |
|   | <p>(TITLE(digital) AND TITLE(inequality) AND PUBYEAR &gt; 2000 AND PUBYEAR &lt; 2009 AND (LIMIT-TO (DOCTYPE,"ar"))]</p> <p>The same search string was repeated for the following index terms and time intervals from 2010 to 2020 and from 2022 to 2029:</p> <p>DIGITAL (TI) + AT RISK (TI)<br/>                     DIGITAL (TI) + VULNERAB* (TI)<br/>                     DIGITAL (TI) + POVERTY (TI)</p> <p>ICT (TI) + INEQUALITY (TI)<br/>                     ICT (TI) + AT RISK (TI)<br/>                     ICT (TI) + VULNERAB* (TI)<br/>                     ICT (TI) + POVERTY (TI)</p> <p>DIGITAL GAP (TI)<br/>                     DIGITAL INCLUSION (TI)<br/>                     DIGITAL DIVIDE (TI)</p> <p>Each search was filtered by country, including all Latin American countries</p>  |   |   |

Fig. 1 Search strings in databases

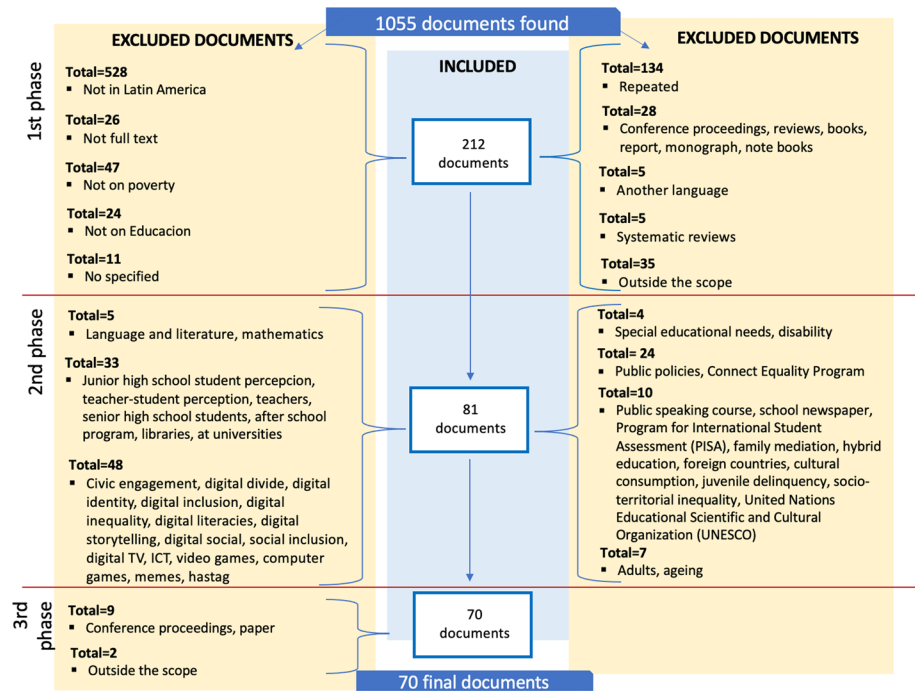


Fig. 2 Flowchart

substantive variables referring to the conceptualization of digitalization and vulnerable populations, as well as their main results, conclusions and limitations.

The extrinsic variables were quantitatively analyzed using descriptive statistics (frequencies and percentages) in Excel, whereas the substantive variables were analyzed according to Flick (2018) and Gibbs (2018) through a qualitative process whereby patterns of emerging similar ideas, concepts or themes were identified, clustering the studies with similar meanings to establish relationships and to integrate the information (Miles & Huberman, 1994).

Thus, we analyzed the studies based on specific categories derived from the literature and other emerging categories defined in a deductive and inductive coding process. Ultimately, the results were structured into seven categories, four predetermined by the literature and three emerging categories (Table 1). By researcher triangulation (Flick, 2018), these categories were adjusted through repetitive, continuous and reflective comparisons.

### 3 Results

#### 3.1 Research Overview

In total, 64.29% of the studies were published between 2015 and 2021, whereas the period from 2004 to 2014 accounts for only 35.71% of the studies. 2020 had the highest number

**Table 1** Deductive and inductive coding

| Categories                     | Subcategories             | Codes                |
|--------------------------------|---------------------------|----------------------|
| Indigenous communities and ICT | Socioeconomic barriers    | Illiteracy           |
|                                |                           | Education level      |
|                                |                           | Infrastructure       |
|                                |                           | Material conditions  |
|                                |                           | Access               |
|                                |                           | Cost                 |
|                                | Sociocultural barriers    | Geographic isolation |
|                                |                           | Rural environment    |
|                                |                           | Aging population     |
|                                |                           | Economic activity    |
|                                |                           | ICT relevance        |
|                                |                           | Social development   |
|                                | Social use of ICT         | Commitment           |
| Co-responsibility              |                           |                      |
| Democratic citizenship         |                           |                      |
| Participatory democracy        | Participation             |                      |
|                                | E-government              |                      |
| Civic and critical literacy    | Passive consumer behavior |                      |

\*ICT for political empowerment Castells and Himanen (2014); Gozálvarez-Pérez et al. (2022); Gozálvarez-Pérez (2011); Subirats (2015)

**Table 1** (continued)

| Categories   | Subcategories                    | Codes  |  |
|--|----------------------------------|--|--|
| *ICT and social capital Bauman (2018); Hanifan (1916); Taylor (2016) | Social and symbolic integration  | Social relationships<br>Socialization<br>Support<br>School environment<br>Cooperation<br>Solidarity<br>Atomism<br>Fragmentation<br>Contact |  |
|  | Sense of belonging               |  |  |
|  | Communication uses               |  |  |
|  | Construction of subjectivity     | Social and cultural identities<br>Personal identity<br>Authenticity<br>Life project<br>Recognition<br>Self-knowledge                       |  |
|  | Self-representation              |  |  |
|  | Symbolic inequality              | Symbolic roles of ICT  |  |
|  | Relationship with technology     | ICT expectations<br>Frequency of use<br>Usability  |  |
|  | Professional responsibility      | Educational uses of ICT<br>Teacher mediation   |  |
|  |                                  |  |  |
|  | Teachers' representations of ICT |  |  |

**Table 1** (continued)

| Categories   | Subcategories                | Codes   |
|--|------------------------------|---|
| *ICT, LKT, EPT; Technological appropriation Castells (2000, 2001, 2004); Reig (2012); Schrape (2019) | Appropriation levels         | Depth of uses of ICT<br>Variety of uses of ICT<br>Digital skills<br>Access devices<br>Active use of ICT<br>Transformation of activities of daily living<br>ICT personalization<br>Unprecedented uses<br>Educational programs<br>Adaptation to the context |
| Public policies under review   | Empowerment                  |   |
|  | Digital inclusion strategies |   |

The asterisked categories derive from the literature (default), the others are emerging categories



of publications (17.14%). None of the studies that met the inclusion criteria was published in 2005 or between 2001 and 2003 (Fig. 3).

The studies (which are, henceforth, referenced by their number and can be consulted in Appendix), involved the participation of Latin American research centers (78.51%) from Mexico (studies 1,8,11,13,14,18,31,34,35,42,46,48,51,58,60,63,67), Colombia (3,4,6,10,30,32,44,45,47,53,66), Brazil (16,17,22,33,39,55,64,65,68), Argentina (19,21,37,40,56,70), Chile (26,27,29,52,54), Peru (20,50), Uruguay (7,61), Bolivia (5,28), Ecuador (57), Costa Rica (69), Nicaragua (43), Dominican Republic (9) and Venezuela (36). In addition, albeit to a lesser extent, research centers from the United States (5.06%), Canada (2.53%), Spain (1.27%), Botswana (1.27%), New Zealand (1.27%) and Turkey (1.27%) also participated in the studies, but 8.86% of the articles do not provide this information.

The geographical areas covered in the studies (countries that have been the study area of research studies) were Argentina (19,21,37,40,56,70), Bolivia (5,28), Brazil (16,17,22,33,39,55,64,65,68), Chile (26,27,29,52,54), Colombia (3,4,6,10,30,32,44,45,47,53,66), Costa Rica (69), Ecuador (57), Mexico (1,8,11,13,14,18,31,34,35,42,46,48,51,58,60,63,67), Nicaragua (43), Peru (20,50), Dominican Republic (9), Uruguay (7,61), and Venezuela (36); in addition, comparative studies simultaneously referred to several Latin American countries or addressed Latin America generally (2,12,15,23,24,25,38,41,49,59,62).

With regard to the gender digital gap, only 38.57% of the studies look into it, and among these, only two (11 and 29) make it a specific research objective. In study 29, in Chile, one of the hypotheses is confirmed: among those who develop digital competencies to a lesser degree, women can be found, who access the Internet only through mobile phones to a greater extent than men. Other studies (1,11,17,48) point to the severely limited technological skills developed by indigenous women, in contrast to those of men.

### 3.2 Digitalization of Vulnerable Populations: Categories

#### 3.2.1 Indigenous Communities and ICT

Articles on the digitalization of Latin American indigenous communities highlight the fact that the preexisting literacy conditions of indigenous peoples prevent the development of other literacies, such as digital literacy, condemning them “to continue with their poverty

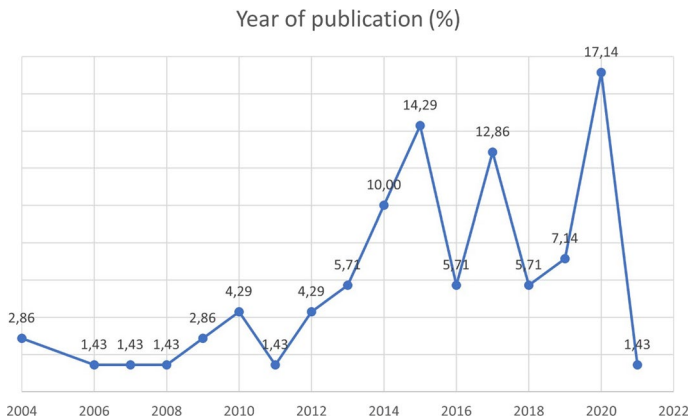


Fig. 3 Year of publication of the studies

and marginalization” (31, p.103;50). Indeed, *illiteracy (which is defined as “any person aged 15 and over who cannot read or write” (1, p.97)) levels are high among indigenous populations (30% of them have only attended early childhood education in 2015, and only 37% have a secondary school degree, in contrast to 14% and 53%, respectively, of the non-indigenous population).*

The indigenous youth, who is the most literate, is interested in ICT and actively produces content that reflects their representations of the environment they inhabit and of themselves—in contrast to the images of indigenous youth that are produced by non-indigenous content creators and assigned to them—but find that their access to and appropriation of ICT is limited by *deficient infrastructure conditions* and by the *mediation* exercised by those in charge of access points. These act as mediators with a strong influence in the first approaches to ICT (21,26,31), either encouraging or stopping exploration and generating preconceived ideas about the possibilities of ICT. Accordingly, they are key players in development because, if they are committed to local problems, they attribute ICT a social meaning and convey this vision, promoting more generalized access to them (31,50).

Another recurrent idea is that the barriers to the digital inclusion of the indigenous population do not end by providing access to ICT (14). Still, there are other barriers of a psychological-individual and socio-cultural-contextual kind: «(...) in rural settings, the main reasons» for lacking Internet connection at home «were lack of relevance (38%), utility (19%), lack of coverage (15%), and cost (14%). These figures suggest that relevance and motivations are more important than coverage and prices» (27, p.249; 17). The authors of study 25 also found that the low demand for ICT among rural populations resulted from insufficient awareness of the opportunities that they provide. In addition, the individual decision to adopt ICT is shaped by contextual factors of these communities (size, geographic isolation (42,48,61), aging population, limited access to ICT socialization agents—youth and public schools –, and main economic activity), which modulate not only their needs and values but also their personalities and attitudes towards new situations and technology (27).

Consequently, digital inclusion can only take place in these communities if their members are shown how ICT can serve their interests and if the community participates in the projects, convinced of their usefulness (25,50).

### 3.2.2 ICT for Political Empowerment

In contrast to technological determinism, digital inequality is understood as a historical construct (51) and, consequently, does not respond to cultural or economic fatality. In other words, digital inequality is not inexorable, irreversible or inherent to specific societies, in this case, Latin American societies. For this reason, the fatalism that naturalizes inequality must be abandoned to approach digital inequality historically, noting how its levels and types change as a function of power relations that are historically generated and sustained by specific economic, political and social structures, which are linked to inequality in a dialectic interaction.

Understanding digital inclusion as a right is the outcome of a historical process whereby digital inclusion has taken «a privileged position over other petitions, which, of course, may become rights» (49, p.51) based on its perception as a *fundamental* need, that is, a need «that we no longer negotiate» (49, p.52), whose satisfaction is *demand*ed or *required* for social and political powers to be considered legitimate because it is a key element of

our understanding of society. Meeting this need entails a double dimension of abstention-provision by the State: it offers “the possibility of enjoying something” (equipment, connection, and training to improve the living conditions) (49, p.52).

In turn, e-government generates the expectation of *reciprocity* in the State-citizen relationship and is presented, from this point of view, as a promoter and protector of a democracy that is not only representative but also *participative*. This reciprocity indicates that «the social is above the economic, and [that] citizens are above the State, which exists to serve, not to use, them» according to 36 (p.714).

From a *political* perspective, ICTs are presented as *processes to be developed* (36), something *that is yet to be done*, not already provided or completed, as *open* realities depending on how we appropriate them in each context and in relation to their problematics.

The studies included in this review describe numerous initiatives that point to the need to generate community and learning-collaboration networks so that ICT serves as a «catalytic mechanism for change in traditional social, economic, political, democratic and cultural structures» (63, p.115). However, this change requires the participation of various social actors who should coordinate efforts: the public sector, private initiatives and universities, which have to cooperate in order to strengthen digital skills and develop new models for the use and implementation of ICT (69). Some of these initiatives are the different projects carried out by the organization *Codeando México* [Elbowing Mexico] (63), such as *Derrocando a la Mexican Tech Mafia* [Bringing down the Mexican Tech Mafia], *DataMX* [Data Mexico], *Retos cívicos* [Civic challenges], *Retos públicos* [Public challenges], and *Explica la ley* [Explaining the law]), that of 43 for water governance during droughts in rural communities of Nicaragua, 16 (with the Dynamic InfoInclusion Model for creating suitable and multilingual interfaces for the accessibility of digitally excluded groups), or 56 (geared towards digital education for informal businesses in disadvantaged neighborhoods).

Television and radio remain highly powerful media for critical literacy in Latin America, helping audiences to know and claim their individual rights, given their potentially high numbers of users who mostly belong to low strata of the population lacking access to ICT. For example, *Televisão Digital Interativa* [Interactive Digital Television] (Brazil, 22) encouraged access to health services and job search, and *Televisión Digital para Todos* (TDT) [Digital Television for All] and *Radio Sutatenza* (Colombia) served as powerful empowerment tools because of the social character of their content (66).

### 3.2.3 ICT and Social Capital

Including ICT in schools positively impacts the social integration and relationships of disadvantaged students (21). Young people report that, through them, «they feel that they have more contacts, which gives them a sense of belonging» (21, p.11). Study 70 also finds that including ICT in education has improved the school environment, generating situations of *mutual help* for solving technical problems, *teamwork* through interdisciplinary projects, and enhanced school *discipline*.

Notwithstanding the ability of ICT to generate social relationships and even cooperation, their inclusion in education neither automatically translated into lasting commitment (as occurred in Community Learning Centers, in Mexico (58)) nor reduced previous marginalization (as happened in *Telecentros* [ICT centers], in Brazil (65)). For this reason, public policies of digital inclusion must be aimed at involving those interested

in co-managing such programs to avoid diluting their responsibility, as detected in the good practice of “*Kioscos vive digital*” [Live digital kiosks], an Internet access and telecommunications technology service provider and training program in Colombia (45).

In rural communities, where access to and appropriation of ICT are far from reaching the corresponding levels of urban environments (14), ICT (for example, the networks provided by the *Programa Conectar Igualdad* [Connecting Equality Program] in Argentina) (21) and the places with public Internet access (such as public schools) (26) are *social integration objects and spaces*. In other words, they are meeting places that provide not only students but also their families with equitable access and contribute to disseminating technology. “The border between what happens at school and what happens in the community is much blurrier in rural areas”, and therefore “the school is a crucial place for the development of the community” (26, p.581) in contexts where users have no other options.

In cases of emigration (35), which requires adapting to the host society and managing the loss of what was left behind in the home country, ICT plays a key role because it facilitates socialization across borders, generating a new transnational habitus (35). However, ICT is used and appropriated differently depending on the profile of the emigrants (the economic capital with which they arrive, their legal status and education level), so ICT provides social support to varying degrees depending on these factors. In any case, the studies recognize that ICT provides social capital, a highly valuable resource that emigrants can draw on for their migratory project (35). However, in border areas (8), face-to-face relationships are prioritized because sharing some information online can be dangerous.

### 3.2.4 ICT and Identity

The appropriation of technology goes beyond the mere use of tools and involves a whole process of sociocultural construction and interpretation (53). In this process, digital devices enable—through specific platforms, prevalent among some groups, but not so much among others (21) –, on the one hand, self-knowledge and reflexivity and, on the other hand, surveillance, control and digital dependency (study 41 indicates that digital dependence dilutes the social capital and that, by dissolving the relational-personal dimension, enslaves the individual). In this dual dynamics, ICTs are regarded as mediators in the contemporary processes of subjectivation—of the production of trans-media subjectivities, a multiple self with many faces and possibilities of expression –, in which recognition –as a characteristic mode of subjection and dependence, essential for the self-formation process—is subject to increasing digital mediation.

The question of identity is especially relevant for indigenous youth. Access to technologies *multiplies* the available referents and makes them much more heterogeneous. As a result, their primary local references are not the only ones. These interactions cause a re-elaboration and negotiation of indigenous communities in which their roots and identity are at stake (31).

The education system is crucial for technologies to positively contribute to the construction of the life projects and identity of individuals by enabling them to appropriate ICTs and to empower themselves through them, thereby overcoming the perspective of mere consumption that objectifies users in a technological dictatorship (5,9,28,37,39,57,58,65).

### 3.2.5 Teachers' perceptions/Representations of ICT

Teachers are not the primary agents of digital literacy (26, 4) (surveys indicate other sources from which individuals learn to use the Internet—friends (55%), others (siblings and Internet cafes) (34%), oneself (29%) –, but teachers act as filters or mediators, gatekeepers of access to and use of ICT (31); that is, they play a key role in digital inclusion because they have the ability to promote or curb technological appropriation. The extent of digital inclusion depends on their «high expectations» about the technology, their own «skills» and «high frequency of access» to ICT, which produces optimal conditions (proper functioning of equipment in schools, students' motivation to use them, a favorable environment for their use) for students to use them «more often» and «more skillfully» (21,26).

Aware of their responsibility in digital inclusion, teachers feel considerably frustrated due to the deplorable conditions of the technological infrastructure they find and their limited digital skills (47). Thus, they go from *illusion* (their first representation of ICT) to *disillusion* and from there to daily dissatisfaction and *criticism* (19,37).

Teachers' perceptions of ICT range from those who consider that these technologies do not significantly change their practices but are just «tools for doing what they were already doing» (70, p.95) more easily and efficiently (an *incremental* view of technology), to those who adopt a *relational* view of them, understanding that ICT can «create new purposes or goals not available for other tools prior to ICT». As such, ICT «tools change the users: their perceptions, relationships, practices and interpretations» (70, p.95).

### 3.2.6 ICT, LKT and EPT: Technological Appropriation

The most disadvantaged populations—those who access the Internet only through the cell phone and not through the computer (11)—mainly use ICT in basic applications (WhatsApp and email, 67%), which indicates low appropriation levels (30,70). These low appropriation levels are also found among teachers, as reported in 70, in the secondary schools under study. In other words, these populations have fewer digital skills and access the Internet for *less varied* and *in-depth* uses (13,21). More specifically, although no difference was found between those who access the Internet only through their cell phone and those who also use a computer for *communication* and *work/business purposes*, differences were indeed found for recreational, informational, e-government, transactional and content creation purposes; therefore, *the access device that is available to a subject is a determinant of appropriation*, that is, of the ability to conduct capital-enhancing activities (29).

This lack of sufficient digital skills suggests that «universal access to ICT can be achieved without generating social change» (51, p.275) or, even worse, and most likely, it can bring about deeper inequality if technology is not placed at the service of human needs (55). For this purpose, digital inclusion programs must *ambitiously address the development of digital skills* (6,20,32,60,64,67)—because autonomous learning is not enough—and *be adapted to each profile or role* (70), placing stakeholders at the center of the action. The lack of personalization is especially detrimental for technologically less skilled people, according to 24.

In this context, rather than proposing generalized uses of ICT (57), *an approach focused on the different social actors is required* because their specific needs define the appropriation processes. In other words, the real and practical meaning of managing technologies derives from their perceived practical utility when performing the specific roles that the

subject must fulfil (12,52), thereby confirming the thesis that each subject generates alternative proposals for ICT or unprecedented uses of it based on their situation and challenges (4). This perspective of real training (68) prevents the most vulnerable people from falling into the consumption cycle and avoids the mistakes made by projects of pure accessibility, such as that of the *Telecentros* (Brazil), which apparently have not contributed to reducing poverty. Therefore, the digital inclusion process should be evaluated from this perspective (65). For teachers, this approach entails not only providing them with Technological, Pedagogical and Content Knowledge (TPACK) but also using this knowledge to manage the limitations of the context (Technological, Pedagogical, Skills and Content Knowledge (TPSACK)) (28). Hence, locally trained teachers can be the best trainers of new teachers.

In rural communities, policies aimed at promoting the appropriation of technologies are more effective when the programs are developed together with the communities to ensure that those communities control the technologies and serve their interests (34,45).

### 3.2.7 Public Policies Under Study

The fact that a digital inclusion strategy has worked in one context does not guarantee it will work in others. For example, providing infrastructure to all official institutions in Colombia did not reduce the digital divide in rural areas (30). More comprehensive plans, such as the Ceibal project—aimed at implementing the one laptop per child (OLPC) policy and providing no-cost Internet access throughout Uruguay (7), which included educational accompaniment (support teachers, facilitators, free repairs, parent workshops) –, are better options but still require specific actions for schools in disadvantaged settings. In a nutshell, *a universal policy is not enough*.

Therefore, public policies often fail because they *do not sufficiently consider the context, its actors and the tensions that are involved in their execution* (68), or even do not build on a well-conducted baseline diagnosis (20): «Politicians prefer their imaginary schools and then blame schools and teachers when their policies fail in the real world» (Ball, 1994, as cited in 19, p.107). In other words, the State «shifts the responsibility to individuals», to their «effort, entrepreneurship and volunteerism» (19, p.108), deeming that adopting technologies is a matter of choice on the part of the subject. This failure is ultimately assumed as their own by the teachers, who feel responsible for not knowing how to handle the tools: it is like «having a Ferrari and not knowing how to drive it», the feeling of «being late» (19, p.109; 67).

Based on the above, a «logic of urgency and immediacy» (19, p.111; 62) should be avoided to *generate the conditions that*, considering the specific recipients of the actions, their cultural differences (15) and their material context, *allow an adequate reception of the initiatives*. In other words, public «macro-policies» should focus on the meso-institutional level, on the school, combining universal and focal approaches (40).

## 4 Discussion and Conclusions

The seven themes identified in the literature review reveal specific needs that must be met for ICT to create real opportunities that can be leveraged to foster human development and reduce poverty in Latin America. These needs call for public policies supporting the supply of adequate infrastructure and educational provision and a demand for ICT and digital education that can serve local interests on the part of those involved.

First, the studies focused on the digitalization of indigenous communities grouped in the first category prove the insufficiency of the measures taken by different Latin American governments to ensure the digital inclusion of the indigenous population, as indicated by Flores-Fuentes and Navarro-Rangel (2020) and even the *disinterest* in their reality for several reasons. First, very little statistical data on their access, use and appropriation of ICT are available (1). As a result, the few government initiatives implemented for such purposes are limited to providing an Internet connection and equipment, which will be underutilized or deteriorate rapidly (17). According to Robinson et al. (2020), several studies confirm that the urban–rural gap is resistant to change because the rural population benefits less from government initiatives (25,50). Added to this, gender is acknowledged as another factor that influences the digital gap: women access the Internet and use ICT less than men and develop fewer digital skills, which is consistent with the findings of other studies (Chesser et al., 2016; Maresova et al., 2020).

This deficit is due to the high illiteracy levels still detected among indigenous populations, which prevent the development of digital literacy (31,50), and to poor material conditions derived from their geographic isolation. In fact, remote locations are considered unprofitable spaces which do not attract private investment. In addition to these *socio-economic* barriers, other *psychological-individual* and *sociocultural-contextual* barriers, related to the way of life in these places, slow down digital inclusion processes. Among the former, the perception of the relevance of ICT, its utility and the opportunities it can open can be listed. Among the latter, the aging population of these places, their territorial marginality and the main economic activities carried out negatively influence ICT use and appropriation. Therefore, *integrated approaches* are needed in rural regions with indigenous populations because projects for providing connectivity/infrastructure fail without the participation of those communities. Fostering their participation requires showing how ICT can serve their interests and how relevant ICT can be to their lives. In this regard, 17 states that those most interested in the Internet are politically active indigenous people, most of whom are members of organizations that fight for their rights.

Second, the studies included in the category «ICT for political empowerment» analyze the contribution of ICT to the construction of democratic citizenship. These studies acknowledge that ICT has generated a new framework for civic action that *can strengthen or undermine participation and empowerment processes* (Castells & Himanen, 2014; Gozávez-Pérez, 2011; Uribe-Zapata, 2019). They provide a *social* view of ICT as means of transformation and universal human development, as indicated by Subirats (2015), and understand that digital education aims at an active-creative «civic and critical literacy» (Gozávez-Pérez et al., 2022), beyond the mere «computer literacy» and «digital literacy» (70, p. 103; 41), which are closer to passive consumer behavior (Oliveira, 2020).

By reviewing various initiatives for the civic use of ICT, the elements that contributed to their success were identified, making them an example of good practices, in contrast to other failed projects. The latter is exemplified by the Community Learning Centers (*Centros Comunitarios de Aprendizaje*—CCA; Mexico, 58), which generated cooperation, but not co-responsibility or long-lasting commitment because they did not give prominence to local actors.

Under these conditions, the political debate on the digital divide should focus on people (Castells & Himanen, 2014), not on devices (55), because the success or failure of the proposals does not depend exclusively on the State but on the intervention of the community (66). In other words, the social and civic appropriation of ICT will not be achieved by governments or companies but by a citizenry that decides on collaborative forms of using ICT (41).

The studies compiled under the third category on the contribution of ICTs to social capital focus on the communication uses of ICT. They underline the fact that technologies fulfil a function that is not merely of *contact* but also of *emotional support*. This perspective aligns with the first definition of social capital as a set of high-quality, trust-generating social relationships which improve our quality of life (Hanifan, 1916). By exploring social interactions on the Internet (their quantity and quality, their times and spaces, access devices...), the studies recognize the capacity of ICTs to increase the social capital of individuals and, consequently, they acknowledge that one of their key contributions is not purely instrumental but that they promote social and symbolic integration in different communities (Lee & Park, 2021).

Yet, despite ensuring increasingly widespread connectivity and communication, digital technologies do not seem to automatically generate good conditions for collaboration, support and solidarity (41) because social matters are not primarily technical but rather fundamentally human. Moreover, left to their own devices, ICT fragments lasting relationships by multiplying ephemeral connections, prioritizing shallow entertainment, the appearance and spectacle of the image, as previously described by Bauman (2018). Since we cannot, nor should we, give them up—especially after the coronavirus disease 2019 (COVID-19) pandemic (Barberá-Gregori & Suárez-Guerrero, 2021) –, we should keep in mind their limitations and their ambivalent dynamics (De Rivera et al., 2021) and rectify their individualistic and atomizing drift, ordering them to promote solidarity and the common good, so that they facilitate and strengthen authentic relationships, which are especially important among marginalized people.

For this purpose, the studies reviewed herein have shown that ICT programs must be focused on their specific context for appropriation and co-management by the stakeholders. Otherwise, as occurred in *Telecentros* (Brazil) (65), these programs may generate spaces of social relationships without reducing prior marginalization. In turn, other programs, such as «*Kioscos vive digital*» (Colombia) (45) succeeded by focusing communication on shared interests to increase cooperative relationships between participants.

The fourth category, «ICT and identity», included research studies on the digital environment as an extension of other social spaces in which individuals build, represent and negotiate their identity in relation to others, both spatially close to and distant from them (Soto-Galindo et al., 2021). These studies have concluded that ICT should not be understood in purely instrumental terms because these platforms provide new opportunities to access symbolic goods and can, therefore, reduce symbolic inequality (21), an issue that is particularly relevant in rural communities.

In education, the function of schools must be urgently redefined (37,39) regarding these new forms of subjectivation and identity constitution through ICT (28,57). Otherwise, under a technological dictatorship, we run the risk of intensifying, instead of mitigating, digital and social segregation, and objectifying users (65), without helping them think for themselves and develop their identity or authenticity (Phillippi & Avendaño, 2011; Taylor, 2016). Accordingly, the predominant recreational uses among youth also contribute to constructing their identity, as long as they go beyond mere consumption and appropriate and use ICTs for their empowerment (58), helping them define their life project and aspirations (5). For this purpose, the educational system is crucial (9) (García-González et al., 2021).

The fifth category, on teachers' perceptions of ICT, grouped the studies that explored how teachers envisage digital inclusion, how they experience the application of public policies and how they appropriate them. These representations of both technology and digital strategies of different governments for facing different digital gaps act as a starting point wherefrom teachers access, relate to, and appropriate technology through its uses.



This category highlights the idea that, strictly speaking, «the policies are not *implemented*; instead, in a practical context, the political text is interpreted, modified and reinterpreted by the central subjects of that practice: the teachers» (Miranda, 2011, as cited in 19, p.101).

The teachers' self-perceived *responsibility* for the digital inclusion of their students is a common theme in all studies. The disenchantment of the teaching staff with the promises of digitalization processes and the criticism of deficiencies of the programs (Gutiérrez-Martín et al., 2022) indicate that they are increasingly overcoming a vision of technology as a mere tool, shifting towards a relational conception of ICT, which modifies activities and social practices, generating purposes or «new goals overlooked by other tools prior to ICT» (54, p.95). Hence, they demand specific, disciplinary and contextualized technological training, that is, training that considers the limitations of a specific teaching context.

The sixth category includes studies that analyze digital appropriation as a process whereby the subject, as an *active* individual, gives meaning to the digital technologies through *personalized* constructions of their uses—some of which are unprecedented—that transform their daily practices. Picking holes in the «dazzling promise of universal progress and equity» or the «development dream» in Latin America through the universalization of access to ICT, the authors of these articles aimed at advancing from mere ICT to the more demanding «paradigms of learning and knowledge (LKT) and empowerment and participation (EPT) technologies (Reig, 2012» (70, p.9). In other words, since the exponential growth of Internet penetration in Latin American societies has not translated into equal levels of use of its potential to improve living conditions, these studies have focused on understanding the process of technological appropriation in vulnerable communities because, as indicated by Castells (2001, 2004), the ambiguity of technological development is exacerbated in these contexts (Schrape, 2019). This category also includes studies examining the extent of ICT appropriation as a function of the access devices (cell phone-only or cell phone and computer access) available to the most disadvantaged population (29).

The conclusions of these studies reflect different appropriation levels across populations, with the most vulnerable population showing the least varied and in-depth use of ICT, in line with the findings of other studies (Andrade-Vargas et al., 2021). This limited use of ICT is related not only to the Internet access device but also to the individuals' perception of technologies, which are primarily regarded as entertainment tools rather than as education media with a potential for social and professional promotion and human development (10).

These results highlight the need for *an ambitious policy for developing digital skills* (20, 67)—as autonomous learning is not enough—which is not generalist but instead *adapted to each profile or activity* (70) because the specific needs determine the appropriation processes. In this context, on the one hand, teachers must rely on not only technological but also educational (Tadeu, 2020) and field-specific skills, which enable teachers to modify their practices through technology. To this end, an in-school teacher training or teacher eco-training model is proposed, which is provided in the workplace and focuses on the specific educational situations that arise in each context; on the other hand, among students, ICT appropriation for academic purposes should be fostered (44).

Lastly, in the seventh category on public policies, a large number of studies evaluate the adequacy of digital strategies adopted by different Latin American countries to specific disadvantaged contexts towards identifying their achievements, as well as the obstacles faced, and formulating recommendations for improvements that inform those responsible for making them. These suggestions are provided in studies focusing on a single country (4,7,19,20,21,70) and in studies comparing proposals from various countries (25). Their

conclusions corroborate the findings of other studies (Meneses et al., 2014; Orr et al., 2019), according to which a universal policy is not enough because the context is the key to identifying the specific material and structural conditions that must be altered so that these programs can have a positive impact. Therefore, better understanding the digital divide as a new inequality of the twenty-first century in Latin America requires contextualizing this phenomenon; otherwise, its meaning will remain excessively vague and ambiguous (12,23,51). For this purpose, its *multidimensional* (ICT access, use, and appropriation), *multifactorial* (not only technological but also economic, political, sociocultural, cognitive and social) and *dynamic* dimensions must be considered because these facets are linked in a dialectical interaction and indicative of different exclusion phenomena.

In conclusion, the analysis of the contextual characteristics of the studies included in this review shows an increasing interest in the digitization of the poorest populations in the last decade, peaking in 2020. As a consequence of the COVID-19 pandemic, this peak will most likely be surpassed in the coming years. However, the abundant literature on digitalization and digital education in general contrasts with the scant research specifically focused on analyzing this process among the most vulnerable people, in their different—rural, urban, and border—contexts. Despite the upward trend, as noted above, this scarcity of studies is even more noticeable, if possible, when it comes to Latin America, where vast populations who live in poverty can be found. Through its specific focus on these populations, this piece of research has attempted to compile and articulate the main focal points or repeated themes that arise in the literature on digitalization to give voice to those affected by it and understand their concerns, needs and perspectives for advancing development through ICT.

In response to the research questions, seven areas of interest have been identified to improve the living conditions of the most disadvantaged through ICT and avoid its potential negative consequences: a demand for more attention to indigenous communities on national agendas that leads to well-informed contextualized projects that engage people by connecting ICT to their own interests and everyday activities, the need to further understand technological appropriation based on the specific roles that those living in vulnerable conditions perform and their own understandings and representations of ICT, thus eschewing generalized universal approaches; the urgency of fostering and supporting collaboration networks for the political empowerment of vulnerable populations through ICTs, taking into account the critical role of mediators; the significant contribution of ICT to the social capital and to the construction of individual identity of the poor, who often have to emigrate and struggle to develop a sense of belonging.

These results point to the need for public policies that not only ensure the *supply* of adequate infrastructure and connectivity but also encourage *demand* for ICT and contextualized digital education that serves local interests on the part of those affected. Increasing this demand involves placing a heavy focus on the complex *human*—not merely technical—process of technological appropriation, overcoming the perspective of mere access. This «human factor» (Ramírez-Montoya & Lugo-Ocando, 2020, p.17) of appropriation requires supporting creative approaches to ICT on the part of these populations so that, aware of the possibilities that ICT brings them, they can leverage them for their empowerment.

Among the limitations of this study, the variability of the methodological approaches of the primary studies reviewed herein should be analyzed in future research. Carrying out a more detailed inspection of the methods and research techniques used in the studies would allow being in a better position to assess the effects of digitalization on Latin American people in contexts of vulnerability. In addition, the time frame considered could

be extended beyond the last twenty years, and documents from the grey literature should be incorporated.

Future research should also look into the different appropriation processes of the populations under study and, using a qualitative approach, narrate successful personal experiences of empowerment through ICT to determine which key factors contributed to appropriation. A meta-ethnography, understood as a method for synthesizing primary ethnographic documents, could be a methodological option for understanding digitalization from another angle. In addition, the theoretical approaches to ICT in the studies should be examined in order to investigate to which extent those ways of understanding digitalization actually serve human development.

## Appendix

See Table 2.

**Table 2** Primary documents (70)

| No. document | Reference   |
|--------------|---|
| 1            | Soto-Hernández, D., Valencia-López, O.D., & Rentería-Gaeta, R. (2020). Alfabetización y brecha digital entre los pueblos originarios de México, 1990–2015. Efectos socioeconómicos. <i>Ciencia Tecnología Sociedad</i> , 12(23), 85–108. <a href="https://doi.org/10.22430/21457778.1720">https://doi.org/10.22430/21457778.1720</a>  |
| 2            | Sánchez-Zárate, A., & García-Morales, K. (2020). Análisis comparativo sobre nativos, migrantes digitales y brecha digital profunda en México y Uruguay. <i>ANIDIP</i> , 8, 1–29. <a href="https://doi.org/10.12804/revistas.urosario.edu.co/anidip/a.9901">https://doi.org/10.12804/revistas.urosario.edu.co/anidip/a.9901</a>  |
| 3            | Rosales-Acevedo, G.A., & Botero-Botero, S. (2015). Análisis de la Penetración de las Tecnologías de la Información y Comunicación (TIC) y su Influencia en la Reducción de la Brecha Digital en el Valle de Aburrá, Caso Internet. <i>Lámpsakos</i> , 13, 62–71   |
| 4            | Álvarez-Cadavid, G.M., & Vega-Velásquez, A.M., & Álvarez, G. (2011). Apropiación de las TIC en comunidades vulnerables: el caso de Medellín Digital. <i>Apertura</i> , 3(1). <a href="https://www.redalyc.org/articulo.oa?id=68822701015">https://www.redalyc.org/articulo.oa?id=68822701015</a>  |
| 5            | Choque-Aldana, M. (2009). Brecha digital y juventud en Cochabamba. Desigualdades en el acceso y uso de nuevas tecnologías. <i>Punto Cero</i> , 14(19), 29–41. <a href="http://www.scielo.org.bo/scielo.php?script=sci_arttext&amp;pid=S1815-02762009000200004&amp;lng=es&amp;tlng=es">http://www.scielo.org.bo/scielo.php?script=sci_arttext&amp;pid=S1815-02762009000200004&amp;lng=es&amp;tlng=es</a> |
| 6            | Adriamyns, G. (2017). Brecha digital de las herramientas web 2.0, entre los docentes de la Institución Educativa Agropecuaria de Fonseca. <i>Revista electrónica estudios telemáticos</i> , 16(1), 43–59  |
| 7            | Rivoir, A., & Lamschtein, S. (2014). Brecha digital e inclusión social, contribuciones y dilemas de las políticas 1 a 1. El caso del Ceibal en Uruguay. <i>Razón y palabra</i> , 87, 1–29   |
| 8            | Flores, M. A., Rojas, V., & Straubhaar, J. (2017). Digital inequality on the US-Mexico border: A multigenerational case study in Laredo, Texas. <i>Estudios Fronterizos</i> , 18(37), 18–40. 10.21670/ref.2017.37.a02   |
| 9            | Actis, J.L. (2010). Brecha digital en la República Dominicana: análisis de la disponibilidad en los hogares y del uso individual de computadoras e Internet. <i>Ciencia y sociedad</i> , XXXV (2), 291–358  |
| 10           | Pedraza, L.F., Danilo, A.L., & Octavio J.S. (2012). Brecha digital por estatus socio-económico en la localidad de Ciudad Bolívar de Bogotá (Colombia). <i>Información Tecnológica</i> , 23(6), 63–72  |

**Table 2** (continued)

| No. document | Reference   |
|--------------|---|
| 11           | Soto-Hernández, D., Valencia-López, O.D., & Moyado-Flores, S. (2020). Brecha digital y actividad económica: el caso de las mujeres indígenas en la Sierra Sur de Oaxaca, México. <i>Revista CTS</i> , 45(15), 209–238   |
| 12           | De Araújo-Farias, A., & Andreu-Abela, J. (2017). Brecha digital y desigualdad social en las sociedades de la información. <i>Revista Inclusiones</i> , 4(4), 156–169  |
| 13           | Toudert, D.E. (2015). Brecha digital y perfiles de uso de las tic en México: Un estudio exploratorio con microdatos. <i>Culturales</i> , 3(1), 167–200  |
| 14           | Toudert, D.E. (2019). Brecha digital, uso frecuente y aprovechamiento de Internet en México. <i>Convergencia</i> , 26(79), 1–27. <a href="https://doi.org/10.29101/crcs.v0i79.10332">https://doi.org/10.29101/crcs.v0i79.10332</a>  |
| 15           | Duggan, E.W., & Virtue, G. (2004). Bridging the Digital Divide in Caribbean Group Decision-Making. <i>The Electronic Journal on Information Systems in Developing Countries</i> , 17(5), 1–23   |
| 16           | Joia, L.A. (2004). Bridging the digital divide: some initiatives in Brazil. <i>Electronic Government</i> , 1(3), 300–315. <a href="https://doi.org/10.1504/EG.2004.005554">https://doi.org/10.1504/EG.2004.005554</a>   |
| 17           | Valle-Rodrigues da Costa, I., & Oliveira-Paulino, F. (2013). Challenges faced in overcoming indigenous digital divide in Brazil. Commons. <i>Revista de comunicación y ciudadanía digital</i> , 2(2), 92–120. <a href="https://revistas.uca.es/index.php/cayp/article/view/3069">https://revistas.uca.es/index.php/cayp/article/view/3069</a>   |
| 18           | Arredondo-Ramírez, P. (2017). Conectividad y desigualdad digital en Jalisco, México. <i>Comunicación y sociedad</i> , 30, 129–165   |
| 19           | Armella, J., & Langer, E. (2020) De la ilusión al desencanto: sentidos y críticas en torno a la inclusión digital. Un estudio con docentes de escuelas secundarias empuzadas en contextos de pobreza urbana. <i>Espacios en Blanco. Revista de Educación</i> , 30(1), 99–115  |
| 20           | Rivoir, A.L. (2019). Desigualdades digitales y el modelo 1 a 1 como solución. El caso de <i>One Laptop Per Child Perú</i> (2007–2012). <i>Revista Iberoamericana de Educación</i> , 79(1), pp. 33–52. <a href="https://doi.org/10.35362/rie7913417">https://doi.org/10.35362/rie7913417</a>   |
| 21           | Benítez-Larghi, S., Lemus, M., Moguillansky, M., Welschinger-Lascano, N. (2015). Digital and Social Inequalities: A Qualitative Assessment of the Impact of the Connecting Equality Program on Argentinean Youth. <i>Electronic Journal of Information Systems in Developing Countries</i> , 69(2), 1–20. <a href="https://doi.org/10.1002/j.1681-4835.2015.tb00496.x">https://doi.org/10.1002/j.1681-4835.2015.tb00496.x</a> |
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