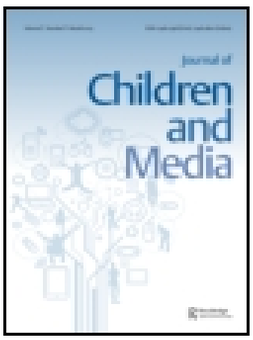

Routledge
Taylor & Francis Group

Journal of Children and Media

ISSN: 1748-2798 (Print) 1748-2801 (Online) Journal homepage: https://www.tandfonline.com/loi/rchm20

Children's and adolescents' digital access in Chile: the role of digital access modalities in digital uses and skills

Patricio Cabello, Magdalena Claro, Rodrigo Rojas & Daniela Trucco

To cite this article: Patricio Cabello, Magdalena Claro, Rodrigo Rojas & Daniela Trucco (2020): Children's and adolescents' digital access in Chile: the role of digital access modalities in digital uses and skills, Journal of Children and Media, DOI: 10.1080/17482798.2020.1744176

To link to this article: https://doi.org/10.1080/17482798.2020.1744176

Published online: 01 Apr 2020.

JOURNAL OF CHILDREN AND MEDIA
https://doi.org/10.1080/17482798.2020.1744176

Routledge
Taylor & Francis Group

Children's and adolescents' digital access in Chile: the role of digital access modalities in digital uses and skills

Patricio Cabello[a], Magdalena Claro[b], Rodrigo Rojas[c] and Daniela Trucco[d]

[a]Center for Advanced Research in Education, Institute of Education (IE), Universidad de Chile, Chile; [b]Faculty of Education, Pontificia Universidad Católica de Chile, Chile; [c]Psychology School, Universidad Academia de Humanismo Cristiano, Chile; [d]Social Development Division, Economic Commission for Latin America and the Caribbean, ECLAC, Chile

ABSTRACT

This article analyses the modes of physical access that facilitate participation in digital opportunities and the development of digital skills in children and adolescents (9 to 17 years old). We analysed the data obtained from the Kids Online survey in Chile. A latent class analysis (LCA) was conducted to identify groups based on access points and devices of use; access modalities were then composed crossing these variables. Four access modalities were found: *cellphone-home; cellphone-ubiquitous; multi-device-home; multi-device-ubiquitous*. Multiple logistic regression analysis showed that ubiquitous modalities (*multi-device* and *cellphone* varieties) predicted digital use and skills among young Chileans, while the more static modalities (*cellphone and home* and *multi-device and home*) did not. These results are critical to addressing what can be defined as "enabling access" among young Internet users in the context of digital inclusion policies.

ARTICLE HISTORY
Received 13 March 2019
Revised 15 March 2020
Accepted 15 March 2020

KEYWORDS
Internet access; digital divide; children; adolescents; digital uses; digital skills

Introduction

Digital technologies are increasingly prevalent in our society and have become part of different areas of young people's lives, such as learning (Sefton-Green, 2013), participation (Fairlie & Kalil, 2017; Gleason & von Gillern, 2018) and social relations (Boyd, 2014; Hooft Graafland, 2018). Several scholars and policymakers agree that being digitally excluded may have negative consequences for the development and well-being of children and adolescents (Livingstone, Carr, & Byrne, 2015; UNICEF, 2017). For example, it can evolve into low levels of perceived self-efficacy to use digital technologies, affecting the development of skills (Wong, Ho, Chen, Gu, & Zeng, 2015; Zhao, Lu, Huang, & Wang, 2010), or may have a negative effect in deeper areas, such as personal identity, emotional development (Robinson, 2018; UNICEF, 2017) and self-esteem (Wong et al., 2015).

Regular and reliable access continues to be a challenge in many parts of the world, especially in developing countries (Ayanso, Cho, & Lertwachara, 2014; Third, Bellerose, Oliveira, Lala, & Theakstone, 2017), generating the so-called *digital divide* (van Dijk, 2005; Warschauer, 2004). This divide was initially described in dichotomous terms as the

CONTACT Patricio Cabello patricio.cabello@ciae.uchile.cl

distance between those who have access to digital technologies and those who do not (Hargittai & Hinnant, 2008; van Dijk, 2005). However, evidence today shows that as physical access increases and levels out, qualitative disparities appear in other levels of inclusion related to how people use and benefit from information technologies. Other than physical access, the benefits of using digital technologies depend on the conditions and capabilities (i.e., digital skills) to *engage in* and *take advantage of* the opportunities provided (Büchi, Just, & Latzer, 2016; van Deursen & Helsper, 2017).

Some authors state that there are different levels of inclusion that are relevant for taking full advantage of digital opportunities (Selwyn, 2010; van Dijk & van Deursen, 2014). The notion of levels or stages of inclusion implies that there are certain types of access that are a necessary condition to enable subsequent levels of inclusion (van Dijk & van Deursen, 2014). The definition of what type of access qualifies as "enabling" is dynamic and must be revised regularly given the continuous technological changes (Livingstone & Helsper, 2007). We propose that such a definition is relative or contextual since it can vary according to the conditions and characteristics of the different groups. For example, older children require autonomous and ubiquitous access to be able to organise social activities with their peers, while younger children do not, as these activities are normally organised by their caregivers.

In the case of children and adolescents, studies tend to focus on one type of access (places or devices of access) and one level of inclusion (uses or skills) and are mostly conducted in developed countries. Nevertheless, the increasing diversification of places and devices of access, mainly associated with the emergence of mobile technologies, makes it more relevant to understand different combinations or *modalities* of access by considering both places and devices of access at the same time. Also, there is a need to understand the consequences of these different modalities of access have in young people's lives, particularly in developing countries where differences in access tend to be wider. In this study, we aim to analyse modalities of physical access and their implications for children's and adolescents' digital opportunities and skills in the context of the Latin American country of Chile.

Literature review

Physical digital access

Given the continuous technological change, physical digital access is a dynamic concept. Physical access has been defined as "obtaining the hardware and software of digital media and a connection to the Internet" (van Dijk, 2017, p. 384). Most international studies measure physical access considering places of access, devices of access and, in some cases, type of connectivity (Fraillon, Ainley, Schulz, & Friedman, 2014; Hassani, 2006; Hooft Graafland, 2018). Concerning the type of connectivity, mobile broadband is becoming more relevant than fixed Internet, both in developing and least developed countries (Donner, 2015).

The different ways in which people access the Internet raises the question of how access through different types of devices and from different places enables different uses and outcomes. Early evidence showed that cell-phones were more limited than other devices such as personal computers in terms of the amount and complexity of content

that can be readily viewed. Among the most important constraints are that they make content creation more difficult and do not seem to allow deep information searches (Hargittai & Kim, 2012) or have lower storage capacity and slower web-browsing speed (Napoli & Obar, 2014). Also, the different characteristics of cell-phones and laptops have raised questions about their affordances for young people's learning. Some studies find that cell-phones offer access to real-time data, and users benefit from features like notetaking, audio, video books or simulations (Lai, Yang, Chen, Ho, & Chan, 2008; Parsons, Wishart, & Thomas, 2016), while others observe limitations related to their small screen size or slow text input (Churchill & Hedberg, 2008; Ko, 2017). Napoli and Obar (2014) found that the lower storage capacity and slower web-browsing speed of cell-phones compared to laptops resulted in significantly different uses and outcomes across devices, amplifying inequalities in digital skills, online participation and content creation. More recently, van Deursen and van Dijk (2018) concluded that personal computers are not superior to cell-phones and other devices, but they allow different uses and, therefore, lead to different affordances and outcomes.

About the place of access, there is also evidence mostly from developed countries related to different uses, affordances and outcomes for adults and young people. Among the adult population, Hassani (2006) found that the place of access determines different levels of enablement for full participation in the digital society and significant use in development and learning. This research showed that having access to the Internet from multiple locations (home, workplace and others) was strongly related with more digital opportunities for wellbeing (banking, e-commerce, health and product information) than having only access at home or the workplace. In the case of young people, some studies have found that the ubiquity enabled by mobile devices is positive because it makes learning possible at any time and place (Churchill & Hedberg, 2008; Ko, 2017; Murphy, Farley, Lane, Hafeez-Baig, & Carter, 2014), while others have found that learning in a fixed place is more effective than is moving or walking to different places (Dolittle, Lusk, Byrd, & Mariano, 2009).

Physical access and sociodemographic variables

Regarding gender, research has found some differences in access to digital technologies. For example, Hasebrink, Görzig, Haddon, Kalmus, and Livingstone (2011), using a representative sample (n = 25.000) of children in Europe, found that girls had a slightly lower average of access locations, platforms, private home access and quality of mobile access than male children and adolescents. Compared to girls, boys used ICT more intensively, perceived them more positively, and trusted them more deeply, were more experienced in their use, and spent more time online for a wider variety of activities. Although over the years differences in access to mobile technologies in many countries have reduced almost entirely (van Dijk, 2017), in low and middle-income countries socio-economic and cultural barriers (social norms and lack of confidence) still keep girls and women behind boys and men in the adoption of these technologies (GSMA, 2019; Mariscal, Mayne, Aneja, & Sorgner, 2019; OECD, 2018b; Sey & Hafkin, 2019). As Livingstone, Nandi, Banaji, and Stoilova (2017) find in an evidence review in some developing countries, girls are given access at an older age than boys, and this access is more limited or surveilled. Also, divides are larger in rural areas (GSMA, 2019) and the

region of Africa (Davaki, 2018). Still, more data regarding children's access and use of the Internet in these countries is needed to better understand the digital gender gaps (Livingstone et al., 2017).

As to physical access and household education, data from developed countries has shown that children and adolescents from households with higher educational levels have access to more locations and platforms, more private access and more sophisticated mobile access (Hasebrink et al., 2011; U.S. Department of Education, 2018; Vigdor, Ladd, & Martinez, 2014). Moreover, a study on children and adolescents in Xiangfan, China, whose parents had higher levels of education tended to have more digital access at home, and parents with higher education levels showed more positive attitudes towards technology (Zhao et al., 2010). Although there are not many studies that look at this particular relationship, some studies like PISA include parents' education as part of their economic, social, and cultural status (ECSC) measure. An analysis of the differences in Internet access at home between students from the bottom and top quarters in the ESCS index in PISA 2012, showed that while in some countries (e.g., Denmark, the Netherlands and others), less than 2% of the bottom quarter did not have access to the Internet at home, in other mid-income countries these percentages were much higher (e.g., 38% in Chile and 45% in Mexico) (OECD, 2016).

Concerning access and age, evidence also in Europe shows that older children have access from more places and platforms as well as more private home access and better quality of mobile access as compared to younger children (Hasebrink et al., 2011; Mascheroni & Ólafsson, 2018).

Physical access uses and digital skills

The relevance of analysing the relationship of physical access to uses and skills is associated with the discussion of the implications of physical access. This discussion relates to the notion of levels or stages of digital inclusion. Selwyn (2010) defines access as a progression that begins with formal/theoretical access; that is, the formal provision of ICT in the home, community and university settings that is theoretically available to the individual. Next is effective/perceived access, or how able to access those resources a person feels, followed by a basic use of ICT, which afterwards may (or may not) lead to meaningful engagement with ICT, information and services. This process ends in potential short-term outcomes and longer-term consequences related to an individual's participation in society (Selwyn, 2010). Early work from the Global North states that motivation is the first stage in the process of appropriation of new technology; the second is acquiring physical access to digital media; the third involves the skills that are necessary to master them; and the fourth and final stage of appropriation is usage (van Dijk, 2005; van Dijk & van Deursen, 2014).

As mentioned in the Introduction, in the case of adolescents, studies tend to examine the relationship between physical access and one level of inclusion (either use or skills) and to define physical access as one-dimensional (i.e., either as points of access or devices of access). Regarding digital uses, these have been defined as indicators of children's and adolescents' participation in the digital society, assuming that the higher the number of activities, the greater the participation in the digital society and its opportunities (Livingstone & Haddon, 2009; Livingstone et al., 2019). As to the relationship of digital

physical access of children and adolescents to digital uses, studies in the educational field have found that the place of access influences the intensity and types of use. Specifically, data from *Programme for International Student Assessment* (PISA) studies shows that students make more intensive use of the Internet from home than from school and that this use tends to be more social and recreational (Hooft Graafland, 2018). Also, the International Computer and Information Literacy Study (ICILS) showed that, on average across countries, the percentage of students from 8th grade that used ICT daily from home or other places for school-related and other purposes, were higher than those students who used it from school (Fraillon, Ainley, Schulz, Duckworth, & Friedman, 2019).

As to the relationship between physical access and digital skills, a broader range of access locations and devices are likely to be related to higher skill levels (Balea, 2016). Some studies find that quality of access, understood as a type of access that guarantees the autonomy of use (e.g., the freedom to use the technology when and where one wants to use it), is positively related to digital skills (Balea, 2016; Hargittai, 2010). Robinson (2009) found that poor quality and autonomy of access create disparities in usage and skills among American youth. In a similar vein, Eynon and Geniets (2016) found in the UK that poor quality of access (e.g., lack of personal access or limited access in contexts of physical, social and institutional constraints) prevented young people from gaining the experiences they need to develop digital skills. A study on mobile-mediated behaviour of teens in the US also showed that mobile Internet access had a significant positive impact on social entertainment-based skills and content/creation-based skills (Park, 2015).

Concerning the relation between points of access and skills, Zhao et al. (2010) found in senior high school students from the prefectural-level city of Xiangfan China that a higher number of access places relates positively to higher levels of self-efficacy and Internet exploring behaviour. Also, a study with fourth- and fifth-grade African-American students in the southern USA found that students with computer use and a greater number of ICT devices at home experience higher levels of computer self-efficacy (Huang, Cotten, & Rikard, 2017). The results of the international study of ICILS 2013 indicated that 8th-grade student´ access to a home Internet connection had statistically significant associations with computer and information literacy (CIL) scores (i.e., information literacy, critical thinking, technical skills and communication skills) in about half of the participant education systems. Additionally, students from countries with greater access to computers in schools tended to have stronger Communication and Information Literacy (CIL) skills (Fraillon et al., 2019, 2014). Similarly, research in Chile shows that secondary students that have access at home have higher scores in a performance-based information and communication digital skills test (Jara et al., 2015).

Physical access in Chile

Chile is an interesting case to analyse within the Latin American Region. On the one hand, it has been classified as a high-income country (OECD, 2018a), has been regarded as "the neoliberal laboratory" (Arteaga & Martuccelli, 2012; Hall, Massey, & Rustin, 2013) and has stood out as a "model of development" for the Region (Oppenheim, 2018). On the other hand, Chile is average in terms of inequality in the Region (World Bank, 2019). In terms of physical access to the Internet, the fixed broadband connection in Chile is much more expensive than in other countries in the Region (i.e., ranked 82 out of 192 countries from

more to less expensive digital broadband connections) (ITU, 2017). At the same time, it shows very high cellphone penetration rates, far above the regional average (ITU, 2018), has the least expensive mobile broadband access in Latin América and is among the top 20% of countries with the least expensive mobile access in the world (ITU, 2017). In other words, although Chile is considered one of the most developed countries in the Region and shows high Internet penetration rates, it has not been able to solve the problems of inequality that characterise the Region.

Research questions

This paper addresses the relevance of physical access in the digital inclusion of children and adolescents in Chile. To do this, it will analyse *modalities* of physical access considering both access points and devices and examine whether or not these modalities facilitate participation in activities involving digital uses and the development of digital skills in children and adolescents. More specifically, this analysis aims to answer the following research questions:

RQ1. Do young Internet users exhibit identifiable patterns based on points of access and devices they use for going online?

RQ2. What are the sociodemographic characteristics of each access group of young Internet users?

RQ3. What is the relation between access groups, sociodemographic variables (sex, age and head of the household educational level) and the level of digital skills and participation in digital activities?

These questions are relevant for three main reasons. First, as seen in the literature review, the study of physical access in children tends to be one-dimensional and consider places or devices of access instead of *modalities* of access that combine both. Second, as also evidenced in the previous section, there is a lack of data in low and middle-income countries like Chile, related to children's digital experiences and divides. Third, the rapid changes in digital technologies require to permanently revise the theoretical and methodological discussion related to children's physical access and its consequences in young people's lives.

Method

Sample

Data for this study drew on the Kids Online Chile survey conducted between August and November 2016 with a representative national sample (n = 1000) of children and adolescents aged 9 to 17 years who were Internet users and 1,000 parents or guardians (one per child interviewed). Internet users were defined as people who had used the Internet at least once during the past three months (ITU, 2014). The sample comprised 52% of boys and 48% girls. The average age was 12.89 years. Out of the 19 education levels envisaged for the head of household, the average of the sample was 10.99 (Table 1).

Table 1. Children´s sex.

Variable	Question/categories	%
Children's sex	Male	52%
	Female (reference category)	48%

The study followed a four-stage cluster sampling method with a probability proportional to size (PPS): first, municipalities were selected and stratified; second, census areas were enumerated; third, homes were systematically selected; and fourth, children were randomly sampled. Probability weights consider this selection method.

Table 2).

Measures used in this study

Physical Access: In this study, physical digital access was measured by two variables, access point and access devices.

- *Access point*: Usage location refers to the places where the children access the Internet. The survey question asked about the following locations: *home, house of friends or relatives, school, public place, street or when commuting*. Frequencies asked were: *never; almost never; at least once a month; at least once a week; every day or almost every day; every day, many times a day; don't know*. The answer choices for this question were grouped into three categories: *once a month or less; once a week; every day*.
- *Access devices*: This refers to the technological devices used to access the Internet. The devices considered for this analysis were: desktop computer, laptop, cellphone, tablet or IPad, Smart TV, other devices. The answer choices for this question were grouped into three categories: o*nce a month or less; once a week; every day*.

Demographics

- *Children's and Adolescents' sex*: Male/female. Female is used as a reference category.
- *Children's and Adolescents' age*: Asked from parents or guardians, using years as a measure.
- *Education level of head of household*: This variable was measured with a scale of 19 education levels assignable to the head of household (understood as the main economic provider of the household), with "No Education" being the lowest and "Postgraduate" the highest level attained.

Online activities

This variable was constructed by applying the concept of *Ladder of Digital Participation* (Livingstone, Mascheroni, & Staksrud, 2015; Livingstone & O'Neill, 2014), which assumes that

Table 2. Children's age and parents' education.

Variable	Question/categories	Mean	SD	Min	Max
Children's age	Children's age	12.89	2.65	9	17
Parents' education	Nineteen categories (from no education to graduate level)	10.99	4.1	1	19

high-frequency online activities are the first steps in participation in the digital society, while low-frequency activities are indicators of a higher level of digital participation. To construct the variable, we used a 23-item questionnaire that asks children, "Have you done these things online in the past three months? (Yes/No)". Assuming this framework, a variation of a rank order scale was constructed giving the lowest score of 1 to the most frequent activity ("Watching videos in YouTube") and the highest of 23 to the least frequent activity ("Using the Internet to join a political, civic or religious group"). Individual scores were obtained by adding the scores for each activity engaged in ($\alpha = 0.75$). A high score on this variable means a high level of access to digital uses, while a low score means a low level of access to digital uses.

Digital skills

In this study, digital skill is defined as the self-reported capacity to do several tasks comprising operational, formal, information navigation and social skills (van Deursen & van Dijk, 2015; van Dijk & van Deursen, 2014. This follows the results of the Exploratory Factor Analysis (EFA) assessment conducted by Cabello, Claro, Lazcano, and Antezana (2018), which found that the digital skills measured in Kids Online Chile form a single factor. Therefore, for the present study, all items were grouped as one variable ($\alpha = 0.88$), summing the items where the child answered "Yes" to the question "Do you know how to … ?"

Access points and devices

As to access points and access devices, it was found that 84% of the sample use the Internet at home, 34.4% in the house of relatives or friends, 31.3% at school, 16% in public places, and 21% on the street or when commuting. On the other hand, 25.2% use a desktop computer every day, 34.5% use a laptop, 80.2% a cellphone, 16.1% a tablet or iPad, and 32.7% a smart TV (Table 3).

As to digital skills and activities, the sample was found to have a mean of 26.01 (SD = 7.87) on the digital skills index, while the activities measured by the activities ranked index yielded a mean of 83.5 (SD = 45.11) (Table 4).

Data analysis

To address the first research question (RQ1), that is, whether it is possible to identify different groups of young Internet users based on access points and devices, two

Table 3. Access points and access devices.

	Once a month or less	Once a week	Everyday
Access Points			
Home	8.3%	7.4%	84.3%
House of friends or relatives	45.5%	20.1%	34.4%
School	55.2%	13.4%	31.3%
Public place	73.7%	10.2%	16.0%
Street or when commuting	70.8%	8.1%	21.0%
Access Devices			
Desktop computer	57.7%	17.1%	25.2%
Laptop	50.8%	14.7%	34.5%
Cell phone	13.1%	6.7%	80.2%
Tablet or IPad	76.5%	7.4%	16.1%
Smart TV	59.9%	7.3%	32.7%

Table 4. Digital skill index and activities ranked index.

Variable	Question/categories	%/Mean	SD	Min	Max
Digital skill index	Do you know how to … ?				
	I know how to change my privacy settings (e.g., on a social networking site)	26.01	7.87	4	40
	I find it easy to choose the best keywords for online searches				
	I know how to save a photo that I find online				
	I find it easy to check if the information I find online is true				
	I know which information I should and shouldn't share online				
	I know how to remove people from my contact lists				
	I know how to post online videos or music that I have created myself				
	I know how to install apps on a mobile device (e.g., phone or tablet)				
	I know how to keep track of the costs of mobile app use				
	I know which different types of licenses apply to online content				
Activities ranked index	Have you done these things online in the past three months?				
	I learned something new by searching online	83.5	45.11	0	236
	I looked for information about work or study opportunities				
	I used the Internet for schoolwork				
	I looked for resources or events about my local neighborhood				
	I used the Internet to talk to people from places or backgrounds different from mine				
	I got involved online in a local organization or charity				
	I looked for news online				
	I discussed political or social problems with other people online				
	I got involved online in a campaign or protest				
	I signed a petition online				
	I used the Internet to join a civic, religious or political group				
	I created my own video or music and uploaded it to share				
	I created a blog or story or website online				
	I posted videos or music created by someone else				
	I visited a social networking site (e.g., Facebook)				
	I talked to family or friends who live further away (e.g., by Skype)				
	I used instant messaging (IM)(e.g., Viber, WhatsApp]				
	I watched video clips (e.g., on YouTube)				
	I played online games				
	I participated in a site where people share my interests or hobbies				
	I looked for health information for myself or someone I know				

procedures were conducted. First, a latent class analysis (LCA) was performed for the variables that make up the dimensions of location and devices for accessing the Internet. The LCA initially considered all the variables of the location and devices dimensions to identify access modalities in a single model. However, all the resulting models showed poor goodness of fit, which was considered as an indication that the dimensions were independent and needed to be analysed separately. Next, for each dimension, five models were calculated, out of which one was selected that showed a p-value greater than.05 and the lowest values among the following indicators: LL (*Log-Likelihood*), BIC (*Bayes Information Criterion*), NP (*Number of Parameters*) and CE (*Classification Error*). Additionally, the contribution of each variable to the selected model was analysed and the profile of each class was examined. From the LCA, the highest probability of each adolescent belonging to the classes formed was calculated. Forty cases were lost since not all the answers to the variables introduced in the models were available. Second, both categories were combined (Internet access location and devices) to form a new set of four classification categories according to the specific type of Internet access for each adolescent.

To answer the second research question (RQ2) related to the sociodemographic characteristics of each access modality, a multinomial logistic regression was conducted,

considering the modality of access as criterion variables and the sociodemographic variables as predictors. The resulting model was evaluated for fit and effect size, as well as the odds ratio (OR) and their significance for each predictor.

Finally, to answer the third research question (RQ3) concerning the relationship between adolescents' access modality and sociodemographic variables and their digital uses and skills, a multiple regression analysis was performed. The model fit and effect size were evaluated, and the regression coefficients were analysed.

Results

Modality of access (RQ1)

Table 5 shows the evaluation of the fit of the models involving location and devices for accessing the Internet. For *access point*, only the two- and three-class models showed overall adequate goodness-of-fit indices with *p-values* greater than .05. When comparing the models, the two-class solution was preferred, since it presented the lowest values in the remaining fit indicators selected for the analysis. On the other hand, for *access devices*, the five models yielded adequate p-values. When comparing these models, the two-class solution was preferred because it showed the best fit about the indicators under consideration.

The classes resulting from the access point model were called *home connection* and *ubiquitous connection*. The former group accounts for 74.87% of the total adolescents in this model, while the latter group accounts for 25.13%. In other words, one in every four adolescents who can access the Internet in Chile can do so from multiple places, while the rest have access mainly from home.

The majority of the adolescents in the first group connected to the Internet daily from their home and once a month or less frequently from other places, while the majority of those in the second group answered that they go online daily from different places. According to the Wald test, all the connection points allow discriminating between the groups, so that the ubiquitous connection group has a higher probability of access in all places. Thus, for example, while both groups have a high probability of responding that they go online daily from home, the number of subjects in the ubiquitous connection group tends to be significantly larger (93.6%) than that in the home connection group (80%).

Table 5. Model fit evaluation information for location and devices to access internet.

	LL	BIC	NP	p-value	CE
Access point					
1-Class	−3956.83	7982.41	10.00	.00	.00
2-Class*	−3611.05	7338.97	17.00	.24	.03
3-Class	−3629.32	7375.52	17.00	.06	.04
4-Class	−3624.95	7373.66	18.00	.03	.03
5-Class	−3624.74	7469.48	32.00	.01	.03
Access Devices					
1-Class	−4890.16	9863.09	12.00	.35	.00
2-Class*	−4862.63	9849.42	18.00	.83	.00
3-Class	−4873.75	9885.46	20.00	.77	.01
4-Class	−4849.26	9891.65	28.00	.93	.00
5-Class	−4849.18	9898.40	29.00	.93	.00

* Selected model.

Regarding access devices, the selected model yielded two classes which were named *cellphone* (71%), meaning those that mainly, but not exclusively, access from a cellphone, and *multi-device connection* (29%), those that usually use various devices for access.

The subjects in the *cellphone* group were more likely to respond that they connect to the Internet from other devices once a month or less, while those classified under *multi-device connection* responded that they accessed the Internet every day through various devices except for iPads or tablets.

By combining the subjects in the latent classes resulting from location and devices of Internet access, four new categories were obtained which represent the specific type of access modality for each adolescent, namely, a) *Cellphone and home* (53.5%); b) *Cellphone and ubiquitous* (17.6%); c) *Multi-device and home* (21%) and d) *Multi-device and ubiquitous* (7.8%). This latter group contains highly digitally included adolescents, since they have a greater possibility of accessing the Internet from different points and devices, while the *cellphone and home* connection group involves the least included subjects given the restriction imposed by access from a single device and connection point.

Sociodemographic predictors of the modality of access (RQ2)

Table 6 presents the averages and the standard deviation of the sociodemographic characteristics of each access modality.

The results of the multinomial logistic regression of predictors of the modality of access are presented in Table 7. The reference category used was the *cellphone and home* modality since it represents the group with the most limited type of access (mainly one device and one place). Because all the predictors were introduced in the same model, the statistical test for the predictors indicates their particular association with a modality of access, controlled by the other variables.

For the overall evaluation of the multinomial logistic regression model fit, a $\chi 2 = 142{,}622$ $p < .001$ was found, which indicates that the model as a whole fits significantly better than an empty model with no predictors. The *Nagelkerke R-square* function indicates that 15.3% of the variation in each modality occurs due to the variation between the factors. This model accurately classifies 54.7% of the inclusion of a modality of access.

As Table 7 shows, age is a consistent predictor for differentiating between Internet access modalities, as the increase in age increases the likelihood of belonging to the *cellphone and ubiquitous* and to the *multi-device and ubiquitous* modalities, and decreases the probabilities of belonging to the *multi-device and home* connection modality as

Table 6. Descriptive statistics of sociodemographic characteristics by access modality.

	Cellphone and home	Multi-device and home	Cellphone and ubiquitous	Multi-device and ubiquitous
Group Size	53.5%	21%	17.6%	7.8%
Sex				
Male	52.7%	53.0%	52.7%	42.7%
Female	47.3%	47.0%	47.3%	57.3%
Child's Age	12.56 (2.579)	12.04 (2.352)	14.76 (2.223)	13.71 (2.690)
Education background	10.58 (4.003)	11.37 (4.084)	11.41 (4.231)	12.07 (3.954)

Table 7. Logistic multinomial regression predicting access modalities with cellphone-only home as reference.

	Multi-device and home connection			Cellphone-ubiquitous connection			Multi-device-ubiquitous connection		
Predictor	B	SE	OR	B	SE	OR	B	SE	OR
Age	−.087	.034	.917*	.354	.040	1.425*	.169	.049	1.184*
Sex[a]	.032	.168	.032	−.027	.188	.974	−.431	.253	.650
Head of home education	.050	.021	1.051*	.043	.023	1.044	.084	.030	1.088*

a = Sex reference category: female; *p <.05.

compared to the reference modality (*cellphone and home* connection). Also, the education of the head of the household is significant to predict belonging to the *multi-device and home* and the *multi-device and ubiquitous* connection modalities. No significant effects of sex are observed.

Modality of access as a predictor of digital uses and skills (RQ3)

The results of the multiple regression of the access modality and the sociodemographic variables as predictors of Internet uses and digital skills are shown in Table 8. Regarding Internet uses, three predictor variables were found that explain 23.6% of the variance (R2 = .236, F (6; 953) = 49.03, p < .01). Age was found to significantly predict digital uses (β = 7.271, p < .01), as well as the modality of *cellphone-ubiquitous* connection (β = 10.861, p < .05) and *multi-device-ubiquitous* connection (β = 19.277, p < .01) as compared to the *cellphone and home* access modality.

Regarding digital skills, four predictor variables were found that explain 33.8% of the variance (R2 = .338, F (6; 953) = 81.05, p < .01). As in the case of predictors of Internet use, age was found to be a significant predictor (β = 1.516, p < .01) as well as the modality of *cellphone-ubiquitous* connection (β = 1.885 < .05) and *multi-device-ubiquitous* connection (β = 1.536, p < .05) as compared to the *cellphone-home* access modality. Additionally, the educational level of the head of the household was found to predict skills (β = .181, p < .05), although it has a lower relative weight for the other predictors.

Discussion

This study aimed to identify modalities of physical access to the Internet by Chilean children and adolescents and the role of the modalities in other levels of inclusion in

Table 8. Multiple regression predicting Internet uses and digital skills.

	Digital uses		Digital Skills	
Predictor	B	SE	B	SE
Constant	−15.488	8.408**	4.752	1.320
Age	7.271	0.516**	1.516	0.081**
Sex[a]	−1.015	2.562	−0.587	0.402
Head of home education level	0.273	0.314	0.181	0.049**
Multi-device and home[b]	0.611	3.307	0.644	0.519
Cellphone and ubiquitous[b]	10.861	3.694*	1.885	0.580*
Multi-device and ubiquitous[b]	19.277	4.954**	1.536	0.778*

Reference categories a = Female sex; b = Cellphone-home connection; **p <.01; *p <.05.

the digital society (uses and skills). Concerning the first research question (RQ1), by combining the main places and devices to connect to the Internet, four modalities of access were found. These groups were: *cellphone and home; cellphone and ubiquitous; multi-device and home*; and *multi-device and ubiquitous*. These results indicate that there are two axes to access: one of them is digital ecology (i.e., more or fewer devices), which describes not only the diversity of technological artefacts but also the variety of possible affordances they deliver. The other is the spatial axis, which describes the different offline contexts where such affordances may or may not manifest themselves. The articulation of these axes provides for referring to differentiated digital experiences for children and adolescents.

As to the distribution of adolescent internet users between the four modalities of access, results show significant differences: only one in four of those who have access to the Internet can regularly connect to it from multiple places, while the rest can mainly do so from their homes. On the other hand, the vast majority (71%) use a cellphone as the access device, while only one third regularly connect from multiple devices. When combining point of access and devices, more than half of the young Internet users mainly have access from a cellphone at home, while multi-device access in various spatial contexts, or ubiquitous access, is available to only 7.8% of this age group. These figures provide grounds for questioning the common belief of fully connected adolescence in non-developed countries, as other researchers have recently stated (Banaji, Livingstone, Nandi, & Stoilova, 2018).

As for the second research question (RQ2) regarding sociodemographic differences between the different user access groups identified, the *cellphone and ubiquitous* and *multi-device and ubiquitous* access groups were found to be mainly composed of older adolescents, while *cellphone and home*, and especially *multi-device and home* access groups, were more associated with the youngest boys and girls analysed. These results show the relative importance of cellphones and the ubiquity of access for older adolescents, probably associated with the autonomy that these modalities of access allow.

The results also showed that *multi-device* (both *home* and *ubiquitous*) access groups are associated with a higher educational level of the head of the household, which is likely to be related to higher social and cultural capital (Robinson, 2009). No differences were observed by sex between access modalities, which is divergent from previous findings that show less access for girls (Livingstone & Helsper, 2007), suggesting that in the case of Chile, a digital gender gap is less evident.

As to the third research question (RQ3) regarding the relationship between access modalities and other levels of inclusion, the results show that both ubiquitous modalities (*multi-device* and *cellphone* varieties) predict digital use and skills among young Chileans, while the more static modalities (*cellphone and home* and *multi-device and home*) do not. These results show how inclusion in digital society involves different access combinations and possibilities for adolescents, with several implications. First, they suggest that what generally facilitates further levels of inclusion is not physical access in general, but rather modalities of access (van Dijk, 2005). Even more, they provide grounds for the idea of *enabling* physical access, understood as a starting point for the display of personal benefits (Hassani, 2006).

Second, they show the importance of ubiquity of access – that is, being able to access the Internet at any place, any time – in digital opportunities and skills. This finding should be further investigated but suggests that access policies for young people in developing

countries should not only consider providing a certain device (e.g., one laptop per child) but also Internet access in public places, thus spreading what can be called the *experience of continuity* of digital inclusion.

An analysis of the relation between the control variables also helps to understand the other levels of inclusion. Regarding the relation between sociodemographic variables and uses, the results are consistent with previous research on children's and adolescents' digital experiences where age is the variable that most differentiates types of use and digital skills (Livingstone & Helsper, 2007; Mascheroni & Ólafsson, 2018). As with access modalities, gender does not predict differences in levels of use. Also, it is noteworthy that the educational level of the head of the household does not predict the level of use, showing a certain homogenization of digital practices among children and adolescents from different cultural backgrounds in Chile (Hinostroza, Matamala, Labbé, Claro, & Cabello, 2015). On the other hand, consistent with previous research, the education of the head of the household is related to differences in digital skills (Claro et al., 2012; Claro, Cabello, San Martín, & Nussbaum, 2015). Considering that the education of the head of household is an indicator of the family's cultural capital (Davis-Kean, 2005; Sirin, 2005), future research on uses and skills should consider the social and cultural capital framework to better understand the variables explaining the digital divide (Bourdieu, 1997; Robinson, 2009).

In synthesis, the results show that the high percentage of adolescents that have access to the Internet in Chile hides different digital modalities or *experiences* related to the devices and places from where they access and that these different modalities affect their digital participation and level of digital skills. Even more, the finding that ubiquitous modalities predict digital use and skills among young Chileans shows the need for public policies that provide free public access together with training opportunities for teachers and parents on how to promote young internet users' digital skills and positive participation in the digital environment.

One limitation of this study is that the measure for uses, even though it considers different weights for different frequencies of uses, is based on an additive measure that does not discriminate between different types of uses (e.g., recreational, educational). Future research could consider types of uses to better understand the relationship with the different experiences of continuity of access. Also, new research should consider qualitative data to understand the more specific ways in which the different modalities of access enable adolescents' activities and participation online.

Another limitation is that digital skills measure considered skills that are relevant to the general population. Future research should consider a definition of skills that is more specific to the age groups studied, including, for example, more specific digital skills for learning and content creation. Finally, although these results may provide some indications of the types of inequalities in the distribution of physical access and its consequences in the Latin American Region, given the particularities of the Chilean model, comparative studies in the region should be performed.

Acknowledgments

The support from ANID/PIA/Basal Funds for Centers of Excellence FB0003 is gratefully acknowledged.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

The support from ANID/ PIA/ Basal Funds for Centers of Excellence FB0003 is gratefully acknowledged. This research was also supported by the ANID – National Research and Development Agency under Grant FONDECYT [11150341] and the Ministry of Education with the support of UNESCO.

Notes on contributors

Patricio Cabello, Ph.D. is an Assistant Professor at the Center for Advanced Research in Education, Institute of Education, Universidad de Chile. His research focuses on digital inclusion, participation, civic engagement, and education. He has been a consultant to UNESCO and UNICEF in projects for the digital inclusion of children and adolescents and has participated as a principal investigator in diverse projects.

Magdalena Claro, Ph. D. is Assistant Professor and Academic Director of the Center of Digital Education Practices, at the Faculty of Education of the Universidad Católica de Chile. Her research focuses on digital inclusion, the effects of the Internet in new generations, digital skills, and teaching and learning in digital environments.

Rodrigo Rojas-Andrade, Ph.D., is a Professor of the Psychology Department of Academy of Christian Humanism University (UAHC, Chile), and director of School Mental Health Laboratory. His research focuses on studying the processes of design and implementing the School-Based Mental Health programs and its effects on educational performance.

Daniela Trucco, M.A. Social Affairs Officer, from the Social Development Division in ECLAC, where she works in the areas of education, childhood, youth and digital society. Her professional experience has concentrated in research and social policy advisory, from the perspective of social inclusion in Latin American and the Caribbean.

ORCID

Patricio Cabello http://orcid.org/0000-0001-9656-3147
Magdalena Claro http://orcid.org/0000-0002-2333-6477
Rodrigo Rojas http://orcid.org/0000-0002-6459-6902

References

Arteaga, A. C., & Martuccelli, D. (2012). Neoliberalismo, corporativismo y experiencias posicionales: Los casos de Chile y Francia. *Revista Mexicana de Sociología*, *74*(2), 275–302.

Ayanso, A., Cho, D. I., & Lertwachara, K. (2014). Information and communications technology development and the digital divide: A global and regional assessment. *Information Technology for Development*, *20*(1), 60–77.

Balea, B. (2016). The role of smartphones in increasing digital and social inequalities among Romanian children. *Journal of Comparative Research in Anthropology and Sociology*, *7*(2), 1–20.

Banaji, S., Livingstone, S., Nandi, A., & Stoilova, M. (2018). Instrumentalising the digital: Adolescents' engagement with ICTs in low-and middle-income countries. *Development in Practice*, *28*(3), 432–443.

Bourdieu, P. (1997). *Capital cultural, escuela y espacio social*. México, D.F.: Siglo XXI.

Boyd, D. (2014). *It's complicated: The social lives of networked teens*. New Haven, CT: Yale University Press.

Büchi, M., Just, N., & Latzer, M. (2016). Modeling the second-level digital divide: A five-country study of social differences in internet use. *New Media & Society*, *18*(11), 2703–2722.

Cabello, P., Claro, M., Lazcano, D., & Antezana, L. (2018). La inclusión digital de niños y adolescentes chilenos desde la perspectiva de usos y habilidades [Digital Inclusion of children and adolescents from the perspective of uses and skills]. In E. Jiménez, M. Casado, & M. Garmendia Eds., *Oportunidades y Riesgos de los Menores en Internet* (pp. 55–85). España: Editorial GEDISA/ Universidad del País Vasco.

Churchill, D., & Hedberg, J. (2008). Learning object design considerations for small-screen handheld devices. *Computers & Education*, *50*(3), 881–893.

Claro, M., Cabello, T., San Martín, E., & Nussbaum, M. (2015). Comparing marginal effects of Chilean students' economic, social and cultural status on digital versus reading and mathematics performance. *Computers & Education*, *82*, 1–10.

Claro, M., Preiss, D. D., San Martí, N. E., Jara, I., Hinostroza, J. E., Valenzuela, S., & Nussbaum, M. (2012). Assessment of 21st century ICT skills in Chile: Test design and results from high school level students. *Computers & Education*, *59*(3), 1042–1053.

Davaki, K. (2018). *The underlying causes of the digital gender gap and possible solutions for enhanced digital inclusion of women and girls*. Brussels: European Parliament's Policy Department for Citizens' Rights and Constitutional Affairs.

Davis-Kean, P. E. (2005). The influence of parent education and family income on child achievement: The indirect role of parental expectations and the home environment. *Journal of Family Psychology*, *19*(2), 294–304.

Dolittle, P., Lusk, D., Byrd, C., & Mariano, G. (2009). iPods as mobile multimedia learning environments: Individual differences and instructional design. In H. Ryu & D. Parsons (Eds.), *Innovative mobile learning: Techniques and technologies* (pp. 83–101). Hershey, PA: Information Science Reference.

Donner, J. (2015). *After access: Inclusion, development, and a more mobile internet*. Cambridge, MA: MIT Press.

Eynon, R., & Geniets, A. (2016). The digital skills paradox: How do digitally excluded youth develop skills to use the internet? *Learning, Media and Technology*, *41*(3), 463–479.

Fairlie, R., & Kalil, A. (2017). The effects of computers on children's social development and school participation: Evidence from a randomized control experiment. *Economics of Education Review*, *57*, 10–19.

Fraillon, J., Ainley, J., Schulz, W., Duckworth, D., & Friedman, T. (2019). Preparing for life in a digital age: IEA international computer and information literacy study 2018 international report. International Association for the Evaluation of Educational Achievement (IEA) website. Retrieved from https://www.iea.nl/studies/iea/icils/2018

Fraillon, J., Ainley, J., Schulz, W., & Friedman, T. (2014). *Preparing for life in a digital age: The IEA international computer and information literacy study international report*. New York: Springer.

Gleason, B., & von Gillern, S. (2018). Digital citizenship with social media: Participatory practices of teaching and learning in secondary education. *Journal of Educational Technology & Society*, *21*(1), 200–212.

GSMA. (2019). The mobile gender gap report 2019. London: Author. Retrieved from https://www.gsmaintelligence.com/research

Hall, S., Massey, D., & Rustin, M. (2013). After neoliberalism: Analysing the present. *Soundings*, *53*(53), 8–22.

Hargittai, E. (2010). Digital na(t)ives? Variation in internet skills and uses among members of the "net generation". *Sociological Inquiry*, *80*(1), 92–113.

Hargittai, E., & Hinnant, A. (2008). Digital inequality: Differences in young adults' use of the Internet. *Communication Research*, *35*(5), 602–621.

Hargittai, E., & Kim, S. J. (2012). The prevalence of smartphone use among a wired group of young adults. Institute for Policy Research Northwestern University Working Paper Series. Retrieved from http://www.ipr.northwestern.edu/publications/papers/2011/ipr-wp-11-01.html

Hasebrink, U., Görzig, A., Haddon, L., Kalmus, V., & Livingstone, S. (2011). *Patterns of risk and safety online: In-depth analyses from the EU kids online survey of 9-to 16-year-olds and their parents in 25 European countries*. London: EU-Kids Online Network.

Hassani, S. N. (2006). Locating digital divides at home, work, and everywhere else. *Poetics*, *34*(4), 250–272.

Hinostroza, J. E., Matamala, C., Labbé, C., Claro, M., & Cabello, T. (2015). Factors (not) affecting what students do with computers and internet at home. *Learning, Media and Technology*, *40*(1), 43–63.

Hooft Graafland, J. (2018). *New technologies and 21st century children: Recent trends and outcomes* (OECD Education Working Papers No. 179). Paris: OECD Publishing.

Huang, K. T., Cotten, S. R., & Rikard, R. V. (2017). Access is not enough: The impact of emotional costs and self-efficacy on the changes in African-American students' ICT use patterns. *Information, Communication & Society*, *20*(4), 637–650.

ITU. (2014). *Manual for measuring ICT access and use by households and individuals*. Geneva: International Communication Union. https://www.itu.int/dms_pub/itu-d/opb/ind/D-IND-ITCMEAS-2014-PDF-E.pdf

ITU. (2017). *ICT prices 2017*. Geneva: International Telecommunication Union Place des Nations. Retrieved from https://www.itu.int/en/ITU-D/Statistics/Documents/publications/misr2017/IPB2017_E.pdf

ITU. (2018). *ITU council contribution to the high-level political forum on sustainable development (HLPF). Report by the secretary-general*. Geneva: International Telecommunication Union.

Jara, I., Claro, M., Hinostroza, J. E., Rodríguez, P., San Martín, E., Cabello, T., & Ibieta, A. (2015). Understanding factors related to Chilean students' digital skills: A mixed-methods analysis. *Computers & Education*, *88*, 387–398.

Ko, M. H. (2017). Learner perspectives regarding device type in technology-assisted language learning. *Computer Assisted Language Learning*, *30*(8), 844–863.

Lai, C. H., Yang, J. C., Chen, F. C., Ho, C. W., & Chan, T. W. (2008). Affordances of mobile technologies for experiential learning: The interplay of technology and pedagogical practices. *Journal of Computer Assisted Learning*, *23*, 326–337.

Livingstone, S., & O'Neill, B. (2014). Children's rights online: Challenges, dilemmas and emerging directions. In S. van der Hof, B. van den Berg, & B. Schermer (Eds.), *Minding minors wandering the web: Regulating online child safety* (pp. 19–38). Berlin: Springer. http://eprints.lse.ac.uk/62276/

Livingstone, S., Carr, J., & Byrne, J. (2015). *One in three: Internet governance and children's rights* (Paper Series No 22). Waterloo, Ontario: Centre for International Governance Innovation and The Royal Institute of International Affairs. Retrieved from https://www.cigionline.org/sites/default/files/no22_2.pdf

Livingstone, S., & Haddon, L. (2009). *EU kids online: Final report*. London: EU Kids Online.

Livingstone, S., & Helsper, E. (2007). Gradations in digital inclusion: Children, young people and the digital divide. *New Media & Society*, *9*(4), 671–696.

Livingstone, S., Kardefelt-Winther, D., Kanchev, P., Cabello, P., Claro, M., Burton, P., & Phyfels, J. (2019). *Is there a ladder of children's online participation? Findings from three global kids online countries*. Florence: UNICEF Innocenti Research Brief. https://www.unicef-irc.org/publications/1019-ladder-of-childrens-online-participation-findings-from-three-gko-countries.html

Livingstone, S., Mascheroni, G., & Staksrud, E. (2015). *Developing a framework for researching children's online risks and opportunities in Europe*. London: London School of Economics/EU Kids Online Network.

Livingstone, S., Nandi, A., Banaji, S., & Stoilova, M. (2017). *Young adolescents and digital media: Uses, risks and opportunities in low-and middle-income countries: A rapid evidence review*. London, UK: Gage. http://eprints.lse.ac.uk/83753/

Mariscal, J., Mayne, G., Aneja, U., & Sorgner, A. (2019). Bridging the gender digital gap. *Economics: The Open-Access, Open-Assessment E-Journal*, *13*(2019–9), 1–12.

Mascheroni, G., & Ólafsson, K. (2018). *Accesso, usi, rischi e opportunità di internet per i ragazzi italiani. I risultati di EU Kids Online 2017*. London: EU Kids Online e OssCom. http://www.lse.ac.uk/media-

and-communications/assets/documents/research/eu-kids-online/reports/EU-Kids-Online-Italy-report-06-2018.pdf

Murphy, A., Farley, H., Lane, M., Hafeez-Baig, A., & Carter, B. (2014). Mobile learning anytime, anywhere: What are our students doing? *Australasian Journal of Information Systems*, *18*(3), 331–345.

Napoli, P. M, & Obar, J. A. (2014). Second class netizens: Race and the emerging mobile internet underclass. In R. A. Lind (Ed.), *Race and gender in electronic media*. (pp. 311–329). London: Routledge.

OECD. (2016). Are there differences in how advantaged and disadvantaged students use the Internet?. *PISA in Focus, 64, OECD Publishing, Paris*, https://doi.org/10.1787/5jlv8zq6hw43-en.

OECD. (2018a). *Estudios económicos de la OCDE: Chile. Visión general*. Chile: Author.

OECD. (2018b). *Bridging the digital gender divide: Include, upskill, innovate*. Paris: Author.

Oppenheim, L. (2018). *Politics in Chile: Democracy, authoritarianism, and the search for development*. Londres: Routledge.

Park, Y. J. (2015). My whole world's in my palm! The second-level divide of teenagers' mobile use and skill. *New Media & Society*, *17*(6), 977–995.

Parsons, D., Wishart, J., & Thomas, H. (2016). Exploring mobile affordances in the digital classroom. In I. Arnedillo Sanchez & P. Isaias (Eds.), *Proceedings of 12th international conference on mobile learning (Mobile Learning 2016)* (pp. 43–50. Portugal: Vilamoura.

Robinson, L. (2009). A taste for the necessary: A Bourdieuian approach to digital inequality. *Information, Communication & Society*, *12*(4), 488–507.

Robinson, L. (2018). The identity curation game: Digital inequality, identity work, and emotion management. *Information, Communication & Society*, *21*(5), 661–680.

Sefton-Green, J. (2013). *Mapping digital makers: A review exploring everyday creativity, learning lives and the digital*. United Kingdom: Nominet.

Selwyn, N. (2010). Degrees of digital division: Reconsidering digital inequalities and contemporary higher education. RUSC. *Universities and Knowledge Society Journal*, *7*(1). http://www.redalyc.org/pdf/780/78012953011.pdf

Sey, A., & Hafkin, N. (2019). *Taking stock: Data and evidence on gender equality in digital access, skills, and leadership*. Macau: EQUALS Global Partnership/UN University. https://i.unu.edu/media/cs.unu.edu/attachment/4040/EQUALS-Research-Report-2019.pdf

Sirin, S. R. (2005). Socioeconomic status and academic achievement: A meta-analytic review of research. *Review of Educational Research*, *75*(3), 417–453.

Third, A., Bellerose, D., Oliveira, J. D. D., Lala, G., & Theakstone, G. (2017). *Young and online: Children's perspectives on life in the digital age*. Sydney: Western Sydney University.

U.S. Department of Education, National Center for Education Statistics. (2018). *Student access to digital learning resources outside of the classroom* (NCES 2017-098). Executive Summary.

UNICEF. (2017). *The state of the world's children 2012: children in a digital world*. New York: Author. https://www.unicef.org/publications/files/SOWC_2017_ENG_WEB.pdf

van Deursen, A., & Helsper, E. (2017). Collateral benefits of internet use: Explaining the diverse outcomes of engaging with the internet. *New Media & Society*, *20*(7), 2333–2351.

van Deursen, A., & van Dijk, J. A. (2015). Toward a multifaceted model of Internet access for understanding digital divides: An empirical investigation. *The Information Society*, *31*(5), 379–391.

van Deursen, A. J., & van Dijk, J. A. (2018). The first-level digital divide shifts from inequalities in physical access to inequalities in material access. *New Media & Society*, *21*(2), 354–375.

van Dijk, J. A. (2005). *The deepening divide: Inequality in the information society*. London: Sage Publications.

van Dijk, J. A. (2017). Digital divide: Impact of access. In P. Rössler (Ed.), *The international encyclopedia of media effects* (Vol. IV, ppp. 384–392). New Jersey: Wiley-Blackwell.

van Dijk, J. A., & van Deursen, A. J. (2014). *Digital skills: Unlocking the information society*. New York, NY: Palgrave-MacMillan.

Vigdor, J. L., Ladd, H. F., & Martinez, E. (2014). Scaling the digital divide: Home computer technology and student achievement. *Economic Inquiry*, *52*(3), 1103–1119.

Warschauer, M. (2004). *Technology and social inclusion: Rethinking the digital divide*. Boston: MIT Press.

Wong, Y. C., Ho, K. M., Chen, H., Gu, D., & Zeng, Q. (2015). Digital divide challenges of children in low-income families: The case of Shanghai. *Journal of Technology in Human Services*, *33*(1), 53–71.

World Bank, World development indicators. (2019). GINI index (World Bank estimate) (data file). Retrieved from https://data.worldbank.org/indicator/SI.POV.GINI

Zhao, L., Lu, Y., Huang, W., & Wang, Q. (2010). Internet inequality: The relationship between high school students' Internet use in different locations and their Internet self-efficacy. *Computers & Education*, *55*(4), 1405–1423.