The same course, different access: the digital divide between urban and rural distance education students in South Africa

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Abstract

Access to education is a significant determinant in future success, not only for a country but equally for individuals. Higher Education (HE) thus is an integral part of the Sustainable Development Goals and vital in supporting African development. Despite this, there is often a lack of access to HE in many parts of Africa, distance education can subsequently play an important role in increasing access to education by providing materials online. Even though institutions such as the University of South Africa, a provider of Open Distance Learning (ODL), can open access to HE for many marginalised and peripheral communities, we cannot separate access to ODL education from the debate of access to ICTs. Students in urban areas have a significantly different educational experience to students with poor ICT access in peri-urban and rural areas. This paper explores the nature of access to ICT and how this affects students' ability to access HE.

Keywords: Digital divide; distance education; intergenerational; rural; urban; Africa

Introduction

Distance Education (DE) is capable of delivering quality university education to geographically marginalised and dispersed African students, however, this access needs to be contextualised within the ongoing debate around access to information and communication technologies (ICTs). The information networks does not look the same everywhere (Broadband Commission, 2013; ITU, 2017; Hill & William, 2018; Warf, 2019), as access to ICTs is spread unevenly across different spaces, populations and households (Graham *et al*., 2014; Bornman, 2015; Pashapa & Rivett, 2017). This is certainly the case in South Africa where only a relatively small proportion of the population has good ICT infrastructure such as internet access (22%), when compared to more developed countries[1] such as the United Kingdom (92%) and United States (89%) (ITU, 2017). It is therefore important to situate the debate on the role of DE in increasing access to higher education (HE) in the context, scope and impact of the digital divide, particularly between

students living in urban areas and those living in peri-urban and rural areas. While DE can open access to HE, it can equally lead to various forms of educational exclusion that may arise from disparities in access to ICTs.

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[1]Developed countries are technologically advanced countries with a Gross National Income (GNI) per capita year of more than $12, 615. The economic criterion is industrialisation and a high Human Development Index (HDI). Available from https://www.un.org/en/development/desa/policy/wesp/wesp_current/2014wesp_country_classification.pdf

Given that quality education is a stand-alone goal that links almost all the other sustainable development goals (UNESCO, 2016), emphasis has been on increasing access to inclusive and equitable quality education, where exclusions are not based on physical condition, social-economic background or geographic dispersion. Thus, ODL has moved from the backdrop of education landscape to the mainstream of university education, with the University of South Africa (UNISA) earning the accolade of being Africa's leading ODL institution and the regional hub of education (Liebenberg *et al*., 2012; Gunter & Raghuram, 2018). As a mega university offering accredited qualifications, UNISA creates access for marginalised individuals to access higher education by providing an alternative mode for acquiring university education from contact institutions (see forthcoming, author, 2019). The institution is primarily dependent on ICT to provide quality university education (Liebenberg *et al*., 2012). Owing to South Africa's digital inequalities in access to ICT, there is need for a more critical understanding of the digital divide among DE students. De Haan (2004) criticised earlier studies on digital divide as being speculative and lacking consideration of its' possible consequences on students' experience of technology-enhanced learning. Even though there is an increased body of studies and evidence from empirical findings (Oyedemi, 2009; 2012; Pashapa & Rivett, 2017), the majority of literature has focused on developed countries with some highlighting the digital gap between developed/ developing countries[2] or urban/ rural areas largely in the former (Hindman, 2000; Pick & Nishida, 2015; Penard *et al*., 2015; Mykhnenko, 2016). Only a few studies have focused on DE and African students, especially in technology-enhanced learning (Ajadi *et al*., 2008; Liebenberg *et al*., 2012; Kaliisa & Picard, 2017; Hill & Lawton, 2018; Madge *et al*., 2019).

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[2]Developing countries are less technologically advanced countries with a GNI per capita year of less $1, 035. These countries have low living standards, less developed industrial base and a low HDI. Available from https://www.un.org/en/development/desa/policy/wesp/wesp_current/2014wesp_country_classification.pdf

Based on the location where ICTs can be accessed – home, work, internet cafés or UNISA centres, this paper investigates how ICT accessibility varies among the South African learners studying with UNISA. We also investigate intergenerational diffusion of access to a computer and internet or the influence of parental education background and their own possession and use ICT to provide an empirical basis for understanding digital divide among students. Locations that provide a rich learning environment are referred to as *meaningful access* because only a serene location can allow ODL students to effectively and conveniently use a computer and internet for learning, which may include the use of online interactive discussions. This paper uses empirical data from a multifaceted research project, known as International Distance Education and Africa Students (IDEAS), to re-conceptualize the notion that the digital divide is not a simplistic separation between "information haves" and "information have-nots", but different social-economic factors may evoke a gradation of 'haves".

The paper is structured as follows. The next (second) section provides literature supporting the existence of geographical digital divide for individuals who live in developed/ developing countries and urban/ rural areas, and resources that are critical for individuals to possess and effectively use ICTs. The third section describes the methodology used to collect the data and provides a summary of the methods of data analysis. The fourth section presents empirical findings aimed at examining the determinants behind private access to a computer and use of internet among DE students. The last section concludes by discussing policy implications for narrowing the digital gap among ODL students.

Differences in the possession and use of ICT facilities

In most literature, "digital divide" is loosely described as inequalities in access to and use of ICT facilities (Furuholt & Kristiansen, 2007; Brown & Czerniewicz, 2010). This definition has been criticised, as it points to digital exclusion as a mere lack of material resources (Liebenberg *et al*., 2012; Li & Ranieri, 2013). According to van Dijk (2006) and Warschauer & Matuchniak (2010),

the concept of digital divide also involves the possession of skills to use digital technologies in a meaningful way. De Haan (2004) used the resource theory to describe three different resources that are fundamental in understanding the concept of digital divide, (1) material, (2) cognitive and (3) social resources. Based on these resources, different multidimensional theoretical models have been developed, with the more recent models outlining the differences in ICT access and use as consequences of motivation, possession, digital skills and use patterns (De Haan, 2004; Liebenberg *et al*., 2012).

Foremost, access to ICT is constrained by the possession of material resources. This includes an individual's financial ability to own a computer and use internet at home or use public ICT facilities at work or at internet cafés and information kiosks. Secondly, cognitive resources or the ability of students to read and process (literacy), handle (numeracy) and interpret (informacy) information that becomes available through ICT is the second resource type that is important in this digital age (De Haan, 2004; Warf, 2019). The notion of "digital natives" has been conceptualised to describe the difference between literacy, numeracy and informacy (Czerniewicz & Brown, 2010). According to Prensky (2010), and Jones & Czerniewicz (2010), literacy and numeracy are more natural to individuals born in the digital age, who through years of interacting and using digital devices (e.g., cell phones and videogames) have acquired and perfected their ability to use, handle and process information that becomes available (Dixon, 2014). Informacy, on the other hand is strongly related to the level of education attainment. For example, the ability to capture, store, manipulate, analyse, manage and translate metrological data is only acquired with attainment of some level of education.

Social resources is the third aspect outlined in the resource theory. Possession of a computer and internet is influenced by the social connections which an individual may have with people of the same social settings who themselves possess or have regular access to digital technology (De Haan, 2004; Dixon, 2014). Positive feedbacks on ICTs can reduce the uncertainties that often accompany skepticism with regard to the possession and use of digital technologies, particularly if the facility fits within existing norms and values of a household or community.

The problem with earlier discourses on digital divide is that they only delved on the binary division between information "haves" and "have-nots", with little or no focus on gradation of the information "haves" based on the degree of access to ICT. There is need to rethink the digital divide if we are to value the *material*, *cognitive* and *social* resources that diverse groups, for instance individuals living in urban areas and those living in peri-urban and rural areas, bring to the fore. Investigating the location of access to ICT and the extent to which it varies among diverse individuals of different geographical location will contribute to a better understanding on how meaningful access to ICT can promote or impede inclusive and equitable access to technology-enhanced learning and ODL in Africa.

Geographical digital divide

Towards the end of the 20th century, the international community started to embrace ICT as an important component of sustainable development (van Audenhove, 2003). The acceptance of digital technology has continued to take place regardless of the spatial extent of a country or level of development (Pick & Nishida, 2015), as over 2.5 billion people are now online (Graham *et al*., 2014). The dawn of the digital era is furthermore associated with the proliferation of ICTs, which not only plays an increasingly important role in economic, social, political and cultural landscapes but has become the information highway of the 21st century (Bornman, 2015; Evans, 2019). Although digital technology has touched almost every corner of the globe, the world has a digital divide that reflects geographical differences in technological infrastructure and implementation of technological strategies between developed and developing countries, differences between urban/ rural areas (Hindman, 2000; Giebel, 2013; Li & Ranieri, 2013; Pick & Nishida, 2015; Robinson, 2015) and across gender (Dixon, 2014).

In developed countries, the spatial diffusion of technological innovations has been widely investigated (Corrocher & Ordanini, 2002; Comin *et al*., 2012; Lin & Kwan, 2016). Studies by Cruz-Jesus *et al*. (2012), Bornman, (2015) and ITU (2017) reason that the even spatial diffusion of ICTs has enabled developed countries to take a leading role in adopting digital technology. This is because of the geographical proximity and clustering of nations or trading relations that are skewed in favour of the more developed and affluent nations (Comin *et al*., 2012). For instance, Scandinavia is considered a high broadband clustered region (Pick & Nishida, 2015),

largely because of the neighboring influence of high-technology nations on less digital nations to elevate their technology level. Thus, the technological developments and strategies in many developed countries appear to be extremely positive about the use of technology-enhanced learning (Mykhnenko, 2016). The same cannot be said for Africa, owing to the continents geography hegemony, which is evident by the increasing digital gap between African countries and between urban and rural areas (Penard *et al*., 2015; Pashapa & Rivett, 2017).

Africa and sub-Saharan Africa, in particular, have become prominent in the discourse of the digital divide (Giebel, 2013; Penard *et al*., 2015). According to the International Communication Union (ITU 2017), Africa lags behind the rest of the world with regard to key indicators of the information society, such as subscription to the internet and the quality (broadband connection at home) of internet. In 2013, the rate of internet use throughout the African continent was estimated at 16% compared with 75% in Europe, with the gap widening in recent years (Penard *et al*., 2015). Based on ICT Development Index (ITU, 2017), South Africa is ranked 92 in the world and third in Africa, only behind Mauritius and Seychelles (Middleton, 2013), yet, different forms of digital divide are manifest amongst different population groups. This is evident by the increasing digital gap between: urban and rural areas, households, and gender differences (Broadband Commission, 2013; Dixon, 2014). Oyelaran-Oyeyinka & Lal (2005) indicated that the low rate of internet usage is often associated with the low rate of computer ownership.

The studies by Lesame (2013), Robinson (2015) and the ITU (2017) point to factors such as education, income and the economic development imbalances between urban and rural areas as some of the factors that hinder the full integration ICTs. The deeper dimensions of social inequalities within the South African context is highlighted by Pashapa & Rivett (2017) who found that female household headship is strongly correlated with household access to ICTs in rural areas more than urban areas. A study of 10 different universities with freely available internet access on campus (Oyedemi, 2009; 2012) established that white students rarely used internet because they had home internet. Nevertheless, Oyedemi (2009; 2012) proposed that analyses of digital divide should move beyond between-racial groups to within group analyses, especially due to the increasing importance of technology-enhanced learning in providing inclusive and equitable education.

Technology-enhanced learning and ODL

The spatial diffusion of ICT coupled with the need for lifelong learning opportunities have enabled ODL to move from the margins to the mainstream of university education policy and practice (Kaliisa & Picard, 2017). The broad concept of ODL, typically encompass the expansion of student enrolments and use of ICTs to support teaching and learning (Mykhnenko, 2016). Traditionally, a typical response to an upsurge in the demand for university education is to increase the infrastructural capacity of classroom sizes and/or the number of universities (Ajadi, 2010). In the current information society, advancements in ICT has triggered the need for a paradigm shift, with many education providers embracing ODL as an innovative and cost effective approach of delivering their pedagogical responsibilities (McPheea & Pickren, 2017), while demonstrating commitments towards effective implementation of education agenda of SDG4 (UNESCO, 2016).

Clearly, African institutions that have adopted ODL are better equipped to face the future of university education than institutions that are solely based on the traditional classroom settings (Kaliisa & Picard, 2017). The spatial diffusion of ICTs, even though slow paced (Comin *et al*., 2012), offers some coping capacity to adapt to the growing demand for education at the same time remaining competitive in a global educational economy (Czerniewicz & Brown, 2005; ITU, 2017). Furthermore, the flexibility and environment of DE provide long term learning opportunities to previously disadvantaged population groups, especially those who find it challenging to attend classes at a regular university campus (Enoch & Soker, 2006). Potential learners such as mature individuals and women, have opportunities to study at their own space (McPhee & Pickren, 2017; Mässsing, 2017; Breines *et al*., 2019) while remaining committed to their work and family responsibilities (Bucy, 2000). In order to reach greater digital equity, the ODL policy on ICT need to place importance not only on literal access and use of ICT, but also on the need to understand the local realities associated with the broad contour of digital divides. At its core, is the need to include digital divides in geography curricula with objectives of recognising and understanding the causes and consequences of the digital divides at different spatial scales. Teaching digital divides, a form of "social resources", is proposed by Warf (2019)

as a strategy to help students appreciate the nature and seriousness of digital divide. This uncharted area is premised to encourage students of different social-economic background to appreciate the differences that ICT makes in their daily lives and the disadvantages suffered by those without access (Warf, 2019), and thus help bridge the gap between those with and those without ICT. We address this aspect by investigating the location of access to a computer and internet, and factors shaping the different gradation of access.

Materials and methods

The research employed a mixed method approach which firstly involved collecting demographic data from a total of 230 (a subset from the IDEAS project dataset) local undergraduate UNISA students through an online questionnaire survey, which was developed and implemented as part of the project funded by the Economic and Social Research Council (ESRC) and National Research Foundation (NRF) of South Africa (Mittelmeier *et al*., Submitted). This was followed by in-depth individual online interviews, where questions on student adaptation to college questionnaire (SACQ; Mittelmeier *et al*., 2019), social media usage (Madge *et al*., 2019), migration plans (Breines *et al*., 2019) and other cross-cutting themes such as location of access to a computer and internet, and the university education level of parents were asked. The interviews were recorded, transcribed, coded and organised into themes and sub-themes using the NVivo software.

Quantitative and qualitative data on 18% (230 students out of 1295) of black South African students were extracted from the IDEAS project data. Because the country is characterised by socio-economic inequalities that are largely inherited from the apartheid era (1913-1994), this excerpt from the IDEAS project data is ideal in understanding factors that may provoke varied experiences of DE, especially among the previously disadvantaged population groups (Fuchs & Horak, 2008). We used the student age at the 25^{th} percentile, and that at the 50^{th} and 75^{th} percentile to categorise the participants into traditional entry university students ($<25^{th}$ percentile) and mature students ($>25^{th}$ percentile or median) (Vieira *et al*., 2017). All binary responses were systematically converted into graded response. Multivariate analyses with SPSS was used to deduce relationships among the relevant themes: living in urban areas or not, age, location of access to a computer (home, work, public facilities, and UNISA centre) and whether

at least one parent attended university education or not. This enabled us to analyse the patterns of ICT usage and develop an understanding of the nuances of digital access.

Results

Age

In the following, we summarise the main findings pertaining to the age distributions of the black South African students (Table 1). Of the 230 participants, 79 were male students (urban dwellers: 52; non-urban dwellers: 27) and 151 female students (urban dwellers: 105; non-urban dwellers: 46). At the 25th percentile were the traditional-entry university male students aged 28 and below, while at the 50th percentile were students who were less than 33 years old (traditional and mature students) and an increased proportion of mature students (less than 40 years old) at the 75th percentile (Table 1). By comparision, the age of female students were 25 years old at the 25th percentile, and 31 and 36 years old at the 50th and 75th percentile, respectively (Table 2).

Insert **Table 1**

In detail, a large proportion (54%) of UNISA male students who were living in urban areas were above 28 years old, of which 13% were above 40 years old. In contrast, only 44% of the total male students who were not living in urban areas were above 28 years old, with only 4% student being above 40 years old. These distributions indicate that the mature students were the most dominant learners among the urban dwellers, probably pursuing university education for personal development or career development needed to maintain the lifestyle asssociated with living in urban areas. A 33 year old male student living in an urban area of South Africa mentions the convinience and desirability of ODL, especially for individuals who may opt to enter the labour maket, and cannot abandon their economic activities, “I have focussed on starting a business of my own, at least UNISA has allowed me to balance on both my business and academics.” This means that being employed or being in some form of income generating activities provide divergent opportunities for mature students to buy ICT equipment.

Insert **Table 2**

For female students, a total of 70 (67%) out of 105 learners were above 27 years old for students living in urban areas and 28 (61%) out of 46 for students not living in urban areas. Similar to the male learners, the female non-urban dwellers were marginaly younger than the urban dwellers, but with both distributions being negatively skewed, where the mean age were less than the median or age age at the 50^{th} percentile. These findings consistently suggest that female students in DE are relatively younger than the male cohorts. Nontheless, a 30 year old female student also mentions of ODL as a learning mode that minimises interruptions to an individuals everyday lives: "I am a full-time employee and find UNISA meeting my needs as a worker plus being a student".

Access to a computer and internet

As shown in tables 1 and 2, the numbers show the percentage of students with access to a computer, while the numbers in parenthesis indicate the corresponding percentage of students with internet connections. Male students seemed to create a general hierarchical location of access to a computer (internet) as: Home access 62% (31%), followed by Work access 40% (21%), UNISA centres 27% (15%) and Public access such as Internet cafés 17% (4%) for students living in urban areas. Among these students, we found age group differences, with students aged >28 years having increased access to computers at home than the younger students. A different hierarchical location of access for the non-urban dwellers was: Work access 30% (19%), UNISA centres 30% (11%), Home access 26% (11%) and public access 19% (19%). These findings demonstrate that male students living in urban areas had more private access to computers than those not living in urban areas, a pattern which is associated with a positively skewed age distribution for urban dwellers and a negatively skewed age distribution for the non-urban dwellers (Table 1).

Students access to a computer connected to internet even if it is not personally owned, varied signficantly between female urban dwellers and the non-urban dwellers ($\rho = 0.00$), and between students of different ages ($\rho = 0.00$). Likewise, the proportion of female learners with regular access to a computer (internet) at home was 48% (15%) for the non-urban dwellers, which was significantly ($\rho = 0.00$) less than that for urban dwellers, 66% (33%). Age was the primary

variable that strongly correlated with students possession of material resources, and the liklihood of owning a laptop or computer and stable internet connection. The research indicated traditional-entry university students (aged 25 years and below) had less access to computers and internet at home than the mature students. A 23 year old male student studying Bachelor of Education was asked about resources that have been useful in adjusting to university and academic life despite not living in urban areas:

> Google, firstly has been amazing, it just helps because where I live we are maybe 15-20 kilometers away from our closest library or petrol station. I live in a tiny little town and without the internet, I can't go to the library at ten o'clock at night if you have left your assignment to the last minute. Due to lack of internet, sometimes I'm left behind with studies, but regularly I go use my friends Wi-Fi to download the study material.

In order to understand how the location of access to a computer (internet) varies among South African learners studying via DE, the second research question focused on demographic patterns of private access to a computer and usage of internet, with particular attention to gender. For both students living in urban and rural areas, we noted a strong pattern of gender-differentiated usage. For every male student, there were at least 1.2 female students who had private access to a computer and internet, 49% (24%) male to 62% (29%) female. When compared between the two sets of students, urban dwellers and the non-urban dwellers, the study demonstrated that a large proportion of women used private access computers (internet) than men, with the digital footprint gap widening between male and female students living in rural areas, 26% (11%) male to 48% (15%) female. Further analysis was undertaken to assertain the other locations of access to ICTs. Our findings indicate that ICT facilities at work, UNISA centres and internet cafés functioned as the common location of accessing computers and internet, especially among male students aged 28 years and below.

Regular access to a computer and effective internet connectivity provides the flexibility of studying without being tied to a specific geographical location. The importance of having access to a computer and internet at home is outlined by some changing circumstances that may not allow students to live in one specific location. For instance, married female students are often

obliged to defer and follow their husbands on career oriented decisions on migration. A 35 year old female student who owns a computer and uses internet at home said:

> My husband was reassigned at work, and we recently relocated to Malaysia from South Africa. I have been a student at UNISA for eight years. It made sense to study distance learning so I could carry on studying. Studying through UNISA doesn't tie me down to a specific location.

In general, the preferred location of access to a computer and internet leans towards home access, with the resources needed to acquire these ICT facilities favouring older students. The results also revealed that students whose parents attended university education were likley to have a computer and internet at home (urban dwellers: $r^2 = 0.15$; non-urban dwellers: $r^2 = 0.26$). Of the students living in urban areas and whose both parents attendend university, 65% (29%) of the total male students and 93% (53%) female learners had access to a computer (internet) at home, while only a small proportion of students whose parents did not attended HE had private access to a computer (internet): male 50% (20%) and female 63% (29%) (Table 1, 2). Students for whom neither parents have attended university, access to a computer at home even though not personally owned, was notably lower (Table 1). Instead, usage of computers' and internet at public spaces and UNISA center was common among the non-urban dwellers. Therefore, parents lack of university education is an educational barrier to first generation of female students regardless of the remoteness of a locality, and this is consistent with other research that has studied about the slow-paced progress of college students whose parents did not attend higher education (Hahs-Vaughn, 2004; Li & Ranieri, 2013).

The Digital Divide

The concept of digital divide has moved beyond literal access gap in digital technologies to multifaceted issues of cognitive and social resources (De Haan, 2004; Czerniewicz & Brown, 2010). The possession of these resources is crucial for effective teaching, and for formal and informal learning which include students' online interactive learning in DE. Although there are several studies on digital divide, focus has been on the divisions between the "haves" and the "have nots" (De Haan, 2004; Czerniewicz & Brown, 2005). At the global and national level, emphasis has been on mapping and implementing technological diffusion from developed

countries to developing countries (Furuholt & Kristiansen, 2007; Liebenberg *et al*., 2012), and bridging the rural-urban digital gap through the facilitation of public ICT access such as internet cafés (Pick & Nishida, 2015; Penard *et al*., 2015; Mykhnenko, 2016). These previous studies neatly fitted the theory of access to ICT into a binary model of ICT "haves" and "have-nots", with only a few studies revealing that the levels of access also vary within each construct (Brown & Czerniewicz, 2010; Liebenberg *et al*., 2012). In the context of ODL and Africa (Liebenberg *et al*., 2012), our study highlights that there is a gradation of technological "haves" among students, a disparity which could be a bottleneck to achieving inclusive and quality in technology-enhanced learning. The study focused on material resources, particularly the location where students access a computer and internet, as a basis for effective use of digital technology in ODL. At local level, public facilities such as internet cafés and UNISA centres have been key components of national and university policy initiatives to reduce the access gap between individuals living in urban areas and those not living in urban areas. Evidence from our empirical data suggests that the location of access to a computer can evoke either positive or negative experience of DE among South Africans.

ODL could be more appealing to the traditional-entry university students or "digital natives" (Czerniewicz & Brown, 2010), particularly given their acquired and perfected skills to use digital technology (Prensky, 2010; Dixon, 2014). Instead, mature students generally spoke positively about DE, while the younger students felt more ambiguous. With home computer and internet access increasing with age, it is evident that mature students are more likely to adjust to the academic demands with relative ease. The apparent large proportion of mature learners studying with UNISA provides a clear indication of a more general acceptance of ODL among mature individuals than the younger people. The feeling of technophobia among the younger students [See a quote by a 23 year old male student pursuing Bachelor of Education], especially the non-urban dwellers may be associated to the lower proportion of home access to a computer and internet. Even though there are other public locations of access to a computer and internet such as at work, internet cafés and UNISA centres, our findings revealed a gradation of 'technology haves' each with different education experience. This is shown by the gendering of public access use among students, where more male students used public ICT facilities than the female learners.

Even though DE students describe internet access as essential for pursuing their studies (Madge *et al*., 2019), we found that more than twice as many students living in urban areas had home access to a computer and internet than those who were not living in urban areas (Tables 1, 2). Owing to the fact that the students are drawn from different social and economic backgrounds, differences in the location of access largely reflects the geographical division between urban and rural areas in in Africa (Hindman, 2000; Giebel, 2013; Li, & Ranieri., 2013; Pick & Nishida, 2015; Robinson, 2015). Unlike studies that have shown that the rural peripheral areas continue to fall further behind in the intra-country digital divide because of being economically disadvantaged (Hindman, 2000; Furuholt & Kristiansen, 2007), we observe the widening digital gap is actually the differences to meaningful access, in this case, home access to technology. The majority of students who were living in non-urban areas relied on public ICT facilities at work and at UNISA centers for their studies.

Accessing ICTs from other locations other than home is often associated with issues of privacy concerns, such as restrictions on what to download and store on the computer or the need to be considerate of other users who may consider any computer-mediated communication mechanism to be a disturbance. We therefore argue that the location of access to ICT other than home access barely supports effective technology-enhanced learning. Even though we agree with De Haan (2004), van Dijk (2006) and Warschauer & Matuchniak (2010) that literal access alone does not translate into effective use of ICT, we stress that home access is critical for DE students to *translate*, *transfer* and *transform* their educational journey (Madge *et al*., 2019). This is consistent with Oyelaran-Oyeyinka & Lal (2005) who observed that increased ownership of digital technology often leads to increased usage of internet. Like a female student nearing completion of university studies with UNISA:

> My advice to a student who is just starting with UNISA would first of all they should own a computer and be computer literate, they should know how to navigate the digital device…

In an effort to ensure ODL students have internet connectivity on a computer at home even though not personally owned, the Centre for Open, Distance and eLearning (CODeL), an

academic centre at the University of Namibia is one successful institution of HE that has recognised rural-urban digital divide in its educational landscape. CODeL provides free wireless modem dongles with rationed data bundles to all registered ODL students (Mässing, 2017). The impact of this prescription is evident in the increase of regional centres (from 1 to 7), and the number of local and international ODL students. The importance of technology diffusion between the ICTs "haves" and "have-nots" in ensuring digital equity cannot be overemphasized (Corrocher & Ordanini, 2002; De Haan, 2004; Pick & Nishida, 2015). Regardless of whether living in urban areas or not, intergenerational diffusion of technology possession was observed among DE students, simply put, the leverage associated with having home access to a computer and internet for students whose parent/s attended university education. Empirical data from this research show that the diffusion of digital technology was marginally influenced by whether parents attended HE or not. Even though there are no similar studies to support our findings on intergenerational diffusion of ICT possession and usage, a more similar by Pashapa & Rivett (2017) found that households headed by female are likely to have home access to ICT in rural areas more than urban areas.

The varied location of access to a computer and use of internet between students of different parental backgrounds reflect the shared material and economic resources, and the consequences of the neighboring influence (a form of *social resources*) at fine scales. This spatial perspective is a necessary antidote for narrowing the digital gap among ODL students of the same module or course but with different levels (patchy - regular) of access to ICT. In particular, we note that advancing the diffusion of *material* and *cognitive* resources is in part the pedagogical responsibility of geography educators, and the digital gap could be bridged if knowledge about the causes and consequences of unequal means of access is part of the geography curricula and taught to students. A shared knowledge about digital divides can motivate students to appreciate the spatiality of access to computer and use of internet, and in turn help scholars use the unequal means of access to reach greater equity while raising the learners' capability to use ICT for pedagogic purposes. This is consistent with the uncharted idea of teaching digital divides as a mean of helping students imagine the world with irregular and regular access to ICT (Warf, 2019), and thus allow the real and imaginary worlds shape one another.

As the diffusion of ICT move towards a more balanced intra-country parity (Comin *et al*., 2012; Lin & Kwan, 2016), different forms of digital exclusion proliferate. With the advent of ODL which often seeks to draw the previously disadvantaged population groups (Hill & William, 2018), the location of access matters for research on topics relating to effective students' engagement in technology-enhanced learning (Madge *et al*., 2019). This paper calls for African institutions offering ODL to remain vigilant, critically reflecting on the emerging forms of digital inequalities among students. In spite of the promise of ODL in realising the objective of greater access to university education, we still remain a distant from institutionalising digital technology as a single mode of instruction delivery. Our policy recommendation is therefore an incessant use of mixed mode of instruction delivery, where a large portion of technology-enhanced learning continues to be supported by the delivery of printed materials. This responsiveness, however, calls for continuous modification of institutional policies in agreement with the emerging needs and expectations of DE students.

Conclusions

This paper seeks to show that location and access to ICTs among ODL learners influence the ability of students to access HE, with home access being the most common location among leaners living in urban areas. Inversely, students in non-urban areas often utilised ICT facilities at work and UNISA centres. The spatialities of access to a computer and internet for students living in urban areas and rural areas has demonstrated that ensuring greater digital equity remains a challenge for inclusive ODL. By analysing the gendered differentiated location of access to ICT and age of students at different percentiles, the study has shown that the possession of *material resources* varies quite noticeably between learners of different ages. This was partly explained by the large proportion of students aged 28 years and above in ODL. Different gradation of technological "haves", especially among students aged 28 years and below, was revealed by the different location of access other than home access, with a few traditional entry university students with home access commonly having parents who attended university education. The observed intergenerational diffusion of access to home ICT, a form of *social resources* at fine scale, suggests an antidote for reaching greater digital equity among ODL students of the same course but with different access. Through teaching digital divide, *social resources* at a relatively

large scale, geography educators can to help shape students of the "same course, different access".

Although this research was done in the specific context of undergraduate students studying via ODL with UNISA, it highlights that the digital divide among students is first and foremost a question of differences to meaningful access, in this case home access. Having a "one-size-fits all" policy on the use of ICT in facilitating teaching and learning is bound to have limitations in a developing country like South Africa where the realities of digital divide are so diverse. For better educational interventions, those of us working in HE need to recognise that integrating ICT in teaching and learning requires access to a much range of resources, which most students may not have. The study stress the need for future educational reforms and policy initiatives, as well as DE providers to fully acknowledge the different conditions and actualities of students, and continuous adapt the ODL teaching and learning delivery mode to the local context.

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