Open Research Online

Internet kiosks in Uganda: A window of opportunities?

Book Section

For guidance on citations see FAQs.

Version: Version of Record

Link(s) to article on publisher's website:
http://dx.doi.org/doi:10.4324/9781003177098-12

oro.open.ac.uk

Chapter 10

Internet kiosks in Uganda

A window of opportunities?

Khadija Mohamud, Alison Buckler, Beck Pitt and Peter Twining

10.1 Introduction

Despite the massive expansion of education in Africa through the various global development frameworks in the last three decades, including the current Sustainable Development Goals (UN, 2015), several challenges remain which the international community has described as a "learning crisis" (World Bank, 2018). The evidence shows that African countries exhibit the highest population of out-of-school children for all school-age groups (UIS, 2019). Besides, data on the quality of schooling indicate that approximately 202 million children are not attaining minimum proficiency in literacy and numeracy even after several years of attending school (Bold et al., 2017). The reasons for these low learning outcomes are multifaceted; however, a fundamental determining factor is the lack of essential instructional resources (Figa et al., 2020). Looking at Uganda, the focus of this research, the government proposed a new education curriculum in 2018, formulated in 2019 to address the low learning outcomes (World Bank, 2019). However, this policy reform was not aligned with the development and distribution of instructional resources. Many schools lack basic infrastructure and teaching resources to support this new curriculum (Tromp and Datzberger, 2019).

In addition to technical skills such as literacy and numeracy at the heart of the learning crisis narrative, the inclusion of a broad array of soft skills competencies, also known as 21st-century skills such as computer literacy, collaboration, confidence, communication skills, critical thinking, decision-making and problem-solving have been emphasised as an essential component of education in the rapidly changing labour market (Joynes et al., 2019). It has been outlined that these skills extend beyond the work environment as individuals translate the acquired knowledge into beneficial, practical action that impacts all areas of their lives (Reece and Reece, 2016), leading to an improvement in their quality of life (Joynes et al., 2019). Although many countries in Africa acknowledge the importance of soft skills in their public policy (Care et al., 2016), limited evidence exists of how these skills have been integrated into the education curriculum in practice (Kim et al., 2019).

Due to formal education deficiencies, non-formal learning opportunities have become a core component of knowledge acquisition and livelihood improvement

in Africa (Yasunaga, 2014). Information Communication Technology for Development has been associated with bridging these gaps (Jordan, 2020). However, many low-income communities in Africa cannot afford to access ICT on their own and therefore experience a digital divide, described as disparities in the access and use of ICT (Van Dijk, 2017).

To bridge this digital divide, Community Technology Centres (CTCs), which are public-shared access to ICT resources with computers, Wi-Fi and, in some cases, mobile devices have been deployed in low-income contexts (Nemer, 2018b). Studies assessing CTCs in Brazil and Kenya indicated these facilities provide positive benefits that enable users to access information on education, health, current affairs (Wamuyu, 2017) and provide a social space to address individual and community needs (Nemer, 2018a).

Additionally, similar studies have focused on how CTCs could support educational outcomes in the Global South (e.g., Dangwal et al., 2014; Mitra, 2014; Mohamud, 2016). However, the evidence showed most studies focused on the wider Global South with limited focus on Africa. Furthermore, although many young people are not attending school, as the data suggest, they may be involved in non-formal learning contributing to lifelong learning (Yasunaga, 2014). Chapter 10 explores the impact of Internet Kiosks, a CTC intervention in Uganda on users' learning outcomes and influence on the quality of life.

Moreover, studies on CTCs have often focused on reporting tangible positive contributions limiting the intangible contributions (Osman and Tanner, 2017; Tabassum et al., 2019), and scarce evidence exists on associated threats, particularly in the African context (Livingstone et al., 2017). This chapter presents a holistic assessment of impacts comprising three perceived influences identified by young people (in-school and out-of-school) and adults who were users of the Internet Kiosks in Uganda.

10.2 Theoretical framework and methodology

The theoretical framing in Chapter 10 is based on the view that individuals are embedded within their context and are influenced by the cultural and social practices of the society they live in, drawing on (Vygotsky, 1978) sociocultural perspective. It draws on knowledge construction as an enculturation process that incorporates tools as organising resources integrated into participants' meaning-making processes. Tools include symbols and other devices (Lave, 1988) including ICT. Meanings are constructed through interpretation of situations and objects based on previous knowledge and experience (Zittoun and Brinkmann, 2012). This proposition provided a foundation for understanding how the research context influenced the Kiosks' communities' perception and determined how they engaged with them.

This chapter's findings were part of a larger research project conducted in 2018 at two urban low-income suburbs in Uganda. Skills to Survive [pseudonym], a UK-based organisation, partnered with a local organisation and built two outdoor solar-powered Internet Kiosks in October 2015, each equipped with wireless

Internet and two computers with educational software. One Kiosk [Kiosk A] was located in a local primary school [Hillside school] and the other [Kiosk B] in a busy market area approximately six kilometres from the school. Each Kiosk had two sides: one side with a lowered computer screen intended for children and a higher screen on the opposite side intended for all other users. Chapter 10 focuses on the following research question: What are the perceived impacts of the Kiosks on users (young people and adults) at the two sites in Uganda?

10.2.1 Methodology and analysis

Chapter 10 adopted a qualitative case-study research methodology. A purposive sampling through gatekeepers and a snowballing technique were used to select participants who could provide information on this study's research objectives. A total of 50 participants (26 young people; eight adult users of the Kiosks, including four teachers; 13 young people's carers; and three young people's teachers) participated in this research. The data generated were drawn from twelve focus group discussions (FGDs) with young people (45–60 minutes per FGD), semi-structured interviews with all 50 participants (30–60 minutes per interview) and field notes. The focus groups and interviews were conducted in a quiet location familiar to participants and done in the language participants preferred (either English or Luganda, which the first author speaks). All the data were transcribed and analysed following Braun and Clarke's (2006) thematic analysis approach on NVivo 12. Based on the analysis, quotes that are most representative of each theme were selected for presentation in this chapter.

10.3 Findings

Three main themes emerged from the thematic analysis encompassing perceived opportunities, perceived influence on users' quality of life and threats. This section explores these sequentially.

10.3.1 Perceived opportunities

The data on perceived opportunities demonstrate how the Kiosks created a potential for users according to their interests and abilities, thereby providing them with relevant skills and knowledge that supported their activities. Users valued the Kiosks outlining, "It has helped us to nurture our talents…." (Jason, adult, Kiosk A) and described the changes that came in their life through their engagement. One out-of-school participant framed it as "… For me the [Kiosk] opened up a world that I would have never seen" (Suleiman,16, out-of-school boy, Kiosk A). The purposes of use that were key to facilitating opportunities were different for young people and adults and depended on whether users were enrolled in school/college or not. Users' descriptions of the Kiosks' perceived opportunities were grouped into three sub-themes: learning; instructional resource support; and computer literacy.

10.3.2 Learning

The findings highlight that the Kiosks opened up new learning opportunities for all participants and is presented as follows: In-School Young people; Out of School Young People; and Adults.

10.3.2.1 In-School Young People

Young people who were enrolled in school felt the Kiosks supported them in learning a range of topics related to their school subjects.

> I have been able to expand my knowledge on various subjects. Instead of having to wait for the teacher to tell me everything in my school subjects… […] the [Kiosk] has helped me to be ahead… and even when we have not been taught something but it is part of the syllabus for the term, I used to do research on it. In History… 'Ngoni migration'; 'Nyamwezi'; 'the history of Maasai'. … chemistry, I learnt how to balance chemical equations through watching YouTube videos on balancing equations. …Statistics, I watched videos that helped me learn how to find the class boundary, cumulative distribution function, probability density function, linear regression, multiple regression… …its simplified things for me.
>
> (Garry, 16, in-school boy Kiosk A)

Most young people enrolled in school outlined the media resources facilitated better understanding of new concepts compared to what they were taught in class.

> Because on that computer we see them, but in the books, in the teacher's notes, they don't show them to us. They show us only their functions and words but don't show us their pictures. So, on that computer we see their pictures, functions and get more functions than in the books [teacher's notes].
>
> (Shaheen, 16, in-school girl, Kiosk A)

The evidence particularly indicated that the Kiosks supported young people's understanding of concepts in science and mathematics disciplines, explicitly outlining how the digital resources stimulated their comprehension of topics in these disciplines.

> I wanted to learn and understand paper chromatography… I read on the topic separating mixtures on BBC bitesize and watched some videos on Khan Academy on this topic, the videos simplified things for me because I understood things better than in class.
>
> (Gift, 15, in-school girl, Kiosk A)

Many participants reported that the research they conducted at the Kiosks' computers had a positive influence on their overall school performance.

> Actually it [the Kiosk] has helped me much because I was not performing well in Biology… But now the last two terms I got a D1 [Distinction 1 ranges from 85 to 100 percent] in Biology after searching on that computer. But before I used to get F9, C5 [lower grades as per the Ugandan education grading system].
>
> (Shaheen, 16, in-school girl, Kiosk A)

Participants' teachers also acknowledged that the Kiosks had a positive influence on students' overall performance. For example, in the case of Shaheen above, her Biology teacher commented "…whatever she is doing has improved her performance…" (Mr. Williams, Shaheen's teacher).

10.3.2.2 Out of school young people

Young people who were not enrolled in school noted the Kiosks supported them to learn concepts they felt were important to their daily activities. They also indicated using the Kiosks to engage with specific aspects of the school curriculum they felt were essential to supporting them with their tasks.

> I learnt farming methods that prevent soil erosion like contour farming and planting trees to break the wind. As you can see our land here is very hilly, in the rainy season I used to lose a lot of crops but now that has reduced. […] I also learnt about some farming tools that I did not know about like dibber… Because I am a farmer, I needed to know maths so I can count when I am planting and harvesting and even when selling my fruits and vegetables. So, I went and started learning on that [Kiosk] addition and subtraction on Khan Academy. … As I told you I stopped school some years ago, so I had forgotten what I learnt then.
>
> (Salim, 14, out-of-school boy, Kiosk B)

Out of school participants also indicated the Kiosks supported them in attaining skills for specific interests they had.

> It has been helping me to learn about photography and photo editing. Now there is a photography shop near here that I volunteer at…
>
> (Suleiman, 16, out-of-school boy, Kiosk A)

10.3.2.3 Adults

The findings illustrate that adult users utilised the Kiosks to learn about entrepreneurial concepts that facilitated enhancement of an existing business or stimulated innovative ways of income generation. For instance, Eddie noted the Kiosk provided him with access to entrepreneurial information enabling him to establish a small-scale business.

For me I didn't have the courage to open up a business and I thought you need a lot of capital to open up a business. But one day… read a bit about small scale business, how to open up a small-scale business, what do I need? what do I have to know about it? and what should I focus on? … I didn't think I was able to start up something… After I realised that, then I… got determined to open up this business.

(Eddie, adult, Kiosk B)

10.3.3 Instructional resource support

As established in the context section, Kiosk A was located at Hillside school. Teachers felt the Kiosk supported instruction at the school by bridging its educational resource constraint.

I use it [Kiosk] when… we are learning about the skeleton because we don't have these physical parts of a skeleton.…we usually go to the [Kiosk] computer, we type in and different structures appear, then a child is able to identify how a skeleton is…

(Ms. Elaine, teacher, Kiosk A)

Ms. Jane, another teacher stated:

…I take my kids to see what I teach physically at the [Kiosk], so it helps me to simplify my work as a teacher…

(Ms. Jane, teacher, Kiosk A)

Ms Jenna, another teacher explained the significance of the Kiosk in her lesson planning:

Some books we use are not up to date, there are missing some things. So, when I need to teach kids something and I fail to get from the book they [the school] have given me, I go to the [Kiosk] I search for that thing.

(Ms. Jenna, teacher, Kiosk A)

By complementing teaching at Hillside school, the findings show Kiosk A positively impacted the school's reputation.

…many people have picked interest of bringing their children to us. …they know we have free internet; we can easily search and get to know what we don't know, that means the academic standard is now improving than before.…previously if you come across a question I didn't know, I just left it out and skipped it… I wouldn't give to the pupils because even as a teacher I don't know the answer. But now I can come across a question I do research on the [Kiosk] and once I get its explanation and understand, I teach it to my students.

(Ms. Elaine, teacher, Kiosk A)

10.3.4 Computer Literacy

Most young people underlined the Kiosks were their first interaction with computers and indicated learning basic operating systems functions, Microsoft Office, and Internet functioning. As a result, participants felt confident that they could now use the computer and Internet independently.

> …it has taught me so many things, I didn't know how to use a computer but now I know, I have learnt how to use Microsoft word, PowerPoint and searching on the internet.
>
> (Ross, 15, out-of-school boy, Kiosk A)

Some teachers also pointed out that Kiosk A was their first engagement with computers, providing them with the chance to develop computer literacy with the assistance of colleagues.

> I am one of the teachers who at first didn't know how to use a computer totally. But since we had that computer, [Elaine, another teacher] has been helping me a lot in learning the computer because she learnt computer studies.
>
> (Ms. Jessica, teacher, Kiosk A)

10.3.5 Perceived influence on users' quality of life

The second theme that emerged under opportunities was the influence on the quality of life, which explores both tangible impacts encompassing the Kiosks' economic impact and intangible impacts that contributed to users' overall well-being. These intangible impacts comprised of social impact, collaboration skills, leadership skills, problem-solving skills, increased motivation and self-belief and community learning beyond Kiosks' users. The majority of stories and testimonials show that the access to ICT at the Kiosks provided users with the possibility to improve their quality of life through continuous knowledge access and connectivity. Many participants felt they had evolved as a result of the knowledge they acquired. In the words of one participant:

> This would never have happened if the [Kiosk] was never there. So, the [Kiosk] was the main source of knowledge for me with everything I learnt because I started with the [Kiosk]. At that time, I didn't have even 1000 Uganda Shillings [$ 0.27] to buy data bundle to put on my phone. […] I have been able to get jobs through social media… […] It's because the main source of knowledge was the [Kiosk]. If they repair the [Kiosk], I think you can get ten [Jasons] from the [Kiosk] because it has promoted me.
>
> (Jason, adult, Kiosk A)

The findings indicate the Kiosks provided adult users with access to resources that enabled them to elevate their economic livelihood, leading to an improved quality

of life. For Eddie, the Kiosk built his capacity to have the confidence to start a small-scale business that grew to become a photography studio and electronic accessories shop. Jason, another adult user, noted that Kiosk A provided him with the opportunity to generate income from YouTube vlogging.

> …the [Kiosk] has helped us… I used my YouTube channel I post there my videos and get views and then they pay me… Last year they [YouTube] gave me 47,000 Uganda Shillings [$12].
>
> (Jason, adult, Kiosk A)

Some users identified that the Kiosks provided them with an opportunity to earn an income. In the case of Ms Jane, she described the changes that occurred in her life due to the financial assistance she obtained from the online connections she made at the Kiosk.

> …When I went, I opened Facebook and Gmail and I got friends who help me because they send me help from abroad even my kids have got sponsors which I think there are others who have benefited like me from the [Kiosk]. Before the [Kiosk] came I was so badly off girl what I am telling you, that's the fact I was in a small house, I couldn't afford to pay for my kids' school fees, but when those people came [Kiosk developers] and they opened for us Facebook so we got many successful friends abroad.
>
> (Ms. Jane, teacher, Kiosk A)

Some users also noted gaining employment opportunities on social media via the Kiosk.

> It [the Kiosk] has helped me to get a job on Facebook, the other time when I was looking for a job everywhere, I found the job at the construction place up there on Facebook. They advertised it in a Facebook group.
>
> (Fuad, 17, out-of-school boy, Kiosk A)

The findings show that the Kiosks became important spaces where users strengthened social ties with their community through their interactions at the Kiosks. Many young people indicated they made new friends as a result of their engagement with the Kiosks.

> I had just moved here when the [Kiosk] was built. So, I was still new and through the [Kiosk] I made new friends. So, the [Kiosk] helped me to make new friends and to fit in, in this community.
>
> (Garry, 16, in-school boy, Kiosk A)

In addition to the in-person interaction, most participants talked about the Kiosks offering them new opportunities to nurture relationships with people in other

geographical locations, nationally and internationally, creating a sense of connection to a broader world.

> I found a way of communicating with my dad [in Abu Dhabi] at this [Kiosk], before I used to wait for him to call us once per week, but now I communicate with him directly through Facebook.
>
> (Gift, 15, in-school girl, Kiosk A)

Adult users particularly emphasised speed and ease to which they were able to communicate improved their relationships with others.

> I've been connected to friends than before, so it has made my communication easy because sometimes mostly on WhatsApp… I could take a long time without loading airtime. But now with the WiFi of the [Kiosk] communication has become fast and easy; I just communicate on WhatsApp with our supervisors… So, it has made communication easy for me.
>
> (Ms. Elaine, teacher, Kiosk A)

Many young people appreciated the Kiosks' collaborative nature, indicating that it encouraged them to develop collaborative skills.

> It makes me work together with other people and you show them the question or a problem… It promotes unity when you are working together because other children come and then you work together the question and then you get the answer, that's the opportunity I get from the [Kiosk].
>
> (Patricia, 13, in-school Kiosk A)

Furthermore, many young people identified a heightened feeling of accomplishment after achieving their goals and indicated that their motivation increased as a result.

> …like in my group at school they can say that you have the answer okay you give us, and it makes me feel good because I am becoming a leader. Because I know my group depends on me for answers, my interest in my studies increased and I do a lot of research.
>
> (Jacob, 14, in-school Kiosk B)

Several participants also expressed becoming competent in what they had learned at the Kiosks, which suggested an improvement in their self-belief and confidence.

> I had a problem I didn't know anything, like I told you I dropped out in primary three, but ever since they brought that computer, then I started using it for reading and all, now I can read, I can speak English. Now I know something, there is a change on my life because of that computer.
>
> (Ross, 15, out-of-school boy, Kiosk A)

10.3.6 Perceived threats

Despite the numerous opportunities, the Kiosks provided for all participants, a significant threat that emerged from the data analysis was the threat of children being exposed to pornographic content on the computers at the Kiosks.

> …those elder men watch blue movies [pornography] during the day when us children are there, and many children end up seeing things they should not be seeing.
>
> (Jacob, in-school boy, Kiosk B)

Although the threat of pornography was present at both Kiosks, the data shows that this threat's frequency was lower at Kiosk A than B, where a committee to oversee the Kiosk and the school established measures to mitigate it.

> So how we did to control that [pornography], we make sure for example for my case since I live here within the school, I make sure every morning… I could come here earlier than the pupils then I put it [the computer] on and I check what is there and remove anything that is inappropriate that a kid can come across. If it's not there, I would just leave. So, this is how we are trying to control this.
>
> (Ms. Elaine, teacher, Kiosk A)

10.4 Discussion and moving forwards

Chapter 10 presents a holistic assessment of impacts comprising three perceived influences encompassing opportunities, the effect on the quality of life, and threats identified by users of the Kiosks in Uganda through the sociocultural lens. The findings reported in this chapter shows the Kiosks had numerous positive impacts on users. The evidence on learning demonstrates how the Kiosks supported young people enrolled in school to learn a range of school topics and illustrates how the media resources facilitated understanding of new concepts, particularly in science and mathematics disciplines. Many of them reported that the Kiosks positively influenced their overall performance, with some explicitly indicating improvement in their grades. These findings align with similar previous studies (such as Dangwal et al., 2014; Mohamud, 2016). These results contribute to this literature by presenting evidence from an African context demonstrating explicit areas to which the Kiosks supported young people's school learning. Teachers who participated in this research also outlined that Kiosk A helped bridge the educational resource gap at Hillside school, indicating they utilised the computers to demonstrate the concepts they taught and provided them with relevant teaching content. Overall, this evidence suggests that the Kiosks helped bridge some of the educational resource gaps outlined in this chapter's introduction encountered in this research context.

The findings further demonstrate how the Kiosks supported out-of-school young people to engage with school curriculum aspects that supported their daily

activities. This finding adds depth to the literature focusing on how ICT could be used in non-formal contexts (such as Yasunaga, 2014) to support out-of-school children. The quotes from the out-of-school participants demonstrate how a more nuanced approach can help them acquire relevant knowledge to navigate their everyday experiences. Additionally, the Kiosks provided adult users with entrepreneurial knowledge that facilitated improvement in their livelihood. Most participants also expressed that they had developed basic computer literacy through self-directed learning and assistance from peers, a finding that echoes similar CTC studies (such as Wamuyu, 2017). The data also shows that some users, particularly young people, shared the knowledge acquired with peers, teachers, and their families, suggesting that the Kiosks' positive influence benefitted a wider community.

Furthermore, adult users and out-of-school young people noted that the Kiosks provided them with access to resources that helped improve their economic livelihood. Some stated that the entrepreneurial concepts learnt at the Kiosks enhanced their existing business, and others highlighted accessing employment opportunities and resources that stimulated innovative ways of income generation, suggesting the Kiosks promoted improvement in users' life quality. Many participants also reported that the Kiosks provided them with an opportunity to emerge as leaders as they assisted other users. Some participants also pointed out that the knowledge they acquired at the Kiosks provided them with the competence to implement what they had learned, suggesting that the Kiosks increased their confidence and self-belief. This evidence addresses the identified gap in the literature on soft skills development discussed in the introduction of this chapter by demonstrating how non-formal learning contexts such as the Kiosks examined here begins to bridge this gap for low-income communities in Uganda. It also contributes to the anecdotal research on the intangible influences of CTCs (such as Osman and Tanner, 2017; Tabassum et al., 2019).

The findings on social impact demonstrate that the Kiosks became vital social spaces where many users fostered social ties with their community through interactions at the Kiosks. Many young people linked this to the Kiosks' collaborative nature, where they shared a computer and developed a peer learning process to address questions and assisted each other in using the computer. These findings contribute to the anecdotal data on social practices afforded by CTCs (such as Nemer, 2018a) by presenting evidence from an African context. It also shows how the Kiosks provided many users with an opportunity to build online connections and relationships that afforded them new learning opportunities, better communication, and some of them obtained new income possibilities. This evidence suggests that the Kiosks contributed to the improvement of users' quality of life.

While the Kiosks provided numerous opportunities to the users in the low-income communities where they were built, the findings show that the threat of children encountering pornographic content on the computers due to some adults accessing them had a negative implication. This finding contributes to the literature on children's online risks (such as Livingstone et al., 2017) by providing evidence from a Global South perspective where data has been identified to be scarce. Although this threat was present at both Kiosks, the data shows a difference in impact at the two Kiosks as the school and committee overseeing the Kiosk

established a measure to mitigate this threat. This finding proposes a need for consideration on how this threat is mitigated when CTCs are being designed. Despite this threat that needs to be addressed, the findings demonstrate the Kiosks created opportunities for users in this low-income context. Although this research was limited to the specific low-income communities in Uganda, its findings have implication for stakeholders to inform implementation of CTCs in similar contexts.

10.4.1 Implications for practice

Chapter 10 provides insights into how CTCs could support education in low resource contexts and demonstrate how out-of-school young people can be supported through non-formal learning to acquire relevant skills to help them navigate their everyday experiences. The Kiosks' tangible and intangible impacts demonstrate how CTCs can support low-income communities in this context to achieve their desired goals and facilitated soft skills development. This evidence provides an insight into how underserved communities in Uganda and similar contexts can be supported through CTCs to create changes in quality of life.

References

Braun, V. and Clarke, V. (2006) 'Using thematic analysis in psychology', *Qualitative Research in Psychology*, 3(2), pp. 77–101.

Bold, T., Filmer, D., Martin, G. et al. (2017) 'Enrollment without learning: Teacher effort, knowledge, and skill in primary schools in Africa', *Journal of Economic Perspectives*, 31(4), pp. 185–204. doi: 10.1257/jep.31.4.185.

Care, E., Anderson, K. and Kim, H. (2016) *Visualizing the breadth of skills movement across education systems*. Available at: https://www.brookings.edu/wp-content/uploads/2016/09/global_20160916_breadth_of_skills_movement.pdf.

Dangwal, R., Sharma, K. and Hazarika, S. (2014) 'Hole-in-the-wall learning stations and academic performance among rural children in India', *Journal of Multicultural Education*, 8(1), pp. 31–53. Available at: https://www.emerald.com/insight/content/doi/10.1108/JME-03-2013-0006/full/html.

Figa, J. G., Tarekegne, W. M. and Kebede, M. A. (2020) 'The practice of formative assessment in Ethiopian secondary school curriculum implementation: The case of West Arsi zone secondary schools', *Educational Assessment*, pp. 1–12. doi: 10.1080/10627197.2020. 1766958.

Jordan, K. (2020) 'Beyond indicators: A scoping review of the academic literature related to sdg4 and educational technology', in Alario-Hoyos, C. et al. (eds) *Addressing global challenges and quality education*. Springer, Cham, pp. 353–357. doi: 10.1007/978-3-030-57717-9.

Joynes, C., Rossignoli, S. and Fenyiwa Amonno-Kuofi, E. (2019) *21st century skills: Evidence of issues in definition, demand and delivery for development contexts (K4D Helpdesk Report)*. Brighton, UK. Available at: https://assets.publishing.service.gov.uk/media/5d71187 ce5274a097c07b985/21st_century.pdf.

Kim, S., Raza, M. and Seidman, E. (2019) 'Improving 21st-century teaching skills: The key to effective 21st-century learners', *Research in Comparative and International Education*, 14(1), pp. 99–117. doi: 10.1177/1745499919829214.

Lave, J. (1988) *Cognition in practice: Mind, mathematics and culture in everyday life*. Cambridge University Press, Cambridge.

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

Mitra, S. (2014) 'The future of schooling: Children and learning at the edge of chaos', *Prospects*, 44(4), pp. 547–558. doi: 10.1007/s11125-014-9327-9.

Mohamud, K. A. (2016) *An ethnographic case study research on students' perspectives of the self-organised learning environment (SOLE) and the granny cloud: A case of the School in the Cloud in West Bengal, India.* Newcastle University. doi: 10.13140/RG.2.2.18198.57926.

Nemer, D. (2018a) 'Going beyond the "T" in "CTC": Social practices as care in community technology centers', *Information (Switzerland)*, 9(135), pp. 1–13. doi:10.3390/info9060135.

Nemer, D. (2018b) 'Wired mobile phones: the case of community technology centers in favelas of Brazil', *Information Technology for Development*, 24(3), pp. 461–481. doi: 10.1080/02681102.2018.1478383.

Osman, M. A. and Tanner, M. (2017) 'The influence of telecentre components on the psychological empowerment of underserved community members in the western cape, South Africa', *Electronic Journal of Information Systems in Developing Countries*, 81(4), pp. 1–29. doi: 10.1002/j.1681-4835.2017.tb00596.x.

Reece, B. and Reece, M. (2016) *Effective human relations: Interpersonal and organizational applications.* Cengage Learning, Boston, MA.

Tabassum, G., Kulathuramaiyer, N., Harris, R. et al. (2019) 'The indirect and intangible impacts of a telecentre on a rural community', *Electronic Journal of Information Systems in Developing Countries*, 85, pp. 1–15. doi: 10.1002/isd2.12087.

Tromp, R. E. and Datzberger, S. (2019) 'Global education policies versus local realities. Insights from Uganda and Mexico', *Compare*, pp. 1–19. doi: 10.1080/03057925.2019.1616163.

UIS (2019) *New methodology shows that 258 million children, adolescents and youth are out of school, UNESCO Institute for Statistics.* Available at: http://uis.unesco.org/sites/default/files/documents/new-methodology-shows-258-million-children-adolescents-and-youth-are-out-school.pdf.

UN (2015) 'Sustainable development summit', (September), pp. 1–2. Available at: https://sustainabledevelopment.un.org/content/documents/8316Overview_Sustainable_Development_Summit_Final.pdf.

Van Dijk, J. A. G. M. (2017) 'Digital divide: Impact of access', *The International Encyclopedia of Media Effects*, pp. 1–11. doi: 10.1002/9781118783764.wbieme0043.

Vygotsky, L. S. (1978) *Mind in society: The development of higher psychological processes.* Harvard University Press, Cambridge, MA.

Wamuyu, P. K. (2017) 'Bridging the digital divide among low income urban communities. Leveraging use of community technology centers', *Telematics and Informatics*, 34(8), pp. 1709–1720. doi: 10.1016/j.tele.2017.08.004.

World Bank (2018) *World development report 2018: Learning to realise education's promise.* Washington, pp. 1–239. doi: 10.1596/978-1-4648-1096-1.

World Bank (2019) *Economic development & human capital in Uganda: A case for investing more in.* Available at: http://documents.worldbank.org/curated/en/925741559163051034/pdf/Economic-Development-and-Human-Capital-in-Uganda-A-Case-for-Investing-More-in-Education.pdf.

Yasunaga, M. (2014) *Non-formal education as a means to meet learning needs of out-of-school children and adolescents.* Available at: https://www.semanticscholar.org/paper/NON-FORMAL-EDUCATION-AS-A-MEANS-TO-MEET-LEARNING-OF-Yasunaga/4f0f212ce1f44bd7706ac533ddc40a98c0da2bef.

Zittoun, T. and Brinkmann, S. (2012) 'Learning as meaning making', *Encyclopedia of the Sciences of Learning*, pp. 1809–1811. Available at: https://core.ac.uk/download/pdf/20657132.pdf.