CONCEPTUALIZING MOBILE DIGITAL LITERACY SKILLS FOR EDUCATORS

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ABSTRACT

With mobile phones as a near pervasive technology amongst the youth, their use in classroom practice are often considered particularly daunting by the teaching fraternity. Many teachers qualified in the so-called 'pre PC' era, and do not consider themselves on technology par with their students. Their students on the other hand are growing up in an era of technology immersion. In order to enact the 'loco parentis' role often required, these educators need to be equipped with mobile digital literacy skills; often neglected in, amongst other, Teacher Professional Development interventions. The purpose of this paper is conceptualize mobile digital literacy skills for educators in using mobile technology in formal education. The research exapts the 'best-fit' framework synthesis of Carroll et al. (2013) from the health domain, towards this end. The strategy is operationalized through two phases. Phase 1 identifies the Ng (2013) digital skills model as *a priori* framework. Phase 2 utilizes the categories presented in Phase 1 to guide the classing of purposefully selected literature towards conceptualizing mobile digital literacy skills for educators using mobile technology in formal education. The literature considered was identified in accordance with Grant et al. (2014) description of a systematized scoping review. The contribution of this paper lies in its outcomes to identify and classify literacy skills for mobile technologies. These identified skills can further guide interventions aimed at educational mobile phone use.

KEYWORDS

Mobile Digital Literacy Skills, Mobile Devices, Literacy, Digital Literacy

1. INTRODUCTION

The number of mobile technology users have increased considerably, not only South Africa, but across the world (ITU, 2018), making mobile ICT the world's fastest growing technology. The perceived availability of the technology and the established user base present several developmental opportunities (Van Biljon & Renaud, 2017). As mobile Information and Communication Technology (ICT) continues to permeate the market (Chang & Hwang, 2018), the ability to navigate the technology becomes even more important (Bartikowski, Laroche, Jamal, & Yang, 2018). This state of affairs has created a conundrum within the education domain in South Africa (Mabila, Biljon, & Herselman, 2017) where educators are supplied with technology, that they are expected to meaningfully utilize in their classroom practice, in support of 21st century teaching and learning (Finn-Stevenson, 2018). However, ICT education initiatives have been noted to have failed due to a lack of a focus on, amongst other factors, the digital literacy skills (Mabila et al., 2017). The lack of skills pose a challenge for educators to successfully integrate mobile technologies into classrooms (Yu, Lin, & Liao, 2017).

This paper endeavors to conceptualize mobile digital literacy skills towards eventually enabling the articulation of the mobile digital literacy skills needed by educators using mobile technologies in formal education. The perspective of *formal education* highlights the active teaching and learning activities that are associated with classroom practice. As such, this paper prioritizes specific instances where mobile technology is used in educational specific contexts, although not necessarily as an exclusive focus to answer the research question: What constitutes mobile digital literacy skills for educators in formal education?

2. METHOD

This paper adopts the ‘best-fit’ framework synthesis of Carroll, Booth, Leaviss, and Rick (2013) towards conceptualizing mobile digital literacy skills for educators when embarking on using mobile technology in their classroom practices. The technique presents a method to extend on existing published research artifacts, in the form of models frameworks or theories, conceived within sufficiently similar context. The ‘best fit’ framework synthesis is considered suitable for this study as it entails a moderately rapid, transparent and pragmatic process whereby purposefully selected literature can be scrutinized at the hand of *a priori* research artifact. The systematic method for identifying suitable frameworks and subsequent thematic analysis enables both *artifact* and *literature synthesis* outcomes that are “reproducible and correspond to a shared reality” (Carroll et al., 2013, p. 1). This paper enacts the best-fit framework synthesis through the identification of a suitable digital literacy model as a relevant research artifact that can be abstracted to themes, which forms the *a priori* framework for a systematized scoping review as outlined by Grant and Booth (2009). A systematized scoping review is envisioned to cover the breath of the literature available while providing a systematic, transparent method in its identification and selection.

The methodology followed in this paper is then operationalised in two phases. Firstly, a literature synthesis that involves the identification of *a priori* themes against which to map literature from purposefully selected studies in the second phase. The identification and selection of *a priori* framework that would present the themes is outlined in section 3, the thematic synthesis at the hand of the themes is detailed in section 4. Due publication constraint, a full literature overview is not feasible and only a literature synthesis is presented in both section 3 and 4.

3. A PRIORY FRAMEWORK

In selecting a suitable framework, relevant and well-cited articles documenting research artifacts such as frameworks, models and theories for mobile digital literacy skills were sought in academic journals, as indicated in Table 1. As per year of publication, articles from 2000 to 2018 were included. Some older articles were incorporated as they were highly cited by other publishing researchers or were often viewed.

Table 1. Identifying a priory framework

	Systematised scoping review to select a priory framework
Keywords	Digital, Literacy, Digital skills, Framework
Literature review method	Systematized Scoping
Databases used	Scopus, IEEE Xplore, Wiley Online Library, Web of Science, Science Direct
Inclusion and exclusion principles	Only publications written in English were used; Studies referring to the components of digital skills were used; Studies including frameworks and models of digital skills were used; and Studies involving PC-centric skills were excluded
Number of papers used	30

The literature suggests that reading and writing were adequate literacy proficiencies a few decades ago and certainly sufficient to distinguish the educated in society (Zheng, Yim, & Warschauer, 2018). Lankshear and Knobel (2008) argue that this, however, is no longer the case. Technology has given rise to new literacies, involving different sets of skills and abilities to perceive and manage information. Markauskaite (2007) further notes that practical skills are a very important aspect of digital literacy. At the same time these is consensus that the notion of digital literacy refers to more than the mere operation of a technological device (Parry, Eikhof, Barnes, & Kispeter, 2018; Sadaf & Johnson, 2017; Zapata, 2018; Zheng et al., 2018).

Several approaches have been used to unpack the idea of digital literacy. Some authors regard digital literacy as a group of literacies (Eshet-Alkalai, 2004; Eshet-alkalai & Chajut, 2009; Jisc, 2015; Parry et al., 2018; Sadaf & Johnson, 2017; Zapata, 2018; Zheng et al., 2018), while others are proponents of a component view of digital literacy (Ferrari, 2008; Gilster, 1997; Schreuers, Quan-Haase, & Martin, 2017). This research identified the digital literacy model of Ng (2012) as the most appropriate as it manages to combine most of the published literacies and/or components into a single digital literacy model. The themes identified and their conceptual relations suggests that digital literacy is facilitated by the intersection of technical, cognitive and social-emotional perceptions. The three dimensions are briefly outline in Table 2.

Table 2. A priori framework for educator digital skills (Ng, 2012)

Dimension	Literacy	Description
Technical dimension	Operational Literacy; Reproduction Literacy; Branching Literacy; Social networking functional literacy	Technical and functional expertise of ICT in daily use.
Cognitive dimension	Information Literacy; Reproduction Literacy; Branching Literacy; Online etiquette literacy; Cyber safety Literacy	Critical thinking for digital information.
Social-emotional dimension	Social-emotional literacy; Social networking functional literacy; Online etiquette literacy; Cyber safety Literacy	Use internet appropriately.
All dimensions	Critical Literacy	Applicable to all dimensions

Ng (2012) has argues that the dimensions of digital literacy are very much applicable to mobile devices. The digital literacy model of Ng (2012) is then selected as a scaffold against which the literature examined in the following section (section 4) can be brought together and organized.

4. SYSTEMATISED SCOPING REVIEW

The literature review scrutinized the phenomena of Mobile Information and Communication Technology (ICT), and ICT in the education domain as framed by the *a priori* framework themes outlined in Table 2.

Table 3. Summary of search criteria for literature review

	Mobile Information and communication Technology (ICT)
Keywords	Mobile ICT, Connectivity, Networks, Adoption model, Mobile digital literacy skills
Literature review	Systematised Scoping
Databases used	Information systems research, INFORMS journal of Computing and MIS Quarterly: Management Information systems, Web of Science, Science Direct
Inclusion and exclusion principles	Only publications written in English were used; Studies referring to the components of Mobile Digital Literacy skills were included; Studies looking at mobile technology in Africa were considered; and Uptake of technology in non-African rural areas were excluded.
Nº of papers	70

The following narrative highlights some of the most relevant literature towards synthesizing a conceptualization of mobile digital literacy skills of educators using mobile technology formal education.

Mobile technologies have evolved over the years, from specific devices created for either communication or information access, to a powerful mixed device supporting both *information access* and *communication* (Chipangura, 2016; Walls, 2017). Mobile technologies are described as computing devices that are portable due to their smaller size (like a cell phone or smartphone) and can include tablets, laptops and netbooks (Valk, Rashid, & Elder, 2010). Within this understanding, mobile digital literacy is seen as a subset of digital literacy. This view is supported by Hansen (2018) and Ng (2013). Digital literacy is described as progressive and adaptive and builds on initial skills which lead to the adaptation of new and emerging mobile devices requiring mobile digital literacy skills (Ng, 2012). Clark, Coward, Rothschild et al. (2017) agree and concede that the experience of using a mobile device differs to that of any other technological device. The *European Information Society* supplied a brief definition of mobile digital literacy skills as an individual's ability to use mobile devices to manipulate digital data and to interact (Martin, 2018). Despite the significant amount of research has been carried out on digital literacy and digital literacy skills, mobile digital literacy skills is yet to be comprehensively articulated (Hansen, 2018). Many of the published authors affirm that the available digital literacy frameworks have failed to incorporate a mobile-centric orientation (Clark et al., 2017; Ng, 2012).

Van Biljon and Kotzé (2007) proposed a Mobile Phone Technology Adoption Model (MOPTAM) depicts the *determining* and *mediating* factors in mobile technology uptake and use. Van Biljon and Kotzé (2007) categorized the following six determining factors: Social influence, these conditions refer to the social burden placed on individuals, based on the opinions and beliefs of other people or groups. This category includes social influences and perceived usefulness and ease of use; Facilitating conditions refers to mobile phone infrastructure which comprises of: system services, cost of system services and cost of handset; Perceived

usefulness as the degree to which an individual believes in the benefits of a mobile device; Perceived ease of use which is described as the degree to which an individual believes that using the device will be effortless; Attitude involves the negative or positive associations of an individual with a targeted behavior; and the behavioral intention, that involves perceived performance while interacting with a mobile device.

The three mediating factors that determine mobile phone usage, are (Van Biljon & Kotzé, 2007): Personal factors that include an individual's personal preferences and/or beliefs regarding the benefits of technology. Therefore, relative advantage, compatibility, intricacy, image, trust and observability are considered; Demographic factors denoting an individual's age, gender, education level and technological expertise and ability; and the Socio-economic factors that include variables like job status, occupation and earnings.

Together these determining and mediating factors affect the actual usage of a device (Van Biljon & Kotzé, 2007). Additionally it can be argued that improvements in mobile devices have led to a further increase in the number of users (Mushi, Jafari, & Ennis, 2018). In support of this, Chipangura (2016) mentions that many South Africans prefer acquiring a more feature enabled smartphone which has resulted in a decreased demand for feature phones. The increase in smartphone usage could be due to two factors. Firstly, the increased broadband network coverage reaching more or less 90% of South Africa (Chipangura, 2016) and, secondly, the reduction in the price of smartphones due to competitive pricing of devices (Kende, 2015). Poushter (2016) feels that the proper adaptation and use of mobile technology is currently the crucial factor in human progress. This leads to Sharples, Sánchez, Milrad, and Vavoula (2009) asking why people take to using mobile technologies. The following listed benefits of mobile technology use go a long way in answering Sharples et al. (2009) question:

- It is easy to use and requires only one hand engagement (Rashevskia & Tkachuk, 2018).
- Functionalities are rich and devices have many sensors, therefore many more abilities (Casey & Babu, 2016).
- It is smaller and ubiquitous (Bagot, Matthews, Mason et al., 2018).
- It does not require lengthy boot up and shut down (Paily, 2016).
- It facilitates easy access to applications, like checking e-mails and shopping online (Casey & Babu, 2016).
- A very suitable personal device that keeps track of meetings etc. and thus helps one to organise his/her life (Mabila et al., 2017).

The literature further suggests that learners are embracing mobile devices, so much so that they prefer group facilitated learning through social media platforms like Facebook and WhatsApp (Aventurier, 2014; Blodgett, 2017; Kasemsap, 2017). Rodriguez and Igartua (2018a) strongly agree and note that social group education thrives due to quick response times and easy sharing of resources (Blodgett, 2017). Other scholars suggested that learners prefer e-mail as a method of communication with their educator (Krish & Salman, 2018; Savić, 2018). This preference was as a result of its formality, record being kept of conversations and ability to ask more detailed and comprehensive questions (Krish & Salman, 2018).

Despite the listed benefits, users need to have some knowledge of safety and security guidelines when using mobile devices (Chew, Cheng, & Chen, 2018; Collins & Halverson, 2018; Kluzer, 2015). Several precautions have been listed to safeguard mobile devices and their owners (Chew et al., 2018; Collins & Halverson, 2018; Kluzer, 2015).

Further to these selected highlights, the selected papers' examination for relevant Mobile digital literacy skills for the use of mobile technologies, led to the additional identification and classing according to the categories identified in the a priori framework selected in Section 3. The ordered skills are presented in Table 4 with the literature that supports it, and the dimensions and categories used to synthesize this conceptualization of Mobile Digital Literacy skills

Table 4. Identified and classed Mobile Digital Literacy skills as obtained from the literature study

Dimensions: Digital Literacy Model	Category of Digital literacy skills (Ng, 2012)	Mobile digital literacy skills for the use of mobile technologies	Support from Literature
Technical dimension	Operational literacy	Getting started with a mobile device	(Martin, 2018)
		Personalization of one's device	(Kelly & Minges, 2012)
		Underpinnings – basic skills to operate a device	(Jere, Thinyane, Boikhutso, & Ndlovu, 2013); (Kelly & Minges, 2012); (Pan, 2012); (Brown & Mbatia, 2015); (Caudill, 2007)

Dimensions: Digital Literacy Model	Category of Digital literacy skills (Ng, 2012)	Mobile digital literacy skills for the use of mobile technologies	Support from Literature
Social- emotional dimension		Understanding mobile hardware operation, affordances and specifications of a device	(Kelly & Minges, 2012); (Brown & Mbat, 2015); (Caudill, 2007); (Martin, 2018)
		Using basic functionalities on a mobile device to organize one’s life	(Ventimiglia & Pullman, 2016); (Kelly & Minges, 2012); (Sharon, 2003); (Rashevskia & Tkachuk, 2018)
		Adaptability	(Brown & Mbat, 2015)
		Navigation - use of fingers to navigate	(Kelly & Minges, 2012); (Pan, 2012); (Bagot et al., 2018)
		Application management	(Casey & Babu, 2016); (Kelly & Minges, 2012); (Hausknecht & Kaufman, 2018)
	Social-emotional literacy	Securing one’s device and its contents	(Kluzer, 2015); (Paasch & Duchene, 2012); (Hicks & Turner, 2013); (Voogt, Erstad, Dede, & Mishra, 2013)
		Understanding the internet platform	(Clark et al., 2017); (Saxena, Gupta, Mehrotra et al., 2017)
	Social networking functional literacy	Use the internet to search information	(Chipangura, 2016); (Qadir, Gordon, Tan et al., 2018)
		Use of social networks for collaborative learning and teamwork	(Rodriguez & Igartua, 2018b); (Zhang, 2018)
		Being part of online groups	(Krish & Salman, 2018)
Sharing and storing of information –cloud computing		(Mitrovic, 2017)	
Using social networks for professional growth and collaboration		(Nagel & Verster, 2012); (Aventurier, 2014; Mayisela, 2013); (Bansal & Joshi, 2014); (Rodriguez & Igartua, 2018a)	
Cognitive dimension	Online etiquette Literacy	Communication	(Nagel & Verster, 2012); (Chipangura, 2016); (Harper, 2003; Jones & Flannigan, 2006); (Kelly & Minges, 2012); (Dahlstrom, Walker, & Dziuban, 2013); (Martin, 2018)
		Conduct and demeanour over the internet	(Voogt et al., 2013); (Dhir, Kaur, Jere, & Albidewi, 2012); (Chew et al., 2018)
	Cyber Safety Literacy	Being safe in the online world	(Kluzer, 2015); (Chew et al., 2018)
		Reproduction Literacy	Dealing with graphics, video and animation
	Branching Literacy	Content recreation	(Dhir et al., 2012)
		Word processing and electronic spreadsheets	(Martin, 2018)
		Multidimensional skills at sourcing information	(Chipangura, 2016)
		Developing a connection between different forms of information	(Mabila et al., 2017); (Russell, Rawson, Freestone et al., 2018)
		Having visual and media knowledge	(Dhir et al., 2012)
	Literacy for all dimensions	Information Literacy	Background knowledge in acquiring information
Critical Literacy and other literacies like financial literacy and work around literacy			(Van Biljon & Kotzé, 2007); (Astill, 2017); (Supachayanont, 2011)

The table 4 provides an initial conceptualization of Mobile digital literacy skills for the use of mobile technology as identified from literature, framed by the *a priori* framework constituted by the digital literacy model of Ng (2013).

5. CONCLUSION

In this paper, a conceptualization of mobile digital literacy skills towards eventually enabling the articulation of the mobile digital literacy skills needed by educators using mobile technologies in formal education is presented and the research question (What constitutes mobile digital literacy skills for educators in formal education?) answered (Table 4). The authors paper exapted the 'best-fit' framework synthesis of Carroll et al. (2013) from the health domain, towards conceptualizing mobile digital literacy skills for educators when embarking on using mobile technology in their classroom practices. Table 4 suggests a conceptualization of mobile digital literacy skills needed by an educator. This will, going forward, in its turn, be used as an updated *a priori* framework to explore a nuanced conceptualization framed specifically by the activities of the educator within their classroom practice.

As it currently stands however, the conceptualization can serve as a Meta level guide for future training programmers designed for educators. Educators and experts developing courses for ICT in schools may also benefit from this study, as they seek to enhance their skills to heighten the success of implementing mobile technologies in formal education. This study further provide educators with a list of skills to assess themselves in terms of implementing mobile technology in the classroom.

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