DEVELOPING DIGITAL INFORMATION LITERACY AT INSTITUTIONS OF HIGHER LEARNING IN SUB-SAHARAN AFRICA: OPPORTUNITIES AND CHALLENGES

Ezra ONDARI-OKEMWA

University of Fort Hare, South Africa
Email: EOndari@ufh.ac.za

Abstract

This is a study on developing digital information literacy at institutions of higher learning in sub-Saharan Africa and how digital information literacy may play a role in socio-economic development in sub-Saharan Africa. Information literacy has changed drastically. The digital information literacy that may play a role in socio-economic development in sub-Saharan Africa is no longer the literacy defined as the ability to read and write at a basic level and sign a document. Digital information literacy is now defined as an individual's ability to read, write, speak in English, compute and solve problems at levels of proficiency necessary to function on the job, in the family of the individual and in society at large. As society is moving from information age to digital age, new definitions of digital information literacy are evolving which include how to access information in digital formats, and how to evaluate information and use it appropriately. Digital information literacy forms the basis for lifelong learning and is common to all disciplines, to all learning environments and to all levels of education. In sub-Saharan Africa, levels of digital information literacy are low due to numerous factors which will be investigated in this study. Development of digital information literacy in sub-Saharan Africa has been slow compared to the development of information and communication technologies in the region. Objectives of the study are to identify obstacles which hinder students at institutions of higher learning from developing digital information skills; find out how the development of digital information literacy may be speeded up among students at institutions of higher learning in sub-Saharan Africa; establish the role digital information literacy may play in socio-economic development in sub-Saharan Africa; and find out the effects of digital divide in acquiring and maintaining digital information skills in sub-Saharan Africa. A thorough review of the literature was conducted and whenever possible those responsible for digital information literacy programmes at institutions of higher learning were contacted for their views.

Keywords: Digital information literacy; sub-Saharan Africa; digital divide; institutions of higher learning; socio-economic development

1. Introduction

United Nations Educational, Scientific and Cultural Organization (UNESCO) (2011) contend that Information and communication technologies (ICTs) have penetrated all areas of contemporary life. As a consequence, digital literacy has become much more than the ability to

handle computers. Just like traditional literacy and numeracy, it comprises a set of basic skills which include the use and production of digital media, information processing and retrieval, participation in social networks for creation and sharing of knowledge, and a wide range of professional computing skills. UNESCO posits that digital literacy improves employability because it is a gate skill, demanded by many employers when they first evaluate the capabilities of a job applicant. Digital literacy also works as a catalyst because it enables people to acquire other important life skills. The benefits of digital technology can only be realised if people are empowered with the knowledge and skills to access and use them (Antonio and Tuffley, 2014). In developing regions such as sub-Saharan Africa, Antonio and Tuffley argue that women are 45% less likely than men to be online.

Digital literacy is increasingly being recognised as a critical requirement for 21st century life regardless of where one lives or works (Beetham, McGill, and Littlejohn 2009; Ferrari 2012; the United Kingdom-based Joint Information Systems Committee (JISC) 2012a). In the higher education sector, the development of digital information literacy (DIL) has been slow in comparison to changes in information and communication technologies (Duderstadt & Womack, 2004). In the case of higher education sector in sub-Saharan Africa, the slow base of the development of information digital literacy may attributed to several factors including a shortage of skilled instructors of digital literacy, poor equipment for teaching digital literacy, and technological challenges. The meaning of the concept of information literacy has changed drastically. The digital information literacy that may play a role in socio-economic development in sub-Saharan Africa is no longer the literacy defined as the ability to read and write at a basic level and sign a document. Digital information literacy is now defined as an individual's ability to read, write, speak in English, compute and solve problems at levels of proficiency necessary to function on the job, in the family of the individual and in society at large.

Being digitally literate means more than simply knowing how to operate a computer. Digital literacy means having the ability to find resources, critically evaluate and create information, and to do this by using digital technology (Antonio and Tuffley, 2014). Antonio and Tuffley further contend that digital literacy promotes democracy by giving access to a vast repository of knowledge. It also provides a platform from which one can speak out and make one's views heard.

UNESCO (2011) traces the origin of the word "literacy" as basically referring to the ability to read and write. Early descriptions of computer-related literacies seemed to focus on the acquisition of sets of rules and technical capabilities. However, by the end of the 20th century, this definition had expanded considerably to include several other literacies. According to the working definition, agreed at the UNESCO June 2003 Expert Meeting in Paris, "literacy is the ability to identify, understand, interpret, create, communicate, compute and use printed and written materials associated with varying contexts. Literacy involves a continuum of learning in enabling individuals to achieve their goals, to develop their knowledge and potential, and to participate fully in their community and wider society" (UNESCO, 2004).

Gilster (1997) opines that "Digital Literacy is the ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers." On the other hand, Street (1984) contends that traditionally, literacy was "conceived as social practices and conceptions of reading and writing." This could be evident in a 3Rs curriculum with its text-focused content. The OECD (2006) defined reading literacy as "understanding, using and

reflecting on written texts, in order to achieve one's goals, to develop one's knowledge and potential and to participate in society." Definitions of reading and reading literacy have changed over time in parallel with changes in society, the economy and culture. The concept of learning, and particularly the concept of lifelong learning, has expanded perceptions of reading literacy and the demands made on it. Functional literacy is no longer considered as ability only acquired in childhood during the early years of schooling. Rather, it is looked upon as an expanding set of knowledge, skills and strategies which individuals build on throughout life in various situations, and through interaction with their peers and with the larger communities in which they participate. For many, digital literacy forms part of this expansion.

The OECD (2009) PISA evaluation of digital literacy defined Digital Reading Literacy as "evaluating information on the Internet, assessing its credibility, and navigating web pages." have however taken a wider perspective. Gardner's (1983) study on multiple intelligences sought to widen considerations of intelligence. Influenced by Gardner's work, some scholars have shown interest in developing frameworks for digital intelligence or digital literacy (Adams, 2004; Eshet-Alkalai, 2005; Solez, 2009). According to Thomas (2011) digital literacy comes with a need for transformative pedagogies, whereas Gee (2003) sees it as a "function of social practice, social context and discourse." Media Literacy and Digital Media Literacy are sometimes used synonymously with digital literacy (Belshaw 2011). Briggs and Makice (2011) look at Digital Fluency as a logical objective for learning through digital technologies. They see digital literacy as a step below the required level needed to reliably achieve desired outcomes through technology use.

The European Joint Research Centre (JRC 2012) attempted to develop digital competence frameworks to link with other competencies such as "language, mathematics, learning to learn and cultural awareness." Some prefer more restricted meanings, such as focusing on effective use of ICT exclusively (Koltay 2011) or on the need to bring digital skills to the 66 million Americans deemed by the Federal Communication Commission as lacking digital access / digital literacy (Southerland 2012). Digital literacy also overlaps Information Literacy, Visual Literacy and Media Literacy as the importance of visual communication and information has taken on more influence (Koltay 2011). Belshaw (2011) provides an all embracing set of digital literacy consideration s (referred to as the eight Cs):

- Cultural: what is the context of experiences?
- Cognitive: how is the mind expanded?
- Constructive: what is new in such constructions?
- Communicative: how is communication enhanced?
- Confident: how is failure addressed constructively?
- Creative: how can we move beyond the canon?
- Critical: how are conventions critically addressed?
- Civic: how is a civil society developed?

Belshaw (2011) points to the complex, contextual nature of digital literacy requiring identification of learning objectives achievable within specified domains.

From educational point of view, Voogt et al. (2011) see digital literacy as requiring an understanding of the "interplay between technology and society to understand the technological principles needed to develop relevant solutions and achieve goals", contending that "digital literacy should not be regarded as a separate set of skills, but instead embedded within and across the other 21st century skills and core subjects." This is supported by recent Horizon Reports (NMC 2009, 2012) which contend that digital literacy is not about the tools, but thinking critically about how technologies shape identities and cultures. The European Union views digital literacy as "an evolving agenda" within political and cultural contexts (Shapiro 2009). Beetham (2011) summarizes this in a visual map (fig 1 below), while Martin (2006) provided a definitive explanation. "Digital Literacy is the awareness, attitude and ability of individuals to appropriately use digital tools and facilities to identify, access, manage, integrate, evaluate, analyse and synthesise digital resources, construct new knowledge, create media expressions, and communicate with others in the context of specific life situations, in order to enable constructive social action; and to reflect upon this process"

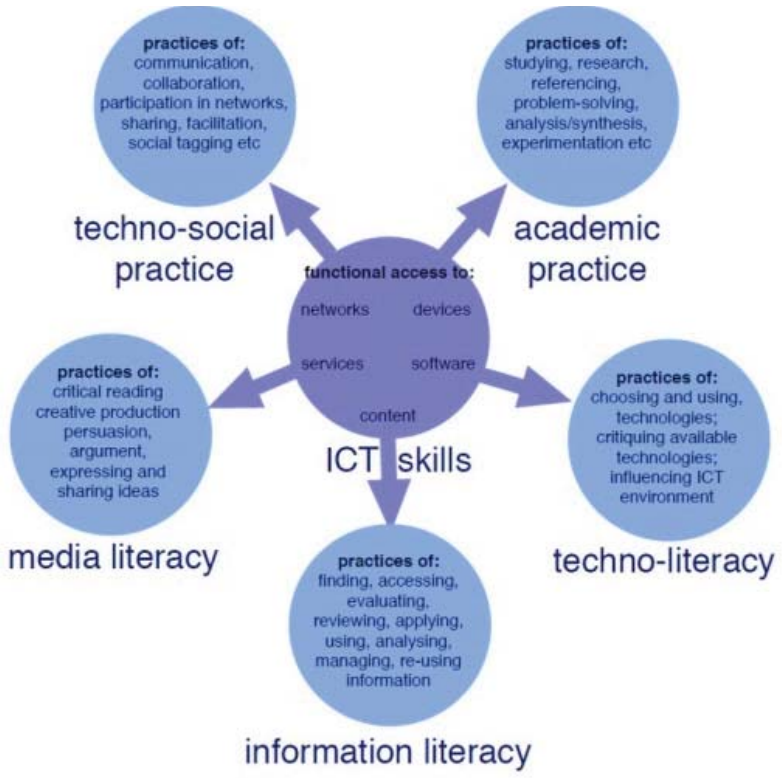

Figure1: Digital Literacy Elements
Source: Beetham, 2011

Traditional definitions of literacy have focused on skills relating to numeracy, listening, speaking, reading, writing and critical thinking, with the end goal being developing active thinkers and learners who are able to engage in society in effective and meaningful ways (Combs, 2010). These skills are needed for full participation in digital society as well, but they are only part of a larger set of skills and competencies that are required.

According to the Media Smart (2016), competencies for digital literacy can be classified according to three main principles, namely Use, Understand and Create.

Use: represents the technical fluency that's needed to engage with computers and the Internet. Skills and competencies that fall under "use" range from basic technical know-how – using computer programs such as word processors, web browsers, email, and other communication tools – to the more sophisticated abilities for accessing and using knowledge resources, such as search engines and online databases, and emerging technologies such as cloud computing.

Understand: is that critical piece – it's the set of skills that help us comprehend, contextualize, and critically evaluate digital media, so that we can make informed decisions about what we do and encounter online. These are the essential skills that should be taught to children as soon as they go online.

Understand includes recognizing how networked technology affects our behaviour and our perceptions, beliefs and feelings about the world around us.

Understand also prepares us for a knowledge economy as we develop – individually and collectively – information management skills for finding, evaluating and effectively using information to communicate, collaborate and solve problems.

Create: is the ability to produce content and effectively communicate through a variety of digital media tools. Creation with digital media is more than knowing how to use a word processor or write an email: it includes being able to adapt what we produce for various contexts and audiences; to create and communicate using rich media such as images, video and sound; and to effectively and responsibly engage with Web 2.0 user-generated content such as blogs and discussion forums, video and photo sharing, social gaming and other forms of social media.

The ability to create using digital media ensures that digital citizens are active contributors to digital society. Creation – whether through blogs, tweets, wikis or any of the hundreds of avenues for expression and sharing online – is at the heart of citizenship and innovation.

Given how quickly and frequently the media world is evolving, developing and maintaining one's digital literacy is a lifelong process. The specific skills that are needed will vary from person to person depending on their needs and circumstances – which can range from basic awareness and training to more sophisticated and complex applications.

In comparison to the above digital literacy model, Media Smarts (2016) proposes a model which illustrates the many interrelated elements that fall under the digital literacy umbrella. These range from basic access, awareness and training to inform citizens and build consumer and user confidence to highly sophisticated, and more complex creative and critical literacies and outcomes. There is a logical progression from the more fundamental skills towards the higher, more transformative levels, but doing so is not necessarily a sequential process: much depends on the needs of individual users.

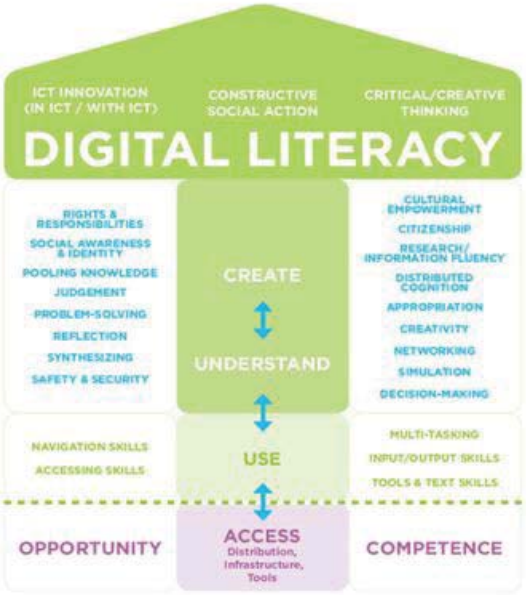

Figure 2: Elements of digital literacy
Source: Media Smarts, 2016

Digital literacy looks beyond functional IT skills to describe a richer set of digital behaviours, practices and identities (JISC, 2014). What it means to be digitally literate changes over time and across contexts, so digital literacies are essentially a set of academic and professional situated practices supported by diverse and changing technologies.

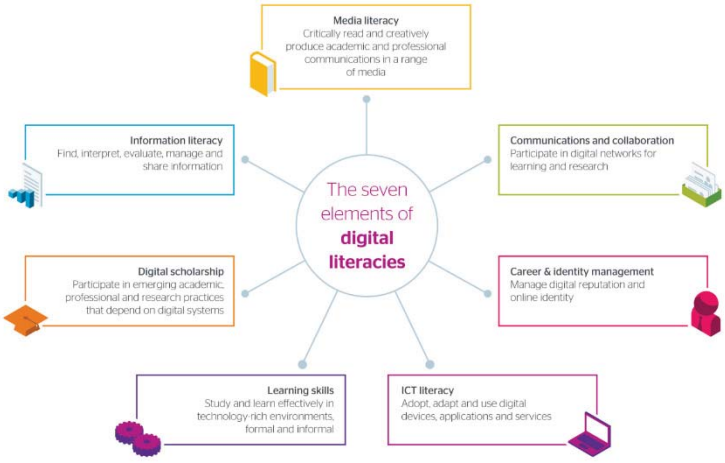

Figure 3: Seven Capabilities Model of media literacy
Source: JISC, 2014

2. Digital citizenship

Digital Citizenship is “character education” in a networked world (Media Smarts, 2016). Being

a critically engaged user and consumer of media is an essential part of active citizenship in the 21st century: we use media to inform ourselves, to help shape our opinions, to interact with our communities and to make our voices heard. Models for digital citizenship are generally framed around elements such as rights and responsibilities, participation or civic engagement, norms of behaviour or etiquette and a sense of belonging and membership (Collier, 2011).

Digital citizenship is closely aligned to civics in a traditional sense, where understanding digital media and being able to use it is becoming a vital part of active citizenship. As media messages dominate our political debates and tools such as Facebook and Twitter are used for activism and organizing political movements around the world, it's increasingly important for young people to be able to view media critically and be prepared to be engaged digital citizens who contribute to their communities in a positive way. To do so, they need the full range of skills associated with media and digital literacy to be able to know and exercise the rights they hold as consumers, as members of online communities, as citizens of a state and as human beings.

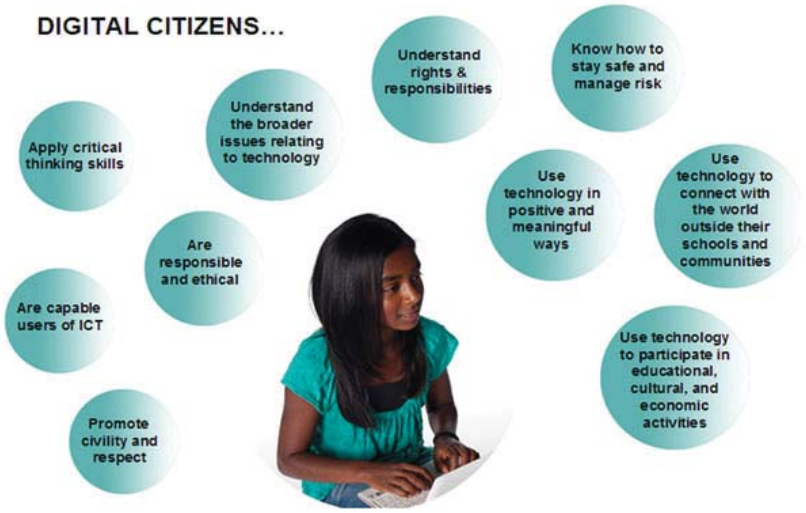

Figure 4: Digital citizenship skills
Source: Media Smarts, 2016

3. Higher education

The importance of the institutions of higher learning in a region like sub-Saharan Africa may not be gainsaid. Tertiary education policy is increasingly important on national agendas. According to the Organization for Economic Co-operation and Development (OECD 2008), the widespread recognition that tertiary education is a major driver of economic competitiveness in an increasingly knowledge-driven global economy has made high quality tertiary education more important than ever before. The imperative for countries is to raise higher-level employment skills, to sustain a globally competitive research base and to improve knowledge dissemination to the benefit of society. The OECD (2008) pointed out that tertiary education contributes to social and economic development through four major missions:

- The formation of human capital (primarily through teaching).
- The building of knowledge bases (primarily through research and knowledge development).
- The dissemination and use of knowledge (primarily through interactions with knowledge users).
- The maintenance of knowledge (primarily through inter-generational storage and transmission of knowledge).

Kaufman (2011) lists a number of skills he thinks an educated person should have. The skills Kaufman identifies resonate with digital literacy skills.

- Information-Assimilation – how to find, consume, and comprehend information and identify what's most important in the face of a problem or challenge.
- Writing – how to communicate thoughts and ideas in written form clearly and concisely.
- Speaking – how to communicate thoughts and ideas to others clearly, concisely, and with confidence.
- Mathematics – how to accurately use concepts from arithmetic, algebra, geometry, calculus, and statistics to analyze and solve common problems.
- Decision-Making – how to identify critical issues, prioritize, focus energy/effort, recognize fallacies, avoid common errors, and handle ambiguity.
- Rapport – how to interact with other people in a way that encourages them to like, trust, and respect you.
- Conflict-Resolution – how to anticipate potential sources of conflict and resolve disagreements when they occur.
- Scenario-Generation – how to create, clarify, evaluate, and communicate a possible future scenario that assists in decision-making, either for yourself or another person.
- Planning – how to identify the necessary next steps to achieve an objective, account for dependencies, and prepare for the unknown and inevitable change via the use of contingencies.
- Self-Awareness – how to accurately perceive and influence your own internal states and emotions, including effective management of limited energy, willpower, and focus.
- Interrelation – how to recognize, understand, and make use of key features of systems and relationships, including cause-and-effect, second and third-order effects, constraints, and feedback loops.
- Skill Acquisition – how to go about learning a desired skill in a way that results in competence by finding and utilizing available resources, deconstructing complex processes, and actively experimenting with potential approaches.

4. Developing digital literacies

Digital literacy does not just happen, rather, it has to be planned for and implemented. In sub-Saharan Africa, there are challenges of developing digital literacies among students at higher education institutions of learning. JISC (2012a) suggests 'a holistic kind of approach to reviewing how digital literacies are developed and embedded within their organisation'. However, the suggestions by the JISC do not necessarily focus on developing digital literacies at institutions of higher learning. Based on the definition created through its *Developing Digital Literacies*

Programme (JISC 2012b), the JISC suggested seven significant thematic areas of digital literacy:

- Be safe in a digital environment.
- Find, evaluate and apply information.
- Use digital tools – hardware/software.
- Understand social responsibility.
- Showcase achievement.
- Awareness of digital identity.
- Collaborate – education, community & work life.

Developing a digital infrastructure which creates a supportive, adaptable and secure digital environment is critical for digital literacy development to flourish (JISC, 2014). As the use of personal mobile devices increases so does the need to provide more flexible and personalised access to institutional services and technologies through fast, reliable and secure networks and services across multiple locations.

IT strategies, policies and processes will set the direction for the development of the digital environment so develop these continuously and engage users throughout the process.

Anyangwe (2012) proposes 20 ways of 20 ways of thinking about digital literacy in higher education - from understanding what digital literacy is, to developing skills and establishing ethical principles for students. The 20 ways of thinking about digital literacy in higher education proposed by Anyangwe (2012) seem appropriate to developing digital literacy in higher education in sub-Saharan Africa. The 20 ways are shown in table 1 below:

Table 1: Ways of developing digital literacy in higher education institutions

First define what you mean by digital literacy: Then state its main characteristics	It supports and helps develop traditional literacies It's a life-long practice It's about skills, competencies and critical reflection on how these skills and competencies are applied It's about social engagement
Top tips for developing the digital literacy of non-traditional students include:	Begin by exploring the ways in which the group are already using mobile and web based technologies. Many of them will already be engaging with tech for personal use, for example Skyping relatives, keeping in touch on Facebook or using mobile phones. If you have a group who aren't using technology in any of these ways, personal use might be where you start the conversation.

Digital literacy instructors should be alive to the fact that Literacy is not static	Digital literacy is functional, socio-cultural and transformational. The functional and practical skills required to function within a community Socio-cultural refers to literacy only being meaningful within a social context, and facilitating access to cultural, economic and political structures Transformational recognises that new ways of seeing and thinking about the world become possible as new cognitive and processing tools come into play.
All education sectors face many of the same challenges with digital literacy, so institutions of higher education can learn from one another	How do we get staff to engage? How do we resource digital literacy support in an on-going and sustainable way? How do we make sure that organisations embed digital literacy as a cultural approach and expectation rather than as a discrete thing that one or two staff members are responsible for 'delivering'? What does a successful approach to digital literacy entail?
It is important to recognise that new students arrive with their own digital practices	Universities tend to have some very well established practices that traditionally they have tried to 'pass on' to students. However, students arrive at university with some well-established digital practices of their own. It isn't always a question of 'both/and'. For example, referencing and plagiarism are areas where students' own digital practices and cultures clash with those of the university. Academic and digital literacy instructors at university should identify the values and history behind those academic practices, rather than slavishly learning Harvard or APA style punctuations. We can't just see students as empty vessels to be filled up with what we do over here in academia.
Developing digital literacies in practice requires:	Providing authentic contexts for practice, including digitally-mediated contexts Individual scaffolding and support Making practices of meaning-making explicit Anticipating and helping learners manage conflict between different practice contexts Recognising and helping learners integrate their prior conceptions and practices

Establish guiding ethical principles	If you look at the graduate attributes that universities now ask their students to aspire to, many of them are really values. Developing digital literacy should also have an ethical dimension. What does it mean to behave well as digital professionals, researchers or citizens? How do we act ethically in environments where public and private are blurred?
Mid-career is the worst time for academics and professional staff to be up to date with technology	Older and more secure academic staff may actually have more time to experiment and are more confident to admit they need to learn. It's all about having time, having opportunities for 'peer supported experimentation' - which turns out to be the best way to learn new technical tricks, and of course, having some incentive.
'Digital natives' need a basic understanding of computers as technical platforms, or of coding	Avoid keeping technology in a black box and getting students to have a little more mastery by writing programs in an object-oriented language. Students of all academic departments should be taught digital literacy so that it is valuable to everyone
It should be acknowledged that there is anxiety about technologies in the classroom and instructors take the lead	Too many people in universities have been shirking their responsibilities to educate students about this important subject either because they feel anxiety about their own technical literacy or they feel the barbarians are at the gate, with many faculty members feeling that traditional literacies are under attack. If professors are going to be considered as experts rather than merely fodder for funny remixes like this one or this one they need to take the lead
On managing your online identities	Your identity as a blogger and digital activist must not be separate from your identity as a scholar and academic
Instructors need to understand learners personal digital literacies before ploughing into 'supporting' them	Many students have many highly effective digital literacies but often feel that they are not 'real' or legitimate approaches
Higher education institutions need to help legitimise digital practices without trying to own them	This is a practice in many institutions of higher education which should be avoided

A key digital literacy principle is how you manage distraction	How to not get walked all over by social media. Many learners recognise that they are poor at managing the social media – There are several media platforms: Social networking sites- Facebook, Google Plus, CafeMom, Gather, Fitsugar Micro-blogging sites- Twitter, Tumblr, Posterous Publishing tools- WordPress, Blogger, Squarespace Collaboration tools- Wikipedia, WikiTravel, WikiBooks Rating/Review sites- Amazon ratings, Angie's List Photo sharing sites- Flikr, Instagram, Pinterest Video sharing sites- YouTube, Vimeo, Viddler Personal broadcasting tools- Blog Talk radio, Ustream, Livestream Virtual worlds- Second Life, World of Warcraft, Farmville Location based services- Check-ins, Facebook Places, Foursquare, Yelp Widgets- Profile badges, Like buttons Social bookmarking and news aggregation- Digg, Delicious Group buying- Groupon, Living Social, Crowd savings
Engage students in this debate and ensure that they too have ownership of this agenda	Involve students as partners in their research and give them a voice to express their views and ideas on what the term means to them, what skills they feel they need to live, learn and work effectively in a digital environment

Reticence to adapt is less about the fear of the technology itself but about the fear of doing this differently from the way they've have always been done:	Show the benefits: for example how technology can save time or help higher education staff do things easier. This is where students' expertise may be utilised to work with staff and assist them with gaining confidence in using new technologies
Digital literacy as an important part of transliteracy	Transliteracy is the ability to read, write and interact across a range of platforms, tools and media from signing and orality through handwriting, print, TV, radio and film, to digital social networks. It is the literacy of convergence, unifying literacies past and present across different platforms, media and cultures. This means it encompasses all kinds of communications from scratching pictures in the sand to editing photos in Instagram, or from inscribing tablets to text-messaging. When promoting digital literacy on its own, we can alienate people who are already very literate in other areas, and that's why it is preferable to take a holistic approach and be as inclusive as possible.
The idea that you build some kind of identifiable career capital online is likely to have a big influence on your ability to get a job	There is an assumption that the issue of digital literacy will go away because students are good with computers and have Facebook accounts. In the context of learning organisations, the question is how they can apply the skills that they have to new areas such as employability skills.
Digital engagement shouldn't be led by a platform or task-specific agenda	What is required is a change in consciousness in how we relate to technology. The underlying principle is that all technology should facilitate critical reflection - awareness of the self and the ability to articulate ideas. People should be able to make judgements on the information they consume and the contexts they create whilst sharing information. Technology is becoming increasingly seamless but our relationship with it isn't intuitive.

5. Students' expectations of digital literacy

Margaryan and Littlejohn (2008) argue that there that a new generation of students – variably named Millenials, NetGen, Generation Y, Homo Zappiens, and Digital Natives – is entering institutions of higher education. Some of this new generation of students may have grown up in environments dominated by ICTs and may have sophisticated technology skills and a whole new set of cognitive capacities. What may be the students' expectations of digital literacy and how may such expectations be addressed by institutions of higher education in sub-Saharan Africa? The JISC (2014) identifies some of the students' expectations as:

- robust and ubiquitous Wi-Fi across campus locations
- easily to connect their own devices to the university network, and access personal/ social web services
- continued access to institutional devices, especially desktop computers with relevant software for their use

A number of studies have pointed out the expectations of higher education students in a digital environment as including:

- Strong association between use of sites such as Facebook and the students' development and enhancement of their social capital as well as their psychological well-being (Ellison, Steinfield and Lampe, 2007).
- Affordances of social networking environments for knowledge construction processes (Paulus, 2007)
- Emergence of new types of literacy practices (Perkel, 2008; Martin and Madigan, 2006).
- Games and simulations fostering development of metacognitive skills, such as problem solving, interpretive analysis and strategic thinking, and increased motivation (FAS, 2006).
- Enhanced transfer of knowledge between various contexts, such as between online and offline realities and between local and global networks (Mejias, 2005).

Students are innovative and find different ways of working with technology (JISC, 2014). They need a flexible environment that lets them experiment, learn from each other, and create their own blend. But many of their most valued experiences – specialised skills such as design, data analysis, reference management and journal searches – are formally learned as part of the curriculum. This means that the confidence of teaching staff has a strong impact on students' satisfaction with the use of technology.

6. Challenges of developing digital literacy at institutions of higher learning in SSA

There are opportunities of developing digital literacy at institutions of higher education in sub-Saharan Africa in the 21st century. Equally, there are several challenges of developing digital literacy at institutions of higher learning in the sub-Saharan region. Some of the challenges include:

- Low levels of information literacy among library users in SSA
- Poor Internet connectivity
- High cost of installing information infrastructure

- Financial constraints
- Copyright issues
- A shortage of experts in digital literacy

These may be classified as generic challenges developing digital literacy at institutions of higher learning in sub-Saharan Africa. Margaryan and Littlejohn (2008) identify other more specific challenges which may need to be addressed at institutions of higher learning in sub-Saharan Africa as:

- Students' lack of skills in using technology.
- Lecturers' poor IT skills
- Lecturers' lack of using IT in teaching
- Lack of integration of technologies within education
- Reluctance to change the mind-set

6.1 Digital divide

Digital divide, when viewed holistically, is but one component of the larger problem of

Information Poverty, which in turn encompasses the lack of access to emerging ICTs, information infrastructure in general, skills to manipulate and use information, and basic educational and cultural barriers. While originally a concept applied to gaps between the information rich and poor in developed nations, what was once a basic discrepancy quickly

became a matter of global concern (Gebremichael and Jackson, 2006). Digital divide is one of the major obstacles in developing digital literacies in institutions of higher education in sub-Saharan Africa. Gebremichael and Jackson (2006) contend that equitable access to information is one of the most vital principles in the emerging global information economy, and there is perhaps no region of the world that epitomizes the conflict between the information haves and have-nots more than Sub-Saharan Africa. In addition to the more traditional forms of poverty, a new concept, "information poverty" has manifested itself that better explains the true nature of being a have-not in a world increasingly reliant on information and communication technologies (ICTs). Sub-Saharan Africa includes some of the most impoverished nations in the world.

There are numerous political, economic, and social problems, in addition to the so-called digital divide which increasingly affects these societies. As a result, information poverty in sub-Saharan Africa is part of a larger pattern of social ailments. Its root causes have been theorized by many to be tied to information illiteracy, a lack of resources, governmental censorship and control, established information policies or lack thereof, and poor and undeveloped internal information infrastructures (Bertot, 2003).

As a continent, Africa represents an estimated 14 percent of the world's total population, but accounts for less than 2% of the world's Internet usage (Internet World Stats, 2005). In terms of overall teledensity, A 2002 United Nations Information and Communications Task Force report cites a UNSECO figure estimating the number of radios at over 200 million sets, making the radio the most prominent mass media form available in Africa.

Oyelaran-Oyeyinka and Lal (2005) are of the opinion that the Digital Divide faced in sub-Saharan Africa is as complex as it is simple. The duo contends thus:

> *"There are twin divides in broad terms, the global divide between Africa and the industrialized countries and the divide within a region. Evidently African countries need greater investment flows, since huge investments are a prerequisite to building effective communications networks. African countries have recorded improvements in literacy at the primary, secondary, and tertiary levels since independence; however, they are still far behind the rapidly industrializing developing countries. Even then, basic literacy is not enough, digital literacy is required and explicit investment will have to be made by African countries for individuals to become computer literate." (Oyelaran-Oyeyinka and Lal, 2005).*

The above challenges may act as major impediments to developing digital literacies in institutions of higher learning in sub-Sharan Africa, a region where tertiary enrolment is estimated to be 6% compared to the world average of 26% (UNESCO, 2009). However, the percentage enrolment of students in institutions of higher education in sub-Saharan Africa continues improving.

7. Concluding remarks

The definition of digital literacy now covers more than the traditional operational literacy which focused on skills relating to numeracy, listening, speaking, reading, writing and critical thinking, with the end goal being developing active thinkers and learners who are able to engage in society in effective and meaningful ways (Combs, 2010). These skills are needed by university students in sub-Saharan Africa who upon graduation are likely to work in a digital environment. Just like traditional literacy and numeracy, digital literacy comprises a set of basic skills which include the use and production of digital media, information processing and retrieval, participation in social networks for creation and sharing of knowledge, and a wide range of professional computing skills (UNESCO, 2011). It is now clear that digital literacy should be made an important component of any curricular of an institution of higher learning. For institutions of higher learning in sub-Saharan Africa, it may be tempting to assume that these skills are innate to contemporary learners in the region. For digital literacy to be developed in institutions of higher learning in sub-Saharan Africa, new approaches to education and learning should be adopted. New types of technologies to support those new approaches may be required. The ultimate goal is to produce graduates who are creative individuals and who may constantly invent new possibilities for themselves and their communities.

References

Adams, N.B. 2004. Digital intelligence fostered by technology. Online [Available]: http://scholar.lib.vt.edu/ejournals/JOTS/v30/v30n2/pdf/adams.pdf. Acessed November 23, 2015.

Antonio, A. and Tuffley, D. 2014. Digital literacy in the developing world: a gender gap. *The conversation*, Online [Available]:

https://theconversation.com/digital-literacy-in-the-developing-world-a-gender-gap-28650. Accessed January 23, 2016.

Anayangwe, E. 2012. 20 ways of thinking about digital literacy in higher education. Guardian Higher Education Network, 15 May. Online [Available]: http://www.theguardian.com/higher-education-network/blog/2012/may/15/digital-literacy-in-universities. Accessed January 7, 2016.

Beetham, H., McGill, L. & Littlejohn, A. (2009) 'Thriving in the 21st century: learning literacies for the digital age (LliDA Project)', *JISC*, Online [Available]:

http://www.caledonianacademy.net/spaces/LLiDA/uploads/Main/LLiDAreportJune09.pdf. Accessed December 28, 2015.

Bertot, J. C. (2003). The multiple dimensions of the digital divide: More than the technology 'haves' and 'have nots'. *Government Information Quarterly,* 20(2): 185–191.

Briggs, C., and Makice, K. 2011. Digital fluency. Online [Available]: http://socialens.com/fluencybook.php. Accessed Janyary 3, 2016.

Beetham, H. 2011. Digital literacy anatomised: access, skills, and practices. Online [Available] : http://jiscdesignstudio.pbworks.com/w/file/40474828/Digital%20literacies%20anatomy.pdf. Accessed February 22, 2016.

Belshaw, D. 2011. What is 'digital literacy'? A Pragmatic investigation. Unpublished Ed.D Thesis, Department of Education, University of Durham. Online [Available]: http://etheses.dur.ac.uk/3446/. Accessed February 22, 2016.

Bundy, A. 2004. *Australian and New Zealand information literacy framework: Principles, standards and practice* (2nd ed.). Adelaide: ANZIIL. Online [Available]: http://www.anziil.org/resources/Info. Accessed January 15, 2016.

Collier, A. 2011. Making the Case for Digital Citizenship. Slideshare presentation. Online [Available]: http://www.slideshare.net/annecollier/making-the-case-for-digital-citizenship-111104. Accessed February 28, 2016.

Combes, B. (2010). How much do traditional literacy skills count? Literacy in the 21st century & reading from the screen. Online [Available]:

http://www.slideshare.net/IASLonline/literacy-skills-challenged. Accessed February 3, 2016.

Ellison, N. B., Steinfield, C., & Lampe, C. 2007. The benefits of Facebook "friends:" Social capital and college students' use of online social network sites. *Journal of Computer-Mediated Communication,* 12(4), article 1.

Eshet-Alkalai, Y. 2005. Thinking skills in the digital era. In: Haward, C., Bottcher, J. V., Justice, L., Schenk, K., Rogers, P. L., Berg, G, A. (eds.) 2005. *Encyclopaedia of Distance Learning*, Vol. I. London: Idea Group Inc., 1840-1845.

FAS Federation of American Scientists.2007. *Harnessing the power of video games for learning*. Report, Summit of Educational Games. Online [Available]: http://www.fas.org/programs/ltp/policy_and_publications/summit/Summit%20on%20Educational%20Games.pdf. Accessed January 17, 2016

Ferrari, A. (2012) 'Digital competence in practice: an analysis of frameworks'. *JRC Technical Reports*, Online [Available]: http://ftp.jrc.es/EURdoc/JRC68116.pdf. Accessed December 14, 2015

Gardner, H. 1983. *Frames of Mind: the theory of multiple intelligences,* New York: Basic Books.

Gilster, P. 1997. *Digital Literacy.* New York: Wiley.

JISC. 2012a. *Digital Literacies Organisational Review*, [online] Available: http://www.jiscrsc.ac.uk/media/249071/digital_literacies_organisational_review_11_sep_2012.pdf. Accessed December 29, 2015

JISC .2012b. *Developing Digital Literacies*, Online [Available]: http://www.jisc.ac.uk/developingdigitalliteracies . Accessed December 29, 2015.

JISC. 2014. Developing digital literacies. Online [Available]: https://www.jisc.ac.uk/guides/developing-digital-literacies. Accesses January 14, 2016.

JRC. 2012. Online consultation on experts view on digital competence. Online [Available] http://ipts.jrc.ec.europa.eu/ publications/pub.cfm?id=5339. Accessed January 22, 2016.

Kaufman, J. 2011. What must an educated person know? Online [Available]: https://joshkaufman.net/what-must-an-educated-person-know/. Accessed February 25, 2016.

Koltay, T. 2011. The media and the literacies: media literacy, information literacy, digital literacy. *Media, Culture and Society,* 33(2):211-221.

Margaryan, A. and Littlejohn, A. 2008. Are digital natives a myth or a reality?: students' use of technology for learning. Online [Available]: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.172.7940&rep=rep1&type=pdf. Accessed January 18, 2016.

Martin, A. 2006. Towards a Framework for Digital Literacy Glasgow. DigEuLit Project. Online [Available]: htttp: // www.digeulit.ec .

Martin, A., and Madigan, D.(Eds.) 2006. *Digital literacies for learning*, London: Facet Publishing.

Media Smarts: Canada's Centre for Digital and Media Literacy. Online [Available]: http://mediasmarts.ca/digital-media-literacy-fundamentals/digital-literacy-fundamentals. Accessed January 21, 2016.

Mejias, U. (2005). *A Nomad's guide to learning and social software*. Online [Available]:http://knowledgetree.flexiblelearning.net.au/edition07/download/la_mejias.pdf. Accessed February 14, 2016.

OECD. 2006. Assessing scientific, reading and mathematical literacy: a framework for PISA 2006 Online [Available]:

http://www.oecd.org/edu/school/assessingscientificreadingandmathematicalliteracyaframeworkforpisa2006.htm.

OECD. 2008. Tertiary Education for the Knowledge Society: OECD Thematic Review. Paris: Organisation for Economic Co-operation and Development. Online [Available]: http://www.oecd.org/education/skills-beyond-school/40345176.pdf. Accessed February 23, 2016.

OECD. 2009. Education: Korea tops new OECD PISA survey of digital literacy. Online [Available]: http://www.oecd.org/hungary/educationkoreatopsnewoecdpisasurveyofdigitalliteracy.htm.

Oyelaran-Oyeyinka, B., and Lal, K. 2005. Internet diffusion in sub-Saharan Africa: a cross-country analysis. *Telecommunications Policy*, 29(7): 507–527.

Paulus, T. 2007. CMC modes for learning tasks at a distance. *Journal of Computer-Mediated Communication, 12*(4), article 9.

Perkel, D. 2008. Copy and Paste Literacy? Literacy practices in the production of a MySpace profile. In Drotner, K., Jensen, H.S., & Schroeder, K. (Eds). *Informal learning and digital media: Constructions, contexts, consequences*,203-224. Newcastle, UK: Cambridge Scholars Press.

Rheingold, H.2012. Stewards of digital literacies. *Knowledge Quest,41(1):52-55*.

Shapiro, H. 2009. Supporting Digital Literacy: Public Policies and Stakeholder Initiatives. Final Report: Topic Report 4: Conclusions and recommendations based on reviews and findings. Danish Technological Institute. Online [Available]:

http://ec.europa.eu/information_society/eeurope/i2010/docs/benchmarking/dl_topic_report_4.pdf Accessed January 28, 2016.

Solez, K. 2009. Human digital intelligence. Online [Available]: http://www.cyber-medicine.org/FeaturesNews/ digital.html. Accessed September 14, 2015.

Southerland, A. 2012. Getting past the catch-22 of digital literacy. Online [Available]: www.theatlantic.com/sponsored/workforce-of-tomorrow/archive/2012/07/getting-past-the-catch-22-ofdigital-literacy/260195/. Accessed January 12, 2016.

Street, B. 1984. Literacy in theory and practice. Cambridge: Cambridge University Press Speak-Up. 2011. Mapping a Personalized Learning Journey - K-12 Students and Parents Connect the Dots with Digital Learning. Online [Available]: http://www.tomorrow.org/speakup/SU11_April_Report.html. Accessed May 28, 2015.

Thomas, A. 2011. Towards a transformational digital literacies pedagogy. *Nordic Journal of Digital Literacy,* 6: 89-101. Online [Available]: http://kellimcgraw.com/2011/11/17/transformative-digital-literacies/. Accessed February 26, 2916.

Turner, J. 2012. The difference between Digital Learning and Digital Literacy - a practical perspective. Online [Available]: https://jturner56.files.wordpress.com/2013/01/digital-literacy-paper.pdf. Accessed January 22, 2016.

United Nations Educational, Scientific, and Cultural Organization (UNESCO). 2002.

International literacy day 2002. Regional illiteracy statistics. Online [Available]:

http://www.uis.unesco.org/en/stats/statistics/literacy2000.htm. Accessed January 14, 2016.

United Nations Educational, Scientific, and Cultural Organization (UNESCO). 2004. The Plurality of Literacy and its Implications for Policies. UNESCO Education Sector Position Paper. Online [Available]: http://unesdoc.unesco.org/images/0013/001362/136246e.pdf. Accessed January 28, 2016.

United Nations Educational, Scientific, and Cultural Organization (UNESCO). 2005.

Community Multimedia Centers to open in Bahir Dar and Lalibela in Ethiopia. Online [Available]:http://portal.unesco.org/ci/en/ev.php-URL_ID=16019&URL_DO=DO_TOPIC&URL_SECTION=201.html. Accessed January 24, 2016.

United Nations Educational, Scientific, and Cultural Organization (UNESCO). Literacy in Africa. Online [Available]: http://portal.unesco.org/education/en/ev.php-URL_ID=31032&URL_DO=DO_TOPIC&URL_SECTION=201.html. Accessed January 12, 2016.

UNESCO.2009. Information Society Policies. Annual world report. Online [Available]: http://portal.unesco.org/ci/en/files/29547/12668551003ifap_world_report_2009.pdf/ifap_world_report_2009.pdf. Accessed January 25, 2016.

UNESCO. 2011. Digital literacy in education: IITE Policy Brief, May 2011. Online Available]: http://iite.unesco.org/files/policy_briefs/pdf/en/digital_literacy.pdf. Accessed January 22, 2016.

Voogt, J., Erstad, O., Mishra, P., and Dede, C. 2011. TWG6: 21st century learning - expanded brief paper. EduSummIT 2011. Online [Available]: http://edusummit.nl/res2011/calltoaction2011/briefpapers2011. Accessed December 16, 2015.