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Towards The Conceptual Digital Skills Framework in South African Public and Private Sector

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Abstract

The aim of this paper to propose conceptual framework for digital skills in south African private and public sector. The Digital skills remains a critical requirement in this era of 4IR, in south Africa the unemployment rate the remain high and the majoring of our youth have university degrees but still lacks the experience and the digital skills which is been sought by their different industries. The methodological approach which has been selected for this study is based on qualitative research methods using grounded theory. Qualitative research is suitable when seeking to understand experiences and understanding their context in words. This study was conducted using primary and secondary data sets. Secondary data sets were sourced from reputable academic sources and recognized international organizations. This research aims to contribute to the body of knowledge by making available literature that can be referenced for implementation initiatives, furthermore the proposed Conceptual Digital skills framework can be adopted by the South African government and private sector to accelerating digital skills development efforts in closing the digital divide and skills shortage in this 4IR era. It is evident from the results presented in this study that the conceptualization of digital skills needed for the digital revolution is key to accelerating digital skills development efforts. Indeed, research shows that efforts to successfully deliver these skills should begin at the national level through promoting good practices, developing a National Digital Skills Development Strategy, and building this capacity at school level to equip the young generation with the foundational skills

1 Introduction

The digital technology revolution is already transforming and changing working environments and societies. Emerging technologies, which include machine learning, artificial intelligence, and robotics, are advancing at a rapid pace and represent an opportunity to improve operational efficiency and economic growth (Gekara, Snell, Molla, Karanasios and Thomas, 2019). This revolution, however, requires a workforce equipped with appropriate digital skills to thrive (Balacescu, Zaharia and Delia,

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2019). South Africa is faced with the mounting task of bridging the digital skills gap prevalent in its economy to compete in the global community and to maximize the many prospects of this digital technology revolution.

Research shows that digital skills are a scarce commodity in the South African workforce (Schofield, 2018). This is more so in the public sector than in the private sector. Consequently, the public sector in South Africa lags in terms of digital transformation whilst the private sector is making progress. The private sector can attract the few skilled workers as it offers flexibility and attractive packages whilst government is often unable to provide such flexibility as it is highly regulated and bureaucratic. Nevertheless, the World Economic Forum (WEF) highlights that the fast pace at which emerging technologies are growing will lead to an increase in the shortage of digital skills in all industries (World Economic Forum, 2019). To overcome this challenge, the WEF recommends a holistic approach to skills development that is targeted at the existing workforce and untapped talent pools (World Economic Forum, 2019). This study, therefore, proposes a conceptual framework for digital skills in both the public and private sectors in South Africa. It investigates the nature of digital skills requirements for both these sectors and proposes effective and holistic approaches for digital skills development for the country.

2 Literature Review

Digital skills are considered to be one of the prerequisites for innovation and digital transformations in organizations around the world. The growing use of digital technology in the workplace now demands all workers to have the digital skills that they require to perform their daily tasks (OECD, 2016).

While the concept of digital skills has been around for quite some time, research shows that this concept evolves as technology changes (UNESCO, 2018). Furthermore, the term ‘digital skills’ is often interchangeably used with terms such as ‘digital literacy’, or ‘digital competence’ (International Telecommunication Union, 2018 & Gekara et al., 2017). Consequently, research shows that there is still a lack of global understanding of the definition of these terms (Park, 2019). This Section introduces the accepted definitions and concept of digital skills that are adopted for this study.

2.1 Definition of digital skills

UNESCO defines digital skills as "a range of abilities to use digital devices, communication applications, and networks to access and manage information” (UNESCO, 2018). This definition encompasses skills that enable individuals to create and share digital content, communicate, collaborate, as well as solve problems in the various spheres of life (UNESCO, 2018). A more comprehensive definition by Gekara et al. (2019) defines digital skills as a combination of digital knowledge, cognitive know-how, practical know-how, and competence that is required for the current and future digital environments (Gekara, Snell, Molla, Karanasios and Thomas, 2019). This definition recognizes digital skills to be made up of hard technical skills which are needed to operate systems and software; cognitive skills required to process information and data; ethical skills for dealing with security concerns; and lastly strategic skills for planning and solving work related problems in the digital era (Gekara, Snell, Molla, Karanasios and Thomas, 2019). Whilst traditionally the concept of digital skills was more focused on technical skills, or know-how of using software and hardware components, these definitions illustrate that the focus has shifted to incorporating non-technical abilities, such as cognitive, and interpersonal or soft skills (Gekara, Snell, Molla, Karanasios and Thomas, 2019). Subsequently, various literature reveals that digital skills can be categorized or classified into the following categories:

- Basic or generic digital skills
- Intermediate digital skills
- Advanced or specialist digital skills. (OECD, 2016; ITU, 2018; Gekara et al., 2019)

2.1.1 Basic or generic digital skills

Basic level digital skills are recognized as being those skills that enable individuals to perform basic tasks, such as using email, and other productivity tools, such as word processing, files management, searching, and others (OECD, 2016; ITU, 2018; Gekara et al., 2019)

2.1.2 Intermediate digital skills

Intermediate skills are recognized as those skills which enable individuals to create produce, analyses, interpret, visualize data, and create digital marketing or graphic design content (OECD, 2016; ITU, 2018; Gekara et al., 2019).

2.1.3 Advanced or specialist digital skills

Advanced skills refer to specialists skills needed by ICT professionals, such as programming, network specialist, artificial intelligence (AI), big data, cybersecurity, mobile app developers, etc. (International Telecommunication Union, 2018). This category also includes digital entrepreneurship skills required to successfully integrate technology with traditional business processes.

2.2 RELATED DIGITAL SKILLS FRAMEWORKS

2.2.1 21st-Century digital skills

The concept of 21st century digital skills as defined by van Laar et al. (2017) is an integration of the traditional 21st-century skills, also referred to as ‘soft skills’ required to function in the knowledge economy, with the digital dimension. According to van Laar et al. (2020), the concept of digital skills no longer just focuses on technical skills but incorporates these soft skills as well. Therefore, the conceptualization of 21st century digital skills aim to meet the demand of the workforce by proposing a set of skills needed by the workforce to participate in the knowledge-based economy while leveraging information and communication technologies (van Laar, van Deursen, van Dijk and de Haan, 2017). The framework proposes the following conceptual skills:

2.2.2 Technical skills

These skills refer to the knowledge that workers require for using hardware, software, and digital devices. These skills are dynamic, and they evolve with technology changes (van Laar, van Deursen, van Dijk and Haan, 2020).

2.2.3 Communication digital skills

As a result of the inter-connectivity of the global economy, employees are required to have the skills to communicate using different communication media or platforms (van Laar, van Deursen, van Dijk and de Haan, 2020).

2.2.3 Information digital skills

The vast amount of data and information being generated by systems require employees that have the skills for searching analyzing, and evaluating information from multiple sources (van Laar, van Deursen, van Dijk and de Haan, 2020).

2.2.4 Collaboration digital skills

Work in the 21st century is increasingly being performed in groups or teams. This requires employees to be equipped with skills that enable them to work in partnership with each other, understanding their role and the role of those they are working with (van Laar, van Deursen, van Dijk and deHaan,2020).

2.2.3 Critical thinking digital skills

Critical skills are those skills required for solving problems. Critical skills in the age of information and communication technologies entail having the ability to make choices on the type of information or communication that is appropriate for a given context (van Laar, van Deursen, van Dijk and de Haan, 2020). It also entails having the ability to analyses and filter this information. Problem-solving skills involve applying critical thinking skills to find an appropriate solution for a particular problem (van Laar, van Deursen, van Dijk and de Haan, 2020). Creativity skills enable individuals to formulate new solutions to complex problems and to derive new knowledge from information (van Laar, van Deursen, van Dijk and de Haan, 2020).

2.3 Digital Intelligence (DQ) Framework

In an attempt to provide a global standard to the concept of digital skills, the DQ Institute in partnership with the OECD, IEEE Standards Association, and the World Economic Forum, has formulated a digital intelligence framework which comprises eight competencies considered to be essential in today's digital environments (Park, 2019).
The framework covers a range of competencies that addresses "technical, cognitive metacognitive, and sociology, emotional competencies grounded in universal moral values" (Park, 2019).

Figure 1: DQ framework

The eight competencies of the DQ framework as illustrated in the above diagram, figure 1, are briefly explained in the following list:

Digital Identity refers to the ability to create an online and offline identity (Park, 2019).

Digital Use refers to the skills required to operate and use technology in a healthy and civilized manner, whilst respecting the environment (Park, 2019).

Digital Safety refers to the competencies required to understand and mitigate the security risks associated with the use of technology (Park, 2019).

Digital Security refers to the competencies associated with detecting and avoiding cyber security threats to protect data, networks and digital devices (Park, 2019).

Digital Emotional Intelligence, is the ability to recognize, navigate, and express emotions in one's digital intra and interpersonal interactions (Park, 2019).

Digital Communication is the ability to communicate and collaborate with others using technology (Park, 2019).

Digital Literacy, is the ability to find, read, evaluate, synthesize, create, adapt, and share information, media, and technology (Park, 2019).

Digital Rights is the ability to understand and uphold human rights and legal rights when using technology (Park, 2019).

2.4 OECD Public Sector Digital Skills Framework

The technology evolution has transformed the needs and expectations of citizens about how they interact with the public sector and how they access public services (OECD, 2019). In order to drive the digital transformation necessary to meet these expectations, the public sector needs a creative and citizen-centric workforce equipped with the necessary skills to take advantage of the emerging technologies to respond to this need (OECD, 2019). Governments around the world are now, more than ever, increasingly required to increase their effort in digital skills development in order to enhance digital transformation (OECD, 2019). The OECD recommends a framework for the types of digital skills required by the public sector for driving digital transformation. The four areas of this framework are illustrated in figure 2 below (OECD, 2019).

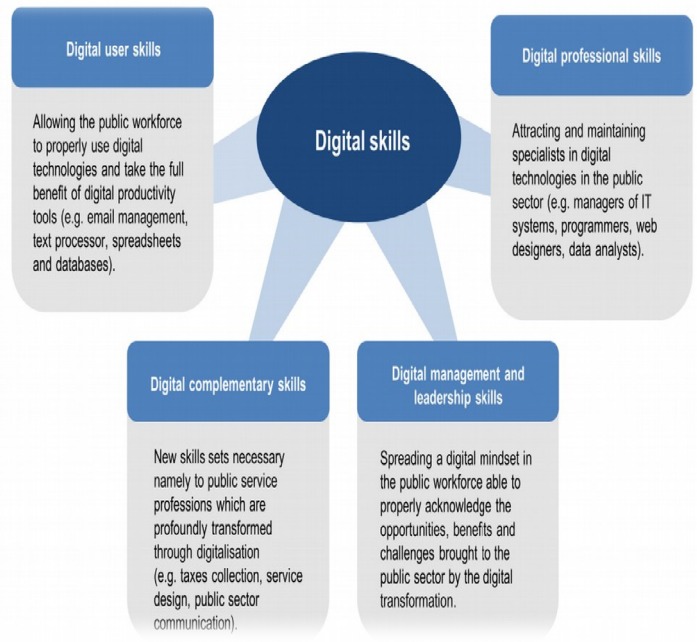

Figure 2: OECD framework

The framework comprises four key skills that the public sector needs to consider for driving digital transformation. They are:

2.4.1 Digital user skills

These skills include abilities required for operating tools, such as email, word processing, spreadsheets, and presentation tools (OECD, 2019). These skills are already mandatory for most of the public and business sector workforce.

2.4.2 Digital professional skills

Professional skills include the specialist IT skills required to manage and develop ICT resources (OECD, 2019). These skills include software engineers or developers, network specialists, enterprise architects, data scientist, database administrators, business analysts, product managers, etc. (OECD, 2019).

2.4.3 Digital complementary skills

These are new skills that are required by the workforce as a result of digital technologies penetration into the different non-ICT-specific business functions or processes (OECD, 2019).

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3 Research Methodology

3.1 Research paradigm or orientation to knowledge

The philosophical assumption that underpins this study is based on interpretivism. Interpretivism is based on the assumptions that multiple realities can exist as the world is diverse (Kroeze, 2012). It places emphasis on the meaningful nature of people's participation in the social or cultural context (Mathison, 2005; Saunders, Lewis, and Thornhill, 2016). Furthermore, this philosophical position acknowledges that knowledge is continuously changing and is based on context (Kroeze, 2012). Whilst philosophies, such as positivism, places emphasis on statistical analysis and objective views, interpretivism emphasizes qualitative data and interpreting human experiences and meanings (Kroeze, 2012). Nevertheless, the vast amount of information available in literature on the concept of digital skills and related frameworks is an indication that no single narrative can be ascribed to the study of digital skills. It can, therefore, be assumed that the concept of digital skills is a contextual knowledge that can be studied subjectively. Consequently, as interpretivism assumptions believe that knowledge can only be understood subjectively, this makes it an appropriate view for this study.

3.2 Methodological approach/strategy

The methodological approach which has been selected for this study is based on qualitative research methods using grounded theory. Qualitative research is suitable when seeking to understand experiences and understanding their context in words (Given, 2008).

3.3 Data collection method

This study was conducted using primary and secondary data sets. Secondary data sets were sourced from reputable academic sources and recognized international organizations. The purpose of the secondary data is to provide the baseline on the concept and common definitions of digital skills found in the literature. One of the objectives of this research was to gain an understanding of the concept of digital skills required in the digital era, therefore, the reviewed secondary data sets will be used to deliver on this objective. Furthermore, the secondary data will be used to identify industry best practice and guidelines in successfully building digital skills capabilities for the workforce.

4 Developing a Conceptual Digital Skills Framework

Proposed conceptual framework for digital skills

The literature reviewed in this study shows that the development of digital skills requires countries to invest in national digital skills frameworks (OECD, 2016); (Bellman and Eggers, 2015); (Gekara, Snell, Molla, Karanasios and Thomas, 2019). Frameworks allow for the capturing and categorizing of the nature of digital skills required by the workforce and citizens to provide a mechanism for countries to monitor and assess digital skills needs.

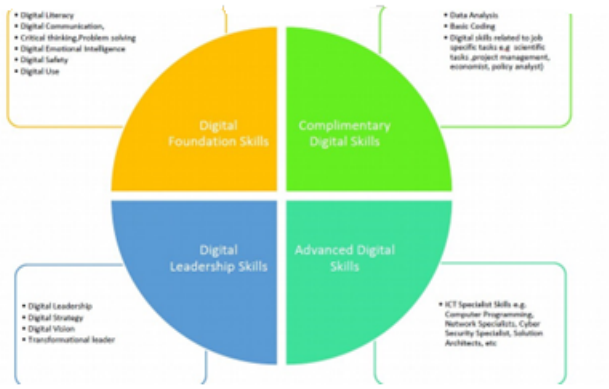
Even though research recognizes more than 60 digital frameworks, not all frameworks are adequate cover the needs of a workforce. Some frameworks, for example, tend to emphasize the basic

and soft skills, while others the technical skills. However, this study identified four categories of digital skills required by the public and private sectors in South Africa. As illustrated in figure 3 these skills are:

- Digital foundation skills
- Complimentary digital skills
- Advanced digital skills
- Digital leadership skills.

The skills recommended in this framework were adopted from the two frameworks reviewed in this study which are the Digital Intelligence (DQ) Framework recommended by Park (2019) and the types of skills recommended by the OECD (2019). The skills recommended for this conceptual framework presents a combination of digital skills.

Figure 3: Conceptual digital Skills Framework



Digital foundation skills

Digital foundation skills are the basic skills required by every citizen to function. These skills include the eight competencies of the DQ framework which have been defined in the literature review section. These competencies include the basic skills required for operating hardware or software and the soft skills necessary for collaboration, communication, and relationship management in the digital context.

Digital Leadership skills

The advert of the digital revolution has also given rise to the need for the leaders who re competent in leading digital transformation to create value for their organizations. The fusion of digital technology in business often creates new business models and introduces new structures that come with complexities and new challenges (Mihardjo and Sasmoko,2019). Consequently, this change requires a transformational leadership style to optimize technology and create the organizational culture necessary to drive transformation (Mihardjo and Sasmoko, 2019)

Digital complementary skills

The digital complementary skills are those skills which are related to job-specific tasks. These skills enable workers to use technology in performing work-related tasks, for example digital marketing, digital graphic design, financial analysis, etc. As technology continues to evolve becoming more integrated into business functions, it is envisioned that this will create new roles.

Advanced digital skills

Advanced digital skills refer to specialist IT skills required by the IT professionals to implement, maintain, and support IT solutions. These include, among others, skills, such as computer programming, cloud computing, network management, artificial intelligence.

5 Conclusion and Limitations

The main aim of this study was to explore the digital skills required by both the private and public sectors' workforce in South Africa. The study has researched and analyzed existing literature to understand the definitions and concepts of digital skills required by today's workforce furthermore the study proposes the digital Skills conceptual framework that can be adopted by both public and private sector in order to address current skills shortage in south Africa.

5.1 How the objectives were met

This study sought to meet the following objectives which were set out in the beginning of the research:

- Gain an understanding of the concept of digital skills in the digital era
- Identifying the type and category of current and future digital skills required by the South African and private workforce to fully harness the opportunities offered by the digital era.
- Gain an understanding of challenges in current digital skills development efforts in SA
- Identify skills development approaches to address the growing demand for digital skills in South Africa's workforce.

Objective 1: Gain an understanding of the concept of digital skills in the digital era

This objective sought to bring an understanding of the definition and concept of digital skills as it applies to the current digital revolution. Even though the literature reviewed shows that this concept has been in existence for a while, the literature also revealed that this term is often interchangeably used with other terms, such as digital literacy and digital competence. Therefore, the accepted definition which was adopted for this study recognized digital skills to be made up of hard technical skills which

are needed to operate systems and software; cognitive skills required to process information and data; ethical skills necessary for dealing with security concerns; and lastly strategic skills required for planning and solving work-related problems in the digital era.

Objective 2: Identifying the type and category of current and future digital skills required

The second objective sought to identify the type and category of skills required by the South African workforce to drive digital transformation and thrive in the digital era. Through the review of global digital frameworks, such as the Digital Intelligence (DQ) framework and OECD framework for public servants, this study proposed the following category of skills required by public and private sector workers:
-digital foundation skills
-digital complementary skills
-digital advanced skills
-digital leadership skills.

Objective 3 Gain an understanding of the challenges in current digital skills development efforts in the country

This objective sought to investigate the challenges in digital skills development in both the public and private sectors in South Africa. Through data collected from respondents from the private and public sectors the challenges to digital skills development were identified to be the following:

- Lack of digitally competent leaders
- Lack of overall digital strategy.

Key contributions

This study recognizes the urgency in the South African context to accelerate digital transformation to realize the benefits and opportunities offered by the digital revolution. This research, therefore, aims to contribute to the body of knowledge making available literature that can be referenced for implementation initiatives, furthermore the proposed Conceptual Digital skills framework can be adopted by the South African government and private sector to accelerating digital skills development efforts in closing the digital divide and skills shortage in this 4IR era.

6 Recommendation and Conclusion

It is evident from the results presented in this study that the conceptualization of digital skills needed for the digital revolution is key to accelerating digital skills development efforts. Indeed, research shows that efforts to successfully deliver these skills should begin at the national level through promoting good practices, developing a National Digital Skills Development Strategy, and building this capacity at school level to equip the young generation with the foundational skills. The literature also reveals that upskilling of the existing workforce should be a collaborated effort involving a partnership between the private sector, public sector, and non-governmental institutions.

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