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Investigating the Internet Skills of Older Adults in South Africa

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Abstract.

The older adult population is growing in South Africa. However, it is reported that approximately only 3.6% of older adults use the Internet. Using information technology resources and the internet can enable older adults to be independent for longer, and the internet may improve older adults' quality of life. Additionally, access to technology and the internet supports access to information and digital inclusion. This study investigated older adults' level of internet skills in South Africa and their experiences regarding internet use. The research followed a positivist, quantitative approach and used online questionnaires for data collection. The results showed that older adults appear to be lacking in internet skills in South Africa. The overall mean scores were low, where mobile skills seemed to be the lowest-rated skill for the respondents. The evaluation also showed that online operational and creativity skills appeared low for older adults.

Keywords: Older adult, Grey divide, Digital skills, Internet skills scale (ISS), Digital inclusion, Social inclusion

Introduction

The 4th Industrial Revolution (4IR) is a phenomenon that enables people to integrate their online and offline domains by taking advantage of innovative technologies (Xu et al., 2018). Researchers previously noted that the 4IR will change the future based on the potential impact that technological innovations have on government and businesses alike (Xu et al., 2018). Some reports argue that we are

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beckoning the fifth industrial revolution (5IR), which will see an even greater integration with technology globally. Society increasingly relies on technology and the internet (Reisdorf & Rhinesmith, 2020). The recent technological developments promise several benefits for businesses, governments and citizens through digital technologies and services. However, organisations and members of society would require the appropriate skills to take advantage of these benefits. Internet skills are necessary in the current way of life and the context of the 4IR and 5IR. Internet skills are essential to enable various digital opportunities for people in the 21st century (Brahima, 2018), including older adults.

Niehaves and Plattfaut (2014) stated that information technology (IT) enables older adults to remain independent longer, but observations of age-related underutilisation of technology remain. Evaluating the digital skills of older adults is essential in assisting them in exploiting the advantages that innovative technologies offer (Oh et al., 2021). Digital inclusion is partially formed and improved by internet skills to reduce the digital divide (van Deursen et al., 2014). Older adults appear not to use the Internet as much as the average population in the world (Niehaves & Plattfaut, 2014). In European countries, life expectancy is increasing globally (Tirado-Morueta et al., 2016). Between 2005 and 2014, the population of people over the age of 55 grew by approximately 12 million citizens (Tirado-Morueta et al., 2016). Spain had a 1.2 million increase within the same age range, while the younger generation's average remained the same (Tirado-Morueta et al., 2016). The paper by Blažič and Blažič (2020) highlights reports on challenges related to low internet use by people above the age of 65 years in the European Union (EU) and similarly in the United States of America (USA). In the South African context, it is noted that 9% of the population in South Africa comprises older adults, which includes people 60 years old and above (StatsSA, 2019). It was also estimated that about 3.6% of older adults in South Africa use the Internet (MyBroadBand, 2018). An age-related digital divide affects older adults primarily by preventing them from enjoying the quality of life linked to using information systems (IS) (Niehaves & Plattfaut, 2014).

The purpose of this study was to investigate older adults' experiences and perceptions regarding the use of the internet and to

understand the level of internet skills of this group in terms of internet and technology platform usage in South Africa. Accordingly, the study was underpinned by the following research question: *What is the level of internet skills of the elderly in South Africa?*

Literature Overview

Older Adults and Digital Inclusion

Prior studies have indicated that technology can improve the lives of older adults (Mostaghel, 2016). Technology innovations are noted as feasible for supporting older adults in maintaining family and other social relationships, reducing social isolation, monitoring their health and living independently (Niehaves & Plattfaut, 2014; Mawela, 2020). Technology can help older adults manage their lives through information and communications technology (ICT) based care such as telecare and telehealth (Damant et al., 2016; Oh et al., 2021). Technology and internet access can also support older adults by providing access to digital financial services (Msweli& Mawela, 2021).

In an increasingly digital society, enhanced digital skills are a necessity. Digital capabilities have become important when determining the skills necessary for citizens living in a knowledge society (van Laar et al., 2017). Holgersson et al. (2019) highlight that education and training are significant drivers for digital inclusion for older adults. Digital inclusion is partially formed and improved by internet skills to reduce the digital divide (van Deursen et al., 2014).

The digital divide is characterised as the inequality among people, companies, and geographical regions when looking for possibilities to access and use ICT resources and the Internet for different needs (Mubarak & Nycyk, 2017). A variant of the digital divide, the grey digital divide, recognises issues that older adults face in accessing the internet (Mubarak & Nycyk, 2017; Mubarak & Suomi, 2022). Education and internet skills knowledge are critical in reducing the grey digital divide, impacting older adults' technology preferences (Mubarak & Nycyk, 2017). Persons who are digitally excluded may face social exclusion or isolation. Reisdorf and Rhinesmith (2020) also indicate that digital inclusion is a growing concern for governments worldwide. As such, there is a need to

understand how the skills of older adults may be enhanced for the uptake of the Internet and related technologies.

Internet Skills

There are different types of internet skills (van Deursen et al., 2014). Operational and formal skills make up technical internet skills, where operational skills involve the fundamental use of the internet browser, and formal skills involve the aptitude to navigate the internet browser and familiarise oneself with the internet structure (van Deursen et al., 2014). Content-related internet skills consist of information, strategic, and communication internet skills (van Deursen et al., 2014). Strategic internet skills consist of capabilities to operate the internet to achieve a personal goal or a professional objective, and information internet skills include capabilities to discover information and assess the integrity of the source on the internet (van Deursen et al., 2014; van Laar et al., 2019). The lack of these internet skills stated above can be improved by requesting assistance, using a trial-and-error approach, using available support mechanisms, or through formal training (van Deursen et al., 2014).

There are different levels of internet skills, according to Brahima (2018), and these are basic, intermediate, and advanced. The types of internet skill levels are summarised below in Table 1, and these are intended to guide digital skills national policies (Brahima, 2018; Bogdan-Martin, 2020a; Bogdan-Martin, 2020b):

Table 1: Skills Levels

Level	**Description**
Basic	Enable citizens to use basic internet skills to execute essential tasks in society such as creating a document, managing and organising files on a computer, changing mobile phone settings, sending and receiving emails, etc., and these can be termed as mobile skills if based on a mobile device (Brahima, 2018; Bogdan-Martin, 2020a; Bogdan-Martin, 2020b).
Intermediate	This level enables individuals to be job-ready as this level involves being able to create content and critically assess and use technology (Brahima,

Level	Description
	2018; Bogdan-Martin, 2020a; Bogdan-Martin, 2020b)
Advanced	Skills on this level are for specialists in their profession, for example, programmers, data scientists, cyber security specialists, etc. (Brahima, 2018; Bogdan-Martin, 2020a; Bogdan-Martin, 2020b).

Technology changes rapidly and requires developing 21st-century internet skills (van Laar et al., 2019). These internet skills will enable people to excel in their roles across the workplace and society. These skills include: "Information, communication, collaboration, critical thinking, creativity, and problem-solving" (van Laar et al., 2019), as summarised below in Table 2:

Table 2: Skills Overview

Internet Skills	Description
Information	Ability to discover, assess, and use information online efficiently and responsibly (van Laar et al., 2019; Kurbanoğlu et al., 2006; Kiliç-Çakmak, 2010).
Communication	The ability to articulate and share online content by considering the target audience and how they access information online (van Laar et al., 2019).
Collaboration	Denotes the capability to work jointly to accomplish a similar purpose (van Laar et al., 2019; Green et al., 2001).
Critical Thinking	It involves analysing and determining the quality of online information and communication (van Laar et al., 2019; Manalo et al., 2013).
Creative	Refers to the ability to produce concepts from the internet that can be used to invent innovative products and services in the work environment because of the support provided by the digital

Internet Skills	Description
	environments that allow the generation of knowledge and integration (van Laar et al., 2019; Karakaya & Demirkan, 2015).
Problem-Solving	All internet skills above are essential and lead to problem-solving skills (van Laar et al., 2019;).

Internet Skills of Older Adults

The use of Information technology (IT) gives older adults the ability to remain independent for longer (Czaja & Lee, 2007; Niehaves & Plattfaut, 2014; Blažič & Blažič, 2020). Older adults do not use the internet as much as the younger population due to the pervasive nature of IT, which results in a persistent digital divide among older adults (Niehaves & Plattfaut, 2014). Older adults are noted as having contrasting and dissimilar approaches to adopting modern technologies compared to other age groups (Alonso et al., 2021).

Information technology usage is perceived as one of the ways that may help older adults enjoy a higher quality of life. However, there are shortcomings in assessing their needs and expectations when technology devices are created, resulting in older adults' low adoption of technology and usage (Lee & Coughlin, 2015). Also, according to Mubarak and Nycyk (2017), teaching older adults ICT-related skills has yielded different outcomes depending on the surroundings, contextual factors and the background of the particular older adult group. Research has also highlighted that the digital divide and digital literacies of older adults can be barriers towards the elderly's adoption of mobile commerce and banking services (Msweli & Mawela, 2020). It highlights the need for further research to understand how older adults' needs can be met in an increasingly digital society. Hargittai et al.(2019) lament that there is insufficient understanding of how older adults vary in the skills required to take advantage of the benefits of using the internet in older adulthood.

Theoretical Foundation

The rise of internet-related services, including e-commerce, e-health, e-government, and e-learning that support the independence of

older adults highlights the critical role and necessity of internet skills development for older adults (Blažič& Blažič, 2020). However, internet skills have been acknowledged as a complex concept (van Deursen et al., 2014; van Deursen et al., 2016).

Several methods and frameworks can be used to investigate internet skills and assess the skill levels of older adults (Arning et al., 2008; Boot et al., 2015). This study was informed by the Internet Skills Scales (ISS) (van Deursen et al.,2016). The study adopted the ISS as a rigorous conceptual framework based on its strengths. It also includes reliable measures and evaluates an extensive range of skills using the Internet, from basic to advanced levels (van Deursen et al.,2016). It is argued that internet skills must be measured further than the basic technical level, including the capacity to operate communication technologies (van Deursen et al., 2016). The ISS highlights the following areas: o*perational, information navigation, social media, creative, and mobile skills.* This study adopted the ISS to assess the level of internet skills for older adults over 60 years old in South Africa and investigate their perceptions regarding internet use. Various studies have previously adopted the ISS framework. See, for example: (van der Geest et al., 2014); (Surian & Sciandra, 2019); (Cabello-Hutt et al., 2018); (O'Doherty et al., 2019); (Burin et al., 2018); (Loliyana & Sukamto, 2020); (Marsh, 2018).

Methods

The positivist philosophical paradigm underpinned the study. This research used a quantitative method for data collection and followed the deductive reasoning approach. The research strategy applied was a survey strategy that allowed data to be collected economically from a large group of respondents. The study obtained ethical clearance from the institution's ethics committee before data collection. The critical criterion for the inclusion of respondents in this study was age. The population of interest included people over 60 years old residing in South Africa. A combination of purposeful and snowball sampling was adopted to reach out to older adults in the researchers' professional and personal networks and communities.

A standard method for measuring internet skills is the self-assessment survey approach that asks respondents to self-assess

their skills based on the survey questions provided (van Deursen et al., 2014). This self-assessment survey method was also used in this study. Survey participants responded using the scale provided (Chyung et al., 2018). Data was collected via an online questionnaire. The cover page of the questionnaire included a consent form, and respondents could proceed with the questionnaire once they confirmed consent. The questionnaire had 35 questions adapted from the Internet Skills Scale (ISS) framework (van Deursen et al., 2016). The questions were evaluated based on a Likert scale including the options: "not at all true of me", "very true of me", a neutral option in the middle ", neither true nor untrue of me", "mostly true of me", and "very true of me". The responses had numeric values ranging from 1 to 5 on the scale, as suggested by Chyung et al. (2018). This study used exploratory data analysis, where statistical analysis and descriptive statistics were performed.

Results and Discussion

Respondents Overview

Respondents were asked to select their age range before they could proceed to access the questions. The table below provides an overview of the respondents (114) per age group:

Table 3: Respondents

Age Range	**N (#)**	%
60 to 64	30	26,3
65 to 69	28	24,6
70 to 74	32	28,1
75 to 79	15	13,2
80 to 84	6	5,3
85 to 89	3	2,6
90+	0	0
Total	114	100,0

The table above shows that the age range with the highest number of respondents was 70 to 74, with a total of 32, followed by 60 to 64,

with 30 respondents. The lowest total number of respondents was in the 80 to 84 and 85 to 89 age ranges, with totals of 6 and 3, respectively. The descriptive statistics analysis below is based on the responses provided by the respondents.

Results

Operational Skills

Operational skills are associated with basic internet browser knowledge and allow a person to operate digital media (van Deursen et al., 2014; O'Doherty et al., 2019). The overall mean score for operational internet skills was a low mean of 2.13, linked to a lowest possible score of 1 and the highest possibility of 5. The items that scored the highest were "I know how to open a new tab in my browser", with a mean of 2.25, followed by "I know how to upload files on a website", with a mean of 2.23. The item that scored the lowest was "I know how to use shortcut keys", with a mean of 1.98. These results indicated that most older adults over the age of 60 years lack operational internet skills.

Table 4: Operational Skills

Attribute	Mean	Std Deviation	Min	Max
I know how to open a new tab in my browser	2,25	1,238	1	5
I know how to upload files on a website	2,23	1,241	1	5
I know how to download/save a photo I found online	2,21	1,237	1	5
I know how to open downloaded files	2,19	1,275	1	5
I know where to click to go to a different webpage	2,19	1,196	1	5
I know how to adjust privacy settings (e.g., on Facebook, Google, etc.)	2,11	1,150	1	5
I know how to connect to a WIFI network	2,06	1,345	1	5
I know how to bookmark a website (create a favourite)	2,02	1,113	1	5
I know how to complete and submit online forms	2,01	1,300	1	5
I know how to use shortcut keys (e.g., CTRL-C for copy, CTRL-S for save)	1,98	1,113	1	5
Total	**2,13**	**1,221**		

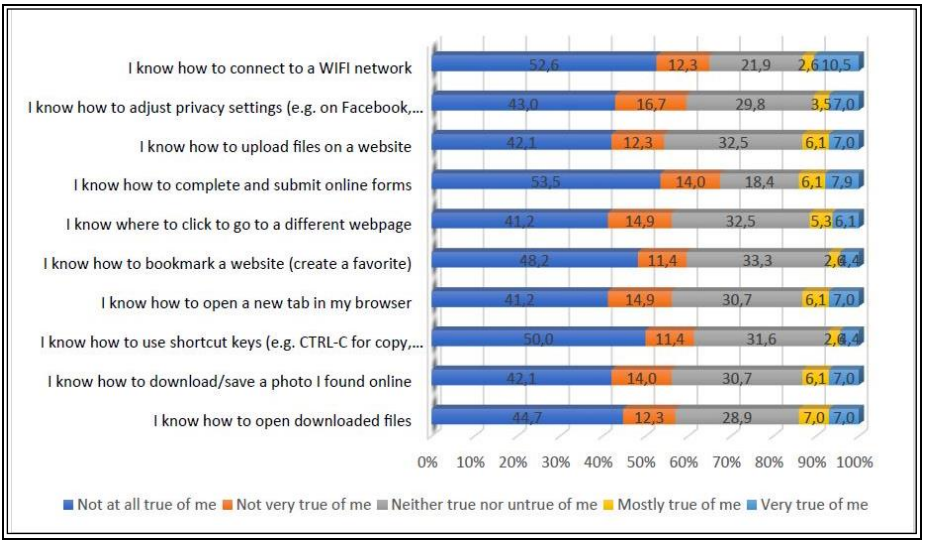


Figure 1: Operational Skills Results

Online Information Navigation

Information navigation is related to searching for information online, using this information online, and the issues these types of internet skills may lead to (O'Doherty et al., 2019; van Deursen et al., 2014). The overall mean score for online information navigation was a mean of 2.91, which indicates an undecided opinion on whether older adults can or cannot comfortably navigate and source information online. This includes the desire or intention to take a course for online information navigation to improve navigation skills.

Table 5: Online Information Navigation

Attribute	**Mean**	**Std. Deviation**	**Min**	**Max**
I get tired when looking for information online	3,03	1,223	1	5
I find it hard to decide what the best keywords are to use for online searches	3,03	1,140	1	5
Sometimes, I end up on websites without knowing how I got there.	2,97	1,237	1	5
All the different website layouts make working with the internet difficult for me	2,96	1,189	1	5

I find how many websites are designed confusing	2,94	1,162	1	5
I find it hard to find a website I visited before	2,92	1,198	1	5
Sometimes, I find it hard to verify the information I have retrieved	2,90	1,197	1	5
I should take a course on finding information online	2,54	1,351	1	5
Total	**2,91**	**1,212**		

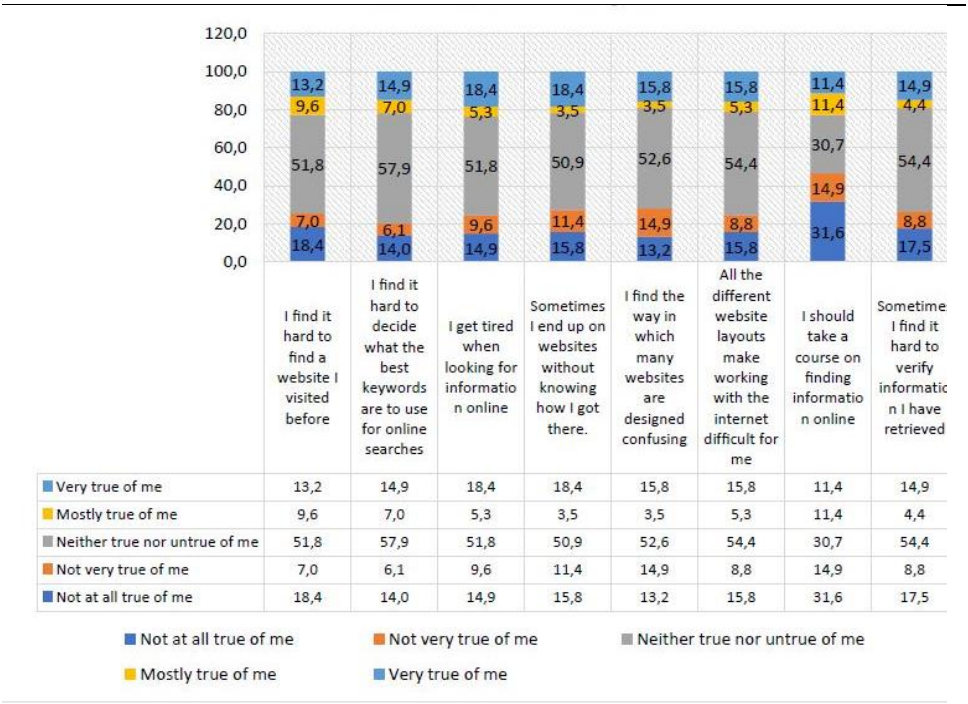


Figure 2: Online Information Navigation Results

Social Media Behaviours

Social media behaviours are related to the skills used for operating online communication technologies (van Deursen et al., 2016) and social networking platforms. Most items for the social media behaviours scale scored neutrally, except for 2 of them: "I know how to change who I share content with (e.g., friends, friends of friends or public)" and "I know how to remove friends from my contact lists"

which both scored 2.44. These two items scored low and indicated a lack of skills to operate social media technologies.

Table 6: Social Media Behaviours

Attribute	Mean	Std. Deviation	Min	Max
I am careful to make my comments and behaviours appropriate to the situation I find myself in online	2,64	1,213	1	5
I know when I should and should not share information online	2,57	1,197	1	5
I feel comfortable deciding who to follow online (e.g., on services like Twitter, Facebook or Instagram)	2,52	1,228	1	5
I know which information I should and shouldn't Share online	2,52	1,214	1	5
I know how to change who I share content with (e.g., friends, friends of friends or the public)	2,44	1,205	1	5
I know how to remove friends from my contact lists	2,44	1,262	1	5
Total	**2,52**	**1,220**		

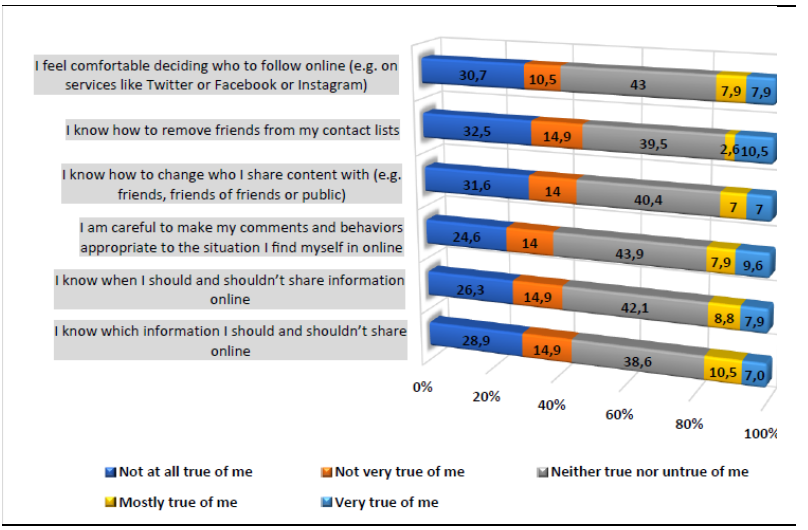


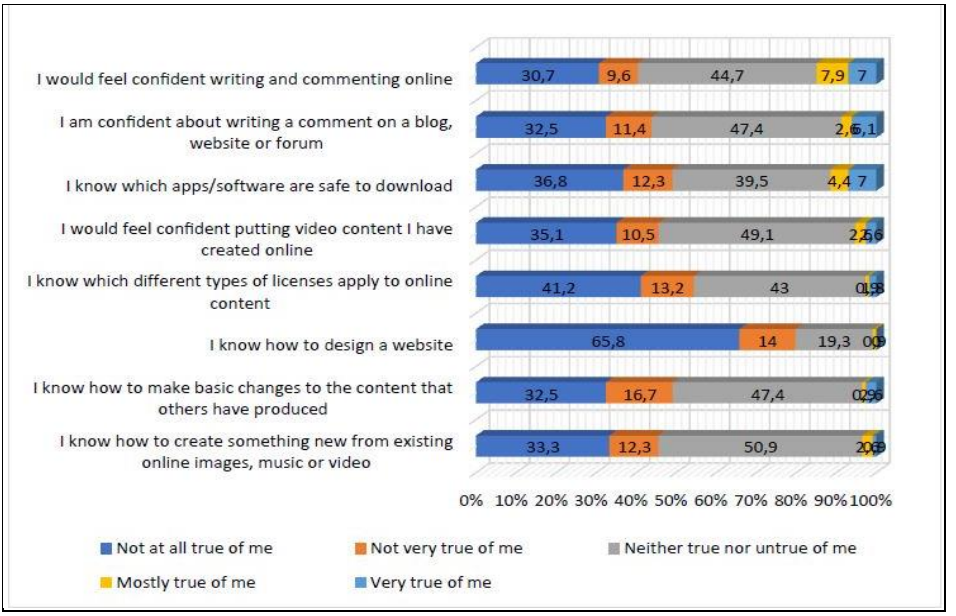
Figure 3: Social Media Results

Creativity Online

Creativity online is associated with building content online (van Deursen et al., 2016; van Deursen et al., 2014). All the items on the creativity scale mean scores were at the lower end, except the: "I would feel confident writing and commenting online" item with a score of 2,51, which is in the neutral range. The lowest mean score was for the item "I know how to design a website", with a mean of 1.57, indicating a lack of website design skills. This item was also scored the lowest by the respondents (n=114), with a minimum response of 1 and a maximum of 4 noted in the results.

Table 7: Creativity Online

Attributes	**Mean**	**Std. Deviation**	**Min**	**Max**
I would feel confident writing and commenting online	2,51	1,207	1	5
I am confident about writing a comment on a blog, website, or forum	2,39	1,148	1	5
I know which apps/software are safe to download	2,32	1,216	1	5
I would feel confident putting video content I have created online	2,27	1,058	1	5
I know how to create something new from existing online images, music, or video	2,25	0,985	1	5
I know how to make fundamental changes to the content that others have produced	2,25	1,009	1	5
I know which different types of licenses apply to online content	2,09	1,018	1	5
I know how to design a website	1,57	0,841	1	4
Total	**2,21**	**1,060**		

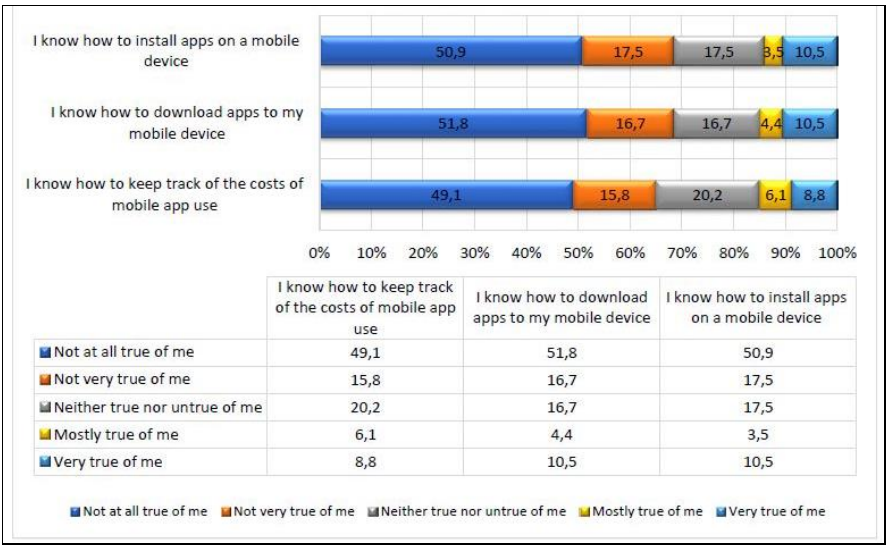


Mobile Usage

Mobile skills are necessary to effectively use and manage applications on a mobile device (Surian & Sciandra, 2019). The total mean score for this skill category was 2.07, low on a scale of 1 to 5. All three items for the mobile skills scale scored almost the same mean score. This indicates that the respondents in the study have low mobile skills, as indicated in Table 8.

Attributes	**Mean**	**Std. Deviation**	**Min**	**Max**
I know how to keep track of the costs of mobile app use	2,10	1,317	1	5
I know how to install apps on a mobile device	2,05	1,336	1	5
I know how to download apps to my mobile device	2,05	1,349	1	5
Total	**2,07**	**1,334**		

Table 8: Mobile Usage



	I know how to keep track of the costs of mobile app use	I know how to download apps to my mobile device	I know how to install apps on a mobile device
Not at all true of me	49,1	51,8	50,9
Not very true of me	15,8	16,7	17,5
Neither true nor untrue of me	20,2	16,7	17,5
Mostly true of me	6,1	4,4	3,5
Very true of me	8,8	10,5	10,5

Figure 5: Mobile Usage Results

Overall Scales

The overall mean score for all five skill scales evaluated in this study was 2.36. This is shown in Table 9 below. This is on the lower end of the Likert scale of 1-5. It falls between 1 and 2.4, the range associated with a lack of internet skills.

Table 9: Descriptive Statistics Summary

Skills Scales	Mean	Std. Deviation	Min	Max
Online Information Navigation	2,91	1,041	1	4,7
Social Media Behaviours	2,52	1,116	1	5
Creativity Online	2,21	0,879	1	4,5
Operating the internet	2,11	1,079	1	5
Mobile Usage	2,07	1,274	1	5
Total	**2,364**	**1,0778**		

The above gives a perception that older adults have challenges related to internet skills.

Internal Consistency

The internal consistency Cronbach alpha for all five internet skills scales was above 0.9, which indicates an acceptable level of internal consistency. This leaves the error rate with the +-5% probability vs +-95% success rate. This means that the scale used is suitable for this research to measure the level of internet skills for older adults in the South African context and their perception of internet use.

Table 10: Internal consistency (Cronbach Alpha)

Internet skills type	**Reliability Statistics**	
	Cronbach's Alpha (α)	**# Of Items**
Operating the internet	0.97	10
Online Information Navigation	0.95	8
Social Media Behaviours	0.96	6
Creativity Online	0.93	8
Mobile Usage	0.95	3

Correlations

The correlation coefficient shows the strength of the scales for measuring internet skills. The tables below show the Spearman's correlation coefficient for the internet skills data of the older adult population.

	[Operating the internet]	[Online Information Navigation]	[Social Media Behaviours]	[Creativity Online]	[Mobile Usage]
[Operating the internet]	1,000				
[Online Information Navigation]	-.252**	1,000			
[Social Media Behaviours]	.619**	-0,144	1,000		
[Creativity Online]	.561**	-0,147	.623**	1,000	
[Mobile Usage]	.616**	-0,156	.563**	.502**	1,000

Table 11: Spearman's correlation coefficient

**. Correlation is significant at the 0.01 level (2-tailed).

	Spearman's rho	Significance (2- tailed)	95% Confidence Intervals (2-tailed) a, b	
			Lower	Upper
[Operating the internet] - [Online Information Navigation]	-.252	.007	-.421	-.066
[Operating the internet] - [Social Media Behaviours]	.619	<,001	.486	.723
[Operating the internet] - [Creativity Online]	.561	<,001	.416	.679
[Operating the internet] - [Mobile Usage]	.616	<,001	.483	.721
[Online Information Navigation] - [Social Media Behaviours]	-.144	.125	-.325	.046
[Online Information Navigation] - [Creativity Online]	-.147	.119	-.327	.044
[Online Information Navigation] - [Mobile Usage]	-.156	.098	-.335	.034
[Social Media Behaviours] - [Creativity Online]	.623	<,001	.491	.726
[Social Media Behaviours] - [Mobile Usage]	.563	<,001	.418	.680
[Creativity Online] - [Mobile Usage]	.502	<,001	.345	.631

Table 12: Confidence Intervals of Spearman's Rho

There is a negligible negative correlation between operational skills and information navigation (r= -0.252, n=114, p=0.007). This indicates operational skills where older adults seemingly have challenges navigating for information online successfully. The correlation between the older adults' operational skills and social media behaviours is moderately positive (r=0.619, n=114, p<0.001). In this case, operational and social media skills have a direct relationship; if operational skills grow, social media skills also grow and vice versa. Similarly, this was the case for the relationship between operational skills, online creativity (r=0.561, n=114, p<0.001), and mobile usage (r=0.616, n=114, p<0.001) skills. They are all moderately positive and have a direct correlation with each other. Online information navigation skills of the older adults were found to not correlate with other skills scales, social media (r= -0.144, n=144, p=0.125), online creativity (r= -0.147, n=144, p=0.119), and mobile skills (r= - 0.156, n=144, p=0.098).

Social media skills were found to have a moderate positive correlation with online creativity ($r=0.623$, $n=144$, $p<0.001$) and mobile skills ($r=0.563$, $n=114$, $p<0.001$). When older adults become increasingly comfortable on social media, the more they gain mobile internet skills, and vice versa. A moderate positive relationship exists between creativity online and mobile internet skills ($r=0.502$, $n=114$, $p<0.001$). The higher the creativity skills of older adults online, the more they can use a mobile device. The above correlation analysis has shown that there seems to be an association between internet skills scale items, except with online information navigation skills.

Discussion of the Findings

Operational Skills

Internet operational skills indicate the ability to manage digital media and operate on the Internet (van Deursen et al., 2014). This comes in many forms, such as browsing the internet, using a smart device and how to connect to the internet. The main findings from the data analysis are highlighted below.

Most older adults do not know how to connect to a Wifi network.

The results support this finding that 64.9% of the older adults responded that they do not know how to connect to a Wifi network, and 21.9% gave neutral responses, leaving only 13.1% that can connect to a Wifi network. Today, some public areas have public Wifi that people can connect to conveniently. People can use the same while waiting in queues, to browse the internet. Prior literature has argued that internet use can help older adults stay independent for as long as possible (Niehaves & Plattfaut, 2014; Czaja & Lee, 2007). Their inability to connect to a network such as Wifi in both public and private settings may limit their easy access to the internet and may impact their independence.

Most older adults cannot download or upload files on the internet.

In this study, on average, 55% of older adults do not know how to upload or download files online, with 32% being neutral and only 13% indicating that they know how to handle files online.

Most older adults cannot adjust privacy settings online.

About 60% of the respondents gave this indication, where about 30% were neutral, and only 11% had the skills to update and manage privacy settings online. The literature by Gupta and Chennamaneni (2018) states that older adults' attitudes towards online privacy protection may be affected if they have uncertainties about their loss of privacy. This may hinder their mindset about the use of the internet because of privacy issues and may affect their perception of the use of the internet.

Most older adults cannot complete online forms.

The data indicated that 67.5% of the respondents could not complete and submit online forms, 18.4% were neutral, and only 14% could complete online forms. Various essential functions have been automated, and citizens must use the internet to acquire those services. For example, in South Africa, the Department of Home Affairs provides e-services (home affairs) for applying for a passport and identity document online. Additionally, there are other public services where citizens can book online by filling in online forms. This finding highlights that older adults may be unable to access the electronic public services they need. As such, it may impact their daily activities and independence, as per Niehaves and Plattfaut (2014).

Most older adults cannot browse the internet.

This finding was supported by the analysis that showed that 56.1 % of the respondents do not know how to browse to the next page, and 56.1% do not know how to open a new tab on the internet browser. About 31% of the respondents are neutral on these functionalities, and about 12% know how to perform these functions on the internet browser. The inability to browse the internet effectively may negatively impact older adults' use and uptake of the Internet and the various services they can access.

Information Navigation Skills

Information navigation is chiefly related to searching for information online and using this information online. The study

probed whether older adults have difficulty navigating the internet in search of information or if they are generally comfortable with online navigation and searches. The main findings that were derived from the results are discussed below.

The majority of older adults do not want to undergo training to improve their information navigation skills.

The data analysis showed that 46.5% would not like to take training, whereas only 22.8% indicated a desire to attend training. This confirms the literature by Pal et al. (2019) suggesting that older adults are not keen on learning and adapting to new technologies. They prefer devices aligned with their current infrastructure and, as such, have a higher preference for tools they may already be familiar with. On the other hand, the results also align with a study by Alonso et al. (2021) that found the majority of older adults were not interested in the need for training courses, where 56.7% of their respondents in that particular study were against and only about 12% were optimistic about completing appropriate training. Additionally, the majority of their respondents did not see the relevance of learning about new technological tools (Alonso et al., 2021)

It is noted that a few skills scales were evaluated for the information navigation aspect. Some focused on finding and visiting websites they had visited before, searching accurately online, and following and navigating websites based on their design. Most responses were neutral, and the total mean score was 2.91, which is in the neutral range. We acknowledge that in this study, it is a possibility that some respondents did not know what some of the questions meant and opted for a middle-response option. However, one key finding from this study is regarding the perceptions on taking a training course covering online information navigation concepts, which indicated that the majority may not be interested in completing an appropriate training course that could improve their internet skills despite having a low level of internet operational skills as noted in the previous section.

Most older adults take an extended time to find what they seek online.

In highlighting the neutral total mean score for online information navigation skills, we link it here to the low internet operational skills reported in the previous section. The outcome indicated that 59.6% of respondents cannot bookmark a website for easy access in the future, and 61.4% cannot use shortcut keys while browsing the internet. Only 7% know how to do this. Therefore, based on the respondents in this study, it appears that many older adults lack internet operational skills. The total mean score average indicated by the descriptive analysis was a mean score of 2.13, which is in the lower range of the scale (1-5). This may be linked to the online information navigation skills challenges. Also, 59.78% of responses indicated that they do not know how to operate the internet based on the items included in this skills category versus the 11.37% that know how to operate it. These findings confirm that older adults use the internet less than younger generations, as suggested in the literature and previous reports (Niehaves & Plattfaut, 2014; MyBroadBand, 2018). These findings also suggest that older adults may not benefit from the independence that the Internet can enable for their day-to-day life and to be independent for longer, as suggested in the literature by Niehaves and Plattfaut (2014), because of the lack of Internet operational skills.

Social Media Behaviour and Skills

Anyone operating online communication technologies must possess communication skills (van Deursen et al., 2016). This is usually associated with social media platforms. Communication skills form part of the Internet Skills Scale (ISS) skill types that were assessed as part of the skills self-assessment of the respondents in this study. The behaviours associated with online communication technologies were assessed to understand older adults' ability to operate on social media. The findings related to this skill type are discussed below.

On social media platforms, older adults are not comfortable deciding who to follow and who not to follow online.

The results indicated that 41.2% of the elderly are uncomfortable deciding who to follow online. Only 15.8% were comfortable, and 43% appeared to be neutral. The neutral

group may have a neutral opinion, or some of them do not have an opinion on this item, perhaps because they do not use the internet, social media and online communications technologies extensively, based on the statistic that only about 3.6% of the elderly population in South Africa use the internet (MyBroadBand, 2018).

Older adults on social media cannot remove contacts from their friends list.

The analysis in this study further showed that 47.4% of respondents indicated that they cannot manage their contact lists, and only 13.1 % can manage them effectively.

A large number of older adults cannot manage content sharing online.

About 45.6% cannot change who they can share content with online. Also, it was noted that only 14% indicated that they were able to share content online.

Additionally, the data for social media-related categories showed that:

Approximately 38.6% of the respondents are not careful when commenting online and do not think about appropriate behaviour online, with only 17.5% thinking about comments and behaviours when they are online. The analysis also indicated that 41% of older adults do not know when to share and when not to share information online. The data showed neutral responses for approximately 41% of respondents, and for those who were aware of how to share information online, the figure was at only 16.7%.

The above findings from the social media behaviours skills scale indicate that respondents may not have the requisite communication skills to operate online communication and social media technologies. The total mean score indicated was a mean of 2.52. This is on the borderline of the numeric scale of 1-5. However, based on the above findings, most respondents cannot operate social media platforms. The study by Budree et al. (2019) shows that social network usage declines for older ages, starting at 50, compared to younger generations. The neutral percentage may be for people who

do not have an opinion regarding social media, perhaps because they do not participate in it.

Creativity Online Skills

Creativity online is about creating and managing electronic content. It is associated with creativity skills. The questionnaire evaluated Various creativity-related skills, and the findings are discussed below.

Older adults do not participate in the online blogs and forums.

About 40.3% do not feel comfortable writing and commenting online, with just 14.9% comfortable participating online. There is a neutral group, which comprised 44.4% of the respondents. About 43.9% are not confident participating in blogs or online forums, with 47.4% neutral, and just 8.7% are confident writing and commenting online.

Most older adults cannot identify apps or software that are safe to download and are not familiar with the licenses that apply to online content.

About 49.1% indicated on the questionnaire that they do not know safe or unsafe software, with 11.4% comfortable on this issue and 39.5 providing neutral responses. Additionally, the analysis indicated that 54.4% of older adults do not know different license types related to online content, with only 2.7% understanding licenses.

Older adults cannot design websites and have limited skills in updating online content.

The descriptive statistics showed that 79.8% of older adults indicated they cannot design websites, versus 0.9% who can only design websites. Regarding updating content found online, the analysis pointed out that 49.2% of older adults indicated a lack of knowledge, and only 3.5% indicated knowing updating online content.

The overall mean score from descriptive statistics for the creativity online category was low, with a mean of 2.21, indicating an unfavourable score for the scale. The above findings on online

creativity suggest that older adults in South Africa lack online creativity skills. A study by Gonzalez Restrepo et al. (2019) suggests that there may be a substantial decline in online creativity during old age. This may depend on an individual's characteristics, such as attitude and health (Palmiero et al., 2014; Gonzalez Restrepo et al., 2019). Thus, this study confirms the existing literature regarding online creativity for older adults.

Mobile Usage

Mobile skills help individuals to manage and maintain their mobile devices. The findings related to mobile skills are as follows:

> *Most older adults cannot download and install applications on mobile devices.*
>
> The data analysis supports this by indicating that 68.4% of respondents cannot install applications versus 14% that can successfully install applications. About 68.5 % indicated that they cannot download applications on a mobile device, with 16.7% indicating that they have this ability.
>
> *Older adults cannot manage costs on their mobile devices.*
>
> Over 67% of the respondents in the study indicated that they cannot manage costs, as opposed to 14.6% who can manage costs on a mobile device. This was the lowest-scoring skills category, with an overall mean of 2.07. Hence, this study suggests that older adults in South Africa do not have mobile usage skills. The literature by Leburu et al. (2018) suggests that age-related physiological challenges such as declining eyesight, hearing, mobility, and other conditions can result in decreased mobile device usage by older adults. Some older adults may have special needs as they reach advanced age, and these are sometimes not catered for when mobile devices are designed, contributing to their decline in using mobile devices (Leburu et al., 2018).

Conclusion and Recommendations

The study adopted the Internet Skills Scale (ISS) to investigate older adults' internet skills. The findings highlight that most of the older adults in this study lack various internet skills. This means that they

may miss the opportunities and benefits that the internet offers to citizens, as argued in the extant literature where it is mentioned that internet skills can keep the elderly independent for longer (Czaja & Lee, 2007; Niehaves & Plattfaut, 2014; Blažič& Blažič, 2020). The findings also confirmed the literature that fewer older adults in South Africa use the internet than other age groups (MyBroadBand, 2018; StatsSA, 2019). Several recommendations are put forward for consideration, including:

Government entities may consider community outreach and digital awareness programmes targeting older adults and a strategy to digitise some of the services they provide by socialising the benefits of shifting to digital platforms. Additionally, the design of digital services focusing on older adults should include the ideas and contributions of older adults, thus promoting co-design approaches.

Organisations that work with older adults, such as nursing homes or NGOs, can continuously gather information about their internet skills and perceptions to obtain additional knowledge about their internet skill levels. This knowledge may then inform future training initiatives targeting older adults.

Various companies have digitised some of the services that they provide to their customers. However, they do not necessarily provide guidance and instructions on how to use the digitised services. The awareness created regarding digital services is general to the public at large. Older adults should be catered explicitly for when services are digitised. It would be beneficial if these organisations could implement awareness programs that specifically target older adults and meet the needs of this group.

Limitations and Future Research

The research respondents in this study were mainly from the Gauteng and KwaZulu Natal provinces. Future studies may consider collecting data across the nine provinces of South Africa. Upcoming studies on internet skills for the elderly in South Africa may also consider the urban versus rural context. This study adopted an online questionnaire; thus, respondents who may not be able to access online questionnaires could be excluded. Future studies may consider mixed methods approaches. This can include

individual interviews or focus groups with older adults, which would provide additional rich data to be analysed to understand older adults' perceptions, enablers, and barriers to using the internet further.

Declaration

This work is declared original and has not been published by another journal.

References

Alonso Gonzalez, D., D'Antonio Maceiras, S., Díaz Catalán, C., & Sádaba Rodríguez, I. (2021). Types of older adults ICT users and the grey divide: Attitudes matter. *Revista de cercetare şi intervenţie socială, 74, 120-137*

Arning, K., & Ziefle, M. (2008). Development and validation of a computer expertise questionnaire for older adults. *Behaviour & Information Technology*, *27*(1), 89–93.

Blažič, B. J., & Blažič, A. J. (2020). Overcoming the digital divide with a modern approach to learning digital skills for elderly adults. *Education and Information Technologies*, *25*, 259-279.

Bogdan-Martin, D. (2020A). Digital Skills Insights. Geneva: International Telecommunication Union.

Bogdan-Martin, D. (2020B). Digital Skills Assessment Guidebook. Geneva: International Telecommunication Union.

Boot, W. R., Charness, N., Czaja, S. J., Sharit, J., Rogers, W. A., Fisk, A. D., ... & Nair, S. (2015). Computer proficiency questionnaire: assessing low and high computer proficient seniors. *The Gerontologist*, *55*(3), 404-411.

Brahima, S. (2018). Digital Skills Toolkit. Geneva: International Telecommunication Union.

Budree, A., Fietkiewicz, K., & Lins, E. (2019). Investigating usage of social media platforms in South Africa. *The African Journal of Information Systems, 11*(4), 314- 336.

Burin, D. I., Irrazabal, N., Ricle, I. I., Saux, G., & Barreyro, J. P. (2018). Self-reported internet skills, previous knowledge and working

memory in text comprehension in E-learning. *International Journal of Educational Technology in Higher Education, 15*(18), 1-16.

Cabello-Hutt, T., Cabello, P., & Claro, M. (2018). Online opportunities and risks for children and adolescents: The role of digital skills, age, gender and parental mediation in Brazil. *New Media and Society, 20*(7), 2411-2431.

Chyung, S. Y., Swanson, I., Roberts, K., & Hankinson, A. (2018). Evidence-based survey design: The use of continuous rating scales in surveys. *Performance Improvement*, *57*(5), 38–48.

Czaja, S. J., & Lee, C. C. (2007). The impact of ageing on access to technology. *Universal access in the information society, 5*(4), 342-349.

Damant, J., Knapp, M., Freddolino, P., & Lombard, D. (2016). Effects of digital engagement on the quality of life of older people. *Health & Social Care in the Community*, 1-28.

Gonzalez Restrepo, K. J., Arias-Castro, C. C., & Lopez-Fernandez, V. (2019). A Theoretical Review of Creativity Based on Age. *Papeles del Psicólogo, 40*(2), 125- 132.

Green, F., Ashton, D., & Felstead, A. (2001). Estimating the determinants of supply of computing, problem-solving, communication, social, and teamworking skills. *Oxford Economic Papers, 53*(3), 406–433.

Gupta, B., & Chennamaneni, A. (2018). Understanding Online Privacy Protection Behaviour of the Older Adults: An Empirical Investigation. *Journal of Information Technology Management, XXIX*(3), pp. 1–13.

Hargittai, E., Piper, A. M., & Morris, M. R. (2019). From Internet access to Internet skills: Digital inequality among older adults. *Universal Access in the Information Society*, pp. *18*, 881–890.

Holgersson, J., Söderström, E., & Rose, J. (2019). Digital inclusion of elderly citizens for a sustainable society. In *27th European Conference on Information Systems (ECIS), Stockholm & Uppsala, Sweden, June 8-14, 2019*. Association for Information Systems.

Karakaya, A. F., & Demirkan, H. (2015). Collaborative digital environments to enhance the creativity of designers. *Computers in Human Behavior, 42*, 176-186.

Kiliç-Çakmak, E. (2010). Learning strategies and motivational factors predicting information literacy self-efficacy of e-learners. *Australasian Journal of Educational Technology, 26*(2), 192-208.

Kurbanoğlu, S., Akkoyunlu, B., & Umay, A. (2006). Developing the information literacy self-efficacy scale. *Journal of Documentation, 62*(6), 730-743.

Leburu, K., Grobler, H., & Bohman, D. (2018). Older people's competence to use mobile phones: An exploratory study in South Africa. *Gerontechnology, 17*(3), 174–180.

Lee, C., & Coughlin, J. F. (2015). Perspective: Older Adults' Adoption of Technology: An Integrated Approach to Identifying Determinants and Barriers. *J Prod Innov Manag, 32*(5), 747–759.

Loliyana, & Sukamto, I. (2020). Students Exploratory Analysis Study of Internet Skills. *Jurnal Ilmu Pendidikan*, 26(2), 62-65.

Manalo, E., Kusumi, T., Koyasu, M., Michita, Y., & Tanaka, Y. (2013). To what extent do culture-related factors influence university students' critical thinking use? *Thinking Skills and Creativity, 10*, 121-132.

Marsh, E. (2018). Understanding the Effects of Digital Literacy on Employees' Digital Workplace Continuance Intentions and Individual Performance. *International Journal of Digital Literacy and Digital Competence, 9*(2), 15–33.

Mawela, T. (2020). Ambient Intelligence Systems for the Elderly: A Privacy Perspective. In *Computational Science and Its Applications–ICCSA 2020: 20th International Conference, Cagliari, Italy, July 1–4, 2020, Proceedings, Part I 20* (pp. 875–888). Springer International Publishing.

Mostaghel, R. (2016). Innovation and technology for the elderly: Systematic literature review. *Journal of Business Research*, *69*(11), 4896-4900.

Mubarak, F., & Nycyk, M. (2017). Teaching older people internet skills to minimise grey digital divides: Developed and developing countries in focus. *Journal of Information, Communication and Ethics in Society, 15*(2), 65–178.

Mubarak, F., & Suomi, R. (2022). Elderly forgotten? Digital exclusion in the information age and the rising grey digital divide. *INQUIRY: The Journal of Health Care Organization, Provision, and Financing*, p. *59*, 00469580221096272.

Msweli, N. T., & Mawela, T. (2020). Enablers and barriers for mobile commerce and banking services among the elderly in developing countries: a systematic review. In *Responsible Design, Implementation and Use of Information and Communication Technology: 19th IFIP WG 6.11 Conference on e-Business, e-Services, and e-Society, I3E 2020, Skukuza, South Africa, April 6–8, 2020, Proceedings, Part II 19* (pp. 319-330). Springer International Publishing.

Msweli, N. T., & Mawela, T. (2021). Financial inclusion of the elderly: exploring the role of mobile banking adoption. *Acta Informatica Pragensia*, *10*(1), 1-21.

MyBroadBand. (2018, March 4). *What we know about Internet users in South Africa*.

My broadband.https://mybroadband.co.za/news/internet/251063-what-we-know-about-internet- users-in-south-africa.html

Niehaves, B., & Plattfaut, R. (2014). Internet adoption by the elderly: employing IS technology acceptance theories for understanding the age-related digital divide. *European Journal of Information Systems*, 23, 708-726.

O'Doherty, D., Lougheed, J., Hannigan, A., Last, J., Dromey, M., O'Tuathaigh, C., & McGrath, D. (2019). Internet skills of medical faculty and students: Is there a difference? *BMC Medical Education, 19*, 1–9.

Oh, S. S., Kim, K. A., Kim, M., Oh, J., Chu, S. H., & Choi, J. (2021). Measurement of digital literacy among older adults: systematic review. Journal of medical Internet research, 23(2), e26145.

Pal, D., Papasratorn, B., Chutimaskul, W., & Funilkul, S. (2019). Embracing the Smart-Home Revolution in Asia by the Elderly: An end-user negative perception modelling. *IEEE Access*, 7, 38535-38549.

Palmiero, M., Di Giacomo, D., & Passafiume, D. (2014). Divergent Thinking and Age-Related Changes. *Creativity Research Journal, 26*(4), 456–460.

Reisdorf, B., & Rhinesmith, C. (2020). Digital inclusion is a core component of social inclusion. *Social inclusion*, *8*(2), 132-137.

StatsSA. (2019). *Mid-year population estimates 2019.* Pretoria, South Africa: Statistics South Africa. https://www.statssa.gov.za/publications/P0302/P03022019.pdf

Surian, A., & Sciandra, A. (2019). Digital divide: addressing Internet skills. Educational implications in the validation of a scale. *Research in Learning Technology, 27*.

Tirado-Morueta, R., Hernando-Gómez, Á., & Aguaded-Gomez, J. I. (2016). The capacity of elderly citizens to access digital media in Andalusia (Spain). *Information, Communication & Society, 19*(10), 1427-1444.

van der Geest, T., van der Meij, H., & van Puffelen, C. (2014). Self-assessed and actual Internet skills of people with visual impairments. *Universal access in the information society*, 13(2), 161-174.

van Deursen, A. J., Courtois, C., & van Dijk, J. A. (2014). Internet Skills, Sources of Support, and Benefiting From Internet Use. *Intl. Journal of Human-Computer Interaction*, 30(4) 278-290.

van Deursen, A. J., Helsper, E. J., & Eynon, R. (2016). Development and validation of the Internet Skills Scale (ISS). *Information, Communication & Society, 19*(6), 804-823.

Van Laar, E., Van Deursen, A. J., Van Dijk, J. A., & De Haan, J. (2017). The relation between 21st-century skills and digital skills: A systematic literature review. *Computers in human behavior*, *72*, 577-588.

van Laar, E., van Deursen, A. J., van Dijk, J. A., & de Haan, J. (2019). The Sequential and Conditional Nature of 21st-Century Digital Skills. *International Journal of Communication*, 13 (26), 3462–3487.

Xu, M., David, J. M., & Hi Kim, S. (2018). The Fourth Industrial Revolution: Opportunities and Challenges. *International Journal of Financial Research, 9*(2), 90–95.