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ABSTRACT

In as much as youth unemployment is a global challenge, and with the increasing embeddedness of digital technologies in most forms of work, it is often assumed that the youth are digital natives who are naturally attuned to accomplishing tasks using Information and Communication Technologies (ICT). This paper therefore sought to compare the general self-efficacy (confidence to accomplish general tasks) to ICT self-efficacy (confidence to accomplish tasks using ICT) of the youth in South Africa. The study adapted the validated general self-efficacy (GSE) scale to develop the ICT self-efficacy (ISE) scale. Confirmatory Factor Analysis reliably validated the developed ISE scale. The ANOVA results from 1,948 youths show that overall, the youth of South Africa have a higher general self-efficacy compared to their ICT self-efficacy. Specifically, the youth in township areas have the lowest ISE and GSE. The findings suggest that although the youth are regarded as digital natives, their confidence in using ICT to accomplish tasks remains lower than their non-ICT competencies to accomplish tasks. The study points to intentional digital and non-digital skills efforts for the youth similar to other age groups rather than making the assumption that they will naturally use ICT. Further studies on factors such as demographic and social influences that might influence GSE and ISE among the youth in Africa, are recommended.

Keywords: ICT self-efficacy, general self-efficacy, youth, digital age, Fourth Industrial Revolution (4IR)

INTRODUCTION

The youth of today experience high unemployment globally, yet they have grown up in a digital world and are sometimes referred to as *digital natives*. A digital native refers to an individual who is familiar with digital technology since birth (Stockham, Cross and Shield, 2018) and has knowledge and skills to naturally handle technology (Sorgo and Dolnic, 2017). Regardless of their lived exposure to digital technologies, Csernoch and Biró (2019), for example, found that first-year students of Informatics still needed digital skills training to cope with understanding basic algorithms needed in spreadsheets. Gomez (2019) and Stockham, Cross and Shield (2018) similarly found that a large proportion of the youth in Spain and the United States of America are mainly basic users, and that there exists a digital divide even amongst the youth in terms of the outcomes and benefits they derive from using digital technologies.

In the current context of the fourth Industrial Revolution (4IR), an era where rapid technological advances are increasingly interconnected, it is well accepted that the nature of work is similarly changing to incorporate some form of digital technology (Stromquist, 2019). It is very likely that the youth of today will have an element of digital technology as an integral part of their work. It is therefore important to understand how the youth perceive their ability to carry out ordinary tasks by using ICT, otherwise regarded as ICT self-efficacy (Callum and Jeffrey, 2013; Aesaert and Braak, 2014). ICT self-efficacy has been identified as necessary for individuals to participate in the digital age (Fraillon *et al.*, 2014) and is required for certain employment opportunities (Masucci *et al.*, 2019). Cázares (2010) found that individuals with a low ICT self-efficacy were intimidated and less likely to use ICT.

This paper considers the GSE and ISE of youth in South Africa. One third of the population of South Africa (36.2%) are youth (18-35), yet this most productive resource experiences the highest unemployment at 55.2% reported in the first quarter of 2019 compared with the national unemployment average of 29% (Statistics South Africa, 2019). While youth unemployment is a global challenge and not unique to South Africa, the high levels of poverty and social inequality

exacerbate the condition and further present steeper barriers for the youth to overcome. The backdrop of apartheid in South Africa further suggests that different sections of the population might experience differing levels of confidence in performing tasks. This paper therefore sought to compare the GSE to ISE of youth in South Africa, particularly making a comparison across rural, peri-urban, township and urban youth.

The rest of the paper is structured as follows: the next section presents literature on general and ICT self-efficacy; it is followed by the research method used to conduct the research; then a discussion of the findings from the data; and finally the conclusions draws inferences from the findings and suggests areas for further research.

LITERATURE REVIEW

General self-efficacy

General self-efficacy refers to an individual's judgement of their own capabilities to perform a course of action or execute tasks (Bandura, 1978). Self-efficacy is developed through past experiences, social interaction with peers, constructive feedback and modelling (Bandura, 1978; Asl, 2017). The levels of self-efficacy will differ, depending on whether the individuals have confidence in themselves to overcome challenges (Marra *et al.*, 2009; Bonsaksen *et al.*, 2018; Van Hoye *et al.*, 2019). Those with higher levels of self-efficacy tend to persevere for longer when facing difficulties or challenges and are willing to exert more effort to complete tasks (Bonsaksen *et al.*, 2018; Kim, 2018). Past experiences are argued to be the strongest predictor of self-efficacy (Bandura, 1978).

Self-efficacy plays a strong role in overcoming challenging life problems. In this regard, Bandura and Locke (2003) maintained that "whatever other factors serve as guides and motivators, they are rooted in the core belief that one has the power to produce desired effects; otherwise one has little incentive to act or to persevere in the face of difficulties" (p. 87). In the effort to survive, individuals should have confidence in their abilities to solve problems, build a purposeful life and exert effort to achieve desirable outcomes (Asl, 2017; Van Hoye *et al.*, 2019). The motivation to develop a set of skills to improve ones career is similarly influenced by self-efficacy (Howard,

2019; Peura *et al.*, 2019). Burger and Samuel (2017) also found that life satisfaction was positively influenced by self-efficacy among adolescents.

ICT self-efficacy

ICT self-efficacy is an adapted general self-efficacy tool that measures an individual's ability to successfully complete tasks using ICT or digital technologies (Compeau and Higgins, 1995; Hatlevik *et al.*, 2018). ICT self-efficacy includes both computer and internet self-efficacy (Callum and Jeffrey, 2013; Aesaert and Braak, 2014). Aesaert and van Braak (2014) described ICT self-efficacy as an individual's judgement of their ability to use digital information and to communicate using digital technologies.

ICT self-efficacy is important in an environment that is driven by digital artefacts. A high level of self-efficacy has been shown as vital in a range of complex tasks and competencies for the 4th Industrial Revolution (4IR) such as analytics (Bonsaksen *et al.*, 2018); to explain digital technology adoption and use among youth (Broos and Roe, 2006; Bosch, 2017); comparing gender (Vekiri, 2010; Tellhed, 2017); and how teachers are influenced when teaching with ICT (Topkaya, 2010; Hsiao, Tu and Chung, 2012). Hammond, Reynolds and Ingram (2011) found that student teachers use ICT for teaching and learning because of their confidence when using digital technology and their belief that technology had a positive impact on teaching and learning. In many organisations, it is the younger generation who are active advocates for the increased use of digital technologies in the workplace; it is however not clear if it is their lived experiences with digital technologies that separates them from older digital immigrants (Stockham, Cross and Shield, 2018).

This study particularly differentiates itself from the computer self-efficacy approach of Compeau and Higgins (1995), that focused on the use of new computer software within an organisational environment. This study focuses on the confidence in using various digital technologies to accomplish tasks whether for personal or organisational benefit. The difference is that the proliferation and familiarity with digital technologies today, means that digital technologies are not exclusive to organisations, but are part of the everyday lived experiences of individuals. This study therefore compared the general self-efficacy to ICT self-efficacy of youth in South Africa by using the same approach taken by other recent and earlier authors to compare GSE and ISE (Table *1*).

Table 1: Related works comparing GSE and ISE

No	Authors	Focus of comparison
1	Shank and Cotton (2014)	Investigated the relationship between technology use and general self-efficacy among urban youth. The findings revealed that technology use influences various domains of GSE in a specific way, indicating the importance of considering multiple domains of self-efficacy. Students with previous experience of computers from a young age were reported to have a greater GSE and academic efficacy. The study also suggests that youth with higher GSE might engage with computers more than their less efficacious counterparts.
2	Ortiz de Guinea and Webster (2015)	Investigated the influence that personal beliefs have on computer self-efficacy. The results indicate that culture affects ISE indirectly through individuals' GSE preferences for individualism and task interdependence. The findings demonstrated how ISE beliefs can be improved by designing strategies for the management of ambiguity in the workplace as well as designing computer training that will leverage individuals' innovativeness.
3	Krause *et al.* (2017)	The study considered chemistry teachers and the development of prospective ICT-related attitudes and their corresponding GSE. The qualitative part of the study suggests that even if positive attitudes and GSE beliefs already exist or can be developed during the course, pre-service teachers' imagination when it comes to using ISE in chemistry teaching is relatively limited and mainly focuses on visualisation aids.
4	Chau and Kong (2001)	They investigated the influence of computer attitudes and GSE on ICT usage behaviour. The results suggest the need for a positive attitude towards ICT to see the perceived usefulness. Individuals with higher self-efficacy towards ICT usage may see limitations in addition to its usefulness compared to those with high general self-efficacy.
5	Topkaya (2010)	The paper examined the relationship between pre-service English language teachers' perceptions of computer self-efficacy and their perceptions of GSE. The results indicated that the pre-service teachers did not have high perceptions in the use of computers. The correlation analysis between GSE and ISE revealed a moderate and a positive correlation between the two constructs. Computer experience proved to be the variable that affected the ISE beliefs of pre-service English teachers the most.

RESEARCH METHOD

The study adopted a quantitative-positivist research design to measure both general and ICT self-efficacy from across the four population settlements of South Africa. In South Africa, there are four distinct population settlements as a result of the history of apartheid, namely urban, township,

peri-urban and rural. Townships are areas in the periphery of urban areas where non-white populations were settled, often forcefully, to provide easy access to work in the white-only urban areas or factories (Cocks, Alexander and Mogano, 2019). Peri-urban areas were located at the intersections of urban and rural areas and represented those transitioning from a rural to an urban lifestyles without moving from the rural areas (Huang *et al.*, 2018; Xiang *et al.*, 2018; Elijah *et al.*, 2019). People in townships and peri-urban areas eventually developed their own unique lifestyles and cultures different from those in rural or urban areas (Donaldson *et al.*, 2013; Waters, 2019).

Sampling followed both non-probability convenience sampling in selecting the towns from where data was collected; and a random sampling in selecting the respondents to be interviewed. The data was collected in all nine provinces of South Africa. The sample of towns was split among urban, township, peri-urban and rural areas as indicated in Table 2. The study forms part of a larger study that sought to map a baseline of digital skills in South Africa in an effort to advise policy interventions on how the 4IR can be taken advantage of to create employment, reduce poverty and increase social cohesion, especially among the youth.

The GSE survey instrument was taken from a validated GSE scale (Schwarzer and Jerusalem, 1995; Wang *et al.*, 2018) and adapted to create the ICT self-efficacy scale. A five-point Likert scale was used where 1= Strongly agree (very high self-efficacy) and 5=Strongly disagree (very low self-efficacy). Data was collected from 1,948 participants (958 men and 990 women; mean age of 26.72 years) using face-to-face pen and paper interviews (PAPI) between December 2018 and April 2019. Ethics clearance was obtained from the host university.

ANALYSIS RESULTS

Confirmatory factor analysis was performed to test the structure and validity of the two scales (ICT self-efficacy and general self-efficacy). The Kaiser-Meyer-Olkin (KMO) measure (

Table *3*) was calculated to ensure that the sample is adequate for factor analysis. Accordingly, the suitability of the data is supported because the KMO value (.951) is superior to the threshold of 0.6; and Bartlett's Test of Sphericity is significant (.000) (Pallant, 2013).

Table 2: Questionnaire Sample Breakdown

Province	Municipality	Area	Setting

Eastern Cape	Nelson Mandela Bay	KwaZakhele	Township
		Port Elizabeth	Urban
	Sundays River Valley	Kirkwood	Rural
Free State	Mangaung	Bloemfontein	Urban
		Thaba Nchu	Peri-Urban
	Mantsopa	Botshabelo	Township
Gauteng	City of Joburg	Alexandra	Township
		Bramley	Urban
		Johannesburg	Urban
	Sedibeng	Orange Farm	Township
KwaZulu-Natal	eMondlo	eMondlo	Rural
	eThekwini	Durban	Urban
		Umlazi	Township
Limpopo	Capricorn	Polokwane	Urban
	Makhado	Tshakhuma	Rural
	Thulamela	Thohoyandou	Peri-Urban
Mpumalanga	Mbombela	Kanyamazane	Township
		Nelspruit	Urban
		White River	Peri-Urban
Northern Cape	Ga-Segonyana	Barkley West	Rural
	Sol Plaatje	Galeshewe	Township
		Kimberley	Urban
Northwest	Greater Taung	Taung	Rural
	Madibeng	Hartbeespoort	Peri-Urban
	Rustenburg	Rustenburg	Urban
Western Cape	City of Cape Town	Cape Town	Urban
		Khayelitsha	Township
	Drakenstein	Paarl	Rural

Table 3: KMO and Bartlett's Test

Kaiser-Meyer-Olkin measure of sampling adequacy		.951
Bartlett's test of sphericity	Approx. Chi-square	31400.155
	df	190
	Sig.	.000

Table 4: Total variance explained

Component	Initial eigenvalues	Extraction sums of squared loadings	Rotation sums of squared loadings

	Total	% of variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of variance	Cumulative %
1	8,557	42,784	42,784	8,557	42,784	42,784	7,379	36,893	36,893
2	4,896	24,482	67,265	4,896	24,482	67,265	6,075	30,373	67,265
Extraction method: Principal Component Analysis.									

Table 5: Rotated component matrix

Items	**ICT Self-efficacy**	**General Self-efficacy**
I can always manage to solve difficult problems using ICT if I try hard enough.	0,850	
If someone opposes me, using ICT I can find the means and ways to get what I want.	0,812	
Using ICT, it is easy for me to stick to my aims and accomplish my goals.	0,862	
I am confident that I could deal efficiently with unexpected events using ICT.	0,865	
Thanks to my resourcefulness, I know how to handle unforeseen situations using ICT.	0,854	
I can solve most problems using ICT if I invest the necessary effort.	0,852	
I can remain calm when facing difficulties because I can rely on using ICT to cope.	0,856	
When I am confronted with a problem, I can usually find several solutions using ICT.	0,862	
If I am in trouble, I can usually think of a solution by using ICT.	0,870	
Using ICT, I can usually handle whatever comes my way.	0,838	
I can always manage to solve difficult problems using ICT if I try hard enough.		0,737
If someone opposes me, I can find the means and ways to get what I want.		0,742
It is easy for me to stick to my aims and accomplish my goals.		0,771
I am confident that I could deal efficiently with unexpected events.		0,804
Thanks to my resourcefulness, I know how to handle unforeseen situations.		0,792
I can solve most problems if I invest the necessary effort.		0,773
I can remain calm when facing difficulties because I can rely on my coping abilities.		0,778
When I am confronted with a problem, I can usually find several solutions.		0,812
If I am in trouble, I can usually think of a solution.		0,818
I can usually handle whatever comes my way.		0,672

Principal component analysis (PCA) with orthogonal rotation (Varimax) was used as the extraction method (Table 4), revealing the presence of two distinct factors with eigenvalues exceeding 1. The component number 1 (Table 4) has the highest eigenvalue of 8.557 which corresponds to 42.784% of the total variance, while component number 2 has an eigenvalue of 4.896 which represents 24.482% of the total variance. Cronbach's alpha was used to measure the internal consistency of

the two constructs (ISE and GSE), the Composite Reliability (CR) coefficient for reliability analysis (Field, 2013), and convergent validity using Average Variance Extracted (AVE) ((Bagozzi and Yi, 1988; Chin, Gopal and Salisbury, 1997; Hair *et al.*, 2008). All values were above the thresholds 0.7, 0.5 and 0.5 respectively.

Table 6: Reliability and validity test scores

Constructs	Cronbach's alpha	Composite reliability (CR)	Average variance extracted (AVE)	Number of total items and initials
ICT self-efficacy	0.961	0.961	0.709	10
General self-efficacy	0.927	0.927	0.562	10

Table 7: Demographics

Urban	976	50.1%
Rural	528	27.1%
Peri-urban	90	4.6%
Township	354	18.2%
Total	1948	100%

Table 8: Education level

Pre-matric/pre-grade 12/pre-standard 10	387	19.9%
Matric/grade 12/ standard 10	704	36.1%
Certificate	304	15.6%
Diploma	304	15.6%
Undergraduate/Bachelors/BTech Degree	170	8.7%
Post-graduate qualification	58	3.0%
Other	21	1.1%
Total	1948	100%

Table 9: Employment status

Unable to work	23	1.2%
Unemployed	563	28.9%
Employed full time/permanent/contract/temporary	693	35.6%

Employed part time/permanent/contract/temporary	213	10.9%
Self-employed/business owner	107	5.5%
Student/scholar	336	17.2%
Other	13	0.7%
Total	1948	100%

Table 10: ISE and GSE means

	ISE mean	**ISE Std**	**GSE mean**	**Std**	**Difference in mean**
Urban	2.40	.772	2.00	.585	.40
Rural	2.48	.892	1.99	.556	.48
Peri-urban	2.47	.847	2.05	.421	.44
Township	2.54	.937	2.11	.696	.41
Total	2.45	.842	2.02	.594	.43

Table 11: ISE ANOVA

	Sum of squares	df	Mean square	F	p-value	Conclusion
Between groups	6.146	3	2.049	2.898	.034	There is a significant difference of mean scores across areas because the p value=.034 <.05.
Within groups	1374.264	1944	.707			
Total	1380.410	1947				

Table 12: Multiple comparisons of ISE by using Tukey HSD (only significant value)

(I)	(J)	Mean difference (I-J)	Std. error	p-value	95% confidence interval		Conclusion
					Lower bound	Upper bound	
Urban	Township	-.146*	.052	.027	-.28	-.01	The ISE average score of youth from townships is significantly higher (p=.027 <.05) than the average score of youth from urban areas.
*. The mean difference is significant at the 0.05 level.							

Table 13: GSE ANOVA

	Sum of squares	df	Mean square	F	P-value	There is significant difference of mean scores somewhere across different areas because the p value=.018 <0.05.
Between groups	3.565	3	1.188	3.382	**.018**	
Within groups	683.036	1944	.351			
Total	686.601	1947				

Table 14: Multiple comparisons of GSE by using Tukey HSD (only significant value)

(I)	(J)	Mean difference (I-J)	Std. error	P-value	95% confidence interval		Conclusion
					Lower bound	Upper bound	
Urban	Township	-.108*	.037	.017	-.20	-.01	The general self-efficacy average score of youth from townships is significantly higher (p=.017<.05) than the average score of youth from urban areas.
Rural	Township	-.114*	.041	.027	-.22	-.01	The general self-efficacy average score of youth from townships is significantly higher (p=.027<.05) than the average score of youth from rural areas.
*. The mean difference is significant at the 0.05 level.							

Table 15: ANOVA COMPARISON between ISE and GSE

	Sum of squares	df	Mean square	F	P-value	Conclusion
Between groups	2.355	3	.785	.877	.452	There is **non-significant difference** of mean scores between ICT self-efficacy and general self-efficacy across areas because the p value=**.452 >.05.**
Within groups	1740.000	1944	.895			
Total	1742.355	1947				

DISCUSSION

The data was skewed to the youth in urban areas (50.1%) because the larger population of South Africans reside in urban areas (Statistics South Africa, 2019). The developed ICT self-efficacy scale was validated by using Confirmatory Factor Analysis. The educational levels varied with 42.9% having post-secondary education (post-matric), 36.1% having matric, and 19.9% not completing matric. This indicates that majority of the youth in the study did not have a particular skill specialisation. 52% had some form of work, while 30.1% were unemployed or unable to work. 17.2% were students.

It was noticeable that the youth overall had a higher GSE compared to their ISE. The mean for ISE was closer to a lower confidence in using ICT to accomplish tasks (2.45), compared to the mean GSE overall at 2.02, closer to a higher confidence in the ability to complete tasks in general. This finding suggests that despite being considered digital natives, the youth still require some form of intervention to assist them to complete tasks using ICT.

On closer analysis, the ISE of the youth in township areas was lower than that of youth in urban areas. This finding requires further interrogation of the moderating or mediating factors such as access to free ICT and internet facilities in urban areas. A similar finding existed among the youth in townships who had a significantly higher GSE compared with those in urban areas. The youth in rural areas had the highest confidence in completing tasks in general (GSE) compared with those in urban, peri-urban or townships areas. Those in township areas had the lowest GSE.

These findings suggest that the youth in township areas overall require the highest amount of interventions for both general and digital skills compared with the youth in urban, rural or township areas. The finding reflects the influence that the creation of townships continues to have on the confidence of certain sections of the South African population to complete tasks in general or using ICT.

CONCLUSION

The aim of this study was to compare the general and ICT self-efficacy of South African youth with a particular view on their ICT self-efficacy as digital natives in the 4th Industrial Revolution (4IR). The basis of the study was the context that most work in the 4IR for the youth will probably

have an element of digital technology embedded in it, and consideration should be given to the degree of preparedness of the youth for such an environment.

The findings do not support the assumption that the youth, despite being digital natives born into digital technology, are confident enough to complete tasks using ICT in South Africa. The youth overall are more confident in their own abilities to complete tasks without ICT. Particularly, the youth of townships are most affected in terms of both their digital and non-digital skills – their confidence was lowest in both ISE and GSE. Townships represent a legacy of apartheid in South Africa that intentionally settled non-white populations into areas close to urban areas. The study suggests these nuances might still be a challenge that need to be considered in ongoing skills policy interventions in South Africa.

LIMITATIONS AND AREAS FOR FUTURE WORK

The study was limited in considering only the ISE and GSE without looking at the factors that might influence the differences in GSE or ISE. Further work needs to consider such as influences.

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