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Perceived usefulness and culture as predictors of teachers attitudes towards educational technology in South Africa

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The use of educational technology (ET) worldwide is increasing rapidly, and South Africa is no exception. Grouped amongst the emerging economies of the world, South Africa's information and communication technology (ICT) infrastructure is often mentioned as one of the key factors leading to the growth of the country. Integrating ICT into education has become a priority for the South African government. However, it is necessary to move beyond merely providing physical access to ICT's in order for integration to be successful. The integration of ET in schools is greatly influenced by teachers' attitudes towards the technology. The aim of this study was to investigate teachers' attitudes towards educational technology and the factors that are thought to influence teachers' attitudes, namely, perceived usefulness, perceived cultural relevance, perceived competence and access to ET. A convenience sample of 117 teachers in the Johannesburg area, from both public and private schools, across foundation, intermediate and senior phase, completed the Attitudes Towards Computer Scale. Teachers' attitudes were generally positive. The strongest predictor of teachers' attitudes was perceived usefulness followed by perceived cultural relevance. Thus, it is evident that when integrating ET into schools, attention must be paid to teachers perceptions of the utility of ET in order for integration to be successful. Having access to ET and the competence to use ET are not enough for the successful integration of ET in schools.

Keywords: attitudes; computers; diffusion of innovations; education; educational technology

Introduction

South Africa is listed amongst the emerging economies of the world and is the highest ranked emerging economy in Africa (Grant Thornton International Ltd., 2015). This is partly due to South Africa's ICT infrastructure, which gives the country an opportunity to enter and compete in the globalised information society. South Africa, like other emerging economies, is concerned with reducing the digital divide within the country, so as to employ ICT in ways that will be empowering and transformative for the South African population. One of these initiatives was outlined in the White Paper on e-Education (Education White Paper 7, section 2.23, Department of Education (DoE), 2004), which stipulated as a goal, that every teacher and learner ought to be ICT capable by 2013. Whilst admirable, this goal is yet to be achieved. It has been argued that one of the main reasons for this was the largely techno-determinist view adopted by the government, where the provision of physical access to ICT infrastructure was considered to be adequate for creating the shift to ICT capable learners and teachers (Xiao, Califf, Sarker & Sarker, 2013). It is clear from the literature that notions of access extend beyond infrastructure and material access (Farrukh & Singh, 2014; Fu, 2013; Selwyn & Facer, 2013). It is necessary to consider aspects of use such as who accesses ICT, how and for what purpose is it accessed and what the perceptions of users are, with regards to ICT. In the educational context, exploring this aspect of ICT would be useful in terms of understanding the uptake of ICT in education (Farrukh & Singh, 2014; Fu, 2013; Selwyn & Facer, 2013). Hence, this study explored attitudes towards ICT in a sample of South African teachers. However, in keeping with convention in the field, the term educational technology (ET) is used, rather than ICT, as this delineates the specific field and purpose for which ICT is being employed. In the literature review to follow, we define ET and attitudes. This is followed by an explanation of Roger's Diffusion of Innovations Theory, which guided the exploration of attitudes in this study. The literature review concludes with an exploration of international and local research on teachers' attitudes towards ET.

Educational Technology

The Association for Education Communications and Technology (AECT) defines educational technology as "the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources" (Januszewski & Molenda, 2008:1). Thus, ET refers to technology that is used specifically for educational purposes. For the purposes of this study, this includes computers, laptops, tablets, interactive smartboards, overhead projectors, and other forms of technology that are used in classrooms for educational purposes. An attitude is defined as one's perception of an object, which may be favourable or unfavourable (Capan, 2012). Thus, 'attitudes towards ET' refers to an individual's perception of computers and educational technology, which may range from being very positive, to very negative.

Roger's Diffusion of Innovations Theory

Cantrell and Visser (2011) argue that the successful integration of ET depends on the attitudes and aptitudes of teachers. They also note that attitudes are precursors to actual behaviour and intended behaviour. Positive

attitudes can result in increased willingness to learn about ET, and thus, in increased ET competence. This will ultimately result in successful pedagogical integration of ET. According to Fishbein and Ajzen (2010), individuals form beliefs (and thus attitudes) about an object, by associating it with certain attributes. Lack of knowledge may cause one to assign negative attributes to ET, and as a result, they would have a negative attitude towards ET. These arguments concur with Rogers' Diffusion of Innovations Theory (Rogers, 2003). Rogers (2003) proposed five steps towards successful integration of technological innovations, namely: Knowledge, Persuasion, Decision, Implementation and Confirmation. The Knowledge phase involves knowing what the innovation does, and how to use it. The Persuasion phase follows the Knowledge phase, and it is here that positive or negative perceptions or attitudes are formed. Rogers (1995) argues that attitudes in this stage are affected by how useful an individual perceives the innovation to be in terms of its relative advantage over previous innovations, its compatibility with existing practices, its complexity, and whether the changes brought about by the innovation are tangible and observable, and allow for the innovation to be experimented with before implementation. Rogers (1995) also identified the need for the innovation to be compatible with and conform to social and cultural norms, for attitudes to be more positive. According to Rogers (2003), once knowledge and persuasion criteria are met, the decision phase will follow, with a positive choice resulting in implementation and ultimately confirmation. Albirini (2006) used Rogers' (2003) theory to develop the Attitudes Towards Computer Scale (ATCS), which consists of a scale to measure whether overall attitudes towards ET are more positive or negative, as well as four subscales, to measure the elements of the knowledge (ET access and ET competence scales) and persuasion (perceived usefulness and perceived cultural relevance scales) phases, to determine to what extent these are useful in predicting attitudes as per Rogers' theory. The ATCS was used in this study to determine attitudes towards ET.

ET does have the capacity to impact student learning positively. It supports collaborative learning, encourages creativity and promotes higher-order learning (Chai, Hong & Teo, 2009; Fu, 2013). Studies have shown that when integrated effectively, it can also result in higher test scores, improved writing skills and higher self-efficacy (Gulek & Demirtas, 2005; Rankin & Hoaas, 2001; Susskind, 2008). The use of technology in classrooms also enables teachers to teach a large number of students at the same time (Bruffee, 1993), which is particularly helpful in a South African context, where teacher to student ratios are high (Murtin, 2013). It is thus desirable to implement effective ET programmes in schools. This, however, cannot be achieved without the input of teachers, which is why teacher attitudes towards ET come to play such an important role in ET implementation and integration.

Research on Teacher Attitudes towards ET

Current research states that teachers' attitudes towards ET play a crucial role in its successful implementation and the effectiveness of its use in the classroom (Buabeng-Andoh, 2012; Deng, Chai, Tsai & Lee, 2014; Ertmer, Ottenbreit-Leftwich & Tondeur, 2015; Farrukh & Singh, 2014; Fu, 2013; Teo, Fan & Du, 2015). Several reviews of international literature found that computer attitudes are influenced by training, knowledge, computer anxiety, computer experience, perceptions of ease of use and usefulness (Buabeng-Andoh, 2012; Fu, 2013; Sabzian & Gilakjani, 2013). Hennessy, Harrison and Wamakote (2010) also found that teachers' poor ET literacy and their lack of confidence in using ET hampered the integration of ET. Pierce and Ball (2009) considered the factors that may affect Australian secondary school teachers' intentions to use technology when teaching Mathematics. They found a prevailing sense that teachers need to be convinced that the technology will in fact increase students' interest and motivation before they are inclined to use the technology.

Hennessy et al. (2010) have identified several challenges to ET integration in primary and secondary schools in Sub-Saharan Africa. According to Hennessy et al. (2010), teachers' beliefs and attitudes towards ET, as well as pedagogical innovation, were primary facilitators and barriers to the use of ET in the classroom. Other factors that challenged ET integration included the optional nature of ET use within the curriculum, principals' negative attitudes towards computers, as well as the internet, and a lack of contextually appropriate course content. However, it was evident that teachers' agency is critical in the integration of any e-learning policy or ET implementation and integration.

The research internationally is consistent in emphasising the need to examine teacher attitudes as an important element in predicting the success of ET integration in schools. Research in the South African context also emphasises the importance of considering attitudes.

Teacher attitudes towards educational technology in South Africa

Govender and Govender (2009) surveyed 1,237 teachers across 93 schools in Kwa-Zulu-Natal on ET attitudes. They reported that teacher perceptions of

relative advantage and compatibility of ET was positively correlated to teachers' attitudes towards computers. There was uncertainty as to whether technology meshed with curriculum goals. Thus, if teachers did not believe that educational technology would help them reach their teaching goals, they were unlikely to develop positive attitudes towards them. Govender and Govender (2009) found that 68.1% of teachers lacked core computer competence and only 15% of teachers used computers for teaching, even though they had access to them.

In the South African context, access to ET is not always available. Sherman and Howard (2012) found that access to computers was a first order barrier towards ET use. Sherman and Howard (2012) in a qualitative study on four secondary school teachers, from two schools, found a number of both first and second order barriers to ET integration in schools in the Western Cape. One of the secondary barriers to ET integration was that teachers did not understand the value of ET in teaching and learning. Therefore, it is important to provide teachers with information about ET and the benefits of its use in the classroom.

Chigona, A, Chigona, W, Kausa and Kayongo (2010), conducted in-depth interviews with three principals and nine educators, from three different schools, in disadvantaged communities in the Western Cape. They found that teachers were reluctant to use technology in their teaching, because they were never certain that it would actually be working, when the time came to use it, and thus, most teachers made limited use of the available technology.

In a study comparing the policies of South Africa and Chile, it was noted that Chile's integration was more successful. One of the reasons for this was that schools in Chile were required to provide a detailed proposal of how they would use technology if they wanted it, while South African schools were just given the technology, whether they wanted it or not (Howie, 2010). This highlights the fact that teachers' input is crucial in ET integration. Nkula and Krauss (2014) reviewed the factors that affect ET integration in schools. They suggest that aligning teacher attitudes with ET use is crucial in order to successfully integrate ET.

Thus, the aim of this study was to explore teachers' attitudes towards computers and other ET in South Africa. This study also considered to what extent the components of competence, access, perceived usefulness and perceived cultural relevance predicted attitudes towards ET.

Methods

This was a quantitative study. Teachers completed a survey at one point in time, with no manipulation of variables. Therefore, the study was exploratory in nature using a correlational design. These designs are best suited to contexts where little research has been conducted and where a need exists to determine trends in the field so as to aid intervention (Babbie & Mouton, 2012). Correlational designs are often used in applied research to predict scores on an outcome variable from a set of predictor variables in the absence of clear causal paths (Gravetter & Forzano, 2015).

Sample

A nonprobability, convenience sample of 117 teachers, from 12 schools in the Johannesburg area, voluntarily participated in the study. Nine of the schools were public schools, while three of them were private schools. As evident from Table 1, the sample consisted of 80 public school teachers and 30 private school teachers (one undefined). Thirty-eight of these teachers taught Foundation Phase, 66 taught Intermediate Phase and 33 taught Senior Phase. The majority of the sample was female (88.0%). The age distribution of the sample was as follows; 29.9% of the sample were between the ages of 20-29, followed by 24.1% between the ages of 30-39, 23.9% between the ages of 40-49, 18.8% between the ages of 50-59 and 5.1% were over the age of 60. Most teachers had completed an undergraduate degree (33.3%), an honours degree (23.9%), or a postgraduate teaching certificate/diploma (18.8%). Most teachers reported a monthly salary of between R15,000 to R19,000 (36.8%), followed closely by R10,000 to R14,000 (29.1%). Number of years of teaching experience varied greatly; 31.6% of teachers had 1-5 years, 17.9% had 6-10 years, 13.7% had 11-15 years, 9.4% had 16-20 years and 26.5% had 20 or more years of teaching experience.

Table 1 Demographic description of sample

Variable	Level	Frequency	%	Variable	Level	Frequency	%
Gender	Male	14	12.0	Grades Taught	1-3	38	32.5
					4-7	43	36.8
	Female	103	88.0		8-9	23	19.7
					10-12	33	28.2
					Not Specified	6	5.1
Age	20-29	35	29.9	Formal ET program	Not Specified	3	2.6
	30-39	25	21.4		Yes	93	79.5
	40-49	28	23.9		No	21	17.9
	50-59	22	18.8	Attended training course	Not Specified	2	1.8
	60+	6	5.1		Yes	77	69.4
Qualifications	Not specified	13	11.1		No	32	28.8
	Undergraduate (Bachelor of Arts (BA) / Bachelor of Science (BSc))	39	33.3	Type of technology used for communication	Email	107	91.5
	Postgraduate (Postgraduate Certificate in Education (PGCE) / Higher Diploma in Education (HDE))	22	18.8		Communicator	57	48.7
	Honours	28	23.9		SMS	84	71.8
	Masters	5	4.3		Whatsapp™	66	56.4
	Diploma	10	8.5		MXit™	0	0
Income	Not specified	5	4.3	Type of technology used for educational purposes	Overhead projector	55	47.0
	R5,000-9,000	10	8.5		Slide Projector	16	13.7
	R10,000-14,000	34	29.1		Interactive Whiteboard/ Smart board	34	29.1
	R15,000-19,000	43	36.8		Media Centre	47	40.2
	R20,000-24,000	10	8.5		Computer Lab	67	57.3
	R25,000-28,000	6	5.1		Smart Classroom	6	5.1
	R29,000+	9	7.7		Computer for teacher in classroom	25	21.4
Years of teaching experience	Not specified	1	0.9		Computer for students in classroom	10	8.5
	1-5	37	31.6		Laptop in classroom for teacher	22	18.8
	6-10	21	17.9		Laptop in classroom for students	4	3.4
	11-15	16	13.7		Tablet/IPad® in classroom for teacher	35	29.9
	16-20	11	9.4		Tablet/IPad® in classroom for students	13	11.1
	20+	31	26.5		Smartphone in classroom for teacher	33	28.2
School Type	Unspecified	2	1.7		Smartphone in classroom for students	11	9.4

Variable	Level	Frequency	%	Variable	Level	Frequency	%
	Private	31	26.5		Other	5	4.6
	Public	84	71.8		None	2	1.8
Grades Taught	1-3	38	34.2				
	4-7	43	38.7				

As evidenced in Table 1, 79.3% of teachers reported that they had a formal ET programme at their school, indicative of the fact that these schools were moderate to high resourced schools, with adequate ET access. Sixty-nine point four percent of teachers reported receiving training of some sort and the average number of courses attended by teachers was two. They primarily made use of email and short message services (SMS) for communication purposes. Approximately half of the teachers made use of a school communicator and just over half used WhatsApp™ to communicate. Only two participants reported not having any form of technology in the classroom. Approximately half of the teachers used overhead projectors, while only 13.7% reported using the older slide projectors. Interactive whiteboard /smartboards were used by 29.1% of the teachers, 21.4% of teachers had access to computers in the classroom, and 18.8% had access to laptops in the classroom. Eight point five percent of students had access to computers in the classroom and 3.4% had access to laptops in the classroom. Twenty-nine point nine percent of teachers and 11.1% of students had access to a tablet/iPad® in the classroom. Twenty eight point two percent of teachers and 9.4% of students had access to a smartphone in the classroom for educational purposes, while 79.5% of teachers have received some form of ET training.

It should thus be noted that in terms of Rogers' Diffusion of Innovations Theory (Rogers, 2003), ET knowledge and ET access would be the first elements to incorporate, to have better and more positive attitudes and to have successful implementation. From the description of the sample, it is evident that the teachers teach in moderate to highly resourced schools, where first order barriers such as, access to computers, are not generally problematic. The teachers also appear to be competent in their use of technology.

Instruments

This study made use of an adapted version of the ATCS that was developed by Albirini in 2006, for a study of a similar nature that was conducted in Syria. In the adapted version, the word 'computer' was replaced by: 'computers and other educational technology', and two questions pertaining to ET training were added in the final section. The questionnaire takes approximately 20 minutes to complete, and consists of six sections: ET attitudes, perceived usefulness, perceived cultural relevance, ET competence, ET access and personal characteristics.

Attitudes towards ET (20 items), perceived usefulness of ET (18 items) and perceived cultural relevance of ET (16 items) were measured on a 5-point Likert scale ranging from 'strongly disagree' (1) to 'strongly agree' (5). ET competence (15 items) was measured on a 4-point Likert scale, where 1 indicated 'no competence' and 4 indicated 'much competence'. ET access (4 items) was measured on a 5-point Likert scale from 'never' (5) to 'daily' (1). Section 6 asked for participants' demographic information: age, gender, number of years of teaching experience, what type of technology they used for communication, as well as teaching and the number and type of workshops attended.

Albirini (2006) reported Cronbach's alpha reliability co-efficients of 0.9 for computer attitude, 0.86 for computer attributes (perceived usefulness in this study), 0.76 for perceived cultural relevance and 0.94 for computer competence. In this study, the original scales, as proposed by Albirini (2006), were found to have Cronbach's alpha coefficients of 0.85 for computer attitudes, 0.82 for perceived usefulness, 0.73 for perceived cultural relevance, 0.92 for competence and 0.43 for access. However, an exploratory factor analysis, with principal components analysis and promax rotation, revealed that some factors were not loading as expected. Various factor solutions were examined and the researchers also examined each item for meaning. The adapted scale consists of the same six sections as proposed by Albirini (2006), but the number of items per scale differed. Items which had poor loadings, poor item-total correlations and those ambiguously worded, were removed. The adapted scale together with the factor loadings is included in Appendix A. It consisted of 55 items as follows: attitudes towards ET (15 items); perceived usefulness (16 items); perceived cultural relevance (6 items); ET competence (15 items); and ET access (3 items). Cronbach's alpha co-efficients for the revised scales were as follows: ET attitudes 0.86, perceived usefulness 0.90, perceived cultural relevance 0.73, ET competence 0.94 and ET access 0.57. Although ET access has a low reliability, it is an improvement on the original scale's reliability, which was 0.43.

Procedure

Permission to conduct the study was obtained from the Gauteng Department of Education and the principals of the various schools. Ethical clearance for this study was obtained from the researchers' university (Protocol number HONS/14/005IH). The principals assisted the researchers by informing the teachers of the study and distributing the questionnaires. The questionnaires were available in hard copy and online. If the hard copy version was preferred it was delivered to the school and the completed questionnaires were collected from the school the following week. Teachers were given an envelope containing the questionnaire, and upon

completion, they placed the questionnaire in the envelope, sealed it and then placed it at a designated place within the school to be collected. If the online version was preferred, the link to the questionnaire was sent to the principal, or whoever the principal designated as a contact person. The link was then distributed to all teachers. Data was collected, collated on Microsoft Excel and analysed using the Statistical Package for Social Sciences (SPSS) Version 22 (International Business Machines Corporation (IBM), 2013).

Data Analysis

Descriptive statistics were used to analyse demographic information and teachers' attitudes towards ET. Frequencies were used for nominal variables, whilst means, standard deviations, skewness coefficients, minimum and maximum values were used to describe the attitudinal variables.

A backwards, stepwise, multiple regressions analysis was performed to determine whether perceptions of ET usefulness, ET competence, level of access to ET or perceived cultural relevance best predicted teachers' attitudes towards ET. This technique begins with all of the independent variables in the model. At each step, the most non-significant variable is removed and the model is retested after deletion to see if the model improves. This process of removing non-significant contributors is repeated until the model cannot be improved further (Huck, 2014). The following assumptions for a regression analysis were tested: normality was assessed using a frequency versus regression standardised residuals histogram; homogeneity of variance was assessed by means of a regression studentised deleted (press) residual versus regression standardised predicted values scatterplot; and outliers, influential points and influential outliers were identified by a Cook's d versus centered leverage plot (Huck, 2014). Outliers and influential points were removed from the dataset. Multicollinearity was also determined and found to be within the appropriate range as specified by Huck (2014).

Results

Attitudes towards Educational Technology

Teachers' attitudes towards ET were generally positive, with an overall mean score of 4.02 (*SD* = 0.42) as evidenced in Table 2. Teachers' perceived usefulness of ET was also positive, with an overall mean of 4.21 (*SD* = 0.60). Teachers' perceptions of cultural relevance were within the neutral range with a mean of 3.14 (*SD* = 0.59). ET competence was adequate, with a mean of 3.14 (*SD* = 0.64).

Table 2 Descriptive statistics on teachers' attitudes and related factors

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness
Teachers' attitudes	117	1	5	4.8	.42	-.469
Perceived usefulness	117	1	5	4.21	.60	-1.849
Perceived cultural relevance	117	1	5	3.14	.59	.641
ET Competence	117	1	4	3.14	.64	-1.584
ET Access	117	1	5	3.34	.83	1.170
Number of courses attended by teachers	117	0	20	2.25	3.375	.229

Table 3 Teachers' level of access to ET in various settings

Access to computers	At home (frequency)	At home (%)	At school (frequency)	At school (%)	In class (frequency)	In class (%)
Daily	100	85.5	93	79.5	60	51.3
2-3 times a week	10	8.5	14	12.0	13	11.1
Once a week	4	3.4	6	5.1	9	7.7
Once a month	3	2.6	1	0.9	8	6.8
Never	0	0.0	3	2.6	27	23.1

Teachers had more than sufficient ET access, with a mean of 3.35 (*SD* = .83) as evidenced in Tables 1 and 2. Eighty-five point six percent of the teachers had daily access to ET at home. Seventy-eight point four percent had daily access to ET daily at school, and 49.5% had daily access to ET in the classroom. From Table 2, the average number of courses attended by teachers was 2.25, while some teachers did not attend any courses, and one person attended as many as 20 training courses, showing great variability within this variable. The most common reason for attending training courses was that teachers wanted to improve their computer skills (*n* = 27). Other reasons included the fact that the training courses were provided by the school, or as part of teacher training degrees (*n* = 9); or that teachers wanted to learn about how to integrate educational technologies into the classroom (*n* = 7). Another reason, which appeared less frequently, was that the training courses were compulsory (*n* = 2). Of the

teachers who stated that they did not attend training courses, the most common reason was that they had not been given the opportunity to attend a course (n = 8). Other common reasons were that they did not have enough time (n = 4), because it was not necessary (n = 4), or because they already knew how to use computers (n = 4). Further reasons included not having the money to attend training courses (n = 1) and not wanting to attend training courses because they found computers intimidating (n = 1).

Predictors of Teachers' Attitudes towards ET

Table 4 presents the results from the multiple regression. Model 1 indicated that 26.8% of the variance in teacher attitudes was explained by all the variables. The overall model was significant at the 0.01 level of significance (F (4,111) = 11.509, p = 0.000). Perceived usefulness ($p < 0.01$) and perceived cultural relevance ($p < 0.01$) were the only significant predictors, with perceived usefulness being the strongest predictor of teacher attitudes.

Table 4 Multiple regression analysis for teacher attitudes and perceived usefulness, perceived cultural relevance, ET access and ET competence

Model		Unstandardised coefficients		Standardised coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	30.108	5.486		.5.488	.000**
	Perceived cultural relevance	.460	.137	.272	3.349	.001**
	Perceived usefulness	.281	.061	.383	4.637	.000**
	ET competence	.103	.069	.141	1.491	.139
	ET Access	.176	.261	.063	.674	.502
2	(Constant)	31.899	4.788		6.662	.000**
	Perceived cultural relevance	.460	.137	.271	3.353	.001**
	Perceived usefulness	.284	.060	.387	4.722	.000**
	Perceived ET Competence	.079	.059	.108	1.337	.184
3	(Constant)	34.627	4.347		7.966	.000**
	Perceived Cultural relevance	.465	.138	.274	3.380	.001**
	Perceived usefulness	.298	.060	.406	5.004	.000**

Note: * $p < 0.05$; ** $p < 0.01$.

Model 2 was significant at the 0.01 level of significance (F (3,112) = 15.269, p = 0.000). Educational Technology (ET) access was removed from the model. Perceived usefulness, Perceived cultural relevance and ET competence explained 27.1% of the variance in teacher attitudes in this model. Perceived usefulness ($p < 0.01$) and perceived cultural relevance ($p < 0.01$) were the only significant contributors, with perceived usefulness contributing the most to the model. Educational Technology (ET) competence was removed from the regression analysis.

The final model, as reported in Table 4, indicated that 26.6% of the variance was explained by all the variables. The overall model was significant at the 0.01 level of significance (F (2,113) = 21.857, p = 0.000). Perceived usefulness ($p < 0.01$) and perceived cultural relevance ($p < 0.05$) were the only two significant contributors in this model, with perceived usefulness demonstrating the greatest predictive value.

Discussion

This study explored attitudes towards ET among 117 teachers in the Johannesburg area. It also considered the predictors of teachers' attitudes towards ET. The majority of teachers in this study reported high levels of access to ET at home and at school, but less access in the classroom itself, accompanied by moderate ET competence. The knowledge stage is the first stage in Rogers' Diffusion of Innovations Theory (Rogers 2003). According to Rogers (2003), it is necessary that an individual have access to the innovation as well as the knowledge and competence to be able to use it. As is evident from the demographic profile and scores on the ET access and ET competence scales, these areas were not problematic for the teachers in this sample. It is likely that the teachers in this particular sample in moderate to high resourced schools have moved past the first stage of the Rogers'

theory (Rogers, 2003) and this would explain why competence and access were not found to be predictors of teachers' attitudes in this study.

Perceived usefulness of ET looked specifically at perceptions of whether ET could be advantageous over previous teaching methods, whether it could exist alongside current methods, whether the complexity ET brought was manageable, and whether ET could produce tangible outcomes. Thus, it assessed the aspects identified in the second stage of Rogers' theory, namely, persuasion (Rogers, 2003). Teachers were positive about the usefulness of ET. Teachers' attitudes were also predicted most strongly by perceived usefulness. This is supported by previous research, where perceived usefulness and perceived cultural relevance were also found to be the strongest predictors of attitudes (Albirini, 2006; Buabeng-Andoh, 2012; Fu, 2013; Sabzian & Gilakjani, 2013). Govender and Govender (2009) also found that attitudes were positively related to relative advantage and compatibility, with current teaching methods (perceived usefulness). Perceived usefulness, according to Rogers (2003) predicts the rate of integration of an innovation, and is a key element in the third decision phase. As perceptions of usefulness were high among teachers, this suggests that the prospects for integration of ET at these schools are good.

Rogers (2003) also emphasised the need for the innovation to tie in with cultural and social norms in the second stage. Perceived cultural relevance responses were in the neutral range. This scale considered issues such as whether ET hinders future generations from learning their traditions, whether ET is proliferating too fast, and whether ET needs to be adapted to better suit South African culture and identity. Despite the neutral attitude score, perceived cultural relevance still remained a significant predictor in the regression analyses. This suggests that the focus needs to be placed the culture and social norms in order to achieve lasting and effective change, with regards to the integration of ET in these South African schools. If perceptions of cultural relevance are not positive, this could be a major hindrance to the integration of ET. In previous studies in South Africa, the role of teacher as expert and 'saving face', as well as the need for classroom control and the value of ET in teaching, were identified as barriers to the integration of ET (Chigona et al., 2010; Sherman & Howard, 2012). Internationally, the need to address school culture as well as broader cultural perceptions was also highlighted as a factor influencing ET integration (see Farrukh & Singh, 2014; Fu, 2013). Thus, along with perceptions of the usefulness of ET, it is valuable to address perceptions of ET fit and relevance in the broader environment, so as to facilitate better integration. This result confirms the infrastructure versus usage access arguments presented in the literature (Selwyn & Facer, 2013).

Stage 3 of Rogers' theory deals with decision-making (Rogers, 2003). If the knowledge and persuasion stages are successful, then attitudes in Stage 3 should be positive, thereby ensuring greater success with Stages 4 and 5, that is, the implementation and confirmation stages. Findings from this study indicate that teachers' attitudes towards technology are positive. The fact that teachers' attitudes were positive in this study bodes well for ET integration in schools, and is consistent with other research findings in the field (Buabeng-Andoh, 2012; Fu, 2013).

Conclusion

This study has provided useful insight from the teachers' perspective, in terms of factors that could influence the implementation and integration of ET in South African schools. Teachers' attitudes towards ET were generally positive in this study. The strongest predictor of teachers' attitudes was perceptions of usefulness, followed by Perceived cultural relevance. It is evident that when integrating ET into schools, attention must be paid to the extent to which teachers perceive ET as fitting into their cultural frame of reference. More importantly teachers need to perceive that ET will add value to the teaching experience for ET integration to be successful. It is also evident that having access to ET and the skills to use ET, while necessary, are not enough for the successful integration of ET into schools. These findings conform to those produced internationally (Buabeng-Andoh, 2012; Ertmer et al., 2015; Fu, 2013; Sabzian & Gilakjani, 2013).

It is acknowledged that the sample on which we base this argument is a convenience sample, from a particular sector of society. Hence, it is recommended that more research be undertaken with bigger and more diverse samples across the country. Previous studies have identified computer anxiety as being negatively correlated with attitudes towards ET (Agbatogun, 2010; Buabeng-Andoh, 2012; Sabzian & Gilakjani, 2013). The scale used in this study did not consider this particular aspect. Hence, future research should consider incorporating a computer anxiety scale. Together, these scales could be extremely effective in providing evidence for the Diffusion of Innovations approach. If findings are consistent, then a series of workshops could be developed and rolled out to increase knowledge and/or awareness of the utility of ET in education, which could enhance teacher buy-in and ultimately the integration of ET in schools.

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Appendix A: Item Factor Loadings

Item	Component 1	2	3	4
ET Attitudes				
I am glad there are more computers and other Educational Technology these days.	.156	.125	**.425**	.038
I do not like talking with others about computers and other Educational Technology.	.162	.154	**.440**	.188
Using computers and other Educational Technology is enjoyable.	.206	.158	**.441**	.114
Students must use computers and other Educational Technology in all subject matter.	-.075	.022	**.437**	.135
Computers and other Educational Technology would motivate students to do more studying.	-.113	.120	**.648**	-.011
Computers and other Educational Technology are a fast and efficient means of getting information.	.143	-.009	**.602**	.067
Computers and other Educational Technology can enhance students' learning.	.232	-.038	**.524**	-.054
Computers and other Educational Technology do more harm than good.	-.004	-.037	**.512**	.220
If I had the money I would buy a computer and other Educational Technology.	-.036	.027	**.736**	.025
I would avoid computers and other Educational Technology as much as possible.	.283	.047	**.568**	.111
I would like to learn more about computers and other Educational Technology.	-.123	-.236	**.705**	-.178
I have no intention to use computers and other Educational Technology in the near future.	.010	-.115	**.551**	-.084
Computers and other Educational Technology will improve our standard of living.	-.168	.247	**.474**	-.003
The increased proliferation of computers and other Educational Technology will make our lives easier.	-.118	.166	**.476**	.154
Computers and other Educational Technology should be a priority in education.	-.129	-.083	**.571**	.305
Perceived Usefulness				
Computers and other Educational Technology will improve education.	.019	**.703**	.223	-.099
Teaching with computers and other Educational Technology offers real advantages over traditional methods of instruction.	-.073	**.759**	.083	.024
Computers and other Educational Technology cannot improve the quality of students' learning.	-.138	**.624**	.025	-.138
Using computers and other Educational Technology in the classroom would make the subject matter more interesting.	-.117	**.674**	.220	-.119
Computers and other Educational Technology are not useful for language learning.	-.081	**.616**	.077	-.110
Computers and other Educational Technology have no place in schools.	-.076	**.816**	-.120	-.117
Computers and other Educational Technology use fits well into my curriculum goals.	.074	**.670**	.094	-.021
Computers and other Educational Technology use suits my students' learning preferences and their level of computer and other Educational Technology knowledge.	.001	**.580**	-.127	.073
Computers and other Educational Technology use is appropriate for many language learning activities.	-.054	**.564**	.265	-.257
It would be hard for me to learn to use a computer and other Educational Technology in teaching.	.247	**.615**	.053	-.045
I have no difficulty in understanding the basic functions of computers and other Educational Technology.	.389	**.486**	.112	.001
Computers and other Educational Technology complicate my task in the classroom.	.199	**.526**	.002	.109
I have never seen computers and other Educational Technology at work.	.080	**.514**	-.253	.229
Computers and other Educational Technology have proved to be effective learning tools worldwide.	-.124	**.751**	.140	-.074
I have never seen computers and other Educational Technology being used as an educational tool.	.002	**.644**	-.442	.253
I have seen some South African teachers use computers and other Educational Technology for educational purposes.	-.031	**.798**	-.118	-.143
Cultural Perceptions				
We need computers and other Educational Technology that better suit the South African culture and identity.	.141	-.028	-.208	**.498**
Computers and other Educational Technology are proliferating too fast.	.185	-.017	.051	**.538**
There are other social issues that need to be addressed before implementing computers and other Educational Technology in education.	-.050	-.150	.098	**.692**
Computers and other Educational Technology dehumanise society.	-.082	-.116	.232	**.559**
Working with computers and other Educational Technology does not diminish people's relationships with one another.	-.229	-.047	.235	**.562**
Computers and other Educational Technology encourage unethical practices.	.007	-.162	.153	**.718**
Perceived Competence				
Install new software on a computer	**.755**	.013	-.022	.067

	Component			
Item	1	2	3	4
Use a printer	**.792**	-.104	.159	-.188
Use a computer keyboard	**.763**	-.166	.010	-.189
Operate a word processing program (e.g., Word)	**.806**	-.106	.040	-.266
Operate a presentation program (e.g., PowerPoint)	**.788**	.073	-.064	-.028
Operate a spreadsheet program (e.g., Excel)	**.773**	-.027	-.055	.076
Operate a database program (e.g., Access)	**.613**	.099	-.042	.119
Use the internet for communication (e.g., email and chat room)	**.876**	-.115	-.007	-.135
Use the World Wide Web to access different types of information	**.834**	-.186	.030	-.097
Solve simple problems in operating computers	**.716**	-.034	.089	.095
Operate a graphics program (e.g., Photoshop)	**.612**	.115	-.117	.214
Use computers for grade keeping	**.753**	.137	-.027	.093
Select and evaluate educational software	**.621**	.034	-.022	.176
Create and organise computer files and folders	**.768**	-.023	.058	.020
Remove computer viruses	**.685**	.129	-.012	.084
% of Variance Explained	21.38%	14.95%	7.13%	4.69%

Note: Bold Values: Factor loadings of more than 0.4 were considered as significantly contributing to the factor (Kline, 1994).