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THE INFLUENCE OF TEACHER ATTITUDES AND BELIEFS ON INFORMATION AND COMMUNICATIONS TECHNOLOGY INTEGRATION BEHAVIOR IN SOUTH AFRICAN HIGH SCHOOLS

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Abstract

The integration of Information and Communications Technology (ICT) into teaching practices has the potential to improve both teaching and learning outcomes. Governments and educational authorities worldwide are increasingly investing in various initiatives to introduce ICTs in education. However, the rate of ICT integration by teachers at various levels and types of schools remains low. Research suggests that even in schools where educational ICTs are readily available, teachers do not effectively integrate the technology into their teaching practices. This study uses the Theory of Planned Behavior (TPB) as a theoretical framework to understand how the attitudes and beliefs of teachers influence their ICT integration behavior. Participants were drawn from South African high schools in Cape Town with well-endowed ICT resources. The study concludes that even though teachers believe that ICT is beneficial, their ICT integration behavior is inconsistent with these beliefs.

Keywords

ICT, Education, ICT Integration, Self-Efficacy, Theory of Planned Behavior.

1. Introduction

The effective integration of Information and Communications Technologies (ICTs) to pedagogical practices has the potential to contribute positively to learning at schools (Koh et al, 2016; Nkula & Krauss, 2015; Ndibalema, 2014; Lim et al., 2013; Livingstone, 2012). Pedagogy, in the context of this study, refers to the various teaching practices which aim to improve the cognitive abilities of students by allowing them to engage with, and solve problems independently in the long term (Richardson, 2003; Teo et al., 2008).

The South African Department of Education is increasingly investing in the introduction of technology into the classrooms as well as to empower teachers in the use of technology with an aim to effectively integrate ICTs into the pedagogy (Dlamini & Na'Allah, 2015). Despite these initiatives, the rate of ICT integration within South African schools is still considered very low, which suggests that there are other barriers at play (Bladergroen & Buckley, 2016). This study investigates whether the effectiveness of these educational ICT initiatives are being hampered by

the attitudes and beliefs of teachers to implement the newly acquired technology in their teaching practices.

The role of teachers in ICT integration is vital as teachers determine the level of ICT integration that will be implemented in their classrooms (Hennessy et al. 2010, Nkula & Krauss, 2015). The potential flaw could lie in the fact that the initiatives are primarily concerned with the provision of ICT resources and teacher up-skilling while neglecting the personal teacher attitudes and beliefs towards technology as a determinant for educational ICT integration success (Hew & Brush, 2007). The willingness of teachers to integrate ICT into the pedagogy is dependent on many factors such as personal attitudes towards technology, preconceived beliefs of the effectiveness of technology in the classrooms, pedagogical beliefs and technology self-efficacy beliefs (Sang et al., 2010; Afshari et al., 2009; Hew & Brush, 2007; Teo et al., 2008).

The primary research question this study asks is: How do the attitudes and beliefs of teachers with access to ICT influence their ICT integration behavior in the classroom? The Theory of Planned Behavior (Ajzen, 1991) is used as a lens through deductive hypothesis testing, on a sample of 64 teachers from 9 technology-endowed high schools in Metro Central, North and South parts of Cape Town in South Africa to assess teacher attitudes and beliefs regarding their ICT integration behavior in the classroom. This research makes a practical contribution. It empirically identifies a gap that exists in the beliefs and attitudes of high school teachers regarding what effective ICT integration in the pedagogical practices should look like. This therefore has implications for future educational ICT integration teacher training programs as well as ICT resource investment.

The rest of the paper is structured as follows: Section 2 will explain the constructs related to ICT integration behavior and pedagogy. The application of the theory is undertaken in Section 3. Section 4 presents the conclusion of the research.

2. Literature Review: A discussion of the related constructs

This literature review explores the concept ICT integration in the context of high school education in the South African high school sector. The review also explores educational ICT integration barriers and how these have affected the level of ICT integration. Thereafter a discussion of teacher attitudes and beliefs as an important educational ICT integration variable within the high school education context is considered.

2.1 Educational ICT Integration and the South African Context

ICT integration behavior can either be generative (positive) or representational (negative). Generative ICT integration behavior involves the use and adoption of technology into the pedagogical practices in order to empower learners to use newly acquired knowledge and skills to generate their own solutions to ill-structured problems while representational ICT integration behavior is the surface adoption of technology merely to support traditional teaching methods (Wilson-Strydom et al., 2005; Hokanson & Hooper 2000). The benefits of integrating ICTs in

education within the schooling context as well as the centrality of the teacher in the process has been thoroughly researched both locally and internationally (Jo, 2013; Bester & Brand, 2013; Mutula & Van Brakel, 2007; Ting, 2005; Watson, 2001)

In 2004 the South Africa's DoE (Department of Education) published the legislated set of guidelines on e-Education called "White Paper on e-Education: Transforming Learning and Teaching through Information and Communication Technologies" with the goal that *"every South African manager, teacher and learner in the general and further education and training bands will be ICT capable by 2013"* (DoE, 2004, p. 17). In 2007, the DoE further issued a teacher development framework which aimed *"to provide direction in addressing the ICT training needs of teachers and attempts to move away from imposing a narrow vision of the appropriate use of ICT in teaching and learning"* (DoE, 2007, p. 1).

Additionally, several national initiatives aimed at distributing technologies such as tablets, computer labs, interactive whiteboards, Wi-Fi etc. in schools were undertaken as part of the e-education reform. These initiatives included notable projects such as the Khanya Project in the Western Cape Province and the Gauteng Online project in the Gauteng Province which aimed at distributing ICT technologies and up-skilling teachers in two of South Africa's most economically active regions (Isaacs, 2007; Ford & Botha, 2010; Howie, 2010). Despite these initiatives, there has been limited success in increasing the levels of ICT integration in schools in South Africa (Chigona et al., 2014; Bladergroen & Buckley, 2016).

2.2 Barriers to educational ICT integration

Technology investment decisions in education are motivated by the assumption that technology can positively impact education from the teaching and learning perspectives (Lim et al., 2013). Educational ICT literature focusing on the South African context tends to focus on barriers faced predominantly by teachers at schools in historically disadvantaged areas due to the pervasiveness nature of the system of inequality known as apartheid. These barriers typically includes overcoming factors such as the lack of technology resources and lack of teacher technology skills development. It is generally assumed that teachers at well-resourced schools are more successful at the integration of ICT, than those teachers that have limited or no resources (Chigona et al., 2010).

A study by Nkula & Krauss (2015) argues that while a lack of parity exists between teachers with available resources versus those without, there are many teachers at well-resourced schools still using ICT representationally, merely to supplement traditional teaching methods rather than sufficiently integrating it pedagogically. A study by Henessy et al (2012) showed that teacher up-skilling and the introduction of technology in the classroom by itself, does not guarantee pedagogical ICT integration hence the low level of ICT integration success experienced particularly in South African schools. Sherman & Howard (2012) concluded that teachers' beliefs

and attitude are critical to the ICT integration decision in classroom but this aspect remains insufficiently researched. The aim of this study is to investigate the extent to which teacher attitudes and beliefs influence their ICT integration behavior in the classroom.

2.3 Teacher Attitudes and Beliefs toward educational ICT Integration
Attitude towards an object can be defined as an individual's evaluation of their feelings and beliefs toward an object or behavior (Vahdati et al., 2015). While teacher attitudes are the influencing factor regarding their intention to use technology, it is the teacher's beliefs which influence their attitudes. These beliefs extend to teacher pedagogical beliefs, normative beliefs and self-efficacy beliefs (Liu, 2011; Sang et al., 2010; Teo et al., 2008).

2.3.1 Teacher pedagogical beliefs
Teacher pedagogical beliefs play an important part in a teacher's decision to integrate ICT pedagogically. Teachers with traditional or instructivist (teacher-centered) pedagogical beliefs consider themselves to be the main focus and broadcaster of knowledge. Teachers with instructivist pedagogical beliefs are negatively associated with ICT integration in the classroom, and in the instances where ICT are used, it is limited to merely supporting traditional teaching methods i.e. ICT is integrated in a representational manner (Liu, 2011). While using the concepts of instructivism and constructivism to clearly delineate between teacher pedagogical beliefs, it should be noted that this approach could be misleading. Teachers' beliefs are a convoluted subject and can at times be antithetical (Mansour, 2009). Teo et al. (2008) explores this notion by proposing that while there is a strong link between constructivist pedagogical beliefs and constructivist use of technology, it is equally true that constructivist pedagogical beliefs correlate with instructivist or traditional use of technology. Three factors related to technology use and integration which could explain the inconsistencies between teacher pedagogical beliefs and their pedagogical practices are identified as (Chen, 2008);

- The influence of external factors (e.g. lack of access to technology resources, lack of time to plan instruction, lack of technical and administrative support)
- Teachers' limited or incorrect understanding of constructivist instruction
- Teachers' other beliefs conflicting with the teacher's expressed pedagogical beliefs

2.3.2 Teacher normative beliefs
The individual teacher motivation as well as normative beliefs, which refers to an individual's perceived expectation of how specific referent individuals or groups would like them to act are the two constructs of the social factor referred to as subjective norms (Ajzen, 1991). Subjective norms are an individual's perception of social pressure to either engage or not engage in a specific behavior (Francis et al., 2004). In a study conducted by Sadaf et al. (2012) which explored the influence of normative beliefs on the intentions of teachers to integrate Web 2.0 technologies in their classrooms, various referent groups emerged. These included students (current and future), administrators, parents and colleagues. Data analyses revealed that 45% of teachers' future

students, 38% administrator expectations and 26% colleagues' suggestions influenced their decisions to integrate Web 2.0 technologies. Additionally, these teachers indicated that parents (13%) and everyone else (11%) influenced their intention to adopt these technologies.

2.3.2 Teacher self-efficacy beliefs

Another relevant belief strongly associated with ICT integration is the teachers' self-efficacy beliefs. Self-efficacy is strongly influential in human adaption to change. It is a person's self-believe in their abilities to perform a set of actions in order to reach a given goal. It is this belief of personal efficacy which motivates people and influences their actions. (Bandura, 2000; Sang et al., 2010). Bandura (2000) further elaborates on self-efficacy by stating that, self-efficacy beliefs determine

- If an individual will think in a positive or negative way;
- The amount of effort they expend in a specific action;
- The expectant results of their efforts;
- Their tenacity in dealing with difficult situations.

In practical terms, a teacher is more likely to use technology if he/she has both the skills, and confidence to apply these skills in integrating the technology in the classroom.

3. Research Model and Hypotheses

The theoretical model adopted for this research is the Theory of Planned Behavior (TPB) by Ajzen (1991). TPB extends on the earlier Theory of Reasoned Action (TRA) by Fishbein & Ajzen (1977). TPB considers an individual's intention to perform an action to be a logical decision based on a set of salient beliefs (Ajzen, 2002; Sadaf et al., 2012). Ajzen (1991, p 8) classifies these salient beliefs as *"...beliefs about the likely consequences or other attributes of the behavior (behavioral beliefs), beliefs about the normative expectations of other people (normative beliefs), and beliefs about the presence of factors that may further or hinder performance of the behavior (control beliefs)"*. The decision to use TPB for this study was based on its flexibility, ability to link belief and behaviour as well as wide application to observe the factors influencing human action across various fields of technology use (George, 2004; Lee et al., 2010; Teo, 2012; Yang, 2012).

In the context of this study, the behavioral beliefs refer to the personal pedagogical beliefs of teachers and its influence on their attitude to use technology in the pedagogy. The normative beliefs of teachers refer to their normative expectations of students, colleagues, administrators and parents to either integrate the technology in the pedagogy or not, and gives rise to subjective norms. The control beliefs which results in perceived behavioral control (PBC), is the teacher's perception of the complexity involved in integrating technology in the pedagogy and is closely related to teacher self-efficacy beliefs (Ajzen, 2002; Bandura, 2000; Francis et al., 2004; Sadaf et al., 2012). The resulting particularized model is shown in Figure 1 below:
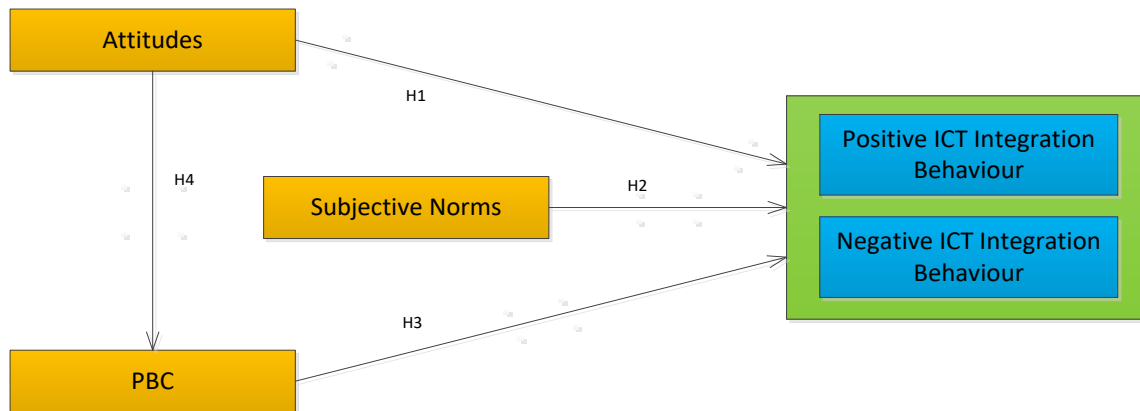
Figure 1: Theory of Planned Behavior adapted for educational ICT integration (Ajzen,1991)

The above research model for this research study is supported by these hypotheses.

#	Hypothesis	#	Null Hypothesis
H₁	Teacher attitude significantly influences teachers' negative ICT integration behaviour.	H₀	Teacher attitude does not significantly influence teachers' negative ICT integration behaviour.
H₂	Teacher subjective norm beliefs significantly influence teachers' negative ICT integration behaviour.	H₀	Teacher subjective norm beliefs do not significantly influence teachers' positive ICT integration behaviour.
H₃	Teacher perceived behavioural control beliefs significantly influence teachers' positive ICT integration behaviour.	H₀	Teacher perceived behavioural control beliefs do not significantly influence teachers' positive ICT integration behaviour.
H₄	Teacher attitudes significantly influence teachers' perceived behavioural control beliefs.	H₀	Teacher attitudes do not significantly influence teachers' perceived behavioural control beliefs.

Table 1: Summary list of hypotheses

4. Results

4.1 Tools and techniques

The research applied the Partial Least Squares (PLS) quantitative analysis and a structural equation modelling (SEM) tool (SmartPLS Software) to analyse the data. This analysis method is considered especially useful for the proposed research as it deals particularly well with small sample sizes and non-normal data (Hair et al., 2011; Yoon, 2011). In this study the exogenous constructs are represented by ATTITUDE, SUBJECTIVE NORM and PBC while the endogenous constructs are represented by POS_ICT_INT_BEHAV and NEG_ICT_INT_BEHAV.

4.2 Analysis

4.2.1 Demographic analysis

A total of 9 schools responded to the questionnaire indicating an average response rate of approximately 7 teacher respondents per school. The sample size consisted of 64 valid responses which were 57% female (n=36) and 43% male (n=28). The age distribution was negatively skewed with the largest responses, 42% (n=27) being over 50 years old. This was followed by the age groups "30 to 39 years old" and "less than 30 years old", representing 23% (n=15) and 22% (n=14) of the respondents respectively. The smallest group of respondents was 13% (n=8) being in the

Figure 1: Theory of Planned Behavior adapted for educational ICT integration (Ajzen,1991)

The above research model for this research study is supported by these hypotheses.

#	Hypothesis	#	Null Hypothesis
H1	Teacher attitude significantly influences teachers' negative ICT integration behaviour.	H0	Teacher attitude does not significantly influence teachers' negative ICT integration behaviour.
H2	Teacher subjective norm beliefs significantly influence teachers' negative ICT integration behaviour.	H0	Teacher subjective norm beliefs do not significantly influence teachers' positive ICT integration behaviour.
H3	Teacher perceived behavioural control beliefs significantly influence teachers' positive ICT integration behaviour.	H0	Teacher perceived behavioural control beliefs do not significantly influence teachers' positive ICT integration behaviour.
H4	Teacher attitudes significantly influence teachers' perceived behavioural control beliefs.	H0	Teacher attitudes do not significantly influence teachers' perceived behavioural control beliefs.

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"40 to 49 years old" age group. The teaching experience distribution was positively skewed with the largest responses, 26% (n=17) having 5 years or less teaching experience. This was followed by 21% (n=14) with greater than 30 years teaching experience, 20% (n=13) with between 11 and 20 years teaching experience and 17% (n=11) with between 21 and 30 years teaching experience. The smallest group of respondents was 14% (n=9) with between 6 and 10 years teaching experience.
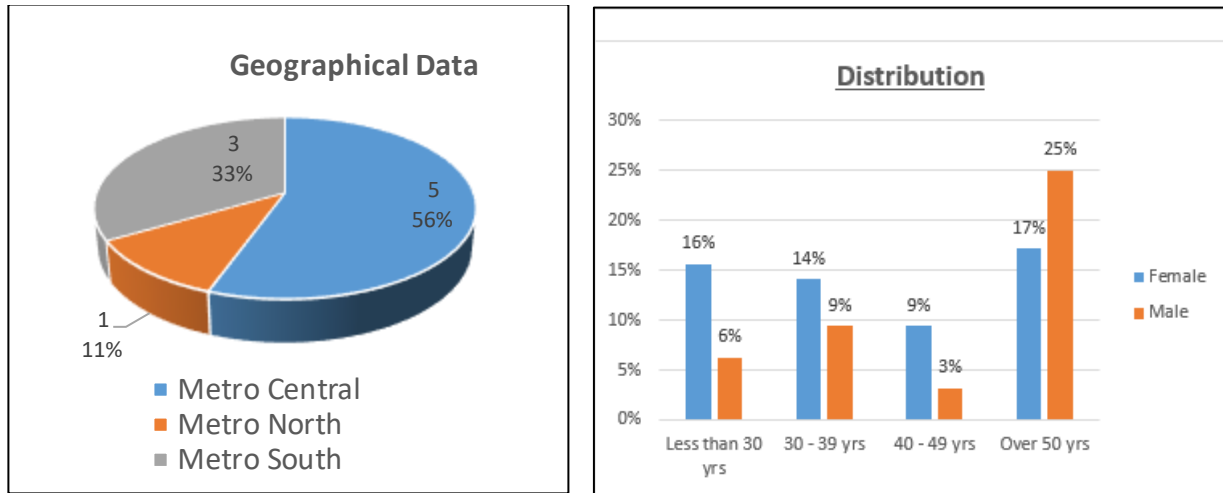

Figure 2. The Geographical, Gender and Age distribution of respondents

The results in Table 2 show the descriptive statistics for the indicator variables of its constructs, i.e. Attitudes, Subjective Norms and PBC. The results suggest that most of the respondents either chose "Somewhat Agree" or "Agree" for the constructs of Attitudes and PBC, indicating that most respondents were in agreement with the questions posed for these constructs. The construct of Subjective Norms showed mixed results, with most respondents either choosing "Somewhat Disagree" or "Somewhat Agree", indicating that most respondents had mixed opinions with the questions relating to the construct of Subjective Norms.

The responses were determined for each of the indicator variables, measuring its construct and plotted on the chart reflected below in Figure 4.
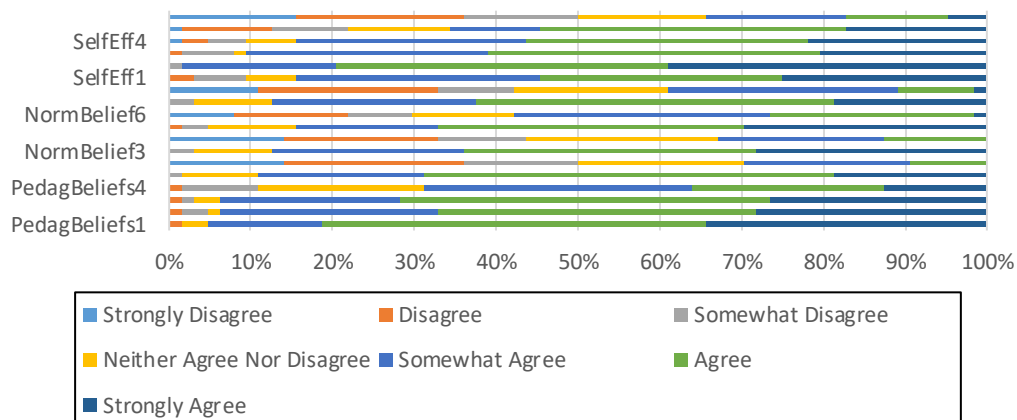

Figure 3. An overview of responses of the indicator variable measuring the constructs.

4.2.2 Reliability and Validity Analysis

Firstly, the reliability and validity for this research model were tested by conducting an indicator reliability test of the outer model loadings, to determine its consistency with its associated latent variable. This was measured by determining the R^2 of each outer loading to find the indicator reliability value. For an indicator reliability test a value greater than 0.7 constitutes an acceptable level (Hair et al., 2011). Secondly, a composite reliability test was done to determine how well each item measures the internal consistency of its construct. Hair et al. (2011), suggests that composite reliability is better suited for PLS-SEM than Cronbach's alpha, when testing construct reliability. This is due to the ability of composite reliability to prioritise indicators according to their reliability, whereas Cronbach's alpha assumes that all indicators share the same level of reliability. Composite reliability values of 0.7 and above is generally considered acceptable, in exploratory research however values of 0.6 and above is considered acceptable. Values below 0.6 indicate a lack of reliability and should be considered for removal, only if the removal of the indicator leads to an increase in composite reliability. Thirdly, the discriminant validity test for this research showed that the R^2 of AVE value for each construct was greater than the correlation among the constructs on both the vertical and horizontal lines on the table below which indicates that the criterion for discriminant validity have been met.

Construct	Cronbach's Alpha	Composite Reliability
ATTITUDE	0.94	0.95
NEG_ICT_INT_BEHAV	0.61	0.83
PBC	0.96	0.97
POS_ICT_INT_BEHAV	0.93	0.95
SUBJECT_NORM	0.96	0.97

Table 2: Composite Reliability Test Results

4.2.3 Structural Model Analysis

Following the confirmation that the construct or latent variable measurement was reliable and valid, a structural model assessment was undertaken in order to confirm the relevance and significance of the relationships within the structural model, or rather the correlation between the latent variables in the inner model. The structural assessment consists of two tests; the first test is a path model which calculates the R^2 values of the dependent latent variables, and secondly a bootstrapping procedure (shown in Figure 5 below) was computed to determine the inner model path coefficients significance (Hair et al., 2011). A bootstrapping procedure was run to analyse the standardised path coefficients. Standardised path coefficients constitute the hypothesised relationship connecting the constructs within the structural model (Hair et al., 2014). Hair et al. (2014) further suggests a standardised path coefficient range of -1 to +1 to determine the strength of the relationship between constructs. Coefficient values closer to +1 represents strong positive relationships while coefficient values closer to -1 indicates a strong negative relationship. The statistical significance level of the hypothesised path for this research model is based on a two-tailed test, which considers t-values of 1.96 (significance level = 5 percent) and 2.58 (significance level = 1 percent).
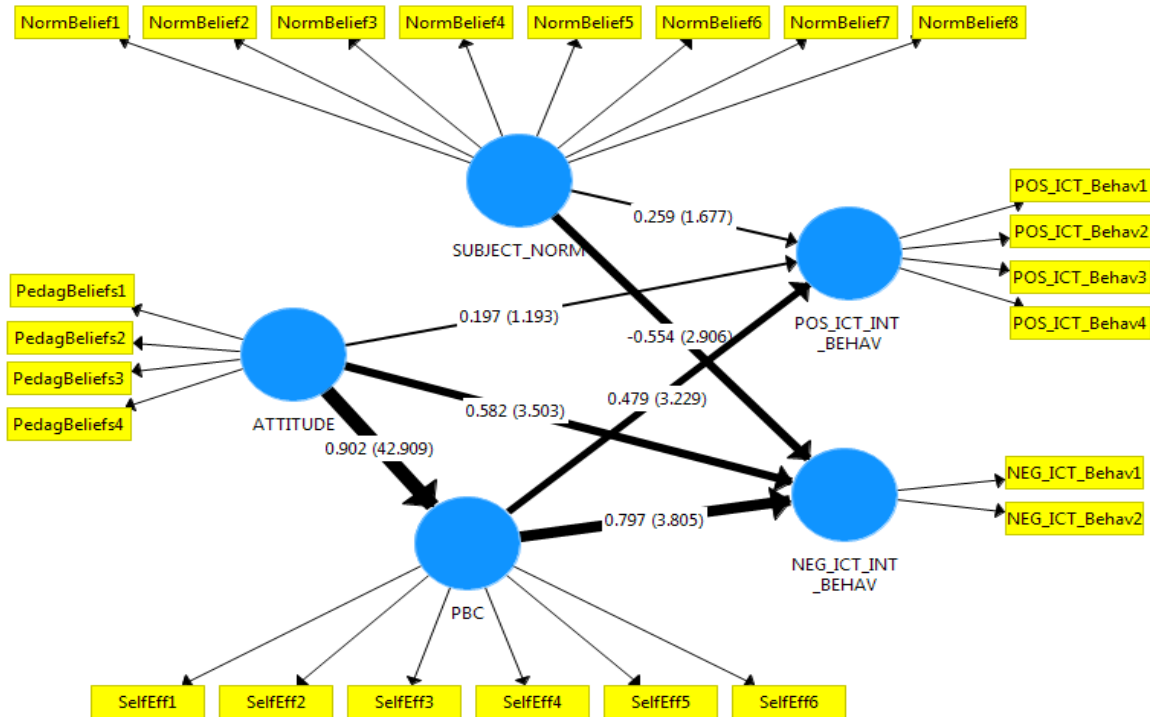
Figure 4. PLS Path Analysis with *t*-Values, after the bootstrapping procedure

4.2.4 Hypothesis Results Analysis

H1: Teacher attitudes significantly influence teachers' negative ICT integration behaviour.
When comparing the results of the hypothesised significance between teacher attitudes and negative ICT integration behaviour, the following results were observed. A statistically significant relationship ($p < 0.01$) existed between teacher attitudes and negative ICT integration behaviour. In addition, the relationship between attitudes and positive ICT integration behaviour showed not to be statistically significant. The results suggest that teacher attitudes significantly influence negative ICT integration behaviour. The hypothesis is therefore fully supported and the null hypothesis is rejected.

H2: Teacher subjective norm beliefs significantly influence teachers' negative ICT integration behaviour.
When comparing the results of the hypothesised significance between teacher subjective norm beliefs and negative ICT integration behaviour, the following results were observed. A statistically significant relationship ($p < 0.01$) existed between teacher subjective norm beliefs and negative ICT integration behaviour. In addition, the relationship between teacher subjective norm beliefs and positive ICT integration behaviour showed not to be statistically significant. The results suggest that teacher subjective norm beliefs significantly influence negative ICT integration behaviour. The hypothesis is therefore supported and the null hypothesis is rejected.

H3: Teacher perceived behavioural control beliefs significantly influence teachers' positive ICT integration behaviour.

When comparing the results of the hypothesised significance between teachers perceived behavioural control beliefs and positive ICT integration behaviour, the following results were observed. A statistically significant relationship ($p < 0.01$) existed between teacher perceived behavioural control beliefs and negative ICT integration behaviour. In addition, a statistically significant relationship ($p < 0.01$) also existed between teacher perceived behavioural control beliefs and positive ICT integration behaviour. The results suggest that teacher behavioural control beliefs share a significant relationship with both negative and positive ICT integration behaviour. The hypothesis is therefore partially supported and the null hypothesis is rejected.

H4: Teacher attitudes significantly influence teachers' perceived behavioural control beliefs.
When comparing the results of the hypothesised significance between teacher attitudes and teacher perceived behavioural control beliefs, the following result was observed. A statistically significant relationship ($p < 0.01$) existed between teacher attitudes and teacher perceived behavioural control beliefs. This result suggests that teacher attitudes share a significant relationship with teacher perceived behavioural control beliefs. The hypothesis is therefore supported and the null hypothesis is rejected.

5. Conclusion, Recommendations and Future Research

The findings suggest that teacher constructivist pedagogical, normative and self-efficacy beliefs significantly influence ICT integration behaviour. Firstly, teachers with student-centered pedagogical beliefs tend to integrate ICT in a negative way or rather, merely to support their traditional teaching methods. Secondly, teachers felt that even though reverent others may have wanted them to integrate ICT in the classroom, they did not feel obligated to do so. This indicated that teacher normative beliefs had no influence on ICT integration behaviour whether positive or negative. Thirdly, teachers who felt confident in their ability to use technology integrated ICT to either support traditional teaching methods, or integrated ICT into their pedagogical practices. While teachers exhibited behaviour consistent with both positive and negative ICT integration behaviour, they tended to gravitate towards using technology to merely support their traditional teaching methods. Current ICT training programmes are primarily aimed at providing technology resources and providing teachers with the technical skills to use the technology. These programs have to start focussing on how to help teachers to appropriately integrate the technology in the pedagogical practices. Policy makers therefore have to restructure of teacher training programmes in order to address the lack of positive ICT integration exhibited by teachers. This study was based on nine high technology-endowed Cape Town high schools, seven of which was categorised as government schools and two as independent or private schools. An opportunity exists to include schools across the greater Cape Town and outlying areas, as well as comparing schools from different socio economic areas to better understand the influence teacher attitudes and beliefs have on their ICT integration behaviour.

References

Afshari, M., Bakar, K. A., Luan, W. S., Samah, B. A., & Fooi, F. S. (2009). Factors Affecting Teachers' Use of Information and Communication Technology. Online Submission, 2(1), 77-104.

Ajzen, I. (1991). The theory of planned behavior. Organizational behavior and human decision processes, 50(2), 179-211.

Ajzen, I. (2002), Perceived Behavioral Control, Self-Efficacy, Locus of Control, and the Theory of Planned Behavior. Journal of Applied Social Psychology, 32: 665–683.

Bandura, A. (2000). Exercise of human agency through collective efficacy. Current directions in psychological science, 9(3), 75-78.

Bester G & Brand L 2013. The effect of technology on learner attention and achievement in the classroom. South African Journal of Education, 33(2):1-15.

Bladergroen, M., & Buckley, Sheryl. (2016). Management of ICT in education: A meta-study on the local (South African and International research landscape. CONF-IRM 2016 Proceedings. Paper 37.

Chen, C. H. (2008). Why do teachers not practice what they believe regarding technology integration? The Journal of Educational Research, 102(1), 65-75.

Chigona, A., Chigona, W., Kayongo, P., & Kausa, M. (2010). An empirical survey on domestication of ICT in schools in disadvantaged communities in South Africa. International Journal of Education and Development using Information and Communication Technology, 6(2), 1C.

Chigona, A., Chigona, W., & Davids, Z. (2014). Educators' motivation on integration of ICTs into pedagogy: case of disadvantaged areas. South African Journal of Education, 34(3), 01-08.

Dlamini, R., & Na'Allah, D. M. (2015). Beyond Policies and Programs: Contextualizing ICT Integration in South African Schools. In South Africa International Conference on educational Technologies (p. 162).

DoE. (2004). White Paper on e-Education: Transforming learning and teaching through information and communication technologies. Available Online http://www.gov.za/documents/white-paper-e-education-transforming-learning-and-teaching-through-information-and

DoE. (2007). Guidelines for Teacher Training and Professional Development in ICT. Available Online: http://www.thutong.doe.gov.za/ResourceDownload.aspx?id=35998

Fishbein, M., & Ajzen, I. (1977). Belief, attitude, intention, and behavior: An introduction to theory and research.

Ford, M., & Botha, A. (2010). A pragmatic framework for integrating ICT into education in South Africa. In IST-Africa, 2010 (pp. 1-10). IEEE.

Francis, J. J., Eccles, M. P., Johnston, M., Walker, A., Grimshaw, J., Foy, R. & Bonetti, D. (2004). Constructing questionnaires based on the theory of planned behaviour. A manual for health services researchers, 2010, 2-12.

George, J. F. (2004). The theory of planned behavior and Internet purchasing. Internet research, 14(3), 198-212.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. Journal of Marketing theory and Practice, 19(2), 139-152.

Hair, J. F., Sarstedt, M., Hopkins, L., & G. Kuppelwieser, V. (2014). Partial least squares structural equation modeling (PLS-SEM) An emerging tool in business research. European Business Review, 26(2), 106-121.

Hennessy, S., Harrison, D., & Wamakote, L. (2010). Teacher factors influencing classroom use of ICT in Sub-Saharan Africa. Itupale online journal of African studies, 2(1), 39-54.

Hew, K. F., & Brush, T. (2007). Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research. Educational Technology Research and Development, 55(3), 223-252.

Hokanson, B., & Hooper, S. (2000). Computers as cognitive media: examining the potential of computers in education. Computers in human behavior, 16(5), 537-552.

Howie, S. J. (2010). ICT-supported pedagogical policies and practices in South Africa and Chile: emerging economies and realities. Journal of Computer Assisted Learning, 26(6), 507-522.

Isaacs, S. (2007). ICT in education in South Africa. Survey of ICT and Education in Africa: South Africa Country Report.

Jo, S. F. (2013). ICT in Education: A Critical Literature Review and Its Implications. International Journal of Education and Development using Information and Communication Technology, 9(1), pp. 112-125

Koh, J. H. L., Chai, C. S., & Lim, W. Y. (2016). Teacher Professional Development for TPACK-21CL Effects on Teacher ICT Integration and Student Outcomes. Journal of Educational Computing Research.

Lee, J., Cerreto, F. A., & Lee, J. (2010). Theory of Planned Behavior and Teachers' Decisions Regarding Use of Educational Technology. Educational Technology & Society, 13(1), 152-164.

Lee, Y., & Lee, J. (2014). Enhancing pre-service teachers' self-efficacy beliefs for technology integration through lesson planning practice. Computers & Education, 73, 121-128.

Lim, C. P., Zhao, Y., Tondeur, J., Chai, C. S., & Tsai, C. C. (2013). Bridging the Gap: Technology Trends and Use of Technology in Schools. Educational Technology & Society, 16(2), 59-68.

Liu, S. H. (2011). Factors related to pedagogical beliefs of teachers and technology integration. Computers & Education, 56(4), 1012-1022.

Mansour, N. (2009). Science Teachers' Beliefs and Practices: Issues, Implications and Research Agenda. International Journal of Environmental and Science Education, 4(1), 25-48.

Mutula SM & Van Brakel P. (2007). ICT skills readiness for the emerging global digital economy among small businesses in developing countries: Case study of Botswana. Library Hi Tech, 25(2):231-245.

Ndibalema, P. (2014). Teachers' attitudes towards the use of Information Communication Technology (ICT) as a pedagogical tool in secondary schools in Tanzania: The case of Kondoa district. International Journal of Education and Research, 2(2), 1-16.

Nkula, K., & Krauss, K. E. (2015, November). The integration of ICTs in marginalized schools in South Africa: Considerations for understanding the perceptions of in-service teachers and the role of training. 8th International Development Informatics Association (IDIA) conference, Port Elizabeth, South Africa.

Richardson, V. (2003). Constructivist pedagogy. Teachers college record, 105(9), 1623-1640.

Sadaf, A., Newby, T. J., & Ertmer, P. A. (2012). Exploring pre-service teachers' beliefs about using Web 2.0 technologies in K-12 classroom. Computers & Education, 59(3), 937-945.

Sang, G., Valcke, M., van Braak, J., & Tondeur, J. (2010). Student teachers' thinking processes and ICT integration: Predictors of prospective teaching behaviors with educational technology. Computers & Education, 54(1), 103-112.

Sherman, K. & Howard, S. K. (2012). Teachers' beliefs about first-and second-order barriers to ICT integration: preliminary findings from a South African study. 23rd International

    Conference of Society for Information Technology and Teacher Education (pp. 2098-2105). Charlottesville, VA: Association for the Advancement of Computing in Education.

Teo, T., Chai, C. S., Hung, D., & Lee, C. B. (2008). Beliefs about teaching and uses of technology among pre-service teachers. Asia-Pacific Journal of Teacher Education, 36(2), 163-174.

Ting, S. E. (2005). The impact of ICT on learning: A review of research. International Education Journal, 2005, 6(5), pp. 635-650.

Vahdati, H., Mousavi, N., & Tajik, Z. M. (2015). The Study of Consumer Perception on Corporate Social Responsibility towards Consumers Attitude and Purchase Behavior. Asian Economic and Financial Review, 5(5), 831-845.

Watson D. M. (2001). Pedagogy before technology: Re-thinking the relationship between ICT and teaching. Education and Information Technologies, 6(4):251-266.

Wilson-Strydom, M., Thomson, J., & Hodgkinson-Williams, C. (2005). Understanding ICT integration in South African classrooms. Perspectives in education, 23(4), 71-85.

Yang, K. (2012). Consumer technology traits in determining mobile shopping adoption: An application of the extended theory of planned behavior. Journal of Retailing and Consumer Services, 19(5), 484-491.

Yoon, C. (2011). Theory of planned behavior and ethics theory in digital piracy: An integrated model. Journal of business ethics, 100(3), 405-417.