TEACHER CHARACTERISTICS ON THE INTEGRATION OF ICT INTO CURRICULA IN SCHOOLS IN WESTERN CAPE SCHOOLS

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ABSTRACT

In ICT4D discourse, Information and Communication Technologies (ICTs) is seen as a tool that can enhance teaching and learning processes. It promotes equal access to quality education reducing continued marginalization between the rich and the poor and ensuring that individuals have the freedom to live the life they value. Although ICTs have great potential to transform teaching and learning processes, a lack of skilled teachers and training, means that they are often neglected and not used to their full potential. Second-order barriers such as teacher individual differences can hinder the effective adoption and use of ICTs for teaching and learning. Yet, an understanding of how teacher individual differences influence ICT enabled pedagogical practices remains inadequate. This research is based on and contributes to the literature on ICT4D by shifting the focus on the context of an individual. It provides a holistic perspective based on individual differences and the use of the philosophical perspective of interpretivist research to better provide in-depth understanding. A qualitative study was conducted, using a case study method. A purposive sampling method was used to select population element; educators in Western Cape Schools. The theory of individual differences was used as an analytical framework for the study. With this framework, the aims and objectives of the study were conceptualized, operationalized and summarized to form a graphical representation of the phenomenon of study. The findings indicate that the relationship between religion, values and cultural beliefs is that teachers tend to implement these beliefs in their teaching and learning practices.

Research question and key words

How do teacher characteristics influence the use of emerging technologies in pedagogical practices?

Key words: *ICT Integration, pedagogical practices, teacher characteristics.*

INTRODUCTION

Information Communication Technology (ICT) is seen as a catalyst for economic development. ICTs and its continuous innovations offer much life-improving efficiency. For example, through e-Government, governance is made effective and convenient (Bharti & Dwivedi, 2013). Through e-Commerce the process of buying and selling can be done in a cost effective and time saving manner (Goel, 2007). Furthermore, equal access to quality education is made possible through features such as educational software, the World Wide Web, e-Learning and m-learning (Bunt-Kokhuis, 2012; Jhurree, 2005). The significance of e-Learning and m-learning for teaching and learning is that it enables learning to happen anywhere and at anytime (Goi & Ng, 2008). Educational software aids in simplifying difficult concepts, making learning fun and easy (Kirriemuir & McFarlane, 2004). It also helps learners to carry out practical tasks such as experiments and presentations   (Kirriemuir & McFarlane, 2004).

ICT offer life-improving opportunities to the user, yet only those with access, knowledge and the financial means to use them can benefit. Whilst the minority mostly located in developed countries have high levels of education, knowledge and the financial resources to access, use and benefit from the technologies (Bridges.org, 2005), the majority in underdeveloped countries still live in conditions of extreme poverty (Blackburn, 2008). They lack basic education, skill, knowledge and the financial resources to access, use and benefit from the capabilities of the new ICT.

In South Africa as a result of the legacy of apartheid there are developmental discrepancies between the advantaged few and the disadvantaged majority. In line with the Sustainable Development Goals (SDGs) which presents universal access to primary education as a priority, the South African government has developed the e-Education policy. The aim of the policy is to ensure that every learner is able to use ICT confidently and creatively to develop the skills and knowledge they need to achieve personal goals (DBE, 2004).

Research Problem

The main problem was that although ICT is seen as a significant enhancer of the teaching and learning process, a lack of skilled teachers and ICT training means that they are often neglected and not used to their full potential. In essence focus of ICT implementation goals seems to be solely on physical deployment and not on how to successfully integrate ICT into schools' curricula. Successful integration of ICTs into schools' curricula is often inhibited by second order barriers. Condie & Munro, (2007) indicates that teacher characteristics can pose as a barrier to their effective use and adoption of ICT as well as for the diffusion of innovative pedagogical practices. Teacher characteristics (i.e. confidence, capability) influence their use of ICTs for pedagogical practices (Buabeng-Andoh, 2012). There is however little information on how teacher characteristics affect their use of ICT to improve pedagogical practices (Inan & Lowther, 2010) .

Research Objective

The aim of the study is to understand how teacher characteristics affect the successful integration of ICT into schools' curricula. The study makes use of concepts from the theory of individual differences, which allows one to look at environmental context of an educator, and how it affects their use of ICT for teaching. By analysing the effects of teacher characteristics in ICT enabled pedagogical practices, the study will providing micro level factors affecting the goals of ICT integration. Therefore, the findings will enable policy makers and implementers to gain a more holistic view of the social context in which the policies are to be implemented.

A research question "How do teacher characteristics influence the use of ICT in pedagogical practices in low income communities in the Western Cape" The following sub-questions was also identified.

- What teacher characteristics influence the use of ICT in schools in disadvantaged areas?
- How do these teacher characteristics influence the use of ICT in schools in disadvantaged areas?
- Why are teachers not integrating ICT into curricula in disadvantaged areas?

A THEORETICAL FRAMEWORK: THEORY OF INDIVIDUAL DIFFERENCES

Individual differences

Behavioural traits are influenced by individual characteristics (Scarr, 1992). Behavioural characteristics can be shaped by early childhood experiences. These characteristics can take the form of specific skills, habits, performances attitude and patterns of behaviours that individuals learn as their tendencies interact with their environment (Motowildo, Borman, & Schmit, 1997). Individual characteristics are a product of tendencies and learning processes (Motowildo, Borman, & Schmit, 1997). An example of the basic tendencies of an individual includes variables such as; general knowledge, language competencies, schemas, social skills, technical skills, religious attitudes, moral values, social, political preferences and personality traits. Personality traits can be categorised as extraversion, agreeableness, conscientiousness, neuroticism and openness to experiences (Judge, Higgins, Thoresen, & Barrick, 1999).

Individual differences and innovation

ICT integration begins with the acceptance of and adoption of the technology. Some individuals adopt technology innovations earlier than others (Moore & Benbasat, 1991). These individuals can serve as key change agents and opinion leaders to facilitate further diffusion of a new technology (Rogers 1995). According to Fishbein (1980), an individual's intentions to use the technology are driven by an individual's attitudes toward the use of the innovation. Attitude is determined by two salient beliefs about the innovation; perceived usefulness and perceived ease of use. Perceived usefulness, a measure of the individual's subjective assessment of the utility offered by the innovation in a specific work-related context. Perceived ease of use, an indicator of the cognitive effort needed to be expended to utilize the innovation (Agarwal & Prasad, 1998). Intentions are conceptualized as a direct and significant predictor of actual usage behaviour.

Individuals are characterised as innovative when they are early to adopt an innovation. The consumer population can therefore be segmented as innovators and non-innovators. It can be operationalized as the time of adoption. This idea has been criticised by (Midgley & Dowling, 1978) and subsequently Flynn and Goldsmith (1993) argue that in personal innovativeness innovation possess certain characteristics (i.e. relative advantage, compatibility, complexity, trialability and observability) which as perceived by adopters determine the ultimate rate and pattern of adoption (Mirela, 2008). The adoption decision unfolds as a series of stages (flowing from knowledge of the innovation through persuasion, decision, implementation and confirmation and adopters are predisposed towards different kinds of influence (Fichman, 1992) at different stages; the action of certain kinds of individuals (opinion leaders and change agents) can accelerate adoption, especially when potential adopters view such individuals as being similar to themselves

The theory of Individual Difference provides a means for understanding how individuals and their environment influence their decisions (Trauth, 2006). It also aids in understanding the similarities and variations of individuals in relation to one another (Trauth, 2006). The theory consists of three constructs that together explain the environmental and individual factors that influence decisions on teacher classroom ICT practices. These constructs are namely (i) personal data, (ii) shaping and influencing factors and (iii) environmental factors.

The theory guiding the data analysis is the emergent theory of individual differences (Trauth, 2006). The individual differences viewpoint looks to individual variants across teachers, which results from a combination of individual characteristics and environmental influences, to shed light on teacher use of ICT for teaching and learning (Trauth, 2006). It holds that necessary skills and predispositions are required to teach with ICT. This view brings social construction down to the individual level. This theoretical stance looks to the influence of socio-cultural interpretation of teaching, societal and power relations.

The individual differences framework is operationalized in figure 1.

TEACHER CHARACTERISTICS IN INTEGRATION OF ICT INTO CURRICULA IN SCHOOLS

TEACHER CHARACTERISTICS

Personal Data

Demographic
Life Style

Influencing Factors

Personal
Characteristics
Personal

Environmental Context

Geographical
Economical

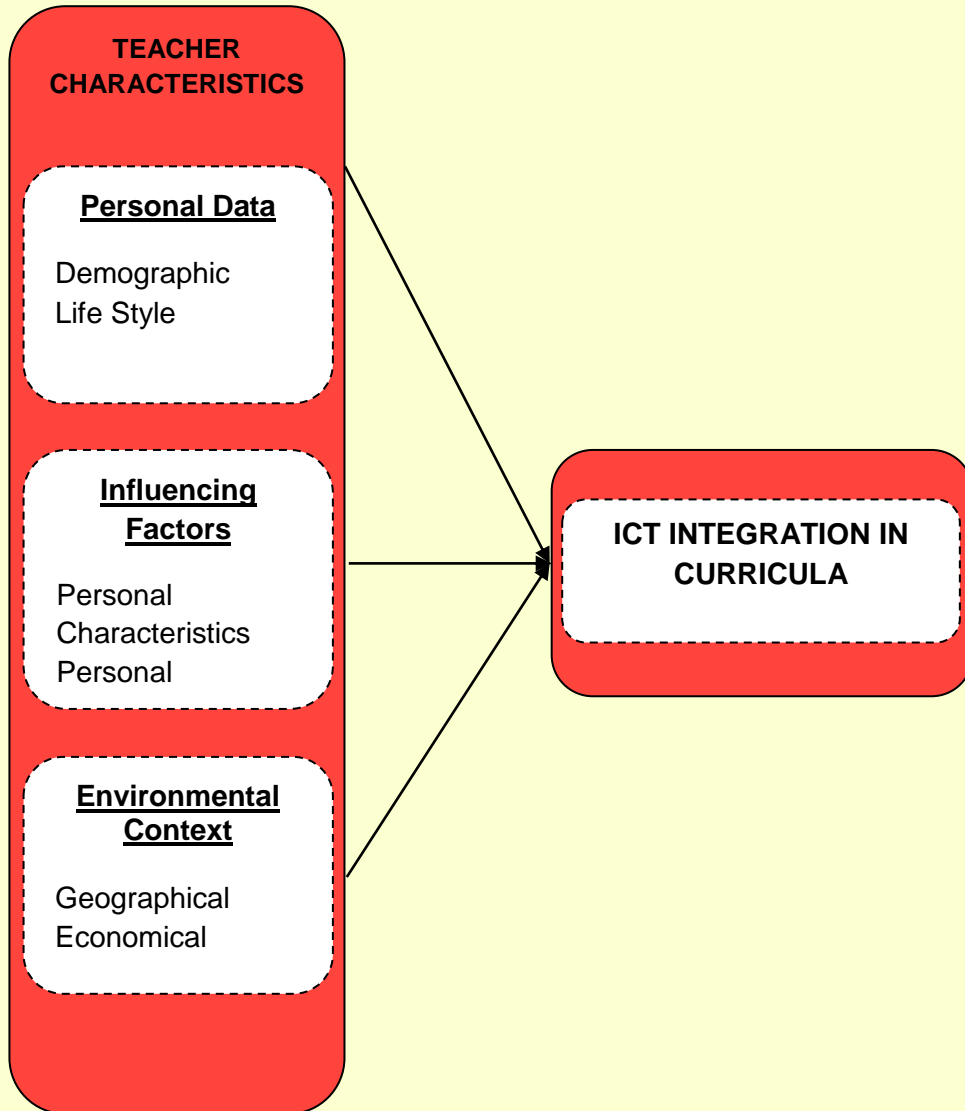**ICT INTEGRATION IN CURRICULA**

Figure 1: An adaptation of Trauth's theory of individual differences

Figure 1, provides a graphical presentation of the adaption of the operationalized theory of Individual differences (Trauth, 2006)

The main theoretical constructs include, personal data, influencing and shaping factors and environmental data. This study focuses on environmental data.

Personal data pertains to descriptive information about the participant. *Personal data* can be characterised by demographic factors of an individual and lifestyle data (Trauth, Nielsen, & Von Hellens, 2003). The demographic data includes the age, ethnicity gender nationality and religion etc. Lifestyle data refers to the factors that describe a persons' life such as number of children, family background, family work background and etc. These factors can either enable or inhibit the use of ICT for teaching and learning.

The decision making process by individuals is influenced and shaped by *personal characteristics* as well as *personal influences* (Trauth, 2002). Starting with personal characteristics, these include educational background, personal traits, abilities, interests and gender identity (e.g. what behaviours one associates with being female). Next, personal influences refer to the experiences that have an influence on an individual's identity. Role models and mentors can influence an individual's identity. The study seeks to understand the situated context of the individual so as to bring to light how environmental factors influence the use of ICT in pedagogical practices. From the theory of individual differences perspective, the study draws on concepts of environmental data.

The study focuses on the *environmental* data which to the situated context of the individual in question. Environmental data is characterised by cultural attitudes, values, geographical data economic data and policy data (Trauth, Quesenberry, & Morgan, 2004). Starting with cultural attitudes and values, within the context of the study, these can refer to a teacher's attitudes concerning their classroom practices. Positive teacher attitude towards ICT can enable the use of ICT for teaching. Next, geographical data refers to the information related to a particular geographical location in which a teacher is situated. This information can include the history and population characteristics of the region. In addition, economic and policy data provides contextual socio-cultural information pertaining to an individual (Trauth, Quesenberry, & Morgan, 2004). The economic and social characteristics of the geographical location of teachers can influence the level of education which in turn influences expertise in ICT use.

METHODOLOGY

This study falls within the interpretivist research paradigm. It follows a qualitative research approach in that the data is not statistical, rather it is descriptive and seeks explanatory insights. Given the in-depth insights into the status quo, a case study method was used (Yin, 2011). In this respect both secondary (literature) and primary (semi-structured interviews) data sources were used. Content analysis in conjunction with a theoretical framework – teacher characteristics individual differences framework was used to analyse and interpret data. The aim of the study is to test a conceptual framework proposed by the researcher. Therefore the research is based on a pilot study. This study will aid the authors to test whether the framework used is appropriate given the phenomenon in question.

The study used purposive sampling. Educators were the population from which research samples were selected (Babbie, 2013). In effect the researcher is limited to including the members of the population that

are willing to provide data (Bharti & Dwivedi, 2013). In this research a purposive sampling method is used to understand the influence of teacher characteristics on the use of technology for teaching in schools in the Western Cape, South Africa. The research uses population elements such as *coordinators of ICT in schools*, *teachers and school principals*, in the Western Cape, South Africa as a representative of the larger population. This is done in order to gain insight into the status quo and its causal factors, so as to inform remedial efforts. The research participants were included with informed consent.

The Western Cape province was chosen due the fact that the Khanya Project has been established to deploy ICT into schools. The Khanya project is seen as the most successful project of its kind in South Africa (du Toit, 2005). Due to its success rate it can be considered that most schools in the Western Cape have access to computers. Since the study seeks to investigate the internal factors (second order barriers) that inhibit the successful integration of ICT into schools' curricula the population sample needs to include schools that have ICTs. The study was conducted in the Western Cape because; it provides a wider sample frame to choose from. The Western Cape Province was also chosen because of the ease of accessibility. Within the Western Cape the school selected is situated in Langa, which is Cape Town's oldest township. Langa was established in 1923 and it is one of the areas in South Africa that was designated for black South Africans. The schools consist of approximately 740 learners.

Educators were the population from which research samples were selected. Guided by the literature background, our research question/s and research objective have been translated into four issues for investigation, (1) Motivations for ICT integration and use in schools; (2) teacher characteristic in ICT integration practices; (3) Status of ICT skills among educators, and; (4) Explanations as to the influence of teacher characteristics on ICT integration.

FINDINGS

The relevance of theory of individual differences in this study is that it provides a the socio-cultural context of the challenges faced in integrating ICT into curricula in schools. From an individual differences theory Analytical Framework (Figure 1) aids in understanding the factors affecting the successful integration of ICT into curricula in schools. The framework was useful in clarifying the context of the investigation, to frame the concepts. In conjunction with the content analysis tool, the framework also informed the identification of themes towards the analysis and most significantly, the interpretation of data. To this end, findings expose the current status of ICT integration into schools and schools' curricula.

The preliminary findings of the study are presented in Tables 2 & 3 and discussed in sections that follow.

Table 2: ICT Teacher Skills

ICT Teacher skills		
Teacher ICT training offered	Training provider	Adequacy of training
Yes (LS_M26 ; CET_107)	Khanya (LS_M24)	Basic computer literacy word and excel (LS_M26; CET_107)

Table 3: Environmental Context

Teacher	Environmental context							
	Values	*Cultural Attitudes*	*Known policy*	*Geographical*			*Economical*	*Influences*
				Location	Population	History		
LS_M	God guardianship, being a role model (LS_M4)	Way of life, values and norms are derived from Muslim religion (LS_M2)	None	Very quiet area, a residential area near to public transport and all places of worship so it is very central and that, Athlone (LS_M10; LS_M12)	Average people that are educated (LS_M12)	A residential area central, near to public transport pulls people towards places like this (LS_M13; LS_M12)	Salary +- 20 000pm (LS_Life-S_13) Basic living requirement: house maintain the house feed and education my children (LS_Life-S_14)	Ok, my religion influences my way of life Aah it runs in the family, my gran, my grandmother was a teacher, so it runs in the family, and I developed a passion for teaching, cause I saw that aa she loves children and children also love her, so aam, it comes from the family (LS_M1)
LS-CET	Respect, being helpful (CET_8)	Religious background so I was brought up knowing that there is the good and the bad, so that up brining is still with me, although Langa (CET_4)	Policy for CAT, e-education policy (CET_94); Policy for CAT (CET_95)	Population characteristics range from upper to middle to lower class people who live in shacks (CET_26)	Langa is a, because some of them they come from indabeni some of them come from all these coloured, these white areas that were removed, forced removals, yeah. (CET_27)		Salary range: +- R20 000 (CET_10)	Influenced by religious family background (CET_4)
LS-LS	Respect & Love people (LS_Life-S_9) Honesty humble, peace (LS_Life-S_9.9)	Culture: being humble, ubuntu, not looking down on people, being helpful to others loving their neighbour as thy self (LS_Life-S_8)		Suburb but I don't take it as a suburb, it does have crime but not much crime aa I think I am secure where I am yes (LS_Life-S_17)	Lived in a rural area at a young age in Eastern Cape (LS_Life-S_18; LS_Life-S_21)	Rural is aa where you know most people in the rural areas like aa people who are not working who are relying on agriculture salary that is sent maybe from the mines, (LS_Life-S_19)	Farmers they were there just for because it was grazing land and then next to the river (LS_Life-S_20.1)	Culture influences my way of life (LS_Life-S_7)

DISCUSSION OF FINDINGS

ICT Skills Amongst Educators

With regards to training, the educators interviewed had only received basic computer literacy training (LS_M26; CET_107), which did not help improve competency in using educational software:

> *"We have a khanya lab, we have a science lab but that is mostly used for physical science and mathematics, but aa these aa equipment are very I would say scarcely used, they becomes white elephants because the educators are not equipped enough or skilful enough or dept enough to make use of these facilities that we have". (LS_M22)*

Environmental Context

According to the framework figure 1, the environmental data provides the context within which a person's response can be situated. Cultural attitudes & values refer to attitudes about teaching that can inform interpretation of the respondents' life. The findings in Table 3 indicate that there is a similar trend of cultural attitudes amongst teachers with most teachers indicating that their religion influences their values as well as their cultural beliefs (LS_M2; CET_4; LS_Life-S_8). Also there exist a relationship between values, cultural beliefs and influences:

> *"God guardianship, being a role model" (LS_M4)*
>
> *"Respect, being helpful" (CET_8)*
> *"Way of life, values and norms are derived from Muslim religion" (LS_M2)*
>
> *"Respect & Love people" (LS_Life-S_9)*
>
> *"Honesty humble, peace" (LS_Life-S_9.9)*
>
> *"Religious background so I was brought up knowing that there is the good and the bad, so that up brining is still with me, although"(CET_4)*
>
> *"being humble, ubuntu, not looking down on people, being helpful to others loving their neighbour as thy self(LS_Life-S_8)"*
>
> *"Influenced by religious family background" (CET_4)*
>
> *"Culture influences my way of life" (LS_Life-S_7)*

The relationship between religion, values and cultural beliefs is that teachers tend to implement these beliefs in their teaching and learning practices (LS_M4).

The research participants consist of 3 Black teachers which composes of 2 males and one female. The subjects taught by these teachers, include life science, Computer Assisted Teaching (CAT) and Mathematics.

Geographical data refers to contextual information about the particular geographical region in which the interview was conducted. These include the location, population and history. The school is located in a previously disadvantaged area in the Western Cape with population elements mainly consisting of Black South Africans:

> *"Langa is a, because some of them they come from indabeni some of them come from all these coloured, these white areas that were removed, forced removals, yeah". (CET_27)*

The economic forecast of the area consisting of middle to lower income groups:

> *"Population characteristics range from upper to middle to lower class people who live in shacks" (CET_26)*

The school itself is under-resourced:

> *"The school is a bit ill equipped when it comes to resources, the school applied and the principal is still busy applying for some resources". (LS_M22)*

CONCLUSION

Considering the findings, it is clear that the environmental context of the teacher influences their use of technology in pedagogical practices. To support teacher pedagogical practices, teachers can be included in decisions through a diffusion from decision-making instructions to curricula to organizational structure and then to the local level. This in turn, allows new ideas and practices to be generated and diffused from the bottom-up. Furthermore policy and decision makers should create adequate conditions (e.g. institutional space and incentive structures) that will encourage risk-taking and the adoption of new pedagogical approaches. A lack of guidelines and strategic coordination of the integration of ICT into schools means that innovative activities commonly fail and are not able to create positive outcomes (Shapiro, Haahr, Bayer, & Boekholt, 2007; Levin & Wadmany, 2008; Hannon, 2009). Policy and decision makers need to also analyse the environment context of the teachers, as these are second order barriers, which can enable or inhibit the educator to make use of ICT for teaching. The environmental context are namely geographical; location, population, history and economical influence.

Considerations for Further Research

A theoretical framework in Figure 1 offers a practical approach to viewing a complex socio-technical phenomenon such as the deployment of ICT, and its integration into schools' curricula. Practically, the work offers analytical tools that can assist planners, policy makers and other interested parties make sense of the underlying factors surrounding the implementation of technology policies in the societal settings.

A replication of a similar study in other provinces, as well as a comparison of ICT deployment efforts between technologically developed and disadvantaged schools in future studies, is also recommended.

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