

The Attitudes of Educators to Information Technology Adoption in School Settings

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Abstract

The successful implementation of educational technologies depends largely on the attitudes of educators, who eventually determine how they are used in the classroom. Educators' attitudes are a major enabling/ disabling factor in the adoption of technology. It was also found that educators who have positive attitudes toward technology, feel more comfortable with using it, and usually incorporate it into their teaching. Any successful transformation in educational practice requires the development of positive user attitudes toward the new technology. The development of educators' positive attitudes toward ICT is a key factor, not only for enhancing computer integration, but also for avoiding educators' resistance to computer use. However we need to consider the severance of innovation from the classroom educator and the idea that 'the educator is an empty vessel into which this externally defined innovation must be poured'. The article investigates the attitude of secondary school educators towards the implementation of ICT into their schools and curricula. The study is based upon a large sample of educators in the KwaZulu-Natal province of South Africa. These results may be extrapolated to the South African teacher population at large.

Introduction

Recent studies (Kersaint *et al.* 2003) have shown that the successful implementation of educational technologies depends largely on the attitudes

of educators, who eventually determine how they are used in the classroom. Bullock (2004) found that educators' attitudes are a major enabling/disabling factor in the adoption of technology. Similarly, Kersaint *et al.* (2003) found that educators who have positive attitudes toward technology, feel more comfortable with using it, and usually incorporate it into their teaching. In fact, Woodrow (1992) asserts that any successful transformation in educational practice requires the development of positive user attitude toward the new technology. The development of educators' positive attitudes toward ICT is a key factor, not only for enhancing computer integration, but also for avoiding educators' resistance to computer use (Watson 1998). Watson (1998::191) warns against the severance of the innovation from the classroom educator and the idea that "the educator is an empty vessel into which this externally defined innovation must be poured". In this article we investigate the attitude of secondary school educators towards the implementation of ICT into their schools and curricula. The study is based upon a large sample of educators in the KwaZulu-Natal province of South Africa. We believe that these results may be extrapolated to the South African teacher population at large.

Literature Review

According to Rogers (1995 p.161) "peoples'" attitudes toward a new technology are a key elements in its diffusion". Roger's *Innovation Decision Process* theory states that an innovation's diffusion is a process that occurs over time through five stages: Knowledge, Persuasion, Decision, Implementation and Confirmation. Accordingly, "the innovation-decision process is the process through which an individual (or other decision-making unit) passes, namely:

1. from first knowledge of an innovation,
2. to forming an attitude toward the innovation,
3. to a decision to adopt or reject,
4. to implementation of the new idea, and finally
5. to confirmation of this decision".

Owing to the novelty of computers and their related technologies at that time, studies concerning technology diffusion in education have often focused on the first three phases of the innovation decision process. This focus is also because the status of computers in education is, to a great extent, still precarious in most developing countries. In cases where technology was very recently introduced into the educational system - as is the case in most developing countries in Africa - studies have mainly focused on the first two stages; that is, on knowledge of an innovation and attitudes about it.

Rogers' premise concerning individuals' shift from knowledge about technology, to forming attitudes toward it, and then to its adoption or rejection, corroborates the general and widely accepted belief that attitudes affect behaviour directly or indirectly (Ajzen & Fishbein 1980 & Zimbardo *et al.* 1997). Abas's 1995 study (*cited* in Mumtaz 2000) involving Malaysian schools, found educators' attitudes to be a major predictor of the use of new technologies in instructional settings. Christensen's 1998 study in Texas shows that educators' attitudes toward computers affect not only their own computer experiences, but also the experiences of the learners they teach. In fact, it has been suggested that attitudes towards computers affect educators' use of computers in the classroom, and the likelihood of their benefiting from training. Positive attitudes often encourage less technologically capable educators to learn the skills necessary for the implementation of technology-based activities in the classroom (Kluever *et al.* 1994). This has much bearing on the study described here since we have found that educators in KZN have strongly positive attitudes towards technology; however, 68.1% lack core proficiency (basic skills required for an educator to integrate ICT into the school curriculum), and 65.5% have little to no proficiency in the use of technology in the classroom.

Knezek and Christensen's (2002) analysis of several major cross-cultural studies - completed during the 1990s, and related to ICT in education - suggests that educators advance in technology integration through a set of well-defined stages, which sometimes require changes in attitude more than changes in skills. According to Zimbardo *et al.* (1997), changing individuals' behaviour is possible once their attitudes have been identified. Zimbardo and his associates suggest that attitudes are made up of three components: affect, cognition, and behaviour. The affective component represents an individual's

emotional response, or liking to a person, or object. The cognitive component consists of a person's factual knowledge about a person or object. Finally, the behavioural component involves a person's overt behaviour directed toward a person or object. Zimbardo *et al.* (1997:52) contends that "even though we cannot predict the behaviour of single individuals, we should be able to predict that people (in general) will change their behaviour if we can change their attitudes...". The latter assertion explains, to a large extent, the wide interest in the study of attitudes toward technology. This study addresses the affective, cognitive and behavioural components of educators' attitudes towards technology.

Unfortunately, the task of pinning down educators' attitudes has not always been an easy one. Watson (1998) considers educators' attitudes as the most misread impeding force in the integration of computers in educational practices. As Zimbardo *et al.* (1997:53) note, the complexity of attitudes and their interrelationship with behaviour, and many other variables, summons considerations for "the maze of variables and processes that could affect attitudes, beliefs, and action."

The Study

Given the importance of educators' attitudes and the relationship of their attitudes towards technology adoption, as discussed above, the purpose of this study is, therefore, to determine the secondary school educators' attitudes toward ICT in South African education.

Methodology

This is a descriptive study of an exploratory nature. Creswell (2003:30) suggests that exploratory studies are most advantageous when "not much has been written about the topic or the population being studied". The target population in this study is secondary school educators in the Ethekwini Region of KZN. The list of educators is based on the Department of Education's, Education Management and Information Systems (EMIS) list, which is maintained and updated on an annual basis by the Provincial Education Management and Information Systems Department. The total

number of secondary schools in the Ethekwini Region on the Department of Education's EMIS list is 403, as of the 30 March 2004. Of these schools, 382 have staff ranging from 2 to 60, and the balance of 21 schools show 0 staff members. In this study we have chosen every alternate school on the list which yields a sample of 191 schools. The Ethekwini region is made up of three districts viz. Ilembe, Pinetown and Umlazi. The schools in our sample are distributed as illustrated in the table below:

DISTRICT	NUMBER OF SCHOOLS
Ilembe	57
Pinetown	68
Umlazi	66
TOTAL	191

Table 1: Distribution of Schools

Questionnaires were distributed to the above 191 schools. A letter of recruitment and a letter indicating that permission had been granted by the Department of Education (KZN) accompanied the questionnaires to the schools. The average number of staff in schools in the Ilembe and Umlazi districts is 15 and the average number of staff in schools in the Pinetown district is 20. Therefore, 15 questionnaires were sent to each school in Ilembe and Umlazi and 20 questionnaires were sent to each school in Pinetown. Some schools received their questionnaires via the circuit office and others received them via post. Most Circuit Managers were cooperative in assisting in the distribution and collection of these questionnaires. However, there were a few who emphatically did not want to assist with this study and this made collection of questionnaires from these schools very difficult.

Of the 191 schools, 18 schools that indicated that they did not receive the questionnaires, 2 indicated that they had misplaced them and another 3 refused to participate in the study. In total 93 schools returned the

questionnaires yielding a 55.4% rate of return. In total, 1237 questionnaires were returned. Of these, 1222 questionnaires were amenable for detailed analysis. This sample size satisfies Leedy and Ormrod's (2005) requirements as the total number of secondary educators in the Ethekwini region stood at 8026 as per EMIS database. The 1222 responses that we used will represent a total of 15.23% of our sampling frame.

Table 2 gives a frequency analysis of respondents according to gender, Table 3 gives a frequency analysis of respondents according to age and Table 4 gives a frequency analysis of respondents according to race.

	Frequency	Percent	Cumulative Percent
Female	704	57.6	57.6
Male	512	41.9	99.5
No Entry	6	.5	100.0
Total	1222	100.0	

Table 5: Gender Distribution

	Frequency	Percent	Cumulative Percent
21&under	7	0.6	0.6
22-30	210	17.2	17.8
31-40	494	40.4	58.2
41-50	395	32.3	90.5
51-60	96	7.9	98.4
61&Older	7	0.6	98.9
No Entry	13	1.1	100.0
Total	1222	100.0	

Table 6: Age Distribution

	Frequency	Percent	Cumulative Percent
African	486	39.8	39.8
Coloured	23	1.9	41.7
Indian	573	46.9	88.5
White	123	10.1	98.6
No Entry	17	1.4	100.0
Total	1222	100.0	

Table 7: Race Distribution

Questionnaire

The questionnaire was created with items validated in previous research (Davis 1989, Davis *et al.* 1989, Venkatesh & Davis 2000, Vannatta & O'Bannan 2002, Abdulkifi Albirini 2004, and Venkatesh *et al.* 2003) and adapted for this study. A five point scale was used for all of the measurement, with 1 being the strongly negative end of the scale and 5 being the strongly positive end of the scale.

The development of the questionnaire was guided by an extensive review of the literature. The questionnaire (Appendix A) consists of 17 elements and was designed for a larger study. The elements comprise demographic and perceptual data. The instrument was also evaluated by the Department of Education's Research, Strategy and Policy Development unit and the University of KwaZulu-Natal's ethical clearance committee. Feedback was mainly used to ensure that the scales measure the content areas of investigation, and are culturally and technically appropriate for the context of the study. The Cronbach's reliability coefficients for elements 10, 11, 12 and 14 are: computer attitude = 0.87, computer attributes = 0.71, cultural perceptions = 0.77, and computer competence = 0.95.

The data was analyzed using the statistical package SPSS®. Descriptive statistics are used to describe and summarize the properties of the mass of data collected from the respondents (Diamantopoulos & Schlegelmilch 2000). Prior to conducting the analysis, the scoring of all negatively stated items was reversed. For this study only data that was

applicable to our research question was extracted from the larger study and used.

High School Educator Attitudes toward the Integration of ICT into Education

According to Rogers (1995) peoples' attitudes towards a new technology are a key element in its diffusion. As explained above peoples' attitudes are made up of three components namely, affective, cognitive and behavioural. Participants were asked to respond to 20 Likert-type statements dealing with their attitudes toward ICT in education (Appendix A). The items are designed to measure the affective domain of computer attitude (items 1–6), cognitive domain (items 7–15), and behavioural domain (items 15–20). Computer attitudes of KZN educators is represented by a mean score on a 5-point scale, where 5 (Strongly Agree) represents the maximum score of the scale and 1 (Strongly Disagree) represents the minimum score. A zero indicates no entry.

For each of the above categories (affective, cognitive and behavioural), a variable is computed to represent an individual's average score. The polarity for negative statements are reversed to achieve a correct and meaningful score when using SPSS®

	Affective	Cognitive	Behavioural	Average Score
Mean	4.162	4.367	4.376	4.301
Median	4.333	4.444	4.600	4.459
Mode	5.000	5.000	5.000	
Standard Deviation	0.7175	0.5533	0.7348	0.668

Table 5: Educators' attitudes towards ICT in Education

Table 5 illustrates the distribution of mean, median, mode, and standard deviation (SD) scores on the attitude toward ICT scale. As Table 5 illustrates, educators' overall attitudes toward ICT are very positive, with an

overall mean score of 4.3 (SD = 0.66). The respondents' positive attitudes are evident within the affective (mean = 4.16), cognitive (mean = 4.37) and behavioural (mean = 4.38) domains. This augurs well for enhancing computer integration and avoiding educators' resistance to computer use in the classroom as noted by Watson (1998). These positive attitudes will encourage the less technologically capable educators to learn the skills necessary for the implementation of technology based activities in the classroom (Kluever *et al.* 1994).

Figure 1 represents the attitudes of educators towards ICT within the affective, cognitive and behavioural domain. Within the affective domain, eighty-four percent (84%) of the respondents have a positive affect toward computers. These respondents report that they have no apprehension of computers, are glad about the increased prevalence of computers, consider using computers enjoyable, feel comfortable about computers, and like to talk with others about computers and to use them in teaching. The "increased prevalence of computers" receives the most favourable responses in this category (affective). The affective component, which represents an individual's emotional response or liking to a person or object, is very positive for our respondents. That is, they seem to have an affinity towards computers.

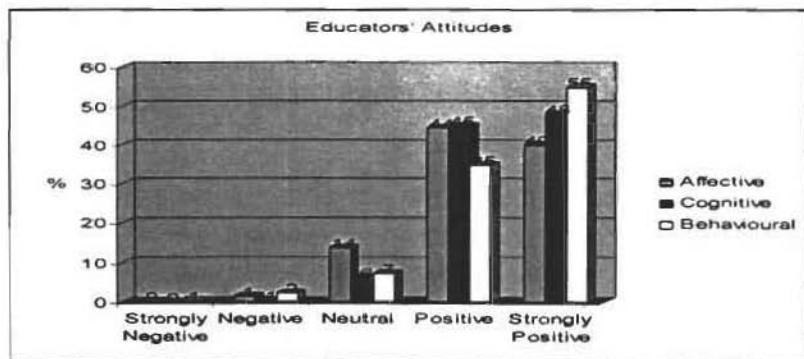


Figure 1: Educators' Attitudes

Within the cognitive domain, 93% of the respondents are of the opinion that computers save time and effort, motivate learners to do more study, enhance learners' learning, are a fast and efficient means of getting

information, must be used in all subjects, make schools a better place, are worth the time spent on learning them, are needed in the classroom, and, generally, do more good than harm. "Schools will be a better place" receives the most favourable responses in this category (cognitive). This tells us that respondents do have factual knowledge of computers.

In the behavioural domain, 90% of the respondents express positive behavioural intentions in terms of buying computers, learning about them, and using them in the near future. The behavioural component represents a person's overt behaviour towards a person or object (Zimbardo *et al.* 1997). Ninety five percent of our respondents are very positive towards the statement "I would like to learn more about computers" as expressing their opinion. This supports the need for retraining of these educators to acquire technology proficiency. This is lacking in the present environment.

Discussion of Above Results

The study investigates the attitudes of secondary school educators in a large region of the KwaZulu-Natal province, toward ICT and the relationship of educators' attitudes to a selected set of independent variables. Educators' attitudes toward ICT have been universally recognized as an important factor for the success of technology integration in education (Rogers 1995, Watson 1998, Woodrow 1992). Findings from this study suggest that participants have positive attitudes toward ICT in education. The respondents' positive attitudes are evident within the affective, cognitive and behavioural domains. Such optimism cannot simply be attributed to the novelty of computers in South African education. The participants seem to have totally accepted the rationale for introducing ICT into schools and are able to base their judgments on understandable reasons. The majority of respondents (90%), therefore, consider computers as a viable educational tool that has the potential to bring about different improvements to their schools and classrooms.

Educators' positive attitudes show their initiation into the innovation-decision process (Rogers 1995). It seems that educators have already gone through the Knowledge and Persuasion stages (Rogers 1995) and are probably proceeding to the Decision phase. As many theorists have

indicated, attitudes can often foretell future decision-making behaviour (Ajzen & Fishbein 1980). Having formed positive attitudes toward ICT in education, participants are expected to be using ICT in their classrooms once computers become more readily available to them. However, it must be noted that participants in this study must also obtain the core proficiency in order to use computers. In fact, the behavioural subscale of the computer attitude scale shows that the majority of educators (93%) have the intention to learn about computers and to use them in the near future. This relationship between attitudes toward ICT, and its use in the classroom, has been widely reported in the literature (for example, Blankenship 1998, Isleem 2003).

Conclusion

Given the recent presence of technology in their schools, developing countries have the responsibility not for merely providing computers for schools, but also for fostering a culture of acceptance of these tools among the end-users. Hence, the study of educators' attitudes becomes indispensable to the technology implementation plans. As Sheingold (1991, cited in North Central Regional Educational Laboratory, 2003) notes, the challenge of technology integration into education is more human than it is technological. The findings of this study may be specific to KZN educators in South African education, but the implications are significant to other educators as well. Educators' positive attitudes in the current study have a special significance given the limitations characterizing the current status of ICT in South African schools: insufficient computer resources and educators' lack of computer competence. It is, therefore, essential for policy-makers to sustain and promote educators' attitudes as a prerequisite for deriving the benefits of costly technology initiatives. Since positive attitudes toward ICT usually foretell future computer use, policy-makers can make use of educators' positive attitudes toward ICT to prepare them better for incorporating ICT into their teaching practices.

References

- Abdulkafi, A 2004. 'Teachers' Attitudes toward Information and Communications Technologies in the Case of Syrian EFL teachers. *Computers & Education* (In-press).

- Ajzen, I & M Fishbein 1980, *Understanding Attitudes and Predicting Social Behavior*. Englewood Cliffs: Prentice-Hall, Inc.
- Blankenship, SE 1998. Factors Related to Computer Use by Teachers in Classroom Instruction. Doctoral thesis, Virginia Polytechnic Institute and State University, ProQuest Digital Dissertations.
- Bullock, D 2004. Moving from Theory to Practice: An Examination of the Factors that Pre-service Teachers Encounter as they Attempt to Gain Experience Teaching with Technology during Field Placement Experiences. *Journal of Technology and Teacher Education* 12,2: 211-237.
- Christensen, R 1998. Effect of Technology Integration Education on the Attitudes of Teachers and their Students. Doctoral thesis, University of North Texas. ProQuest Digital Dissertations, Available: <http://www.tcet.unt.edulresearch/dissert/rhondac>, Accessed: 03 July 2004.
- Creswell, JW 2003. *Research Design: Qualitative, Quantitative and Mixed Methods Approaches*. Beverley Hills: Sage Publications.
- Davis, FD 1989. Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly* 13,3:319-339.
- Davis, FD, RP Bagozzi & PR Warshaw 1989. User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. *Management Science* 35,8: 982-1002.
- Diamantopoulos, A & BB Schlegelmilch 2000. *Taking the Fear Out of Data Analysis*. London: Thomson Learning.
- Isleem, M 2003. Relationships of Selected Factors and the Level of Computer Use for Instructional Purposes by Technology Education Teachers in Ohio Public Schools: A Statewide Survey. Doctoral thesis, Ohio State University, ProQuest Digital Dissertations.
- Kersaint, G, B Horton, H Stohl & J Garofalo 2003. Technology Beliefs and Practices of Mathematics Education Faculty. *Journal of Technology and Teacher Education* 11,4: 549-577.
- Kluever, RC, TC Lam, ER Hoffman, KE Green & DL Swearinges 1994. The Computer Attitude Scale: Assessing Changes in Teachers' Attitudes toward Computers. *Journal of Educational Computing Research* 11,3: 251-261.

- Knezek, G & R Christensen 2002. Impact of New Information Technologies on Teachers and Students. *Education and Information Technologies* 7,4: 369-376.
- Leedy PD & J Ormrod 2005. *Practical Research-Planning and Design*. New Jersey: Pearson Education.
- Mumtaz S 2000. 'Factors Affecting Teachers'. Use of Information and Communications Technology. *Journal of Information Technology for Teacher Education* 9,3: 319 – 341.
- North Central Regional Educational Laboratory (NCREL) 2003. Technology Connections for School Improvements. Available: <http://www.ncrel.org/tplan/tplanB.html>, Accessed: 16 July 2004.
- Rogers, EM 1995. *Diffusion of Innovations*. New York:: The Free Press.
- Vannatta R & B O'Bannon 2002. Beginning to Put Pieces Together: Technology Infusion Model for Teacher Education. *Journal of Computing in Teacher Education* 18,4: 112-123.
- Venkatesh, V & FD Davis 2000. A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science* 46,2: 186-204.
- Venkatesh, V, MG Morris, GB Davis & FD Davis 2003. User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly* 27, 3: 425-478.
- Watson, DM 1998. Blame the Technocentric Artifact! What Research Tells Us about Problems Inhibiting Teacher Use of IT'. In Marshall, G & M Ruohonen (eds): *Capacity Building for IT in Education in Developing Countries*. London: Chapman & Hall.
- Woodrow, JE 1992. The Influence of Programming Training on the Computer Literacy and Attitudes of Pre-service Teachers. *Journal of Research on Computing in Education* 25,2: 200-219.
- Zimbardo, P, E Ebbesen & C Maslach 1997. *Influencing Attitudes and Changing Behavior*. Reading: Addison-Wesley Publishing Co.

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