

Association for Information Systems AIS Electronic Library (AISeL)

CONF-IRM 2010 Proceedings

International Conference on Information Resources
Management (CONF-IRM)

5-2010

12P. An Assessment of Factors Affecting Technology Adoption by Teachers: The Case of Caribbean Secondary Schools

Claudia Louis

Syracuse University, calouis@syr.edu

Gerald G. Grant

Carleton University, Gerald_Grant@carleton.ca

Follow this and additional works at: <http://aisel.aisnet.org/confirm2010>

Recommended Citation

Louis, Claudia and Grant, Gerald G., "12P. An Assessment of Factors Affecting Technology Adoption by Teachers: The Case of Caribbean Secondary Schools" (2010). *CONF-IRM 2010 Proceedings*. 6.
<http://aisel.aisnet.org/confirm2010/6>

This material is brought to you by the International Conference on Information Resources Management (CONF-IRM) at AIS Electronic Library (AISeL). It has been accepted for inclusion in CONF-IRM 2010 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

12P. An Assessment of Factors Affecting Technology Adoption by Teachers: The Case of Caribbean Secondary Schools

Claudia Louis
Syracuse University
calouis@syr.edu

Gerald Grant
Carleton University
Gerald_Grant@carleton.ca

Abstract

This study aims to identify institutional factors that act as barriers to technology adoption in Caribbean Secondary Schools. The research model combines two distinct bodies of research – literature on technology adoption from Information Systems, and studies on IT use in schools from Education literature. Data was collected primarily through surveys completed by secondary school teachers in eight (8) Eastern Caribbean islands, and supported by interviews with education administrators from the various islands. Results indicated the most significant factors were the non-availability of hardware, and lack of time.

Keywords:

Technology adoption, ICTs in Education, Caribbean schools, curriculum integration, intention to use

1 Introduction

In the past decade, we have witnessed the proliferation of computers and related technology in the education system of many countries. Despite the heavy investments, the issue of adoption and use remains a point of concern, reminiscent of earlier adoption debates in business organizations. This leads us to ask the following questions: is the provision of computers and related technology to schools sufficient to guarantee its use? What are some of the factors that act as barriers to more effective and efficient usage?

1.1 Significance of Study

Most studies done on technology adoption in schools have focused on developed, rather than developing countries. This study provides a unique perspective on individual islands in the Eastern Caribbean, which share similarities in education system, culture and resources. The research model draws from two bodies of literature that are not normally combined - Information Systems (IS) research, and Education research on IT use in schools - in an effort to find the best mix of factors.

Research and data collection for this study took place during the period 2001 to 2002. However, the findings still resonate today as education authorities in the region continue to grapple with the same issues seven years later.

2 Literature Review

Information and Communication Technology (ICT) refers to a diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information.¹ The past decade has produced a dramatic increase in the development of technology-based teaching and learning (Alavi and Leidner, 2001), including using the internet for research (Trattner et al., 2000; Robertson, 2000). Teachers may use computers and related technology for non-instructional purposes as a productivity tool (building curriculum, lesson plans, presentations, etc.), or in the classroom for instructional purposes (Robertson, 2000). Here, we are interested in the use of computers and related technologies for classroom instruction.

2.1 Information Systems (IS) Research

Since the mid 1970s, understanding which factors influence an individual's use of technology has been a focal point of IS research. That era was characterized by widespread resistance to end-user systems by managers and professionals (Davis, 1989), and adoption of new technology was not living up to expectations (Compeau and Higgins, 1995). Researchers and practitioners sought to gain a full understanding of why people resisted using computers, in an attempt to devise methods for evaluating and predicting users' response to such systems.

IS researchers borrowed intention models from social psychology to explain determinants of computer user behaviour (Davis, et. al., 1989). Intention models used *behavioural intention* to predict usage, and focused on finding the factors that influenced intention (Taylor and Todd, 1995). The more prominent models found in the literature are Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), and Theory of Planned Behaviour (TPB). TAM), an extension of TRA is the most widely used and accepted, and forms the theoretical foundation for this study.

2.1.1 Technology Acceptance Model (TAM)

In TAM, Davis (1989) sought to explain an individual's intention to use a computer system in terms of two fundamental beliefs: Perceived Usefulness, and Perceived Ease of Use (Figure 1). Davis believed (initially) that any other factor that may affect an individual's use of a system would do so through those two main determinants, and should therefore be classed as external variables (Taylor and Todd, 1995).

Since its development, TAM has gone through various modifications and extensions, to further refine and extend its explanatory and predictive powers. Results of numerous empirical studies indicate substantial theoretical and empirical support for TAM (Davis 1989, Davis et al. 1989). It has consistently been found capable of explaining a substantial portion (about 40%) of variance in usage intentions and behavior, and has also been compared favorably against other

¹ New directions of ICT use in education, UNESCO's World Communication and Information Report 1999-2000, http://www.unesco.org/webworld/wcir/en/pdf_report/chap2.pdf p. 1

theoretical models (Vankatesh and Davis, 2000). TAM has also been validated by many researchers who used this model (or variations of it) to explain user behaviour in applications such as email, voicemail, word-processing (Lederer, Maupin, Sena, Zhuang, 2000); the World Wide Web (Lederer et al. 2000); and telemedicine (Croteau and Vieru, 2001), among others.

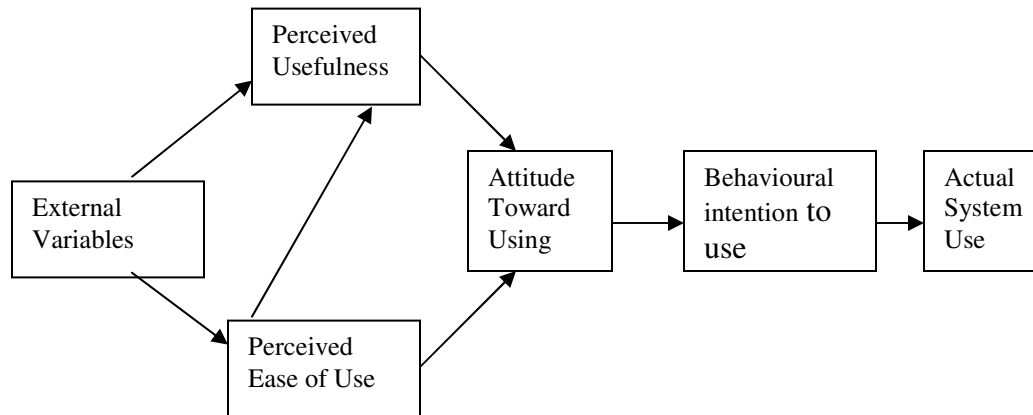


Figure 1: Technology Acceptance Model (TAM)
Source Davis et al,1989

While many of the TAM variations focused on personal factors as determinants of usage, Theory of Planned Behavior (TPB), another extension of TRA, used an additional factor - perceived behavioral control (PBC), to account for situations where individuals did not have complete control over their actions. The underlying constructs of PBC include resource facilitating conditions (such as time and money) and technology facilitating conditions (includes technology compatibility issues) (Taylor and Todd, 1995).

The TAM related studies discussed here have been conducted in business environments, and all factors may not be applicable to a school environment. It is therefore fitting that we look to the education literature to determine which facilitating conditions (if any) are major determinants of teachers' intention to use computers.

2.2 Education Research on IT Use in Schools

The education literature clearly points to factors existing at the administrative level that greatly impact teacher behaviour, and over which teachers have little or no influence (Easdown 1995; Hoffman, 1996; Simpson et al, 1998; Murphy and Greenwood, 1998). Drawing on a myriad of conceptual and empirical assessments, education researchers have suggested a variety of potential barriers from the macro to the micro level, some of which are presented below.

Braak (2001) identified: demographic factors, computer experience, computer attitudes, innovativeness, medium characteristics and organizational constraints, as barriers in secondary schools in Brussels. Watson, Blakeley and Abbott (1997) found the most significant barriers to be lack of resources, absence of technical resource persons, and lack of training for teachers. Hoffman (1996) presented eight success factors necessary for adoption: administrative support,

staff development and technical support, availability of technology, Technology Use Plan, Technology Coordinator, facilities and maintenance, assessment, and broad participation. Ely (1999) identified eight critical conditions: dissatisfaction with the status quo, existence of knowledge and skills, availability of resources, availability of time, existence of rewards or incentives, participation, commitment, and leadership. Easdown (1994) identified: clear institutional policies; infrastructure and support; time to practice, and principal's support.

While there seems to be a lack of consensus on the specific factors, there is some level of agreement on the broad categories such as: personnel and technical (Lawson and Comber, 1999); institutional and individual (Plomp, Pelgrum & Steerneman, 1990); Veen, 1993; Williams and Moss, 1993). This study focuses on the institutional level factors relevant to the organizational environment in which teachers operate.

3 Research Model and Hypotheses

The Research Model presented below seeks to examine the effect of certain institutional level factors on teachers' intentions to use or not to use computer technology in the classroom. It draws from factors identified in both Education and IS literature.

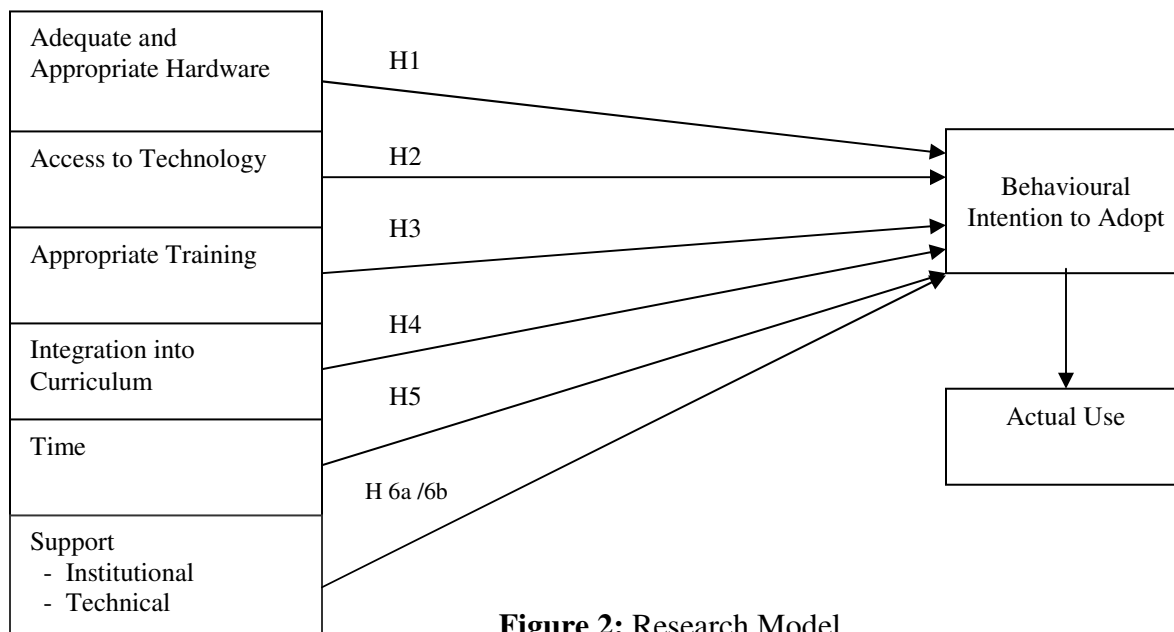


Figure 2: Research Model

Lack of Adequate and Appropriate Hardware

This was identified as a major obstacle faced by teachers in US schools (Byrom and Bingham, 2001). Teachers reported increased workload in when less than half of the students in the classroom have access to computers at the same time. They have to find innovative ways to keep the other students meaningfully occupied, and than have to repeat the lesson at a later time (Rice, 1995). Based on results of their study of UK Secondary Schools, Williams and Moss

(1993) concluded that successful implementation of IT in the curriculum should be preceded by the provision of appropriate hardware (and software) resources.

H1: Lack of adequate and appropriate hardware in schools will negatively influence teachers' intentions to use computers in the classroom.

Access to Technology

Quite apart from the existence of hardware and software in schools, providing easy access to teachers is a major consideration that involves the issue of location in the classroom versus computer labs. In many cases, computers are located in computer labs where teachers do not have adequate and consistent access to them that would encourage their use as an everyday tool. Dorman (2001) in a survey of US Public schools found that teachers were more likely to use the computers when they were located in their classrooms, as opposed to other parts of the school. Dawes (1999) reported that teachers were likely to forget new computer skills if they had no access to computers either at school or at home.

H2: Lack of adequate access to computers will negatively influence teachers' intentions to use computers in the classroom

Lack of Appropriate Training

O'Neil (1995) reported that overall, graduates of teacher education programs in the US were not sufficiently trained to use technology as a teaching tool. Even in cases where training had been received, it usually focused on teaching how to operate computers rather than how to integrate them into particular subject areas. The training issue should be regarded cautiously however, as many institutional administrators believe that the provision of training courses is sufficient, without regard to whether it is ever put into practice (Byron and Bingham, 2001).

H3: Lack of appropriate training in computer technology will negatively influence teachers' intentions to use computers in the classroom

Integration into Curriculum

It is very difficult for teachers to apply their technology skills in the classroom if they cannot make a direct connection between teaching strategies, improvements in achievement and the curriculum (Byron and Bingham (2001). In a US Department of Education Report (2000), teachers and principals identified insufficient understanding of ways to integrate technology into as a major barrier. Student teachers in a UK study reported though they were taught to use specific software, they had no idea how it could be integrated into their actual classroom teaching (Simpson, Payne, Munro, Lynch, 1998). Watson, Blakeley and Abbott (1997) observed that in the few cases where teachers used ICTs, it was usually for personal work, with very little change in the pedagogy of their classrooms.

H4: Lack of adequate knowledge and ability to integrate computer technology into the school curriculum will negatively influence teachers' intentions to use computers.

Time

Dorman (2001) identified the lack of release time to learn how to use computers, and lack of time in the class schedule for students to use computers as the highest reported barrier in US Public schools. Lawson and Comber (1999) found a similar problem in UK schools, and reported that even teachers who were initially very excited by the new technology, later found that there was insufficient time to allow further exploration. Similarly, in some Caribbean

Secondary Schools, computer purchases are made without any corresponding changes in teachers' time schedule to allow for experimentation and familiarization.

H5: Lack of adequate time to experiment with computers will negatively influence teachers' intentions to use computers

Lack of Technical and Institutional Support

In his study involving Dutch Secondary schools, Veen (1993) alluded to the importance of both technical and institutional support for teachers. He reported that teachers viewed the support of a technical assistant as essential in facilitating their use of computers in the classroom. They relied on technical assistance to support a wide range of tasks from making copies of software, to the more significant task of collaboration and practical assistance during lessons in the computer lab. Lawson and Comber (1999) found that teachers were more motivated and committed to innovative practices using computer technology in the environments where technology initiatives received strong support from senior management. Veen (1993) suggested that responsibility for implementing new technology in schools should not be shouldered by individual teachers; but rather should involve a more broad-based initiative from school management and administrators.

H6a: Lack of proper institutional support will negatively influence teachers' intentions to use computers

H6 b: Lack of proper technical support will negatively influence teachers' intentions to use computers

Behavioural Intention (BI)

The dependent variable in this model is Behavioural Intention, defined by Fishbein and Ajzen (1975) as a measure of the strength of an individual's intention to perform a specific behaviour. BI has been a significant inclusion in well-researched and empirically tested models of usage behaviour such as TRA, TAM and TPB; and research results have revealed that the employment of intention in these models has increased the predictive powers, as compared with some models that do not include intention (Fishbein and Ajzen, 1975). Intention to carry out behaviour is seen as an essential antecedent to performing that behaviour (Taylor and Todd, 1995); and the sole direct determinant of behaviour (Davis, et. al. 1989). Behavioural Intention was found to be an accurate predictor of actual usage behaviour, as all other factors that influence user behaviour were found to act indirectly by influencing BI (Davis, et. al., 1989).

Given the situation in Caribbean schools where implementation and use is at different stages, it is appropriate to measure intention as an indicator of future usage behaviour.

4 Research Design

The primary method of data collection was through questionnaires sent to secondary school teachers in eight islands that belong to the sub-grouping of the Organization of East Caribbean States (OECS). Participants were randomly selected from schools in St.Lucia, Grenada, Dominica, St.Vincent, Antigua and Barbuda, St.Kitts/Nevis, Monsterrat, British Virgin Islands (BVI), and Anguilla; and included teachers of all subjects and grade levels.

Data Collection

Questionnaires were sent to 40 teachers in two schools in St. Lucia for pre-testing. Relevant corrections were made before sending out the final questionnaires. Contact persons in each island facilitated the process of distribution and collection, using an adaptation of the Total Design Method (TDM) for mail and telephone surveys (Dillman, 1978, p. 183). Face to face interviews were conducted with one education administrator (curriculum or planning officers with responsibility for IT) from each of the participating territories².

Measures

The measures were drawn primarily from existing literature and adapted, while others were constructed for the purpose of this study. Questions followed as closely as possible to the general format used by Compeau et. al (2001) in their measure for facilitating conditions (*See Appendix*). Behavioural Intention to adopt was measured using a 2-item scale adapted from Taylor and Todd (1995).

Data Analysis

Questionnaire data was analyzed using SPSS statistical package. Descriptive and summary statistics were calculated for each item to get an initial understanding of the data. The research model was tested using correlation and regression analyses following Davis (1989, 1991); Vankatesh and Davis, 2000). Interview responses were used to gain a better understanding of the results of quantitative analysis (Davis, 2000, p. 313) and to create a greater potential for new insights and perspectives into the research question (Aaker and Day, 1980, p 111).

5 Results

5.1 Demographics

Of the 860 questionnaires distributed in 9 islands, 192 valid responses were received from 8 (none received from British Virgin Islands). This number clearly met with the recommended target for this survey of 180 to 240 responses. Distribution among the islands was relatively even, with St.Lucia and Dominica recording slightly higher percentages.

Of the 192 respondents, the majority were female (65 %), and under 30 years (53%). Fifty four percent (54%) had been teaching for 10 years and under, and forty four percent (44%) had received an undergraduate degree or higher. They represented a wide cross-section of subject areas, with the highest from Science (23%) and Social Sciences (16%); Information Technology teachers represented 7% of the respondents.

5.2 Intention to Use

Intentions to use computers were overwhelmingly positive, with 89% indicating intentions to incorporate computers in their lessons, with 87% indicating intentions to use frequently. Scale mean was 4.3 indicating high intention levels.

² Access to these persons was made possible during a training workshop of the ICT Technical Advisory Committee of the OERU (Organization of Eastern Caribbean States Education Reform Unit) held in St. Lucia in March 2002.

5.3 Statistical Analysis

Correlation Analysis was used to examine the strength and direction of relationships between variables, and more specifically, between independent variables and intention to use. Hardware ($r = .420$) had the highest correlation with the dependent variable, followed by time ($r = .267$) and training ($r = .236$) with weaker associations.

Following Davis (1989, 1991) and Vankatesh and Davis (2000), regression analysis was used to analyze the research model. Using the Stepwise method the following model emerged: $F(2,169) = 25.440$, $p < .000$ (Table 1). The Adjusted R Square value (.222) indicates that our model accounts for 22% of variance in the dependent variable. The significant factors are: availability of hardware (Beta = .403, sig = .000) and time (B = .227, sig = .001) (Table 1)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.481 ^a	.231	.222	1.27528	.051	11.179	1	169	.001

a. Predictors: (Constant), Hardware 3, b. Predictors: (Constant), Hardware 3, time

Table 1: Model Summary

A p value less than 0.05 (Table 2) indicates that our model is significant, and that the independent variables *hardware* and *time* emerged as reliable predictors of the independent variable *intention to use*.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	82.750	2	41.375	25.440	.000b
	Residual	274.852	169	1.626		
	Total	357.602	171			

a. Predictors: (Constant), Hardware 3

b. Predictors: (Constant), Hardware 3, time

c. Dependent Variable: Intention to Use

Table 2: ANOVA

The standardized Beta coefficients (Table 3) indicate that hardware (.403) has a greater effect on the model than time (.227).

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	4.246	.609		6.972	.000		
	Hardware 3	.759	.128	.403	5.939	.000	.990	1.010
	time	.151	.045	.227	3.343	.001	.990	1.010

a. Dependent Variable: Intention to Use

Table 3: Coefficients

Interpretations and implications of the results will be discussed below.

6 Discussion

Our final model indicates support for only two hypotheses, H1 (hardware) and H5(time) as significant predictors of teachers' intentions to use computers. The relatively small amount of variance accounted for by these two factors may be an indication that they do not act in isolation, and it may be useful to consider the effects of other moderating variables in a follow up study.

In support of the results, an overwhelming majority of respondents (90%) stated that if adequate and appropriate *hardware* were installed, they would be willing to use computers. The situation was common to all islands, as interviewees acknowledged that the lack of sufficient hardware was one of their biggest problems, and they lacked the financial resources to improve the situation. The situation was compounded with outdated hardware incapable of supporting the latest software versions. Similarly, interviewees all highlighted the significance of *time* as a barrier, by alluding to the notion that teachers were already overburdened, and that it was difficult to find time for activities not built into their schedule.

While the remaining factors were not selected in the final model, some were attributed significance by interviewees and will be mentioned here. Inadequate *access* was viewed as a problem in all islands, since many schools had only one computer lab, with priority given to teaching IT classes. This left virtually no access time during the school day for other subject areas, or for teachers to practice or plan lessons. Teachers who wanted access often had to find time outside school hours, but then faced the problem of labs being locked and treated as personal property of IT teachers. Interviewees also acknowledged that lack of training was a problem, attributed in part to the associated cost. Others referred to the high turnover rate among teachers who had been trained, leading to an ongoing demand to train new teachers. On a positive note, eighty nine (89)% of survey respondents replied that if the appropriate training were provided they would be willing to use computers in the classroom.

Results of this study could help education administrators and policy makers from the OECS territories and wider Caribbean understand some of the issues facing integration of computers in classrooms. Authorities should consider finding innovative ways of tackling the issues of inadequate hardware such as purchasing generic products, or assembling equipment locally. Similarly, they could introduce computer training at teacher training colleges, to reduce the cost of training in-service teachers. The non-selection of many factors in the final model does not mean that they are unimportant, but may be an indication that they do not work in isolation, and invariably affect and are affected by other factors. This understanding could provide a springboard for planning and action targeted at eliminating, or minimizing the effects of these barriers.

6.1 Limitations

The random method for questionnaire distribution within the islands was a limitation of this study. Another unavoidable limitation related to the fact that respondents were asked to imagine the effect of various factors on their future intentions, rather than actual use. However, many studies of human behaviour have found intentions to be an accurate predictor of actual use (Fishbein and Ajzen, 1975; Davis, et. al.1989; Taylor and Todd, 1995). One other limitation concerns the application of theoretical models developed in the North American context to the Caribbean environment. In this study no allowances were made to account for the differences in culture and social environment, and the potential impact of these on survey results. Thus the issue of social context should be addressed in future studies.

6.2 Suggestions for further research

Some factors such as access and training deemed of some importance from interview responses were not significant factors in the final model. It would be interesting to examine the effect of these factors acting through others in a future study. For example, the effect of hardware can be measured with access and technical support as intervening variables. Further research could also focus on individual countries in an effort to isolate factors peculiar to those countries.

6.3 Conclusion

The aim of this study was to identify which factors influence intentions of teachers in Caribbean secondary schools, to use and integrate computer technology in their lessons. Institutional factors drawn from technology adoption studies in business organisations and educational institutions were selected for this part of the study. The primary method of data collection involved a survey of secondary school teachers in eight Caribbean islands, supported by interviews with planning/curriculum specialists from the various Ministries of Education. Correlation and regression analyses revealed the (non) availability of adequate and appropriate hardware, and time to be the major barriers to computer use among teachers.

References

- Aaker, D.A. and Day, G.S., (1980), *Marketing Research* (second edition), John Wiley and Sons, USA
- Alavi, M. and Leidner, D.E (2001) "Research Commentary: Technology-Mediated Learning – A Call for Greater Depth and Breadth of Research" *Information Systems Research*, (12)1, pp. 1-10
- bin Bakar, A. R. and Mohamed, S. (1998), "Preparing Malaysian Vocational and Technology Teachers to Integrate Computer Technology in Teaching Vocational and Technology Subjects" *Computers and Education*, (31), pp.365-372
- Braak, J.V. (2001) "Factors Influencing The Use Of Computer Mediated Communication by Teachers in Secondary Schools" *Computers and Education*, (36), pp. 41-57
- Byrom, E., & Bingham, M. (2001). "Factors influencing the effective use of technology for teaching and learning: Lessons learned from the SEIR-TEC intensive site schools" SERVE: SouthEastern Regional Vision for Education, Greensboro, NC; SouthEast and

- Islands Regional Technology in Education Consortium, Durham, NC available at <http://www.seirtec.org/downloads/publications/lessons.pdf> accessed 07/29/01.
- Compeau, D. and Higgins, C.A. (1995), "Computer Self-Efficacy: Development of a Measure and Initial Test" *MIS Quarterly*, (19)2, pp. 189-211
- Compeau, D. Higgins, C.A. and Huff, S. (1999), "Social Cognitive Theory and Individual Reactions to computing Technology: A Longitudinal Study" *MIS Quarterly*, (23)2 pp. 145-158
- Croteau, A.M and Vieru, D. (2001), "Telemedicine Adoption Studied from Physicians' Perspective" Proceedings of *ASAC Conference*, London, Ontario
- Davis, D., (2000), *Business Research for Decision Making (fifth edition)*, Duxbury, USA,
- Davis, F.D. (1989) "Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology" *MIS Quarterly*, (13)3, pp. 319-340
- Davis, F.D. (1993), "User Acceptance of Information Technology: System Characteristics, User Perceptions and Behavioural Impacts" *International Journal of Man-Machine Studies*, (38) pp. 475-487
- Davis, F.D Bagozzi, R.P and Warshaw, P.R (1989), "User Acceptance of Computer Technology: A Comparison of Two Theoretical Models" *Management Science*, (35)8
- Dawes, L. (1999) "First Connections: Teachers and the National Grid for Learning" *Computers and Education* (33), pp. 235-252
- Dillman, D., (1978) *Mail and Telephone Surveys*, John Wiley and Sons, USA
- Dorman, S.M. (2001) "Are Teachers Using Computers for Instruction?" *Journal of School Health*, (71)2, B3, pp. 83-84
- Easdown, G. (1994) "Student Teachers, Mentors and Information Technology" *Journal of Information Technology for Teacher Education*, (3)1
- Ely, D. P., (1999), "Conditions That Facilitate The Implementation Of Educational Technology Innovations", *Educational Technology*, (39)6, pp. 23-27
- Fishbein, M. and Ajzen, I. (1975), *Belief, Attitude, Intention and Behaviour: An Introduction to Theory and Research*, Reading, Mass: Addison-Wesley Pub. Co.
- Hair, J.F. Anderson, R.E Tatham, R.L and Black, W.C. (1998) *Multivariate Data Analysis (fifth edition)*, Prentice Hall, New Jersey
- Hoffman, B. (1996), "What Drives Successful Technology Planning?", *Journal of Information Technology for Teacher Education*, (5)1/2 pp. 43-55
- Lawson, T. and Comber, C. (1999), "Superhighways Technology: Personnel Factors Leading to Successful Integration of Information and Communications Technology in Schools And Colleges" *Journal of Information Technology for Teacher Education*, (8)1, pp. 41-53
- Lederer, A.L Maupin, D.J. Sena, M.P and Zhuang, Y (2000), "The Technology Acceptance Model and the World Wide Web", *Decision Support Systems* 29, pp. 269-282
- Moonij, T. and Smeets, E. (2001), "Modelling And Supporting ICT Implementation in Secondary Schools" *Computers and Education* (36), pp. 265-281
- O'Neil, J (1995). Teachers and Technology: Potential and Pitfalls; A study of schools in United States, *Educational Leadership*, 53(2) pp. 10-11 <http://www.eklavya.org/computers.htm> accessed 29.07.2001).
- Plomp, T., Pelgrum, W. and Steerneman, A. (1990), "Influence of Computer Use on Schools' Curriculum: Limited Integration" *Computers in Education*, (14), pp. 159-171

- Rice, M (1995) Issues Surrounding the Integration of Technology into the K-12 Classroom: Notes from the Field, *Interpersonal Computing and Technology*, 3 (1) pp 67-81 available at: <http://www.helsinki.fi/science/optek/1995/n1/rice.txt> accessed 01/20/10
- Robertson, B. (2000), "Integrating Technology into Instruction" *Multimedia Schools*, (7)2, pp. 34-39
- Simpson, M. Payne, F. Munro, R. and Lynch, E. (1998), "Using Information and Communications Technology as a Pedagogical Tool: A Survey of Initial Teacher Education In Scotland", *Journal of Information Technology for Teacher Education*, (7)3, pp. 431-446
- Taylor, S and Todd, P.A (1995), "Understanding Information Technology Usage: A Test of Competing Models" *Information Systems Research*, (6)2
- Trattner, H. Wang, Y. and Carter, A.(2000), "Information Technology in Education" *Education Today*, (12)3
- US Department of Education (2000), "Study of Educational Resources and Federal Funding: Final Report" Planning and Evaluation Service, Washington, DC available at: http://www.ed.gov/offices/OUS/PES/edtech_SERFF.html accessed 02.08.2001).
- Vankatesh, V and Davis, F.D (2000), "A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies" *Management Science*, (46)2 pp. 186-204
- Veen, W. (1993) "The Role Of Beliefs In The Use Of Information Technology: Implications For Teacher Education, Or Teaching The Right Thing At The Right Time" *Journal of Information Technology for Teacher Education*, (2)2
- Watson, D. Blakely, B. and Abbot, C., (1998) "Researching The Use Of Communication Technologies In Teacher Education", *Computers Educ*, (30)1/2, pp. 15-21
- Williams, R.V. and Moss, D. (1993) "Factors Influencing The Delivery Of Information Technology In Secondary Curriculum: A Case Study", *Journal of Information Technology in Teacher Education*, (2)1

APPENDIX
Questionnaire Section B

Questions were rated on a 5 point likert scale ranging from 1 = strongly disagree to 5 = strongly agree.

	Training
1.	I need (further) training on how to incorporate computers in my lessons
2.	I need (further) training on basic introduction to computers and common software programs
3.	If I received (further) computer training from school authorities, I would be willing to try using computers in my lessons
	Hardware and Software
4.	The number of computers available is sufficient to allow all students to participate during my scheduled classes
5.	The majority of computers at my school are in good working condition
6.	If adequate/appropriate hardware were installed, I would be willing to use computers in my classes
7.	Getting the software I need for use in my lessons is/would be no problem
	Access
8.	It is very easy for me to get access to computers for use <u>during my scheduled lessons</u>
9.	It is very easy for me to get access to computers <u>outside my scheduled class time</u>
10.	It is very easy for me to get access to computers <u>outside normal school hours</u>
11.	There are clear policies/guidelines at my school to allow me access to computers when I need them
12.	It is very easy for me to get access to the Internet from my school
	Curriculum
13.	I have knowledge of how to incorporate computers into teaching my subject area
14.	There is a lack of appropriate software available for teaching in my subject area *
15.	I am able to develop my own software application for incorporation into my lessons
16.	My subject(s) curriculum must be changed to allow for incorporation of computers in my lessons
	Support
17.	If I need someone's help in using the computer during or outside scheduled lessons I can get it easily
18.	There is adequate technical support available for fixing computer problems when they arise
19.	There is adequate funding available at my school to facilitate computer use in the classroom (e.g. for maintenance, computer supplies, etc.)
	All things considered
20.	Assuming I have access to computers, I intend to incorporate them in my lessons as a teaching and learning tool
21.	Assuming I have access to computers, I intend to use them <i>frequently</i>