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Abstract

In the educational setting, the Internet is profiteering among academics and students. In fact, this has changed the functioning of the educational establishments. However, the success of use of the Internet is largely dependent upon the user's behaviour that in turn affects their attitudes. Even when the formidable opportunities exist for the deployment of technology, adverse attitude can inhabit the use.

Keeping this in view, a survey of 266 students of four technical and vocational colleges was conducted to study the attitudes of the students toward the use of the Internet. The present study develop a normative model by using Davis's Technology Acceptance Model (TAM) and validates two specific attitudinal variables; perceived usefulness and perceived ease of use that are hypothesised to be fundamental determinants of the attitude that in turn predict the students' use of the Internet. By adding external variables such as demographics, task characteristics, computer exposure, and institutional support further test the parsimony of the model. A Structural Equation modelling techniques is used to validate the model.

The study has confirmed that majority of the students (85%) are using the Internet. The final model has confirmed that external variables do contribute towards both of belief parts: perceived ease of use and perceived usefulness that further affects the attitude of the students in predicting the Internet usage.

Keywords

Internet usage, technology adoption model, technical and vocational students, structural equation model (SEM)

INTRODUCTION

The dawn of a new millennium has witnessed an overwhelming worldwide increase in the use of the Internet that has brought dynamic changes in managing and communicating with others. This manifold increase has not only brought a revolution in business world but has also made the Internet a favourite research topic amongst academics. An enormous number of studies have been conducted to reflect the various aspect of the business use of the Internet. However, the use of the Internet in academic setting in general and in vocational and technical establishment in specific is the area that is being neglected.

The use of the Internet for business purposes in developed countries has become widespread over the past twenty years (Soh *et al*., 1997). It has become a vital tool for survival for various small businesses to compete with larger organisations (Kaplan *et al*., 1997). With globalisation the businesses are becoming competitive everyday and similarly the demand for resourceful, skilful and knowledgeable workers is increasing. In order to cope with the industry demand, educational institutions have to develop a new learning culture and to radically shift their existing resources of teaching to the new technology based curriculum. The use of the Internet in educational settings is gaining popularity with the large number of academics and students getting the benefits of the Internet technologies.

Given the opportunities and benefits that the Internet can provide the usage is still limited to infant stage. Besides countless promises of the technology, empirical research on the

adoption and used of the Internet is relatively sparse. Most of the prior research in this discipline has been predicted the user behaviour based upon the data collected in the United States and Europe. For example, in USA by 1995 more than 40 states provided public educators with some level of Internet access (Doty, 1995). In addition, from the period of 1994-1995, access to the Internet from US public schools has increased from 35% to 50% (Heaviside, *et al*., 1995).

Comparatively, there has been less research on the adoption, diffusion and impact of the Internet in educational settings. No doubt, the Internet is permeating professional life and is being promoted as the future way of information transfer. However, we believe that academic institutions are expected to be on the forefront of applications of new technologies. Previously, the studies on the Internet were undertaken among academics and students of the universities. Little is however, researched about the use of the Internet technology among the academics of the technical colleges. It is argued that task characteristics, level and skill of computer experience may differ from their counterpart in the universities. This difference may have an impact on the successful use of the Internet among the technical institutions. This aspect was not addressed by the prior studies and hence there is a need to investigate this aspect into new geographical environments. As mentioned, a majority of studies were undertaken in the Western countries. However, very little has been researched in Asia-Pacific countries. In addition, all these studies have a number of weaknesses. They are based upon single institution survey and a complete picture of the potential users, therefore cannot be analysed. In the present study, an attempt is made to cover the students of technical colleges at large to bring the broader perspective of Internet use among the learners and to make the study different from the previous studies. In addition, this study has used a structural equation modelling techniques to test the hypothesised model that was missing in the prior studies.

The result of these prior studies might not be applicable to a small but technologically emerging country like Brunei Darussalam. A country that is culturally different not only from those of the western world but also from several of Asia-Pacific countries. Brunei Darussalam is a small sultanate located on the northwest coast of Borneo island. Strategically located between the two technological hubs i.e. Singapore and Malaysia. It has a total population of nearly 0.3 million (Brunei Statistical Year Book, 1999) with main economic activity dominated by the oil and gas sector. The country has gross domestic product per capita was B$ 23,865 (US$1= 1.70) in 1999. The government had conceived an IT vision and has taken range of measures to improve IT infrastructure and the Internet business environment in the country. Realising the limitation as to the size of the domestic market, Brunei business environments are determined to utilise the Internet as a major development tool.

In the educational side, currently, two engineering colleges, one vocational college and one technical institute were established to produce technologically oriented professionals at various levels. No doubt, Brunei is technologically oriented country fully with impressive IT infrastructure, however, the utilisation of the various technological elements are mainly dominated by cultural and belief systems of the users. In the absence of extensive research it is difficult to find the root cause of this under-utilisation. So keeping in view the users' aspect of utilisation, two pioneering studies were undertaken to collect empirical evidence of the Internet usage among the academics (Seyal *et al*., 2002) as well as of the students of technical colleges in Brunei Darussalam.

Objective of the Study

The central theme of this study is to examine the student use of the Internet and this has been further classified into two sub-sections:

(a) To assess the students' current level of the Internet use and to identify the factors contributing toward the use.

(b) To test the hypothesised model by using structural equation models and to propose a model that has a greater parsimony.

TECHNOLOGY ADOPTION MODELS

The Internet usage among educational settings is the area of least researched comparative to the other segments of the users. A variety of factors may have influenced the limited use. A success of the Internet use however, is a multi-dimensional issue that requires the cooperation and commitment from all participants. The research on the Internet in fact is the extension of previous researches on technology diffusion, IT adoption and utilisation. The studies were undertaken to develop various models. MIS researchers have used different models over the last two decades as a base for studying the information systems acceptance, adoption and usage.

In earlier work, Triandis (1971) argued that behaviour is determined by what people would like to do (attitudes) what they think they should do (social norms) what they have usually done (habits) and by the expected consequences of their behaviour. He suggested that attitudes involve cognitive, affective, and behavioural components. The cognitive component of attitudes involves belief. Thus attitudes involve what people believe (cognitive), feel (affective), and how they behave (behavioural) toward an object that can be a computer at early stage and later on can be substituted for information technology. The Triandis's theory no doubt, has provided a base for conducting attitudinal studies.

However, researchers in the later stages have proposed several other models based upon innovation diffusion theory (Rogers, 1995), the Theory of Reasoned Action (TRA) purported by Ajzen and Fishbein (1980), and the Technology Acceptance Model (TAM) by Davis (1989). Of these models the TAM has most widely used model to predict computer-usage behaviour with generally providing determinants of technology acceptance that would help explaining user behaviour towards the information technology usage. TAM has also been shown to demonstrate good predictive validity (Szanja, 1994). However, one of the constraints that was not undertaken by the TAM was the ignorance of external factors whereas, later researches has provided us with several of external variables that have an influence on the usage behaviour (Pijpers *et al*., 2001). Agarwal and Prasad (1997) have further suggested that external variables are the only channels for influencing behaviour as the intermediate and dependant variables in TAM are hypothesised to be an internal psychological process. TAM asserts that actual use of system is determined by behavioural intentions and this in turn is related to attitude towards using the system. Davis (1989), while proposing his model further asserted that influence of external behaviour is mediated through user belief and attitude. Belief related to an action where as, attitude is purely affective that relates to positive and negative feelings about performing the behaviour. The belief segments that determine the attitude are perceived ease of use (PEOU) and perceived usefulness (PU).

The TAM has been widely studied in Information Systems research as an explanation of the use of IS across information systems types and nationalities and found significant cross-cultural difference (Gefen and Straub, 1997). In a recent review, Saga and Zmud (1994), identified twenty empirical studies that aimed at exploring the factors that determine IT acceptance. Among these twenty studies, TAM originally proposed by Davis is arguably one of the most cited. Table 1 provides us with a detail of empirical studies based on TAM. In fact, all these studies have focused primarily on the TAM model in predicting the user intentions towards information technology.

The literature tends to fall into a number of categories in the educational setting. Most of the studies were confined to the schoolteacher's usage of the e-mail. It was undertaken at the level of adoption and utilisation of the technological innovation. Songan and Noor (1999) have studied the students' use of the Internet. Doyle and Ponder (1977) and Cuban (1986) found that a positive relationship existed between acceptance of innovation when they seem to be compatible with the previously established value, norms, procedure and facility. Brown and McIntyre (1982) found that perceived practicality and cost of implementing an innovation were crucial to utilisation. The large part of these studies deals with its development and general definition and terms relating to the facilities that the Internet provides (Gould, 1995; Stix, 1994).

Palvi *et al*., (1995) studied both academic staff and undergraduate students in one of the Singaporean universities and indicated a higher level of awareness between both groups,

however, the use was primarily limited to e-mail. The survey has further indicated that majority of the respondents felt that undergraduate students must be Internet literate. Songan and Noor (1999) studied Internet utilisation among students at an institution of higher learning in Malaysia and found that gender and faculty's type have no impact on the Internet utilisation. Whereas, factors such as relative advantage, compatibility, complexity, importance and interactivity affect the use of Internet.

Researchers	**Year**	**Technology features studied**
Davis	1989	E-mail and graphic software Chart Master
Davis *et al.*	1989	Word Processor and Text-editor
Thompson *et al.*	1991	PC
Mathieson	1991	Spreadsheet
Sproull	1991	E-mail
Rice and Aydin	1991	E-mail
Adams *et al.*	1992	Voice-mail and WP
Lu and Gustafson	1994	Computerised Support System
Markus	1994	E-mail
Straub *et al.*	1995	Voice-mail
Chin and Gopal	1995	Group Support System
Igbaria *et al.*	1995	Computer Usage
Szanja	1996	Data-base management system
Straub *et al.*	1997	A Cross-cultural studies of e-mail use
Gefen and Straub	1997	Perception and use of E-mail
Lou *et al.*	2000	Groupware acceptance
Yang and Choi	2001	Office-automation and Internet use
Veiga *et al.*	2001	IT acceptance
Pijpers *et al.*	2001	Executive Information Systems
Seyal *et al.*	2002	Academic use of Internet

Table 1: Empirical studies testing TAM

In Australia, Spennermann (1997) surveyed student attitudes towards use of e-mail at one of the Australian universities and significant differences in positive usage were noticed between external as well as internal students. The internal students are more likely to use e-mail as a method of communication with their academics.

Alsehli (2000) found that despite the widespread use of the Internet, there are no well-organised studies providing information about its use as a research tool and in classroom instruction at one school of Information Systems in USA.

The studies cited above have also identified a variety of factors that affect the users' attitudes of Internet among academic work-settings. Some of the frequently reported factors such as computer exposure include ownership of a PC, and PC experience, task characteristics. PC experience was given considerable attention from some authors in addition to two attitudinal factors PU and PEOU.

Although the review of the literature has provided us a base for the choice of the variables to be included in this study, however, final selection of the study variables are in fact based upon several others Brunei-based studies in IS/IT (Rahim *et al.*, 2000; Seyal *et al.*, 2000; 2001). Giving the ongoing importance to the use of the Internet the selection of the variables are also in line with the objective to test a parsimonious predictive model that is multi-dimensional and posits multi-items variables: demographic variables, PC exposure, task characteristics, institutional support, belief and attitudinal aspect. By testing all the factors together in one model, we are able to investigate their relative contributions to the student use of the Internet. We further believe this model can be generalised to other inter-organisational information technology usage.

RESEARCH MODEL

On the basis of existing literature and of several informal discussions with the members of academic staff of technical colleges during the early stage of the research design, a normative model was developed. This model provides the basis of research.

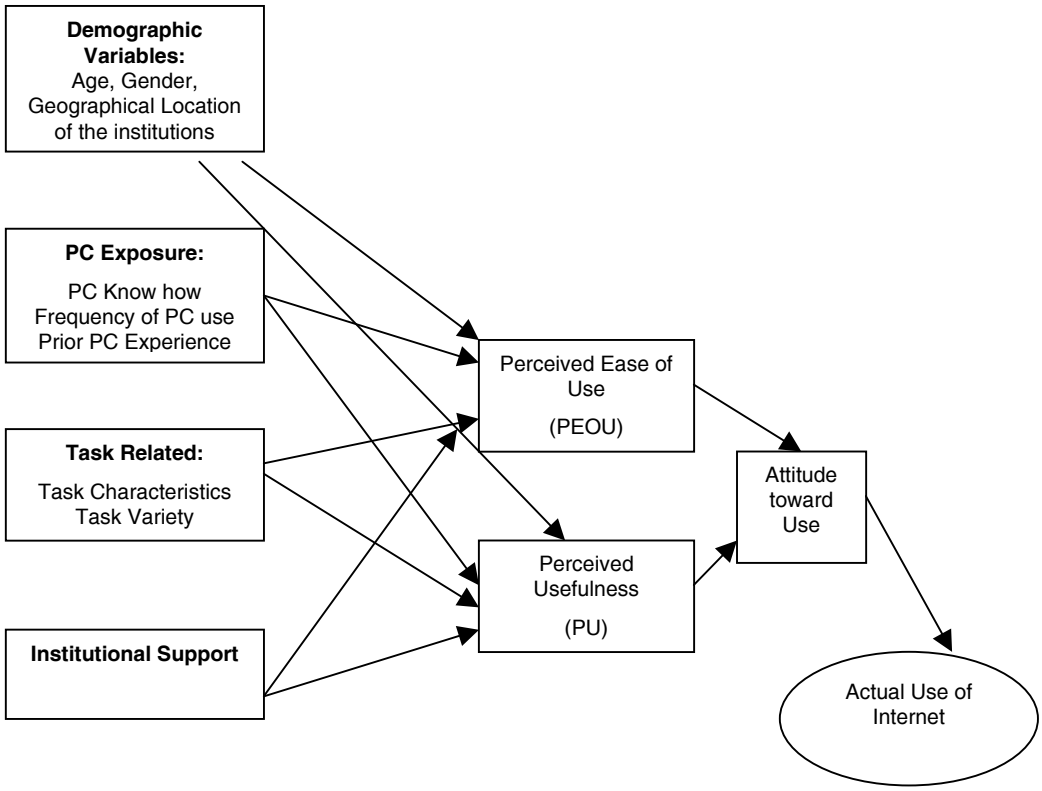

Figure 1: Theoretical Research Model (Extension of TAM)

The normative model as depicted in Figure 1 relates independent (externals) and dependent variables with the intervening or intermediate (perceived ease of use, perceived usefulness and attitude) variables. The relationship as shown in the model is associative rather than casual in nature. In this study, the student actual use of the Internet is the dependent variable, while the normative model ties together four constructs having nine independent variables. Justification for inclusion of each independent variable and to set up hypotheses in the model is presented in Table 2.

Constructs	No	Prior Relationship Tested	Source of selection
A. Demographics			
Age	HA1	Negative	Pijpers *et al.* 2001
Gender	HA2	Men more positive	Songan and Noor, 1999; Gefen and Straub, 1997; Igbaria *et al.* 1995; Pijpers *et al.* 2001
Geographical location	HA3	New variable studied positive in one studies and neutral with two others studies	Rahim *et al*, 2000; Seyal at al. 2000, 2002
B. PC Exposure			
PC ownership	HB1	Negative Positive	Seyal *et al.* 2002 Rahim *et al.* 2000; Seyal *et al.* 2000
PC know how	HB2	Positive	Igbaria *et al.* 1995
Frequency of use PC	HB3	Positive	Igbaria *et al.* 1995; Igbaria and Chakraborti 1990
PC experience	HB4	Positive	Igbaria and Chakraborti, 1990; Igbaria, 1992; Aljabri and Al-Khaldi, 1997

Constructs	No	Prior Relationship Tested	Source of selection
C. Task-Related			
Task characteristics	HC1	Positive Negative	Kwon and Zmud, 1987; Yverbaum, 1988 Igbaria *et al*. 1995 Seyal *et al*. 2002
Task Variety	HC2	Positive	Gani, 1992; Goodhue and Thompson, 1995
D. Institutional support	HD1	Positive	Pijpers *et al*. 2001
E. Intervening Variables			
Perceived ease of use	HE1	Positive with PU	Goodwin,1981; Igbaria *et al*. 1992
Perceived Ease of use	HE2	Positive with attitude to use	Davis *et al*. 1989; Bajaj and Nidumolu, ; 1998; Pijpers *et al*. 2001
Perceived Usefulness	HE3	Positive with attitude to use	Thompson *et al*. 1991; Igbaria and Torasker, 1994 ; Pijpers *et al*. 2001
Attitude towards use	HE4	Positive with actual use	Bajaj and Nidumolu, 1998

Table 2: Summary of hypotheses

The prior literature is full of studies that have used TAM and related it to numerous external variables. Interestingly no consistency has been noticed in making choice of external variables. Pijpers *et al*. (2001) have used twenty-seven variables and grouped them into demographical, organisational task related, characteristics of IT resources and attitudinal variables that measure PU, PEOU and affective attitudes segment. As mentioned earlier, the selection of external variables for the present study is exclusively based upon the prior research in technical colleges of Brunei Darussalam.

RESEARCH METHODOLOGY

Design of Instrument

The inclusion of the various multi-item, multi-dimensional constructs in all four parts of the instrument is based upon existing constructs taken from previous research (Davis, 1989; Igbaria and Chakraborti, 1990; Igbaria *et al*., 1997; Turner and Zheng, 1998; Harris, 1999). Construct measurement of computer experience is adapted from Igbaria (1992). Table 3 provides the detail of items measured along with the mean and corrected-item total. The construct measuring attitudes is adapted from Bijaj and Nidumolu, (1998). It is commonly believed that use of the Internet is multi-dimensional construct that measure the various types of the Internet use. As such to determine the use of the Internet is one of the objectives of this study, therefore Table 4 provides the detail of various types of usage along with their mean and standard deviation. Multiple-act indicators measure the dependent variable; the use of Internet. Similar to computer experience, the Internet use was measured as overall indexes of total number of categories the respondents reported the use. Construct measuring PU and PEOU intervening variables asks the respondents for twenty-six statements adapted from Davis, (1989).

Items	Responses Above Average	Mean Experience	Corrected-item Total
Using computer packages such as spreadsheet and word processing	56%	3.51	.34
Using application languages such as, SQL, Oracle, dBase IV, Access	12.5%	1.95	.61
Using decision support packages such as, financial, statistical or graphical	10%	1.96	.66
Use of Programming language such as, Cobol, Fortran,	19%	2.19	.67

Items	Responses Above Average	Mean Experience	Corrected-item Total
Pascal, C, C++			
Participation in the non-technical design of computer system	13%	1.76	.71
Participation in the technical design of computer system	13%	1.79	.67

Table 3: Computer Experience

Population and Sample size

There are 4 technical colleges in Brunei Darussalam that offer Trade Certificate, National diploma (ND) and Higher National diploma (HND) programs in various disciplines. The target population was the students of these technical colleges. The total numbers of students in all these four colleges were reported to be 1266 (Anonymous, 1998). The questionnaire was therefore sent to one third of the students (422) based upon a stratified random sample that by fulfilled the criteria of Zikmund (1984). Out of these a total 266 responses were received to further test the model.

Items	Mean	Std.Dev
To gather student material	3.71	1.23
To gather teaching aids	3.61	1.13
To perform learner activities	2.52	1.21
To enhance general knowledge	3.46	1.13
To keep informed of interesting developments	3.20	1.36
To keep abreast of exhibitions/trade shows and conferences	2.30	1.34
To subscribe to scholarly users group	2.09	1.16
For recreational use	2.83	1.41

Table 4: Internet Use

Instrument validation and reliability

There are several types of validity measure that includes the face validity and construct validity. Campbell and Fiske (1959) proposed two types of construct validity: convergent and discriminant validity. In order to establish face validity, an initial version of the instrument was pre-tested using several students selected randomly from two colleges located in close proximity of the authors' work place. The participants were asked to comment on the format and appropriateness of questions, and to suggest any items that they believed should be included in the instrument. In view of their suggestions, several amendments were incorporated into the instrument, with the inclusion of some new variables that has greatly improved clarity. The derived instrument was then tested for reliability. In line with our research model, as mentioned earlier, part of the instrument that measures the intervening variables PU and PEOU consists of 26 items adapted from Davis (1989) The original version was used to test e-mail and graphic software Chart-master. However, all the items were reworded for this study. These statements were passed through purification and elimination as proposed by Churchill, (1979). Six items were taken away because of their lowest corrected-item correlation (< .40). Then the remaining 20 items were tested for exploratory factor analysis that has resulted for 2-factors solution. The remaining 20 items, provides with two factors solution (PU and PEOU) in Table-5.

Items No	Items description	Factor 1	Factor 2
Att-1	My job would be difficult to perform without the Internet	.80	
Att-2	Use of Internet gives me a great control over my job	.82	
Att-3	Use of Internet improves my job performance	.79	
Att-4	Interacting with Internet is confusing		.82

Items No	Items description	Factor 1	Factor 2
Att-5	I make frequent errors when using the Internet		.79
Att-6	Interacting with the Internet is frustrating		.78
Att-7	The Internet system addresses my job related needs	.70	
Att-8	Use of Internet saves time	.76	
Att-9	The Internet enables me to accomplish task more quickly	.82	
Att-10	I need help when I use the Internet		.65
Att-12	Overall I find Internet useful in my job	.69	
Att-13	I find it easy to get Internet to do what I want to do	.79	
Att-14	Use of the Internet allows more to accomplish more work than would otherwise be possible	.83	
Att-15	Use of the Internet reduces the time I spend on unproductive activities	.73	
Att-16	Use of Internet enhances my effectiveness on the job	.77	
Att-19	My interaction with the Internet is easy for me to understand	.80	
Att-20	It is easy for me to remember how to perform tasks using the Internet	.85	
Att-22	Use of the Internet improves the quality of my work	.85	
Att-23	Use of the Internet increases my productivity	.84	
Att-24	Use of the Internet increases my productivity	.83	
	Eigenvalue	**15.51**	**1.68**
	% of variance	**64%**	**17%**

Note: Factor 1 refers to perceived usefulness and Factor 2 refers to perceived ease of use.

Table 5: Varimax rotated factor loading and eigenvalues with variance explained

Both factors explain 81% of the variance. The Kaiser Meyer-Olkin measure of sampling adequacy of .85 suggests that data is suitable for factor analysis. Factor analysis has further revealed the construct validity as such all the items have highest factor loading (.50 or above) and load on two factors. The factorial validity further supports construct validity. The derived instrument was then tested for discriminant validity. There are several approaches to apply discriminant validity. The term refers to the extent to which a concept differs from others (Campell and Fiske, 1959). One way of determining this for a construct is to see if it correlates with other constructs and is less than its Cronbach alpha coefficient (Gaski and Nevin, 1985). Bajaj and Nidumolu, (1998) has used the same technique in one of their attitudinal-based study. Table 6 reflects the comparison of the Cronbach alphas with the correlations and found to be true.

Constructs	Mean	Std Dev	Internal reliability (.70 or above)	1	2	3	4	5	6	7	8
1.PC Experience	2.15	.77	.83	1.00							
2.Task Characteristics	3.15	.86	.89	-.238**	1.00						
3.Task Variety	2.95	.84	.90	-.09	.517	1.00					
4. Internet Use	2.95	.80	.92	.214**	-.302*	-.325**	1.00				
5.Institutional Support	2.29	1.00	.92	-.507	-.062	.225*	-.220**	1.00			
6.Perceived Usefulness	3.63	.68	.97	-.012	.133	-.015	.288**	-.280**	1.00		
7.Perceived Ease of Use	2.87	.80	.83	-.155*	.234**	.285**	-.109	.199*	-.056	1.00	
8. Attitude	3.45	.66	.87	-.036	-.049	.042	.185*	-.110	.697**	.215**	1.00

Significance. ** (p<.0.05) * (p<0.01)

Table 6: Correlation between the various constructs

ANALYSIS AND RESULTS

266 questionnaires received were analysed to test the research model in Figure 1 by using SPSS for descriptive analysis.

	(%)
Geographical Location of Institution	
Capital 1	34
Capital 2	27
Capital 3	7
Remote	32
Gender	
Male	55
Female	45
Age	
Between 15-20	52
Between 20-25	44
Above 25	4
Internet facility	
Yes	85
No	15
Location of Internet facility	
At home	67
At institution	5
Both	28
PC Use (frequency)	
Less than a year	15
Between 1 – 5years	59
Between 5 – 10 years	23
More than 10 years	3
PC Ownership	
Own one	85
Does not own	15
PC Knowledge	
Novice	25
Mature	66
Expert	9

Table 7: Background profile of the students

SEPATH, SEM program from STATISTICA 6.0 statistical software was used to test the relationship and to further test the parsimony of the structural model. Table 7 reflects the background profile of the students.

Structural equation model (SEM) estimates a series of separate but interdependent multiple regression equation (Stelzl, 1986). Many researchers (Joreskog and Sorborn, 1993; Kelloway, 1998) proposed a two-stage process: (1) to estimate the measurement model and (2) to investigate the structural model.

Measurement Model

When studying the structural model, many researchers (Kelloway, 1998; Breckler, 1990) propose a two-stage model: (i) measurement model, (ii) investigating the structural model.

Theoretically, in a measurement model an investigation into the structure between items and constructs is carried out. Normally a multi-trait, multi-dimensional approach is adopted. Initial screening indicated that some of the external variables are not normally distributed and are skewed. By testing the measurement model we therefore test the reliability and validity of the instrument.

Structural Model

Stelzl (1986) and Lee and Hersberger (1990) have proposed rules for generating equivalent models. In general, this involves altering the pattern of relationships or paths within the original model so as to produce an alternative model. As mentioned single stage analysis was conducted for various sub-models (1-3). The result has indicated that number of items had no significance at all. At the outset, demographic variables such as gender, age, and geographical location of the institution were trimmed off and than later on; PC ownership, PC use and PC knowledge were taken out. As such all these variables are either based upon dichotomous or categorical scale and the initial data analysis has revealed that these variables are very much skewed. The PC knowledge and PC use are self-reported items with possibility of response errors. So we have excluded them from our first measurement model. The first model was therefore tested for the remaining external variables with the intervening variables Perceived Usefulness and Perceived Ease of Use. Unfortunately this model has very little parsimony.

Goodness-of-fit measure	Recommended value *	Model 1	Model 2	Model3
Chi-square/ degree of freedom	≤ 3.0	10.7	8.7	3.2
Goodness-of-fit index (GFI)	≥ .90	.71	.73	.78
Adjusted goodness-of-fit-index (AGFI)	≥ .90	.41	.49	.70
Normed fit index (NFI)	≥ .90	.42	.25	.83
Not-normed fiit index (NNFI)	≥ .90	.02	.05	.85
Comparative fit index (CFI)	≥ .90	.47	.24	.87
Root Mean square approx (RMSEA)	.005	.02	.17	.01
R^2		.18	.20	.40

(*Recommended values are adapted after Kelloway, 1998)

Table 8: Comparison of goodness-of-fit measures

In a model 2 all the external variables such as PC exposure, Task related and institutional support were directly tested to determine the student's use of the Internet without the intervening variables. This model again have very little support as evident from the Table 8. It further explains the 20% of the total variations toward the use of the Internet. While assessing the parsimony of the model Falk and Miller (1992) criteria were considered that suggests that loadings on paths between latent variables and manifest variables should be 0.55. The PC ownership and PC knowledge do not meet the criteria so they were dropped out from the model. After trimming the significant path analysis between exogenous constructs (PC experience, Task characteristics, Task variety and Institutional support) were studied. Table 9 below shows that a number of external variables had a significant effect on PU and PEOU and attitude. As hypothesised, PU and PEOU determine attitude toward use jointly. Although most of the prior research in TAM exhibit roughly equivalent influence on the acceptance and use of an information technology, however, in our case the path coefficients between PEOU and attitude is not very attractive although the associated p-value is significant, yet it is not a significant predictor of attitude. In other words, the PU mainly determines attitude. Ease of use is not perceived by the students to be related to the functionality of the Internet – i.e. its usefulness, because it interferes with their daily routine work but it might be an aid to complete various assignments. Finally, attitude had a positive relationship with the use of the Internet and from Table 9 seems to be very strong. This model had a better predictive power as compared to two others with about 40% of the total variance is explained. Moreover its chi-square/degree of freedom ratio is close to the recommended value as indicated in Table 8.

Path		**Path Coefficient**		
From	***To***			
	Perceived Usefulness	Perceived Ease of Use	Attitude	Use of the Internet
PC Experience	.391	Not Significant		
Task Characteristics	.301	.311		
Task Variety	.763	.572		
Institutional Support	.401	.580		
Perceived Usefulness			.625	
Perceived Ease of Use			.124	
Attitude				.906

(All values are significant at p< .01 except the one)

Table 9: Estimates of the parameters of structural equation model 3

DISCUSSION

One of the objectives of this study was to identify the current level of use of the Internet among students. The study has produced interesting findings. A total of 85% of students used the Internet facility. Of this percentage 67% are using the facility at home. The institutional resources need to be enhanced to support the increasing demand.

The second objective of this study was to develop and test a model for better parsimony. This was achieved through structural equation modelling. To our best knowledge no previous study has ever targeted the students from technical and vocational colleges with the use of the Internet and the application of robust theoretical model. In this study the research model was used to identify key factors and relationships likely to influence the acceptance and use of the Internet. The result supports the theory that the link between the two beliefs and attitudes as well as between attitudes and actual use is strong. The study has also concluded that external variables influence usage behaviour but the belief construct do not fully mediate this influence as the some of the external variables have strong paths coefficients for PU and some others have strong path coefficient for PEOU.

In the study we have used at the outset a set of uncontrollable variables such as, gender, age, geographical location of the institution and the ownership of PC and were excluded in our structural model as being very much skewed. Where as, other external variables such as; PC experience, task characteristics, task variety, institutional support are taken as controllable variables. The controllable as well as the intervening variables (PU and PEOU) are important because we believe that these have an impact on belief and behaviour to further encourage the use.

The result shows that PC experience is significantly linked to the PU and not significant with PEOU. This makes sense that as such PC experience measures the students' competency and skill on PC so the ease of use does not matter at all. The findings are inline with Igbaria and Chakraborti, (1990; 1992); Seyal *et al*. (2002). Similarly, the task characteristics that involve the browsing the web for various types of jobs have a significant path coefficient for both PU and PEOU with minor difference in PEOU. On the other hand, task variety plays a significant role in influencing belief toward the use of the Internet. Task variety provides an additional dimension of task characteristics. It is further supported by strong path coefficient for PU. The findings support the preposition that an individual who performs a great variety of tasks by using the Internet will become personally involved with technology that enhance the further use. The findings are in line with several prior studies (Goodhue and Thompson, 1995; Harris, 1999).

Institutional support is in fact available to only 33% of the students. Actually only two institutions at present provide this support. The aspect needs to be further examined by the relevant authorities. 67% of the students are using the Internet facility at home and the existing setup of service provider is not very cost-effective so the students may foresee this with the ease of use. As more institutional support is expected it will in turn enhance the use at later stages. This is reflected in Table 9 with strong path coefficient with the PEOU. Our

findings do not fully supports Pijpers *et al*. 2001 who have found that organisational support enhances the actual use but not the belief part.

The findings further support the theory that the link between the two beliefs and attitudes as well as between attitude and actual use is strong but if we consider the path coefficient as a measuring parameter, the affect of perceived usefulness is more strongly believed to predict the attitude than perceived ease of use as reflected in Table 9. Several studies found that PEOU had no significant effects on intention to use the technology (Davis, 1984; Igbaria *et al*., 1995; Chau, 1996). This is mainly because of the fact that users are more computer literate and technologies are more user friendly and even most of the college assignments regardless of the area of study involve more and more of Web-based search, the PEOU has become less a factor in technology acceptance decision (Chau, 1996). PEOU only encourages the novice to try the technology's features and utilities that require wide participation more useful at the early stage. Likewise, most of the previous studies, our study also found that perceived usefulness had the greater direct affects on intention to use. It further implies that students would only use the technology (Internet) if they think that technology would help them to perform the task. This further leads to development of a favourable student attitude that eventually predict the student use of the Internet in the technical colleges of Brunei.

As such, the re-specified model doesn't present an ideal situation of the acceptance criteria as laid down by Kelloway (1998). We should take precautions to accept the results. Overall, model 3 has better parsimony compared to the others with relatively better R^2. As stated by Chin and Todd (1995), we should not purely rely on model fit criterion; instead, closer attention should be paid to the predictiveness of the model and on the path coefficients. Standardised paths should be at least .20 and ideally above .30 in order to considered meaningful. Fortunately, our model 3 meets this criterion and can therefore be used to deduct the meaningful deductions.

CONCLUSION

The study has fulfilled both of the objectives of the research. We found that 85% of the students are using the Internet facility. The study provide support for the core TAM model as an adequate and parsimonious. As such TAM assumes that the influence of external variables on use is channelled through two belief segments that have impact on attitude to predict the use of the technology. This study has confirmed the TAM core model. Under the three structural equation model the third one with better parsimony have further suggested that external variables; PC experience, task characteristics, task variety, institutional support the two beliefs segment PU and PEOU that directly affect the attitude and the right and favourable attitude predict the students' use of the Internet. These external variables are under the direct control of the administration of the technical colleges. So any attempt to either improve or enhance use of the Internet such as more usage for academic purposes should optimise these key controllable variables. The executives and administrators of the colleges must consider these factors so that they can serve the needs of the students within their organisation. This is further supported by the fact that the overall total effect of perceived usefulness is greater when compared with the total effects of perceived ease of use. This further indicates that students with more practical exercises and tasks are more driven to accept the technology primarily on the basis of usefulness compared to user friendliness.

The study similar to several others studies is not free from weaknesses. Several limitations of this study qualify the findings and suggest directions for future research. Most of the items are self-reported that are liable to be further response-bias. These response errors can be minimised by some initial workshops at the college level to educate and to provide some training to the students for the research design and research objectives. The study lacks direction in assessing the problems faced by the students at the institutional level and research design could be further improved by adding more items.

Based upon the results, we therefore recommend another study based upon more variables of the students population in the technical colleges as well as in other colleges and school by adding items measure social and cultural aspects and of perceived fun/enjoyment related. This will definitely provide a better insight of the students' use of the Internet.

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