MEASURING ATTITUDES TOWARD COMPUTER AND INTERNET USAGE AMONG POSTGRADUATE STUDENTS IN MALAYSIA

Dr. Nabeel Abedalaziz
Faculty of Education, Department of Educational Psychology and Counseling, University of Malaya, 50603 Kuala Lumpur, Malaysia
e-mail: nabilabedalaziz@yahoo.com

Dr. Shahrir Jamaluddin
Faculty of Education, Department of Educational Psychology and Counseling, University of Malaya, 50603 Kuala Lumpur, Malaysia
e-mail: jamaluddinshahrir@gmail.com

Dr. Chin Hai Leng
Faculty of Education, Department of Curriculum & Instructional Technology, University of Malaya, 50603 Kuala Lumpur, Malaysia
e-mail:chin@um.edu.my

ABSTRACT
The aim of this study is to investigate and measure postgraduate students' attitudes toward the Internet and computer use. Specifically, the present study sought answers to the following questions: What is the overall profile of postgraduate students' attitudes toward the Internet and computer use? Do postgraduate students' attitudes toward Internet and computer use differ in terms of gender? Do postgraduate students' attitudes toward the Internet and computer use in instruction differ in terms of field of study? Do postgraduate students' attitudes toward the Internet and computer use differ in terms of ethnicity? Do postgraduate students' attitudes toward the Internet and computer use differ in terms of age? A total of 289 postgraduate students participated in this study. Attitudes scales to assess postgraduate student's attitudes toward the use of Internet and computer were used. Results reveal that: (1) participants have a high level perception of the usefulness and their control of the computer and Internet, (2) no significant differences were found between participants' attitudes toward the Internet and computer related with gender, field of study, and ethnicity, and (3) postgraduate student's attitudes toward computer and Internet usage is age related.
Keywords: Affective, Behavioral Intention, Perceived Control, Emotional Response, Usefulness.

INTRODUCTION

Information and Communications Technology (ICT) is becoming increasingly widespread, influencing many aspects of our social and work lives, as well as many of our leisure activities. For instance, ICT dexterities constitute a major part of educational programs (Thomas & Stratton, 2006). In many developed countries, nearly all schools are equipped with the infrastructure to conduct ICT mediated teaching and learning. In Malaysia, the main goals of the Ministry of Education (MOE) in implementing ICT in the education system is to position ICT as a teaching and learning tool, to increase the productivity, efficiency and effectiveness of the management system. To achieve these goals, it is important to ensure students and educators are able to integrate ICT into their teaching and to enable them to adapt their environment and adjust their instructional approaches (Zhang & Espinosa, 1997). Some studies reveal that using ICT consistently develops more positive attitudes toward computers (Delcourt & Kinzie, 1993; Birisci, Metin, & Karakas, 2009; Teo, 2008). So the most important factor that affects teachers' attitudes toward using information technologies in the classroom could be gaining of more positive attitudes. If teachers' attitudes toward ICT are negative, they would not want to use ICT in the teaching and learning process. In particular, 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 influence in the adoption of technology for teaching and learning.

The advent of technology and information systems and their importance in economic development has caused nations to create a more technologically literate workforce. Malaysian government implemented the first computer system in 1966. Since then, the Government has introduced various initiatives to facilitate the greater adoption and diffusion of ICT to improve capacities in every field. Malaysia also has a long-term vision, usually referred to as "Vision 2020" which calls for sustained, productivity-driven growth, which will be achievable only with a technologically literate, critically thinking workforce prepared to participate fully in the global economy of the 21st century (Foong-Mae, 2002).

Malaysia plans a more widespread use of computers and related Information and Communications Technology in educational areas to ensure that graduating students are proficient in the use of such technology. To achieve this objective, the Malaysian government has formulated plans to improve the education system through the implementation of "smart schools." Smart schools facilitated with multimedia technology and worldwide networking. The curriculum for these schools is to be individually-paced and include self directed learning experiences (i.e. student-centered), and open-ended curriculum (Ministry of Education Malaysia, 1999). In addition to the Smart School project, the Ministry of Education is also attempting to reduce the digital divide that exists in the different parts of the country by providing computer laboratories to thousands of schools. Other ICT-related projects involved the training of teachers, school administrators and other school staff. Innovative projects like the use of electronic books and e-learning are also being piloted to ensure their feasibility before any roll-out to all the schools in the country. Non-governmental agencies are also very much involved in the drive to introduce ICT into schools (Foong-Mae, 2002). Moreover, Malaysian teacher training objectives are all directed towards developing the skills of teachers to use ICT in teaching and learning processes (Tasir et. al., 2012).

The Ministry of Education has formulated three main policies for ICT in education. The first policy is that of ICT for all students, meaning that ICT is used as an enabler to reduce the digital gap between the schools. The second policy confirms the role and function of ICT in education as a teaching and learning tool, as part of a subject and as a subject by itself. ICT as part of a subject refers to the use of software in subjects. ICT as a subject refers to the introduction of subjects such as "Information Technology" and "Computerization". The third policy emphasizes using ICT to increase productivity, efficiency and effectiveness of the management system. ICT will be extensively used to automate and mechanize work processes such as the processing of official forms, timetable generation, and management of information systems, lesson planning, financial management and the maintenance of inventories (Foong-Mae, 2002).

The Ministry of Education is committed to utilizing the following multi-prong strategies to ensure that the objectives of ICT in education are achieved: preparation of sufficient and up-to-date tested ICT infrastructure and equipment to all educational institutions, roll-out of ICT curriculum and assessment and emphasis the integration of ICT in teaching and learning, upgrading of ICT knowledge and skills in students and teachers, Increased use of ICT in educational management, and upgrading of the maintenance and management of ICT equipment in all educational institutions (Ministry of Education Malaysia, 1999; Foong-Mae, 2002). In near future, every students will have access to a 4G network in school through 1BestariNet which serve as virtual learning platform that can be used by teachers, students and parents to share learning resources, run interactive lessons and communicate virtually (Preliminary Report Malaysian Education Blue Print, 2012).

Accordingly, all higher education institutions in Malaysia will be affected by these developments including the Faculty of Education at University of Malaya. The faculty must also be computer literate and competent enough to use those technologies that are available and to become innovative and receptive to change by knowing the strengths and the limitations of the technological tools available. While ICT receives wider acceptance in the field of education than in other fields, some teachers still exhibit a certain degree of anxiety toward ICT usage as a tool to be used in the fields of education and learning (Orhun, 2002; Albion, 2003). If high level of anxiety, low level of self-efficacy, and low level of attitudes toward ICT usage exist among postgraduate students they may choose not to use this computer technology even though they believe that ICT usage will lead to improve teaching and learning processes (Delcourt & Kinzie, 1993). Faculty of Education at university of Malaya is now obligated to be knowledgeable and confident of their ability to use the new emerging computer technologies to deliver instruction more efficiently and effectively. However, little is known about the characteristics of the postgraduate student's attitude toward ICT usage. With this in mind, there is a need to assess postgraduate student's attitudes toward ICT usage, and exploring factors relating to postgraduate attitudes toward ICT.

THEORITICAL FRAMEWORK

An attitude refers to one's positive or negative judgment about a concrete subject. Attitudes are learnt; they are moldable and may change with experience of the stimulus objects and with social rules or institutions (Binder & Niederle, 2007). More recent research indicates that attitude represents a summary evaluation of a psychological object and is described both internally and externally in dimensions such as good-bad, likeable-dislikeable, harmful-beneficial, pleasant-unpleasant (Ajzen & Fishbein, 2000; Eagly & Chaiken 1998). Ajzen (1988) described an attitude as a predisposition to respond favorably or unfavorably to an object, person, or event. As implied in this definition, attitudes possess cognitive (beliefs, knowledge, and expectations), affective (motivational and emotional), and performance (behavior or actions) components.

Attitudes toward ICT usage have been defined as a person's general evaluation or feeling towards ICT and specific computer and Internet related activities (Smith, Caputi, & Rawstone, 2000). The learner attitude toward computer measures a person's capabilities in effective learning. Garland and Noyes (2005) indicated that in the educational context, confidence should lead to more positive attitudes toward computers and Internet, and this will enhance learning and associated activities. Attitude, in turn, constitutes various dimensions. Some examples of these are perceived usefulness, computer confidence, anxiety, and liking. Rogers (1995) identifies four main attributes of technology that affect its acceptance and subsequent adoption: relative advantage, compatibility, complexity and observability. These attributes are investigated as a predictor in determining educators' attitudes toward ICT.

Theory of Planned Behaviour (TPB) as initially designed by Ajzen and Fishbein (1980) attempts to understand peoples' intentions to engage in a number of activities. It appears that the application of the theory of planned behavior deals with the antecedents of attitudes, subjective norms, and perceived behavioral control. These antecedents determine intentions and actions. Human action is influenced by attitude towards the behavior, subjective norm and perceived capability to perform the behavior. In combination, attitude, subjective norm and perceived behavioral control lead to the formation of a behavioral intention. In general, the more positive the attitude towards performing the behavior, along with substantial levels of social pressure to do so and perceived control over one's actions, the more likely the individual is to carry out the behavior. Often behaviors pose difficulties with regard to execution. In this way it is useful to consider perceived behavioral control in addition to intention. Depending on how realistic people are in their judgments of the level of difficulty associated with behaviors, a measure of perceived behavioral control can serve as a proxy for actual control and as such can contribute to the prediction of the behavior in question. When applied to the engagement with ICT, TPB suggests that intentions to engage and interact with a particular ICT activity influenced by attitudes towards ICT usage (Fishbein & Ajzen, 2010; Ajzen & Fishbein, 1980).

The Theory of Reason Action (TRA) proposed by Fishbein and Ajzen (1975) postulates that an individual's behavior is determined by his/her intention to perform that both behavior and intention are influenced jointly by the individual's attitude and subjective norm. Davis (1989) developed the Technology Acceptance Model (TAM) to explain perceived technology usefulness and usage intentions by taking into account social influence and cognitive processes. TAM suggested attitude influences behavioral intention to use, and subsequent actual use. TAM also includes the constructs of perceived usefulness and perceived ease of use. Perceived usefulness is the extent to which a person believes that using a system will enhance their performance, whilst perceived ease of use is the extent to which a person believes that use of the system will be free from effort. These two constructs have an important impact on a person's attitude toward using the ICT but, unlike the TRA, Davis found that attitude did not completely mediate between beliefs and intentions; this suggests that an individual could hold negative attitudes to a system, but would still use it because it has high-perceived usefulness.

Although the TAM model has evolved, the attitude toward behavior, subjective norm and behavioral intention components are common to both TAM and TRA models, acknowledging that attitude and subjective norms have an influence on the intention to use ICT leading to their actual use of ICT. The development of the Theory of Planned Behavior (TPB) (Azjen, 1985), which was developed from the TRA, led researchers to consider the use of the TPB for predicting people's behavior towards technology use. Mathieson (1991) suggested that, while TAM is useful for gathering general information about people's perception of a system, TPB can provide detailed information regarding each of its components that might relate to a specific group of people. The TRA and the TPB have continued to be employed and adapted by researchers to predict behavior towards ICT usage.

Based on the related literature, and the previous models (i.e. TPB, TRA and TAM), the present study assessed the participants' attitudes towards various aspects of computer usage (i.e., Affective, Perceived Usefulness, Perceived Control, and Behavioral Intention). In the present study, Affective refers to feelings toward computers, Perceived Usefulness refers to individual's beliefs about the usefulness of computers in their study, Perceived Control refers to perceived comfort level or difficulty of using computers, and Behavioral Intention refers to behavioral intentions and actions with respect to computers (Teo, 2008). Likewise, attitudes towards Internet are a multidimensional factor (Tsai, Lin, & Tsai, 2001). In the present study, attitudes toward internet usage assessed in term of the perceived usefulness, emotional response and perceived control. Perceived Usefulness refers to individual's beliefs about the usefulness of Internet in their study. Perceived Control refers to perceived comfort level or difficulty of using Internet. On the other hand, Emotional response refers to the level of feelings and anxiety when using the Internet. In the present study, postgraduate students attitudes toward computer and Internet usage investigated through gender, age, ethnicity, and field of study (see Figure 1).

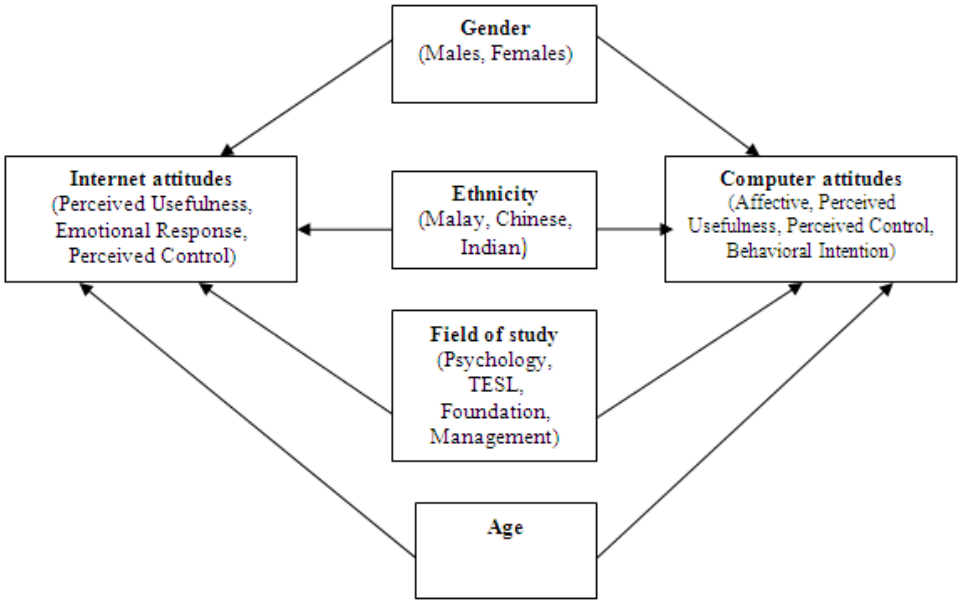

Figure 1: A visual model of the conceptual framework**.**

RELATED LITERATURE

A person's attitude toward a computer is influenced by a variety of aspects, e.g., computer confidence (Teo, 2008), computer anxiety or comfort (Bandalos & Benson, 1990), age and gender (Kutluca, 2010), subject area and years of computer usage (Teo, 2008), For instance, Cavas et. al., (2010) explored Turkish primary science teachers' attitudes towards ICT in education and (then) the relationship between teachers' attitudes and the factors related to teachers' personal characteristics (gender, age, computer ownership at home, and computer experience). The instrument (STATICTE) was developed by researchers and administered to 1071 science teachers. The results indicated that the Turkish science teachers have positive attitudes toward ICT; no gender differences have been traced in their attitudes towards ICT but differences were found in terms of their age, their computer skills (experience) and their ownership of computers at home.

Cultural differences in beliefs need to be taken into account when studying instructional interventions (Brennan, McFadden & Law, 2001). Different cultures and races generate different educational philosophies and beliefs. With this in mind, researchers have studied the appropriateness of adopting Western measuring instruments to be used in non-Western cultural contexts. For instance, Lin and Gorrell (2001) explored pre-service teacher efficacy in Taiwan and clearly argued that teacher efficacy and beliefs are largely shaped by culturally and values. Culture and context have also repeatedly been reported as obstacles to the integration of ICT in education (Chai, Hong, & Teo, 2009; Tearle, 2003). For instance, Chai, Hong, and Teo (2009) argue that culture plays a mediating factor that influences how teachers relate their beliefs to ICT usage.

Since the introduction of ICT related activities have been viewed as a 'male domain' (Panteli, Stack, & Ramsay, 1999). There is a significant body of evidence supporting the notion that gender plays a vital role in actual ICT integration. Previous study findings related to gender differences in attitudes toward computer and Internet are inconsistent. Some of the previous studies reported gender related differences in attitudes toward computers favoring males (Loyd & Gressard, 1986; Blackmore et al., 1992; Al Jabri, 1996; Brosnan and Lee, 1998; Graff, 2003; Shashaani, 1993; Sainz et. al., 2010; Tsai, Lin, & Tsai, 2001). Whereas, other studies reported that gender related differences in attitudes toward computers favoring females (Adebowale et al., 2010; Avraham, 2005; Meelissen & Drent, 2008). For instance, Loyd and Gressard (1986) found male teachers to be more confident and less anxious toward computers usage compared to their female counterparts. In another study, Blackmore et al. (1992) found males appear to be more positive in their attitudes toward computers than females. On the other hand, Pope-Davis and Twing (1991), and Teo (2008) did not find statistically significant gender differences. Since technologies have become a normal part of the workplace setting, a number of researchers argue that computing should no longer be regarded as a male domain (King, Bond, & Blandford, 2002; North & Noyes, 2002). This emphasizes the need to reconsider the potential impact of gender in the context of attitudes toward ICT usage.

The findings from the literature related to the impact of age on attitudes toward ICT usage are mixed. A study of Internet use in an academic library environment found that older librarians were less likely to use the Internet (Rosenthal & Spiegelman, 1996). (Spacey, Goulding, & Murray, 2003) reported that younger workers had higher average intention to use the Internet and ease of use scores than their older counterparts. Positive perceptions of one's computer skills might relate to the familiarity younger workers have with ICT since it is used extensively at school, college and university. As Swann (2003) observes, "Information Communications Technology (ICT) is so recent that most people over the age of 28 have not had the benefit of computer training in their own schooling". Dyck and Smither (1994) found a significant relationship between age and levels of computer anxiety. In another study, Czaja et. al., (2006) out those older and middle-aged adults had lower self-efficacy with respect to use of computers and higher computer anxiety than did younger adults. In his study, Maurer (2001) discovered that older participants reported lower self-efficacy for career-related training, revealing age related declines for specific efficacies. Conversely, Teo (2008) reported that pre-service teacher's attitudes toward compute usage are age-unrelated, whereas participants in different subject domains (Humanities, Sciences, Languages, and General (Primary)) differed in their perceptions of ICT usage.

Mohammad and Alkaraki (2008) indicated that previous studies related to Internet usage revealed: (a) low degree of Internet users in university learning, (b) high degree of Internet usage, (c) significant gender related difference in Internet usage, (d) no significant relationships between major and Internet use with scientific branches predominance, (e) significant relationships between the Internet attitudes and field of studies, (f) the impact of Internet tool in learning process, and (g) the most important aspects of using Internet was e-mail.

THE NEEDS OF THE STUDY

A major reason for studying teachers' attitudes toward ICT is that it is a major predictor of future classroom ICT usage (Myers & Halpin 2002). Woodrow (1992) asserts that any successful transformation in educational practice and process needs the development of positive user attitude toward ICT. Also, Huang and Liaw (2005) stated that teachers' attitudes towards computers affect the successful usage of computers in the classroom. In empirical study, Van Braak, Tondeur, and Valcke (2004) supported that class usage of computers was strongly affected by attitudes toward computers in education. Furthermore, the strong relationship of computer-related attitudes and computer usage in education has been emphasized in many studies (Van Braak, 2001). For instance, Khine (2001) found a significant relationship between computer attitudes and its usage in the institution. Attitudes towards computers influence teachers' acceptance of the usefulness of ICT, and also influence whether teachers integrate ICT into their classroom teaching processes (Akbaba & Kurubacak, 1999; Clark, 2001). Taking the importance of attitudes toward ICT into consideration, it is also important to understand what influences postgraduate' attitudes towards ICT (Fisher, 2000). These attitudes are related to other internal and external variables (e.g. gender, race, age, field of study, experience).

Li (2002) have pointed to a wide range of factors affecting attitudes toward ICT. The variations in the factors identified by different researchers might be attributed to differences in context, participants, and type of research. A large body of literature review further explored the relationship between attitudes toward ICT and demographic variables such as gender, field of study, race, age, academic rank, teaching experience, computer experience, and computer training, which revealed some interesting findings. While there are general consistencies in many of the findings, it should be noted that researchers have not been conclusive in regards to the relationship between attitudes toward ICT and gender. Some studies revealed significant differences between attitudes toward ICT and gender, but others revealed no significant differences. It is hoped that this study will shed some light in regards to the inconclusiveness of such earlier studies. Moreover, it is also hoped that this study will serve as a foundation for other technological studies in Malaysia to further understand factors that may influence integration of ICT among educators. It is also hoped that this study will open a new frontier to achieve the Malaysian government's objective to be a fully developed country by the year 2020 and to provide a technologically skilled and qualified workforce.

Determining postgraduate students' beliefs and attitudes towards computer and Internet usage is so important because most of the postgraduate students at University of Malaya are teachers in schools and some of them will be teachers. Therefore, exploring their attitudes towards computer and Internet usage might help the decision makers at University of Malaya to evaluate students' ICT usage and attitudes. Moreover taking the necessary procedures to enhance postgraduate students' usage of ICT skills will facilitate their professional life and instruction. As such, assessment of students' attitudes toward technology use in teaching and learning is important for future introduction of ICT materials in education. In most cases, the teacher is key to effective ICT implementation in the educational system; given that teachers have tremendous potential to transmit

epistemological beliefs and values to students, it is important to understand the biases and stereotypes teachers have about ICT usage and to investigate the variables acting as facilitators to teachers' positive ICT usage (Teo, 2008). Among the variables affecting successful use of computers and the Internet in instruction are teachers' attitudes towards ICT (Huang & Liaw, 2005).

To date, no specific related studies were found at international and local levels. Moreover no direct relationships between ICT attitudes and various demographic variables such as, ethnicity and field of study is found to be reported at national local levels as well. Furthermore, this study reports on the empirical evaluation of two standard scales to assess Malaysian postgraduates' attitudes toward internet and computer usage. To date, no similar instruments have been empirically evaluated in Malaysian community. Most research on gender differences in use of the Internet has been done in western countries (Nai Li & Kirkup, 2007:302).

In the light of the related literature, there is a need to understand the dimensions that influence teacher attitudes toward ICT (computer and Internet) use as a function of gender, field of study, age, and ethnicity. Accordingly, the present study aimed at exploring the overall postgraduate students' attitudes towards computer and Internet usage. Furthermore, the present study tested the following null hypotheses:

1. Postgraduate students attitudes toward computer and Internet usage would not be significantly related to gender.
2. Postgraduate students attitudes toward computer and Internet usage would not be significantly related to ethnicity.
3. Postgraduate students attitudes toward computer and Internet usage would not be significantly related to the field of study
4. Postgraduate students attitudes toward computer and Internet usage would not be significantly related to age.

METHODOLOGY AND PROCEDURES

Participants were informed of their rights, provided an explanation of the purpose of the study, Those who chose to participate were given a packet that included, a brief demographic survey, the computer attitudes scale (CAS), and the internet attitudes scale (IAS). Data was collected from the participants on a voluntary basis during the first semester of the 2011 academic year. At all occasions, the author was present throughout the data collection process. After a brief introduction to the research, the survey questionnaires were distributed to students. On the average, students took about 30 minutes to complete the survey forms. There were also no queries from the participants.

Therefore, this study is considered as a quantitative study with multivariate design. All analyses were conducted using SPSS 20.0 and AMOS 20.0. Traditional psychometric analysis of the CAS and IAS included exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) to assess the dimensional structure of each scale followed by reliability analysis. Multi factors MANOVA analyses follow up by univariate analysis were conducted to study the effect of various demographic variables as independent variables (i.e. gender, ethnicity, age, and field of study) on the CAS and IAS subscales scores as the dependent variables.

Samples

The participants in this research were 289 postgraduate students enrolled in four educational Master Degree Programs at University of Malaya (i.e., Educational Psychology and Counseling, Teaching of English as a Second Language (TESL), Educational Foundations, and Educational Management). Of these, 155 were males and 134 were females. Students' ages ranged from 24 to 53 (*Mean*= 31.45, *SD*= 6.76) years old. Table 1 shows the sample distribution by gender, race, and department (field of study).

Table 1: Samples distribution by gender, race, department, and economic level

		Number	Percentage
Gender	Male	155	54
	Female	134	46
Ethnicity	Malay	119	41
	Chinese	124	43
	Indian	46	16
Field of study	Psychology	83	29
	TESL	83	29
	Foundation	36	12
	Management	87	30

Total	289	100

Instruments

This section provides a detailed description of the validation processes of two instruments used to measure postgraduates students attitudes toward Internet and computer usage (i.e. Computer attitudes scale, and Internet attitudes scale).

Computer Attitudes Scale (CAS)

The Computer Attitudes Scale (CAS) (Selwyn, 1997), was used to assess the attitude of students toward computer usage. The scale consists of 21 statements representing attitude towards various aspects of computer (i.e., Affective, Perceived Usefulness, Perceived Control, and Behavioral Intention). In the present study, Affective refers to feelings toward computers, Perceived Usefulness refers to individual's beliefs about the usefulness of computers in their study, Perceived Control refers to perceived comfort level or difficulty of using computers, and Behavioral Intention refers to behavioral intentions and actions with respect to computers (Teo, 2008). Participants responded to the CAS using a five-point Likert scale of *strongly disagree* (1), *disagree* (2), *neutral* (3), *agree* (4), and *strongly agree* (5). Furthermore, the negative items were reverse coded.

Prior to analyzing data using factor analysis, data collected in this research went through Bartlett's Test of Sphericity meant to measure the applicability of factor analysis. Kaiser-Meyer-Olkin Measure of Sampling Adequacy recorded at 0.77 (>0.5), hence it is good enough to use factor analysis in determining the number of factors to be retained and loading factors on the items.

Exploratory factor analysis (*EFA*) and principal component analysis with varimax rotation on the 21 items suggested four interpretable factors: Affective (5 items), Perceived Usefulness (4 items), Perceived Control (4 items), and Behavioral Intention (4 items). Items loading more than ±0.40 were retained on the relevant factor, and items loading less than ±0.40 were omitted (Field, 2000). Thus, item analysis reduced the original 21 items to 17 items with four independent constructs. The results show that the factor loadings range between 0.47 and 0.88 on the Affective subscale, between 0.53 to 0.69 on the perceived usefulness subscale, between 0.41 and 0.79 on the Perceived Control subscale, and between 0.51 and 0.77 on the Behavioral Intention subscale. The Eigen values of the first four factors from principal component analysis were larger than 1: 5.48, 3.49, 1.58, and 1.22 respectively. These four factors accounted for 58.82% of variance in the final version of the scale.

The behavior of individual items in relation to others within the same subscale provides good evidence for content validity because the highest factor loading is central to the domains assessed by these subscales (Francis, Katz, & Jones, 2000). The Cronbach alpha coefficients calculated for the Affective, Perceived Usefulness, Perceived Control, and Behavioral Intention subscales were .77, .78, .77 and .78, respectively, and it was calculated to be .81 for the entire scale. The scale correlation coefficients ranged between .35 and .47 on affective, between .36 and .56 on perceived usefulness, between .34 and .62 on perceived control, between .41 and .61 on Behavioral Intention. It is generally agreed that correlations in the range of .35 to .65 are useful and statistically significant beyond the 1% level, whereas correlations less than .25 are not useful and statistically non significant (Brown 1983; Bryman & Cramer, 1997). Thus, the results show that the alpha coefficients for all subscales were significantly high, suggesting that the internal reliability index of the four constructs and the entire scale is adequate. In addition, the results of inter correlations show that each subscale correlates significantly with other subscales and the entire scale. According to Harrison, Seeman, and Behm (1991), this result provides at least further evidence for the consistency of the entire scale and for the convergent validity of each subscale. Therefore, it can be concluded that the four factors measure Internet attitudes in a coherent way. All subscales correlate significantly at the $p < .01$ level and the coefficients range from .32 to .51. This suggests that the four components were fairly independent to be used as independent variables. This allows us to examine the computer attitudes of students by each subscale.

Moreover, Confirmatory Factor Analysis (*CFA*) seeks to determine if the number of factors and the loadings of measured (indicator) variables on them conform to what is expected on the basis of pre–established theory. A *CFA* was conducted to test the fit between the four–factor model and the data. The maximum likelihood estimation method was used.

Prior to *CFA* analysis, the data were examined for multivariate normality, multicollinearity and outliers. The bivariate correlations, tolerance, and variance inflation values indicated that neither bivariate nor multivariate multicollinearity was present. Because maximum likelihood estimation assumes multivariate normality of the

observed variables, the data were examined with respect to univariate and multivariate normality. No items showed skew or kurtosis that exceeded the cutoffs of |3| or |8| (Kline, 2005), respectively, indicating no problems with univariate nonnormality. The Mardias coefficient is a standard measure of multivariate normality and its value obtained in this study is 167.87. This value is less than the recommended value (p (p+2)) where p= total number of observed indicators; 21(23) = 483) by Raykov and Marcoulides (2008) hence the requirement of multivariate normality is satisfied. On this basis, the data for this study was considered adequate for confirmatory factor analysis.

In general, multiple goodness–of–fit tests were used to evaluate the fit between the hypothesized model and the data to determine if the model being tested should be accepted or rejected. These are Normed Fit Index (*NFI*; Bentler & Bonett 1980), the Comparative Fit Index (*CFI*; Bentler 1990), the Root Mean Square Error Approximation (*RMSEA*; Steiger & Lind, 1980), and the minimum fit function Chi–Square ratio degrees of freedom (*CMIN/DF*, Marsh & Hocevar, 1985). NFI and *CFI* greater than 0.90 indicates a good fit to the data, and the RMSEA of about 0.05 indicates a close fit of the model and 0.08 represents a reasonable error of approximation. *CMIN/DF* valve in the range of 2 to 1 or 3 to 1 are indicative of an acceptable fit between the hypothetical model and the sample data (Arbuckle, 2006). All coefficients are significant at p<0.01. *NFI*=0.96; *CFI*=0.97; *RMSEA*=0.05; *CMIN/DF*=1.86

Internet Attitudes Scale (IAS)

The instrument developed to measure the attitudes toward Internet use was adapted from Tsai, Lin, and Tsai (2001) and from Tendency Towards Internet designed by Kilincoglu and Altun (cited in Isman, 2004); it contained 22 items in Likert Type (*strongly agree* = 5, *agree* = 4, *undecided* = 3, *disagree* = 2, *strongly disagree* = 1). Prior to analyzing data using factor analysis, data collected in this research went through Bartlett's Test of Sphericity meant to measure the applicability of factor analysis. Kaiser-Meyer-Olkin Measure of Sampling Adequacy recorded at 0.74 (>0.5), hence it is good enough to use factor analysis in determining the number of factors to be retained and loading factors on the items.

Exploratory factor analysis and principal component analysis with varimax rotation on the 22 items suggested three interpretable factors: perceived usefulness (10 items), emotional response (6 items) and perceived control (5 items). In this study, perceived usefulness was defined as participant's perception of the positive impacts of the Internet on society and the individual, emotional response was defined as the participant's feelings and anxiety when using the Internet and perceived control was defined as participant's confidence in the independent control of the Internet (Tsai et. al., 2001). Items loading more than ±0.40 were retained on the relevant factor, and items loading less than ±0.40 were omitted (Field, 2000). Thus, item analysis reduced the original 22 items to 20 items with three independent constructs. The results show that the factor loadings range between 0.42 and 0.83 on the perceived usefulness subscale, between 0.41 and 0.79 on the emotional response subscale, and between 0.51 and 0.77 on the perceived control subscale. The Eigen values of the first three factors from principal component analysis were larger than 1: 5.11, 3.45 and 1.40 respectively. These three factors accounted for 46.74% of variance in the final version of the scale.

The behavior of individual items in relation to others within the same subscale provides good evidence for content validity because the highest factor loading is central to the domains assessed by these subscales (Francis et. al., 2000). The Cronbach alpha coefficients calculated for the perceived usefulness, emotional response and perceived control subscales were .77, .78, and .76, respectively, and it was calculated to be .81 for the entire scale. The scale correlation coefficients ranged between 0.34 and 0.45 on perceived usefulness, between 0.36 and 0.59 on emotional response, and between 0.38 and 0.69 on perceived control. It is generally agreed that correlations in the range of .35 to .65 are useful and statistically significant beyond the 1% level, whereas correlations less than .25 are not useful and statistically non significant (Brown, 1983; Bryman & Cramer, 1997). Thus, the results show that the alpha coefficients for all subscales were significantly high, suggesting that the internal reliability index of the three constructs and the entire scale is adequate. In addition, the results of inter correlations showed that each subscale correlates significantly with other subscales and the entire scale. According to Harrison et al. (1991), this result provides at least further evidence for the consistency of the entire scale and for the convergent validity of each subscale. Therefore, it can be concluded that the three factors measure Internet attitudes in a coherent way. All subscales correlate significantly at the p < .01 level and the coefficients range from .27 to .58. This suggests that the three components were fairly independent to be used as independent variables; it allows us to examine the Internet attitudes of students by each subscale.

Confirmatory Factor Analysis (*CFA*) seeks to determine if the number of factors and the loadings of measured (indicator) variables on them conform to what is expected on the basis of pre–established model. A *CFA* was

conducted to test the fit between the three–factor model and the data. The maximum likelihood estimation method was used. Prior to *CFA* analysis, the assumptions of *CFA* were verified. No violations to access *CFA* were found. Moreover, all coefficients are significant at $p<0.01$. *NFI*=0.95; *CFI*=0.95; *RMSEA*=0.05; *CMIN/DF*=1.88.

RESULTS

The overall profile of the participants' attitudes toward computer usage was measured in terms of the Affective, Perceived Usefulness, Perceived Control, and Behavioral Intention. The mean scores and standard deviations were used to explain the participant's attitudes profile. According to Birisci et. al., (2009), ranges of agreement with the attributions on the survey was determined by using the (n-1)/n formula and after calculation the interval width of the range between 1 through 5 was calculated as 0.8. As such, the interval width of 1-1.80 showed very low level, the 1.81-2.60 intervals showed low level, the 2.61-3.40 intervals showed medium level, the 3.41-4.20 intervals showed high level and the 4.21-5.00 intervals showed very high level of agreement with the statement on the survey**.** As can be seen in Table 2, the results of the descriptive statistics indicated that participant' attitudes towards computer as indicated by the mean scores ranging from 3.37 to 4.00 on a five point scale. *Perceived usefulness* dimension had the highest mean value (*M*ean = 4.00, *SD* = 3.03), followed by *perceived control* (*M*ean = 3.54, *SD* = 2.52), then by *affective* (*M* = 3.40, *SD* = 5.46) and then by *behavioral intention* (*M*ean = 3.37, *SD*= 3.65). The means suggest that participants have high level perceptions of the usefulness of the computer and their control of the computer. On the other hand, the participants have moderate level perceptions about their affect towards computers and intention to use computer.

Overall profile of the participants attitudes towards Internet were measured in terms of the perceived usefulness, emotional response and perceived control. *Perceived usefulness* dimension had the highest mean value (*M*ean = 4.03, *SD* = 4.96), followed by *perceived control* (*M*ean = 3.69, *SD* = 2.29), and then by emotional response (*M* = 2.85, *SD* = 4.59). The means suggest that participants have high level perceptions of the usefulness of the Internet and their control of the Internet. On the other hand, the participants have a moderate level of feelings and anxiety when using the Internet (Emotional response).

Table 2: Descriptive statistics for each subscale (n=289)

			Attitudes towards computer				Attitudes towards Internet		
			Affective	**Perceived Usefulness**	**Perceived Control**	**Behavioral Intention**	**Perceived Usefulness**	**Emotional Response**	**Perceived Control**
Gender	Male	Mean	3.51	4.03	3.65	3.48	4.06	2.88	3.74
		S.D	5.63	1.95	2.47	3.55	4.59	4.77	2.45
	Female	Mean	3.27	3.97	3.41	3.24	3.99	2.80	3.63
		S.D	5.19	3.94	2.49	3.72	5.35	4.38	2.06
Race	Malay	Mean	3.28	4.15	3.67	3.38	4.01	2.85	3.62
		S.D	5.49	3.93	2.25	3.70	4.67	4.48	2.40
	Chinese	Mean	3.62	3.87	3.47	3.49	4.02	2.88	3.67
		S.D	5.06	2.27	2.62	3.49	5.38	4.55	2.25
	Indian	Mean	3.12	3.98	3.41	3.15	4.09	2.76	3.93
		S.D	5.89	1.57	2.70	3.81	4.53	5.02	1.84
Department	Psychology	Mean	3.43	4.07	3.59	3.42	4.09	2.93	3.68
		S.D	5.77	2.24	2.82	4.00	5.02	4.65	2.25
	Tesl	Mean	3.24	4.04	3.52	3.32	3.99	2.92	3.61
		S.D	5.48	4.70	2.51	3.87	5.23	3.87	2.09
	Foundation	Mean	3.04	3.97	3.49	3.14	4.02	2.56	3.68
		S.D	4.41	1.61	2.44	3.20	3.65	4.77	1.66
	Manageme	Mea	3.67	3.91	3.53	3.46	4.00	2.82	3.79

	nt	n							
		S.D	5.25	1.90	2.28	3.21	5.13	4.96	2.68
Total		Mean	3.40	4.00	3.54	3.37	4.03	2.85	3.69
		S.D	5.46	3.03	2.52	3.65	4.96	4.59	2.29

Assumptions were checked before conducting Multivariate analysis (MANOVA). MANOVA has seven assumptions: sample size, independence of observations, normality, outliers, linearity, multicollinearity and singularity, and homogeneity of variance-covariance matrices. No violations were found on multivariate normality and equality of variance.

A multivariate analysis was conducted to investigate the effects of gender, field of study, and ethnicity on participants' attitudes towards computer usage. In order to evaluate multivariate significance, Wilks Lambda statistic was used. MANOVA results regarding gender, field of study, and ethnicity are presented in Table 3. The results indicated no statistically significant effect of gender on the combined dependent variables (F (4, 284) = 1.12, Wilks lambda = 0.94, partial Eta = 0.06, p = 0.36). The partial eta squared value of 0.06 represented that 6% of the variance in dependent variables could be explained by gender. Moreover, no statistically significant effect of ethnicity on the combined dependent variables (F (8, 280) = 2.04, Wilks lambda = 0.80, partial Eta = 0.10, p = .07). The partial Eta squared value of 0.10 showed that the 10% of the variance in dependent variables could be explained by ethnicity. Furthermore, no statistically significant effect of field of study was observed on the combined dependent variables (F (12, 276) = 1.61, Wilks lambda = 0.77, partial Eta = 0.08, p = 0.09). The partial Eta squared value of 0.08 showed that the 8 % of the variance in dependent variables could be explained by field of study.

Table 3: MANOVA Results for Gender , field of study, and ethnicity (computer)

Effect	Wilks lamda	*F*	Hypothesis df	Error df	*p*-value	Partial Eta Squared
Gender	.94	1.12	4.00	71.00	.36	.06
Ethnicity	.80	2.04	8.00	142.000	.07	.10
Field of study	.77	1.61	12.00	188.14	.09	.08

In order to investigate on which dependent variables participants in different group of gender, field of study, and ethnicity differed in their attitudes towards computer usage, multivariate analyses of variance between groups was conducted. Table 4 shows the summary results of MANOVA analysis. As seen in Table 4, males and females are similar in affective F (1, 287) = 1.58, p > .05; Perceived usefulness F (1, 287) = 1.17, p > .05; Perceived control F (1, 287) = 0.38, p > .05; and Behavioral intention F (1, 287) = 2.74, p > .05. Moreover, the three groups of ethnicity are similar in affective F (2, 286) = 2.30, p > .05; Perceived usefulness F (2, 286) = 2.78, p > .05; Perceived control F (2, 286) = 2.79, p > .05; and Behavioral intention F(2, 286)= 0.93, p > .05**.** Also, participants in different field of study are similar in affective F(3, 285)= 2.91, p>0.05; Perceived usefulness F(3, 285)= 2.20, p > .05; Perceived control F(3, 285)= 0.22, p > .05; and Behavioral intention F(3, 285)= 0.48, p > .05**.**

Table 4: Results of MANOVA Analysis for Differences Between the Means of the Participants attitudes towards computer usage with respect to gender, field of study, ethnicity, and economics level.

Source	Dependent variable	Type III Sum of Squares	*df*	Mean square	*F*-value	*p*-value	Partial Eta Squared
Gender	Affective	30.88	1	30.88	1.58	.21	.02
	Perceived Usefulness	4.68	1	4.68	1.17	.28	.02
	Perceived Control	2.04	1	2.04	.38	.54	.01
	Behavioral intention	26.56	1	26.56	2.74	.10	.04
Ethnicity	Affective	89.89	2	44.95	2.30	.11	.06
	Perceived Usefulness	22.25	2	11.13	2.78	.07	.07
	Perceived Control	22.27	2	11.14	2.79	.06	.08
	Behavioral intention	18.02	2	9.01	.93	.40	.02

Field of study	Affective	170.81	3	56.94	2.77	.07	.11
	Perceived Usefulness	26.39	3	8.80	2.20	.10	.08
	Perceived Control	3.50	3	1.17	.22	.88	.01
	Behavioral intention	13.88	3	4.63	.48	.70	.02

A multivariate analysis was conducted to investigate the effects of gender, field of study, and ethnicity on participant's attitudes towards the internet usage. In order to evaluate multivariate significance, Wilks Lambda statistic was used. MANOVA results regarding the gender, field of study, and ethnicity are presented in Table 5 The results indicated no statistically significant effect of gender on the combined dependent variables (F(3, 285)= 2.40, Wilks lambda= .91, partial Eta= .09, p= .08). The partial eta squared value of .09 represented that the 9 % of the variance in dependent variables could be explained by gender. Moreover, no statistically significant effect of ethnicity on the combined dependent variables (F (6, 282)= .98, Wilks lambda=.92, partial Eta =.04, p= .44). The partial Eta squared value of .04 showed that the 4 % of the variance in dependent variables could be explained by ethnicity. On the other hand, no statistically significant effect of field of study on the combined dependent variables (F (9, 279) = .83, Wilks lambda=.90, partial Eta =.03, p= .59). The partial Eta squared value of .03 showed that the 3 % of the variance in dependent variables could be explained by field of study.

Table 5: MANOVA Results for gender , field of study, age, and ethnicity (Internet)

Effect	Wilks lamda	*F*	Hypothesis df	Error df	*p*-value	Partial Eta Squared
Gender	.91	2.40	3.00	72.00	.08	.09
Ethnicity	.92	.98	6.00	144.00	.44	.04
Field of study	.90	.83	9.00	175.38	.59	.03

In order to investigate on which dependent variables participants with different gender, field of study, and ethnicity differed in their attitudes towards Internet usage, multivariate analyses of variance between groups was conducted. Table 6 shows the summary results of MANOVA analysis. As we seen in Table 6, males and females are similar in perceived usefulness F (1, 287) = 2.10, p>0.05; emotional response F (1, 287) = 3.10, p>0.05; and Perceived control F (1, 287) = .16, p>0.05. Moreover, the three groups of ethnicity are similar in usefulness F (2, 286) = 1.51, p>0.05; emotional response F (2, 286) = .84, p>0.05; and Perceived control F (2, 287) = .23, p>0.05. Furthermore**,** participants in different field of study are similar in perceived usefulness F (3, 285) = .73, p>0.05; emotional response F (3, 285) = 1.43, p>0.05; and Perceived control F (3, 285) = .58, p>0.05. Also, participants at different economic levels are similar in usefulness F (2, 286) = 2.07, p>0.05; emotional response F (2, 286) = 1.26, p>0.05; and Perceived control F (2, 287) = 1.12, p>0.05.

Table 6: Results of MANOVA Analysis for Differences between the Means of the Participants attitudes towards Internet usage with respect to gender, field of study, ethnicity, and economics level

Source	Dependent variable	Type III Sum of Squares	*df*	Mean square	*F*-value	*p*-value	Partial Eta Squared
Gender	perceived usefulness	37.82	1	37.82	2.10	.15	.03
	emotional response	52.81	1	52.81	3.10	.08	.04
	perceived control	.78	1	.78	.16	.69	.00
Ethnicity	perceived usefulness	54.37	2	27.18	1.51	.23	.04
	emotional response	28.73	2	14.36	.84	.44	.02
	perceived control	2.19	2	1.10	.23	.80	.01
Field of study	perceived usefulness	39.09	3	13.03	.73	.54	.03
	emotional response	73.00	3	24.33	1.43	.24	.06
	perceived control	8.38	3	2.79	.58	.63	.02

Univariate analysis was conducted to investigate the effects of age on participant's attitudes towards the internet and computer usage. As we seen in Table 7, participants in different group of ages are differ in their attitudes toward computer usage (F (2,286) =53.06, p<0.05); and their attitudes toward internet usage (F (2,286) =3.76, p<0.05). The partial Eta squared showed that the 27 % of the variance in participant's attitudes toward computer usage could be explained by age. On the other hand, the partial Eta squared showed that the 5 % of the variance in participant's attitudes toward Internet usage could be explained by age.

Furthermore, Post hoc analysis indicated that the mean scores of participant's attitudes toward computer and Internet usage were significantly related to age, with lower age related to higher mean scores (see Table 8, and Table 9). As we seen in Table 8, the youngest participants (< 30 years old) significantly scored higher than the participants in the older groups of age. Table 9 shows that the youngest participants (< 30 years old) significantly scored higher than the participants in the older group (more than 40). In general, postgraduate students toward computer and Internet usage decrease by the increase of age.

Table 7: Results of Univariate Analysis for Differences Between the Means of the Participants attitudes towards Internet and computer usage with respect to the Age

Variable	Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Computer	Age group	14367.37	2	7183.684	53.06	.00**
	Error	38722.78	286	135.394		
	Total	942672.00	289			
	Corrected Total	53090.15	288			
Internet	Age group	7106.70	2	3553.35	3.76	.02*
	Error	269675.31	286	942.92		
	Total	609236.00	289			
	Corrected Total	276782.01	288			

Table 8: Results of Post hoc Analysis for Differences between the Means of the Participants attitudes towards computer usage with respect to the Age

Group of Age by years	Less than 30	From 30 to 40	More than 40
Less than 30	--	14.35**	15.57**
From 30 to 40	-	-	1.22
More than 40	-	-	-

Table 9: Results of Post hoc Analysis for Differences between the Means of the Participants attitudes towards computer usage with respect to the Age

Group of Age by years	Less than 30	From 30 to 40	More than 40
Less than 30	--	9.37	11.20**
From 30 to 40	-	-	1.83
More than 40	-	-	-

DISCUSSION

In general, postgraduate students showed positive attitudes toward computer and Internet usage. The overall positive level of computer and Internet attitudes could be attributed to the availability and accessibility to computers and Internet given to postgraduate students at the University of Malaya. Moreover, in Malaysia, the Ministry of Education (MOE) has given approval to implement ICT in education. Therefore, the Malaysian government has facilitated computer integration in schools to improve the usefulness of the student's education on a personal and national level. Chronologically, the participants of this study would have benefited from the goals of the *Plan of Implementing ICT* in ways that may have shaped their ICT attitudes in a positive direction, and contributed towards increasing home computer ownership among them, which could have promoted greater opportunities with ICT (Teo, 2008). Moreover, the reason for these high attitudes toward computer usage can be attributed to high usage of the computer and its various applications in instruction and being assigned homework and various tasks requiring computer usage. The moderate emotional response mean scores for participants were indicative that they were likely to be less anxious about future usage of the Internet.

Further, results reveal no gender related differences of postgraduate students' attitudes toward computer usage. These findings are consistent with the earlier studies (Teo, 2008). Moreover, North and Noyes (2002) felt that increased usage of computers for teaching and learning in schools has worked against the development of gender differences. Contrary to the findings of these studies, previous studies reporting sex related differences in attitudes toward computer (Adebowale et. al., 2010; Sainz et. al., 2010; Meelissen & Drent, 2008; Avraham, 2005; Graff, 2003; Brosnan & Lee, 1998**;** Shashaani, 1993). Also, results revealed gender related differences of postgraduate students' attitudes toward Internet usage. The results of this study are consistent with the earlier studies (Duggan et. al., 2001; Luan, Fung & Atan, 2008; Odell et. al., 2000; Shaw & Gant, 2002). For instance, Duggan et. al., (2001) reported that university students usually used the Internet for term paper research, retrieval of course notes and spent longer hours on these functionalities. Luan et. al., (2008) reported that the lack of gender differences could possibly be attributed to the sample being studied. The participants involved in

this study were students at University of Malaya. They were likely to posses some experience in using the Internet. Additionally, the university has continued to upgrade the Internet infrastructure to enhance Internet accessibility around the campus, making these services readily available to all students. With the improved facilities, both females and males have equal access and opportunities to use the Internet with no disparity between them.

Further, results indicate no significant differences existed in postgraduate student attitudes toward Internet and computer usage by field of study and ethnicity. This is expected as the respondents were university students and their search in the Internet would have been related to the fulfillment of their educational tasks. Moreover, Malaysia is a multiethnic society where all races have the same opportunities in ICT practice and training at schools and universities. Moreover, all participants were from Faculty of Education, so further studies are needed to assess postgraduates students from different faculties.

Finally, data analysis indicates existence of significant differences between postgraduate students' age and their perceptions toward computer and Internet. In conclusion, ceteris paribus, participant's attitudes toward computer and internet usage decreased as a function of age. This means those students' attitudes toward computer and Internet increase as their age decreases. The significance differences between the age and attitudes toward ICT are probably due to the presence of a wide age gap among postgraduate students. Contrary to these findings, Teo (2008) reported no significant relation between student's age and attitude toward computers.

CONCLUSION

The advantage of this study is that it allows for establishment of comparability with many studies in different cultures and languages. Results from this study may benefit educational authorities and universities by suggesting factors that may affect postgraduate students' attitudes toward computer and Internet. In addition, this study represents a replication of two attitude scales in a culturally different environment, which may be of particular benefit in cross-cultural studies. Variables including gender, field of study, age, and ethnicity were analyzed in this study.

This study provides a glimpse of selected variables that affect the attitudes toward computer and Internet usage of postgraduate students. Our research revealed possible subject differences to the attitudes of postgraduate's students that have not been identified by previous research. Such differences will have practical implications for University of Malaya aiming to promote ICTs among postgraduate's students. This research has raised several interesting questions that might be subject of future studies. Does ICTs using provide educational value and high level of attitudes towards ICT usage over and above traditional way without using ICTs? Which subjects have most attitudes toward ICT usage from using ICTs? Do the Science subjects have most attitudes toward ICT usage than the Arts subjects? Do learning styles influence the attitudes toward ICTs tools? Moreover future research needs to examine the relationship between ICT attitudes and ICT usage to determine the effects of attitudes on ICT usage and under what circumstances positive or negative attitudes can predict effective ICT usage in schooling.

The findings of this study will contribute to technology adoption by University of Malaya and help in implementing successful frameworks of embedding e-learning in University educational system. University of Malaya is therefore called on to take the issues of ICT training seriously, as experienced teachers enhance successful implementation of ICT. Similarly, courses in computing and computer based instruction should be made compulsory for students at Faculties of Education. This will surely enhance acquisition of knowledge and practical skills in computer usage.

The advantage of this study is that it allows for establishment of comparability with many studies in different cultures and languages. Results from this study may benefit educational authorities and universities by suggesting factors that may affect postgraduate students' attitudes toward computer and Internet. The findings of the research enable the researcher to measure the postgraduate student's attitude towards computer and Internet usage.

The result of this study enable lecturers to planed ICT skills training program at different level, instructions, activities, syllabus of ICT courses based on the age, background and prior knowledge of postgraduate students. The research data enable lecturers to use suitable type of teaching method, strategies and technique in presenting their lessons and instruction.

The studies developed and validate two skills (computer and Internet) among postgraduate students. This is the first in the field and in Malaysian version of instrument in measuring postgraduate student's attitude in computer and Internet usage. Both postgraduate students which will be future teachers have high level in attitude encourage positive attitude towards computer and Internet and motivated future teachers to implement ICT in school.

In addition, this study represents a replication of two attitude scales in a culturally different environment, which may be of particular benefit in cross-cultural studies. Variables including gender, field of study, age, and ethnicity were analyzed in this study.

Limitations of the study

The results of the current study may be subject to the following limitations: Firstly, the data collected was through self reports and this may lead to a common method variance. Secondly, the sample size was not large enough to allow for cross validation of results. Additional research will be needed to validate the results of the current study. Furthermore, factor analytic results are inherently subjective in nature, as the numerous decisions regarding factor extraction, rotation, and interpretation can lead to different outcomes. Thirdly, the data were collected using a cross-sectional, single administration design and it was not possible to establish the stability of the participants' attitudes. Moreover, Some reasons from the limitation of study, postgraduate students showed positive attitudes toward computer and Internet usage on account of the availability and accessibility to computers and Internet given to postgraduate students at the University of Malaya. Fourthly, the variables chosen in this study were limited in number. As a result, other significant variables that influence computer and internet attitudes are excluded. Future studies could add other variables to examine their impact on computer and internet attitudes. Finally, the study is limited because it was conducted in a specific university and only at the Faculty of Education. Replicating this study with a large and more representative sample of postgraduate students from different faculties and subjects from different universities and with a more rigorous design is likely to shed more light on differences of mean computer and Internet attitude score in relation to gender, field of study, age, and ethnicity.

REFERENCES

Adebowale, O. F., Adewale, I. A., & Oyeniram, F. M. (2010). Computer interest, approval and confidence of secondary school students in three selected local governments of Lagos State (Nigeria): Implications for global computerization. *International Journal of Education and Development using Information & Communication Technology (IJEDICT), 6*(1).

Ajzen, I. & Fishbein, M. (1980). Understanding attitudes and predicting social behavior. Englewood Cliff, NJ: Prentice Hall.

Ajzen, I. (1988). *Attitudes, personality, and behavior*. Bristol, UK: Open University Press.

Akbaba, S., & Kurubacak, G. (1999). Teachers' attitudes towards technology. *Computers in the Social Studies*, 7(2), 833–836.

Albion, P. R. (2003). PBL + IMM = PBL2: Problem-based learning and interactive multimedia development. *Journal of Technology and Teacher Education*, Vol. 11(2), 243-257.

Al-Jabri, I. M. (1996). Gender differences in computer attitudes among secondary school students in Saudi Arabia. *Journal of Computer Information Systems, 37*, 70-75.

Arbuckle, J.L. 2006, *AMOS* (version 7.0), [Computer software], SmallWaters, Chicago.

Avraham, L. (2005). Differences in the way males and females perceive computers, retrieved from http://eserver.org/course/spring97/76100o/contributions/avraham/

Azjen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl & J. Beckman (Eds.), Action control: From cognition to behavior (pp. 11–39). New York: Springer Verlag.

Bandalos, D. & Benson, J. (1990). Testing the factor structure invariance of a computer attitude scale over two grouping conditions. *Educational and Psychological Measurement*, 50(1), 49-60.

Bentler, P. M. (1990). Comparative fit indices in structural models. *Psychological Bulletin*, 107, 238–246.

Bentler, P. M., & Bonett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin*, 88, 588–606.

Binder, M., & Niederle, U. (2007). Institutions as determinants of preference change- A one way relation? Retrieved from https://papers.econ.mpg.de/evo/discussionpapers/2006-07.pdf

Birisci, S., Metin, M., & Karakas, M. (2009). Prospective elementary teachers' attitudes toward computer and Internet use: A sample from Turkey. *World Applied Science Journal, 6*(10), pp. 1433-1440.

Blackmore, M., Stanley, N., Coles, D., Hodgkinson, K., Taylor, C., & Vaughan, G. (1992). A preliminary view of students' information technology experience across UK initial teacher training institutions. *Journal of Information Technology in Teacher Education,* 1(2), 241–254.

Brennan, R., McFadden, M., & Law, E. (2001). Review of research. All that glitters is not gold: Online delivery of education and training. Leabrook: National Centre for Vocational Education Research.
Brosnan, M., & Lee, W. (1998) A cross-cultural comparison of sex differences in computer attitudes and anxieties: The United Kingdom and Hong Kong. *Computers in Human Behavior, 14*(4), 559-577.
Brown, F. (1983). *Principles of educational and psychological testing* 3rd ed. New York, NY: Holt, Rinehart & Winston.
Bryman, A., & Cramer, D. (1997). *Quantitative data analysis with SPSS for Windows: A guide for social scientists*. London, UK: Routledge.
Bullock, D. (2004). Moving from theory to practice: an examination of the factors that preservice 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.
Cavas, B., Cavas, P., Karaoglan, B. & Kisla, T. (2010). A study on science teachers' attitude toward information and communication technologies in education. *The Turkish Online Journal of Educational Technology, 8*(2), 20-32.
Chai, C. S., Hong, H. Y., & Teo, T. (2009). Singaporean and Taiwanese pre-service teachers' beliefs and their attitude towards ICT: A comparative study. *The Asia-Pacific Education Researcher*, 18(1), 117–128.
Clark, K. D. (2001). Urban middle school teachers' use of instructional technology. *Journal of Research on Computing in Education*, 33(2), 178–195.
Czaja, S., Charness, N., Fisk, A., Hertzog, C., Nair, S., Rogers, W. (2006). Factors predicting the use of technology: Findings from the Center for Research and Education on Aging and Technology Enhancement. *Psychology and Aging, 21*(2), 333-352.
Davis, F.D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technologies, *MIS Quarterly, 13*(3), 319–340.
Delcourt, M. A. B., & Kinzie, M. B. (1993). Computer technologies in teacher education: The measurement of attitudes and self-efficacy. *Journal of Research and Development in Education, 27*(1), 35-41.
Duggan, A., B. Hess, D. Morgan, S. Kim, & Wilson, K. (2001). Measuring students' attitudes toward educational use of the Internet. *Journal of Educational Computing Research, 25*(3), 267-281.
Dyck, J. L., & Smither, J. A. A. (1994). Age differences in computer anxiety: The role of computer experience, gender and education. *Journal of Educational Computing Research, 10*(3), 239-248.
Field, P. (2000). *Discovering statistics using SPSS for Windows: Advanced techniques for the beginner*. London, UK: Sage.
Fishbein, M., & Ajzen, I. (1975*). Belief, attitude, intention, and behavior: An introduction to theory and research.* Reading, MA: Addison-Wesley. Retrieved 9 June, 2011 from http://people.umass.edu/aizen/f&a1975.html
Fishbein, M., & Ajzen, I. (2010). *Predicting and changing behavior: The reasoned action approach*. New York: Psychology Press (Taylor & Francis).
Fisher, M. (2000). Computer skills of initial teacher education students. *Journal of Information Technology for Teacher Education*, 9(1), 109–123.
Foong-Mae, C. (October, 2002). ICT in Malaysian schools policy: Policy and Strategies. Seminar/Workshop on the Promotion of ICT Education to Narrow the Digital Divide, Tokyo, Japan. Retrieved from http://unpan1.un.org/intradoc/groups/public/documents/gaid/unpan033365.pdf.
Francis, L., Katz, Y., & Jones, S. (2000). The reliability and validity of the Hebrew version of the Computer Attitude Scale. *Computers & Education, 35*(2),149-59.
Garland, K. J., & Noyes, J. M. (2005) Attitudes and confidence towards computers and books as learning tools: A cross-sectional study of student cohorts. *British Journal of Educational Technology, 36,* 85-91.
Graff, M. (2003). Cognitive style and attitudes towards using online learning and assessment methods. *Electronic Journal of e-Learning Methods, 1*(1), 21-28.
Harrison, J., Seeman, J., & Behm, R. (1991). Development of a distance education assessment instrument. *Educational Technology Research and Development, 39*(4), 65-77.
Huang, H. M., & Liaw, S. S. (2005). Exploring user's attitudes and intentions toward the web as a survey tool. *Computers in Human Behavior, 21*(5), 729-743.
Isman, A., & Dabaj, F. (2004). Attitudes of students towards Internet. *Turkish Online Journal of Distance Education - TOJDE, 5*(4). Retrieved from http://tojde.anadolu.edu.tr/tojde16/articles/dabaj.htm
Kersaint, G., Horton, B., Stohl, H., & Garofalo, J. (2003). Technology beliefs and practices of mathematics education. *Journal of Technology and Teacher Education*, 11(4), 549-577.
Khine, M. S. (2001). Attitudes toward computer among teacher education students in Brunei Darussalarn. *International Media, 28*(2), 147-153.
Kline, R. B. (2005). Principles and practice of structural equation modeling. (2nd Edition). New York: The Guilford Press. Kuhn, D. (1999). Metacognitive development. In L. Balter & C. S. Tamis-LeMonda

(Eds.), Child psychology: A handbook of contemporary issues (pp.259-286). Ann Arbor, MI: Taylor and Francis.
King, J., Bond, T., & Blandford, S. (2002). An investigation of computer anxiety by gender and grade. *Computers in Human Behavior*, 18, 69–84.
Kutluca, T. (2010) Investigation of teachers' computer usage profiles and attitudes toward computers. *International Online Journal of Science*, *2*(1), 81-97.
Li, N. (2002). Culture and gender aspects of students' information searching behaviour using the Internet: a two-culture study of China and the United Kingdom', Doctoral thesis, Open University United Kingdom, ProQuest Digital Dissertations.
Lin, H. L., & Gorrell, J. (2001). Exploratory analysis of pre-service teacher efficacy in Taiwan. *Teaching and Teacher Education*, 17(5), 623–635.
Loyd, B., & Gressard, C. (1986). Gender and amount of computer experience of teachers in staff development programs: Effects on computer attitudes and perceptions of the usefulness of computers. *AEDS Journal*, 19, 302–311.
Luan, W., Fung, N., & Atan, H. (2008). Gender Differences in the Usage and Attitudes toward the Internet among Students Teacher in a Public Malaysian University. *American Journal of Applied Sciences*, *5*(6), 685-697.
Marsh, H.W. & Hocevar, D. (1985). Application of confirmatory factor analysis to the study of self–concept: First– and higher–order factor models and their invariance across groups. *Psychological Bulletin*, 97, 562–582.
Mathieson, K. 1991. Predicting user intentions: Comparing the technology acceptance model with the theory of planned behavior. *Inform. Systems*, Res. 2, 173-191.
Maurer, T. J. (2001). Career-relevant learning and development, worker age and beliefs about Self-efficacy for development. *Journal of Management*, 27(2), 123-140.
Meelissen, R. M., & Drent, M. (2008). Gender difference in computer attitudes: Does the school matter? *Computer in Human Behaviour*, *24*(3), 969-985.
Ministry of Education Malaysia (MOE), (1999). The Malaysia smart school: An MSC flagship application, a conceptual blueprint. Retrieved January 15, 2006 from http://www.msc.com.my/smartschool/downloads/blueprint.pdf.
Mohammed, J., & Al-Karki, J. (2008). Integrating Internet into traditional education: A practical study of university students' usage and attitudes. *The International Arab Journal of Information Technology*, *5*(3), 45-63. Myers, J. M., & Halpin, R. (2002). Teachers' attitudes and use of multimedia technology in the classroom: Constructivist-based professional development training for school districts. *Journal of Computing in Teacher Education*, 18(4), 133–140.
Nai Li & Kirup G. (2007). Gender and cultural differences in Internet use: A study of China and the UK. *Computer & Education*, 48, 301-317.
North, A. S., & Noyes, J. M. (2002). Gender influences on children's computer attitudes and cognitions. *Computers in Human Behavior*, *18*(2), 135-150.
Odell, P., Korgen, K., Schumacher, P., & Delucchi, M. (2000). Internet use among female and male college students. *CyberPsychology & Behavior*, *3*(5), 855-862.
Orhun, E. (2002a). Computer-Based Cognitive Tools. In E. Orhun, & P. A. M. Kommers (Eds.), Information and communication technologies in education: a focus on cognitive tools, Turkiye: Ege University Press, 17-26.
Panteli, N., Stack, J., & Ramsay, H. (1999). Gender and professional ethics in the IT industry. *Journal of Business Ethics*, 22(1), 93–101.
Preliminary Report Malaysian Education Blue Print 2013-2025. (September, 2012). Retrived from www.moe.gov.my/userfiles/file/PPP/Preliminary-Blueprint-Eng.pdf.
Pope-Davis, D. B., & Twing, J. S. (1991). The effects of the age, gender, and experience on measure of attitude regarding computers. *Computer in Human Behaviour*, *7*, 333-339.
Raykov, T., & Marcoulides, G. A. (2008). An introduction to applied multivariate analysis. New York: Taylor and Francis.
Rogers, E.M. (1995). Diffusion of innovations, 4th edition, The Free Press, New York.
Rosenthal, M., & Spiegelman, M. (1996). Evaluating use of the Internet among academic reference librarians. *Internet Reference Services Quarterly*, *1*(1), 53-67.
Sainz, M., & Saez, M. L. (2010). Gender differences in computer attitude and the choice of technology related occupations in a sample of secondary students in Spain. *Computers & Education*, *54*(2), 578-587.
Selwyn, N. (1997) Students' attitudes toward computers: Validation of a computer attitude scale for 16-19 education. *Computers and Education*, 35-41.

Shashaani, L. (1993). Gender-based differences in attitudes toward computers. *Computers and Education*, *20*(2), 169-181.
Shaw, L., & Gant, L. (2002). Users divided? Exploring the gender gap in Internet use. *CyberPsychology & Behavior, 5*(6), 517-527.
Smith, B., Caputi, P., & Rawstone, L. (2000). Differentiating computer experience and attitude towards computers: An empirical investigation. *Computers in Human Behavior, 16*, 59-81.
Spacey, R., Goulding, A., &. Murray, I. (2003). ICT and change in UK public libraries: Does training matter? *Library Management*, 24 (1-2), 61-69.
Steiger, J. H., & Lind, J. C. (1980). Statistically based tests for the number of common factors. *Paper presented at the Psychometric Society Annual Meeting*, Iowa City, IA.
Swann, D. (2003). ECDL for educators: ICT skills training in context. *Computer Education, 103*, 16-17.
Tasir, Z., Mohammad El Amin Abour, K., Abd Halim, N, & Harun, J. (2012). Relationship between teachers' ICT competency, confidence level, and satisfaction toward ICT: A case study among postgraduate students. *TOJET: The Turkish Online Journal of Educational Technology*, 11(1). 138-143.
Tearle, P. (2003). ICT implementation: What makes the difference? *British Journal of Educational Technology*, 34(5), 567–583.
Teo, T., (2008). Pre-service teachers' attitudes towards computer use: A Singapore survey. Australasian *Journal of Educational Technology*, 24(4), 413–424.
Thomas, A., & Stratton, G. (2006). What we are really doing with ICT in physical education: A national audit of equipment, use teacher attitudes, support, and training. *British Journal of Educational Technology, 37*(4), 617-632.
Tsai, C., Lin, S. S. J., & Tsai, M. (2001). Developing an internet attitude scale for high school students. *Computers & Education, 37*, 41-51.
Van Braak, J. (2001). Individual characteristics influencing teachers' class use of computers. *Journal of Educational Computing Research*, 25(2), 141–157.
Van Braak, J., Tondeur, J., & Valcke, M. (2004). Explaining different types of computer use among primary school teachers. *European Journal of Educational Psychology*, 19(4), 407–422.
Woodrow, J.E. (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), 219-200.
Zhang, Y., & Espinoza, S. (1997). Affiliations of computer self-efficacy and attitudes with need for learning computer skills. *Journal of Educational Computing Research, 17*, 371-383.