Research Journal of Applied Sciences 8 (10-12): 523-528, 2013
ISSN: 1815-932X

Factors Influencing the Attitudes of Secondary School Students Towards Computer Self-Efficacy

Nadia Hidayah Mohd Ariffin, Ahmad Fauzi Mohd Ayub and Wan Marzuki Wan Jaafar
Faculty of Educational Studies, Institute for Mathematical Research,
Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia

Abstract: This study identifies the factors which influence students' attitudes towards computer self-efficacy or confidence in using the computer competently. A total of 413 secondary school students taking the Information and Communication Technology Literacy (ICTL) course were randomly chosen. The study revealed that the respondents had positive attitudes towards computer use with the overall mean at 3.93 (SD = 0.34) on a Likert scale of 1-5. The respondents also showed positive attitudes in the affective, cognitive and behaviour domains. The results indicated that students' computer self-efficacy was at a moderate level. Correlation analyses showed that computer self-efficacy had a positive relationship with students' attitudes in the affective domain ($r = 0.424$; $p<0.01$), behaviour domain ($r = 0.355$; $p<0.01$) and cognitive domain ($r = 0.355$; $p<0.01$). Nevertheless, a multiple regression analysis revealed that only the affective and behaviour domains influenced students' attitudes. The results showed the importance of ensuring that students develop positive attitudes towards computers to increase computer self-efficacy.

Key words: Computer self-efficacy, attitudes towards computers, affective, cognitive and behaviour, Malaysia

INTRODUCTION

Students at secondary schools in Malaysia are exposed to Information and Communication Technology (ICT) in their daily life. Much effort has been made by the Ministry of Education (MOE) to avoid a digital divide among students at all levels. One such initiative is making computer-related subjects mandatory in the primary and secondary levels. In 1992, MOE introduced a pilot study, Computers in Education (KDP) prior to the implementation of the computer literacy subject for form 1 and 2. This was followed in 2007 by the Computer Literacy for Secondary School Programme, aimed at producing computer-literate students nationwide. The introduction of the Standard Curriculum for Primary Schools in 2011 saw ICT being integrated into various disciplines. In addition, MOE embarked on the redesigning of the secondary school curriculum in line with global standards. In this new curriculum, ICT is an important component. Hence, it is vital that students develop positive attitudes towards the computer so that they can use it with ease and confidence.

Self-efficacy relates to the individual's belief in his capability to perform a task (Bandura, 1991). Meanwhile, Kinzie *et al*. (1994) define self-efficacy as an individual's confidence of his ability to perform a certain task required to produce a specific outcome. Computer self-efficacy is also defined as an individual's ability to use the computer (Compeau and Higgins, 1995), measured in terms of computer skills or basic knowledge of computers. In other words, computer self-efficacy is one of the factors driving an individual's confidence in using the computer for learning purposes or for various daily tasks. Another definition of computer self-efficacy offered by Murphy *et al*. (1989) is that of an individual's perception of his own computer knowledge and computer competence.

There has been much research in computer self-efficacy. Among the studies is one by Singaravelu and Raja (2012) in Thanjavur, India. The study revealed that the majority of high school students had high computer self-efficacy. In contrast, a study by Akarsu and Akbiyik (2012) involving 125 university students in Turkey showed that students' attitudes towards computers were moderate and that their computer self-efficacy was low. A correlation analysis showed a positive correlation between these two variables. In Taiwan, Hsiao *et al*. (2012) found that

Corresponding Author: Nadia Hidayah Mohd Ariffin, Faculty of Educational Studies, Institute for Matematical Research, Universiti Putra Malaysia, 43400 Serdang Selangor, Malaysia

computer self-efficacy among 525 secondary school students was moderate. The study also found that the mean for general computer self-efficacy was higher than that for advanced computer self-efficacy.

Students' attitudes toward computers is important in determining the success of the integration of computer technology in academia (Roussos, 2007). Ajzen and Fishbein (1980) define attitude as an analysis of information relevant to a decision which could be positive or negative. Positive attitudes tend to influence individuals to learn and apply information in their daily lives (Ajzen and Fishbein, 1980); conversely negative atttitudes hinder the learning process. Meanwhile, Smith *et al.* (2000) define attitudes toward the computer as a general evaluation or feelings of individuals to support or disparage computer technology and any computer-related activities. Awareness of students' attitudes towards computers is a critical factor in course evaluation as attitude influences future behaviour. A study by Akarsu and Akbiyik (2012) shows that students have positive attitudes towards computers while a study by Inal and Cagiltay (2006) indicates that they do not. Students with positive attitudes will use computers more readily. Bovee *et al.* (2007) study on 240 school students in South Africa showed that attitude towards computers was positively correlated with the desire to use the computer in future. In a study by Ibrahim *et al.* (2011) on 149 students taking ICT subjects in Terengganu, Malaysia, the respondents showed positive attitudes towards using the computer. Interestingly (Inal and Cagiltay, 2006) study among primary school pupils in Turkey showed negative attitudes towards computers, the internet and computer games. Several recent studies have examined the relationship between attitudes and self-efficacy in computer usage. For example, Torkzadeh and van Dyke (2002) in their study find that attitude has an influence on self-efficacy. Individuals who have positive attitudes have high self-efficacy and conversely those who have negative attitudes have low self-efficacy. In their study, the results showed that there was a positive correlation between the computer attitude mean and the mean for internet self-efficacy ($r = 0.45$, $p = 0.01$). Meanwhile, a study by Jegede (2007) measured attitudes based on four sub scales, viz. affective, perceived usefulness, behaviour and perceived behavioural control. The findings showed that there was a positive significant relationship between affective ($r = 0.428$), usefulness ($r = 0.385$), behaviour ($r = 0.546$), perceived behaviour control ($r = 0.486$) and aversion ($r = 0.120$) with computer self-efficacy. A study by Rozell and Gardner (2000) indicates that negative attitudes towards computer use lead to low computer self-efficacy.

Research objectives: This study was based on the following objectives:

- To examine students' attitudes towards computer use
- To assess students' computer self-efficacy
- To determine the relationship between students' attitudes towards computer use with computer self-efficacy
- To determine the relationship between domains of students' attitudes towards computer (affective, cognitive and behaviour) with computer self-efficacy
- To identify factors (domains of students' attitudes) that influence computer self-efficacy

MATERIALS AND METHODS

Participant: This study was conducted in one state in peninsular Malaysia respondents were randomly chosen among schools from rural and urban areas. Students also selected from those taking the ICT subject at the national level examination. A survey study was carried out on 413 form 4 students from 11 different districts in one state of peninsular Malaysia. A questionnaire was administered to participants using print-based survey. Respondents was those who volunteered and confidential.

Measurement: For the purpose of the study, researchers developed an instrument to measure students' computer attitudes and computer self-efficacy. To assess students' computer attitude, researchers adopted an instrument by Jones and Clarke (1994). This instrument was a 39-item scale that measured students' attitude towards the computer based on a 5-point Likert scale with the highest score (5) representing a positive attitude (strongly agree) and the lowest score (1) denoting a negative attitude (strongly disagree). Jones and Clarke (1994) categorize attitudes towards the computer as consisting of three components, viz. affective, cognitive and behaviour. In this study, the affective component refers to emotions, interests and feelings towards using the computer in daily life. The cognitive component measures the extent to which respondents need to use their mental effort while using computers in their activity life. The third component examines the behaviour of the respondents while using computers.

The second variable in this study measured students' computer self-efficacy. According to Compeau and Higgins (1995), computer self-efficacy refers to the individual's judgment about his ability to use the computer in various situations. Computer self-efficacy

has a major impact on an individual's expectations towards using the computer (Compeau and Higgins, 1995). An instrument created by Murphy *et al.* (1989) to measure computer self-efficacy comprises a 32-item scale with three different levels of computing skills: beginner's level, advanced level and a level associated with mainframe computers. However, in this study, researchers used only 26 items, viz. beginner's level and advanced level. All items were preceded by the phrase "I feel confident". The subject responded to a 5-point Likert type scale ranging from 1 (Strongly disagree) to 5 (Strongly agree). High scores indicated a high degree of confidence in the respondent's ability to use the computer. At the beginner's level, the respondents assessed their own confidence when carrying an activity requiring basic computer skills such as moving the cursor around the monitor screen, storing software correctly, adding and deleting information to or from a data file, organizing and managing files and other such skills. At the advanced level, the respondents were required to assess their own confidence when carrying out certain tasks requiring advanced computer skills such as describing the functions of computer hardware using the computer to analyze numerical data, writing simple programmes for the computer, getting help for problems in the computer system and so on.

Pilot study: A pilot study was conducted among 62 students who were randomly selected from three different districts. A reliability test using Cronbach's coefficient (α) was computed for the overall computer attitude scale, overall computer self-efficacy scale and all sub-scales for both variables. Negative items constructed for internal consistency were reversed for the purpose of the analysis. Table 1 shows the reliability coefficients of the overall computer attitude, computer self-efficacy and sub-constructs for both variables. At a significant construct validity ($p<0.01$), all reliability scores were higher than 0.70, implying excellent internal consistencies of assessment items. The overall reliability Cronbach coefficient (α) for computer attitudes was 0.845 with the affective domain scoring the highest at $\alpha = 0.805$ and lowest for behaviour at $\alpha = 0.657$. The overall reliability Cronbach coefficient for computer self-efficacy was 0.910, the beginner's level was 0.826 and the advanced level was 0.860.

Table 1: Results of pilot study

Dimension	Pilot study
Computer self-efficacy	0.910
Beginner's level	0.826
Advanced level	0.860
Attitudes' towards computer	0.845
Affective	0.805
Cognitive	0.656
Behaviour	0.657

RESULTS AND DISCUSSION

The target population for this study consisted of form four students from 11 districts in a state of peninsular Malaysia. A total of 413 students completed the survey. The resulting sample included 178 males (43.1%) and 235 females (56.9%) with 83.5% of them owning a computer at home and 68.5% having internet access at home. The mean hours of the sample using the computer per day was 3.17 h day^{-1} (SD = 1.81; range = 0 to >8 h day^{-1}). Most of them used the computer between 0-3 h a day (Table 2).

Students' attitudes towards computers: Computer attitude has been defined as an individual's general feeling of favour or antipathy toward computer technologies or any specific computer related activities (Smith and Caputi, 2001). According to Durndell and Hagg (2002), attitude towards the computer is a key factor that could affect a student's perception of the computer as a learning tool; this could in turn determine the possibility of his using it in the future for further studies or research. In this research, students' attitudes towards the computer were measured based on cognitive, affective and behaviour scales. As shown in Table 3, the overall mean for students' attitude towards the computer (Mean = 3.78) was higher than the mid-point score (2.5) on the Likert

Table 2: Demographic factors

Demographic factors	Total	Percentage
Gender		
Male	178	43.1
Female	235	56.9
Total	413	100.0
Computer ownership at home		
Yes	345	83.5
No	68	16.5
Internet access at home		
Yes	283	68.5
No	130	31.5
Time using computer (per day)		
0-3 (h day^{-1})	275	66.6
4-7 (h day^{-1})	120	29.1
>8 (h day^{-1})	18	4.4

Time using computer (overall mean) = 3.17 (h day^{-1}) (SD = 1.81)

Table 3: Students' attitudes towards computer

Dimension	Mean	SD
Affective	3.90	0.404
Cognitive	3.62	0.324
Behaviour	3.74	0.432
Overall	3.78	0.320

scale. This finding showed that the computer-related attitude mean of the students who took part in this study was positive. The means for the three dimensions, namely affective, cognitive and behaviour were 3.90, 3.62 and 3.74, respectively. This study indicated that students had positive attitudes towards the computer.

Computer self-efficacy: Computer self-efficacy has been identified as a key determinant of computer-related ability and use of the computer. It affects not only the individual's perceptions of his ability to perform a computing task but also his intentions toward future use of the computer (Marakas *et al*., 1998). Students' computer self-efficacy in this study was measured at the beginner's level and advanced level. Description of mean values was based on the following bands: 3.08-3.68: weak; 3.69-4.14: moderate and 4.15-4.85: high. As shown in Table 4, the respondents had a moderate level of computer self-efficacy. Similar findings were also shown at the beginner's and advanced levels although the mean at beginner's level was higher compared to that at advanced level.

The next part of the discussion deals with the correlation between attitudes towards computer use (cognitive, affective and behaviour) and computer self-efficacy. Table 5 presents the correlations between the two variables. The correlations between the sub-domains of attitude towards computer and computer self-efficacy were all significant. The best correlation was found for the affective domain ($r = 0.424$; $p<0.01$) followed by behaviour domain ($r = 0.355$; $p<0.01$) and the weakest for cognitive domain ($r = 0.355$; $p<0.01$).

To explore the contribution of each sub domain of attitude towards the computer, a statistical regression analysis for predicting computer self-efficacy was performed.

Multiple regression: A linear regression was employed to determine the factors that influenced every domain of computer attitude. The explanatory power of the model for individual subscales was examined using the resulting R^2 value for the dependent variable. As shown in Table 6, the three subscales (affective, cognitive and behaviours) were able to explain 20% of the variances observed in students' attitudes toward computer self-efficacy. The data supported the overall model and all the four subscales were significant in contributing to the overall model with F-value of 34.687, significance at $p<0.001$ level (Table 7).

The standardized coefficient beta of each variable was then analyzed to assess the contribution of that variable to the overall usage (Table 8). It was found that the affective domain was the highest and had a significant direct positive effect on students' computer self-efficacy with a standardized coefficient of 0.322. The effect of the behaviour domain was also significant and showed a standardized coefficient beta of 0.177. On the other hand, the cognitive domain was not statistically significant. These findings indicated that only the affective and behaviour domains had an influence on students' computer self-efficacy.

Computer technology has become a prevalent tool in schools regardless of whether or not the school communities want to use it. Most education activities are facilitated by computers, especially when searching for information. Computers are also useful for the purpose of administration and communication. It is thus important to equip students with sufficient computer knowledge, skills and positive attitudes towards the computer so that they can benefit from advancements in ICT.

This study investigated students' attitudes towards the computer in terms of different domains

Table 4: Mean and standard deviation of students' computer self-efficacy

Dimension	Mean	Standard deviation
Beginner's level	4.00	0.384
Advanced level	3.86	0.366
Overall	3.93	0.343

Table 5: Correlations between sub-domains of attitude towards computers and computer self-efficacy

Domain of attitude	Affective	Cognitive	Behaviour	Computer self-efficacy
Affective	1.000			
Cognitive	0.614	1.000		
Behaviour	0.537	0.418	1.000	
Computer self-efficacy	0.424	0.284	0.355	1

Table 6: Model summary

Model	R	R^2	Adjusted R^2	Std. error of the estimate
1	0.450[a]	0.203	0.197	0.30160

Dependent variable: Computer self-efficacy; Predictors: (Constant), CAS_Cognitive, CAS_Behaviour, CAS_Affective

Table 7: ANOVA

Models	Sum of squares	df	Mean square	F-value	Sig.
Regression	9.466	3	3.155	34.687	0.000[b]
Residual	37.204	409	0.091		
Total	46.670	412			

Dependent Variable: Computer self-efficacy; Predictors: (Constant), CAS_Cognitive, CAS_Behaviour, CAS_Affective

Table 8: Regression coefficient

	Unstandardized coefficients		Standardized coefficients		
Models	B	SE	Beta	t-value	Sig.
Constant	2.324	0.182	-	12.795	0.000
CAS_Affective	0.268	0.051	0.322	5.295	0.000
CAS_Behaviour	0.138	0.041	0.177	3.348	0.001
CAS_Cognitive	0.013	0.059	0.012	0.217	0.828

(cognitive, affective and behaviour). The results showed that the overall mean of attitudes towards computer and the sub-domains was higher the mid-point score (2.5) on the Likert scale, thus indicating that students had positive computer-related attitudes. With regard to the affective domain, the respondents reported that they enjoyed using computers, they thought learning about computers was beneficial; they felt comfortable when using the computer and they did not feel that using the computer would be harmful. Within the cognitive domain, most of the respondents agreed or strongly agreed that they could use the computer that computers would increase interaction with others, computers were easy to understand and that it was important for them to research using computers. In the behaviour domain, the majority of the respondents expressed positive or highly positive intentions in terms of learning about computers, taking subjects related to computers, taking computer courses organised by the school and spending more time using computers.

This study also investigated students' computer self-efficacy. Although, the overall value of computer self-efficacy was moderate, several items received high levels of self-efficacy, showing a high level of confidence in the ability to handle certain computer-related tasks. For example, at the beginners' level, students were confident of their ability to move the mouse, copy files and enter and save data. However, at the advanced level, students had a high level of confidence only in using the computer to manage information. Although, there are mixed findings on students' computer self-efficacy by other researchers, the findings of this study concur with the findings in a study by Hsiao *et al*. (2012) which shows students' computer self-efficacy as moderate. Akarsu and Akbiyik (2012) find that students have low levels of computer self-efficacy while studies by Singaravelu and Raja (2012) show they have high levels of computer self-efficacy.

The findings in this study indicated a positive relationship between all sub-domains of attitudes towards computer with computer self-efficacy. Such findings are also in line with results of studies by Torkzadeh and van Dyke (2002), Jegede (2007) and Rozell and Gardner (2000). This shows that it is essential for school students to have positive attitudes computers in order to develop confidence in using computers not only in school but in the years ahead. Of the three sub-domains of attitudes towards computer, only two domains, viz. affective and behaviour were identified as factors that would significantly influence students' computer self-efficacy. This means that school administrators need to make an effort to persuade their students to be more connected with the computer. One way is to encourage students to take up computer-related courses and to make it enjoyable to participate in computer-programmes. Teachers could also play an important role by providing challenging tasks or homework requiring the use of a computer, either to complete a specific task or search for specific information on the internet. In this way, students would not only develop more positive attitudes towards computers but they would also be more confident in using the computer.

CONCLUSION

The results of this study indicated that students had a moderate level of computer self-efficacy at the beginner's level and advanced level. There was a positive relationship between computer self-efficacy and all three domains of attitudes (viz. affective, behaviour and cognitive) towards computer use although the influence of the cognitive domain was lost in the multiple regression analysis. A plan should be put in place by school administrators and teachers to encourage students to view computers more favourably so that they would be more confident in using computers to help them in their studies and their future careers.

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