Learning Strategies as Correlates of Computer Attitudes: A Case Study among Malaysian Secondary School Students

Su Luan Wong, Norliza Ibrahim, and Ahmad Fauzi Mohd Ayub

***Abstract*—The introduction of a stand-alone Information and Communication Technology course for Malaysian secondary school students is seen as the right step forward to produce innovative and creative thinkers. The curriculum ensures not only students become proficient in the ICT subject matter, but develop positive attitudes toward ICT—in particular computer technology. This study sought to explore the relationship between learning strategies and computer attitudes. Learning strategies are widely believed to be related to positive computer attitudes. Data were collected from 155 secondary school students through questionnaires. The results showed a positive correlation between computer attitudes and five types of learning strategies—motivation, time management, information processing, selecting main ideas and test strategy. The present study provides some evidence that learning strategies is associated with positive computer attitudes among students.**

***Index Terms*—Learning strategies, computer attitudes, secondary school students.**

I. Introduction

Information Technology and Communication (ICT) has revolutionized and transformed the way teachers teach and students learn in the classrooms. ICT has been recognized as a tool to boost the effectiveness of teaching and enhance students' learning [1], [2], [3], [4]. More specifically, computers are seen as an emerging and dynamic tool that can and will bring about significant transformation to the learning environments. Ten years ago, the Malaysian Ministry of Education (MMOE) introduced a stand-alone Information and Communication Technology course for secondary school students. This was the right way forward to ensure that students acquire adequate ICT knowledge and skills to be successful 21st century learners [5]. The plan to introduce the ICT subject in Malaysian secondary schools is seen as crucial for the MMOE to produce creative thinkers with some basic ICT literacy [5]. It is hoped that this plan can boost the ICT literate work force's ability to compete in the ever-changing global economy in the 21st century [6]. Students who possess adequate ICT knowledge and skills will have the competitive edge—they become dynamic and progressive individuals who appreciate technology advancement based on their positive attitudes and noble values and ethics [6].

The ICT curriculum ensures not only students become proficient in the ICT subject matter, but develop positive attitudes toward ICT—in particular computer technology. Student's computer attitudes is often regarded as a significant variable to be studied as it can influence the extent of their computer usage as a learning tool [7], [8], [9].

II. Predictors of Computer Attitudes

Past studies have shown that perceived usefulness and ease of using computers have a direct effect on computer attitudes [10], [11]. In other words, users who believe that using computers are useful to them will have more positive attitudes toward computers. At the same time, the likelihood of them using computers will increase when they perceive that using such machines is free from effort. Apart from these aforementioned predictors, personal traits such as gender and age have some effects on computer attitudes too. Anderson, Lankhear, Timms and Courtney [12] reported that senior female high school students were less likely to enrol in ICT subjects as they expressed strong aversion towards computers. They also perceived advanced computing subjects as uninteresting. Shashaani dan Khalili [13] found that females had lower confidence level than males did in terms of their computer abilities. Female students felt that computers made them anxious and uncomfortable although they acknowledged the importance of computers in education. In terms of age, Comber, Colley, Hargreaves and Dorn [14] found that younger students (grade 11-12) had more computer experience with positive attitudes when compared to older students (grade 15-16). Interestingly, the findings from Bozionelos' study [15] contrasted Comber et al.'s findings [14] when he found younger students to exhibit higher anxiety than the older students although both groups had been exposed to computers at an earlier stage.

However, other studies have shown that gender and age do not necessarily have any effects on computer attitudes. For example, Wong and Hanafi [16], asserted that gender differences in the use of technological tools do not exist when both males and females possessed the equivalent amount of technological experience; whilst Taghavi [17] reported that age did not have a significant effect on attitudes although older students were found to enjoy more when using computers.

Tsai and Tsai [18] acknowledged the importance of the aforesaid predictors but echoed past researchers' [19], [20] concerns that not much can be done on these personality traits such as beliefs, age and gender in order to enhance students'

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computer literacy—including computer attitudes. They suggested that learning strategies can boost students' computer literacy.

III. Learning Strategies

Weinstein and Mayer [21, p.1] defined learning strategies as "behaviour and thoughts in which the learner engages and which are intended to influence the learner's encoding process". According to Namlu [22], learning strategies can be taught to students to optimise learning. Learning strategies have been proven to improve learning effectiveness which translates into better performance for subject matters such as mathematics and science [23], [24]. For computer related subjects, empirical studies on learning strategies are scarce. In fact, Tsai and Tsai [18] asserted that evidence are sorely lacking to prove the association between learning strategies and contemporary computer literacy research.

For this reason, Tsai and Tsai [18] embarked on a study to investigate if high school students' learning strategies were related to computer literacy which was measured in terms of computer achievement, computer attitudes and computer anxiety. Their study revealed that students who possessed higher order metacognitive skills were more likely to have better computer achievement, more positive computer attitudes and lower computer anxiety.

IV. Objective of the Study

The relationship between student's learning strategies and computer attitudes is not well supported by past literature. The need to explore the association between these variables is urgent now, especially in the Malaysian context. This is because ICT has been introduced as an elective subject in all secondary schools since 2001. The objective of this study is, therefore, to explore the association between learning strategies and computer attitudes.

V. Methodology

A. Research Approach

This study employed a quantitative approach and was part of a larger study to explore the relationship between learning strategies and computer attitudes of students in secondary schools and universities. This article reported the findings obtained from only secondary schools students. This correlational research was deemed suitable as the data obtained allowed the researchers to determine significant relationships between the ten sub-scales of learning strategies and computer attitudes.

B. Subjects and Procedures

Participants of this study were Form Four (Grade 10) students from secondary schools located in the state of Terengganu, Malaysia. The schools are spread out in seven districts throughout Terengganu—Kuala Terengganu (four schools), Marang (one school), Dungun (four schools), Kemaman (two schools), Hulu Terengganu (one school), Setiu (two schools), and Besut (three schools). Two schools were randomly selected from each district except for Marang and Hulu Terengganu. The only school in both these districts were included in the study. Prior permission was obtained from the Malaysian Ministry of Education before the study was carried out. For each randomly selected school, the researchers obtained the cooperation of the ICT teachers in the respective school to administer the questionnaires. A total of 155 questionnaires were administered for this study. Out of these, there were 149 complete questionnaires (93 females and 56 males). The number of participants surpassed the minimum number of samples (148) that was required for a population of 238 students [25]. All students had an average of 5.78 years of computer experience (*S.D.* = 2.60).

C. Instrumentation

Two instruments were used in this study—the Learning and Study Strategies Inventory-High School Version (LASSI-HS) and the Computer Attitude Scale (CAS).

The LASSI-HS was developed by Weinstein and Palmer [26] to measure student's use of learning and study strategies and methods. The scale consists of ten sub-scales— attitude, motivation, time management, anxiety, concentration, information processing, selecting main ideas, study aids, self testing and test strategies. The items were translated into the Malay Language with permission from H & H Publishing. The instrument comprised 76 items where each item was measured by a five-point Likert-type set of alternatives ranging from "not at all typical of me", "not very typical of me", "somewhat typical of me", "fairly typical of me" and "very much typical of me". Hence the responses indicate how well the statement describes them.

A detailed description of the sub-scales as defined by Weinstein and Palmer [26] in the user manual, with a sample item each is presented in Table I.

TABLE I: Sample Items of LASSI-HS

Subscale with definition	Sample item
Attitude: attitude and interest in high school and achieving success	I feel confused and undecided as to what my educational goals should be
Motivation: diligence, self discipline, and willingness to work hard	When work is difficult I either give up or study only the easy parts
Time management: use of time management principles for academic tasks	When I decide to study, I set aside a specific length of time and I stick with it
Anxiety: students' worry about school and their performance	I am very tense when I study
Concentration: students' ability to pay close attention to academic tasks	I concentrate fully when studying
Information processing: student's use of imaginal and verbal elaboration, comprehension monitoring and reasoning	I translate what I am studying into my own words
Selecting main ideas: students' ability to pick out important information for further study	I have difficulty identifying the important points in my reading
Study aids: students' use of support techniques or materials to help students learn and remember new information	I use special helps such as italics and headings, that are in my textbooks
Self testing: student review and prepare for classes and tests	I try to identify potential test questions when reviewing my class materials
Test strategies: student prepare for and taking examinations	I have difficulty adapting my studying to different types of courses

The computer attitude scale comprised 29 items adapted with permission from established scales developed by Albirini [27], Selwyn [7] and Soh [28]. There were three subscales—affective, behavioural and cognitive domains. Table II shows the sample item of each subscale with its definition derived from Kay [29].

TABLE II: SAMPLE ITEMS OF CAS

Subscale with definition	Sample item
Affective (Feelings towards computers)	Computers do not scare me at all
Cognitive (perceptions and information about computers)	Computers save time
Behavioural (behavioural intention and actions with respect to computers)	I would rather do things by hand than with a computer

D. Validation and Pilot Test

Two lecturers—one with vast experience in the field of computer technology and the other with vast experience in psychology validated the items. The items were also checked for clarity. The content validators found the items to be suitable in the Malaysian context. The instruments used in this present study was in the national language—Malay. A double back translation was carried out on items to ensure that the items in the Malay Language were equivalent to the original English version. Three bilingual school teachers were involved in this process. The first teacher translated the original English version into Malay. The second teacher then retranslated the Malay version into English without looking at the original version. Finally, the third teacher compared the original and the translated English versions. This teacher agreed that the meanings of both versions were consistent with one another.

Both the LASSI-HS and CAS was pilot tested on a group of 33 students who took the ICT subject as an elective. They were not included in the actual study. The Cronbach's alpha reliability coefficient was used as the index of scale internal consistency. The alpha values recorded for all subscales of the student version in Table III were good (greater than .80).

TABLE III: INTERNAL CONSISTENCY RELIABILITY FOR LASSI-HS AND CAS

Instrument		Cronbach alpha (α)	
		Pilot study	Actual study
LASSI-HS		.95	.91
	Attitude	.63	.66
	Motivation	.65	.66
	Time management	.65	.67
	Anxiety	.70	.55
	Concentration	.81	.78
	Information processing	.80	.80
	Selecting main ideas	.73	.50
	Study aids	.64	.70
	Self testing	.84	.70
	Test strategies	.72	.65
CAS		.85	.86
	Affective	.45	.60
	Cognitive	.77	.70
	Behavioural	.65	.80

VI. RESULTS

The relationships between each of the ten learning strategies and attitudes towards computers were investigated using Pearson product-moment correlation coefficient. Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity and homoscedasticity. Correlation coefficients between the 10 components of learning strategies and attitudes towards computers are shown in Table IV. The results show that the scale—motivation and time management were significantly correlated ($p<0.05$) with attitudes towards computers. The motivation and time management sub-scales were from the will and self-regulation components respectively.

Three other sub-scales—information processing, selecting main ideas and test strategy were more significantly correlated ($p<0.01$) with attitudes towards computers. All three sub-scales were from the skill components.

The aforementioned results indicate that students who have higher motivation and good time management will tend to have more positive computer attitudes. Students who have the ability to process information, select main ideas and prepare for tests are more likely to have more positive computer attitudes as well.

TABLE IV: CORRELATION COEFFICIENTS BETWEEN LEARNING STRATEGIES AND ATTITUDES TOWARDS COMPUTERS

Learning strategies	Attitudes towards computers
Attitude	0.121
Motivation	0.170*
Time management	0.199*
Anxiety	-0.027
Concentration	0.115
Information processing	0.213**
Selecting main ideas	0.236**
Study aids	0.150
Self testing	0.141
Test strategy	0.266**

*$p<0.05$, **$p<0.01$

VII. DISCUSSION AND CONCLUSION

The aim of this study is to expand understandings of learning strategies in relation to attitudes towards computers among students in a developing nation—Malaysia. The current study suggests that learning strategies play an important role in facilitating positive attitudes toward computers among students. The findings of the current study are consistent with those of Tsai and Tsai [18] who found that students with better learning strategies tended to have more positive attitudes toward computers. Their study revealed that "students with higher-order metacognitive skills in monitoring their comprehension, selecting main ideas and using resources helpful for learning tended to have higher computer achievement, better computer attitude and lower computer anxiety" (p.58). An earlier study by Ward [30] also suggested that computer anxiety decreased among learners who possessed advanced learning strategies.

Five learning strategies—motivation, time management, information processing, selecting main ideas and test strategy were significantly correlated with attitudes toward computers. The relationships between these five learning strategies and

computer attitudes are definite, but small. The significant positive association between motivation and computer attitudes indicates that students who are diligent with self discipline and are willing to work hard tend to possess positive computer attitudes. At the same time, the significant positive association between time management and computer attitudes suggests that those who are able to manage their time well will most likely have positive computer attitudes. Also, students who have good learning strategies especially the strategies of information processing, selecting main ideas and test strategies are inclined to have more positive computer attitudes. In other words, students with positive computer attitudes will most likely be able to use imagery, verbal elaboration, organization strategies and reasoning skills; pick out important information for further study and also apply the test preparation and test taking strategies in their computer learning environment.

Suffice to say, the results of the correlation coefficient analysis revealed that computer attitudes is related to selected learning strategies (motivation, time management, information processing, selecting main ideas and test strategy). It is important to note that computer attitudes is more strongly associated with the skill component of the strategic learning (information processing, selecting main ideas and test strategy) as compared to the other two components—will and self regulation.

To conclude, it is important for students to be strategic learners and for teachers to emphasise on the aforesaid learning strategies in the ICT learning environments. Strategic learners are more inclined to possess positive computer attitudes. Once students exhibit positive computer attitudes, there is a higher likelihood that they will be able to use computers successfully in their learning environments.

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