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Factors that Influence Students' Learning Attitudes toward Computer Courses for Technology and Vocational Institute Students in Taiwan

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Abstract

For the rapidly development of computer and information technologies, the relevant computer courses has become the fundamental curriculum in Taiwanese educational systems. The purpose of this paper was to discuss learning contingency factors that influence vocational and technology students' learning attitudes toward computer courses. Two groups of factors, internal learning motivation and external learning environments, were defined as the learning contingency factors. The former group included interest, employment, and trend variables, and the latter was consisted of two variables, home and school. Through an intermediate variable, computer use, a causal model was constructed to analyze how the learning contingency factors influenced students' learning attitudes which were measured by two indicators, self-efficacy and anxiety. As an empirical study, 235 valid vocational and technology institute students were sampled in Taiwan. The results indicated that the interest motivation had direct (the most significant) effect on subjects' learning attitudes, so did the school environment, employment, and trend variables, but the last one was a negative effect. The home environment did not directly affect the subjects' learning attitudes, but indirectly affected subjects' attitudes through computer use. The interest motivation also had an indirect effect on learning attitudes. The results could provide useful information for students and teachers in learning and teaching computer courses.

Keywords: learning motivation, attitudes toward computer use, computer self-efficacy, anxiety

Introduction

Computers and information technologies are rapidly becoming important components within societies' and people's lives globally (Coffin & MacIntyre, 1999). Thus, computer and information technology education has become a fundamental curriculum in schools and colleges worldwide. In Taiwan, the computer information technology curriculum has been incorporated to all levels of the educational systems. Accordingly, the Ministry of Education spends a great amount of instructional resources to enhance teaching facilities to increase teaching effectiveness. However, besides teaching methods and facilities, learning attitudes of learners are also essential factors to determine the instructional effectiveness. If instructors can identify learners' attitudes, their instructional effectiveness would be improved easily. Generally, the attitudes toward computer were defined as subjects' computer anxiety (Dupagne & Krendl, 1992) or computer self-efficacy (Compeau & Higgins, 1995). Most of the studies that discussing factors of influencing computer learning attitudes focused on subjects' background variables or the relationships of students' computer learning attitudes and their learning effectiveness. The subjects' background variables included gender, department majors, availability of computer facilities, and computer experiences, etc. There were few studies about the relationships of learners' learning attitudes and their learning motivation. In fact, motivation is one of the powerful driving forces for all learning behaviors including computer course learning. Woldkowski (1985) explained that motivation was the driving force for student learning and participation. Normally, positive motivation is helpful to improve positive learning attitudes. Schunk (1996) presented four factors which were interest, relevance, expectancy, and outcome to define the motivation. For school students, the most common motivation to learn computers is interest. However, there is other motivation that drives students to spend more time to learn computers. For example, some students may learn more computer skills for better employment opportunities in the future. This type of motivation for

employment could be described as the above outcome motivation because students expect that they will have better job opportunities (outcome) if they learn hard enough. Furthermore, for some school students, the learning trend among peers may be another motivation for them to study compute skills. These students do not learn computers for some certain purposes like employment or interest. They learn computers just for some trend standpoints, such as “every one should have basic computer literacy in the future”.

The purpose of this paper was to discuss factors that influenced students’ learning attitudes toward computer courses. This paper investigated the influencing factors from subjects’ internal and external perspectives. Two groups of factors, internal learning motivation and external learning environment, were defined as the influencing factors. The former group included interest, employment and trend variables, and the latter was consisted of two variables, home and school. Through an intermediate variable, computer use, a causal model was constructed to analyze how the learning contingency factors influenced students’ learning attitudes which were measured by two indicators, self-efficacy and anxiety. As an empirical study, 235 valid vocational and technology institute students were sampled in Taiwan. Furthermore, this paper also employed the computer use as an intermediate variable to analyze the influence of learning environments toward learning attitudes. The results of this study could provide information for educational administrators, computer teachers, and students in teaching and learning computer courses.

Literature Review

The intent of this paper was to discuss factors that influenced vocational and technology students’ learning attitudes toward computer courses. Accordingly, the relevant researches will be reviewed as follows.

Learning Attitudes toward Computers

Most researches about subjects’ attitudes toward computer focused on subjects’ computer anxiety (Dupagne & Krendl, 1992). Computer anxiety was referred to fear of computers, feeling uneasy, stressed, nervous, terrified and hating to use computers (Cambre & Cook, 1985; Igbaria, 1993). However, besides computer anxiety, there were other definitions for subjects’ attitudes toward computer, such as self-efficacy (Compeau & Higgins, 1995), interest and favorite (Kay, 1993). In recent studies, computer anxiety and self-efficacy are the most frequently employed to describe subjects’ attitudes toward computers. In fact, the definitions of these two attitudes are very similar, nothing but the former described the attitudes from negative viewpoint (anxiety) and the latter from positive perspective (confidence). Hence, Levine and Donitsa-Schmidt (1998) concluded, basically, they were the same. Beckers and Schmidt (2001) considered computer self-efficacy was a part of attitudes of computer anxiety. Many research findings indicated that the demographic variables significantly influenced subjects’ computer anxiety. For examples, female users had more negative attitudes and higher computer anxiety compared to male users (Busch, 1995; Bradley & Russell, 1997; Mikkelsen et al., 2002). Older subjects might have higher computer anxiety than younger ones (Mikkelsen et al., 2002), or might have not (Maurer, 1994; Rosen & Weil, 1995). Frequent users felt less computer anxiety than non-frequent users (Levine et al., 1998). Students majoring in humanity and social science had higher computer anxiety than those majoring in science and business (Marcoulides, 1989). Users with using experiences appeared significantly lower computer anxiety than the others (Gayle & Thompson, 1995).

Learning Motivation

Motivation is the behavior process of origin and continuation (Schunk, 1996). Woldkowski (1985) explained that motivation was the driving force for student learning and participation. Schunk (1996) presented that interest, relevance, expectancy, and outcome would be the four factors to define motivation. Wigfield and Eccles (2000) claimed that learning motivation was the value assessment and expectation of learners to specific learning purposes. Therefore, enhancing students' motivation by developing students' self interests would increase learning effectiveness (Ellis, 1995).

Learning Environment

Generally, student learning activities take place both at homes and schools. The environment of these two places would influence students' learning outcomes. Usually, learning environment of home is consisted of families and personal computer equipments. Bandura (1986) indicated that good quality of home environment would provide individual good learning model, as a result, influenced individual development of social characteristics and learning effectiveness. Studies had shown that subjects who had access to computer facilities at home tended to develop more computer knowledge and confidence (Geissler & Horridge, 1993; Nichols, 1992; Rocheleau, 1995). Research also indicated that individuals who had access to internet at home had higher computer literacy levels (Becker, 1999). For the learning at schools, teachers, teaching facilities and peers are the main factors to formulate the learning environment. Therefore, the qualities of these three factors are essential elements to form a good learning environment. Most of the related studies concentrated on the factors of teaching. Rosen and Weil (1995) indicated that negative teacher attitudes towards using technology had negative impacts on student attitudes about using technology. Young's study (2000) showed that positive teacher attitudes toward computers significantly affected male students' computer knowledge levels without mentioning about females.

Computer Use

A review of literature showed that individuals with computer experiences would have better computer attitudes, higher confidence, and lower computer anxiety compared to those without computer experiences (Loyd & Gressard, 1984; Baylor, 1985; Gardner, Dukes & Discenza, 1993; Shashaani, 1994; Woodrow, 1994; Gayle & Thompson, 1995). Levine and Donitsa-Schmidt (1998) confirmed that computer use significantly and positively affected users' confidence and attitudes, as well as frequent users felt less computer anxiety than non-frequent users. Thus, there should be relationship between computer use and attitude.

Methods

Research Model

The purpose of this paper was to discuss factors that influence vocational and technology students' learning attitudes toward computer courses. A causal model shown as Figure 1 was constructed for the above analysis. The influencing factors included two groups of exogenous variables: the internal learning motivation (interest, employment and trend) and external learning environments (home and school). The computer use was an intermediate variable in the model. hypotheses of this study are described as follows.

H1 Learning environments have positive effects on computer use
H2 Learning environments have positive effects on learning attitudes.
H3 Learning motivation have positive effects on computer use
H4 Learning motivation have positive effects on learning attitudes.
H5 Computer use has a positive effect on learning attitudes.
H6 Learning motivation and environments are related.

Population and Sample

The research population consisted of full time freshmen of vocational and technology institutes in Southern Taiwan. Based on the 1:4 ratios of the public and private schools in this region, samples were drawn randomly from four private institutes and one public institute. A personal distributed survey method was applied in this study. All those sampled were asked to The learning attitudes were assessed by computer self-efficacy and anxiety. Based on Figure 1, the participate in the study voluntarily and anonymously. The sample size equaled 280 subjects with a total of 235 valid responses. In the valid sample, male student percentage was 62.9%, and female was 37.1%. The public and private rates of school were 29.4% and 79.6% respectively. All of the subjects were taking basic computer courses, such as introduction to computers and data processing.

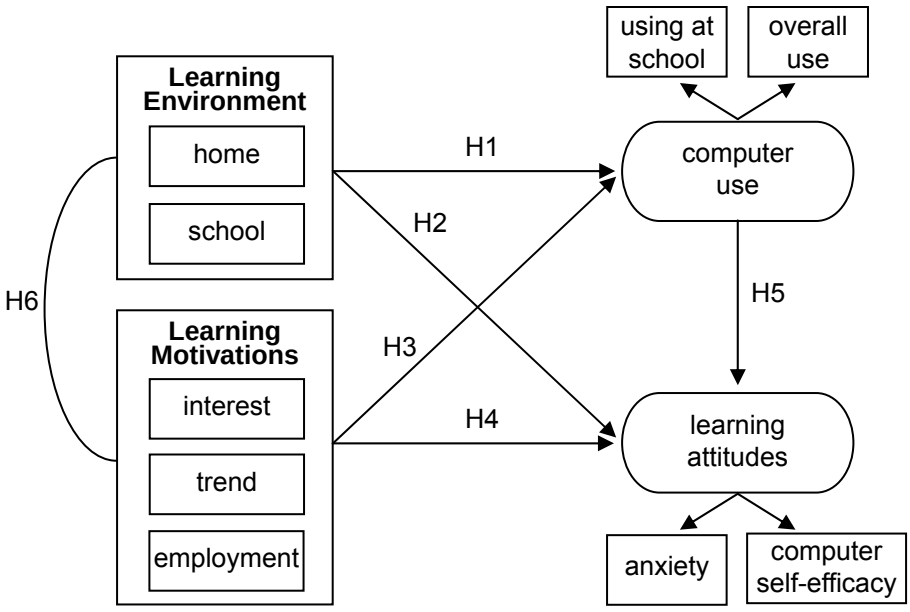

Figure 1. *Research Model*

Research Instrument

The survey was designed as a self-reporting questionnaire. According to the research model, there were three subscales and one demographic section in the survey. The subscales were designed with a 5-point Likert scale (5 = strongly agree; 4 = agree; 3 = uncertain; 2 = disagree; 1 = strongly disagree) to determine students' agreement with each statement. Higher scores represented greater agreement with each statement. The negative statements were reversed when scored.

Learning motivation

This part of the subscale was modeled after the surveys by Loyd and Gressard (1984)

and Hsu and Huang (1999). The statements were designed to measure students' perceptions for three learning motivation toward computer courses: interest, trend and employment. Higher scores represented higher learning motivation. After pretest, this part of the questionnaire was modified to contain 12 statements. The factor analysis with the principal component method and varimax rotation were employed to identify and extract factor dimensions. The results are shown in Table 1, which indicate that three dimensions were extracted with eigenvalues $1 \equiv \lambda$ and named as interest, employment and trend. The cumulative percentage of variance of this subscale was 61.78%. The reliabilities (Cronbach) of the three dimensions were 0.84, 0.83 and 0.79 respectively.

Table 1
The Validities and reliabilities of Constructs in the Model

Constructs	Dimensions	Eigenvalue	Cronbach's	Variance Explained%	Indicators Cronbach's α
Learning Motivation	Interest Employment Trend	4.367 1.811 1.231	0.84 0.83 0.79	61.78	--
Learning Environment	School Home	1.841 1.177	0.74 0.75	60.345	--
Computer Utilization	Using at home Overall usage	-- --	-- --	--	0.71
Computer Attitude	Confidence Anxiety	-- --	0.87 0.88	--	0.81

Learning environment

This part of the subscale was modeled after the surveys by Chen and Willits (1998) and Hsu and Huang (1999). The statements were designed to evaluate students' perceptions of satisfaction for their computer learning environment at school, and home respectively. Higher scores represented greater satisfaction of students. After pretest, this part of the questionnaire was modified to contain 6 statements. The factor analysis, which was also shown in Table 1, indicated that two dimensions were extracted and named as home and overall. The cumulative percentage of variance of this subscale was 60.35%. The reliabilities (Cronbach) of the two dimensions were 0.74 and 0.75 respectively.

Learning attitude

This part of the subscale was modified after the studies by Compeau and Higgins (1995) and Levine and Donitsa-Schmidt (1998). The statements were designed to evaluate students' perceptions of learning attitudes from self-efficiency (positive attitudes) and anxiety (negative attitude). After pretest, there were 6 items remained with 3 statements for each confidence and anxiety. The latter statements were scored reversely. Higher scores represented that students had higher positive learning attitudes. Since computer self-efficacy and anxiety had been widely discussed and the measurements were well developed and validated, the factor analysis was not employed for these two scales. However, the Cronbach αs (0.78 and 0.88) of these two dimensions, which were shown in Table 1, indicated that both of the constructs still had adequate reliability

Demographic item

Besides the students' background items: sex, department, and institute (private or public schools), this part of survey also includes two items to measure the subjects' computer use: the extent of computer use at school (Using at school), and the frequency of general computer use both at home and school (Overall) (1=rarely, 2=sometimes, 3=often) (Levine and Donitsa-Schmidt, 1998).

Data Analysis Techniques

Based on the research model shown as Figure 1, a confirmatory factor analysis using LISREL (Linear Structure Relations) was employed to test the hypothesized causal relationships in the model. In the model, there are 5 manifest exogenous variables (home, school, interest, employment and trend) and 4 endogenous indicators (using at home, overall use, computer self-efficacy and anxiety) to be measured. According to the above survey, besides the indicators of using at home and overall use with only one measuring item respectively, all of the other variables contain 3 measuring items. This paper measures these variables by summing up the scores of measuring items for each variable. The Cronbach αs of the two endogenous (computeruse and learning attitudes) with 2 indicators were also shown in Table 1, which indicated that thereliability of the constructs are adequate (0.71 and 0.81).

Results

Based on the research model that was shown on Figure 1, a confirmatory factor analysis using LISREL was conducted to test the causal relationships in the model. The fit of the overall measurement model was estimated by various indices including χ test , GFI, SRMR, RMSEA, AGFI, NFI, and CFI. The suggested values of these indices are shown in Table 2 (Bentler, 1995). The initial results of LISREL showed that the model was acceptable with χ

(11) = 13.431 (p = 0.266). However, there are several coefficients of paths not significant under the significant level α = 0.05. Thus, LISREL was processed again by eliminating these paths. The results were presented in Table 2 and Figure 2.

Table 2 indicated that all the indices for the fit of the measurement model are within the acceptance range. The χ (14) = 13.874 (p = 0.459 > 0.05) implied that the proposed model is good fitting. The path coefficients were illustrated Figure 2. According to the results in Figure 2, the interest motivation (β = .49) and computer use (β =.33) were the most significant factors to directly affect the subjects' learning attitudes. The former also had an indirect effect on subjects' learning attitudes through the computer use β =.08 (.23*.33).

Table 2
The Results of the Model Goodness of Fit Tests

Test indices	χ^2/df	*p*	GFI	RMSR	AGFI	NFI	CFI
Suggestion value	--	>.05	>0.9	<0.05	>0.9	>0.9	>0.9
Tests of research model	17.87/14	.459	0.982	0.040	0.964	0.978	0.999

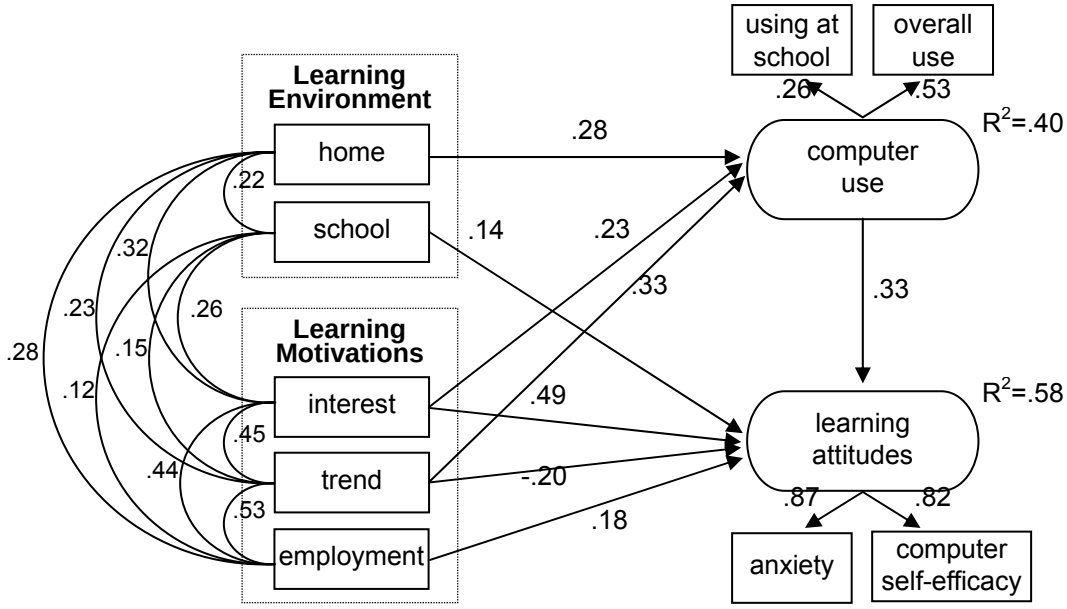

Figure 2. The results of LISREL analysis

Thus, the total effects of interest motivation on subjects' learning attitudes would be *β* =.57 (.49 +.23 * .33). The school environment (*β* = .14), employment motivation (*β* = .18) and trend motivation (*β* = -.20) also had a significantly direct effect on the subjects' learning attitudes, but the last one was a negative effect. However, trend motivation had a positive effect on computer use. Thus, the total effects of trend motivation on subjects' learning attitudes would be *β* = -.09 (-.20 +.33 * 33). The home environment, although, was the only one exogenous variables that did not directly affect the subject's learning attitudes, however, through computer use, it still had an indirect effect on the subject's learning attitudes *β* = .09 (.28 * .33). In additions, the results of Figure 2 also showed that there were significantly positive correlations among all of the exogenous variables, especially the 3 variables in the group of learning motivation, in which all of the correlation coefficients (*r*) were over 0.44. To sum up the above results, the hypotheses of H4, H5 and H6 were confirmed, and the hypotheses of H1, H2 and H3 were partly validated. The variances of subjects' learning attitudes can be explained 58 % in the research model.

Conclusions and Recommendations

The purpose of this paper was to discuss the factors that influenced students' learning attitudes toward computer courses. A causal model with 5 exogenous variables: 3 learning motivation (interest, employment, and trend) and 2 learning environments (home and school), and two endogenous variables: computer use and learning attitude were employed to construct the research model. As an empirical study, 235 valid students of vocational and technology institutes in Taiwan were sampled. According to the results, the following conclusions and recommendations are made.

Learning Motivation

The results indicated that the interest motivation had the most significant and direct effects on students' learning attitudes. Besides, through computer use, interest motivation also had an indirect effect on the attitudes. Hence, how to motivate students' interests toward information technology is an important issue that teachers should consider. Usually, many students are more interested in internet activities, such as playing network games and on-line chatting, therefore, designing the instructions with involving these activities may be good ways to increase students' learning For the trend motivation, the result indicated that it had a significant and negative effect on the learning attitudes and a positive effect on computer use. This result revealed that the more important students consider the computer skills for their future career, the more anxiety they would have in learning computer courses as well as they would spend more time on using computers. The negative effect of trend to learning attitude might be caused by students' anxiety about not being able to learn enough computer knowledge to deal with the demand of their future career. However, this negative attitude may push them to pay more attentions and efforts on leaning computer skills. From the learning perspective, sometimes, an adequate pressure would help to improve the performance of learners. Therefore, teachers may inspire students to learn computer knowledge from a negative "warning" by emphasizing the un-survival in the future society if learners have not enough computer literacy.

Learning Environment

The results indicate that the home environment had a significant and direct effect on the computer use, but not the school environment. The results revealed that having the accessible computer facilities at home and parents' encouragement would help students in developing their computer knowledge. This result also implied that school did provide adequate learning environment for students. The adequate computer learning environment is not just determined by providing sufficient computer facilities. The accessibility of facilities for students and well management of the environment are also important. In Taiwan, every year government spends a great amount of budget to support schools to setup or update the computer facilities, therefore the learning facilities should not be the problem. How to make the best use of these teaching and learning facilities to improve educational performance is an important issue for school administrators. The other result indicated that school environment had positive effect on the students' learning attitudes. This result showed that teachers pay more attentions and give encouragement to students would enhance their confidence in learning computer courses. Generally, these caring behaviors are more essential when students come across a frustration during the process of learning. In this information era, computer and information technology education has become a fundamental curriculum worldwide in schools and colleges. This paper discusses the factors of students' learning attitudes toward computer courses. The results could

provide useful information for students and teachers in learning and teaching computer courses. For the differences of national conditions, the results may not be generalized to students in other countries. However, the research model, especially the motivation factors, still can provide useful references for the related researches.

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