Identify the Motivational Factors to Affect the Higher Education Students to Learn Using Technology

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ABSTRACT
The purpose of this study is twofold. Firstly, engineering students' motivation in using technology for learning in one of Hong Kong universities is investigated. Secondly, new research model about students' perception in using technology for learning is developed. Survey was employed and the questionnaires were distributed to targeted university under study. 211 questionnaires were collected. The major findings of this study are that (i) Confidence was positively related to Relevance; (ii) Satisfaction was positively related to Confidence; (iii) Relevance was positively correlated with Satisfaction; (iv) Interest is positively related to Relevance; (v) Perceived personal ability is positively associated with Confidence; (vi) Confidence is positively associated with perseverance; (vii) Confidence, is negatively associated with anxiety; and (viii) Satisfaction is positively associated with social influence.

Keywords: Anxiety; Confidence; Relevance; Satisfaction; Interest; Perceived personal ability; Perseverance; Social influence.

1. INTRODCTION

Motivation plays an essential role in learning and it affects various fields of education (Kahveci, 2010). Also, there are extensive educational literature which is related to the student's motivation for learning and the instructional strategies affecting the student's motivation (Keller, 1984; 1987; 2010; Oliver & Reeves, 1996; etc.). However, it appears that there is little research on undergraduates' perception on the use of educational technology. Also, the research about the relationship among the motivational factors of the ARCS model for the use of technology (Keller, 2010) is lacking. Wenhao et al (2006) pointed out that there were lack of instruments that could validly measure motivational level. In addition, previous studies related to the ARCS model and the motivational instrument such as the Instructional Material Motivational Survey (IMMS) only focused on the information searching and instructional gaming (Dempsey & Johnson, 1998; Klein & Freitag, 1991). Therefore, the purpose of this study is to fill this research gap to determine undergraduates' perception in the use of technology and the relationship among the motivational components. This study is undertaken at one of the Hong Kong universities. Students need to use technology for learning such as searching information on internet, using software (SPSS, AutoCad, Compiere, PowerPoint, Excel). On the other hand, instructors use technology to teach students such as internet, video, educational software and other telecommunication devices. However, it is not easy for educators to motivate students to learn in the university. Some of the students may be absent from the course because they may feel boring about the courses. Then, it would affect the effective learning for the students. Hence, the purpose of this study is to examine the engineering students' perception of motivation in using technology for learning. This study also gives a fundamental understanding of engineering students' perception of motivation in using technology for learning to the educators in order to integrate technological component to enhance students' learning and motivation to learn during the design process of the course.

The research question to be addressed is "What is the relationship between the motivational factors about the use of technology for learning?"

2. LITERATURE REVIEW

2.1 Development of Educational technologies in Hong Kong universities

Educational technologies were employed in most of Hong Kong universities. Students use those technologies to learn in university. Technology can be divided in software and hardware. Considering the software, the Internet and the World Wide Web are widely used as a tool of teaching and learning in education. The Internet provides a platform for students to access unlimited information (Langin, Ackerman & Lewark, 2004). Undergraduates commonly use the Internet for communication with classmates or teachers via email, newsgroup or discussion forums, searching information from the Internet, checking news, doing research etc (Blanche & Kathleen, 2010). Moreover, Blackboard is a popular course management system in most universities in Hong Kong. It plays an important role is to build community among student and teachers. Since after the three hours lecture per week, there is not enough time to build a learning environment to students. Thus, a blackboard can help teachers sustain the learning environment to students in order to help the students achieve their learning goals (Lang, 2008). Furthermore, there are many functions of the blackboard and here we will introduce some of the popular functions, such as discussion board, email and library database. For the hardware, there are many learning tools such as personal computer, laptop and cell phone.

The positive effects of the instructional technology are strongly depends on students' motivation to use technology (Kahveci, 2010). Previous research found that different technology can have different effect on students' motivation. Web-based Learning becomes popular in university and students can access the course materials online. Though the online course materials like exercises and assignments, students can understand the concepts of the course. Since practice is important in programming course, a web-based learning environment with automated feedback and assessment is developed in one of Hong Kong University (Ronnie, 2005). It can help students learn the Java Servlet programming by the automatic feedback of their assignments. Then, students can learn from their mistakes and motivate them to practice more and more. For an online course, much research revealed that it has many advantages, which can motivate students to learn. The social capital was found in online courses (Andrew, Yannie, Reggie, 2005). Social capital has a positive relationship with effective learning in colleges. It can facilitate the social interaction processes through the online learning platforms. Hence, students can learn how to deal with the complexity social interaction, human characteristics and the conditions of community development through the online learning platform. Another advantage is the flexibility in online learning and they have positive influence on learning since they study when they can study (Kyong-Jee, Shijuan, Curtis, 2005). Moreover, it can help them develop the virtual teaming skills, which is important skill for the workplace in the global business environment. In additional, online learning allow learners to have more time to think critically and reflectively and stimulus higher order thinking such as analysis, judgment and application of knowledge (Daniel, Amber, Kevin, 2010). Email is one of the educational technologies which can improve interactions between instructors and students such as sending some supportive information with personal attention to each student who improves interactions between instructors and students such as sending some supportive information with personal attention to each student. Moreover, PowerPoint is the main presentation software used in the university, which used to deliver information to students. Previous study indicated that the use of PowerPoint can maintain the university students' interest in lectures (Jennifer, 2008).

2.2 ARCS Model

The ARCS Model was used as a base for our study. ARCS Model is a method for improving the instructional materials interesting and motivated (Keller, 1984). Keller (1984) defines that there are four categories in motivation based on the extension of the motivational literature review. The four categories are attention, relevance, confidence and satisfaction. Attention is about gaining and sustaining attention to the instructional content. Relevance is about relating to learning objectives and future use of learning. Confidence is about building confidence in learning and accomplishment. Satisfaction is about promoting the potential for learning satisfaction.

Afterwards, Kahveci (2010) used and expanded the ARCS model in his study. He indicated that there are eight factors affecting students' perception in using technology for learning. Kahveci (2010) named the factor components as Relevance, Interest, Confidence, Satisfaction, Personal Ability, Social Influence and Perseverance. In addition, one technology component "anxiety" was added in our study. Technology anxiety is also one of the students' perceptions in using technology for learning (Agatha & Don, 2008).

2.3.1 Relevance

Relevance is one of the important factors which affects students' motivation to use technology for learning. According to the ARCS model, relevance refers to people's feelings or perceptions of attraction toward desired outcomes, ideas, or other people based upon their own goals, motives and values (Keller, 2010). Based on the psychological basis, relevance not only occurs when the content to be learned is useful to one's work, but also occurs when there is a match between teaching and learning styles, a match between the content and one's personal interests, when one can relate prior knowledge and experience to the content, and when the content and performance requirements are consistent with one's personal and cultural values (Keller, 2010). Students are more motivated to learn the new knowledge which can help them achieve a goal in the future, such as getting a job, getting a raise, getting a promotion or improved job performance (Keller, 2010). Thus, students are motivated to use technology for learning when it is related to their goals or their future jobs.

2.3.2 Interest
According to ARCS Model, interest belongs to the relevance category and it is an important component for this category. Schank (1979) defines interest as the attraction or concern we feel toward events or objects because they touch upon our most basic needs and fears, or absolute interest. People tend to be interested in the content that is related to their personal interests (Keller, 2010). Thus, the student's interest in using technology for learning is related to the relevance in student's goal.

2.3.3 Confidence
As I have mentioned above, confidence is one of the components of ARCS models. Keller (2010) defines confidence as people's expectancies for success in the various parts of their lives. In other words, it means the degree of people who can predict and control their behavior. Locus of control, self-efficacy and attribution theory are the obvious theory regarding the confidence and personal control.

2.3.4 Perseverance
Perseverance is one of the effects of confidence. As the attribution theory mentioned above, if the person have confidence, the perseverance will be relatively high to achieve the goal (Weiner, 1992). Moreover, self-efficacy is positively related to perseverance (Bandura, 1977). High self-efficacy leads to higher and more perseverance when faced with obstacles and it also leads to higher attainment. In the learning environment, research found that students in high self-efficacy spent more effort in learning from difficult materials, such as learning from text than TV (Salomon, 1984). Some research found that students with high self-efficacy appeared to have more flexible learning styles and coping strategies with greater persistence (Nichols & Miller, 1994).

2.3.5 Anxiety
Anxiety refers to an unpleasant emotional state with qualities of apprehension, dread, distress and uneasiness (Reber, 1985). Computer anxiety is the common one. It means that users interact with computers and experience mixed feelings, like fear, stress and resistance to learn how to use them and cannot control the computer in their life and these feelings may limit people's abilities to learn using computers (Korobili, Togia , Malliari, 2010). Previous study found that there are strong negative correlation between confidence and anxiety (Bandura, 1997; Agatha and Don, 2008; Weiner, 1992; 1974).

2.3.6 Perceived personal ability
Perceived personal ability refers to people's beliefs that their abilities will influence their expectancies for success, attributions, and performance (Keller, 2010), which is one kind of the confidence category in the ARCS model. There were two concepts of perceived personal ability, which is entity concept of ability and incremental concept of ability. Entity concept of ability means that people believe that they either have an aptitude for a given activity or they do not, or, that they have a specific level of ability and that they cannot change it to any meaningful degree (Keller, 2010). In contrast, incremental concept of ability refers to the belief that one's ability in any of these areas can be improved with effort (Keller, 2010). This factor was closely related to self-efficacy, which is the person's belief that he or she can succeed in using technology for learning (Bandura, 1977). Positive relationship between self-efficacy and perceived personal ability was found in extensive educational research (Ashton & Webb, 1986; Woolfolk & Hoy, 1990).

2.3.7 Satisfaction
Creating satisfaction can continually motivate students on using technology for learning. Intrinsic motivation and extrinsic reinforcements are the two important elements in the satisfaction category. Intrinsic motivation is also named as intrinsic satisfaction, which means when students who perform the challenging and meaningful task successfully, then their feeling of satisfaction will be relatively high. For example, when students achieved a desirable level of success while studying the meaningful or relevant topics, then higher intrinsic satisfaction will be resulted. Moreover, it has been reported that intrinsic motivation is always a key to develop an effective instructional system in order to have motivate students in learning (Oliver & Reeves, 1996). On the other hand, if students' motivation are based on the extrinsic reinforcement, such as getting a good grade and they do not get it, then lower satisfaction will be resulted even they have positive intrinsic satisfaction (Keller , 2010). Thus, the satisfaction category is related to the relevance category since students will feel the level of satisfaction when they can achieve their goals at the certain task.

2.3.8 Social Influence
Social influence is another factor which will affect students' motivation in using technology for learning. Satisfaction is the only one factor which affects the social influence. With respect to the satisfaction, people's

feelings of satisfaction are influenced by their subjective evaluation if an outcome based on their expectations and social comparisons. In other words, when the outcomes are not what people expected they will probably modify their feelings or attitudes and this will influence their future motivation for that task. And, they will compare what happens to them to what happens to others and to their own expectations (Keller, 2010). For example, students get the same grade in group project and students feel unfair when they have done a lot of work compared to the others group members, then their satisfaction will be depressed.

2.3.9 Development of Hypotheses
According to the ARCS model as mentioned above, there are positive relationship among the category of Relevance, Confidence and Satisfaction (Keller, 1984; 2010; Oliver & Reeves, 1996; Wenhao et al, 2006). Thus, the following hypotheses were developed:
H1: Confidence is positively related to Relevance.
H2: Satisfaction is positively related to Confidence.
H3: Relevance is positively related to Satisfaction.

According to the ARCS model, the psychological theory of interest is related to the category of Relevance (Keller, 2010; David, Jon, Matthew, 1995; Hidi & Baird, 1986). Hence, the following hypothesis was developed:
H4: Interest is positively related to Relevance.

Based on the ARCS model, there were positive relationship between Confidence and Perceived Personal Ability, and Perseverance and negative relationship between Confidence and Anxiety (Keller, 2010; Agatha and Don, 2008; Ashton & Webb, 1986; Bandura, 1997; Korobili, Togia , Malliari, 2010; Nichols & Miller, 1994; Paula, Nicole , Samantha , Brendan. 2008; Woolfolk & Hoy, 1990 and Weiner 1992; 1974). Thus, the following three hypotheses were developed:
H5: Perceived personal ability is positively associated with Confidence.
H6: Confidence is positively associated with perseverance.
H7: Confidence, is negatively associated with anxiety.

Finally, there is positive relationship between Social Influence and Satisfaction according to the ARCS model (Keller, 2010; Lee, et al, 2003; So & Brush, 2008). Thus, the following hypothesis was developed:
H8: Satisfaction is positively associated with social influence.

Figure 1 shows the new research model about students' perception in using technology for learning.

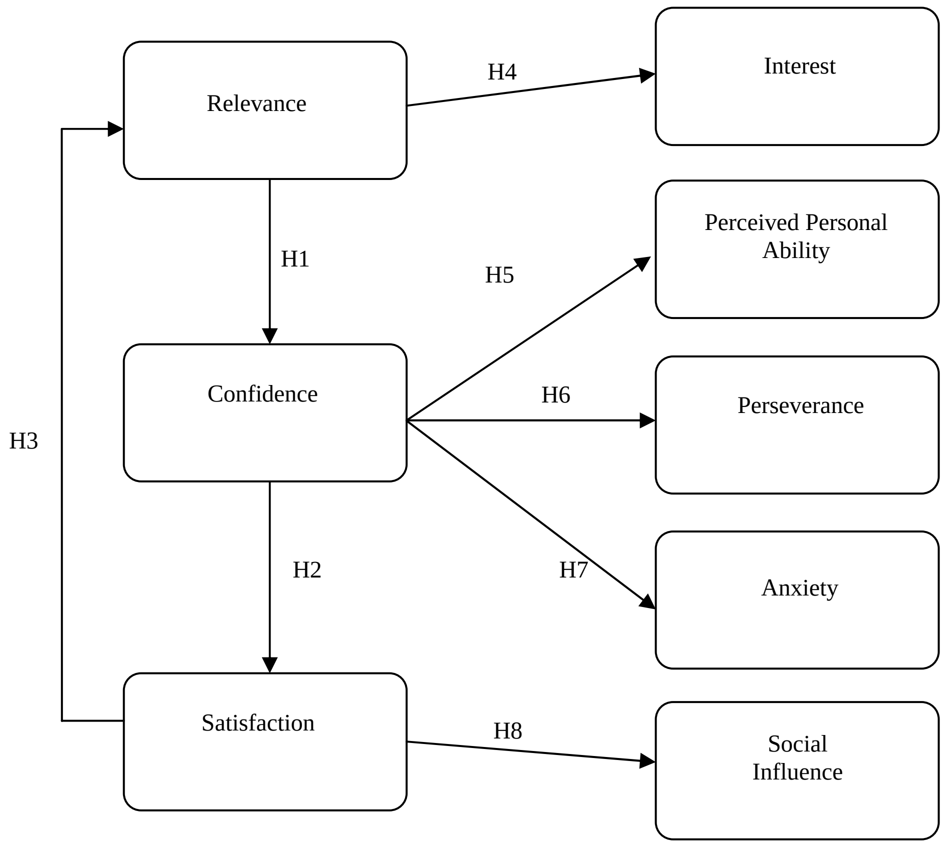

Figure 1: The Research Model of Student’s Perception in Using Technology for Learning

3. RESEARCH METHOD

3.1 Constructs Measure and Questionnaire Design

A questionnaire was used in this study to investigate students’ motivation in using technology for learning. There are 44 items as shown in Table 1 for eight dependent constructs in the questionnaire: namely, confidence (Q1 to Q5), perceived personal ability (Q6 to Q10), satisfaction (Q11 to Q15), social influence (Q16 to Q20), relevance (Q21 to Q26), perseverance (Q27 to Q30), interest (Q31 to Q35), anxiety (Q36-Q44). The constructs “confidence”, “perceived personal ability”, satisfaction”, social influence”, relevance”, perseverance” and “interest” were derived from the modified Fennema-Sherman Attitudes Scales (Kahveci, 2010) while the construct “anxiety” was derived from the Technology anxiety of Computer Technology Use Scale (CTUS) (Agatha and Don, 2008). The constructs “confidence”, “perceived personal ability”, satisfaction”, social influence”, relevance”, perseverance” and “interest” were rated from a 5-point Likert type scale, ranging from 1 “strongly agree” to 5 “strongly disagree”. The construct “anxiety” was rated from a 7 - point Likert type scale, ranging from 1 “comfortable” to 5 “uncomfortable”.

Table 1 – Items of questionnaire

ITEMS	Factor Loading
Confidence (1-5 scale from strongly agree to strongly disagree)	
1. I am sure I can do advanced work in technology.	.712
2. I am sure I can use technology.	.516
3. I think I could handle more difficult technology problems.	.711
4. I can get good grades in the courses related to technology.	.726
5. I have a lot of confidence when it comes to the use of technology.	.774
Eigenvalues Percentage of variance explained Cronbach’s Alpha	3.439 68.788 0.886
Perceived personal ability (1-5 scale from strongly agree to strongly disagree)	
6. I am not good at using technology.	.734
7. I don’t think I could use advanced technology.	.801
8. For some reasons even though I work too hard on it, using technology seems unusually hard for me.	.764
9. Most subjects I can handle okay, but I have a knack for flubbing up the problems about the use of technology.	.744
10. Technology related courses have been my worst courses.	.750
Eigenvalues Percentage of variance explained Cronbach’s Alpha	3.793 75.863 0.920
Satisfaction (1-5 scale from strongly agree to strongly disagree)	
11. It would make me happy to be recognized as an excellent student in the use of technology.	.625
12. I’d be happy to get top grades in the courses in which we use technology.	.707
13. Being first in the competition related with the use of technology would make me pleased.	.707
14. Being regarded as a smart in the courses in which we use technology would be great thing.	.612
15. I like using technology.	.338
Eigenvalues Percentage of variance explained Cronbach’s Alpha	2.881 57.619 0.803
Social influence (1-5 scale from strongly agree to strongly disagree)	
16. Winning a prize in technology related courses would make me feel unpleasantly conspicuous.	.440
17. People would think I was some kind of nerd if I get good grades in technology related courses.	.536
18. If I got the highest grades in technology related courses I would prefer no one knew.	.672
19. It would make people like me less if I were really good student in the	.742

technology related courses.	
20. I don't like people to think I am smart in the technology related courses.	.619
Eigenvalues Percentage of variance explained Cronbach's Alpha	3.008 60.170 0.833
Relevance (1-5 scale from strongly agree to strongly disagree)	
21. I try to use technology since I know how useful it is.	.653
22. Learning the use of technology is worthwhile and necessary subjects.	.699
23. I will need a firm mastery using technology in my future work.	.676
24. It does not make any difference whether I use technology.	.460
25. The use of technology will not be important in the rest of my life.	.735
26. I think technology is the area that I use rarely in my life.	.619
Eigenvalues Percentage of variance explained Cronbach's Alpha	3.842 64.034 0.883
Perseverance (1-5 scale from strongly agree to strongly disagree)	
27. When I am faced with technology related problem that I cannot solve immediately I stick with it until I solve it.	.698
28. Once I start trying to work on a study related with technology, I find it hard to stop.	.643
29. When a question left in the use of technology, I will keep on thinking about it.	.766
30. I am challenged with the problems in the use of technology I cannot understand immediately.	.499
Eigenvalues Percentage of variance explained Cronbach's Alpha	2.607 65.167 0.819
Interest (1-5 scale from strongly agree to strongly disagree)	
31. Figuring out technology problems does not appeal to me.	.751
32. The challenge of technology related problems does not appeal to me.	.763
33. The use of technology is boring.	.443
34. I don't understand how some people can spend so much time to use technology and seem to enjoy it.	.559
35. I would rather have someone give me an answer of technology related problems than to solve it by myself.	.653
Eigenvalues Percentage of variance explained Cronbach's Alpha	3.169 63.376 0.853
Anxiety (1-7 scale from strongly agree to strongly disagree)	
36. Learning a software package	.563
37. Using a computer	.689
38. Programming a video recorder (e.g., VCR, DVD)	.385
39. Using a mobile phone	.635
40. Learning about computers	.532
41. Using video conferencing	.572
42. Using Internet	.726
43. Computer technology is changing very quickly	.541
44. Reading a computer manual	.639
Eigenvalues Percentage of variance explained Cronbach's Alpha	3.994 44.373 0.832

3.2 Survey and Student Profile

The actual survey was conducted by distributing the questionnaires to the respondents during the lectures. The questionnaire was generally completed within 20 minutes. Thus, 350 questionnaires were distributed to students and, finally, 211 questionnaires were returned with a return rate of 60.29%. The usability rate was 100% as no incomplete questionnaires were found.

Descriptive statistics were used to analyze the demographic data on respondents. Table 2 displays the demographic data on respondents.

Of the questionnaire returned, 51.7% were completed by males and 48.3% were completed by females. 35.1% of respondents were under age 21, 58.3% of respondents ranged between 21 and 25, 4.7% of respondents ranged between 26 and 30, 1.9% of respondents ranged between 31 and 35. 28.4% of respondents were year 1 students, 35.5% were year 2 students and 36% were year 3 students. In addition, 85.8% were full time students, 13.3% were part time students and 0.9% were exchange students.

Table 2 – Statistics of the personal data of respondents

Personal Details	No. of respondents	Percentage of respondents (%)
Gender		
Male	109	51.7
Female	102	48.3
Age		
< 21	74	35.1
21-25	123	58.3
26-30	10	4.7
31-35	4	1.9
Year of Study		
Year 1	60	28.4
Year 2	75	35.5
Year 3	76	36.0
Mode of study		
Full time	181	85.8
Part time	28	13.3
Exchange	2	0.9

3.3 Validity and Reliability Tests

In this study, the statistical tool of AMOS was used. To confirm the construct of the questionnaire is valid and reliable, the validation of the measurement construct was examined. Firstly, the Cronbach’s alpha was used to measure the reliability of each construct. Cronbach’s alpha is a single correlation coefficient and it estimates the average of all the correlation coefficients of the items (Robert, 2006). The recommended cutoff criterion of the scale is 0.7 (Fornell and Larcker, 1981). Thus, if the Cronbach’s alpha of the items is higher than 0.7, all of the items are reliable and the scale is internally consistent. From Table 1, the Cronbach’s alpha values of eight constructs “confidence”, “perceived personal ability”, satisfaction”, social influence”, relevance”, perseverance”, “interest” and “anxiety” were 0.866, 0.920, 0.803, 0.833, 0.883, 0.819, 0.853 and 0.832 respectively. As no alpha value in this survey study was less than 0.7, the results were considered to be consistent and reliable.

In additional to the Cronbach;s alpha, a factor analysis using varimax rotation was also performed as it typically produces an orthogonal set of interpretable dimensions (Kaiser & Coffrey, 1965; McDermeit, Funk, Foss, & Dennis, 2000). The factors with eigenvalues larger than 1 should be retained because an eigenvalue less than 1 implies the scores on the component would have negative reliability (Cliff, 1988; Kaiser, 1960; Zwick & Velicer, 1986). Factor loadings of less than 0.3 were omitted as it is accepted that only factor loadings on the attributes greater than 0.3 were suitable for interpretation (Fornell and Larcker, 1981).

The results of factor loadings, eigenvalues and percentage of variance explained are shown in Table 1. For the 5 items of confidence, all factor loadings were greater than 0.3 and only one factor had an eigenvalue greater than 1. This single factor accounted for 68.788% of total variance; factor loadings ranged from 0.0.516 to 0.774. For the 5 items of perceived personal ability, all factor loadings were greater than 0.3 and only one factor had an eigenvalue greater than 1. This single factor accounted for 75.863% of total variance; factor loadings ranged from 0.734 to 0.801. For the 5 items of satisfaction, all factor loadings were greater than 0.3 and only one factor had an eigenvalue greater than 1. This single factor accounted for 57.619% of total variance; factor loadings ranged from 0.338 to 0.707. For the 5 items of social influence, all factor loadings were greater than 0.3 and only one factor had an eigenvalue greater than 1. This single factor accounted for 60.170% of total variance; factor loadings ranged from 0.440 to 0.742. For the 6 items of relevance, all factor loadings were greater than 0.3 and only one factor had an eigenvalue greater than 1. This single factor accounted for 64.034% of total variance; factor loadings ranged from 0.460 to 0.735. For the 4 items of perseverance, all factor loadings were greater than 0.3 and only one factor had an eigenvalue greater than 1. This single factor accounted for 65.167% of total variance; factor loadings ranged from 0.499 to 0.766. For the 5 items of interest, all factor loadings were greater than 0.3 and only one factor had an eigenvalue greater than 1. This single factor accounted for 63.376% of total variance; factor loadings ranged from 0.443 to 0.763. For the 9 items of anxiety, all factor loadings were greater than 0.3 and only one factor had an eigenvalue greater than 1. This single factor accounted for 44.373% of total variance; factor loadings ranged from 0.385 to 0.726.

Discriminant validity was also conducted using correlation analysis. According to Table 4.4, the correlations among eight constructs are less than 0.85. It is concluded that the discriminant validity exists between the constructs (John & Benet-Martinez, 2000).

Confirmatory factor analysis was then conducted using AMOS version 18 to establish a model with the closest fit to the data (Hu and Bentler, 1999). The resulting model contained 44 items. The overall model suggests good fit according to the standards set forth by Hu and Bentler (1999) (chi-square of 503 with 360 degrees of freedom; SRMR = 0.069; RMSEA = 0.050; CFI = 0.96).

4. RESULTS

4.1. Means and standard deviations

The means and stand deviations of eight constructs are shown in Table 3.

Table 3- Means and standard deviations of eight constructs

Construct	Mean	Standard deviation
Confidence	2.85	0.85
Perceived Personal Ability	2.69	0.92
Satisfaction	2.23	0.72
Social influence	2.25	0.71
Relevance	2.08	0.73
Perseverance	2.96	0.85
Interest	2.86	0.86
Anxiety	5.18	0.85

4.1.1 Confidence

The mean value of confidence is 2.85. The mean value approached to disagree in the Likert scale used. The mean value implied that engineering students tended to be lack of confident in using technology for learning. In addition, some students were lack of confidence when they learnt the software programming courses because they could not get higher marks in those courses.

4.1.2 Perceived personal ability

The mean value of perceived personal ability is 2.69. The mean value was near to neutral in the Likert scale used. The mean value implied that engineering students had no idea about their personal abilities to use technology for learning.

4.1.3 Satisfaction

The mean value of satisfaction is 2.23. The mean value was near to neutral in the Likert scale used. The mean value implied that engineering students tended to be satisfied in using technology for learning.

4.1.4 Social influence

The mean value of social influence is 2.25. The mean value was near to neutral in the Likert scale used. The mean value implied that engineering students tended to be influenced by their classmates when they used technology to learning.

4.1.5 Relevance

The mean value of satisfaction is 2.08. The mean value approached to agree level in the Likert scale used. The mean value implied that engineering students considered using technology were important, useful and relevant to their goals or life.

4.1.6 Perseverance

The mean value of perseverance is 2.96. The mean value approached to disagree level in the Likert scale used. The mean value implied that engineering students tended to lack of perseverance in using technology for learning. Since there are many programming courses in the engineering programmes, students found difficulty in learning such programming technology.

4.1.7 Interest
The mean value of perseverance is 2.86. The mean value approached to disagree level in the Likert scale used. The mean value implied that engineering students tended to lack of interest in using technology for learning. Since there are many programming courses in the engineering programmes, students found difficulty in learning such programming technology and eventually they lost interest in learning the relevant subjects.

4.1.8 Anxiety
The mean value of anxiety is 5.18. The mean value approached to disagree level in the Likert scale used. The mean value implied that engineering students tended to be fear in using technology for learning. The reason was that they were fear to learn programming courses, students found difficulty in learning such programming technology and eventually they were fear in learning the relevant subjects.

4.2 Correlations among motivation components
The correlation analysis was conducted to test the relationships among eight hypotheses. Table 4.4 shows the results.

Table 4.4 - Correlations among the Motivation components

Relationship	**Pearson Correlation**	**Result**
H1: Relevance-Confidence	.383**	Supported
H2: Confidence-Satisfaction	.238**	Supported
H3: Satisfaction-Relevance	.523**	Supported
H4: Relevance-Interest	.421**	Supported
H5: Confidence-Perceived Personal Ability	.794**	Supported
H6: Confidence-Perseverance	.649**	Supported
H7: Confidence-Anxiety	-.470**	Supported
H8: Satisfaction-Social Influence	.467**	Supported

** Correlation was significant at the 0.01 level (p<.01, two-tailed).

4.2.1 Relationships among Relevance, Confidence and Satisfaction
There were closely relationships among Relevance, Confidence and Satisfaction in ARCS model and each motivation components would affect each other (Keller, 2010). Pearson's correlation coefficients indicated positively significant relationship between relevance and confidence (r=.383, p<.01), confidence and satisfaction (r=.238, p<.01), satisfaction and relevance (r=.523, p<.01). These findings were supported by Oliver & Reeves (1996) and Wenhao et al (2006). Thus, the hypotheses H1, H2 and H3 were supported.

4.2.2 Relationship between Relevance and Interest
The Pearson's correlation coefficients indicated that there was positive and significant relationship between relevance and interest (r =.421, p<.01). This finding was supported by David, Jon, Matthew (1995) and Hidi & Baird (1986). Therefore, the hypothesis H4 was supported.

4.2.3 Relationships among confidence and perceived personal ability, perseverance, anxiety
There were significant positive relationship between confidence and perceived personal ability(r =.794, p<.01), and perseverance (r =.649, p<.01). On the other hand, a significant negative relationship between confidence and anxiety (r = -.470, p<.01). These findings were supported by Agatha and Don (2008) , Ashton & Webb (1986), Bandura, 1997), Korobili, Togia , Malliari (2010), Nichols & Miller (1994), Paula, Nicole , Samantha , Brendan (2008), Woolfolk & Hoy(1990) and Weiner (1992, 1974). Hence, the hypotheses H5, H6 and H7 were supported.

4.2.4 Relationship between Satisfaction and Social Influence
There was a significant positive relationship between satisfaction and social influence (r =.467, p<.01). This finding was supported by Lee, et al (2003) and So & Brush (2008). Thus, the hypothesis H8 was supported.

5. DISCUSSION
Generally speaking, engineering students were motivated to learn to use the technology in targeted university under study. The reason was that the university provided proper and sufficient educational technology in campus such as computers, laptops and software. Since 2005, the targeted university under study created an e-learning environment for engineering students to use technology for learning effectively. Moreover, an e-learning platform provided rich learning resources for engineering students in order to encourage them for proactive learning such as library database (Zoey, 2009). In addition, engineering students use the technology everyday, which can build up their confidence in the use of technology. For example, teacher will upload the course

materials on the blackboard and students download the materials through the blackboard and they would check email every day; they would usually use the MS Office to accomplish the projects or assignments; they would search information. Extensive research found that the use of technology could motivate student in learning and provided an effective learning environment to them such as Internet (Blanche & Kathleen, 2010; Langin, Ackerman & Lewark, 2004), online course (Kyong-Jee, Shijuan & Curtis, 2005), blackboard (Lang, 2008), discussion board (Clyde, William, Andrew, 2004; Lang, 2008), email (Clyde, William & Andrew, 2004), library database (Clyde, William & Andrew, 2004), MS Word , Excel, PowerPoint (Lawrence & Tomei, 2003), Laptop (Chuleeporn, Robert, Susan, 2008) etc. Therefore, engineering students have positive attitude towards the use of technology and they were motivated to use it for learning based on the e-learning environment created by university. However, the engineering students were not motivated to learn programming languages. The students found difficultly in learning programming languages and they could not get high marks in those courses. Although the students enjoyed in using the high technology facilities provided by university, they could not enjoy the software programming courses offered by departments.

From the results, all hypotheses H1 – H8 were supported since there were significant relationships among motivational components. Firstly, there were significant positive relationships among Relevance, Confidence and Satisfaction. Past studies revealed that there were significant relationship among Relevance, Confidence and Satisfaction (Wenhao et al, 2006). In this study, this finding indicated that engineering students perceived using technology was relevant to their life and future jobs. As a result, they were willing to learn the application technology provided by university. Also, when they were confident in the use of technology, they tended to be more satisfied in using technology for learning. Furthermore, when they achieved a desirable level of success in the use of technology for relevant purposes, their level of satisfaction was relatively high.

Secondly, there was significant positive relationship between Relevance and Interest (Keller, 2010). This finding was also consistent with David, Jon, Matthew (1995) and Hidi & Baird (1986). David, Jon, Mattew (1995) found that there were strong positive relationship between relevance and interest. Hidi & Baird (1986) pointed out that students had the highest recall for the interesting content, which was interested to them or personal meaningful to them. This relationship indicated that engineering students interested with the use of technology that related to their personal goals or life.

Thirdly, with respect to the relationship between confidence and perceived personal ability, the positive relationship was obtained. This finding was consistent with Ashton & Webb (1986) and Woolfolk & Hoy (1990). They indicated that when students believed that they were able to use the technology, their level of confidence would be relatively high. Moreover, they found that students were more confident in learning if they could learn the strategies and skills which helped them achieve their goals. Therefore, engineering students were more confident if they had higher perceived personal ability of using technology. Bandura (1997) pointed out that people with higher self-efficacy would be more perseverance in facing with obstacles. In this study, more engineering students insisted in the use of technology when faced with problems. Thus, the relationship between confidence and perseverance existed. Regarding the relationship between confidence and anxiety, negative relationship was observed. This finding was consistent with Agatha and Don (2008), Bandura (1997), Korobili, Togia , Malliari (2010) and Paula, Nicole, Samantha, Brendan (2008). Based on the attribution theory (Weiner, 1992; 1974), people who had confidence in their ability would not see the task that was difficult and their level of anxiety would be relatively low. In this study, engineering students who were more confident towards educational technology, they were less anxiety with the use of technology. Therefore, the negative relationship existed between confidence and anxiety.

Finally, the positive relationship between satisfaction and social influence was found. The finding was consistent with Lee et al (2003) and So & Brush (2008). Previous research found that the extent of social influence would affect the degree of satisfaction in the use of technology (Lee et al, 2003). As a result, students might change their attitude towards the use of technology when cooperating with others (Lee et al, 2003). In this study, engineering students had positive attitude towards social influence in the use of technology and their satisfaction levels were relatively high.

6. CONCLUSION

In conclusion, the students' perception of the use of technology for learning have been examined and the motivational factors and personal characteristics have been identified and the relationship among the motivational components was found. The new research model had been developed and this was the major contribution of this study. The major implication of this study is that the top management of the targeted university under study and educators can provide different supports for different group of engineering students and design the instructional strategies based on the engineering students' motivation.

There are some limitations and future research opportunities. The main limitation of this study was the narrow range of the age group. As the age ranges are from less than 21 to less than 35 but no participants aged higher than 35. It is not enough to compare the difference between the older and younger students in the use of technology. When the age range becomes wider, the difference becomes more valid. The second limitation is the small sample size and only engineering students of one university were invited in this study.
There are some future research opportunities for this study. Firstly, additional research is needed to evaluate the validity of the research model and the modified FSMAS. As the model and the modified FSMAS were new, further examination was needed to investigate students' perception in the use of technology and the relationship among the motivational components. Secondly, this study only examined engineering students at targeted university under study about the use of technology for learning. This study can be applied to other faculties, other universities, secondary schools or other countries for further research.

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