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ROLE OF SELF-EFFICACY IN E-LIBRARY USAGE AMONG STUDENTS OF A PUBLIC UNIVERSITY IN MALAYSIA

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ABSTRACT

This study looked at the influence of self-efficacy on e-library usage by 704 university students from four different schools in a Malaysian public university -, School of Humanities, School of Mass Communication, School of Chemistry and School of Biology. The results of the study suggest that self-efficacy has a significant direct impact on perceived usefulness and perceived ease of use when predicting e-library usage. Results also suggest that self-efficacy, perceived ease of use and perceived usefulness have direct significant impact on e-library usage. The results further indicate that perceived ease of use fully mediates self-efficacy when explaining e-library usage and perceived usefulness fully mediates perceived ease of use when predicting e-library usage.

Key-Words: Self-efficacy; Technology Acceptance Model (TAM); Perceived Ease of Use (PEU); Perceived Usefulness (PU); e-Library; Electronic resources usage.

INTRODUCTION

In this era of Information and Communication technology (ICT), there is a need for students at various higher learning institutions to be more receptive and adaptive to new technology. These students should be able to understand the importance of new technology adoption and exploitation. When the adoption habit is instilled in students from an early age, their receptiveness later on will be much more enhanced. There are a lot of ways whereby institutions can encourage students to use new technology and one of the easiest ways to introduce the adoption of new technology is through encouraging students to use 'e-library' in doing their course work assignments. Electronic or online library (e-library) can be defined as the digital library that requires technology to link the resources of many libraries and information services (Akla, 2002). In order to encourage university students to use e-library, we need to understand what factors influence students to seek out information from online sources (e-library). This entails for educational administrators to know what factors influences and enhances the usage of 'e-library'.

RESEARCH OBJECTIVE

Although educational institutions realize that it is important for students to use electronic resources by using e-library, they are still not able to make students utilize the e-library facilities provided by institution to its full potential. Several studies have shown that self-efficacy influence academic achievement (Pintrich & Garcia, 1991). This study tries to explore whether self-efficacy of an individual student influences his or her usage of e-library when searching for information and in using e-resources. Hence, the problem statement of this study is to find whether self-efficacy influences e-library usage level through perceived usefulness and perceived ease of use.

REVIEW OF LITERATURE

(a) Technology Acceptance Model (TAM)

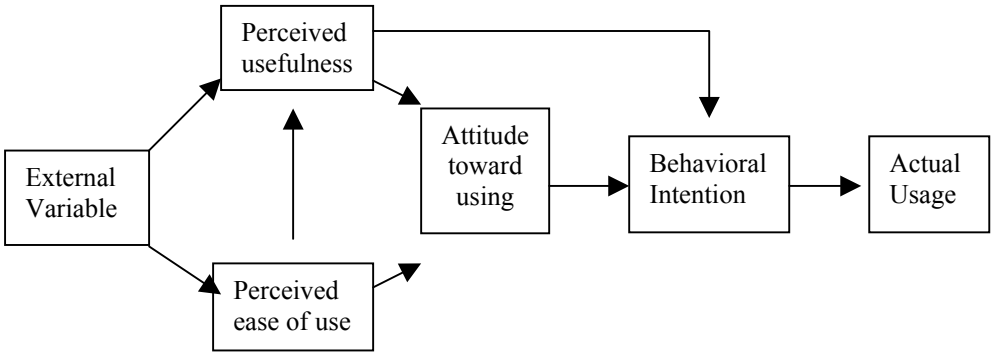
Several models have been developed to investigate and understand the factors affecting the acceptance of computer technology in large organizations. Among the notable models include Technology Acceptance Model (TAM), Theory of Reasoned Action (TRA) and Theory of Planned Behavior (TPB). TAM was developed by Davis (1989) to explain the computer-usage behavior and has adopted the generic Fishbein and Ajzen's TRA model to the particular domain of user acceptance of computer technology. TAM adapted the TRA's belief-attitude-intention-behavior relationship to model user acceptance of IT. The goal of TAM was "to provide an explanation of the determinants of computer acceptance that is generally capable of explaining user behavior across a broad range of end-user computing technologies and user populations, while at the same time being both parsimonious and theoretically justified" (Davis, 1989).

A variety of models that incorporate attitudinal, social, and control factors have been advanced to explain IT usage (e.g. Davis, 1989; Davis, Bagozzi, & Warshaw, 1989; Mathieson, 1991; Moore & Benbasat, 1991; Thompson, Higgins, & Howell, 1991), of which the Technology Acceptance Model (TAM) (Davis, 1989) is the most well known. TAM has been validated through testing with a number of technologies (Davis, 1989; Davis, 1993; Igbaria, 1993; Igbaria, Schiffman & Weickowski, 1994; Dishaw & Strong, 1999) and cultures (Straub, 1997). TAM is usually used for explaining the relationship between usage (both self-reported and anticipated future usage) and perceived usefulness (PU) and perceived ease of use (PEU).

According to TAM, usage behavior (B) is a direct function of behavioral intention (BI). Which is, in turn, a function of: attitude toward usage (A), which reflects feelings of favorableness or unfavorableness toward using the technology, and perceived usefulness (U), which reflects the belief that using the technology will

enhance performance. Attitude is determined jointly by perceived usefulness and perceived ease of use (E). Figure 1 depicts the Technology Acceptance Model (Davis, 1989).

Figure.1 Technology Acceptance Model (TAM)



Jantan, Ramayah, and Chin (2001) used the refined TAM to study the various factors influencing personal computer acceptance by small and medium sized companies. Whereas Ndubisi, Jantan, and Richardson (2001) tested TAM's validity among Malaysian entrepreneurs and found that among entrepreneurs, IT usage was influenced directly by perceived usefulness and indirectly (via usefulness) by perceived ease of use.

Though TAM has been researched with a lot of external influencing factors, most of the researches are techno-centric. A study was done by Jackson, Chow, and Leitch (1997) to identify if there is any impact of situational involvement, intrinsic involvement, prior use and argument of change on TAM. They found that there is a direct impact of situational involvement on behavioral intention and they also found that intrinsic involvement plays a significant role in shaping perceptions.

Igbaria, Zinatelli, Cragg, and Cavaye (1997) studied the effect of internal computing support, internal training, management support, external computing support and training on TAM. They found that PEU is a dominant factor in explaining PU and system use, but PU has a stronger effect on use. Exogenous variables influence both PEU and PU. Chau (1996) tried to find if implementation gap and transitional support have any effect on software acceptance by using the TAM model. They concluded that ease of use has the greatest impact on software acceptance.

Yet another study was initiated to find if factors such as role of technology, tenure in workforce, level of education, prior similar experience, and training participation influences TAM (Agarwal & Prasad, 1999). The study suggested that there is

nothing inherent in individual differences that strongly determines acceptance (use). Several individual variables like level of education, prior similar experience, and training participation has significant influence on TAM.

(b) Self-Efficacy

Computer self-efficacy is certainly not the only external factor affecting PEU and PU. Other factors may also have impact on the two variables of TAM. The primary objective of this study is to extend our knowledge of possible external variables affecting PEU and PU, namely self-efficacy.

Bandura (1986) defines self-efficacy as "the belief that one has about the capability to perform a particular behavior". According to Bandura (1986), perceived self-efficacy plays an important role in affecting motivation and behavior (Igbaria & Iivari, 1995). According to Compeau and Higgins (1995), computer self-efficacy represents "an individual's perceptions of his or her ability to use computer in the accomplishment of a task, rather than reflecting simple component skill".

Attitudinal construct may also impact IT usage, in order to find that this study tried to determine if self-efficacy has significant influence on e-library usage. Few studies have examined self-efficacy as an additional explanatory variable of an individual's use of IS/IT (Compeau & Higgins, 1995; Igbaria & Iivari, 1995).

A study conducted by Igbaria and Iivari (1995) on impact of computer self-efficacy on computer use found that computer self-efficacy has a strong direct effect on PEU, but only an indirect effect on perceived usefulness through perceived ease of use. They also found that computer self-efficacy has no direct effect on computer usage.

Computer attitude and self-efficacy was tested to determine if they exert any impact on PEU and PU. It was found that computer attitude has a significant, positive effect on PU and PEU. Computer self-efficacy, on the other hand, has a relatively small, but negative effect on PU and no significant effect on PEU (Chau, 2001).

A study was conducted by Zhang, Li, Duan and Wu (2001), on self- efficacy of distance learning's influence on learner's attainments. They found that if students have positive self-efficacy towards distance learning, the level of learner's attainment would be high as well. Thus, they found direct positive relationship between self-efficacy and learners attainment.

A study done by Liu and Grandon (2002) on the influence of self-efficacy and task performance on PEU, found that though PEU is positively influenced by self-efficacy and task performance, this influence become weaker when subjects are given prior training.

The training provided on computer and computer technologies does not influence employee self-efficacy levels. Self-efficacy remains stable for 2½ year period after the training is provided (Decker, 1998). Hence, it means that training does not influence self-efficacy of a given employee. On the other hand, hands-on training was found to exert significant difference in self-efficacy and perceived ease of use (Venkatesh & Davis, 1994).

A few studies have considered students and industry employees in their study of computer self-efficacy. It was found that computer self-efficacy as a component of user acceptance in e-mail and gopher information technology (Venkatesh & Davis, 1994; Venkatesh & Davis, 1997; Yi, & Venkatesh, 1996)

Surveying a class of freshman at Baruch College on the role of self-efficacy's role in search of information and use of the library's electronic resources, it was found that use of library is correlated to students' use of the library's electronic resources. It was also found that students who express an interest in learning about library's electronic resources would be more likely to have higher self-efficacy (Waldman, 2003).

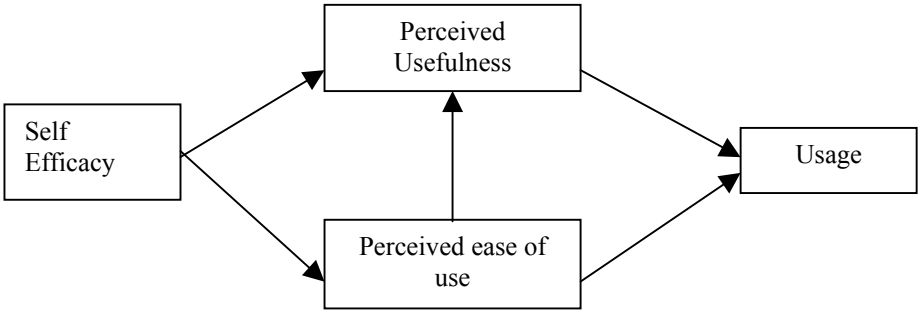
A study showed that when self-efficacy is too low, students would not be motivated to learn (Schunk, 1994) therefore different strategies need to be devised to reach such students.

In a study done by Ren (2000), it has been found that people are generally more interested in performing activities in which they have high self-efficacy", hence it can be said that students with high self-efficacy regarding e-library or searching for information for their assignments on the web, will be more likely to take advantage of what is around them. That is, if they are familiar and feel comfortable with computers, they will use them, and if they feel that learning about library's resources will enhance their academic performance, they will learn about them.

Research has shown that for college students, their computer use and their technology acceptance are positively related to computer self-efficacy. And that computer self-efficacy has a direct effect on a person's perceptions of the ease of computer use, which, in turn, affects the frequency and time of computer use (Ren, 2000).

Based on the above discussion, an augmented TAM was used as research model and self-efficacy was incorporated in the research model as an external variable affecting PU and PEU (Figure 2). The model examines the influence of self-efficacy on the e-library usage among university students.

Figure 2. Research Model



After looking at the literature, this research posits the following hypotheses:

H1: Self-efficacy will positively influence perceived usefulness.
H2: Self-efficacy will positively influence perceived ease of use.
H3: Perceived ease of use will positively influence perceived usefulness.
H4: Perceived usefulness and perceived ease of use will positively influence e-library usage.
H5: Relationship between self-efficacy and e-library usage will be mediated by perceived ease of use.
H6: Relationship between perceived ease of use and e-library usage will be mediated by perceived usefulness.

METHODOLOGY

This research involved a field study where the survey instrument was designed based on relevant researches and existing measures consisting of a 5-part questionnaire (see Table 1) in order to gather information regarding demographics, perceived usefulness, perceived ease of use, usage level, and self-efficacy.

Table 1: Questionnaire Sources

Section	Sample Question	Source
PEU	I would find online library easy to use.	Davis (1989)
PU	I would find online library useful in my study.	Davis (1989)
Self-efficacy	I could complete the job using the software package…if I had seen someone else using it before trying it myself.	Compeau and Higgins (1995)

The population consisted of students from four faculties at a public university. The sample for the study was selected through convenience sampling from these faculties, namely, School of Mass Communication, School of Humanities, School of

Chemistry and School of Biology. This population was chosen as this particular university has its own e-library, which can be accessed by all students from any given location, either in campus or outside campus. The demographic profile of the respondents is presented in Table 2.

Table 2: Demographic profile of respondents

Variables	Frequency	%
Male	242	34.4
Female	462	65.6
Malay	336	47.7
Chinese	278	39.5
Indian	70	9.9
Others	20	2.8
Humanities	151	21.4
Mass Communications	187	26.6
Chemistry	116	16.5
Biology	250	35.5
Undergraduate	624	88.6
Masters	78	11.1
Ph.D.	2	0.3
Age		
19-20	160	22.7
21-22	354	50.3
23-24	153	21.7
>=25	37	5.3

From Table 2 it can be seen that 65.6% of the respondents are female whereas only 34.4% of them are male. As for ethnic composition, 47.7% of the respondents are Malay, 39.5% are Chinese, followed by 9.9% and 2.8% of Indian and Others respectively. The majority of respondents are of 21-22 years age group (354, 50.3%). A total of 88.6% of the respondents are enrolled in the undergraduate program, followed by 11.1% and 0.3% enrolled in Masters and PhD program respectively. Furthermore, 21.4% of the respondents belong to the School of Humanities, followed by 26.6% from the School of Mass Communication, 16.5% and 35.5% from the School of Chemistry and the School of Biology respectively.

FINDINGS

A factor analysis with Varimax rotation was performed to validate whether the items in each section loaded into the expected categories when used for analyzing the hypotheses. As presented in Table 3 and Table 4, the results show two distinctive factors for PEU and PU (Table 3) and one factor for self-efficacy (Table 4). For PEU and PU the total variance explained was 64.16%, whereas for self-efficacy the

total variance explained was 51.40%. The criteria used to identify the loadings was that each item should load 0.50 or greater on one factor and 0.35 or lower on another factor (Igbaria, Iivari & Maragahh, 1995).

Table 3: Factor Analysis for PU and PEU

Items	Factor 1	Factor 2
PU1	**0.836**	
PU2	**0.864**	
PU3	**0.823**	
PU4	**0.732**	
PEU1		**0.765**
PEU2		**0.749**
PEU3		**0.814**
PEU4		**0.847**
Eigenvalue	5.13	1.00
Variance Reliability	38.72	37.34
Mean	0.90	0.88
SD	4.62	4.50
	1.23	1.10

* Values lower than 0.35 is not shown

Table 4: Factor Analysis for Self-Efficacy

Items	Factor 1
SE1	**0.510**
SE2	**0.619**
SE3	**0.740**
SE4	**0.764**
SE5	**0.789**
SE6	**0.734**
SE7	**0.755**
SE8	**0.777**
Eigenvalue	4.11
Variance	51.40
Reliability	0.86
Mean	4.64
SD	0.91

* Values lower than 0.35 is not shown

To further gain insight of respondent's awareness and experience with e-library information relating to computer usage experience, prior experience with online library and their current usage of e-library was gathered. Table 5 summarizes the information relating to respondent's awareness and experience with e-library.

Table 5: Respondent's awareness and experience with e-library

Category	Freq.	%
Computer usage experience		
< 1 year	26	3.7
1-2 years	84	11.9
3-4 years	145	20.6
5-6 years	198	28.1
7-8 years	99	14.1
9-10 years	67	9.5
> 10 years	85	12.1
Frequency of e-library usage		
More than once a day	133	18.9
About once a day	95	13.5
2 or 3 times a week	125	17.8
About once a week	135	19.2
About once in 2 weeks	151	21.4
About once a month	42	6.0
Less than once a month	23	3.3

From Table 5, it can be seen that majority of respondents (28.1%) have computer usage experience of 5-6 years, followed by 20.6% with experience of 3-4 years. Moving on to the usage level of e-library currently by the respondents, it can be seen that 21.4% of the respondents use e-library about once in 2 weeks, whereas 19.2% and 18.9% of the respondents use e-library about once a week and more than once a day respectively.

HYPOTHESES TESTING

Regression analysis was used to test the hypothesized relationships among the variables. The result of each hypothesis is summarized below.

(a) Self-efficacy will positively influence perceived usefulness

To test whether there is a direct impact of self-efficacy on PU, a linear regression was run whereby PU was taken as the dependent variable and self-efficacy as the independent variable. Table 6 shows the summary of the regression that was performed.

Table 6: Summary of the results of Regression Analysis (SE→ PU)

Independent variable	Std Beta
Self- efficacy	0.334***
R^2	0.112
Adj R^2	0.111
F Value	122.45***

* p<0.1, **p<0.05, ***p<0.01

From Table 6, it can seen that the R^2 value of 0.112 suggests that 11.2% of the variance in perceived usefulness is explained by self-efficacy. The standardized beta value of 0.334 (p<0.01) suggests that self-efficacy directly influences perceived usefulness. Thus, H1 is fully supported.

(b) Self-efficacy will positively influence perceived ease of use.

To test whether there is a direct impact of self-efficacy on PEU, a linear regression was run whereby PEU was taken as the dependent variable and self-efficacy as the independent variable. Table 7 shows the summary of the regression that was performed.

Table 7: Summary of the results of Regression Analysis (SE→ PEU)

Independent variable	Std Beta
Self- efficacy	0.380***
R^2	0.145
Adj R^2	0.144
F Value	164.69***

* p<0.1, **p<0.05, ***p<0.01

From Table 7, it can seen that the R^2 value of 0.145 suggests that 14.5% of the variance in perceived ease of use is explained by self-efficacy. The standardized beta value of 0.380 (p<0.01) suggests that self-efficacy directly influences perceived ease of use. Thus, H2 is fully supported.

(c) The perceived ease of use will positively influence perceived usefulness

To test whether there is a direct impact of PEU on PU; a linear regression was run whereby PU was taken as the dependent variable and PEU as the independent variable. Table 8 shows the summary of the regression that was performed.

Table 8: Summary of the results of Regression Analysis (PEU→ PU)

Independent variable	Std Beta
Perceived ease of use	0.694***
R^2	0.482
Adj R^2	0.481
F Value	904.13***

* p<0.1, **p<0.05, ***p<0.01

From Table 8, it can seen that the R^2 value of 0.482 suggests that 48.2% of the variance in perceived usefulness is explained by perceived ease of use. The standardized beta value of 0.694 (p<0.01) suggests that perceived ease of use directly influences perceived usefulness. Thus, H3 is fully supported.

(d) Perceived usefulness and perceived ease of use will positively influence e-library usage.

To test whether there is a direct impact of perceived usefulness and perceived ease of use on e-library usage; a linear regression was run whereby e-library usage was taken as the dependent variable and PU and PEU as the independent variables. Table 9 shows the summary of the regression that was performed.

Table 9: Summary of the results of Regression Analysis (PU + PEU→ Usage)

Independent variable	Std Beta
PU	0.161***
PEU	0.083
R^2	0.052
Adj R^2	0.049
F Value	18.323***

* p<0.1, **p<0.05, ***p<0.01

From Table 9, it can seen that the R^2 value of 0.052 suggests that 5.2% of the variance in e-library usage is explained by PU and PEU. The standardized beta value of 0.161 (p<0.01) suggests that PU directly influences e-library usage, whereas PEU does not significantly influence e-library usage. Thus, H4 is partially supported.

(e) Relationship between self-efficacy and e-library usage is mediated by perceived ease of use

In order to determine if perceived ease of use mediates the relationship between self-efficacy and e-library usage, multiple regression was employed, by taking usage as

dependent variable whereas self-efficacy and PEU as independent variables. Results are summarized in Table 10.

Table 10: Summary of the results of Regression Analysis (SE + PEU → Usage)

Independent variable	Std Beta
SE	0.020
PEU	0.160***
R^2	0.028
Adj R^2	0.025
F Value	10.11***

* p<0.1, **p<0.05, ***p<0.01

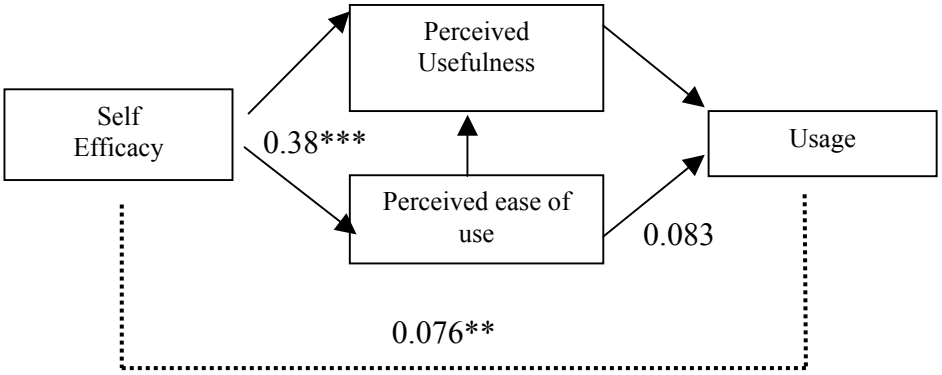
A variable may be considered a mediator to the extent to which it carries the influence of a given independent variable (IV) to a given dependent variable (DV). According to McKinnon et al, (1995), mediation is generally present when:

1) the IV significantly affects the mediator,
2) the IV significantly affects the DV in the absence of the mediator,
3) the mediator has a significant unique effect on the DV, and
4) the effect of the IV on the DV shrinks upon the addition of the mediator to the model.

Baron & Kenny (1986) has formulated the steps and conditions to ascertain whether full or partial mediating effects are present in a model (Figure 3).

It can be seen from Table 10 that when regressed together to determine the extent of influence of PEU and self-efficacy, self-efficacy does not impact e-library usage significantly, whereas PEU exerts significant with beta value of 0.160 (p<0.01).

Figure 3: Mediating effect of Perceived ease of use



To test whether there is a direct impact of self-efficacy on e-library usage; a linear regression was run. Table 11 shows the summary of the regression that was performed.

Table 11: Summary of the results of Regression Analysis (SE→ Usage)

Independent variable	Std Beta
Self-efficacy	0.076**
R^2	0.006
Adj R^2	0.004
F Value	4.04**

* p<0.1, **p<0.05, ***p<0.01

From Table 11, it can be seen that self-efficacy is found to have significant impact on e-library usage at beta value of 0.076(p<0.05). The relationship between self-efficacy and PEU is found to be significant as well at beta value of 0.38(p<0.01) (see Table 7). But from Table 10, it can be seen that only PEU has significant impact on usage whereas self efficacy has insignificant impact, thus it can be concluded that perceived ease of use acts as a full mediator when predicting relationship between self-efficacy and e-library usage. Thus, H5 is fully supported.

(f) Relationship between perceived ease of use and e-library usage is mediated by perceived usefulness

In order to determine if perceived usefulness mediates the relationship between perceived ease of use and e-library usage, multiple regression was employed, by taking usage as dependent variable whereas PU and PEU as independent variables. Results are summarized in Table 12.

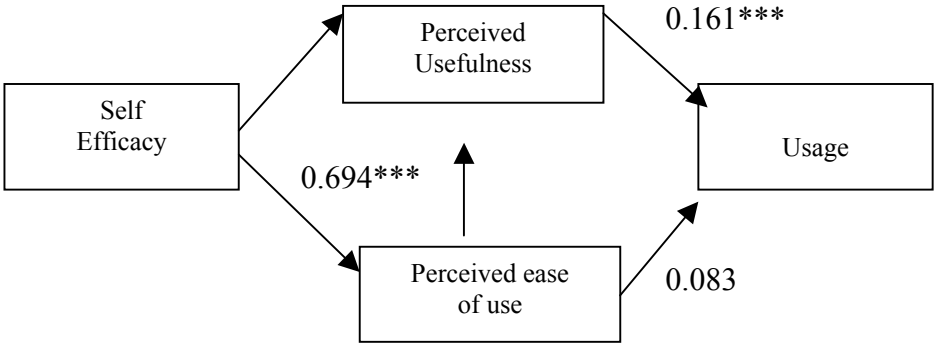
Table 12: Summary of the results of Regression Analysis (PU + PEU → Usage)

Independent variable	Std Beta
PEU	0.083
PU	0.161***
R^2	0.052
Adj R^2	0.049
F Value	18.323***

* p<0.1, **p<0.05, ***p<0.01

It can be seen from Table 12, that when regressed together to determine the extent of influence of PEU and PU, perceived ease of use does not impact e-library usage significantly, whereas PU exerts significant influence with a beta value of 0.161 (p<0.01).

Figure 4: Mediating effect of Perceived usefulness



Perceived ease of use is found to have significant impact on PU at beta value of 0.694 (H3) (Figure 4). The relationship between PU and usage is also found to be significant as well at beta value of 0.186 (H4). But from Table 12, it can be seen that only PU has significant impact on usage whereas perceived ease of use has insignificant impact, thus it can be concluded that perceived usefulness acts as a full mediator when predicting relationship between Perceived ease of use and e-library usage. Thus, H8 is fully supported.

CONCLUSION

This study investigated the possible influence of self-efficacy on the e-library usage among university students via perceived ease of use and perceived usefulness. The findings suggest that self-efficacy has a significant positive impact on perceived ease of use when predicting e-library usage. This finding is in line with the findings of few past researches, which also found that self-efficacy has a direct impact on perceived ease of use (Igbaria & Iivari, 1995; Thong, Hong, & Tam, 2002), and contradictory to a study conducted to determine influence of computer attitude and self-efficacy on IT usage behavior, whereby self-efficacy was found to exert no significant impact on perceived ease of use (Chau, 2001). The results also indicated that self-efficacy exerts positive impact on perceived usefulness, which is in line with past researches (Chau, 2001, Lopez, & Manson, 1997). Perceived ease of use was found to influence perceived usefulness positively, which confirms the past findings (Igbaria & Iivari, 1995; Chau, 2001). E-library usage was found to have significant impact from perceived usefulness, which is if students feel that a system is usefulness, their usage level will be higher, which is similar to the past studies findings (Igbaria & Iivari, 1995; Lopez, & Manson, 1997). The impact of perceived ease of use when predicting e-library usage was also found to be insignificant, which

is similar to the findings of past research (Igbaria & Iivari, 1995). Self-efficacy was found to have positive significant impact on e-library usage, which is similar to previous studies (Lopez, & Manson, 1997).

Perceived ease of use was found to have a full mediating effect on self-efficacy when predicting e-library usage by university students. This finding concurs with past studies done by Lopez and Manson (1997), Compeau and Higgins (1995). Lastly, perceived usefulness was found to fully mediate the relationship between perceived ease of use and e-library usage (Igbaria & Iivari, 1995).

From the results it can be deduced that self-efficacy is an important element that plays a significant role in determining e-library's usage level. As it can be seen that self-efficacy has both direct and indirect effects on usage, which demonstrate its important in the decision to use any given computer technology.

Hence, in order to enhance the self-efficacy of students, they should be given right information and training that will help develop positive self-efficacy towards computer technology in general. When computer self-efficacy increases, perceived usefulness and perceived ease of use will be more positive. This in turn will impact e-library's usage level. How to enhance self-efficacy? University management does not have any control over student's prior experience with computer technology but they can formulate programs such as introductory courses on computer and training, which will give students exposure and hands-on experience on computer technology. As students become more familiar with computer usage, using new application (e-library usage) will be perceived as much easier. The library management should also embark on an information dissemination program to highlight the usefulness of the electronic resources available on their website to all students, especially during the orientation period. The lecturers in these schools should also be roped in to become the change agents in influencing the behavior of students under their tutelage.

Finally, it can be concluded that this study contributes to understanding the role of self-efficacy when predicting e-library usage. It is found to be a very crucial element in predicting e-library's usage through perceived ease of use and perceived usefulness. Hence, the results of this study have implications for the university management to take into consideration students' self-efficacy when encouraging them to use e-library.

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