Learning Experience is Important for the Attitude of Using Statistical Software

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Abstract: - The purpose of this study is to test the effect of learning experience on attitude of using statistical software. Under a context of natural experimental setting, there are experimental and control groups. The experimental group is learning to use the statistical software in a course of software application. The control group is learning to apply the statistical software for analyzing data in a course of research method. The participants are 63 university students, 42 in experimental group and 21 in control group. The results show that learning experience has effect on attitude of using statistical software. It is concluded that learning experience is important for the attitude of statistical software usage.

Key-Words: - experimental design, learning experience, statistical software, attitude, university students, technology acceptance model

1 Introduction

The technology acceptance model (TAM) is a powerful and robust predictive model [1], and one of the simplest, easiest, and most widely used models for predicting computer usage behaviors [2]. However, empirical tests of this model have focused

on systems that the study participants were already familiar with. Taylor and Todd (1995) suggested that prior experience would be an important factor which might change the relative influences of perceived usefulness and ease of use [3]. While Davis et al. (1989) and Szajna (1996) have provided empirical evidence showing that ease of use becomes non-significant with increased experience [4, 5].

The literature is full of discussions surrounding the moderating effect of experience. But they focus on the level of experience [11], not on the approach of learning experience.

The application of statistical package is a required ability for the students of the Department of Health Care Administration. Since there are many packages for statistical processing, and most of the packages are friendly for self-learning. The course of statistical software application is not a required subject, and the students have the freedom to choose the course or not. However, the research method is a required course and in this course the students have to use the statistical software analyzing data. So, the students may learn to use a statistical package either in the class of statistical software appliance, or in the class of research method. Will the learning experience make any difference to the attitude of using statistical software?

2 Problem Formulation

The argument is that the experience of learning has effect on their attitude.

2.1 Theoretical foundation

The theoretical foundation for the TAM is Fishbein and Ajzen's theory of reasoned action [4]. The TAM adapted the TRA model to the specific domain for user acceptance of computer technology, replacing the TRA's attitudinal determinants with a set of two variables, perceived ease of use (PEU) and perceived usefulness (PU). Perceived ease of use refers to "the degree to which a person believes that using a particular system would be free of effort" [5]. Perceived usefulness is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance [5].

The TAM has been empirically proven to have high validity [6]. However, a meta-analysis of TAM literature identified that the role of external variables has received little attention [9]. Based on a detailed analysis of 22 articles from six journals, Legris et al. found that only 60% of TAM studies considered external variables and there was "no clear pattern with respect to the choice of the external variables considered." The authors argued that it is important to study external variables, because they are the ultimate drivers of usage. Furthermore, indicating that the model explained only a fraction of the observed IT usage variance, McFarland & Hamilton (2006) examined the influence of contextual specificity when describing technology acceptance, and found that prior experience would influence system usage [9].

As the results of a meta-analysis of TAM model [1] showed that the type of usage would influence the importance of EU factor. In this study, the types of usage were including job-related, office, general, internet and e-commerce. Sun and Zhang (2006) systematically selected published articles on technology acceptance to examine the role of moderating factors in user technology acceptance. In these 55 articles, the technology studied was including text-editor, WordPerfect, Email, Graphics software, etc. Little attention was paid on statistical software application.

2.2 A natural experimental setting

The students of the Department of Health Care Administration are required to complete projects in hospitals independently; they have to be provided with the ability of applying the statistical package. The software SPSS is a statistical and information analysis system running on a personal computer. It is widely accepted by universities and hospitals. The ability to use this software is a basic skill for all the university students whose majors are health related administration. Since each of the students will practice in hospital and implement a project independently. The acceptance of using statistical software is very important for them.

The course of the statistical software application is not a required subject. The students have two approaches to learn this subject in their 3rd year. One is taking both courses of research method and SPSS software application. The other is only taking the course of research method. And in the class of research method, the students will be required to implement an investigation research within a 4-6 members' team. They will learn how to use the statistical software through doing data analysis. There are two classes of research method, and construct a natural experimental setting. The experimental group is these students who have taken the course of statistical software appliance. The control group is those students not taking the course.

3 Problem Solution

The questionnaire is designed according to the technology acceptance model. It includes the measurement of perceived ease of use, perceived usefulness, and the attitude. The items used to operationalize the constructs of each variable were adopted from relevant previous studies, with necessary wording modification. Items measuring perceived usefulness and ease of use were adopted from Davis [4], whereas items measuring attitudes and behavioral intention were derived from Taylor and Todd [12]. All items were measured using a seven-point Likert-type scale with anchors ranging from "strongly disagree" to "strongly agree". Table 1 represents the results of the reliability testing using Cronbach alpha, which ranged from 0.749 to 0.937. Factorial validity was assessed by factor analyzing the 8 scale items using principal components extraction and varimax rotation. The resulting two-factor solution was consistent with distinct (Table 2).

Table 1 Reliability estimates

Construct	Items	Cronbach α
PU	4	0.877
PEU	4	0.936
Attitude	4	0.749

Table 2. Factor analysis of perceived usefulness and ease of use items

Scale items	Factor 1 (Usefulness)	Factor 2 (Ease of Use)
Easy to use	.920	.157
Controllable	.903	.190
Easy to become skillf	.900	.145
Easy to learn	.865	.251
Effectiveness	.137	.899
Job performance	.197	.836
Useful	.145	.812
Increase productivity	.210	.805

The students were asked to complete the questionnaire in their last class of research method. There are 18 male and 45 female students, and 2 thirds of these students have taken the software appliance course, as table 3. The means of usefulness, ease of use, and attitude are 22.38, 17.29, and 21.81 respectively.

The result, as table 4, shows that the relationship between gender and perceived usefulness and ease of use is not significant. However, the relationship between groups and perceived usefulness is significant. The perceived usefulness of the students in experimental group is higher than those of control group.

Table 3. Profile of all respondents

Variable	N	%
Gender		
Male	18	28.6
Female	45	71.4
Group		
Experiment	42	66.7
Control	21	33.3
	Mean	SD
Usefulness(7-28)	22.38	3.17
Ease of use(7-28)	17.29	4.39
Attitude(7-28)	21.81	3.48

Table 4. Relationship of gender and experience with perceived usefulness and ease of use

	Usefulness		Ease of use	
	Mean	SD	Mean	SD
Gender				
Male	22.94	3.32	17.78	4.17
Female	22.16	3.12	17.09	4.51
t value	0.89		0.56	
Groups				
Experiment	23.29	3.05	17.14	4.52
Control	20.57	2.64	17.57	4.21
t value	3.65***		0.36	

***p<0.001

Regression analysis (Table 4) indicates that the effect of usefulness on attitude, controlling for ease of use, was significant at the 0.001 level. In contrast, the effect of ease of use on attitude, controlling for usefulness, was non-significant. The relationship among usefulness, ease of use, and attitude was significant. The explanatory power for attitude is 0.39. Model 2 shows that the change of R^2 was significant at the 0.05 level when adding the learning experience. The explanatory power for attitude increases from 0.39 to 0.42. Obviously, the experimental group had more positive attitude than the control group.

Table 5. Regression models of attitude

	Model 1	Model2
Usefulness	0.65***	0.52***
Ease of use	0.08	0.13
Group(E/C)		1.73*
R2	0.39	0.42

*p<.05 ***P<.001

4 Conclusion

The results tested the effect of learning experience on the attitude of using statistical software. It makes important contribution to the growing body of technology acceptance literature by showing that learning experience can enhance the predictability of users' attitude.

Several recent studies using TAM suggested the exclusion of attitude from the model. But, Yang and Yoo (2004) argued that attitude deserved more attention [16]. The social psychology literature clearly suggests that attitude has a social function. It is contagious and influential in the learning process. The interaction among students will strengthen the attitude of learning. The more positive attitude the students have, the more possibility they will use the software to perform their work.

Burton-Jones and Hubona (2006) found that experience had a direct effect on the frequency and volume of system usage, and suggested that the effects of external variables appear to depend on the nature of the IT [14]. Comped with the email and word processing systems they studied, the statistical software appliance needs more intellectual capacities. The usage of statistical software is different from other kind of system usage. It needs the knowledge of statistics. Sun and Zhang (2006) had discussed about experience [15]. The concept of experience refers to more familiar with and more knowledgeable about the technology of interest. In this study, the level of statistics knowledge did not include as a control variable. Furthermore, the experimental setting is under a natural context, the participants are not randomly assigned as experimental or control members. This is the limitation of the study.

One of the significant findings was the relative strength of the usefulness-attitude relationship compared to the ease of use-attitude relationship. Examining the joint direct effect of these two variables and learning experience, this difference was still pronounced.

Barker et al. (2003) experimental study on the spoken dialogue system, in which they concluded PEU was not a significant predictor for BI, with a positive but small R^2 change of 0.002 [13]. King and He's meta-analysis indicated the importance of perceived usefulness as a predictive variable and concluded that the major effect of PEU is through PU rather than directly on BI [1].

Sun and Zhang indicated that the variable attitude was omitted from the final TAM because the PU→BI link seemed more significant [15]. Davis et al. [5] explained that if a system is perceived to be useful, people may have a high BI even though they do not have a positive attitude toward it. Another explanation is that attitude is a complex construct with multiple components.

This study yields three implications for research. First, it would useful for researchers to investigate the core set of system characteristics. Studies should systematically investigate various technologies that differ on important dimensions. For example, some systems need more intellectual capacity, others need more skill. Second, attitude deserves more attention, especially toward the acceptance of technology needing more learning experience. Third, experience is important for technology acceptance, not only frequency or volume, but pattern of learning experience.

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