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The Impact of Facilitating Conditions on Anxiety, Attitude, Self-Efficacy, And Performance: Insights from an Empirical Study of iPad Adoption

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Abstract:

Educational institutions across the world are increasingly adopting tablet personal computing devices in the classroom. However, prior literature has not established a consistent relationship between facilitating conditions, user-related constructs and technology utilization, and these aspects have received limited attention in the specific context of tablet devices in educational settings. Hence, this study examines how facilitating conditions influence computer anxiety, attitudes towards technology, computer self-efficacy and perceived ease of use, and the consequent impact on performance expectations. Using data collected from a school in Israel, this study concludes that facilitating conditions are significant determinants of computer anxiety, computer self-efficacy, perceived ease of use and attitudes towards technology. As expected, performance expectancy is also influenced by technology attitude and partially by computer self-efficacy. Practical and theoretical implications are discussed

Keywords: tablet computing, adoption, use, computer anxiety, self-efficacy, performance expectation, perceived ease of use, iPad

I. INTRODUCTION

Advances in mobile technologies have increased the appeal and access to handheld computing, mobile computing, smart phones and tablet personal computing. These technologies provide users with easy access to integrated platform of applications and network resources. For example, an individual can use a smart phone to access weather, traffic, stock-market data, calendar, geographical positioning systems, and the news. Easy access to content through e-readers, e-textbooks, seamless integration with cloud computing and collaboration capabilities are making mobile and tablet computing very popular in businesses and educational institutions. Some of the popular tablet personal computing technologies include Hewlett Packer's Slate, Motorola's Xoom and Apple's iPad.

The focus of the current study is to understand the adoption of tablet computing technologies in educational institutions. Many schools in the US are adopting and introducing the iPad in the classroom. Apple Inc. sold 1 million iPads to schools between April and June in 2012 [Ogg, www.gigaam.com, 2012]. In 2010, the Roslyn High School on Long Island provided students and teachers in humanities class with 47 iPads and the school district intends to eventually provide 1,100 iPads to all students [The New York Times, 2011; Harrison, 2010]. The Zeeland Public Schools in Michigan embarked on an ambitious project in 2011 to provide 1800 iPads to every student in grades 3 to 12 [USA Today, 2011]. In Madison county, Wisconsin state provided 1400 iPads for the school district [Huber, 2012]. Several different reasons have been advanced for adopting tablet personal computing in schools. Some of the reasons for the popularity of the iPad in schools include the functionality of the technology and the availability of affordable educational software and application. The portability of the technology, long battery life, educational software and the potential to support a

paperless classroom are some of the reasons advanced by school administrators in the US for introducing iPads in the classroom. Some school administrators have even noted that the iPad may reduce the cost of textbooks and printing. Although many schools have embraced iPads in the classroom, Larry Cuban, a professor at Stanford University, is of the view that the money spent on iPads could be used in recruiting better teachers, since quality of instruction is still important and the novelty of the iPad will eventually wean [The New York Times, 2011]. Thus, not everyone is optimistic that the introduction of tablet personal computing in the classroom will increase learning performance.

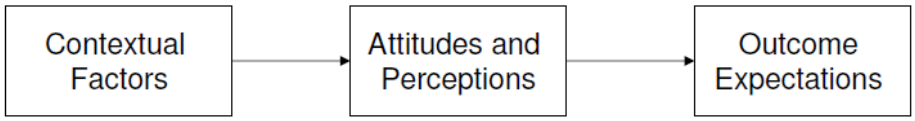

Figure 1: Theoretical Model

A study of the deployment of iPod and iPad devices in a large urban Canadian school concluded that some students and teachers resent the intrusion of personal devices in the learning environment and not everyone is familiar with the devices [Crichton et al., 2012]. Schools and administrators ought to be cautious, take steps to mitigate unintended effects, and also create conducive environments to foster the use and application of tablet personal computing by students and teachers. The theoretical motivation for this study is to demonstrate a relationship between contextual factors, attitudes and perceptions and outcome expectations. As depicted in Figure 1, this study examines how contextual factors, reflected in facilitating conditions, influence attitudes and perceptions and the consequent impact on outcome expectations. Explicating the relationship between facilitating conditions, perceptions and attitudes, and outcome expectation informs research on adoption and use on how context influences attitudes and perceptions. An understanding of this relationship may also provide additional insights into the antecedents of individual perceptions and attitudes. As many schools and educational institutions implement tablet personal computing in the classroom, an understanding of how facilitating conditions influence technology utilization has practical implications.

The extant literature on technology adoption and diffusion underlines three main factors that influence the adoption and use of technology; user-related attitudes, technology features and the context. User-related attitudes, specifically, attitudes towards technology, affective disposition, abilities, and cognitive capabilities have been noted to affect how individuals respond, adopt and use technology [Davis 1986; Moore, 1987; Venkatesh et. al. 2003; Moore and Benbasat, 1996; Goodhue and Thompson, 1995; Compeau et al., 1999; Thompson et al., 1991]. Technology features tend to address the suitability of the technology. Technologies that are more suitable to a task are more likely to be adopted [Goodhue and Thompson, 1995]. The context in which the technology is introduced, more specifically, the facilitating or inhibiting conditions, may also impact how the technology is perceived and accepted by users [Compeau et al., 1999; Thompson et al., 1991; Sabherwal et al., 2006]. Different studies have examined different combinations of these factors to explain adoption and use of technology. As depicted in the theoretical model in Figure 1, this study draws on prior literature to examine how contextual factors influence attitudes and perceptions and the consequent impact on outcomes expectations. More specifically, this study examines how facilitating conditions influence computer self-efficacy, attitudes towards technology, computer anxiety and perceived ease of use and the consequent impact on performance expectations. As schools and educational institutions implement tablet personal computing technologies in the classroom, they have limited control over the technology. However, schools can create conditions that foster positive attitudes and perceptions towards technology. Individual disposition, such as attitudes and perceptions, can be influenced by the environment or the context. Since the context is an aspect that institutions can manage and control to influence attitudes and perception, it is important that research examines how it influences individual perceptions. By understanding how facilitating conditions influence individual disposition in the adoption and use of technology, this study informs research on adoption and use of technology in the context of schools, learning environments and educational institutions. The

implications are that managing the environment and creating an atmosphere that fosters the adoption and use of technologies may determine the success or failure of technology implementation.

II. BACKGROUND

Several individual psychological perspectives have been used to explain how attitudes and disposition towards technology influence the use and adoption of technology and information systems (IS). Theory of Planned Behavior (TPB), Theory of Reasoned Action (TRA) and Social Cognitive Theory are some of the individual psychological perspectives that have been used to examine intentions to use and adopt technologies [Ajzen and Fishbein 1977; Bandura 1977; Davis, 1989]. Several studies on adoptions and technology utilization draw upon the personality psychological perspective to explain how individual perceptions influence use and adoption of technology (e.g. Davis 1989, Davis 1986; Moore 1987; Venkatesh et al. 2003; Moore and Benbasat, 1996; Thompson et al., 1991, Rogers, 1976].

Beliefs, perceptions and attitudes influence intentions and behaviors. Thus, in the context of technology adoption and use, how individuals perceive technology, their beliefs about technology and their norms about technology influence their attitudes and consequent behavior intentions to use technology. In the technology adoption model (TAM), Davis (1989) emphasized on perceived ease of use and perceived usefulness to explain attitudes and intentions to use technology. Perceived ease of use and perceived usefulness have been shown to influence intentions to use and adopt technology and information systems. How individuals perceive a technology or a system is an important determinant of intentions to use technology [Venkatesh et al., 2003, Davis, 1989]. When individuals feel that the use of a system requires minimum effort and mastering the system is not difficult, they are more likely to use and adopt the system. The belief that using a system is effortless and requires minimum cognitive abilities influences perceptions about the system and intentions to use the system [Venkatesh, 2000; Davis, 1989].

In a study examining the antecedents of perceived ease of use, Venkatesh (2000) notes that computer anxiety, perception of external control, computer self-efficacy, perceived enjoyment, objective usability, and computer playfulness are significant determinants of perceived ease of use. This study provides additional explanation by examining how facilitating conditions influence perceived ease of use. Ultimately, it is how individuals perceive the effort and challenges of using a system that influences their intentions and behaviors towards a system. If a system is perceived to be difficult to use and requires considerable amount of effort to use, then individuals are likely to avoid using the system. Since perceptions are important determinants of intention to use, by establishing a relationship between facilitating conditions and perceived ease of use, this study informs research on adoption and use and provides further insights into the precursors of perceived ease of use.

In TAM and other extensions of the model, perceived usefulness of the technology is another important determinant of attitudes and intentions to use technology [Venkatesh and Davis 2000; Venkatesh and Bala, 2003; Davis 1989; Venkatesh, 2000]. Individuals perceive technology to be useful if the technology facilitates task execution. Studies examining other determinants of technology utilization have focused on the fit between the technology, individual abilities and the task. The task-technology fit literature emphasizes on the congruence of individual abilities, task characteristics and technology characteristics [Goodhue and Thompson, 1995]. Individuals are likely to perceive a system to be useful when the system yields tangible results relevant to a task.

In a study examining the determinants of perceived usefulness, Davis and Venkatesh (2000) noted that job relevance, output quality and result demonstrability are some of the factors that influence how individuals perceive the usefulness of a system. Other studies have focused on other affective and cognitive dispositions of users to explain intention to use technology. The effects of computer anxiety, computer self-efficacy, and attitudes towards technology [Compeau and Higgins, 1995; Venkatesh, 2000; Thompson et al., 1994] on the intention to use technology have been examined. Compeau et al. (1999) examined how computer self-efficacy and attitudes towards technology influence performance expectations. Thompson et al. (1994) examined attitudes towards technology and computer utilization. Thus, prior literature has examined other factors, besides facilitating conditions, to understand how individuals form perceptions about a system. By examining the relationship between facilitating conditions and perceptions in this study, we provide additional explanation of how attitudes and perceptions are shaped by facilitating conditions.

In the Theory of Planned Behavior [Ajzen, 1991], perceived behavior control influences intentions and behaviors. Hence, the degree to which individuals perceive that they have control over their environment influences their intentions and behaviors. Facilitating conditions can increase perceived behavior control and foster positive attitudes and perceptions. When organizations create environments that impress on individuals that they have control, they are more likely to form positive attitudes. Enabling conditions mitigate the effects of inhibiting factors on the use and adoption of information technologies and systems [Thompson et al., 1991; Venkatesh, 2003].

Facilitating conditions are objective factors conducive to the use and adoption of technologies in organizations. The extant literature on adoption and utilization of technology advances a direct relationship between facilitating conditions and use behaviors or behavior expectations [Thompson et al., 1991; Venkatesh et al., 2003; Thompson et al., 1994; Venkatesh et al., 2008]. Thus, prior literature underlines the significance of facilitating condition in determining technology utilization, however, the relationship between facilitating conditions, perceptions, and attitudes have not been adequately explored. Moreover, Venkatesh et al. (2008) observed that facilitating conditions may not be good predictors of behavior intentions because of uncertainty and incomplete information about the environment. The authors' further noted that the relationship between facilitating conditions and intentions are contingent on behavior expectations. In spite of these assertions, an examination of the determinants of information system success by Sabherwal et al. (2006) noted that facilitating conditions shape user attitudes and are important determinants of information system success. Thus, the extant literature acknowledges the importance of facilitating conditions in explaining technology utilizations, however the relationship between facilitating conditions, user related constructs and system utilization have not been consistently established.

Thus, the extant literature on adoption and technology use has explored several different relationships between facilitating conditions, attitudes and perceptions, and intentions to use technology. In this study, facilitating conditions are posited to influence attitudes and perceptions, specifically, attitudes towards technology, computer self-efficacy, computer anxiety, and perceived ease of use. Hence, this study explores a much broader list of attitudes and perceptions that may be influenced by facilitating conditions. By examining a broader list of attitudes and perceptions that can be influenced by facilitating conditions, this study provides additional explanation of how facilitating conditions influence technology utilization.

Tablet personal computing, specifically the iPads, have built-in and customized applications designed to facilitate collaboration, content consumption, and content creation. For example, the iCloud, iBooks, eReader and eTextbook facilitate collaboration, easy and seamless access to content. Although tablet personal computing has several built-in applications suitable for students and teachers, it is how students and teachers perceive the technology in the classroom that determines utilization and adoption. When students and teachers have positive attitudes and perceptions, they are likely to have positive expectations that the technology will facilitate task execution in the classroom. In learning environments, such as educational institutions, students and teachers are driven by goals, albeit different goals. Students want to learn and master the instructional material and teachers aim to be effective in delivering the instructional material. Technologies that enhance teaching effectiveness and also facilitate positive learning experience can increase performance expectations. Students and teachers form performance expectations through their evaluation of a technology's capability to increase their capacity to be effective in the attainment of task goals in the classroom.

Performance expectations are job related outcomes that influence intentions and behaviors on the job [Campeau and Higgins, 1995; Venkatesh et al., 2003]. Expectations are formed and shaped by the consequences of our actions. In the context of technology use, the outcomes of using a technology to perform a task shapes performance expectations. Individuals evaluate the outcomes of using a technology and then form performance expectations, which in turn guide their future behaviors and intentions of using the technology. When individuals have positive expectations that a technology will facilitate the achievement of task goals, they are likely to use the technology. Compeau et al. (1999) examined the relationship between computer self-efficacy and performance expectations and concluded that computer self-efficacy increase performance expectations. Performance expectations are significant determinants of intentions to use technology in voluntary and mandatory use environments [Venkatesh et al., 2003]. The value and benefits of any information system depend on how the system is used [Goodhue and Thompson, 1995]. Since the value of any

technology stems from utilization, as new technologies are introduced by organizations, they should create conditions that encourage system utilization. Creating conditions that influence perceptions and performance expectations may impact utilization and performance outcomes [Compeau et al., 1999]. Hence, understanding how facilitating conditions influence individual perceptions and performance expectancy has practical implications for many organizations implementing new technologies. Moreover, understanding how facilitating conditions interact with individual perceptions and attitudes to influence performance expectations in learning environments informs research on adoption and use.

Investigating the impact of facilitating conditions on perceptions and attitudes provides further insights into how facilitating conditions may influence intentions and behavior, thus contributing to a better understanding of adoption and technology use. In the context of schools and tablet personal computing, school administrators ought to management the implementation process to ensure that the technology is adopted and used by students and teachers. Although attitudes, perceptions and dispositions play important role in the adoption of technology, the antecedents and precursors of attitudes and perception are numerous and varied. It is impossible for school administrators to control and manage all the factors that can influence attitudes, perception and disposition of students and teachers. By establishing a relationship between facilitating conditions, individual perceptions and attitudes, this study informs school administrators and managers on how to effectively manage the implementation of tablet personal computing in the classroom.

III. HYPOTHESIS DEVELOPMENT

Facilitating conditions are defined as “the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system” [Venkatesh et al., 2003]. Facilitating condition is the perception that there are resources, structures and processes in place that encourage use of technology and reduce factors that inhibit the use of a technology [Thompson et al., 1991]. Supporting resources, such as help desk support, knowledge repository, top management support, knowledgeable IT staff, and training of users reduce barriers to technology utilization and promote the use of technology. Thus, barriers to technology use, such as computer anxiety, can be reduced by facilitating conditions.

Computer anxiety is the fear and apprehension of using a computer. These negative affective reactions to the use of technology are inhibitions that limit the use of technology [Venkatesh, 2000]. The anxiety over the use of a computer or technology can be reduced with objective conditions that reduce the apprehension and fear of using technology. For example, an efficient help desk may reduce anxiety because support from the help desk can allay some of the fears of using the system. Likewise, training and top management support can also mitigate user apprehension and fear of using a system [Venkatesh and Bala, 2008].

Computer self-efficacy is the perceived ability to use computer [Compeau and Higgins, 1995]. It is the perception of general capability, capacity and skills to use a computer to accomplish tasks and enhance performance. Facilitating conditions, such as knowledge repository and user training, can increase computer self-efficacy and reduce computer anxiety [Venkatesh and Bala, 2008]. Training and the availability of a knowledge repository may increase user perception of computer self-efficacy. If users have access to knowledge on how to use a system and have had training on how to use the system, they may feel that they have the capability to use the system to accomplish tasks.

This relationship is also depicted in the research model in Figure 2.

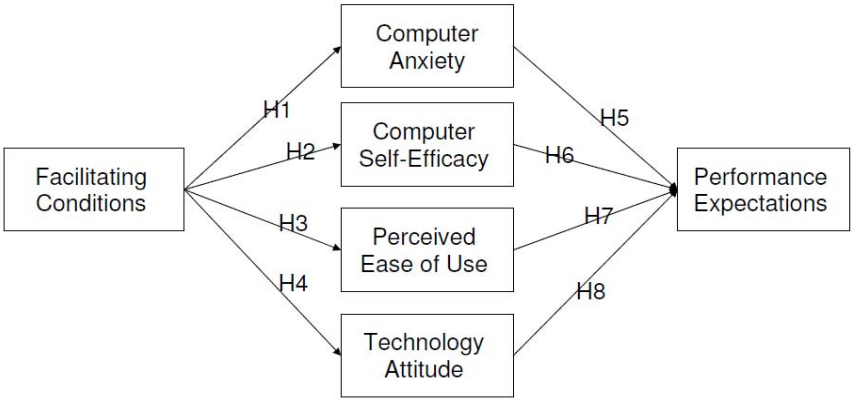

Figure 2: Research Model

Facilitating conditions influence both cognitive and affective reaction to the use of technology. Attitudes towards technology are the affective reaction to technology and may include feelings of excitement, fear, joy, playfulness, happiness boredom and frustration. In this paper we focus on the positive affective reaction to technology, hence the focus is on the enjoyment a person derives from using computers [Compeau et al., 1999]. Facilitating conditions can increase positive attitudes towards a technology. Thus, if users perceive that there are objective conditions, such as training manuals, qualified IT staff, and top management support for technology, they may form positive attitudes towards a technology.

Facilitating conditions can also influence how individuals perceive ease of use. Davis (1989) defines perceived ease of use as "the degree to which a person believes that using a particular system would be free of effort". Thus, if individuals perceive that using a system requires less effort, in terms of acquisition of skills to use the system or the cognitive capacity required to use a system, then they perceived the system to be easy to use. As shown in Figure 2 of the research model, facilitating conditions, such as training manuals, on-the-job training, knowledge repository, help desk support, an efficient IT support staff, and an effective technology infrastructure, may increase an individual's perception of ease of use. Based on these explanations of how facilitating conditions influence computer anxiety, computer self-efficacy, attitudes towards computer and perceived ease of use, we advance and test the following hypotheses:

H1: Facilitating conditions decrease perceptions of computer anxiety
H2: Facilitating conditions increase computer self-efficacy
H3: Facilitating conditions increase perceptions of ease of use
H4: Facilitating conditions increase positive attitudes towards technology

Individuals tend to form outcome expectations about their actions and intentions. If individual behaviors and actions meet outcome expectations, then the behaviors and intentions are considered desirable and will be repeated in the future [Bandura, 1997]. In the context of technology, when individuals use computers to facilitate the execution of tasks, they expect the technology to increase their capacity to be more effective in accomplishing their tasks. According to Venkatesh et al. (2003), performance expectation is the "degree to which an individual believes that using the system will help him or her to attain gains in job performance". Hence, performance expectation is the anticipation that using a system increases the capacity to be effective and efficient at accomplishing tasks. Performance outcomes are influenced by individuals' attitudes, perceptions, and affective reactions to the technology. When individuals have positive affect towards a technology, they feel happy when using the system and are not frustrated or bored by using the system. The positive affect towards using a system influences perceptions about how the system can help meet performance expectations. Hence, if individuals have a positive affect towards a system, they are more likely to have positive performance expectations.

Similarly, if individuals feel that using a system requires less cognitive effort and it is easy to acquire the skills to use a system, then their perceptions of ease of use will influence their performance expectation. If users of a system perceive that the system is easy to use, they will also feel that the system will enhance their effectiveness in accomplishing their task, thus we expect a positive relationship between perceived ease of use and performance expectations. When individual feel competent and confident about themselves, they tend to have high expectations of themselves, hence self-efficacy affects performance expectations [Bandura, 1997]. In the context of technology use, computer self-efficacy is a reflection of an individual's capacity to be effective and efficient at using a computer to accomplish tasks. When individuals feel that they have the skills to be effective at using a computer, they tend to have high performance expectations [Compeau et al., 1999]. Hence, in this study, we postulate that computer self-efficacy increases performance expectations.

The fear and apprehension of using computers can negatively impact performance expectations. When users are nervous and uncomfortable using a system they are likely to have negative affect, in the form of anxiety, when contemplating using the system [Venkatesh et al., 2003]. When individuals are scared and feel uneasy using a system, they will have negative feelings and affect towards the system and these affective reactions will influence use of the system [Compeau et al., 1999; Venkatesh et al., 2003]. In this study, we postulate that negative affect also decreases performance expectations. When users have negative affect towards a system, they are more likely to feel that the system will not help them to be effective in accomplishing their tasks. Hence the current study advances a negative relationship between computer anxiety and performance expectation. On the other hand, if users have positive affect towards a system they are more likely to have positive performance expectations. When users enjoy using a system, they look forward to using the system to accomplish their tasks, are immersed in using they system, and tend to feel that the system enhances their capacity to be effective at their jobs. Hence, positive affect towards a system increases performance expectations. Based on these explanations, we predict and test the following hypotheses

H5: Perceived computer anxiety reduces performance expectations
H6: Computer self-efficacy increases performance expectations
H7: Perceived ease of use increases performance expectations
H8: Favorable technology attitude increases performance expectations

IV. STUDY DESIGN

To accomplish the goals of the study, students were recruited from a secondary school in Israel to participate in the study. The school provides each student in the secondary school with an iPad for use in the classroom. With the support of school administrators and permission from parents, students in grade 10 were selected to participate in the study and a total of 90 students completed a web-based questionnaire for the study. Only 87 surveys were included in the final analysis, because three of the surveys were deemed incomplete and excluded from the study. Participants completed a web-based survey with questions adapted to the context of the study from prior studies. All the questions in the survey used a 5-point Likert scale. Computer self-efficacy and attitudes towards technology were measured with items adapted from Compeau et al. (1999). Measurement items were adapted from Venkatesh and Bala (2008) to measure computer anxiety. Facilitating conditions are measured with scales adapted from Venkatesh et al. (2003).

V. ANALYSIS AND RESULTS

We used Smart PLS software, Version 2.0 M3, [Ringle et al., 2005] and partial least squares (PLS) structural equation modeling to analyze the data. We conducted confirmatory factors analysis to evaluate the measurement model used in the study. Most items loaded strongly on their intended variables, with a few cross loadings and low loadings; hence some of the items were excluded from the study. Table 1 provides a list of the latent variables and the loadings for observed indicators used in the analysis of the data. After excluding low and cross loading items, the remaining items loaded strongly on their intended variables, meeting the recommended threshold of 0.7.

Table 1: Factor Loadings						
	Technology Attitude	Computer Anxiety	Computer Efficacy	Ease Of Use	Facilitating Conditions	Perform Expectancy
AFS1	**0.93**	-0.44	0.41	0.51	0.50	0.57
AFS2	**0.91**	-0.36	0.47	0.57	0.47	0.46
CAX2	-0.35	**0.90**	-0.04	-0.16	-0.41	-0.25
CAX3	-0.51	**0.91**	-0.30	-0.40	-0.45	-0.31
CAX4	-0.36	**0.95**	-0.21	-0.27	-0.45	-0.35
CSE1	0.51	-0.18	**0.76**	0.51	0.39	0.34
CSE5	0.27	-0.28	**0.76**	0.37	0.31	0.34
CSE6	0.27	0.04	**0.76**	0.35	0.23	0.28
EOU2	0.51	-0.22	0.51	**0.85**	0.53	0.35
EOU4	0.49	-0.30	0.48	**0.88**	0.46	0.42
EOU5	0.52	-0.28	0.44	**0.88**	0.44	0.41
FAC1	0.43	-0.35	0.38	0.49	**0.90**	0.35
FAC2	0.53	-0.51	0.38	0.51	**0.93**	0.50
PEX2	0.48	-0.27	0.37	0.43	0.48	**0.81**
PEX4	0.42	-0.34	0.35	0.38	0.36	**0.86**
PEX5	0.52	-0.23	0.37	0.33	0.34	**0.87**

Construct validity is typically assessed for established measures by demonstrating that the observed indicators demonstrate convergent validity and discriminant validity. Convergent validity indicates whether the items used to measure the variables are related to each other. It is established by examining item loadings, average variance extracted (AVE), and reliability. Discriminant validity indicates whether the latent variables are distinct from each other and measure different things. It is established by examining the item loadings, and comparing the AVE to the correlations among the latent variables.

Table 2: Reliability and Construct Validity			
	AVE	Composite Reliability	Cronbach Alpha
Computer Anxiety	0.85	0.95	0.91
Computer Self-Efficacy	0.58	0.8	0.64
Ease Of Use	0.76	0.9	0.84
Facilitating Conditions	0.83	0.91	0.8
Performance Expectancy	0.71	0.88	0.8
Technology Attitude	0.85	0.92	0.82

We evaluated the reliability of measures using composite reliability (it should be > 0.7), AVE (AVE should exceed 0.5), and Cronbach alpha (it should be > 0.7. These measures are displayed in Table 2. With the exception of a Cronbach Alpha of 0.64 for computer self-efficacy, all the measures of construct validity and discriminant validity meet the recommended threshold. The descriptive statistics are displayed in Table 3, they provide more support for the construct and discriminant validity, as the AVE for each latent variable is larger than the correlations between that variable and all other constructs.

Table 3: Correlations and AVE						
	Computer Anxiety	Computer Self-Efficacy	Ease Of Use	Facilitating Conditions	Performance Expectancy	Technology Attitude
Computer Anxiety	**0.85**					
Computer Self-Efficacy	-0.20	**0.58**				
Ease Of Use	-0.31	0.55	**0.76**			
Facilitating Conditions	-0.47	0.42	0.55	**0.83**		
Performance Expectancy	-0.33	0.43	0.45	0.47	**0.71**	
Technology Attitude	-0.44	0.47	0.58	0.53	0.56	**0.85**
*diagonals are AVE						

The hypotheses are tested using PLS, and the results of the analysis are depicted in Figure 3 and displayed in Table 4. The path coefficients support hypotheses H1 through H4 at 0.05 significant levels with p-values less than 0.01. The results support hypothesis H1, which advanced a negative relation between facilitating conditions and perceived computer anxiety, the path coefficient is -0.47 and significant at 0.05 level (p-value < 0.01). As shown in Table 4 and Figure 3, the hypothesized positive relationship between facilitating conditions and computer self-efficacy is supported; the path coefficient is 0.42 and significant at 0.05 level with a p-value less than 0.01. The path coefficient between facilitating conditions and perceived ease of use is 0.55 and it is significant at 0.05 level (p-value < 0.01) providing support for hypothesis H3. The relation between facilitating conditions and attitudes towards technology is also supported by a path coefficient of 0.53 and significant at the 0.05 level (p-value < 0.01). The results of this study did not provide support for the impact of computer anxiety and perceived ease of use on performance expectancy, thus hypotheses H5 and H7 are not supported. The positive relations between computer self-efficacy and performance expectancy hypothesized in H6 is partially supported with a path coefficient of 0.17 and significant at the 0.1 level (p-value < 0.10)

Table 4: Path Coefficients		
	Path Coefficient	T Statistics
Computer Anxiety -> Performance Expectation	-0.10	0.90
Computer Efficacy -> Performance Expectation	0.17*	1.68
Ease Of Use -> Performance Expectation	0.11	0.92
Facilitating Conditions -> Computer Anxiety	-0.47***	5.04
Facilitating Conditions -> Computer Efficacy	0.42***	4.12
Facilitating Conditions -> Ease Of Use	0.55***	6.24
Facilitating Conditions -> Technology Attitude	0.53***	5.56
Technology Attitude -> Performance Expectation	0.37***	3.77
***p<0.01, **p<0.5, *p<0.1		

Attitudes towards technology positively influence performance expectancy as hypothesized in H8, the path coefficient is 0.37 and significant at the 0.05 level (p-value < 0.01). These results imply that facilitating conditions can foster positive attitudes and perceptions towards computer and also reduce factors that inhibit technology use and adoption. The model also explained 37 % of the variance in performance expectations. Perceived ease of use did not influence performance expectancy, this could possible mean that users perceptions of ease of use do not automatically lead to performance expectation, perhaps other factors, such as types of tasks and the cognitive effort required to complete the task, moderate the relations between perceived ease of use and performance expectancy.

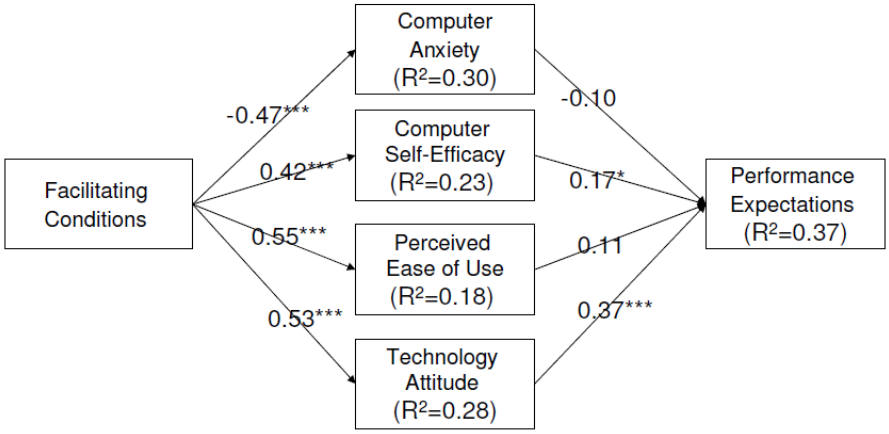

Figure 3: Path Coefficients (***p <0.01; **p<0.05; *p<0.1)

VI. CONCLUSIONS

This paper presents initial results of an ongoing study of the long-term effects of tablet computers on learning outcomes in the classroom. The overall study intends to collect longitudinal data in three stages over a period of six months. The analysis and conclusions in this paper are based on the first round of data collection. Since the results are based on data collected at a single point in time, the generalizability of the conclusions on performance expectations may be limited. Performance expectations evolve over time and may change as attitudes, perceptions and task environment change. In spite of these shortcomings, the results of this study have practical and theoretical implications.

The results of the current study underline the importance of facilitating conditions in influencing attitudes and affect towards technology. The study contributes to research and studies on technology adoption and use in learning environments. In many learning environments and educational institutions, there are multiple stakeholders and although profit is not the overriding motive for the implementation of technology, positive performance outcomes are expected. This study demonstrates that facilitating conditions are important determinants of attitudes and perceptions. Attitudes and perceptions, in turn, influence performance outcome.

In terms of theory on adoption and diffusion of technology, the results of the study provide further insights into the role of facilitating conditions. The impact of facilitating conditions on intention to use technology has been tested and validated in prior studies [Venkatesh et al., 2003], but the impact of facilitating conditions on attitudes and perceptions has not received much attention. When that relationship is tested, as in the studies by Sabherwal et al. (2006) and Compeau et al. (1999), different sets of attitudes and perceptions have been examined. In this study, we examined computer anxiety, computer self-efficacy, perceived ease of use and attitudes towards computer. Hence, this study includes several additional aspects and dimensions of user-related constructs that can be influenced by facilitating conditions. In an examination of the antecedents of perceived ease of use, Venkatesh (2000) only investigated individual perceptions relating to general beliefs and experience using a system as the main determinants of perceived ease of use. In this study we have demonstrated that facilitating conditions can also influence how individual perceive ease of use, thus expanding the list of determinants of perceived ease of use.

For many educational institutions implementing tablet personal computing and other mobile computing technologies in the classroom, creating and fostering enabling conditions that encourage technology utilization and reduce inhibiting factors are important. Venkatesh and Bala (2008) listed several intervention strategies, including pre- and post-implementation intervention strategies, all

aimed at creating conditions conducive to technology use. The results of this study provide additional evidence that educational institutions should implement structures and processes that facilitate technology use, since these may have implications on how individuals perceive technology and subsequent impact on performance expectations and use intentions.

VII. REFERENCES

Editor's Note: The following reference list contains hyperlinks to World Wide Web pages. Readers who have the ability to access the Web directly from their word processor or are reading the paper on the Web, can gain direct access to these linked references. Readers are warned, however, that
1. these links existed as of the date of publication but are not guaranteed to be working thereafter.
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