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Parents' and Students' Attitudes Toward Tablet Integration in Schools





Sha Zhu[1, 2], Harrison Hao Yang[3, 4], Jason MacLeod[3], Yinghui Shi[1], and Di Wu[1]
[1]National Engineering Research Center For E-Learning, Central China Normal University, China; [2]Wuhan Huada National E-learning Technologies Co. Ltd., China; [3]School of Educational Information Technology, Central China Normal University, China; [4]School of Education, State University of New York at Oswego, USA

Abstract

This study explored parents' and students' attitudes toward tablet usage in a formal educational setting. A total of 212 students from four 7th-grade classes, along with 145 of their parents, responded to the Tablet Acceptance Questionnaire. Quantitative methods including a t-test and partial least square (PLS) analyses were employed to examine students' and parents' attitudes toward tablet integration in schools, and to investigate factors influencing students' and parents' attitudes toward tablet usage, respectively. The results indicated significant differences between students' and parents' attitudes. Empirical findings suggested students hold more positive views than their parents with regard to tablet usage, tablet benefits for learning, and technical advantages and ease of use. Conversely, parents expressed greater concern over potential negative effects of tablet usage in education than do their children. This study also suggested educational benefits of tablet usage were the key factor influencing both students' and parents' attitudes. Based on the cross-examined understanding of parents' and students' attitudes, suggestions for large scale tablet initiatives are proposed.

Keywords: parent, student; attitude, tablet, technology integration, partial least square

Introduction

Tablet integration into K-12 education is a steadily increasing global phenomenon. Despite the prevalence of attitudinal studies from students' and teachers' perspectives (e.g., Uzoğlu & Bozdoğan, 2015; Ifenthaler & Schweinbenz, 2013; Shih, Chu, Hwang, & Kinshuk, 2011), few studies have examined parents' perception of personalized tablet usage in K-12 education. Meanwhile, it is well known that successful educational technology implementation is a complex process (Robertson, Grady, Fluck, & Webb, 2006) and regardless of the type or generation of educational technology, teachers', students', and parents' perspectives must all be considered.

Despite students' and teachers' positive attitudes toward tablet usability, effectiveness, and satisfaction (Chen, 2013), among large scale tablet initiatives, a global pattern of unexpected integration outcomes has emerged in schools. From the Los Angeles Unified School District in the United States (Blume, 2014) to the Shenzhen FuTian School District in China (Zhang & He, 2013), large scale tablet initiatives have been receiving negative publicity due to parental concerns. General parental concerns have often emphasized potential threats to academic performance (Soykan, 2015), however, parents' concerns regarding personalized tablet usage and comparative analysis between students and parents have not yet been the target of peer-reviewed research.

To further support the demand for research, Kiger and Herro (2015) regarded parental support as the key to successful tablet integration and Khan, Al-Shihi, Al-Khanjari, and Sarrab (2015) stated parents' trust in tablet benefits for learning is critical to tablet acceptance in schools. Additionally, it is believed that parents and students may influence each other's attitudes toward tablet initiatives in education.

Failure to recognize parental concerns has hindered the progress of tablet initiatives on a global scale. Therefore, deep analysis regarding parental attitudes is of great importance. The exploration of parental attitudes and inter-relationships between parents' and students' perspectives are necessary to complete the foundation of knowledge surrounding tablet integration in schools. This study was expected to expand literature and inform strategic planning processes for large-scale tablet initiatives' design and implementation.

Related Works and Theoretical Framework

Educational Technology Implementation in Schools

The guiding theoretical framework of this study was based on Davis's (1989) Technology Acceptance Model (TAM), which has been utilized across a broad range of tasks and settings (Fathema, Shannon, & Ross, 2015; Wixom & Todd, 2005) to assist understanding of human acceptance and the usage of technology. Figure 1 illustrates the proposed TAM-based framework for educational technology implementation in schools.

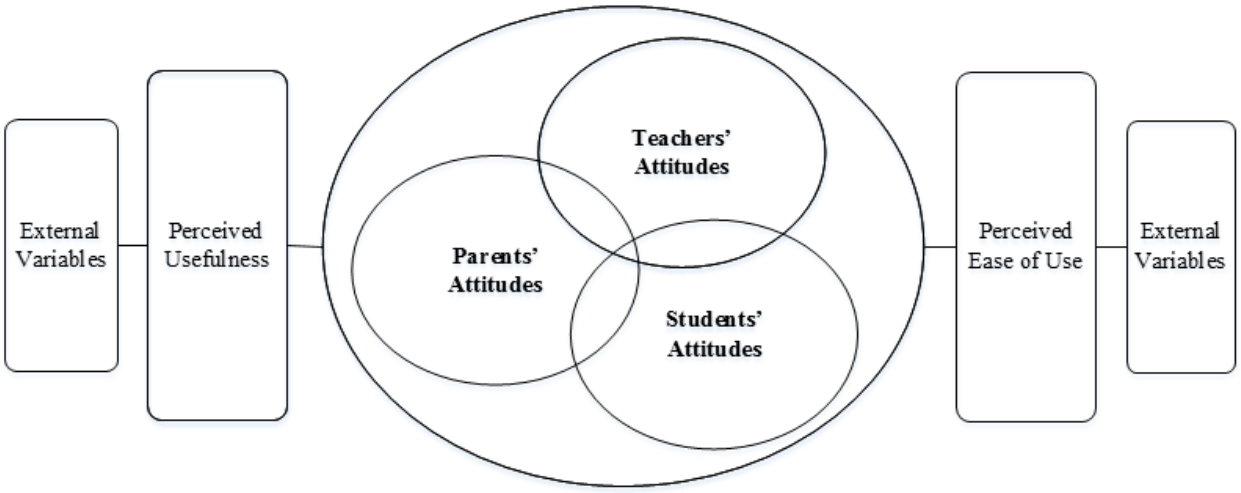

Figure 1. Framework for educational technology implementation in schools.

Among the many factors that influence technology integration, Davis (1989) stated that users' attitudes toward computer technology were directly related to Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). PU is the degree to which a person believes using a system enhances their performance; while PEOU is the degree to which a person believes usage would be free from effort. It was also discovered that, "usefulness is significantly more strongly linked to usage than is ease of use" (Davis, 1989, p. 333). All stakeholders in Figure 1 are affected by PU and PEOU. However, it is believed that PEOU will typically be of greater importance to teachers and students, since parents may not directly engage with educational technologies. Thus, parents are likely to focus more heavily toward PU. The external variables influencing PU and PEOU may vary based on the specific technology being implemented in schools. Therefore, a thorough literature review will always be necessary to identify relevant external variables for the specific technology being implemented.

Proposed Research Model for Tablet Implementation in Schools

Specifically relating to tablets, prior research has utilized a technology acceptance model and findings supported PU and PEOU as key determinants of human attitudes toward tablets (Park & Pobil, 2013). All external variables influencing PU and PEOU in this study were aligned to a core psychological construct which includes three widely recognized components: cognitive, affective, and behavioral. Table 1 defines psychological construct terms used in this framework.

Table 1

Psychological Construct of External Variables

Attitude	Definitions
Cognitive	Attitude stimulants relating to factual knowledge and object capabilities.
Affective	Attitude stimulants relating to personal opinions, feelings, and object aesthetics.
Behavioral	Attitude stimulants relating to past experiences and personal capabilities.

Figure 2 illustrates the proposed research model used for analyzing attitudes toward tablet usage in this study. This model consists of five variables: (1) tablets' potential negative effects (Negative Potential, NP), (2) tablets' benefits for learning (Educational Benefits, EB), (3) individuals' related awareness and understanding of tablets (Technical Awareness, TA), (4) individuals' prior computer-related experiences (Prior Experiences, PE), and (5) general attitudes toward tablets (Attitudes, AT). Literary support for the five variables is provided in the following section.

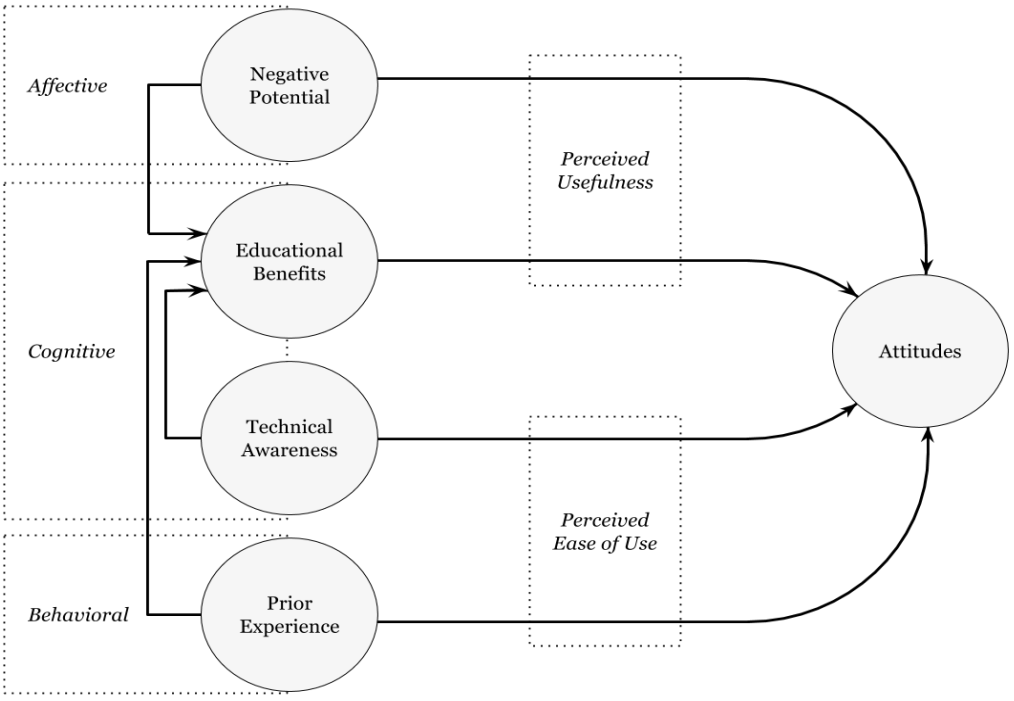

Figure 2. Proposed research model for attitudes toward tablet usage in schools.

PU - Educational Benefits and Negative Potential. Educational Benefits is a cognitive attitude stimulant because it relates to proven facts about technology attributes and capabilities. Prior

research has shown tablets' mobility and connectivity enables students to become active participants, rather than passive receivers in learning activities (Pegrum, Howitt, & Striepe, 2013). Additionally, tablets have been stated capable of facilitating students' academic performance (Boticki, Baksa, Seow, & Looi, 2015), increasing motivation to learn, supporting interactive collaboration (Chen, 2013), and promoting teachers' and students' engagement (Valstad, 2011).

Negative Potential is an affective attitude stimulant because it reflects personal opinion and human emotions. Prior research suggested concern among parents in educational settings are due to potential distraction from studies and internet game addictions (Soykan, 2015). However, other Negative Potential may include eye strain from reading words on small screens (Kraut, 2013), prevention of physical exercise, and reduction of face-to-face interaction (Takeuchi, 2011). Additionally, a variety of socioeconomic variables have attracted considerable attention (Billon, Lera-Lopez, & Marco, 2010). These literary-supported Educational Benefits and Negative Potential attributes are appropriate external variables for generalizing PU attitudes toward tablet usage in schools.

PEOU - Prior Experience and Technical Awareness. Prior Experience is a behavioral attitude stimulant, as it relates to things done in the past; while Technical Awareness is a cognitive attitude stimulant, as it relates to knowledge of the subject matter. Specifically regarding tablets, human attitudes have strongly aligned with attitudes toward computers, as tablets are regarded as a form of portable computer (Dündar & Akçayır, 2014). Additionally, researchers have found users' prior experience and usage frequency the most closely related influential factors of attitudes toward computers (Schumacher & Morahan-Martin, 2001). Although experience is tough to measure and some controversy over this topic exists (Garland & Noyes, 2004), large bodies of evidence suggest computer experience is positively correlated to computer attitudes (Adebowale, Adediwura, & Bada, 2009; Kumar & Kumar, 2003; Gobbo & Girardi, 2001). Furthermore, lack of adequate knowledge and experience has been found to negatively affect attitudes toward tablets' PEOU (Çuhadar, 2014). Therefore, these literary-supported Prior Experience and Technical Awareness attributes are appropriate external variables for generalizing PEOU attitudes toward tablets in schools.

Methodology

Research Questions

This study analyzed attitudes toward tablet usage in education to investigate influential factors and relationships between parents and students. The three research questions guiding this study and seven hypotheses are listed below.

1. What major factors influence parents' and students' attitudes toward tablets in schools?
2. Are there significant differences between parents' and students' attitudes?
3. Are there relationships between parents' and students' attitudes?

Specifically, seven hypotheses have been formed in alignment with the proposed research model.

1. Negative Potential is negatively related to Educational Benefits.
2. Prior Experience is positively related to Educational Benefits.
3. Technical Awareness is positively related to Educational Benefits.
4. Educational Benefits is positively related to Attitudes.
5. Negative Potential is negatively related to Attitudes.
6. Prior Experience is positively related to Attitudes.
7. Technical Awareness is positively related to Attitudes.

Participants

A sample of seventh grade students (n=228) from a school located in central China was used. Students were distributed across four different classes and selection included all students participating in a new large scale tablet initiative. All participants were informed of a parallel research initiative and were required to sign a consent form to participate in the study.

Parent participants (n=171) were all directly related (one generation prior) to student participants. Age ranged from 35 to 42 with a mean of 38. A single response was collected from each family. For a variety of reasons (i.e., work schedules, family living arrangements, or personal issues), some parents were unable to participate. Prior to participation in the tablet initiative, the school provided all parents with basic tablet information regarding usage in educational settings. Additionally, demographic surveys suggested 80% of the parents reported accessing the internet almost every day and claimed basic ICT skills. Over the durations of this study, parents were asked to supervise their children's tablet usage at home to the best of their ability.

Students belonged to two types of classes (two classes for Chinese language, two classes for mathematics). Chinese language and mathematics were purposefully selected due to their critical significance in China's K-12 education system. It was believed that tablet acceptance in these disciplines could predict attitudes toward using tablets in all other curricula. Prior to study initiation, all teachers received training from the software provider for general usage and specific pedagogical techniques. The software provider also cooperated with administrators to co-design the tablets being implemented in this study. The resulting tablets being implemented had software accessibility controls to support only specific functions. Figure 3 provides a diagram to explain the tablets' three functional components.

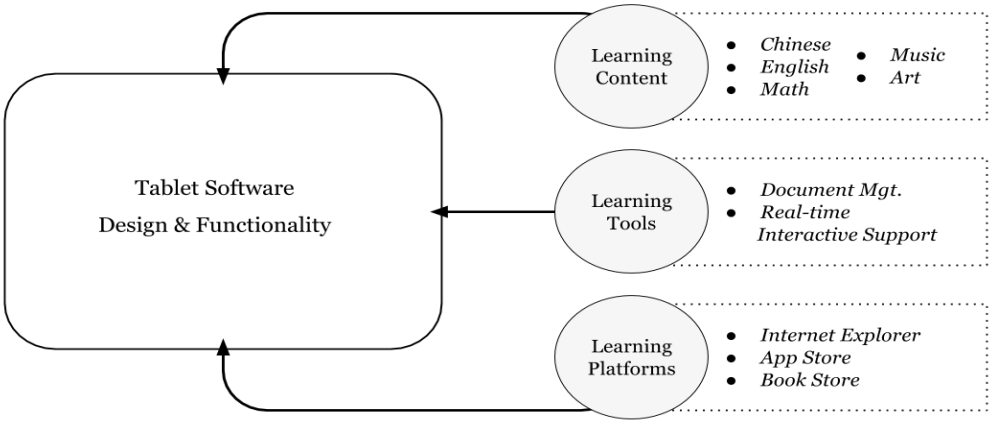

Figure 3. Overview of tablets' software design and functionality.

Instrumentation

The completed Tablet Acceptance Questionnaire (TAQ) was based on the theoretical framework and proposed research model for determining attitudes toward tablets in schools. The TAQ contained five dimensions (Negative Potential, Educational Benefits, Technical Awareness, Prior Experience, and Attitudes) and aligned to the proposed research model. Two versions of the TAQ were designed, with the only difference being language for sentence subjects to represent a parent or student perspective. The TAQ contained 13 items evaluated on a 5-point Likert scale from strongly disagree (1) to strongly agree (5). Each item referred specifically to a TAQ dimension and was supported by relevant literature. An example item from the Technical Awareness dimension was "Tablets provide great mobility and flexibility for connectivity." Appendix A presents the full 13 items included in the TAQ. The content validity of TAQ was validated by three educational technology researchers prior being administered.

Data Collection and Analysis

After one month of tablet usage, all students and their parents were invited to complete a questionnaire aimed at measuring attitudes toward tablet usage. A total of 357 valid questionnaires were collected, including 212 (93%) students and 145 (85%) parent submissions.

Results

Overview and Comparison of Responses

T-test was conducted to compare parents' and students' responses. As indicated in Table 2, parents reported significantly lower scores than students in four of the five dimensions (Attitudes, Educational Benefits, Negative Potential, and Technical Awareness). The only exception was the Prior Experience dimension, which assessed individuals' exposure to ICT. Parents scored highest on Technical Awareness and lowest on Negative Potential. Meanwhile, students scored highest on Attitudes and lowest on Prior Experience. The findings revealed parents held less positive views than students with regard to tablet usage in schools despite having had more Prior Experience than their children. Parents also displayed

greater concerns over the Negative Potential of tablet usage than students, while students expressed greater recognition of Technical Awareness.

Table 2

T-Test of TAQ Responses

Category	Parents		Students		*t*
	Mean	SD	Mean	SD	
Attitudes	3.32	0.94	4.18	.79	9.02*
Educational benefits	3.22	0.84	3.85	.78	7.17*
Negative potential	2.45	0.69	2.91	.87	5.59*
Technical awareness	3.68	0.64	4.08	.71	5.52*
Prior experience	3.13	1.04	2.81	.75	-3.26*

Note: *p<.001

PLS Analysis of Factors Influencing Attitudes

PLS method was used to verify the proposed research model and to investigate influential attitudinal factors of attitudes. PLS was appropriate for the sample size of this study (Chin, 1998; Gefen, Straub, & Boudreau, 2000) and well-suited for testing theories in early stages of development (Fornell & Bookstein, 1982). SmartPLS 3 software was used to assess the measurement and structural models.

Measurement model. The measurement model was assessed by convergent validity, reliability of measures, and discriminant validity. The convergent validity was measured by the average variance extracted (AVE). Results showed the AVE values were over 0.6, which was satisfactory (Segars, 1997). The reliability of the measurement model was examined using the composite reliability and Cronbach's alpha. Findings indicated that the composite reliability (CR) coefficients were over 0.8, which demonstrated satisfactory reliability (Nunnally & Bernstein, 1994). Cronbach's alpha were all over 0.58 and within acceptable limits (Helmstadter, 1964). Furthermore, to evaluate the discriminant validity, the square roots of AVE were compared to correlations among latent variables (Fornell & Larcker, 1981), in which all latent correlations were less than the corresponding AVE square roots. Table 3 shows the results of the measurement model.

Table 3

Results of the Measurement Model

	Convergent validity	Reliability of measures		Discriminant validity				
	AVE	CR	Cronbach's α	AT	EB	NP	TA	PE
AT	0.70	0.87	0.78	0.84				
EB	0.62	0.83	0.70	0.76	0.79			
NP	0.60	0.82	0.67	0.33	0.34	0.78		
TA	0.70	0.82	0.58	0.59	0.67	0.22	0.83	
PE	0.74	0.85	0.66	-0.07	0.03	-0.14	-0.02	0.86

Structural model. The structural model was used to test hypothesized paths using path coefficients (γand β), R^2 value, and *t*-value bootstrapping (500 resamples; Cohen, 1988). When comparing influential factors of attitudes toward tablet usage in education, structural model tests were conducted twice using parent and student data respectively.

Structural model test for parents. As seen in Table 4, Hypothesis 3 and 4 were supported. Negative Potential and Prior Experience had no significant influence on Educational Benefits and Attitudes. However, Technical Awareness significantly influenced Educational Benefits, and accounted for 57% of the variance. In addition, Educational Benefits exhibited a significant relationship with Attitudes, accounting for 36% of the variance. Figure 4 shows results of the structural model test using PLS analysis. Path coefficients along with the associated *t*-values are provided and explained the variance given.

Table 4

Structural Model Test for Parents

Hypothesis	Independent variable	Dependent variable	γ	β	*t*	*p*	Result	R^2
H1	NP	EB	0.16		11.14*	0.25	Rejected	0.57
H2	PE	EB	0.11		11.26*	0.17	Rejected	
H3	TA	EB	0.57		15.72*	0.00	Supported	
H4	EB	AT		-0.68	10.62*	0.00	Supported	0.36
H5	NP	AT		-0.02	10.22*	0.82	Rejected	
H6	PE	AT		-0.11	11.51*	0.05	Rejected	
H7	TA	AT		-0.13	11.30*	0.09	Rejected	

Note: *p<.001

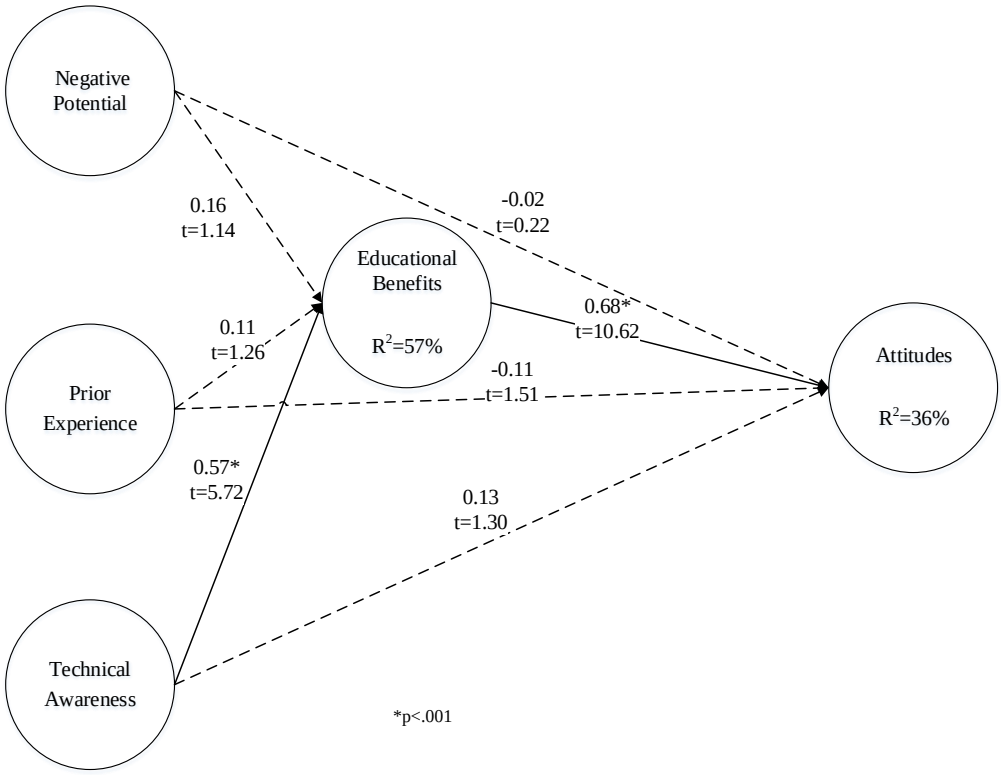

Figure 4. Results of structural model test for parents.

Structural model test for students. As seen in Table 5, Hypothesis 1, 3, and 4 were supported. The significant predictors of Educational Benefits included both Technical Awareness, and Negative Potential, which collectively explained 51% of the variance. Moreover, Educational Benefits was the significant predictor of Attitudes, accounting for 53% of the variance. Figure 5 shows results of the structural model test using PLS analysis. Path coefficients and associated *t*-values are provided and explained the variance given.

Table 5

Structural Model Test for Students

Hypothesis	Independent variable	Dependent variable	γ	β	*t*	*p*	Result	R^2
H1	NP	EB	0.23		13.32*	0.00	Supported	0.51
H2	PE	EB	0.14		11.32*	0.19	Rejected	
H3	TA	EB	0.60		9.73*	0.00	Supported	
H4	EB	AT		0.59	18.62*	0.00	Supported	0.53
H5	NP	AT		0.07	11.53*	0.12	Rejected	
H6	PE	AT		0.01	10.13*	0.90	Rejected	
H7	TA	AT		0.15	11.51*	0.02	Rejected	

Note: *p<.001

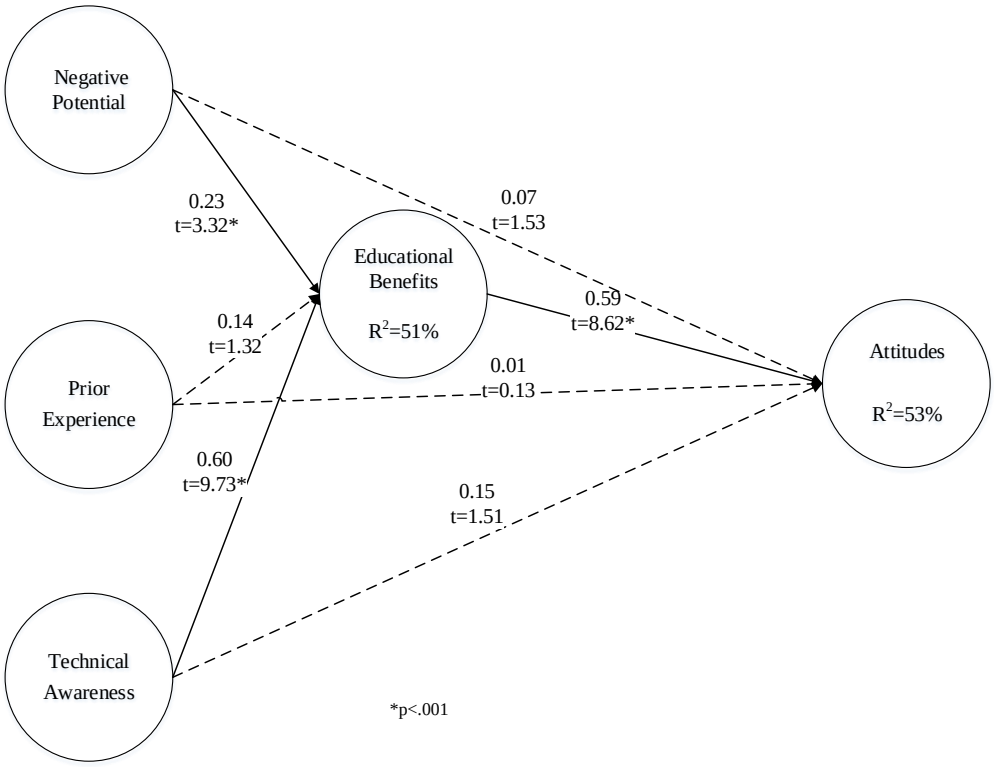

Figure 5. Results of structural model test for students.

Mediation Analysis of Factors Influencing Attitudes

Mediation analysis has been employed to better understand the relationship between independent and dependent variables both in the absence of the mediating variable(s) and in their presence (Chin, 2010). In this study, by adopting the bootstrapping procedures in SmartPLS 3, mediation tests of parents' and students' responses were conducted according to Baron and Kenny's (1986) four step recommendation.

Mediation analysis for parents. As shown in Table 6, Educational Benefits acted as a mediator. That is, parents only perceived tablet usage positively when they perceive a tablet was useful in enhancing their children's learning experience. Technical Awareness did not directly predict Attitudes, but instead relied on mediating effects of Educational Benefits.

Table 6

Parent Results for Technical Awareness, Educational Benefits, and Attitudes

Step	Path			Path coefficient	*t*-value
1	Technical Awareness	→	Attitudes	0.52	05.46*
2	Technical Awareness	→	Educational Benefits	0.57	06.85*
3	Educational Benefits	→	Attitudes	0.75	14.96*
4	Technical Awareness	→	Attitudes	0.13*	01.30
4	Technical Awareness	→	Educational Benefits	0.57	05.72*
4	Educational Benefits	→	Attitudes	0.68	10.62*

Note: *p < .001

Mediation analysis for students. As shown in Table 7 and Table 8, Educational Benefits played a full role in mediating two relationships: Technical Awareness to Attitudes, and Negative Potential to Attitudes. The direct path coefficients of these relationships were 0.51 and 0.22 when the links were direct, and they became non-significant when Educational Benefits was included as a mediator. The mediation analysis indicated Technical Awareness and Negative Effects do not directly predict Attitudes, but instead rely on mediating effect of Educational Benefits. Unless students perceive tablet usage beneficial to learning, any level of Technical Awareness or perception of Negative Potential may not greatly affect their Attitudes.

Table 7

Student Results for Technical Awareness, Educational Benefits, and Attitudes

Step	Path			Path coefficient	*t*-value
1	Technical Awareness	→	Attitudes	0.51	7.67*
2	Technical Awareness	→	Educational Benefits	0.60	8.65*
3	Educational Benefits	→	Attitudes	0.69	7.97*
4	Technical Awareness	→	Attitudes	0.15	1.51*
4	Technical Awareness	→	Educational Benefits	0.60	9.73*
4	Educational Benefits	→	Attitudes	0.59	8.62*

Note: *p < .001

Table 8

Student Results for Negative Potential, Educational Benefits, and Attitudes

Step	Path			Path coefficient	*t*-value
1	Negative Potential	→	Attitudes	-0.22	2.97*
2	Negative Potential	→	Educational Benefits	-0.23	3.56*
3	Educational Benefits	→	Attitudes	-0.62	5.41*
4	Negative Potential	→	Attitudes	0.07*	1.53*
4	Negative Potential	→	Educational Benefits	-0.23	3.32*
4	Educational Benefits	→	Attitudes	-0.59	8.62*

Note: *p < .001

Discussion and Conclusion

The results of this study strengthened understanding of parents' and students' attitudes toward tablet usage in educational settings. Overall, parents hold less positive attitudes than students regarding tablet usage in schools. This finding may be driven by China's exam-oriented education system (Hill, 2013), whereby Chinese parents generally prioritize assessment in K-12 schools. Additionally, prior research has suggested inter-generational difference regarding attitudes, PU, and PEOU of mobile technologies in educational settings (Salajan, Schonwetter, & Cleghorn, 2010). Therefore, parents may simply be more comfortable with traditional teaching methods and opt against emerging technology integration into schools.

This study indicated parents have greater concerns than students regarding tablet usage in schools. Findings aligned with recent parent protests against tablet usage in formal education settings (Zhang & He, 2013). Among the potential negative effects of tablet usage examined in this study, problems associated with video game addiction and distractions were the most serious issues for parents. Furthermore, in China, this concern appears to be reasonable, as a recent survey involving a nationally representative sample of elementary and middle school students reported the percentage of internet addicts has increased with increasing frequency of internet use per week (Li, Zhang, Lu, Zhang, & Wang, 2013).

Perhaps the most important finding of this study is the identification of tablets' educational benefits as the key factor determining both parents' and students' attitudes toward tablet usage in schools. From the parents' perspective, as long as tablet usage was perceived beneficial for learning, tablets were accepted despite potential of negative effects. From the students' perspective, having a technical awareness of tablet usage is critical to determining perception of educational benefits.

Empirical findings cross-examined parents' and students' attitudes toward the use of tablets in an educational environment. These findings indicated the following strategies may be effective in promoting large-scale tablet initiatives in educational settings:

1. Build awareness among parents before implementation**.** Clear and open information communication can provide a foundation for deepening parents' understanding of tablet usage in education. If large scale tablet usage is a school priority, then strategic planning must incorporate a buffer period for educational outreach to gain parental support. In order to avoid problematic issues, transparent communication channels must be established to keep parents updated on usage trends and to be assured that devices are being used appropriately.

2. Implementation is an interconnected partnership**.** Opportunities for parental involvement can support understanding and comfort with large scale tablet initiatives. Accordingly, rules of usage must be an open discussion between all stakeholders to ensure responsible tablet usage in home and school environments. In order to minimize potential negative effects of tablets (Stevenson, 2011), stakeholders must have the proper capabilities and confidence in each other's ability to monitor tablet usage in their respective environments. Additionally, communication between stakeholders must be maintained throughout the duration of tablet usage.

3. Parents require training too**.** Teachers play a critical role in tablet integration because the responsibility for implementation largely happens in the classroom (Bebell & O'Dwyer, 2010). However, these devices span multiple environments, which is different than many other stationary educational technologies. Thus, the discussion cannot only focus professional development toward teachers, as parents play an equal role in ensuring positive integration. Parents should be trained in a similar manner to teachers so they are capable of understanding, monitoring, and supporting home usage.

This study focused on attitudes toward tablet usage in schools among seventh grade students and their parents participating in a large scale tablet initiative in central China. However, one study cannot completely capture the dynamics of educational tablet usage. Further research should extend to differing cultures and education levels. Additionally, mixed method studies combining quantitative and qualitative data may be beneficial for cross-sectional comparisons between parents' and students' perspectives.

Acknowledgements

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Appendix A

Tablet Acceptance Questionnaire

Dimension	Code	Questionnaire Item
Attitudes	AT1	I would recommend using tablets for learning to other friends. (Shih, Chu, Hwang, & Kinshuk, 2011; Chu, Hwang, Huang, & Wu, 2008)
	AT2	I would be happy if tablet usage was continued in education. (Shih, Chu, Hwang, & Kinshuk, 2011; Chu, Hwang, Huang, & Wu, 2008)
	AT3	Using tablets in class is much more interesting than traditional classes. (Shih, Chu, Hwang, & Kinshuk, 2011; Chu, Hwang, Huang, & Wu, 2008)
Educational Benefits	EB1	[Subject's] learning interest and motivation improved after using tablets. (Chen, 2013)
	EB2	Tablets can facilitate [subject's] academic performance. (Boticki, Baksa, Seow, & Looi, 2015)
	EB3	Tablets have a positive impact on [subject's] learning. (Chen, 2013)
Negative Potential	NP1	Tablets may damage eyesight, reduce face-to-face time or deprive [subject] of exercise. * (Kraut, 2013; Takeuchi, 2011)
	NP2	The use of tablets may cause video game addictions or result in distraction. * (Soykan, 2015)
	NP3	Tablet usage may cause imbalanced access to educational resources. * (Billon, Lera-Lopez, & Marco, 2010)
Technical Awareness	TA1	Tablet attributes can enhance engagement and improve communication. (Valstad, 2011)
	TA2	Tablets provide great mobility and flexibility for connectivity. (Pegrum, Howitt, & Striepe, 2013)
Prior Experience	PE1	I have used computers for a long time. (Schumacher & Morahan-Martin, 2001)
	PE2	I use the internet almost every day. (Schumacher & Morahan-Martin, 2001)

Note: *Scored in a reverse manner.


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