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Parents' Usage of a Kindergarten Smart Campus System: An Exploration of the Continuance Intention Factors

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Abstract

In today's digital age, the innovation of smart campuses can bring convenience to the instruction and management of schools. However, parents' support with continued usage determines the application and implementation of smart campus system (SCS). Thus, it is necessary to explore the parents' continuance intention factors of usage of SCS. Based on the existing studies and theories on continuance intention to use (CIU), a research model composed of ten hypotheses was designed to test what factors could predict the kindergarten parents' CIU and the expectancy-confirmation factors. From the data analysis, we could conclude that satisfaction, perceived usefulness, expectation confirmation, subjective norms, and perceived ease of use were positively correlated. It is hoped that the results can be a reference for SCS system designers and managers to improve the SCS implementation in order to facilitate kindergarten children's learning.

Keywords

Smart Campus System, Innovation, Kindergarten Parents, Continuance Intention to Use

1. Introduction

Under the smart learning environment created by the Internet of Things (IOT), all campus activities are expected to be effective and efficient (Sari et al., 2017). Given the need to actively address the usage of technology, educational leaders have a growing interest in constructing smart campuses which is a school where technology devices and apps create new experiences or services and improve operational efficiency (Zaballos et al., 2020). That is, smart campuses promote a

convenient campus network, innovative scientific research, and efficient administrative management (Coccoli et al., 2014). Currently, many smart technologies have been put into smart campuses to monitor and analyze teaching activities (Zhao et al., 2021a, 2021b). Such systems have significantly improved the efficiency and quality of student learning engagement (Raes et al., 2020), and have provided students with reliable conveniences in their academic and social life (Abdrabbah et al., 2018). Nowadays, some discussions have been focused on the understanding of the technology application of smart kindergarten management (He et al., 2014; Pagliaro et al., 2016), the learning effects and children's behavior information with sensor connections and the Global Positioning System (GPS) (Singh et al., 2019). In line with the design of GPS, smart campus system (SCS) has been implemented in some kindergartens. SCS is also important for enhancing home-school partnerships in kindergartens (Lau & Ng, 2019). Permission and support should be gained from kindergarten parents. Thus, the present study focused on kindergarten parents' acceptance and attitudes toward engaging with SCS.

To raise the standard of education, SCS has been successfully incorporated into the education system (Bi et al., 2017). However, parents' support of the use of SCS in instruction and management is still not clear (Gao et al., 2017). The information literacy of parents is not high, and the acceptance of information technology is lack of initiative, resulting that the use of information technology is difficult (Liu & Liu, 2020). To discuss this issue, this study adopted the expectation-confirmation theory (ECT) (Oliver, 1980) to explore the understanding of information system usage. ECT delineates a process model in which an individual compares their pre-usage expectations about a product or service to their post-usage perceptions of the product or service to determine the extent to which their expectations are confirmed, which is then utilized to determine their level of satisfaction/dissatisfaction. In this process, an individual assesses their post-usage belief about the performance of a product (or service) against their pre-usage expectations of how the product (or service) should perform (Cadotte et al., 1987). The performance can be better, the same as, or worse than expected. If the performance is the same as was expected, the outcome is termed as "confirmation". However, if the performance is better or worse than expected, then "disconfirmation" occurs (Oliver, 1980). ECT is increasingly being used in the field of information systems to predict and interpret intentions for continuance intention to use (CIU) (Bhattacherjee, 2001). For example, Chou et al. (2012) argued that the ultimate success of a technology depends more on the users' continued use of the system than on their initial adoption. Additionally, Bhattacherjee (2001) argued that perceived usefulness and perceived ease of use may influence subsequent continuance decisions regarding information system (IS) usage. Extended from the ECT framework, the present study used the constructs, satisfaction, expectation confirmation, and perceived usefulness and ease of use from the modified ECT to understand Chinese parents' CIU related to a

SCS. It is hoped that the findings of this study could provide valuable information for kindergarten designers and managers to better implement smart campuses.

2. Literature Review

2.1. Smart Kindergarten Campuses

The smart kindergarten in this study, also called a smart kindergarten campus, is a common concept similar to a smart campus. The term "smart campus" is different from the traditional campus; in this concept, cloud computing, IOT and other internet technologies are connected with the campus teaching, research, management and campus resources, and integrate different information system platforms to form a unified information management platform (Chao, 2017; Kwok, 2015). Comparing the input and output of smart campus construction, many studies based on smart campuses have been conducted with a focus on the technology (Torres-Sospedra et al., 2015; Van Merode et al., 2016; Luo, 2018), application, and learning outcomes evaluation (Xu et al., 2018). Catering to the needs of teachers and students has popularized the use of intelligence, with an increasing number of scholars having explored smart college campus systems. For example, Wang and Yan (2018) designed a mobile smart campus system and found that it provides the college with a ubiquitous learning space that combines innovative network research, transparent and efficient school management, colorful campus culture, and convenient and thoughtful campus life. Yang et al. (2018) developed a situational awareness smart campus system and found that it was convenient for decision makers to make corresponding decisions, and the campus application was better able to serve teachers and students.

Nowadays, the construction of SCS in Chinese kindergartens is still in its infancy. Only a few kindergartens have applied a SCS to facilitate teaching and school management. The main reason for this slow adoption is the attitudes of the parents. For example, one study indicated that most parents asserted that students should not be allowed to use mobile phones during classes and examinations (Gao et al., 2017). Nevertheless, due to their perceived ease of use, perceived usefulness, and connectedness to multiple sources of technology, Lee et al. (2014) expected that in the future, smart systems for early childhood education would be increasingly common. Therefore, this study focuses on parents' CIU on SCS in kindergartens.

2.2. Continued Intention to Use

Apart from ECT, there are two other theoretical models, Technology Acceptance Model (TAM) and Information Systems Acceptance Model (ISAM), widely used in the field of Management Information Systems to explore the adoption and success of information systems (Chou et al., 2012). TAM derived from Davis (1989), has become a powerful model for predicting usage intentions and acceptance of new information technologies. The other theory proposed by Davis,

ISAM, based on TAM which is derived from the social psychology literature has also been developed to systematically assess and interpret users' usage intentions and satisfaction. Perceived usefulness means "the degree to which a person believes that using a particular system can improve his or her job performance." Perceived ease of use is "the degree to which one believes that using a particular system is effortless" (Davis, 1989: p. 320). The two variables predict users' attitude towards using the product.

Bhattacherjee (2001) proposed the Post-Acceptance Model (PAM) of IS continuance to extend Oliver's ECT theory. In his model, four variables, perceived usefulness, confirmation, satisfaction and IS continuance intention, were proposed. He stated that perceived usefulness predicts satisfaction and IS continuance intention. The satisfaction variable is predicted by perceived ease of use and usefulness and confirmation (Gan & Balakrishnan, 2018). Aimed at a particular product or IS, and integrating different theories, the CIU model was developed to explain those factors which play a prediction role (Rahman et al., 2017). Moreover, Mouakket (2015) proposed the expectation–confirmation model by exploring the subjective norms as key factors, and found that they could directly predict continuance usage intention. Taken together, the present study proposed the SCS success model to analyze six factors of ECT.

3. Method

3.1. Research Model and Hypotheses

Due to the convenience of smart technology, many parents support its use and feel that it should be adopted in preschool education as an opportunity to prepare their children for the future (Erdogan et al., 2019). Conversely, due to parents being new to technology change, their attitudes towards adopting smart technologies play a major role in understanding the educational value of the usage of smart technologies, particularly in kindergartens (Papadakis et al., 2019).

Confirmation of previous factors such as subjective norms will predict user satisfaction and perceived usefulness, and predict CIS of IS (Cheng & Yuen, 2018; Joo et al., 2018). Extending from expectation-confirmation theory (ECT), the present study explored a model with the variables which are assumed to directly or indirectly predict the parents' CIU of a smart campus in a kindergarten (see **Figure 1**).

To understand this controversy with the research model, the present study proposed the following hypotheses:

H1: Parents' US is positively related to their CIU.

H2: Parents' EC is positively related to their US.

H3: Parents' PEU is positively related to their PU.

H4: Parents' PU is positively related to their US.

H5: Parents' PEU is positively related to their US.

H6: Parents' PU is positively related to their EC.

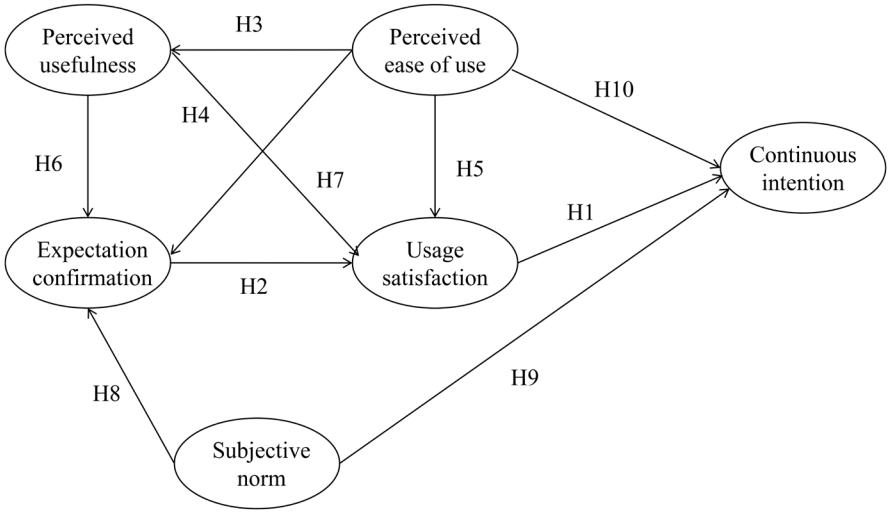


Figure 1. Research model.

H7: Parents' PEU is positively related to their EC.

H8: Parents' SN is positively related to their EC.

H9: Parents' SN is positively related to their CIU.

H10: Parents' PEU is positively related to their CIU.

3.2. Research Setting

It has been more than two years since the experimental kindergartens applied SCS in their campuses. Not all the classes implemented the SCS. Only a few classes adopt the system. Therefore, it is still the beginning stage of the application of the smart campus construction for these kindergartens.

The current functions of the SCS in the kindergartens include collecting check-in and check-out time, deep sleeping duration, and the duration of one particular learning activity through a wristband with one sensor for each child. The check-in and check-out system relies on the wristband touching a sensor node which is designed to look like a robot standing at the school entrance. When the child uses his/her wristband to touch the robot, it says hello. Parents and teachers can get the exact check-in and check-out time. It is easy to calculate the deep sleeping duration by checking children's heart rate with the wristband. Learning activities in the kindergartens could be divided into indoor and outdoor activities. Indoor activities mainly include learning activities occurring in different learning areas similar to the curricular areas of Practical life, Sensorial, Language, Mathematics and Geometry, Geography, Music, Art, and Culture in Montessori education (Montessori, 1967, 1989a, 1989b). Outdoor activities are the activities of physical education and other games. With the wristband, children's positions could be detected with the help of the Internet, and the duration of one particular learning activity is easily calculated so as to check children's learning interest and engagement in that learning activity.

Using a data cloud, the data from each child's wristband are stored and computed to be analyzed by experts and teachers to form knowledge and wisdom for

teachers and parents. The experts are proficient in computers and big data, and the teachers have rich teaching experience. Based on their knowledge and wisdom, teachers could redesign or reorganize their learning activities, and parents could conduct their family education to cooperate well with the school education (see Figure 2).

Most of the parents might not understand the detailed construction of the kindergarten SCS, and how the SCS works or its benefits, especially the technology applied. However, they learned about all of the functions and applications of the entire SCS through face-to-face training conducted by the kindergarten for about one hour. The SCS tutorial made in Microsoft PowerPoint, including the functions and usage instruction of the SCS, was sent to the parents as well. The parents could install the SCS application (APP) on their own mobile devices, enabling them to check the record of their children's activities. Figure 3 shows the screenshot of the interface of the SCS APP. There are five buttons at the bottom of the interface: kindergarten, dynamic, health, parenting and me. The current interface shows the health record of the child's one-whole-day morning examination, check-in time, morning exercise performance, description of deep sleeping and activity performance. The kindergarten interface will show any notices from the kindergarten. Parents can check their child's learning activities in the dynamic interface. The parenting interface is to show information for family education. The interface of "me" is the child's personal information. The tutorial also declared that the data from the SCS was safe and would be used for promoting kindergarten teaching and management, rather than for commercial use or any other purposes.

The wristband is the only way to collect the information of the children's in-campus behaviors and learning activities. The children are required to wear their wristbands from the beginning to the end of the school day. Therefore, the parents have to remind their children to wear the wristband every day when they

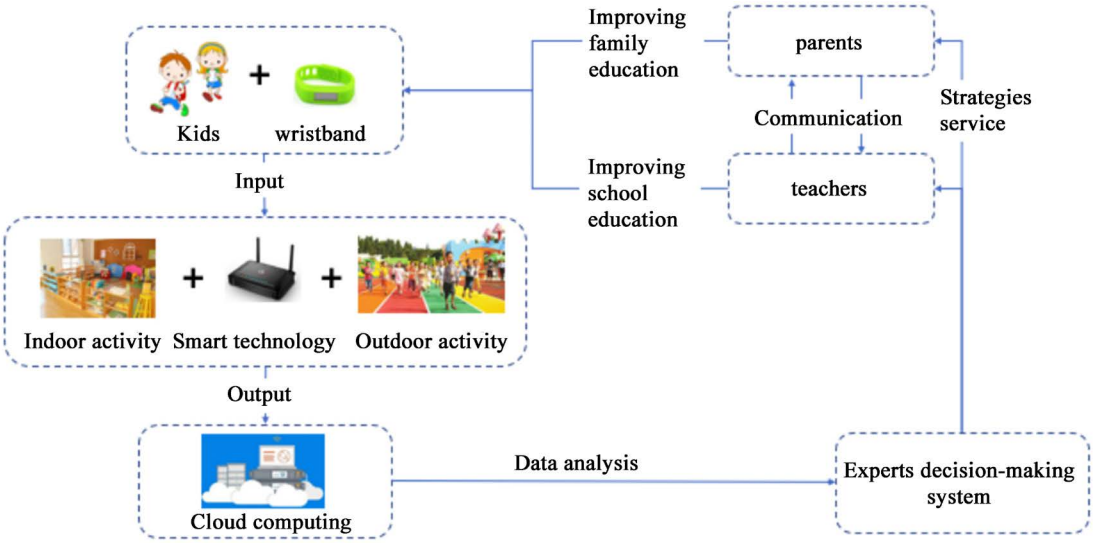


Figure 2. Kindergarten smart campus system (SCS).

Figure 3. Interface of the SCS APP.

go to school. From the beginning of the implementation of the SCS more than 2 years ago to now, all the parents permitted their children to wear the wristband to the kindergarten every day.

The participating parents of the children accepted and experienced the SCS for at least two semesters. They had become familiar with the SCS and supported the behavior of wearing a wristband from the beginning of its application. However, with the application of the SCS for all classes and its expanding functions, in contrast to accepting the SCS, the study on the parents' CIU is meaningful for the further development and implementation of the SCS.

3.3. Instrument

Adapted from previous theories or studies (Bhattacherjee, 2001; Hsiao et al., 2016; Venkatesh et al., 2003), the questionnaire items were professionally translated into Chinese and subjected to accuracy checking by experts to ensure their face validity. There were two parts to the questionnaire. The first was demographic information, including three questions (see Table 1). The second part was designed to measure the factors. They were measured using 5-point Likert scales (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly

agree), consisting of perceived usefulness (eight items), perceived ease of use (five items), expectation confirmation (three items), subjective norms (three items), usage satisfaction (four items), and CIU (four items). The questionnaire items which remained after the internal and external validity analyses were further subjected to reliability and validity tests. Moreover, the reliability and validity of the questionnaire were tested after the data were collected.

Perceived usefulness measuring: PU in the model means the degree to which the parents believed that utilizing the SCS would enhance their family education and cooperation with school education for their children. Questions were designed based on the studies of Venkatesh et al. (2003); exemplary items are "The check-in and check-out robot is convenient and friendly" and "I am so relieved that I can watch my child's check-in and check-out video."

Perceived ease of use measuring: PEU means the degree to which the parents believe that using the SCS would be free of effort. Questions were designed according to the studies of Venkatesh et al. (2003); exemplary items are "I always forget to remind my child to wear the wristband to school" and "I think the user interface of the SCS application on my mobile device is friendly and easy to use."

Expectation confirmation measuring: EC was the degree of the gap of parents' pre-use and use expectation of the SCS, which is based on the study of Bhattacherjee (2001); exemplary items are "The functions of the wristband are more than I imagined before" and "It has become a part of my life to check the application."

Subjective norm measuring: SN referred to the prediction of other people's decisions on the parents' use of the SCS. Three questions were based on the studies of Venkatesh et al. (2003); exemplary questions were "Teachers in the kindergarten suggest that I use the wristband and the SCS application" and "My child's classmate is wearing the wristband and I think my child will do so too."

Usage satisfaction measuring: US referred to the experience of the whole usage of the SCS by the parents. Its measurable questions were based on the studies of Bhattacherjee (2001); exemplary items are "I am satisfied with using the SCS application" and "It is a wise choice to use the SCS application for me."

Continuous intention to use measuring: CIU was the intention of parents' continuing usage of the SCS, including their agreement with and support of their children's wristband wearing, the use of the SCS app, etc. CIU was measured by four questions based on the studies of Hsiao et al. (2016); exemplary questions are "It is a habit for me to check the information in the application to know my child's in-school performance and activities" and "It is a natural behavior for me to use the SCS application and insist on asking my child to wear the wristband."

3.4. Participants and Procedure

The participants of the study were from three kindergartens. The survey was conducted at the end of the 2019-2020 school year. There were 522 parents from 18 classes who participated in the survey (each class has about 29 children, with

one parent per child participating). The questionnaire was sent to an online survey tool named Questionnaire Star, then a cover letter was sent to participants' emails to ask them to link to the questionnaire website and reply to those questionnaire items. In the preface of the questionnaire, participants were told that they were participating in a study that the data they provided was anonymous, and the study data might be published.

However, after removing incomplete returns, and after the useful data were subjected to first-order confirmatory factor analysis, a total of 6 samples were deleted. Table 1 shows the number and percentage of the profile of the remaining 516 samples. The frequency of checking the app on their mobile devices was also mentioned in the survey (see Table 1).

4. Results

Structural equation modeling (SEM) could be used to confirm direct, indirect, and mediating relationships (Sin & Kim, 2013), and could test the research model. According to Kline's (2005) recommendation, the sample size (n = 516) was considered sufficient for AMOS to obtain reliable results in structural equation modeling. Therefore, the present study tested Confirmatory Factor Analysis (CFA) and path analysis with SEM using AMOS 24.0.

4.1. Mean and Standard Deviation

Using SPSS, the mean and standard deviation of the questionnaire were calculated as Table 2. The mean value of each item of the questionnaire was more than 3.5. The value of the standard deviation was less than 1.4.

4.2. Reliability and Validity Analysis

A survey was conducted with a small sample before the formal survey. Some questions were deleted or revised according to the study context. The software of SPSS 24.0 was used to test the validity and reliability of the questionnaire. The

Table 1. Profile of participants by parents.

Variable	Classification	Count	Percentage
Gender	Male	213	41.3%
	Female	303	58.7%
Child's Grade	Nursery grade	308	59.7%
	Lower-kindergarten	96	18.6%
	Upper-kindergarten	112	21.7%
Frequency of checking the app on their mobile devices	Rarely	62	12.0%
	Once every few days	159	30.8%
	Once a day	247	47.9%
	More than once a day	48	9.3%

Table 2. Mean and standard deviation (n = 516).

	Item	Mean	Standard deviation
PU	PU1	3.85	1.276
	PU2	3.74	1.245
	PU3	3.82	1.212
	PU4	3.75	1.211
	PU5	3.77	1.204
	PU6	3.77	1.193
	PU7	3.78	1.130
	PU8	3.77	1.193
PEU	PEU1	3.57	1.247
	PEU2	3.75	1.300
	PEU3	3.78	1.307
	PEU4	3.78	1.252
	PEU5	3.73	1.302
EC	EC1	3.76	1.134
	EC2	3.77	1.178
	EC3	3.77	1.171
SN	SN1	3.98	1.067
	SN2	3.98	1.059
	SN3	3.99	1.095
US	US1	4.01	1.095
	US2	4.01	1.111
	US3	4.02	1.086
	US4	3.93	1.118
CIU	CIU1	3.92	1.109
	CIU2	3.90	1.129
	CIU3	3.92	1.094
	CIU4	3.84	1.136

study applied Cronbach's alpha, average variance extracted (AVE), and composite reliability (CR) to assess the model data reliability and validity (see **Table 3**). Cronbach's alpha is used to measure the internal consistency of data. Reliability is the degree to which a measure is free from error and yields consistent results (Hair et al., 2010). The Cronbach's alpha of each item in the questionnaire is above .7 (Nunnally & Bernstein, 1994) (see **Table 2**) thus showing that the data reliability of the study is acceptable. The study used confirmatory factor analysis to measure the discriminant validity and convergent validity. Based on the finding of Fornell and Larcker (1981), the convergent validity can be measured by

CR, AVE, and indicator factor loading. An acceptable value of the indicator factor loading is 0.5 or above (Hair et al., 2010). The value of CR and AVE should be 0.7 and 0.5 or above (Fornell & Larcker, 1981). The results of the value CR and AVE in the study all showed acceptable values, which indicated the validity of the measures (see **Table 3**).

As suggested by Fornell and Larcker (1981), discriminant validity is determined when the square root of the AVEs is greater than the inter-construct correlations. **Table 4** showed that the square root of the AVEs of the study was greater, which indicated acceptable discriminant validity.

4.3. Model Fit Assessment

In the study, Confirmatory Factor Analysis (CFA) (Anderson & Gerbing, 1988) was applied to conduct model fit assessment. The following fit indices, chi-square normalized by degree of freedom (Chi-square/df), the goodness-of-fit statistic (GFI) (Tabachnick & Fidell, 2007), the adjusted goodness-of-fit statistic (AGFI) (Tabachnick & Fidell, 2007), normed-fit index (NFI) (Bentler & Bonnet, 1980), comparative fit index (CFI) (Bentler, 1990), and root mean square error of approximation (RMSEA) (Steiger, 1990) were calculated to assess the measurement model.

We conducted the SEM analysis on the structural model and found that the Chi-square/df was 2.447, which was under the acceptable threshold level of 5.0

Table 3. Reliability and validity analysis.

	Construct Factor loading	Cronbach's alpha	Composite reliability (CR)	Average variance extracted (AVE)
PU	0.910	0.974	0.9746	0.8275
PEU	0.921	0.966	0.9655	0.8485
EC	0.914	0.950	0.9382	0.8351
SN	0.906	0.932	0.9322	0.821
US	0.911	0.954	0.951	0.8291
CIU	0.904	0.954	0.9469	0.8168

Table 4. Reliability and validity analysis Construct discriminant validity analysis.

	PU	PEU	EC	SN	US	CIU
PU	0.910					
PEU	0.823**	0.921				
EC	0.781**	0.794**	0.914			
SN	0.475**	0.407**	0.586**	0.906		
US	0.773**	0.803**	0.740**	0.591**	0.911	
CIU	0.827**	0.820**	0.815**	0.562**	0.823**	0.904

Note: $^{**}p < 0.01$, $^{***}p < 0.001$.

(Bentler & Bonett, 1980). The value of RMSEA was 0.053, which is less than the value of 0.08 (Anderson & Gerbing, 1988). The values of NFI and CFI were 0.960 and 0.976, which are both above the acceptable value of 0.90 (Hair et al., 2010). The values of GFI and AGFI were 0.907 and 0.888, which are more than the suggested value of 0.80 and less than 1.0 (Foster et al., 2006). Thus, the results showed a good model fit.

4.4. Hypotheses Testing

In the path model a standardized path coefficient (beta, β) shows the direct effect of an independent variable on a dependent variable. The value of β is between −1 and 1. If the value is less than 0, the effect of an independent variable on a dependent variable is negative. The larger the absolute value of β is, the greater the effect of an independent variable on a dependent variable is. The value of p indicates the degree of significance of prediction. The acceptable value of p is less than 0.05. US was positively related to CIU (H1: β = 0.362, $p < 0.001$). EC was positively related to US (H2: β = 0.224, $p < 0.001$). PEU was positively related to PU (H3: β = 0.835, $p < 0.001$). PU was positively related to US (H4: β = 0.233, $p = 0.003$). PEU was positively related to US (H5: β = 0.363, $p = 0.006$). PU was positively related to EC (H6: β = 0.243, $p < 0.001$). PEU was positively related to EC (H7: β = 0.510, $p < 0.001$). Parents' SN was positively related to their EC (H8: β = 0.338, $p < 0.001$). Parents' SN was positively related to their CIU (H9: β = 0.179, $p < 0.001$). Parents' PEU was positively related to their CIU (H10: β = 0.458, $p < 0.001$). Table 5 showed the standardized path coefficient for hypothesis testing. The 10 hypotheses were all positively supported.

The determination coefficient r^2 quantifies the variance ratio interpreted by the statistical model. We consider that 0.3 - 0.6 of r^2 is medium, and less than 0.3 is low (Sanchez & Golding, 2013). In addition, the model effect size (f^2) allows researchers to move from a simple recognition of statistical significance to a more general quantifiable description of the size of the effect (Fritz et al., 2012). f^2 values

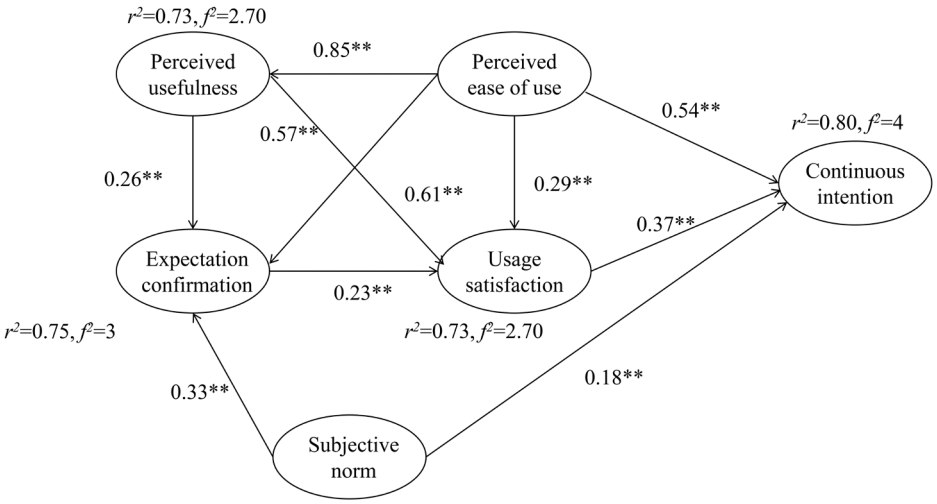
Table 5. Standardized path coefficient for hypothesis testing.

Hypothesis	β	S.E.	C.R.	p
H1	0.362	0.052	6.985	***
H2	0.224	0.048	4.678	***
H3	0.835	0.034	24.220	***
H4	0.233	0.051	4.569	***
H5	0.363	0.055	6.637	**
H6	0.243	0.051	4.765	***
H7	0.510	0.050	10.243	***
H8	0.338	0.032	10.495	***
H9	0.179	0.030	6.045	***
H10	0.458	0.042	10.889	***

greater than 0.8 can be considered large. When it is between 0.2 and 0.8, it can be considered medium, and when it is less than 0.2, it can be considered small. In this study, the explanatory power of PEU on PU is 73% (r^2 = 0.73, f^2 = 2.70), and the explanatory power of PU, PEU and EC on US is 73% (r^2 = 0.73, f^2 = 2.70). The explanatory power of PU, PEU and SN on EC is 75% (r^2 = 0.75, f^2 = 3), and the explanatory variance of PEU, US and SN on CIU is 80% (r^2 = 0.80, f^2 = 0.4). Hence, the six variables in this study have good predictive power (Hair et al., 2014) as shown in **Figure 4**.

5. Discussion

Meyer et al. (2019) propose that if parents do not view smart technology as an efficient method to promote their children's learning, they may not support the implementation of smart technology in schools. Many parents support smart technology and feel that it should be involved in the curricula of preschool education (Erdogan et al., 2019). On the other hand, some parents have negative attitudes towards the use of smart technology in schools (Ebbeck et al., 2016). To understand this issue, this study adopted the related theories to explore the correlates between variables of PU, PEU, EC, SN, and US that are assumed to predict the parents' CIU. Briefly, according to the results, PEU, SN, and US were the direct factors predicting parents' CIU. PEU had a direct prediction to parents' CIU. This finding was the same as that of the study of Roca and Gagné (2008), in which PEU can predict continuance intention. SN had a direct prediction to CIU, which was the same as the findings of other studies (Lee, 2010; Mouakket, 2015; Liu et al., 2021). In these studies, satisfaction was the only factor predicting CIU. Other factors indirectly influenced CIU through satisfaction. Related studies also had a similar result, namely that satisfaction had the greatest prediction (Lee, 2010; Limayem & Cheung, 2008; Shi et al., 2010; Kumar et al., 2018). However, according to Tam et al. (2018), satisfaction and performance expectancy were



Note: $^{**}p < 0.01$, $^{***}p < 0.001$.

Figure 4. Verified research model.

the factors which can predict continuance intention to use mobile apps. Partially inconsistent with previous research, the results of this study showed that other people's decisions about using the SCS had direct prediction on the parents' CIU, and the evaluation of the usage of the system could also directly predict their intention, which indicated that H1, H9 and H10 were positively supported.

The result of this study revealed that satisfaction was not the most important variable predicting the parents' CIU. The satisfaction variable was predicted by perceived usefulness and confirmation based on the post-Acceptance Model of IS continuance (Bhattacherjee, 2001). The study found that satisfaction was not only predicted by the two variables, but also perceived ease of use, which was consistent with the study of Gan and Balakrishnan (2018). This result of this study was also similar to the finding of the Post-Acceptance Model of IS continuance (Bhattacherjee, 2001). Parents had their own judgment and wisdom to evaluate and decide whether to use SCS after they used it, although other people's opinions and the first feelings about the system's usefulness about the educational value might influence them (Papadakis et al., 2019). To address this issue, the present study showed that H2, H4, H5, H6, H7, and H8 were all positively supported.

Hooi and Cho (2017) draw on self-awareness theory and ease of use to explain how user continuance intention may be predicted by digital devices. Supporting this, the ease of use related to the SCS device directly predicted parents' decisions in this study. The reason might be the friendly and simple operation of the system app. Wang et al. (2019) found that perceived ease of use did not have a significant impact on continuance intention to use a Cloud e-learning application, but Der Heijden (2004) proved that perceived ease of use has a positive impact on continuous use intention. However, perceived ease of use by parents could positively predict perceived usefulness and their CIU in this study, indicating that H3 and H10 were positively supported.

6. Conclusion

The sample parents applied the kindergarten SCS for two semesters. Their attitudes towards their kindergarten SCS CIU were valuable for the following development and implementation of the SCS. They could also address the gap in the literature on parents' views of CIU on the SCS. A number of implications are proposed based on the results of this study.

The results show that the different factors directly or indirectly predict the kindergarten parents' CIU. Thus, designers and researchers can determine appropriate strategies for constructing a kindergarten SCS. First, PEU, SN, and US are the direct factors predicting the application of a SCS. The parents' decision of continuance intention to use the SCS is a comprehensive factor which combines others; thus, it can be concluded that more attention should be paid to the improvement of the system to satisfy the parents' need to know about the daily life of their children from the SCS.

Second, parents' expectation confirmation is related to PU, PEU and SN. The latter three variables can predict parents' pre-use expectation. Although the advertising of the system and others' using experience results did have some predictive power on parents' CIU, the individual usage experience played the greatest role in the expectation confirmation. However, the result of this study reveals that if the pre-use expectations are high, the final expectation of confirmation may be low. Thus, the designers of the system can add more friendly functions to the SCS system to enhance parents' perceived usefulness, for example, the function of a reminder service for parents to make sure that their child wears the wristband to school every day.

Third, from the survey, there were still 30.8% of parents who checked the app once every few days, which cannot get their children's information in time. Thus, how to promote parents' common and frequent usage of the system remains an issue. Thus, it is necessary to design an APP to introduce to parents how to get familiar with the system, for example, information about how to communicate with the teachers and others through the app.

Only 18 classes in three kindergartens applied the SCS, which may lead to the result of low mean value and high standard deviation value of PEU in this study. Future studies need to increase the sample size and include more kindergarten parents from different schools and different areas. Along with the development of the construction of the SCS, there may be new functions to serve kindergarten parents, and effects on the change of parents' needs and attitude. Following these changes, future studies may focus on the related factors of CIU with new versions of the SCS.

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Author Contributions

This work is the result of the collaboration of all authors. All authors have equally contributed, reviewed, and improved the manuscript. All authors have revised and approved the final manuscript.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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