



Validating Pupils' Behaviour Intention to Use E-Book Technology in their Learning

Moamar Elyazgi

Faculty Of Engineering and Information Technology, Al-Azhar University - Gaza, Palestine

*Corresponding Author E-Mail: Moamar@Alazhar.Edu.Ps

Abstract

The purpose of this study was to develop and validate a new learning environments instrument designed to aid investigators and practitioners in measuring and researching the pupils' behaviour intention to use e-book technology. The use of e-book technology in schools is now ubiquitous, but the effectiveness on the learning environment has mixed results. This study intends to investigate factors affecting pupils' behavioural intentions to use the e-book technology. Integrating Child Computer Interaction (CCI) factors such as usability and interface with the Technology Acceptance Model (TAM) factors such as Perceived Enjoyment (PE), Perceived Ease of Use (PEOU), Perceived Usefulness (PU) and Behaviour Intention (BI). Using e-book technology acceptance survey was developed, field-tested with 40 pupils from school aged 10-17 years and then validated. The proposed questionnaire has 33 items allocated to six scales: (1) Usability; (2) interface; (3) Perceived Enjoyment; (4) Perceived Ease of Use; (5) Perceived Usefulness and (6) Behaviour Intention. The proposed questionnaire was administered to pupils in the schools. Six experts in the field of computer science, information system and technology to justify it, especially in relation to the elements of each concept, assessed content validity or face validity of the questionnaire. Then alpha reliability, convergent validity and discernment validity have been calculated in this study. The questionnaire of e-book technology acceptance has strong evaluative and discriminative properties and can be used with confidence to measure the e-book acceptance for pupils.

Keywords: E-book Technology; Child Computer Interaction; Technology Acceptance Model; Face Validity; Convergent Validity; Discernment Validity

1. Introduction

In recent years, the booming and rapid development of e-books has had a huge influence on both the information and education industries. Educational technology supported tools have one common objective, which is to motivate children to learn and to increase their confidence (1, 2). An electronic book (e-book) is an educational technology supported tool. As early as 1992, (3) proposed the phrase "electronic book" (also called e-book or eBook for short), which is widely referred to as a medium using electronic channels to store and transport a variety of information and multimedia information-transporting technologies that integrate text, sound, images, videos and animation. Like many other technologies, e-book as a technology-based product has number of advantages. These include easy functionality, anytime, anywhere use, large storage capacity, multimedia capability, WI-FI usability and so on (4). Moreover, due to multiple features, e-books are spreading fast and having impact on various agencies. Writers, libraries, users, book trade, are some of the agencies that are experiencing and observing the impact of e-books (4).

In addition, the e-book is characterized by software and hardware including software with texts, pictures and other information, while hardware, known as s reader, is a special computer style device or program that displays the digital book on a screen (5-8). In recent years, many researchers have conducted studies on the use of e-books for teaching and they have discovered that e-books could enhance the users' learning outcomes (9-17). In addition, a study by (10) has shown that after using e-books for study, students gained a better comprehension of science concepts and de-

veloped more proficient scientific technology application abilities. Meanwhile, students' problem-solving abilities in subject-based learning are cultivated and their self-efficiency and confidence in learning are enhanced.

From the teaching and learning with e-books perceptive, the success of e-books had spread worldwide. In the future, students may no longer need to carry heavy schoolbags. Instead, they can carry an e-book reader for their studies, which are convenient both to carry and for making notes (18). A revolution in studies may occur. (19) pointed out that the digital technologies incorporated into e-books are excellent multimedia tools that could promote the studies of learners. In recent years, due to the development of reading devices, e-books have become mainstream applications in both classroom learning and outdoor learning. Moreover, they are useful tools for teaching and learning. If good use is made of their advantages, e-books can help with the development of more diversified teaching and richer learning. Consequently, for this study, e-book technology is the key technology of ICT to measure the acceptance of technology in schools.

Furthermore, several studies have reported the use of e-book technology. (20) hypothesised that students used the e-books as they found them to be novel and new medium, and hence they tend to read them more when they can access the e-books. E-book technology is more popular among the young readers (21-23), students studying economics or literature (24), undergraduate nursing students (25, 26), students studying humanities (27), other graduate students (28-31). Moreover, e-book technology is very popular among the public or specialised libraries and academicians (32, 33). Hence, this technology has been routinely applied for teaching and for learning in academic organisations. Several ambiguous

and contradictory results have been published regarding the children's learning and comprehension by reading on computer screens when compared to traditional reading printed material. Hence, proper attention should be given to the effect of e-books on children of differing age-groups, especially in the schools

One widely accepted measure of quality is pupil's acceptance of technology in school. However, most pupil's acceptance of e-book technology surveys are of simple design and have rarely validated and evaluated. Questionnaire reliability and validity becomes increasingly important as survey results are more frequently used as measurement data in assessing quality improvement interventions (34). If any attempt is to be made to use survey data in selecting improvement studies, it is further necessary to have reliable and valid measures of specific aspects of pupil judgement of quality. A global measure will be inadequate, since improvement interventions are targeted at specific processes.

The present study primarily utilized and validated the questionnaire to investigate pupils' behaviour intention to use the e-book technology in schools. Additionally, the study draws on past evaluations of educational innovations (35-37) from the field of computer-based learning environments. Especially those research studies on e-book technology learning environments, which have illustrated the effectiveness of the use of e-book technology in learning and its relationship with selected learner outcomes (13, 38-41).

Behavioural intention is the degree to which a person has formulated conscious plans to perform or not perform some specified future (42). Behavioural intention measures provide an effective means for investigating the impact of the use of technology in teaching at the schools. Several scholars have been used successfully Technology Acceptance Model (TAM) by Davis (42) to predict the BI towards the use of IT (40, 41, 43-49).

(50) stated, "Learning quality should increase as learners engage in more interactive systems and the positive consequence of the interactive system is referred to as the interactivity effect". Based on the previous studies, the pupils would not accept technology without interaction with a computer. Pupils' interaction with a computer strengthens the acceptance of e-book technology. Few studies have been conducted on integrating CCI dimension with TAM. Most of the studies affirming the advantages of interactive technology were conducted in higher educational learning environments. However, little is known about how pupils react to interactive technology programs.

Evaluating the quality of learning environments has a long tradition in educational technology and many qualitative and quantitative methods such as interview, focus groups and questionnaires have been developed. Most of these instruments were developed to fit existing theories about factors that predict achievement and to investigate which factors in the learning environment predict behavioural intention (51-55). Despite of pupils' development is considered in both strands of research, insights from research on the development of professional expertise have not yet been systematically implemented in instruments used for evaluating the quality of learning environments.

E-book research articles analysis reveals that survey is the most popular research method. Nevertheless, there is variation in the adoption of survey method for e-book research. (56) adopted the simplest form of survey. They conducted an opinion survey to know the influence of recommendation sources on the intention to use e-books. (57) carried out survey research using the questionnaire tool and adopted purposive sampling method. Since they wanted to examine factors influencing preferences for e-books, they chose only those students who have used e-books.

2. Technology Acceptance

Research done in the area of technology acceptance generally has lacked the integrated view needed to understand school-specific domains. The latest work proposed by (41) integrates Child Computer Interaction (CCI) factors (Usability and Interface) into revised Technology Acceptance Model (TAM) by (58). The study

proposed by these authors was a shift from a fragmented view of technology acceptance to a unified view that integrated the major theories and models in the area. Figure 1 shows the proposed the e-book technology acceptance model. To measure user acceptance of e-book technology, the measures for Behaviour Intention (BI) to use and Perceived Ease of Use (PEOU) were taken from an updated TAM (42) model and TAM2 (Venkatesh and Davis 2000). Perceived Enjoyment (PE) was measured using four semantic differential scales which were taken from past enjoyment research (59, 60).

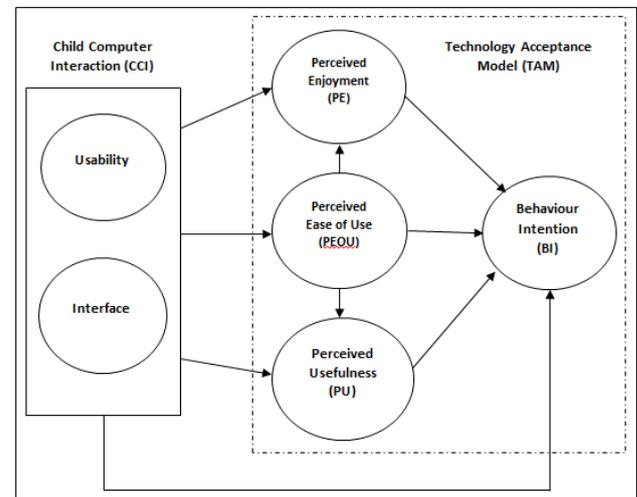


Fig 1: The E-book Technology Acceptance Model (41).

3. Research Objective

The main objective of this work is to develop and validate a new learning environment questionnaire for e-book technology in the context of schools in Malaysia utilizing the new instrument in investigating associations between the CCI factors and TAM factors.

4. Designing and Developing the Questionnaire

4.1. Questionnaire Specifications

In recent years, several studies have used questionnaires as a data collection method. This section shows the conceptual and operational definitions of the variables of this study and the instruments used. The authors proposed framework that includes constructs from revised Technology Acceptance Model (TAM) of (58) and Child Computer Interaction (CCI). The revised TAM constructs, namely, Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Perceived Enjoyment (PE) and Behaviour Intention (BI) while CCI constructs are usability and interface.

The dominant paradigm in this area of research is rooted in Davis' technology acceptance model (TAM) (42, 61), which posits that user acceptance can be explained by two beliefs: PU and PEOU. PU is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" (42). PEOU is defined as "the degree to which a person believes that using a particular system would be free of effort" (42). An important extension to the model is a third belief called PE (62). This concept is defined as "the extent to which the activity of using the computer is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated" (62).

With technologies, being associated with education and learning, different theoretic models have been deployed to better comprehend the significance of these technologies in learning and their acceptance (63-67). The Behavioural Intention (BI) construct is an indicator to actual usage prediction, which has been successful so

far (47, 68). According to Warshaw and Davis (69), BI is the extent to which an individual has framed mindful plans to accomplish or not accomplish certain behaviour in the future.

In contrast, according to (70), CCI is that portion of Human Computer Interaction (HCI) in which the individuals are children. CCI is a domain of scientific analysis which pertains to the phenomena bordering the interaction between children and computational and communication technologies. Additionally, CCI draws the majority of its inspiration from HCI (71). CCI blends inputs and outlooks from several scientific domains, appraising and supporting an area of study and industrial practice, which pertains to the design of interactive systems for children. In addition, (72) defined CCI as the study of the conducts, activities, aptitudes and concerns of children as they intermingle with computer technologies, frequently with the intermediation of others (mostly adults) in circumstances which they somewhat (and not fully) control and manage. To summarize, elements that are crucial in comprehending the intricate user-computer interactions comprise interface design and usability (73). Therefore, in this study, usability and interface factors are considered as CCI dimension.

(74) offers a good take-off point for the understanding of usability, many different ways have been used in applying the term itself, which makes usability a concept that is difficult to define. The explanation of (75) states that "usability refers to both a set of independent quality attributes, such as user performance, learnability and satisfaction, or all at once, making it quite tough to accurately gauge usability." When there is no consistent terminology, it is hard to look into the idea of usability. While the term "human computer interface" is also known as "user interface", considering the focus is on the end user, i.e. the pupil. It can also be termed as "the interface" in simple words (76). Human computer interface is where the user gets in contact with the computer (76). According to (77), human computer interface is the point of contact between the application and the end user. From the educational context, it allows the learner to communicate with the computer and vice versa.

4.2. Items Generation Stage

The responses of pupils of substances are used in forming the measures. The items can be formulated as assessment questions. Items were carefully selected so that to cover all parameters included in the theoretical framework. The items in the questionnaire were presented in groups relating to each parameter. The revised TAM of (58) is used because of its tested validity and reliability in measuring and predicting technology acceptance and use. Table 1 lists the measurement items and their related constructs. The survey instrument extends the revised TAM constructs, namely, PU, PEOU, PE and BI to include CCI factors, namely, usability and interface. There are three parts to the questionnaire. The first part of the survey instrument used in this study contains four closed-ended demographic questions. Pupils are asked to provide information about their gender, age, school name and level of education (grade). The second part contains questions of PEOU, PU, PE and BI. Moreover, there are questions related to CCI, which are usability and interface.

Items to measure PU, PEOU and BI were generated based on the procedures suggested by (42, 78-80) while the items to measure PE were generated based on the procedure suggested by (79, 81, 82). The third part of the questionnaire contains questions on CCI. It contains two sections: usability and interface. Items to measure the usability were generated based on the (83) study while the items to measure the interface were generated based on (84) study. After the instrument validation process by experts, all the items are then modified for the context of e-book technology.

The (85) scaling method was found to be adequate for measuring the questionnaire items of this study. There is evidence that the reliability of the entire scale can be increased when each respondent could express his or her agreement or disagreement with every item using a five-point scale (86, 87). In addition, (88) recommended that if researchers want to use agree-disagree, they should

offer five answer categories rather than seven or eleven because the latter results in data of lower quality. Therefore, this study uses 5-point Likert scales answers for school children (1=Strongly Disagree; 2=Disagree; 3= Neutral; 4= Agree and 5=Strongly Agree) for the second and the third part. Several items are used as instruments throughout the data collection of this study. The overall outline of the questionnaire can be represented as shown in Figure 2.

Table 1: The Measurement Items and their Related Constructs

Construct	Items	References	Reliability
Perceived Usefulness (PU)	5	(42, 79)	0.97
Perceived Ease of Use (PEOU)	5	(42, 78, 79)	0.92
Perceived Enjoyment (PE)	3	(79, 81, 82, 89)	0.977
Behaviour Intention (BI)	3	(42, 78-80)	0.960
Usability	8	(83, 90, 91)	0.96
Interface	9	(84, 90)	0.94

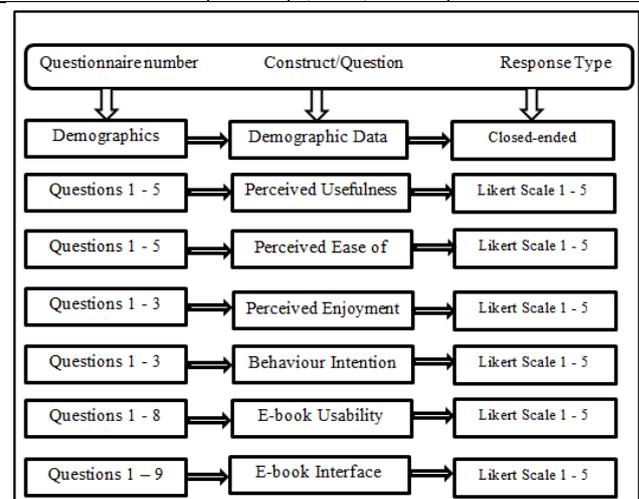


Fig 2: Outline/Content of the Questionnaire

5. Respondents' Profile

Based on (92) recommendation, in this study, the researcher selects 40 pupils (use e-book technology) randomly from age 10 years to 17 years old from Garden International School (GIS), Kuala Lumpur-Malaysia. Garden International School (GIS) is a large private and co-educational, British International School in Malaysia. Table 2 presents the characteristics of pupils for the study purpose. A number of males participated the questionnaire are 21 males and number of females have participated the questionnaire are 19 females.

Table 2: Characteristics of the Pupils

	Gender				Total	
	Male		Female		N	%
	N	%	N	%		
School children	21	52.5	19	47.5	40	100

6. Validity and Reliability of Questionnaire

6.1. Content and Face Validity

Based on the theoretical constructs, a draft of the questionnaire was prepared. Depending on the observations of a pilot study that was carried out to determine the consistency and the authenticity of the questionnaire features, 33 items were selected. In order to determine content and face validity, the questionnaire features were then validated and modified by the professional panel, which consisted of six experts belonging to the field of, information sys-

tem, computer science and the education technology from the Universiti Teknologi Malaysia. In order to equalize the experts' conceptions of content validity indices (relevancy, clarity and comprehensiveness of the questionnaire), the definition of these indices were explained to them (93, 94). The ability of designed questions to reflect the content was defined as relevancy. The questions lucidity concerning their wording and concept was considered as clarity. Finally, the questionnaire's ability to include all content domains was defined as comprehensiveness (95, 96).

Upon the panel's agreement, the initial questions were mailed to them and each expert was asked to write his or her additional comments about the items. Moreover, we asked them to share their opinions on the extracted indices and to suggest some questions, which they believed, were appropriate for e-book technolo-

gy identification. After collecting the experts' opinions, the initial expert panel modified some of the questions based on the feedbacks (94, 95). Finally, the items in need of revision were reworded in order to be grammatically and colloquially acceptable and easily comprehended. (see Table 3). In the next step, the questions were assessed by the cooperation of 40 the pupils, who participated in the study (see Table 2). Moreover, pupils were directed to inquire and ask the researchers about any doubts or concerns regarding the questionnaire features. This was done to minimise the problem of the survey respondents answering the questionnaire when they have not fully understood it. Furthermore, these stages, the face validity of the questionnaire was also evaluated (97).

Table 3: Measurements of each construct

Construct	Source	Questions	Original Items	Refined Items
Perceived Usefulness (PU) The degree to which a person believes that using a particular system would enhance his or her job performance.	(42, 79)	1	Using the system improves my performance in my job.	Using the e-book technology enables me to achieve the learning more quickly.
		2	Using the system in my job increases my productivity.	Using the e-book technology improves my learning performance.
		3	Using the system enhances my effectiveness in my job.	Using the e-book technology increases my grade in my learning.
		4	I find the system to be useful in my job.	Using the e-book technology helps me in my learning.
		5	Using the system improves my performance in my job.	Overall, I find the e-book technology useful in my learning.
Perceived Ease of Use (PEOU) The degree to which a person believes that using a particular system would be free of effort	(42, 78, 79)	1	Learning to operate system would be easy for me.	Learning to use the e-book technology is ease for me.
		2	I find it easy to get the system to do what I want it to do.	E-book certainly provides me with some ease way to find what I want.
		3	My interaction with the system is clear and understandable.	My interaction with the e-book technology is ease for me to understand.
		4	It is not easy for me to become skillful in using system	It is ease for me to become skillful at using the e-book technology.
		5	I find the system to be easy to use.	Overall, I find the e-book technology ease to use.
Perceived Enjoyment (PE) The degree to which the activity of using a specific system is perceived to enjoyable in its own right.	(82)	1	I find using e-book technology to be enjoyable.	Using the e-book technology is enjoyable.
		2	The actual process of using the e-book technology is pleasant.	Using the e-book technology is pleasant.
		3	I have fun using the e-book technology.	Using the e-book technology is fun.
Behaviour Intention (BI) The degree to which a person has formulated conscious plans to perform or not perform some specified future behaviour.	(80)	1	I intend to use the system in the next <n> months.	I intend to use the e-book technology in the future.
		2	I predict I would use the system in the next <n> months.	I will use the e-book technology in the future.
		3	I plan to use the system in the next <n> months.	I have the plan use the e-book technology in the future.

Table 3: Measurements of each construct (continued)

Construct	Source	Questions	Original Items	Refined Items
E-book Usability (EU) The extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use.	(83, 90)	1	This system has all the functions and capabilities I expect it to have.	E-book technology has all the functions and capabilities I expect it to have.
		2	The contents in the e-book technology is effective in helping me complete the tasks and scenarios.	The contents in the e-book technology is effective in helping me complete the tasks.
		3	I was able efficiently to complete the tasks and scenarios using this system.	I am able to complete my work efficiently using the e-book technology.
		4	The information (such as on-line help, on-screen messages and other documentation) provided with this system was clear.	The information (such as online help, on-screen messages, and other documentation) provided with the e-book technology is clear.
		5	The system gave error messages that clearly told me how to fix problems.	The e-book technology gives error messages that clearly tell me how to fix problems.
		6	I was able to complete the tasks and scenarios quickly using this system.	I am able to complete my work quickly using the e-book technology.
		7	I could effectively complete the	I can effectively complete my work using the e-book

			tasks and scenarios using this system.	technology.
		8	The information provided for the system was easy to understand.	The information provided for the e-book technology is ease to understand.
		9	The interface of this e-book is pleasant Comment.	Removed
E-book Interface (EI) The interface is a part of any interactive computer, system or application, which the human comes with contact perceptually, cognitively and physically.	(84, 90)	1	Reading characters on the screen is ease.	Reading characters on the screen is ease.
		2	Organization of information is clear.	Organization of information is well organized.
		3	Sequence of screens is clear.	Sequence of screens is clear.
		4	Position of messages on screen is consistent.	Position of messages on screen is consistent.
		5	Error messages is helpful for me.	Error messages is helpful for me.
		6	Help messages on the screen is helpful.	Help messages on the screen is helpful.
		7	The screen layout and design is appropriate.	The screen layout is clear design.
		8	The configuration colour and background is clear and harmonious for the e-book.	The e-book's configuration colour and background is harmonious.
		9	Remembering names and use of commands	It is pleasant to follow and use the menu structure.

6.2 Reliability of Questionnaire

Internal consistency reliability gives an estimate of the equivalence of sets of items from the same test (98). It assumes that items measuring the same construct should correlate and the coefficients provide an estimate of the reliability of measurement. Cronbach's alpha (99), is one of the widely used methods to estimate internal consistency reliability (100). It is a function of the average inter-correlations of items and their number in the scale. The measure gives the degree to which responses are consistent across the items. (101) posited that a measure of 0.70 or greater is considered an acceptable reliability level.

The reliability of the items was determined by Cronbach's alpha. All internal consistency reliabilities based on Cronbach's alphas for measurement items are listed in Table 4. In this study, thirty-three items were calculated. Most of the items are considered good as they are higher than 0.70. Since all reliability tests are higher than 0.70, the items in each set are positively correlated to one another (102, 103). Therefore, the constructs degree of reliability is good. Hence, the results show that the questionnaire is a reliable measurement instrument and can be used in the main study.

Table 4: The Research Variables of Cronbach's α Coefficient

Constructs	Items	Cronbach's α
Perceived Usefulness (PU)	PU1 PU2 PU3 PU4 PU5	0.861
Perceived Ease of Use (PEOU)	PEOU1 PEOU2 PEOU3 PEOU4 PEOU5	0.883
Perceived Enjoyment (PE)	PE1 PE2 PE3	0.911
Behaviour Intention (BI)	BI1 BI2 BI3	0.876
E-book Usability (EU)	EU1 EU2 EU3 EU4 EU5 EU6 EU7 EU8	0.720
E-book Interface (EI)	EI1 EI2 EI3 EI4	0.926

Constructs	Items	Cronbach's α
	EI5 EI6 EI7 EI8 EI9	

6.3. Convergent Validity

Convergent validity refers to construct indicators that mirror a shared elevated degree of variation among factors. This parameter ascertains the degree of correlation among the measures of a similar idea (104, 105). Convergent validity sorts out construct loadings, Average Variance Extracted (AVE) and construct reliabilities. AVE is the amount of the square of standardized factor loadings that denotes each item's degree of disparity. In addition, AVE computation also yields the average proportion of this disparity through the measurement of items held by a construct. (106-108) set the standard value of AVE as 0.50 or greater. During efforts to probe convergent validity, it is essential to verify if a complete list of items is meaningfully loaded on a construct. The main loading and cross loading of items were scrutinized to confirm the reliability of the indicators. As proposed by (109), the question items tagged with a main loading value 0.5 and higher were upheld. The results show that all items were higher than 0.5 in checking cross loadings as illustrated in Table 5. In addition, the AVE principal is described as "the grand mean value of the squared loadings of the indicators associated with the construct." The AVE of each construct is displayed in Table 5. A minimum AVE value of 0.5 or above is indicative of a latent variable with the capacity to describe in excess of half the disparity of its indicators. As such, these latent variables are deemed acceptable (109, 110). (106-108) mentioned that the mutual variance of a construct and its measures is considered greater than error if the AVE is above 0.50.

Furthermore, Table 5 also displays the value of Construct Reliability (CR) for each variable. The minimum value of the composite reliability is at least 0.70 (104, 111). As exhibited in Table 5, the degree of reliability for all constructs is satisfactory. CR was harnessed to evaluate the regularity of the measurement items utilized for this research. CR is in line with the premise that "a block is considered as homogeneous and a measure of internal consistency" (112). CR is deemed more appropriate for PLS-SEM during model estimation when compared to Cronbach alpha which focuses on indicators in accordance with their reliability (113). Accordingly, based on of outer loadings, AVE and CR are concluded that there is no issue of the convergent validity of the constructs in the current study.

Table 5: Factor Loadings, CR and AVE

Constructs	Items	Factor Loadings	Composite Reliability	AVE
Perceived Usefulness (PU)	PU1	0.859	0.890	0.620
	PU2	0.639		
	PU3	0.859		
	PU4	0.789		
	PU5	0.771		
Perceived Ease of Use (PEOU)	PEOU1	0.826	0.912	0.675
	PEOU2	0.760		
	PEOU3	0.832		
	PEOU4	0.838		
	PEOU5	0.849		
Perceived Enjoyment (PE)	PE1	0.918	0.954	0.874
	PE2	0.932		
	PE3	0.954		
Behaviour Intention (BI)	BI1	0.949	0.928	0.802
	BI2	0.870		
	BI3	0.866		
E-book Usability (EU)	EU1	0.531	0.829	0.548
	EU2	0.786		
	EU3	0.787		
	EU4	0.783		
	EU5	0.786		
	EU6	0.656		
	EU7	0.554		
	EU8	0.804		
E-book Interface (EI)	EI1	0.673	0.873	0.536
	EI2	0.675		
	EI3	0.729		
	EI4	0.659		
	EI5	0.675		
	EI6	0.552		
	EI7	0.553		
	EI8	0.826		
	EI9	0.826		

6.4. Discernment Validity

Discriminant validity refers to the degree to which comparable constructs have distinctly dissimilar values. The gauging of responses in this form of validity is conducted without the performance of cross loading in the context of latent constructs. In a circumstance where the correlation among exogenous constructs exceeds 0.85, discriminant validity is deemed breached (104, 111). This type of validity calls for the AVE square root value to surpass the inter-construct correlation values. The cross-loadings (109, 110) was utilized for testing the discriminant validity of the constructs. According to the Fornell-Larcker criterion, every latent construct's square root ought to be greater than the latent inter-construct correlation with other latent variables present in the model (109). As illustrated in Table 6, results derived from the cross-loading of all constructs signified that the items were generating a superior degree of loading onto their respective constructs. This circumstance confirms the establishment of discriminant validity.

Table 6 : Cross Loadings of the Items

	BI	CCI	PE	PEOU	PU
BI1	0.948384	0.672284	0.774574	0.633873	0.595768
BI2	0.869642	0.644610	0.778698	0.551071	0.508211
BI3	0.865916	0.557552	0.657077	0.380287	0.546407
EI1	0.579741	0.672657	0.590678	0.534316	0.521308
EI2	0.310798	0.675193	0.484740	0.353855	0.433748
EI3	0.381606	0.729484	0.528429	0.353329	0.404369
EI4	0.311679	0.658807	0.425925	0.296485	0.416338
EI5	0.310798	0.675193	0.484740	0.353855	0.433748
EI6	0.207239	0.551777	0.401533	0.470762	0.242014
EI7	0.451732	0.553320	0.611869	0.417517	0.195158
EI8	0.505859	0.825855	0.674501	0.529000	0.503303
EI9	0.505859	0.825855	0.674501	0.529000	0.503303
EU1	0.244232	0.530514	0.352079	0.454566	0.266558
EU2	0.461443	0.786092	0.622087	0.457753	0.368718
EU3	0.664097	0.786952	0.790439	0.505546	0.440445

EU4	0.555379	0.783097	0.726265	0.569961	0.393924
EU5	0.461443	0.786092	0.622087	0.457753	0.368718
EU6	0.703245	0.656557	0.602901	0.526911	0.463329
EU7	0.542117	0.554397	0.605900	0.468000	0.397671
EU8	0.755905	0.803611	0.774355	0.703747	0.370364
PE1	0.806144	0.753354	0.917656	0.641861	0.519816
PE2	0.722353	0.840213	0.932426	0.647751	0.498145
PE3	0.787524	0.813127	0.953654	0.653725	0.480798
PEOU1	0.339889	0.449908	0.417910	0.826082	0.225009
PEOU2	0.685615	0.674054	0.787515	0.759743	0.382487
PEOU3	0.394204	0.528058	0.486446	0.832001	0.182688
PEOU4	0.379773	0.490221	0.402212	0.838168	0.088968
PEOU5	0.465988	0.553957	0.569503	0.848791	0.237944
PU1	0.377031	0.322545	0.239044	0.101605	0.858949
PU2	0.155835	0.166699	0.106890	0.046138	0.638660
PU3	0.377031	0.322545	0.239044	0.101605	0.858949
PU4	0.478732	0.395427	0.405586	0.228547	0.789326
PU5	0.693360	0.695457	0.710033	0.430918	0.770592

7. Discussion and Conclusion

In this research, we sought to develop a comprehensive work design measure by using the extant literature and adapting or creating scales to measure theoretically distinct work characteristics. The purpose of this study was to better understand the acceptance of e-book technology in Malaysian school. The factors affecting behaviour intention to use e-book technology were explored using an instrument (Questionnaire) utilizing independent variable. One major contribution of this study is the establishment of a validated questionnaire in the area of technology acceptance. The questionnaire instrument is based on a review of literature in this area. The instrument included items to measure variables (one dependent and five independent) and all were found to be reliable measures of the intended constructs. BI is an independent variable while CCI factors namely, usability and interface and TAM factors namely, perceived enjoyment, perceived usefulness, perceived ease of use are independent variable. The findings have shown that there are no excluding items from the instrument.

In addition, the development and validation of the e-book technology acceptance instrument is a significant outcome of this study. This instrument has been shown to have validity and the e-book technology acceptance scales of usability, interface, perceived enjoyment, perceived usefulness, perceived ease of use and behaviour intention have acceptable reliability, convergent validity and discriminant validity from a statistical perspective. This study contributed to the area by developing an instrument for schools and validating the instrument using a sample of pupils. The initial set of items yielded a reliable instrument that was used to predict behavioural intention in the context of e-book technology acceptance for pupils in Malaysia. E-book technology in Malaysia is booming and thus schools are in great need to understand their pupils' attitudes and perceptions towards this technology. Without a well-validated instrument, this process will yield misleading results. In e-book technology environment and in Malaysia.

Future work and Implications for research and practice are as follows the instrument developed in this work opens doors for researchers to explore pupils' attitudes towards e-book technology. Moreover, this instrument is a building stone that can contribute to other types of technology testing. E-book technology in Malaysia is a new technology that emerged from the needs of schools' administrators to better serve their pupils and improve their learning process. This work is important for schools to test the factors affecting their pupils' acceptance of a technology. A limitation of this study is related to small sample of pupils.

References

[1] Earle RS. The integration of instructional technology into public education: Promises and challenges. Educational Technology. 2002;42(1):5-13.

- [2] Chester A, Gwynne G. Online teaching: Encouraging collaboration through anonymity. *Journal of Computer-Mediated Communication*. 1998;4(2):0-.
- [3] Van Dam A. Electronic books and interactive illustrations—transcript of a talk. In: Cunningham S, Hubbard RJ, editors. *Interactive Learning Through Visualization*. Begur, Spain: Springer-Verlag Berlin Heidelberg; 1992. p. 9-24.
- [4] Kumbhar RM, Bansode SY. E-books: an Analysis of Published Research. *Asia Pacific Journal of Library and Information Science*. 2012;2(2).
- [5] Borchers JO, editor *Electronic books: Definition, Genres, Interaction Design Patterns. Human Factors in Computing Systems, Workshop: Designing Electronic Books*; 1999 1-3 July; Linz University, Austria.
- [6] Cavanaugh C, Cavanaugh T, editors. *eBooks for Education. Society for Information Technology & Teacher Education International Conference*; 2002 18-23 March; Chesapeake, VA, USA: Association for the Advancement of Computing in Education (AACE).
- [7] Anuradha K, Usha H. Use of E-books in an Academic and Research Environment: A Case Study from the Indian Institute of Science. *Program: Electronic Library and Information Systems*. 2006;40(1):48-62.
- [8] Vassiliou M, Rowley J. Progressing the definition of “e-book”. *Library Hi Tech*. 2008;26(3):355-68.
- [9] Chen Y-S, Kao T-C, Sheu J-P. Realizing outdoor independent learning with a butterfly-watching mobile learning system. *Journal of Educational Computing Research*. 2005;33(4):395-417.
- [10] Encheff D. Creating a science e-book with fifth grade students. *TechTrends*. 2013;57(6):61-72.
- [11] Ihmeideh FM. The effect of electronic books on enhancing emergent literacy skills of pre-school children. *Computers & Education*. 2014;79(2014):40-8.
- [12] Korat O, Levin I, Atishkin S, Turgeman M. E-book as facilitator of vocabulary acquisition: Support of adults, dynamic dictionary and static dictionary. *Reading and Writing*. 2014;27(4):613-29.
- [13] Lai C. Integrating e-books into science teaching by preservice elementary school teachers. *Journal of Education in Science, Environment and Health (JESHE)*. 2016;2(1):57-66.
- [14] Liang TH, Huang YM. An Investigation of Reading Rate Patterns and Retrieval Outcomes of Elementary School Students with E-books. *Educational Technology & Society*. 2014;17(1):218-30.
- [15] Morgan H. Using digital story projects to help students improve in reading and writing. *Reading Improvement*. 2014;51(1):20-6.
- [16] Schneider JJ, Kozdras D, Wolkenhauer N, Arias L. Environmental E-Books and Green Goals. *Journal of Adolescent & Adult Literacy*. 2014;57(7):549-64.
- [17] Schugar HR, Smith CA, Schugar JT. Teaching with interactive picture e-books in grades K–6. *The Reading Teacher*. 2013;66(8):615-24.
- [18] Brodersen C, Christensen B, Grønbaek K, Dindler C, Iversen O, editors. *eBag—The Digital School Bag. Fourth Danish Research Symposium*; 2004 16-18 Nov; Aalborg University, Aalborg.
- [19] Dalton B. E-text and e-books are changing literacy landscape. *Phi Delta Kappan*. 2014;96(3):38-43.
- [20] Fasimpaur K. E-books in schools. *Media and Methods*. 2004;40(5):12-.
- [21] Doty DE, Poppellwell SR, Byers GO. Interactive CD-ROM storybooks and young readers’ reading comprehension. *Journal of Research on Computing in Education*. 2001;33(4):374-84.
- [22] Grimshaw S, Dungworth N, McKnight C, Morris A. Electronic books: Children’s reading and comprehension. *British Journal of Educational Technology*. 2007;38(4):583-99.
- [23] Rahim NZA, Bakar NHA, editors. *e-Book use by Malaysian primary school children. Digital Information and Communication Technology and its Applications (DICTAP)*, 2014 Fourth International Conference on; 2014 6-8 May; Bangkok: IEEE.
- [24] Hernon P, Hopper R, Leach MR, Saunders LL, Zhang J. E-book Use by Students: Undergraduates in Economics, Literature, and Nursing. *The Journal of Academic Librarianship*. 2007;33(1):3-13.
- [25] Appleton L. The use of e-books in midwifery education: the student perspective. *Health and Information Libraries Journal*. 2004;21(4):245-52.
- [26] Appleton L. Using Electronic Textbooks: Promoting, Placing and Embedding. *The Electronic Library*. 2005;23(1):54-63.
- [27] Levine-Clark M. Electronic books and the humanities: A survey at the University of Denver. *Collection Building*. 2007;26(1):7-14.
- [28] Letchumanan M, Tarmizi R. Assessing the intention to use e-book among engineering undergraduates in Universiti Putra Malaysia, Malaysia. *Library Hi Tech*. 2011;29(3):512-28.
- [29] Vernon RF. Teaching notes: Paper or pixels? An inquiry into how students adapt to online textbooks. *Journal of Social Work Education*. 2006;42(2):417-27.
- [30] Rowlands I, Nicholas D, Jamali HR, Huntington P, editors. *What do faculty and students really think about e-books? Aslib proceedings*; 2007: Emerald Group Publishing Limited.
- [31] Stone RW, Baker-Eveleth L. Students’ expectation, confirmation, and continuance intention to use electronic textbooks. *Computers in Human Behavior*. 2013;29(3):984-90.
- [32] Armstrong C, Edwards L, Lonsdale R. Virtually there? E-books in UK Academic Libraries. *Journal of Program*. 2002;36(4):216-27.
- [33] Blummer B. E-books revisited: The adoption of electronic books by special, academic, and public libraries. *Internet Reference Services Quarterly*. 2006;11(2):1-13.
- [34] Funk L, Thiessen D, Wright V, Andrysek J, Rispin K. Reliability and validity of the Lower Limb Function Questionnaire when completed by young adult orthotic and prosthetic device users. *Disability and Rehabilitation: Assistive Technology*. 2016:1-10.
- [35] Khine DLFMS. *Contemporary Approaches to Research on Learning Environments Worldviews*. Hackensack, N.J.: World Scientific; 2006 May 25, 2006.
- [36] Koul RB, Fisher D, Shaw T. An application of the TROFLEI in secondary-school science classes in New Zealand. *Research in Science & Technological Education*. 2011;29(2):147-67.
- [37] Zandvliet D. Learning environments in new contexts: Web-capable classrooms in Canada. In: Fisher MSKDL, editor. *Technology-rich learning environments: A future perspective*. Singapore: World Scientific. 2003; 2003. p. 133-56.
- [38] Aldridge JM, Dorman JP, Fraser BJ. Use of Multitrait-Multimethod Modelling to Validate Actual and Preferred Forms of the Technology-Rich Outcomes-Focused Learning Environment Inventory (TROFLEI). *Australian Journal of Educational & Developmental Psychology*. 2004;4:110-25.
- [39] Aldridge JM, Fraser BJ. Effectiveness of a technology-rich and outcomes-focused learning environment. *Technology-rich learning environments: A future perspective*. 2003:41-69.
- [40] Elyazgi M, Nilashi M, Ibrahim O, Rayhan A, Elyazgi S. Evaluating the Factors Influencing E-book Technology Acceptance among School Children Using TOPSIS Technique. *Journal of Soft Computing and Decision Support Systems*. 2016;3(2):11-25.
- [41] Elyazgi M, Ibrahim O, Nilashi M, Elyazgi S, Abu-Ulbeh W, Rayhan A. Investigating a Theoretical Framework for E-book Technology Acceptance. *Journal of Soft Computing and Decision Support Systems*. 2015;2(5):16-23.
- [42] Davis FD. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*. 1989;13(3):319-40.
- [43] Shroff RH, Deneen C, Ng EM. Analysis of the technology acceptance model in examining students’ behavioural intention to use an e-portfolio system. *Australasian Journal of Educational Technology*. 2011;27(4):600-18.
- [44] Gerlach J, Buxmann P, editors. *Analyzing Electronic Book Acceptance: A Compatibility Perspective*. 46th Hawaii International Conference on System Sciences (HICSS); 2013 7-10 Jan; Wailea, HI, USA: IEEE.
- [45] Hiramatsu A, Nose K. Behavior Analysis of Video Hosting Website Users Based on an Extended Technology Acceptance Model. In: Matsuo T, Colomo-Palacios R, editors. *Electronic Business and Marketing*. Berlin Heidelberg: Springer; 2013. p. 125-36.
- [46] Deshpande Y, Bhattacharya S, Yammiyavar P, editors. *A behavioral approach to modeling Indian children’s ability of adopting to e-learning environment*. 4th International Conference on Intelligent Human Computer Interaction; 2012 27-29 December; Kharagpur, India: IEEE.
- [47] Ramayah T, Ignatius J. Impact of perceived usefulness, perceived ease of use and perceived enjoyment on intention to shop online. *ICFAI Journal of Systems Management (JSM)*. 2005;3(3):36-51.
- [48] Fridin M, Belokopytov M. Acceptance of socially assistive humanoid robot by preschool and elementary school teachers. *Computers in Human Behavior*. 2014;33(1):23-31.
- [49] Elyazgi MG, Mahrin MNr, Rahim NZA, Imtiaz MA. Feasibility Study of Tablet PC Acceptance Among School Children in Malaysia. *Jurnal Teknologi*. 2014;69(2):39-44.
- [50] Evans C, Gibbons NJ. The interactivity effect in multimedia learning. *Computers & Education*. 2007;49(4):1147-60.
- [51] Jou M, Tennyson RD, Wang J, Huang S-Y. A study on the usability of E-books and APP in engineering courses: A case study on mechanical drawing. *Computers & Education*. 2016;92:181-93.
- [52] Park E, Sung J, Cho K. Reading experiences influencing the acceptance of e-book devices. *The Electronic Library*. 2015;33(1):120-35.
- [53] Torres R, Johnson V, Imhonde B. The Impact of Content Type and Availability on eBook Reader Adoption. *Journal of Computer Information Systems*. 2014;54(4):42-51.
- [54] Roslina W, Fariha Z, Haslinda N, Fahmy S. Evaluating of Teacher’s Acceptance of e-Book: A Case Study. *Australian Journal of Basic and Applied Sciences*. 2014;8(4):136-41.
- [55] Olasina G, Mutula S. The Acceptance and Use of e-books: A group study in Nigeria. *International Journal of Global Education*. 2014;3(3):19-42.
- [56] Lin C-S, Tzeng G-H, Chin Y-C, Chang C-C. Recommendation sources on the intention to use e-books in academic digital libraries. *The Electronic Library*. 2010;28(6):844-57.
- [57] Woody WD, Daniel DB, Baker CA. E-books or textbooks: Students prefer textbooks. *Computers & Education*. 2010;55(3):945-8.
- [58] Heijden Hvd. User Acceptance of Hedonic Information Systems. *MIS Quarterly*. 2004;28(4):695-704.

- [59] Chang MK, Cheung W. Determinants of the intention to use Internet/WWW at work: a confirmatory study. *Information & Management*. 2001;39(1):1-14.
- [60] Igbaria M, Iivari J, Maragahh H. Why do individuals use computer technology? A Finnish case study. *Information & Management*. 1995;29(5):227-38.
- [61] Davis FD, Bagozzi RP, Warshaw PR. User acceptance of computer technology: a comparison of two theoretical models. *Management Science*. 1989;35(8):982-1003.
- [62] Davis FD, Bagozzi RP, Warshaw PR. Extrinsic and intrinsic motivation to use computers in the workplace. *Journal of Applied Social Psychology*. 1992;22(14):1111-32.
- [63] Yeou M. An Investigation of Students' Acceptance of Moodle in a Blended Learning Setting Using Technology Acceptance Model. *Journal of Educational Technology Systems*. 2016;44(3):300-18.
- [64] Waheed M, Kaur K, Qazi A, Jansen J. Students' perspective on knowledge quality in elearning context: A qualitative assessment. *Internet Research*. 2016;26(1):120-45.
- [65] Sabi HM, Uzoka F-ME, Langmia K, Njeh FN. Conceptualizing a model for adoption of cloud computing in education. *International Journal of Information Management*. 2016;36(2):183-91.
- [66] Park Y, Yu JH, Jo I-H. Clustering blended learning courses by online behavior data: A case study in a Korean higher education institute. *The Internet and Higher Education*. 2016;29:1-11.
- [67] Mirzajani H, Mahmud R, Fauzi Mohd Ayub A, Wong SL, Dalrymple J. Teachers' acceptance of ICT and its integration in the classroom. *Quality Assurance in Education*. 2016;24(1):26-40.
- [68] Yang H, Yu J, Zo H, Choi M. User acceptance of wearable devices: An extended perspective of perceived value. *Telematics and Informatics*. 2016;33(2):256-69.
- [69] Warshaw PR, Davis FD. Disentangling behavioral intention and behavioral expectation. *Journal of Experimental Social Psychology*. 1985;21(3):213-28.
- [70] Read J. Children as participants in design and evaluation. *Journal of Interactions*. 2015;22(2):64-6.
- [71] Read J, Markopoulos P. Child-computer interaction. *International Journal of Child-Computer Interaction*. 2013;1(1):2-6.
- [72] Read JC, Bekker MM, editors. The nature of child computer interaction. 25th BCS Conference on Human-Computer Interaction; 2011 4-8 July Newcastle-upon-Tyne, United Kingdom. 2305348: British Computer Society.
- [73] Berg GA. Human-Computer Interaction (HCI) in Educational Environments: Implications of Understanding Computers as Media. *Journal of Educational Multimedia and Hypermedia*. 2000;9(4):347-68.
- [74] Mayhew D. The Usability Engineering Lifecycle: A Practitioner's Handbook for User Interface Design. 1st ed. San Francisco, USA: Morgan Kaufmann Publishers; 1999.
- [75] Seffah A, Metzker E. The obstacles and myths of usability and software engineering. *Communications of the ACM*. 2004;47(12):71-6.
- [76] Chalmers PA. The role of cognitive theory in human-computer interface. *Computers in Human Behavior*. 2003;19(5):593-607.
- [77] Sheppard S, Rouff C. *Encyclopedia of Software Engineering*. 2nd ed. NY, USA: Wiley-Interscience New York; 1994.
- [78] Hu PJ, Chau PY, Sheng ORL, Tam KY. Examining the technology acceptance model using physician acceptance of telemedicine technology. *Journal of Management Information Systems*. 1999;16(2):91-112.
- [79] Venkatesh V, Davis FD. A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science*. 2000;46(2):186-204.
- [80] Venkatesh V, Brown SA, Maruping LM, Bala H. Predicting different conceptualizations of system use: the competing roles of behavioral intention, facilitating conditions, and behavioral expectation. *MIS Quarterly*. 2008;32(3):483-502.
- [81] Turel O, Serenko A, Giles P. Integrating technology addiction and use: An empirical investigation of online auction users. *MIS Quarterly*. 2011;35(4):1043-62.
- [82] Venkatesh V. Determinants of perceived ease of use: Integrating control, intrinsic motivation, and emotion into the technology acceptance model. *Information Systems Research*. 2000;11(4):342-65.
- [83] Chin JP, Diehl VA, Norman KL, editors. Development of an instrument measuring user satisfaction of the human-computer interface. SIGCHI Conference on Human Factors in Computing Systems; 1988 15-19 June; Washington, D.C., USA: ACM.
- [84] Lewis JR. IBM computer usability satisfaction questionnaires: psychometric evaluation and instructions for use. *International Journal of Human-Computer Interaction*. 1995;7(1):57-78.
- [85] Likert R. A technique for the measurement of attitudes. *Archives of Psychology*. 1932;22(140):1-55.
- [86] Remmers HH, Ewart E. Reliability of multiple-choice measuring instruments as a function of the Spearman-Brown prophecy formula. *Journal of Educational Psychology*. 1941;32(1):61-6.
- [87] Jenkins GD, Taber TD. A Monte Carlo study of factors affecting three indices of composite scale reliability. *Journal of Applied Psychology*. 1977;62(4):392-8.
- [88] Revilla MA, Saris WE, Krosnick JA. Choosing the Number of Categories in Agree-Disagree Scales. *Sociological Methods & Research*. 2014;43(1):73-97.
- [89] Sun H, Zhang P. Causal relationships between perceived enjoyment and perceived ease of use: An alternative approach. *Journal of the Association for Information Systems*. 2006;7(9):618-45.
- [90] Lewis JR. Psychometric evaluation of the PSSUQ using data from five years of usability studies. *International Journal of Human-Computer Interaction*. 2002;14(3-4):463-88.
- [91] Wu S, Lin C, editors. Exploring Users Intention and Behavior of the Portal Site: Application of Technology Acceptance Model. Pacific Asia Conference on Information System (PACIS); 2001 29-31 December; Taiwan. Taiwan
- [92] Hertzog MA. Considerations in determining sample size for pilot studies. *Research in Nursing and Health*. 2008;31(2):180-91.
- [93] Cook DA, Beckman TJ. Current concepts in validity and reliability for psychometric instruments: theory and application. *The American journal of medicine*. 2006;119(2):166. e7-. e16.
- [94] Graham B, Regehr G, Wright JG. Delphi as a method to establish consensus for diagnostic criteria. *Journal of clinical epidemiology*. 2003;56(12):1150-6.
- [95] Grant JS, Davis LL. Selection and use of content experts for instrument development. *Research in nursing & health*. 1997;20(3):269-74.
- [96] Polit DF, Beck CT. The content validity index: are you sure you know what's being reported? Critique and recommendations. *Research in nursing & health*. 2006;29(5):489-97.
- [97] Boukredid R, Abdoul H, Loustau M, Sibony O, Alberti C. Using and reporting the Delphi method for selecting healthcare quality indicators: a systematic review. *PLoS one*. 2011;6(6):e20476.
- [98] Kimberlin CL, Winetrstein AG. Validity and reliability of measurement instruments used in research. *American Journal of Health-System Pharmacy*. 2008;65(23):2276-84.
- [99] Cronbach LJ. Coefficient alpha and the internal structure of tests. *Journal of Psychometrika*. 1951;16(3):297-334.
- [100] Jones VD. The relationship between emotional intelligence and leadership effectiveness among sponsored research administrators. Mississippi, USA: University of Southern Mississippi; 2012.
- [101] Nunnally JC. *Psychometric theory*. 2nd ed. New York: McGraw-Hill; 1978.
- [102] Sekaran U. *Research Methods of Business: A Skill-Building Approach*. 4th ed. NY, USA: John Wiley and Sons; 2003.
- [103] Zhang P, Li N, Sun H, editors. Affective quality and cognitive absorption: Extending technology acceptance research. 39th Hawaii International Conference on System Sciences 2006 4-7 January; Hawaii, USA: IEEE.
- [104] Rasli A. *Data Analysis and Interpretation-A Handbook for Postgraduate Social Scientists*. 1st ed. Skudai, Malaysia: Penerbit UTM; 2006.
- [105] Hair Jr JF, Hult GTM, Ringle C, Sarstedt M. *A primer on partial least squares structural equation modeling (PLS-SEM)*. 3rd ed. NY, USA: Sage Publications; 2013.
- [106] Baron S, Harris K, Elliott D, Ashill NJ, Carruthers J, Krisjanous J. Antecedents and Outcomes of Service Recovery Performance in a Public Health-Care Environment. *Journal of Services Marketing*. 2005;19(5):293-308.
- [107] Chin WW. The partial least squares approach to structural equation modeling. In: Marcoulides GA, editor. *Modern Methods for Business Research*. London: Lawrence Erlbaum Associates; 1998. p. 295-336.
- [108] Fornell C, Larcker DF. Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*. 1981;18(1):39-50.
- [109] Hair JF, Hult GTM, Ringle C, Sarstedt M. *A primer on partial least squares structural equation modeling (PLS-SEM)*. United States of America: SAGE Publication, Inc.; 2013.
- [110] Henseler J, Ringle C, Sinkovics R. The use of partial least squares path modeling in international marketing. *Advances in International Marketing (AIM)*. 2009;20:277-320.
- [111] Cooper DR, Schindler PS, Sun J. *Business Research Methods*. 12th ed. NY, USA: McGraw-Hill Education; 2013.
- [112] Barroso C, Carrión GC, Roldán JL. Applying maximum likelihood and PLS on different sample sizes: studies on SERVQUAL model and employee behavior model. *Handbook of partial least squares*. New York: Springer; 2010. p. 427-47.
- [113] Hair JF, Ringle CM, Sarstedt M. PLS-SEM: Indeed a silver bullet. *Journal of Marketing theory and Practice*. 2011;19(2):139-52.