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Applying Technology Acceptance Model (TAM) to explore Users' Behavioral Intention to Adopt a Performance Assessment System for E-book Production

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ABSTRACT
With rapidly rising popularity of digital reading coupled with advancement in electronic book technology, there is a sense of urgency to cultivate qualified talent for the digital publishing industry. Based on results of an exploration identifying technical skills needed for the industry to produce electronic books, this study developed a web-based performance assessment system with 35 questions in its item bank regarding four dimensions of full-text e-book production. The study applied technology acceptance model (TAM) to explore the behavioral intention of students in technological colleges and universities and use a web-based performance assessment system as a tool to evaluate their technical proficiency in e-book production. This study also applied structural equation model as a vehicle to test the hypotheses and relationships in the research to verify external effects of "computer self-efficacy". This research concludes that the technology acceptance model can be applied to explain users' willingness to adopt a web-based assessment system.

Keywords: digital publishing industry, technology acceptance model, web-based assessment, electronic book, e-book production

INTRODUCTION

Today, people spend less time reading paper-based publications. Instead, they spend more time sitting in front of the computer. Very few people can finish a book from cover to cover. In the next five to ten years, the influence of the traditional publishing industry on the market will gradually diminish while a dramatic change in the business model of the publishing industry is expected to come in five to seven years (Tian, 2007).

According to a survey by Tribute (2006), a renowned consultant for the printing industry in America, 400,000 electronic books are sold globally each month, with monthly increase rate of 5 to 7 percent. It was estimated that market shares of digital publications reached 50% in 2010. It is expected to reach 60% in 2020. Based on forecast by Romano (2006), digital printing will enjoy a 30% global market share in the time frame between 2005 and 2015. China will become the most important market for the printing industry, with a market value of 2.7 billion in 2015, of which 48% of books were print-on-demand (POD).

Professional personnel are the foundation of a successful business. However, there is very little research at home or abroad directly discussing what kind of professional capabilities are required for digital publishing. As digital publishing gains more and more ground in this industry, the number of professionals in this trade will increase accordingly. For professionals engaged in electronic book production, they need to equip themselves with the capability of integrating digital media in the format of text, picture, video, and audio.

Contribution of this paper to the literature

- The market of the online publishing industry is growing fast, this research using the technology acceptance model to explore users' willingness toward a web-based e-book production performance assessment system.
- The results found that students' computer self-efficacy is positively correlated with their perceived usefulness and perceived ease of use; student's willingness was positively correlated with their perceived usefulness and ease of use experience on using the system.
- As indicated by path analysis results in this study, perceived usefulness and perceived ease of use play roles as mediators in the influence of self-efficacy on user's willingness. A high self-efficacy may also lead to increased learning performance of students.

As indicated by Schmidt (2008), it is feasible to develop understanding of future requirements on capabilities of employees in an industry by looking at the latest technologies and working procedures used in the industry. Therefore, the objective of this research was to explore professional capability requirements for e-book production in terms of both software and hardware. In terms of software, easy-to-read and suitable content are certainly decisive factors for the success of e-readers. In terms of hardware, future e-readers will feature colorful display, soft texture, touch control, and friendly user interfaces (UI).

With rapidly rising popularity of digital reading coupled with advancement in electronic book technology, there is a sense of urgency to cultivate qualified talent for the digital publishing industry. Based on results of an exploration identifying technical skills needed for the industry to produce electronic books, this study developed a web-based performance assessment system with 35 questions in its item bank regarding four dimensions of full-text e-book production.

The main purpose of this research was to use technology acceptance model (TAM) to explore behavioral intention of students in technological colleges and universities and use a web-based performance assessment program as a tool to evaluate their technical levels. This study also applied structural equation model as a vehicle to test hypotheses and path connections among factors in the model developed in this study to verify external effects of "computer self-efficacy".

First, this research explored the development and requirement in cultivating talent for the digital publishing industry. Second, through literature review, related theories and topics such as perceived behavioral control, computer self-efficacy, and technology acceptance model were examined to establish the framework for the research. Finally, students from technological colleges and universities who were taking or had taken courses related to e-book production were asked to take the web-based assessment test before they completed a self-evaluation form and a questionnaire. The structural equation modeling was used to validate the result of the research and explore the user's willingness to adopt web-based assessment programs.

LITERATURE REVIEW

Professional Techniques for Creating E-books

The emergence of e-books can bring new life into traditional cultural industries. Their characteristic of large-scale circulation makes it more convenient to acquire information. Value-added digital publishing services boast advantages of fast circulation and tailor-made production without any possible regret of publications going out of print or out of stock. To consumers, electronic books are more convenient and readily available. Besides, compared to traditional publications, digital publications are more advantageous in terms of cost and communicative effectiveness. Therefore, they are more capable of being customized to meet different requirements.

Roles involved in digital publishing can be categorized as authors, copyright owners, publishers, service providers, sellers, and distribution channels (Draft, 2000). **Authors** include people who create works in text, audio and video forms, translators, and creating artists. **Copyright owners** include authors, publishers, agents, private organizations, databases, schools, and museums. **Publishers** including publishing companies, governments, individuals, and literature and history workers. **Service providers** include people who provide services in editing, coordination, consultation (requirement integration/publishing consultation), content conversion (file format planning and Metadata structure) and print-on-demand service providers, Internet service providers, application service providers, media content compressing (into DVDs, CDs or other forms of content storage) service providers, online money flow or transaction service providers, customer service providers, and business integration service providers. **Sellers** include physical stores, online stores, individuals, governmental organizations, schools, private organizations, publishers, and adverting agents. **Distribution channels** include publishers, physical stores, online stores, Internet data centers, institutions, organizations, and individuals.

It is obvious that digital publishing businesses need people with competitive professional skills, passion, and knowledge about media and technologies used in modern networks, capabilities of creating reading content in different forms, good imagination, and excellent communication skills. However, expertise in areas such as intellectual property right protection, product planning and production, and information security is also indispensable. Therefore, specialists in the digital publishing business should develop fundamental skills in digital technology utilization, text/image/audio/video appreciation, logical thinking and organization, problem solving, self-learning and communicating, among which the ability to use digital technologies is the first priority. Besides good competence in information processing, other skills including storytelling, web tool utilizing, web page design, flash animation design, and multimedia (text/audio/video) integrating skills are also required.

Based on the above-mentioned discussion, it can be concluded that production of quality e-books needs teamwork among well-trained professionals. Professional skills for e-book production can be further classified into publishing planning, text and graphic creation, interface design, multimedia creation, and programming. The expertise for e-book production also involves capabilities of traditional and digital typesetting such as text setup, graphic setup, page setup, tool palette management, table setup, style setup, format setup, dynamic document management, and format software literacy.

Web-based Performance Assessment

The term "performance assessment" emerged in the early 90's because of the insufficiency of traditional paper-and-pen tests and the influence of cognitive psychology. Dunbar, Koretz, and Hoover (1991) considers performance assessment as "a better way than traditional assessment in collecting data to evaluate the proficiency of students." In teaching, performance assessment involves designing a set of planned standard references for students to follow and perform expected behaviors such as analyzing data as well as collecting and composing information. Assessment scores depend on students' proficiency to apply relevant skills and abilities in real-life situations. Pierson and Beck (1993) have defined assessment as "the process of a systematic observation to gather information in view of judging an individual."

Applying varied web-based learning environments to adopt different learning methods has become a critical topic in computer education programs. Computers have become indispensable tools in the learning environment. They have been incorporated in the curricula, teaching materials, teaching, and learning. The Internet also brings great convenience to information communication. It is also applied in assessment systems. Thanks to Internet technology, computer-based assessment systems that could only be operated on specific computers or local area networks in the past can now be operated via the Internet anytime and anywhere. Such systems are called Web-Based Tests (WBT) to distinguish them from Computer-Based Tests (CBT) that are only accessible through a specific computer or local area network.

Students using an Internet-based assessment system can access the system via the web browser anytime and anywhere. In addition, they can view assessment results soon after they finish the test. For teachers, the system not only saves time in grading tests, but also analyzes test results to immediately understand students' learning performance and find out which areas students have difficulties with to adjust their teaching methods accordingly. Through a computer-assisted test, a standardized test process is made possible to allow different people to take a test under identical conditions. Without man-made errors, test procedures and scoring standards are under precise control. Moreover, texts, pictures, audio, video, and animations can all be used in the presentation of questions in a computer-assisted test.

In an assessment system, computer technologies are generally used to construct the item bank and administer the test. Furthermore, computer technologies can be used to passively record the assessment process to generate statistics and perform data preservation and reporting. Computer technologies can also be used to proactively guide students in their learning, identify their weak points, and prevent them from making mistakes. Using computers to develop and administer tests is widely recognized as an inevitable trend. It makes test more standardized, reduces errors from manual scoring while saving a lot of time and manpower. The computerized test environment allows for tests without any restriction of time or space, increasing the flexibility in administering the test. A computer-based assessment system has the advantage of real-time feedback and stability enabled by computerization, allowing students to evaluate their learning results right away. Moreover, such system can provide some brief explanations for right answers, thus reinforcing students' learning.

Since computers can collect and store data, computer-based assessment systems can also store question formats, samples, and test processes in their databases. Questions in one item bank can be linked to those in another item bank to realize information sharing. Moreover, questions can be randomly selected, arranged, and slightly revised each time, making it more efficient to generate different tests.
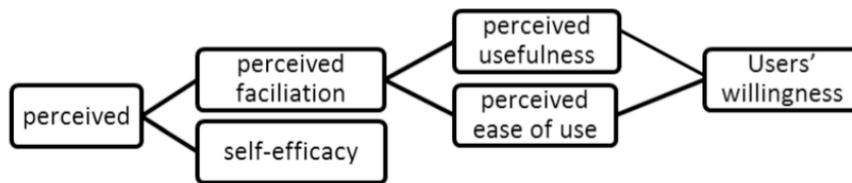
Figure 1. Perceived behavioral control and the technology acceptance model

Perceived Behavioral Control

The concept of perceived behavioral control originates from the theory of planned behavior. It refers to how much control people thinks they have over resources and opportunities in performing a specific behavior. In other words, perceived behavioral control means the degree of difficulty perceived by people for them to conduct a certain behavior. When more resources and opportunities are perceived which can be translated into lower difficulty, higher volitional control is expected. As a result, the behavioral intention will increase and the gap between behavioral intention and actual behavior will become smaller (Ajzen, 1985). For example, when someone feels like reading an e-book, if there is not enough bandwidth or there are very few options to choose from, it will become very difficult for the actual reading behavior to take place. For this reason, the adequacy of opportunities and resources such as time, information, and money can affect whether a behavior will happen. However, these factors are not entirely under volitional control. Perceived behavioral control encompasses two major dimensions: self-efficacy and perceived facilitation (Ajzen, 1985).

Based on the self-efficacy dimension in the perceived behavioral control theory, the present research is an observation and discussion about problems one may encounter when using a computer (Computer Self-efficacy, Figure 1). Furthermore, concepts of perceived usefulness and perceived ease of use in the technology acceptance model are also used in this study to observe user behaviors (behavioral intention).

Computer Self-efficacy

Self-efficacy refers to users' ability and motivation to perform specific tasks (Agarwal, Sambamurthy, & Stair, 2000). Computer Self-efficacy is focused on the concept of "judgment of one's ability to use a technology to accomplish a particular job or task" (Alenezi, Abdul karim & Veloo, 2010; Johnson, Thatcher, & Gerow, 2017; Venkatesh & Morris, 2000). Compeau and Higgins (1995) have defined self-efficacy as assessment of an individual's ability to use a computer. The focus is on what he/she can achieve in the future rather than on what he/she has already achieved (Hatlevik, Throndsen, Loi, & Gudmundsdottir, 2018). In terms of IT usage, higher self-efficacy will lead to higher behavioral intentions and increase the usage. Ajzen (1991) has described self-efficacy as a self-evaluation on one's ability to perform a behavior.

Self-efficacy is measured in three dimensions: magnitude, strength, and generalizability. The magnitude of self-efficacy refers to the level of task difficulty (low, moderate, high) one believes is attainable while the strength of self-efficacy refers to the conviction an individual has regarding performing a specific task. Through dimensions of magnitude and strength, an individual's confidence can be calculated. Generalizability of self-efficacy refers to the degree of applicability of an individual's self-efficacy in a situation.

In the learning process, learners can discover their problems through interactions with the environment. After problems are identified, they can find solutions to improve their learning effectiveness. Different learning environments and training methods can also affect learners' self-confidence and effectiveness. According to Webster and Martocchio (1992) and Bandura and Cervone (1986), verbal and substantive encouragements from supervisors or trainers can positively influence self-confidence and learning effectiveness of learners or trainees. Furthermore, if learners have rich experience in a certain area, it can be a positive factor for learners' self-confidence and learning effectiveness (Compeau & Higgins, 1995; Martocchio & Dulebohn, 1994). In particular, Hill, Smith, and Mann (1987) have found that students with higher computer self-efficacy tend to have stronger intentions of using and learning computers. Their computer self-efficacy is also affected by their previous performance. Results of study by Chen (2017) also support that computer self-efficacy is positively related to learning performance and learning engagement.

In the perspective of social cognition (Bandura, 1977), learning behaviors are results of reciprocal determinism between an individual and the environment. These three dimensions (individual, environment, learning behaviors) are interconnected. Such interconnections may vary in different contexts. For example, the environment can have a very encouraging or discouraging influence on an individual's learning behaviors in some cases. Learning behaviors can also affect the individual in return (Wright et al., 2017).

In computer use, encouragement and support from others, especially supervisors, and learning from others can also positively affect self-efficacy of a computer user. With higher computer self-efficacy, users will have higher expectations of their effectiveness, spend more time on the computer, and have a more positive attitude toward it. At the same time, they will have lower anxiety about computer use (Martocchio 1994).

In the aspect of learning software, Webster and Martocchio (1995) have proposed two potential influencing factors: realistic training preview and optimistic training preview. The former consists of both positive and negative information about the training program while the latter consists of only positive information. According to results of their research, realistic preview has a substantial influence on post-training reaction such as the use and perceived usefulness of the software. On the other hand, optimistic preview is negatively correlated with one's attention to his performance evaluation. For example, when a trainee is more optimistic, he/she will be less likely to suspect that his/her ability is inferior to others. Results of their research also suggest that computer self-efficacy has a positive impact on students' post-training learning effectiveness (Alenezi, Abdul karim, & Veloo 2010).

Technology Acceptance Model

To provide a more general theoretical foundation for reasoned actions, Davis (1985) has developed the technology acceptance model (TAM) based on the theory of reasoned action. The technology Acceptance Model Questionnaire can be used to evaluate the acceptance of SBOT because technology Acceptance Model can be used to evaluate participants' satisfaction with online training as a medium of instruction (Alsofyani, Eynon, & Majid, 2012; Arbaugh, 2000). The purpose of this model is to explain and predict the acceptability of an information technology, analyzing and exploring factors influencing the acceptability of a certain information technology. TAM points out that perceived usefulness (PU) and perceived ease of use (PEOU) are two factors that can affect the attitude. According to TAM, behavioral intention has a positive and substantial effect on actual behaviors.

Lee, Kozar, and Larsen (2003) have conducted a meta-analysis of 101 studies related to TAM published from 1989 to 2003. They discovered that 74 studies indicated a significant correlation among perceived usefulness, behavioral intention, and actual behavior while 58 studies indicated a significant correlation among perceived ease of use, behavioral intention, and actual behavior.

Based on the theory of TAU, TPB, and UTAUT, Terzis and Economides (2011) have developed a behavioral intention model for computer-based assessment. Participants of their experiment were 173 students taking information technology courses. Results of their experiment indicated that both perceived usefulness and perceived playfulness directly affected behavioral intention while computer self-efficacy, social factors, facilitating conditions, content and expected targets could indirectly affect behavioral intention.

Sanchez-Franco (2010) has used the technology acceptance model to explore learning effectiveness of using information technology as a learning platform. Results indicated that perceived usefulness, perceived ease of use, and perceived playfulness all could be used to effectively predict the learning behavioral intention of students. Kim (2010) has applied the theory of planned behavior (TPB) and the expectation-confirmation model for 207 mobile data service users to explore their behavioral intention to carry on using the service. Results showed that customer satisfaction, perceived usefulness, and perceived playfulness were key factors for customers to continue using the service.

Lu, Zhou, and Wang (2009) have used the technology acceptance model and the flow theory to investigate Chinese users' behavioral intention regarding Instant Messenger. They concluded that perceived usefulness and perceived playfulness significantly affected users' attitudes. Taking the Theory of Planned Behavior into consideration, they discovered that subjective norms and perceived behavioral control could also significantly affect behavioral intention. In addition, Davis, Bagozzi, and Warshaw (1989) have performed a survey on the usage of email and document processing software by 120 employees in IBM Canada Laboratory. They found that employees' perceived usefulness, perceived ease of use, and usage of the software were significantly and positively correlated.

Research Hypotheses

In existing studies investigating the use of information technology, TAM is often used to explore potential factors. In addition to TAM, this study also incorporated the concept of perceived behavioral control from the theory of planned behavior as well as the factor of self-efficacy to explore users' willingness to adopt a web-based
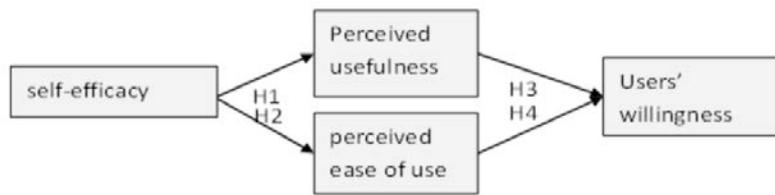
Figure 2. Research structure of this study

assessment system. In this research, a web-based performance assessment system about e-books was built as a vehicle to administer tests and explore users' willingness to use the system by analyzing test results. This study has four hypotheses as shown below. **Figure 2** illustrates the research structure of this study.

H1: Users' computer self-efficacy is significantly and positively correlated with their perceived usefulness in using the web-based performance assessment system.

H2: Users' computer self-efficacy is significantly and positively correlated with their perceived ease of use in using the web-based performance assessment system.

H3: Users' perceived usefulness has a direct and positive influence on users' willingness to use the web-based performance assessment system.

H4: Users' perceived ease of use has a direct and positive influence on users' willingness to use the web-based performance assessment system.

METHODS

Participants

The purpose of this study was to use a web-based performance assessment system to explore the willingness of students from technological colleges and universities in Taiwan to use systems of this kind. Therefore, in this research, purposive sampling methods was adopted to choose students from technological colleges and universities in Taiwan who were taking or had taken courses related to e-book production. A total of 320 questionnaires were returned, among which 94 were invalid while 226 were valid. To increase the recovery rate and provide convenience to subjects of this study, questionnaires were filled out on the Internet.

Based on contents and production methods, e-books can be divided into the following categories: full-text e-books, picture e-books, talking e-books, and multimedia e-books. Regardless how diversified categories of e-books are, the ultimate foundation of e-book production lies in the text layout. In previous research on related issues, performance assessment on e-book production has never been addressed. Therefore, this study was conducted focusing on full-text e-book production.

Material and Tools

Based on contents and production methods, e-books can be divided into the following categories: full-text e-books, picture e-books, talking e-books, and multimedia e-books. However, diversified the categories of e-books are, the ultimate foundation of e-book production lies in the text layout. Moreover, in previous research on related issues, performance assessment on e-book production has never been addressed. Therefore, this study is conducted with its main focus on full-text e-book production.

Two types of study tools were used in this research: a full-text e-book assessment item bank and questionnaires on users' willingness to use a full-text e-book web-based performance assessment system.

E-book Assessment Item Bank

The item bank used in this study was developed using references based on literature review. After a preliminary item bank was put together, review was conducted by scholars and experts in this area. There were originally 32 questions included in the item bank covering seven technical areas of e-book production. The review of questions in the item bank involved three experienced scholars and professionals in the digital publishing industry. The final version was established based on feedback from reviewers, comprising 36 questions covering nine technical areas.

Table 1. Cross-reference for literature used in the questionnaire

Items	Operational definition	Literature
Computer self-efficacy	Proficiency on computer hardware/software operation	Scott & Walczak (2009)
Perceived usefulness	Is the system useful and/or helpful in providing self-assessment?	Davis (1989), Saadé & Bahli (2005)
Perceived ease of use	Is the system easy to use? Are the interfaces used easy to understand?	Davis (1989), Janelle & Gerard (2005)
Users' intention	Is the user willing to continue using the web-based assessment system?	Davis (1989)

Table 2. Reliability and validity of the questionnaire

	Cronbach's α	AVE values
Perceived usefulness	0.919	0.91
Perceived ease of use	0.893	0.77
Users' willingness	0.920	0.91
Computer self-efficacy	0.950	0.88
Overall reliability	0.975	

This study used Cronbach α as a measure of internal consistency among technical areas included in the item bank. The Cronbach α value of the item bank as a whole was 0.73, proving that the reliability of the item bank was good. To establish expert validity, questions in the item bank were revised according to opinions from post-review discussions with experts and scholars. After the revision, professionals with more than three years of experiences in e-book production spent ten to fifteen minutes each trying out the assessment system. Based on their feedback, those questions unclearly expressed were further revised to ensure good content validity. Hence, the item bank used in this study had excellent validity.

Questionnaire

Based on literature review, the study of Park, Nam, and Cha (2012) has indicated that the technology acceptance model can provides empirical explanation regarding users' acceptance of a new information technology. The concept of computer self-efficacy can enhance the explanatory potential of the model. Built on the theoretical foundation of the technology acceptance model and computer self-efficacy, this research produced a questionnaire to explore user's willingness to adopt an e-book assessment system. **Table 1** provides a list of literature used for the questionnaire production in this study.

Table 2 lists reliability and validity values of each dimension in the questionnaire and the questionnaire as a whole. Based on the recommendation of Bagozzi and Yi (1988), internal consistency of each dimension in the questionnaire was evaluated. Cronbach α coefficients of dimensions of perceived usefulness, perceived ease of use, users' willingness, and computer self-efficacy are respectively 0.919, 0.893, 0.920 and 0.950, respectively. All Cronbach α coefficients were between 0.89 and 0.95, indicating good reliability and good internal consistency of the questionnaire.

According to Fornell and Larcker (1981), good convergent validity means factor loadings of all questions need to reach significant level. In other words, all values need to be above 0.5. In this research, all average variances extracted (AVE) were above 0.7, indicating good validity.

Data Analysis

SPSS Statistics analysis software was used to determine Cronbach α coefficients for checking reliability and evaluating internal consistency of dimensions in the questionnaire. Descriptive statistics analysis was conducted to measure the distribution, average, and standard deviation of test results and to evaluate subjects' performance in different dimensions. Analysis results were used to explore frequency distribution and percentage of different background variables among subjects for comparisons with population distribution and for further discussions in this research.

The main purpose of structural equation modeling is to explore connections between latent variables and manifest variables. In this research, Structural equation modeling (SEM) was used to assess the cause-effect path connections among dimensions of computer self-efficacy, perceived usefulness, perceived ease of use, and users' willingness. This research adopted the method of maximum likelihood estimation to estimate parameters. LISREL 8.52 was also employed for model fit analysis and assessment.

Table 3. Confirmatory factor analysis

Variable	Questions	Latent standardized parameter	Measurement errors θ	T value	R^2	Composite reliability
Perceived usefulness	U2. I think web-based assessment can facilitate learning efficiency.	0.94	0.12	5.34*	0.88	0.919
	U3. I think web-based assessment can enhance the joy of learning.	0.90	0.19	7.49*	0.81	
Perceived ease of use	E2. It doesn't take much time to learn how to use web-based assessment systems.	0.88	0.22	6.39*	0.78	0.893
	E4. I think the functions in web-based assessment systems are easy to understand.	0.91	0.71	5.07*	0.83	
Users' Willingness	W1. I will consider web-based assessment a learning tool for me.	0.89	0.22	8.28*	0.72	0.920
	W3. Generally speaking, I am satisfied with the experience of using the web-based assessment system.	0.95	0.10	4.69*	0.90	
Computer self-efficacy	S1. I think computers are easy to use.	0.85	0.28	8.17*	0.72	0.950
	S2. I think it is easy to use a computer to perform a task.	0.93	0.13	4.78*	0.86	

* indicates statistically significant P<.05.

Table 4. SEM analysis fit indices (N = 226)

	Non-Normed Fit Indices	Index value	Acceptable value
AFM	**χ2**	**32.54**	**P value insignificant**
	Goodness of fit index (GFI)	0.97	≥ 0.9
	Root mean square Residual (RMSR)	0.057	≤ 0.1
IFM	Normed fit index (NFI)	0.99	≥ 0.9
	Comparative fit index (CFI)	0.99	≥ 0.9
	Incremental fit index (IFI)	0.99	≥ 0.9
PFM	Parsimonious normed fit index (PNFI)	0.57	>0.5
	χ2 / *df*	2.03	<3

RESULTS

Model Analysis for Users' Willingness to Adopt an E-book Assessment System

The main purpose of measurement model analysis is to identify dimensions with good reliability and discriminant validity. In the initial stage of this research, the measurement model included four dimensions with a total of fourteen questions. After confirmatory factor analysis and elimination of variables with significant measurement errors and measurement complexity, the final version of the questionnaire had eight questions covering four dimensions (**Table 3**). This research also used Cronbach α values to measure the internal consistency among dimensions to evaluate the reliability of dimensions and the questionnaire.

SEM Analysis for Users' Willingness to Adopt an E-book Assessment System

Table 4 summarizes all fit indices of the model in this study. Values for χ2 (226), P, and RMSEA were 32.54, 0.00, and 0.068, respectively. The ratio between Chi-square and the degree of freedom was 2.03, which was smaller than 0.3 and ranged between 0.2 and 0.3, indicating good fit of the model in this study (Marsh & Hocevar, 1985). In addition, RMSEA was below 0.06 and each factor loading reached the level of significance, indicating significance of the covariance matrix in the model of this study and the empirical covariance matrix. This finding demonstrated that the model used in this study had good explanatory power.

Among model fit indices, Goodness of Fit Index (GFI) was 0.97, higher than the acceptable level of 0.9. Normed Fit Index (NFI) was 0.99, meeting the acceptable level of 0.9. Parsimonious Normed Fit Index (PNFI) was 0.57, meeting the acceptable level of 0.5. PGFI was 0.57, exceeding the acceptable level of 0.5. CN was 367.47, higher than the acceptable level of 200. Therefore, the theoretical model developed in this study had a good model fit overall.

Model Elaboration

Figure 3 illustrates results of structural model analysis. Solid lines indicate the existence of significant influences of dimensions. The value of R2 and the path coefficients are the major indicators for the quality of the model.
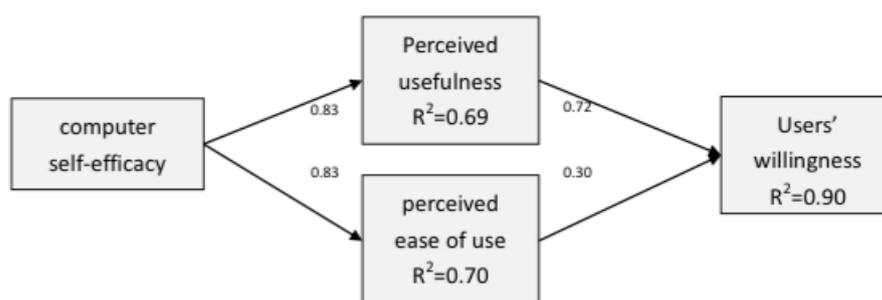
Figure 3. Results of structural model analysis

Table 5. Summary of hypothesis test results

Hypothesis	Relationships between latent variables	Path coefficient
H1	Self-efficacy positively correlates with perceived usefulness	0.83***
H2	Self-efficacy positively correlates with perceived ease of use	0.83***
H3	Perceived usefulness has a positive effect on users' willingness	0.72***
H4	Perceived ease of use has a positive effect on users' willingness	0.30***

Hypotheses were tested using structural model analysis results. Results showed that all hypotheses were supported (**Table 5**).

DISCUSSION

This research adopts technology acceptance model (TAM) as a basic framework to explore relationships among perceived usefulness, perceived ease of use, self-efficacy, and users' willingness regarding a web-based e-book production performance assessment system. A relationship model was established based on the above-mentioned findings. Our results indicated that users' perceived usefulness and perceived ease of use could directly affect users' willingness to adopt an e-book production assessment system. In particular, the influence of perceived usefulness (0.72) was more significant than that of perceived ease of use (0.30).

According to results of this study, subjects' computer self-efficacy had significant and positive influence on their perceived usefulness and perceived ease of use. Subjects' perceived usefulness and perceived ease of use also had significant and positive influence on their willingness to use the system. Therefore, when an individual has higher computer self-efficacy with higher perception of the usefulness and ease of use of the web-based assessment system, he or she will be more willing to use the system.

As indicated by path analysis results in this study, perceived usefulness and perceived ease of use play roles as mediators in the influence of self-efficacy on user's willingness. A high self-efficacy may also lead to increased learning performance of students. This finding is consistent with results of previous studies on the relationship between computer self-efficacy and learning action (Chang et al., 2014), learning performance (Chen, 2017), or learning satisfaction (Li, Yang, Cai, & MacLeod, 2017).

CONCLUSION

Previous studies on the technology acceptance model regarding digital publishing mostly put their focus on reading tools and reading platforms. In recent years, researchers have started to apply the technology acceptance model to explore the application of e-books in digital learning. The significance of this research lies in its adoption of TAM to explore factors affecting uses' willingness to use a web-based e-book production performance assessment system.

Through linear structural model and model test in this study, computer self-efficacy was identified as a significant extraneous variable affecting users' perceived usefulness and perceived ease of use toward an e-book production performance assessment system. It also had an influence on users' behavioral intentions to use the system. The indirect influence of computer self-efficacy on users' willingness through perceived usefulness and perceived ease of use found in this study has never been addressed in previous research on e-books.

Analysis results of this study indicate that computer self-efficacy has a significant, positive, and direct influence on users' perceived usefulness and perceived ease of use. It also indirectly affects users' willingness. Therefore, if

users' computer self-efficacy is improved, they will consider a web-based e-book production performance assessment system more useful and easier to use. Their willingness to use the system will also increase as a result.

This research obtained preliminary results using the technology acceptance model to explore users' willingness toward a web-based e-book production performance assessment system. To increase students' willingness to use e-book web-based performance assessment systems, teachers need to improve students' perceived usefulness and perceived ease of use toward the system in teaching. In other words, as soon as students find that the system is both beneficial and easy to use, their willingness to use the system will increase as a result.

To improve students' perceived usefulness of the system, besides increasing richness and practicality of contents, availability of a complete post-assessment report that can provide references for both students and teachers can also significantly affect students' perceived usefulness of the system.

Since students' computer self-efficacy is positively correlated with their perceived usefulness and perceived ease of use, schools and libraries are recommended to organize more educational activities to elevate students' computer self-efficacy. These activities, including e-book reading contests, can provide opportunities for students to operate on and learn from different types of e-books so that they can improve their professional skills of e-book designs and text layouts.

Emerging information and technology provide a wide range of learning environments. Results of this study prove that students can learn from the Internet and have a good learning willingness. However, this study did not investigate differences among individual students such as differences by gender, professional ability, grade level, or level of learning achievements. This study also did not discuss difference in learning motivation intensity or behavior in the learning process either. In the future, the research topic of computer self-efficacy can be further studied and discussed based on results of this study.

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