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Eunil Park Jungyeon Sung Kwangsu Cho

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Reading experiences influencing the acceptance of e-book devices

Eunil Park

Graduate School of Innovation and Technology Management,
Korea Advanced Institute of Science and Technology (KAIST),
Yuseong, Daejeon, South Korea

Jungyeon Sung

Interaction Science Institute, Sungkyunkwan University, Seoul,
South Korea, and

Kwangsu Cho

Graduate School of Information, Yonsei University, Seoul, South Korea

Abstract

Purpose – This paper aims to explore users' perception of, and then intention toward using, e-book devices as new reading devices, based upon an integrated technology acceptance model (TAM), reading engagement based upon flow theory and readability. The recent introduction of e-book devices has drastically changed the way people access and use reading content. However, few studies have explored the impact of reading experience on acceptance of e-book devices.

Design/methodology/approach – A total of 219 participants participated in a survey after using e-book devices to analyze the research model.

Findings – This study confirmed the crucial roles played by viewing experience, perceived mobility, perceived behavioral control, skill and readability. Also perceived usefulness and text satisfaction were found to have a positive and significant association with acceptance of e-book devices.

Research limitations/implications – Implications and suggestions for researchers and manufacturers are also addressed in the present study.

Originality/value – The current study focused on how actual reading experiences using e-book devices influences acceptance of e-book devices, through the triangular integrated model of TAM, reading engagement and readability features, and investigating users' reading experience on the basis of responses to the characteristics of e-book devices.

Keywords User studies, User satisfaction, Books

Paper type Research paper

1. Introduction

Since the 1970s, the market for e-book contents and devices has drastically increased (Hart, 1971). In 2009, over 2 million e-books were available for download (Survey of e-book Penetration and Use in the USA, 2010). E-book devices have been designed and manufactured by global companies including Amazon, Apple and Samsung. Along with the market increment, many studies have attempted to determine which aspects of

e-books or e-book devices influence user acceptance, e-book comprehensibility or e-book device usage (Abdullah and Gibb, 2006; Bennett and Landoni, 2005; Clark, *et al.*, 2008; Pattuelli and Rabina 2010; Siegenthaler *et al.*, 2010; Shin, 2011), because user acceptance seems directly related to the success of a given e-book device. Over the past ten years, these studies focused on hardware characteristics to explain electronic device usage and information technology based upon the technology acceptance model (TAM; Davis, 1989, 1993; Davis *et al.*, 1989, 1992; Davis and Venkatesh, 1996), and to verify that key factors, such as usefulness and ease of use, are important for the adoption of new technology. For example, Shin (2011) examined the relationships between intention to use and acceptance of e-book devices, in terms of mobility, viewing experience and control of e-book devices.

However, limited research has been conducted to understand how reading experiences with e-book devices affect user acceptance of e-book devices. To understand users' reading experiences, the current research takes a holistic perspective, proposing and testing an integrated theoretical framework that infuses the readability, reading engagement and hardware-related features of e-book devices. Along with the typical hardware-related characteristics of e-book devices, such as mobility and viewing experience, readability constructs are used to measure the ease with which texts can be read and understood in the e-book devices. To measure the reading engagement, a flow model (Csikszentmihalyi, 1988; 1990; 2000), such as skill and control, was used. According to the flow model, when users are completely absorbed in e-book reading, they are said to be in a "flow state", meaning that user skill and control are all absorbed into the e-book reading activity. In other words, they feel skilled and in control of their experience. It is well-known that easy reading helps reading engagement (Fry, 2006). Therefore, it is expected that the reading experience profoundly impacts a user's perception of an e-book device.

The current study was motivated by two research questions:

RQ1. Do reading experiences play a role in user perceptions of e-book devices?

RQ2. What factors affect user intention toward e-book devices and their contents?

This study attempts to understand e-book users' reading experiences from the integrated model we propose. The findings may be helpful to researchers in providing an integrative model for understanding the relationship between reading experience and e-book devices, for user intention that uses various e-book aspects. In addition, this study may provide information that can help marketers and engineers improve the strategy and technology of e-book devices.

2. Literature review and hypotheses
2.1. Technology acceptance
Davis and colleagues (Davis, 1989, 1993; Davis *et al.*, 1989, 1992; Davis and Venkatesh, 1996) proposed TAM to measure user behaviors while adopting a new technology. TAM was developed based on the theory of reasoned action proposed by Fishbein and Ajzen (1975). The aim of TAM is to provide a standard for identifying the impact of variables on internal perspectives or attitudes toward technology (Mathieson *et al.*, 2001; Qi *et al.*, 2009). The model assesses the degree of influence on a user's attitude toward and adoption of technology using two principal factors: perceived usefulness and perceived ease-of-use. The perceived usefulness is defined as the level to which users think the

technology or device will improve their work. The perceived ease-of-use is defined as the level of comfort and amount of effort when using technology (Davis *et al.*, 1989). Both perceived usefulness and ease-of-use affect an individual's attitude toward using the device or technology (Roca *et al.*, 2006). The present study, similarly to previous studies, assumed that the perceived usefulness and perceived ease-of-use would be the key factors of TAM for e-book devices.

Along with the two factors, perceived mobility and viewing experience were included in this research, because they are found to be critical for mobile devices such as the iPad or iPhone (Kim, 2006; Kim *et al.*, 2006; Park and Kim, 2011). Perceived mobility is defined as a user's personal feeling about a specific device's portability. Perceived mobility is positively related to perceived usefulness and ease of use (Hill and Roldan, 2005; Huang *et al.*, 2007). In other words, users who feel that an IT device is highly portable believe it may improve their job performance and be easier to use. Hence, this study proposes the following:

H1. When a person uses an e-book device, perceived mobility has a positive effect on perceived ease-of-use.

H2. When a person uses an e-book device, perceived mobility has a positive effect on perceived usefulness.

Previous studies found that the viewing quality of the display panel affects psychological perceptions (Baaren *et al.*, 2008; Hassenzahl, 2001) such as satisfaction, perceived ease-of-use and perceived usefulness. Therefore, this study proposes that e-book device displays may affect perceived usefulness and ease of use:

H3. When a person uses an e-book device, viewing experience has a positive effect on perceived ease-of-use.

H4. When a person uses an e-book device, viewing experience has a positive effect on perceived usefulness.

Typically, the intention to use in TAM is a resulting factor that can be predicted by perceived usefulness and perceived ease-of-use, when explaining the user adoption of an IT technology (Davis, 1993; Gefen and Keil, 1998; Hong *et al.*, 2002; Liu and Ma, 2006; Pai and Huang, 2010; Sheikhshoaei and Oloumi, 2011; Van der Heijden, 2003). Perceived usefulness is often positively affected by perceived ease-of-use. For instance, prior TAM studies by Davis *et al.* found that people use a new information technology to improve the efficiency of work performance. In this approach, users tend to think that the new technology is more useful after they use it (Davis, 1989, 1993; Davis *et al.*, 1989; Davis and Venkatesh, 1996). Additionally, many studies related to TAM show that perceived usefulness is positively correlated with the behavioral intention to use (Heerink *et al.*, 2010; Liu and Ma, 2006; Sheikhshoaei and Oloumi, 2011; Van der Heijden, 2003):

H11: When a person uses an e-book device, perceived ease-of-use has a positive effect on perceived usefulness.

H12: When a person uses an e-book device, perceived usefulness has a positive effect on behavioral intention to use.

2.2. Reading engagement
The term "flow" is used to describe a state of optimal engagement that develops with experience. Generally, people in the flow state tend to be focused entirely on performing a given task, and may be unaware of the passage of time or the presence of a colleague (Csikszentmihalyi, 1988, 1990, 2000; Csikszentmihalyi and Csikszentmihalyi, 1988).

A typical approach to understanding the flow is to regard it as a function of skill and control. When a person perceives that they are in control and skilled at a particularly activity, they are more likely to enter a flow state. Levels of skill and control may contribute to both perceived usefulness and ease of use when a person uses an e-book. Generally, skill level can be used to measure user proficiency. For example, Novak and Hoffman (2000) found that skill leads directly to flow. Additionally, Koufaris (2002) used a frame model combined of the TAM and flow theory to determine if behavioral intention to use was related to concentration in online shopping. The results showed that user skill and control were correlated with concentration during use.

The combination or relationship between the constructs of flow theory and the main constructs of TAM has not been studied empirically for e-book devices. Therefore, we investigate skill and control as reading engagement with e-book devices, and expect that levels of skill and control will have positive effects on perceived usefulness and ease of use.

Skill has been found to be one of the most important factors for flow in terms of use of devices or systems (Koufaris, 2002; Lu *et al.*, 2009). In many studies of flow theory, skill is measured as user perception and not as a standardized value. Hence, the present study proposed the following:

H5. When a person uses an e-book device, skill level has a positive effect on perceived ease-of-use.

H6. When a person uses an e-book device, skill level has a positive effect on perceived usefulness.

Control is also another important aspect for flow, and can be related to the cognitive resources needed to perform a task. Previous studies have shown that control is a core factor in perceived ease of use (Venkatesh, 2000; Venkatesh *et al.*, 2000). The present study proposes that e-book user control is related to e-book ease of use and usefulness as follows:

H7. When a person uses an e-book device, the level of control has a positive effect on perceived ease-of-use.

H8. When a person uses an e-book device, the level of control has a positive effect on perceived usefulness.

2.3. Readability experience
Studies of text readability and satisfaction have been performed in various fields, and both text readability and satisfaction have been found to be crucial factors in reading and comprehension (Bernard *et al.*, 2003; Dreyer, 1984; Klare, 2000; Zakaluk and Samuels, 1988), which leads to reading engagement. However, previous studies of e-book devices have rarely included the readability constructs.

Following Yi *et al.* (2011), therefore, this study proposes that text readability and satisfaction with e-book devices influence the intent to use e-book devices. Recently, Yi

et al. (2011) posited that user perception of e-book devices is determined by readability, comprehensibility and text satisfaction. Kim and Lee (2007) reported that readability is affected by the screen size of e-book devices. Based on paper books, Wilson *et al.* (2002) argued that five important factors of e-books, such as convenience, reading speed or quality, memorization recall, efficiency and reaction time or success rate, can affect user satisfaction while reading a book. Hayashi *et al.* (2004) reported that satisfaction is a crucial and positive factor of perceived usefulness in online training. Chou *et al.* (2005) found that satisfaction with knowledge management is positively correlated with perceived usability. Additionally, Roca *et al.* (2006) showed that perceived satisfaction is positively correlated with intention to continue using e-learning devices. Therefore, the present study suggests that user satisfaction with text is a significant factor affecting intention to use an e-book:

H9. Text readability has a positive effect on text satisfaction, when a person uses an e-book device and reads e-book content.

H10. Text satisfaction has a positive effect on behavioral intention to use, when a person uses an e-book device and reads e-book content.

Based on these hypotheses, this paper proposes the following research model (Figure 1).

3. Methods
3.1. Participants
A total of 219 undergraduate and graduate students with no audiovisual impairment participated from a large private university. All participants voluntarily signed up for the experiment through an online registration page posted on the university's homepage, and signed an informed consent form, prior to their participation in the experiment. The age of the participants ranged from 18 to 29 years, with a mean age of 22.8 years (SD = 2.26), and 111 participants were male (50.6 per cent).

3.2. E-book devices
Three mobile devices, Apple iPad (Apple Press Info, 2011), Samsung Galaxy Tab (Samsung Galaxy Tab, 2012) and Interpark Biscuit (Interpark, 2011), were used with
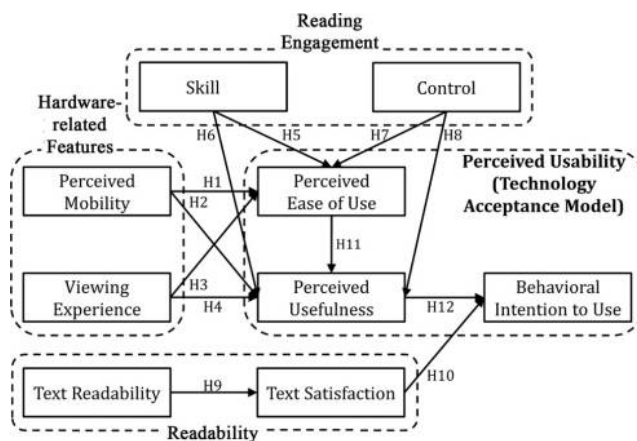

Figure 1.
Research model

their default standard settings (e.g. color tone, gain, brightness and contrast). These configurations were used throughout the experiment. Apple iPad was released by Apple Inc. in 2010. iPad had a 9.7-inch touch screen, and an iBooks app that allowed users to read e-book materials. iPad displayed books, articles and newspapers in formats such as ePub or pdf. Samsung Galaxy Tab was also released in 2010 and an Android-OS tablet PC with a 7-inch touchscreen. It supported various functions and e-book reading, including e-book applications, such as Kobo or Zinio, developed for the Android OS system. Finally, Biscuit was released by Interpark Co. Biscuit was an e-book reader with a 6-inch grayscale display. Although Biscuit was able to display various e-reading materials, it was intended only for e-book materials, unlike the iPad and Galaxy Tab. Table I provides detailed specifications of the three devices.

3.3. E-book materials
If participants were to read the same content on all devices, the perception of the material would change over time, and likely affect perceptions of the reading mechanisms. However, an ideal assessment should use passages of equal font size, style, color and contrast, and the tone of the content and number of words should also be equal (Hara et al., 2003; Boynton et al., 1995; Yi et al., 2011).

To avoid potential story-specific and emotional effects, a pre-test with ten respondents was carried out. First, the respondents were asked to read nine articles that were initially chosen by the researchers of the current study as neutral, average-quality stimulus materials. Respondents then completed a questionnaire using a 7-point rating scale. Based on the ratings, three e-book articles were selected that were rated by the respondents as having the most neutral content (Mean = 3.9 in Health Care, M = 4.1 in Art and Music and M = 4.1 in Human Growth), and these articles were used as the stimulus materials in the experiment.

3.4. Procedure
Before the start of the experiment and survey, individual participants were asked about their previous experience with e-book devices to control the effect of prior experiences of e-book devices on the current experiment and survey. In the practice session, participants were asked to actually use e-book devices with e-book reading materials. Participants were then told that they were going to read an article on an e-book device, and given instructions on using the scroll function of the device to turn pages.

The participants then started the main session. In the beginning of the main session, they were told that they were going to read three articles on e-book devices. Individual

	iPad 1.0	Galaxy tab	Biscuit	
Developer	Apple Inc.	Samsung Electronics	Interpark	
Type	Tablet computer	Tablet computer	e-Book reader	
Display	9.7-inch touch-screen	7.0-inch touch- screen	6.0-inch e-ink screen	
Aspect ratio	4:3	10:6	4:3	
Weight	680 g	380 g	300 g	
Dimensions	$243 \times 190 \times 13$ mm^3	$190.09 \times 120.45 \times 11.98$ mm^3	$124.0 \times 200.5 \times 10.7$ mm^3	
Units sold	28.73 million (Apple Press Info, 2011), - July, 2011	6.0 million (Wikipedia, 2011), - February, 2011	Not available to the public	**Table I.** Three e-book devices used in this study

participants used all the three devices in a random order. Each device had a different, randomly selected e-book material selected from the three reading articles. Participants were allowed to read an e-book per 10 minutes. The 10-minute period was chosen, because the average time to read on e-book devices was known to be about 10 minutes (Chen *et al.*, 2008; Larson, 2010; Shen *et al.*, 2011). Then, participants had a 3-minute break, before moving on to the next device. After reading was complete, participants were asked to fill out a post-experiment questionnaire.

3.5. Measurements
The questionnaire items were reviewed and modified three times by an expert panel, consisting of two professors and three communication researchers, as well as professional experts on e-book devices and communications. Then, three testing rounds of pre-survey were conducted. Twenty graduate students who had experience of e-book devices participated in the tests.

The perceived mobility of the e-book devices was composed of six items (e.g. "I feel like I can carry this device anywhere"), adapted from Huang *et al.* (2007). Viewing experience was composed of three items (e.g. "I was satisfied with the overall viewing experience provided by the device I used during the experiment"), adapted from Kim and Sundar (2011). An index composed of five descriptions of text readability (e.g. "I was able to quickly read the e-book contents") and text satisfaction (e.g. "I was satisfied with the device for text reading") was constructed, to evaluate reading with e-book devices (Duke and Pearson, 2002; Park and Kim, 2011; Quinn *et al.*, 2008; Yi *et al.*, 2011). Control (e.g. "I felt that I controlled the e-book and device") and skill (e.g. "I am skilled at using the e-book device") were also evaluated (Moon and Kim, 2001; Novak and Hoffman, 2000). Finally, the three constructs of the TAM, namely, perceived ease-of-use (PEOU), perceived usefulness (PU) and behavioral intention to use (BIU), were measured. PEOU and PU were composed of four items adapted from Davis (1989), Davis *et al.* (1992) and Park and del Pobil (2012). Behavioral intention to use was composed of three items adapted from Davis (1989) and Davis *et al.* (1992). Participants responded to each item on the questionnaire using a 7-point rating scale (1 = "strongly disagree," 7 = "strongly disagree"). Table II includes an overview of the measurements, including definitions and descriptions.

The reliability and validity of the measurements were evaluated with SPSS 18. A principal component analysis was performed to confirm the structure of the scales. For factor loadings, all items were greater than 0.70, demonstrating significant validity. The reliability of the scale is reported in Table II. Every factor had a Cronbach's alpha coefficient of reliability greater than 0.85, which showed a sufficient degree of reliability (perceived mobility: $\alpha = 0.90$; viewing experience: $\alpha = 0.96$; perceived ease of use: $\alpha = 0.90$; perceived usefulness: $\alpha = 0.96$; behavioral intention to use: $\alpha = 0.92$; skill: $\alpha = 0.87$; control: $\alpha = 0.93$; text readability: $\alpha = 0.86$; text satisfaction: $\alpha = 0.94$).

3.6. Data analysis
A discriminant validity test of the model was performed using the procedure described in Fornell and Lacker (1981). The discriminant validity of the data was successfully demonstrated, because the square root of the average variance extracted was larger than all other cross-correlations for the sample (Table III). Path analysis was used as a statistical method to examine the relationships, and test the hypotheses between

Construct	Definition of measurement	No. of items	Source
Perceived mobility	Perceived degree of ability to move from place to place	6	Huang et al. (2007)
Viewing experience	Perceived degree of overall viewing quality	3	Kim and Sundar (2011)
Perceived ease of use	Perceived degree of effort required to use the e-book device	4	Davis (1989)
Perceived usefulness	Perceived degree of improved performance with e-book use compared to paper books	4	Davis (1989)
Behavioral intention to use	Behavioral intention to use e-books	3	Davis (1989) Moon and Kim (2001)
Skill	Capacity to carry out pre-determined tasks	4	Moon and Kim (2001), Novak and Hoffman (2000)
Control	Degree of dexterity acquired or developed through training or experience	4	Moon and Kim (2001), Novak and Hoffman (2000)
Text readability	Quality of writing for easy reading	3	Duke and Pearson (2002), Quinn et al. (2008), Yi et al. (2011), Park et al. (2011)
Text satisfaction	Quality of writing for reading satisfaction	2	Duke and Pearson (2002), Quinn et al. (2008), Yi et al. (2011), Park et al. (2011)

Table II. Measurement definitions

	Mean (SD)	1	2	3	4	5	6	7	8	9
1. Perceived mobility	5.15 (1.29)	0.70								
2. Viewing experience	4.38 (0.58)	0.34	0.92							
3. Perceived ease of use	5.47 (0.76)	0.21	0.30	0.79						
4. Perceived usefulness	4.69 (1.11)	0.39	0.56	0.43	0.90					
5. Behavioral intention to use	5.10 (1.13)	0.38	0.62	0.40	0.68	0.86				
6. Skill	4.38 (1.23)	0.02	0.24	0.43	0.34	0.31	0.63			
7. Control	4.86 (0.50)	0.01	0.04	0.32	−0.06	0.01	0.02	0.83		
8. Text readability	5.30 (0.80)	0.22	0.46	0.36	0.42	0.41	0.13	0.12	0.79	
9. Text satisfaction	5.12 (0.87)	0.29	0.53	0.36	0.48	0.51	0.07	0.06	0.83	0.94

Note: The diagonal elements in the correlation matrix are the square root of the extracted average variances. These values should exceed the inter-construct correlations for adequate discriminant validity

Table III. Descriptive statistics and correlation matrix

measurements in a frame model (Hoyle, 1995). Maximum likelihood estimation was used as the estimation method, because it is the method most commonly used to estimate the path analysis model. Goodness-of-fit indices were evaluated to measure how well the model adapted to the data. For a sufficient sample size when using the maximum likelihood method, Anderson and Gerbing (1998) suggested that a study should have at

least 200 participants. Thus, the sample size of 219 students selected in the present study was sufficient.

4. Results
4.1. Data integrity
Prior to beginning the data analyses with the measurement model, missing data, outliers and assumptions of multivariate analysis were screened, based on a study by Hair *et al.* (1995). No missing data were found. Multivariate outliers were present in the data. All variables in the present study were measured using a 7-point rating scale. None of the observations was statistically indicated as extreme. Therefore, all data were included in the analysis. Normality was confirmed using the skewness, kurtosis and Kolmogorov–Smirnov normality tests (Justel *et al.*, 1997; Park, 2002).

The means and standard deviations of the constructs in this experiment are described in Table III. They show that all constructs have mean scores higher than 4, ranging from 4.38 to 5.47, indicating that participants have overall positive perspectives toward e-books. The standard deviations of all variables were under 1.5, which indicates that scores were closely distributed around the mean. Correlation coefficients of measurements were analyzed to determine suitability of the data for regression analysis and to avoid the high linearity that is inherent among independent variables.

The measurement model was estimated using a confirmatory factor analysis to test whether all constructs possess validity and reliability. The test of the research model was performed using LISREL 8.70. The hypothesized model appears to be a good fit to the data, as based on the recommendation of Kelloway (1998). Nine model-fit measurements were used to evaluate the overall goodness of fit. The fit indices of the model are within accepted threshold values: the ratio of chi-square (CMIN) to degree of freedom at 2.68, goodness-of-fit index (GFI) at 0.92, adjusted goodness-of-fit index (AGFI) at 0.90, normed fit index (NFI) at 0.94, non-normed fit index (NNFI) at 0.95, comparative fit index (CFI) at 0.96, relative fit index (RFI) at 0.93, incremental fit index (IFI) at 0.97 and root mean square error of approximation (RMSEA) at 0.078. Generally, fitness is obtained when CMIN to degree is lower than 3; the GFI, NFI, NNFI, CFI, RFI and IFI are over 0.90; the AGFI is higher than 0.80; and the RMSEA is under 0.08 (Bentler and Bonet, 1980; Kelloway, 1998).

Table IV and Figure 2 show the results of the path analysis. No post hoc modifications were carried out, due to the goodness of fit between the data and model. Table V shows the squared multiple correlations of the proposed model.

Overall, the results of the path analysis support the proposed model. Most paths appear to be consistent with expectations (Figure 2). The hardware-related characteristics of e-book devices – perceived mobility and viewing experience – were significantly associated with perceived ease of use and also perceived usefulness (*H1-H4*). The reading engagement constructs, skill and control, were positively related with perceived ease of use and also with perceived usefulness (*H5-H8*). Among the perceived mobility, viewing experience, skill and control, the viewing experience had the biggest coefficient, whereas the skill had the most important determinant of the perceived ease-of-use.

Similar to previous TAM studies, the current results show that perceived ease-of-use had a significantly positive effect on perceived usefulness (*H11*), which in turn led to the behavioral intention to use (*H12*). In addition, it was found that the text readability

Hypothesis		Standardized coefficient	Unstandardized coefficient	SE	CR	Support
H1	PM → PEOU	0.147*	0.110	0.047	2.349	Yes
H2	PM → PU	0.216***	0.218	0.057	3.831	Yes
H3	VE → PEOU	0.166*	0.275	0.107	2.572	Yes
H4	VE → PU	0.405***	0.909	0.131	6.952	Yes
H5	Skill → PEOU	0.359***	0.280	0.048	5.846	Yes
H6	Skill → PU	0.175**	0.185	0.062	2.984	Yes
H7	Control → PEOU	0.262***	0.502	0.114	4.398	Yes
H8	Control → PU	0.193***	0.500	0.143	3.488	Yes
H9	TR → TS	0.826***	0.968	0.045	21.635	Yes
H10	TS → BIU	0.262***	0.262	0.059	4.437	Yes
H11	PEOU → PU	0.261***	0.354	0.082	4.340	Yes
H12	PU → BIU	0.586***	0.651	0.062	10.515	Yes

Notes: ***$p < 0.001$; **$p < 0.01$; *$p < 0.05$; PM: perceived mobility; PEOU: perceived ease of use; PU: perceived usefulness; VE: viewing experience; TR: text readability; TS: text satisfaction; BIU: behavioral intention to use; CR: critical ratio

Table IV.
Summary of
hypothesis tests
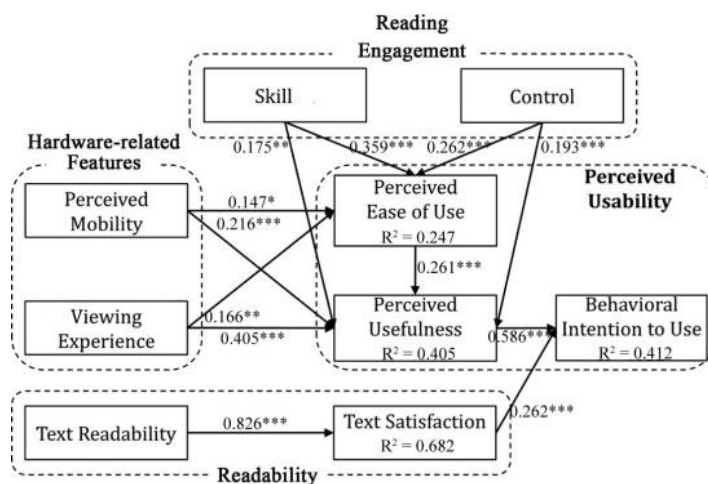
Notes: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

Figure 2.
Results of the
research model

	Values
Perceived ease of use	0.247
Text satisfaction	0.682
Perceived usefulness	0.405
Behavioral intention to use	0.412

Table V.
Squared multiple
correlations of the
proposed model

significantly influenced text satisfaction (H*9*), which then led to the behavioral intention to use (*H10*).

To assess the importance of the five external variables, their total effects on the behavioral intention to use were estimated. The total effects were 0.16 for the skill, 0.15 for the control, 0.15 for the perceived mobility, 0.26 for the viewing experience and 0.22 for the text readability. Thus, the viewing experience had the biggest total effect. The text readability had the second biggest total effect.

5. Discussion and conclusion

This study explored user intention toward e-book devices as new devices, integrating reading engagement based on the flow theory and readability constructs along with the TAM. The current results showed that the user acceptance of e-book devices was affected by the hardware characteristics such as perceived mobility and viewing experience through the perceived ease of use and perceived usefulness. The results are consistent with previous studies that focused on e-book usability, and confirm that perceived usefulness and ease-of-use enhance behavioral intentions to use an e-book. Also, the reading engagement experiences such as the skill and control also influence the user acceptance through the perceived ease of use and usefulness. The text readability and satisfaction independently influenced the user acceptance of e-book devices without going through the perceived ease-of-use and usefulness. Of the factors assessed in this study, the viewing experience and readability were found to be the two most important for the user acceptance of e-book devices. This means that users feel that e-book devices with a high-quality display are the most useful. In sum, the results indicate that each construct in TAM is affected by not only the hardware-related characteristics of the e-book device, but also the cognitive and psychological experiences of reading.

Our results and findings may be useful for marketing strategy, such as which factor of e-book devices to emphasize for promotion, and also offer a different perspective for researcher understanding of user experience with e-book devices. In particular, this study suggested that marketers and developers of e-book devices, in designing and selling new e-book devices, should consider the viewing experience and readability to be the most important factors. In addition, the perceived degrees of users' skill and control are also important for reading engagement. Therefore, e-book devices' manufacturers are able to use constructs in the proposed model as their evaluation indexes, to test new e-book devices in the design process.

Several weaknesses of this study suggest cautious interpretation. First, the participants in this study were all graduate and undergraduate students between the ages of 18 and 29 years, which is a limited range in comparison to that of the Survey of eBook Penetration and Use in the USA (2010). However, because students are the primary users of e-books and e-book devices, these results may be valuable for understanding the student population's acceptance of e-book devices. Second, although the two typical constructs of the flow experience were selected for measurements, the flow state is a very complex concept, and may not be precisely measured with the two constructs (Novak and Hoffman, 2000). Third, this study did not consider any demographic characteristics in data analysis. However, previous studies showed that gender and age differences can affect users' technology acceptance and decision-making processes (Morris *et al.*, 2005; Venkatesh *et al.* 2000). Thus, further studies are recommended, to consider these demographic factors.

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About the authors
Eunil Park is a PhD student in KAIST, Daejeon, Korea. His primary research interests are in human–computer interaction.

Jungyeon Sung is a Postdoctoral Research Associate in Interaction Science Institute, Sungkyunkwan University. Her research interests are in the areas of technology use for business and marketing.

Kwangsu Cho is an Associate Professor in the Department of Interaction Science, Sungkyunkwan University, and is also the Director of Interaction Science Institute. His primary research interests encompass a wide range of interactive technologies in human–computer interaction, human–robot interaction and collaborative learning. Kwangsu Cho is the corresponding author and can be contacted at: kwangsu.cho@gmail.com

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