THE COMPARATIVE ACEPTANCE LEVEL OF USING E-BOOK HOUSED IN MOBILE DEVICES

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Abstract

Background: The rapid development in technology has driven the continuous improvement of software and devices used in education. Mobile devices and e-Book research is more common in elementary, junior high school education and non-nursing professional training. Further studies are required for the application in nursing.

Objective: This paper is intended to report a study of the comparative acceptance level with respect to two mobile devices (Tablet PC vs smartphone) in the form of e-Book, for providing educational materials to nursing students.

Methods: This study used a pretest-posttest experimental design. The sample consisted of 150 participants randomly split between the two devices. An e-Book format was used focusing on the knowledge and skill of body fluid supply. The material was uploaded for access to two forms of mobile device for nursing student review. Both groups completed the pre and post Technology Acceptance Inventory (TAI) and the Demographic Inventory (DI).

Results: The research showed that the Tablet PC (TPC) group scored significantly higher with respect to external factors (EF), ease of use (EOU), attitude toward use (ATU), and actual use (AU). There were no significant differences between the groups for perceived usefulness (PU) and intention to use (ITU). Posteriori comparison showed that TPC group scores differed significantly from that of smartphone (SP) group in terms of overall acceptance level.

Conclusions: The research findings suggested that nursing students were likely accepting and benefit from these two devices in different aspects. The level of acceptance and success of m-learning depend on software compatibility, hardware and ownership of mobile devices. Future research would allow for improved assessment of devices for accessing e-Book format and learning outcome when testing multiple mobile devices.

Keywords: e-Book, Mobile Devices, Mobile Learning, Technology Acceptance Model

1. Introduction

An electronic book (e-book, eBook, e-Book, ebook, or digital book) is a book-length publication in digital form, consisting of text, images, or both, readable on computers or other mobile devices (e.g. Tablet PC, iPad, smartphone) and e-Book reader (e.g. Amazon Kindle). Current e-Book software even allows the integration of sound, animation, hyperlinking and potential for interactivity (Lin & Huang, 2011). The development of e-Book allows greater convenience, accessibility, interactivity and multimedia incorporation (Caudill, 2007). The use of e-Book reduces the carbon footprint on the planet...
through the reduction of waste of traditional text books and the printing process itself (Lin & Huang, 2011). With the continual advances in e-Book software and the integration of multimedia products, e-Book has the potential to become an enriched educational format.

The availability of advanced mobile technologies, including broadband, infrastructure, wireless technologies, and mobile devices has expanded e-learning into mobile learning (m-learning) (Sharpley, 2000). M-learning addresses individualized learning and convenience in both time and place. (Triantafillou, Georgiadou, Economides, 2008). Kukulska-Hulme (2005) suggested that users perceive mobile devices as far more ‘personal’ than static or desktop computers. This means that mobile learning is also personal learning, which could be remote and individual, or social and collaborative. Those learners who have access to mobile and wireless technologies have an additional ways of communication and are able to share information with others. Although e-book housed in mobile devices has been launched since the early '90s, it didn't get popular until recently. Reasons vary, but perhaps the major obstacle to accepting is the conviction of most readers that there’s nothing wrong with old-fashioned books (Small, 2000). Another study found that connectivity difficulties, technology literacy level, compatibility of learning resources with mobile devices, and small screen size were the factors that impacted adversely on the use of iPads (Martyn, Larkin, Sander, Yuginovich, Jameison-Proctor, 2014).

2. Objective

Nursing is an applied science and changing rapidly thanks to the improvements in technology. In order to keep up to date with technological advancements, nursing students must be trained within the technological environment currently in use. Based on the literature review and a meta-analysis review of mobile learning found that most studies focused on learning effectiveness, followed by mobile learning system development (Wu, Wu, Chen, Kao, Lin, & Huang, 2012). The acceptance level study for mobile devices focused more on the relationships between variables or predictors of usage. The differences between mobile devices were rarely examined. The aim of this study is to compare the acceptance level of using e-Book with different mobile devices in order to close the gap in current research.

3. Literature Review

3.1. e-book, M-learning, Mobile Devices and related studies

An e-Book is a book published in digital format. McFall (2005) stated that simply converting a current text book into a digital format does not constitute an e-Book. A successful eBook must incorporate various forms of multimedia available and appeal to the intended audience. Research focusing on e-Books suggests that the strength of e-Book format is accessibility and convenience. Others argue that reading long texts from a screen is an unpleasant experience and, therefore, the format will never be widespread (Lan, 2009). The strength of e-Book supported m-learning is dependent on the appropriate choice of device to host the e-Book media. The size of an e-Book reader monitor or screen remains a key factor. The e-Book software installed on the device must support the potential for content and index linking. Other features include view choice, font size, color presentation, picture resolution, page count, zoom-in/out capability, animations, highlighting, book marks and online evaluations. When factored into the production of an e-Book, the aforementioned features should allow for the development of a maximized learning component (Wilson, 2003).

M-learning is defined as the delivery of learning content to learners utilizing mobile devices and is the latest breakthrough in modern learning environments (Parsons & Ryu, 2006). M-learning allows teaching and learning to be extended to spaces beyond the conventional classroom. Within the classroom, mobile learning also provides instructors and students with increased flexibility and opportunities for interaction (Kukulska-Hulme, 2007). Mobile devices include Personal Data Assistants (PDAs), pocket PCs, Tablet PCs, and smartphones, are evolving equally rapidly (Shih & Mills, 2007). Mobile devices users may download additional software, known as “apps” to increase their devices’ functions. As such, Mobile devices are increasingly able to carry media-rich content, and greater interaction with educational materials. For example, the students are able to bookmark and annotate the educational materials on mobile devices. In addition, it increases the possibilities for students to collect and contribute new content are creating student-generated learning (Kukulska-Hulme, 2005). M-learning frees learner from the constraints of static resources. By contrast, desktop computers are limited by size, weight, and often the need for network connections via cables plugged into imobile ports (Caudil, 2007).

Faculty and students appreciate the advances that M-learning makes possible for accessing enriched learning materials and the improved opportunities for communication. Evans (2008)
evaluated the effectiveness of podcasting in undergraduate students. The results indicated that students expressed that podcasts were more effective tools as they were able to gain a better understanding of the subject matter. The New England Journal of Medicine provided evidence-based nursing skills movie clips. Each of these clips lasting only five minutes in length, could be accessed via smart phone or Tablet PC, was an excellent resource for students to review prior to clinical practicum or immediately before practicing the skill (Phillippi & Wyatt, 2011). PDAs have been more widely utilized by nurses and nursing schools. The use of PDAs has been received high levels of student satisfaction (Altmann & Brady, 2005; White, Allen, Goodwin, Breckinridge, Dowell, & Garvy, 2005; Whatт, 2010). A study of 3D visualization of physiotherapy with mobile devices was done to assess instructors and students perception of the application. The response was positive and it also showed positive relationship between the device and learning outcomes (Noguera, Jimenez, Osuna-Perez, 2013). Sommerich, Ward, Sikdar, Payne, & Herman (2007) studied high school students using Tablet PC who stated that it was a useful and interesting tool, but had no significant effect on learning outcome. Sung & Mayer (2012) compared students’ beliefs in mobile devices and desktops in the United States and South Korea. Students in both nations perceived mobile devices as more accessible, portable and modern, and viewed desktops as more faithful and stable. In addition to learning, mobile device was applied in testing students’ ability. A study was undertaken to combine mobile learning and Newborn Infant Physical Examination (NIPE), participants reported that mobile learning provided flexibility in time and place of learning and enhanced their interest in the learning material (Clay, 2011).

Mobile devices which receive higher acceptance levels feature the following: lightweight, compact size, extended battery usage, resistance to breaking, large screen size, color choice availability, camera with wide angle lens, high resolution, high speed signal, internet access, support for multiple file types, and ease of operation (Liao, S., Ma, L. Y., & Tsai, 2010; Lin, 2010, Wilson, 2003). Similarly, one survey study was conducted in two community hospitals in the southeastern United States. The innovation characteristics of observability, compatibility, job relevance, internal environment, and external environment were significant predictors of attitude toward using a smartphone (Putzer & Park, 2010). Contrarily, iPhone and Tablet PC was compared in children’s acquisition of knowledge of water cycle, engagement, and satisfaction on ease of use. The results showed that the size and weight of the screen may not be the decisive factor, but the game itself was the factor that affected the learning outcome (Furio, Gonzalez-Gancedo, Juan, Segui, Costa, 2013). Lin, Wang & Wu (2011) investigated MP4 players and computers to review nursing skills. Both devices showed no significant difference for attributes including ease of use, attitude toward use, intention to use and actual use. However, the MP4 player group scored a significant difference in perceived usefulness. The insignificant findings could be due to lacked of infrastructure on campus and inadequate amount of mobile devices.

3.2. Theory and Prediction

Acceptance has been conceptualized as an outcome variable in a psychological process that user go through in making decisions about technology (Dillon & Morris, 1996). The Technology Acceptance Model (TAM) was developed and used to predict the acceptability of a tool and to identify the factors which must be brought to the information system in order to make it acceptable to users (Davis, 1989). The concepts of TAM include external factors (EF), perceived usefulness (PU), ease of use (EU), attitude towards use (ATU), intention to use (ITU) and actual use (AU). External factors (EF) (i.e. screen size, font, connectivity, cost etc.) were defined as variables that would impact on the degree to which an individual’s belief in perceived usefulness and ease of use of a given technology. Perceived usefulness (PU) was referred to the degree to which an individual believes that using a particular system would improve his or her performance. Ease of use (EU) was defined as the degree to which an individual believes that using a particular system would be free from effort. Attitude towards use (ATU) was explained as feelings of favorableness or unfavorableness toward the system. Intention to use (ITU) was referred to attitude toward the effect of using the system. Actual use (AU) was defined as the degree to which an individual come to use the system (Davis, 1989; Dillon & Morris, 1996). The TAM postulates that the acceptability of an information system is determined by the intention to use, but on the other hand, that the intention to use is related to the individual attitude towards the use of the system and also by the individual perception of its utility (Dillon & Morris, 1996). Besides, perceived usefulness and ease of use are two salient concepts determining technology acceptance and are the key antecedents of behavioral intentions to use information technology (Chutter, 2009; Dillon & Morris, 1996). Given the strengths of Tablet PC and limitations of smartphone, it was predicted the Tablet PC group (ASUS Eee PC T101MT) would score significantly higher than the smartphone group (HTC...
4. Methods

4.1. Design

A two-group pre and post experimental design was used in this study to compare the acceptance levels between two mobile devices. Data was collected at baseline and immediately completion of the intervention.

4.2. Participants

The participants comprised 150 nursing students who were taking fundamental nursing courses in their second year of a five-year junior college program. The sample size was calculated using G Power ver. 3.1 with the selection of ANCOVA statistical method, and the effect size $f$ was selected as 0.25, probability $\alpha$ as 0.05, power (1-$\beta$) as 0.8, and $df$ as 1. 10% additional cases were added to prevent participant dropouts resulting in incomplete data. The inclusion criterion were: (a) nursing students in the second year of a five-year junior college program; (b) taking fundamental nursing course; (c) both genders; (d) intention to participate in study. Repeated students were excluded from the study. The convenience samples were recruited from a nursing junior college located in Hualien, Taiwan. The sample frame consisted of four clusters of second-year nursing students in the five-year junior nursing college program. Two of the four clusters were randomly assigned to either Tablet PC (TPC) group or Smartphone (SP) group by selecting the cluster from a hat. Each group consisted of 75 participants with the total number of 150 for both groups. Human subjects’ protection approval for the research was obtained from Institutional Review Board of the Buddhist Tzu-Chi General Hospital (IRB100-11).

4.3. Measurement

A set of questionnaires was used to compare the participants’ acceptance level for mobile devices, including: (a) 5-item Demographic Inventory (DI) collecting participants’ personal characteristics, (b) 26-item Technology Acceptance Inventory (TAI) assessing the difference of acceptance level towards mobile devices, (c) 6 open-ended questions based on the TAM’s concepts gathering more participant feedback. The TAI included 9-item for EF, 3-item for EOU, 5-item for PU, 4- item for ATU, 3- item for IOU, and 2-item for AU. The TAI was rated by a 5-point Likert Scale from strongly agree to strongly disagree. The highest score of TAI were 130. The instrument included refining the areas of interest and incorporating participant feedback for each of the TAM concepts. The CVI (content validity index) was established by three experts as 0.92. The Cronbach’s $\alpha$ was between 0.738-0.911 and the overall Cronbach’s $\alpha$ was 0.939 (Lin, Wang, Wu, 2011). Three experts in nursing, nursing education and informatics were invited to provide CVI as.90. The Cronbach’s $\alpha$ of EF was 0.684, EOU was 0.848, PU was 0.887, ATU was 0.865, ITU was 0.804, AU was 0.859 and the overall Cronbach’s was 0.921.

4.4. Materials

Nursing knowledge is taught in the classroom and practical skills (i.e. injection, catheterization, wound care etc.) are guided and then tested in the laboratory. However, students have limited access to practice the skills due to time and location constraints. Visualization of nursing knowledge and skill demonstrations help learners to understand the concepts and memorize the steps for performing the skills when they are away from the school. The subject matters of body fluid supply was chosen to create an e-Book to address the known problems of poor skills performance, poor knowledge acquisition and concomitant student scores. The subject matters of body fluid supply and electrolytes; (b) introducing delivery methods; (c) balancing and buffering mechanisms; (d) nursing care for body fluid supply; (e) nursing skill demonstrations of body fluid. Nursing skill demonstrations of body fluid included: (a) changing intravenous bottle; (b) adding medication to intravenous bag and calculating the dosage, flow rates; (c) voiding tubing air. Adobe InDesign CS5 was used for type face, Photoshop CS5 for pictures and interface, and Premiere CS5 for movie clips forming a one-hour body fluid supply e-Book for this particular study.

4.5. Procedures

The participants were given explanations about the purpose, procedures, and right to withdraw from the research without penalty by the principal investigator. Written consent forms were obtained for participating in this study. The random assignment for experimental (TPC group) and comparison participants (SP group) was done by cluster because students within each session were closely learning and living together in the school (i.e., they stayed in the same classroom for most of their courses and lived near each other in the dormitory). A total of 75 students were assigned to the TPC group, and 75 were assigned to the SP group. The experiment was carried out on weekends for time availability of each participant. The TPC group was in classroom A while the SP group in classroom B. Both groups were
given the opportunity to review the body fluid supply e- Book. All participants completed the DI and pre TAI prior to review the materials with assigned mibile devices. Post TAI was collected in the completion of the experiment.

4.6. Data Analysis

The Statistical Package for Social Sciences 17.0 (SPSS) was employed for data analysis. Descriptive statistics (e.g., number, percentage) were used to report the results of demographics and the normality of the demographics. Chi-Square Tests were performed to assess the equivalence of groups in terms of their demographic characteristics. A t test was used to determine whether the TPC group scored higher in TAI’s variables than the SP group. Analysis of Covariance (ANCOVA) was employed to examine whether the TPC group scored higher in TAI than SP group post intervention.

5. Results

5.1. Demographics

A total of 150 participants completed the intervention and questionnaires, for a 100% response rate. There were no statistically significant differences (p > .05) in the demographics of the two groups, indicating effective randomization. Table 1 presents participant demographics characteristics.

Table 1
<table>
<thead>
<tr>
<th>Variables</th>
<th>TPC n (%)</th>
<th>SP n (%)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>0 (0)</td>
<td>5 (6.7)</td>
<td>0.008</td>
</tr>
<tr>
<td>Female</td>
<td>75 (100)</td>
<td>70 (93.3)</td>
<td></td>
</tr>
<tr>
<td>Computer experience (years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-3</td>
<td>4 (5.3)</td>
<td>4 (5.3)</td>
<td>0.128</td>
</tr>
<tr>
<td>3.1-6</td>
<td>18 (24)</td>
<td>16 (21.3)</td>
<td></td>
</tr>
<tr>
<td>6.1-9</td>
<td>38 (50.7)</td>
<td>27 (36)</td>
<td></td>
</tr>
<tr>
<td>9.1-12</td>
<td>7 (9.3)</td>
<td>19 (25.3)</td>
<td></td>
</tr>
<tr>
<td>over 12</td>
<td>8 (10.7)</td>
<td>9 (12)</td>
<td></td>
</tr>
<tr>
<td>Internet experience (years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-3</td>
<td>2 (2.7)</td>
<td>3 (4.0)</td>
<td>0.326</td>
</tr>
<tr>
<td>3.1-6</td>
<td>22 (29.3)</td>
<td>22 (29.3)</td>
<td></td>
</tr>
<tr>
<td>6.1-9</td>
<td>37 (49.3)</td>
<td>28 (37.3)</td>
<td></td>
</tr>
<tr>
<td>9.1-12</td>
<td>6 (8.0)</td>
<td>14 (18.7)</td>
<td></td>
</tr>
<tr>
<td>over 12</td>
<td>8 (10.7)</td>
<td>8 (10.7)</td>
<td></td>
</tr>
<tr>
<td>Owning a mobile device</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>42 (56.0)</td>
<td>37 (49.3)</td>
<td>0.140</td>
</tr>
<tr>
<td>No</td>
<td>33 (44.0)</td>
<td>38 (50.7)</td>
<td></td>
</tr>
<tr>
<td>Using a mobile device in learning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>59 (78.7)</td>
<td>51 (68.0)</td>
<td>0.140</td>
</tr>
<tr>
<td>No</td>
<td>16 (21.3)</td>
<td>24 (32.0)</td>
<td></td>
</tr>
</tbody>
</table>

5.2. TAI Differences

The TPC group scored significantly higher with respect to EF ($M=32.92, SD=4.426$ vs $M=31.00, SD=3.715, t=1.968, p=0.048$, CI=[-0.03–2.643]), EOU ($M=12.51, SD=2.095$ vs $M=10.73, SD=2.840, t=4.352, p=0.000$, CI=[9.68–2.579]), ATU ($M=16.31, SD=3.000$ vs $M=15.03, SD=2.790, t=2.706, p=0.008$, CI=[3.45–2.215]), and AU ($M=8.20, SD=1.748$ vs $M=6.53, SD=2.101, t=5.282, p=0.000$, CI=[1.043–2.290]) in TAI than SP group post intervention. However, there were no significant differences between the groups for PU ($M=20.91, SD=3.445$ vs $M=20.55, SD=2.673, t=0.715, p=0.476$, CI=[–0.635–1.355]) and ITU ($M=11.32, SD=2.219$ vs $M=10.72, SD=2.172, t=1.673, p=0.096$, CI=[–1.109–1.309]) (Table 2).

Table 2
<table>
<thead>
<tr>
<th>Variables</th>
<th>TPC Mean</th>
<th>SD</th>
<th>SP Mean</th>
<th>SD</th>
<th>t value</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>EF</td>
<td>32.92</td>
<td>4.426</td>
<td>31.00</td>
<td>3.715</td>
<td>1.965</td>
<td>0.048*</td>
</tr>
<tr>
<td>PU</td>
<td>20.91</td>
<td>3.445</td>
<td>20.55</td>
<td>2.673</td>
<td>0.715</td>
<td>0.476</td>
</tr>
<tr>
<td>EOU</td>
<td>12.51</td>
<td>2.095</td>
<td>10.73</td>
<td>2.840</td>
<td>4.352</td>
<td>0.000*</td>
</tr>
<tr>
<td>ATU</td>
<td>16.31</td>
<td>3.000</td>
<td>15.03</td>
<td>2.790</td>
<td>2.706</td>
<td>0.008*</td>
</tr>
<tr>
<td>ITU</td>
<td>11.32</td>
<td>2.219</td>
<td>10.72</td>
<td>2.172</td>
<td>1.673</td>
<td>0.096</td>
</tr>
<tr>
<td>AU</td>
<td>8.20</td>
<td>1.748</td>
<td>6.53</td>
<td>2.101</td>
<td>5.282</td>
<td>0.000*</td>
</tr>
</tbody>
</table>
When baseline acceptance level was controlled, ANCOVA revealed that TPC group scored higher in overall acceptance level ($F_{(1,76)} = 21.769$, $p<.05$). The TPC had higher mean post intervention (M=102.449, SE=1.146, 95% CI=100.183–104.715) than the SP (M=94.909, SE=1.139, 95% CI=92.658–97.159). Posteriori comparison showed that TPC produced results that differed significantly from SP (mean difference=7.540, SD=1.616, 95% CI=4.346–10.734, $p=0.000$) in terms of acceptance level (Table 3).

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Mean</th>
<th>SD</th>
<th>Adjusted Mean</th>
<th>SE</th>
<th>F value</th>
<th>Post hoc analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>TPC</td>
<td>75</td>
<td>102.25</td>
<td>14.119</td>
<td>102.449</td>
<td>1.146</td>
<td>21.769*</td>
<td>Exp &gt; Com</td>
</tr>
<tr>
<td>SP</td>
<td>75</td>
<td>95.11</td>
<td>11.800</td>
<td>94.909</td>
<td>1.139</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. “The baseline score was used as the covariate for ANCOVA. * $p<.05$

The participant feedback gathered from open-ended questions further supported the findings. In terms of EF, the TPC group indicated that Tablet PC is convenient, reusable, portable, and glad to have one offered by the school. However, the participants worried they might damage the devices as they were expensive. The SP group said that the screen size was too small to read. Zoom in functionality helped to view the pictures, texts, and videos better, but the resolution quality became poor when this application used. The touch screen was insensitive and the connection was slow. Regarding EOU, more than half of the participants of the TPC group felt the device was easy to operate, and the layout of e-Book made it easy to find the learning materials desired. Contrarily, the SP group expressed increased difficulty in operations due to small screen and insensitive touch screen. With regard to PU, both groups indicated that it was quite interesting to use Tablet PC and smartphone in learning. The movie clips were clear to illustrate the concepts and procedures of educational contents. E-Book housed in Tablet PC helped them to recap the contents which they misunderstood, confused, or missed in the lectures.

In terms of ATU, the TPC group indicated that the movie clips not only incorporated texts, but also narration. Additionally, they provided excellent resources to review each step of nursing skills, which cannot be reached by hardcopy textbooks and handouts. They tended to like the device and wish they are recognized for their usefulness in learning and applied by other instructors. The SP group indicated eye fatigue and sore hands due to small screen, and therefore, preferred using conventional textbooks or handouts. Regarding ITU, the TPC group indicated that e-book with Tablet PC offered self-reviewed and self-explored learning opportunities and then decreased the time to ask the instructors face-to-face. Although there were some limitations of smartphone, both groups said participating in study provided an opportunity to use e-book with a mobile device which they could not afford. Their levels of intention of use and learning will be increased if they have the ownerships of the devices. In AU, the TPC group spent approximately 33 minutes in using the device to review the teaching materials, as opposed to 18 minutes of the SP group. The SP group also indicated they could not keep on reading due to inconvenience and discomfort caused by the smartphone. These signified that the device was the key for extension of use.

6. Discussion

The results indicated that significant differences existed among EF, EOU, ATU, AU, and overall acceptance. Significant differences existed in EF because the SP group obtained low scores in screen size resolution, and network connection etc., despite the two mobile devices being both convenient and conducive to learning. This result conforms to the finding of Churchill and Hedberg (2008). They found the smallness of the screen not only affected the clarity, but also impacted on the acceptance and integration of technology in education. Furio et al. (2013) presented results that differed from those of the present study. They observed that the screen size and weight of mobile devices did not influence the level of knowledge acquisition, or cause differences in perceived EOU, AU, or overall satisfaction. This disparity in the research findings may be related to the brand of smartphones used. Furio et al. (2013) compared acceptance level of iPhone and Tablet PC.
in playing game. iPhone is widely considered to be high quality regarding design, resolution, weight, and the touch screen functionality in this study. Consequently, the use of iPhone is comparable to Tablet PC. The TPC and SP groups exhibited significant differences regarding EOU, which is consistent with the finding obtained by Selim (2003). The EOU encompasses consistency, flexibility, efficiency, and ease of understanding of a learning tool. The participants of our study all owned a computer device and had been using the Internet for 6 to 9 years. Consequently, using a Tablet PC interface to operate the e-Book was considerably effortless and easy to understand for the participants who could also quickly search for and locate information. By contrast, information search and subsequent use were comparatively difficult when using smartphones because of the small screens that required users to continually use the zoom function. Significant differences were observed between the two groups regarding ATU. Participants in the TPC group provided positive feedback regarding the novel experience of using mobile devices, indicating that they desired additional opportunities to obtain similar experiences. These participants also expressed that Tablet PCs benefit learning because they provide vivid and clear explanations of the e-Book content, and that they preferred Tablet PCs because of its flexibility as a learning method. Conversely, participants in the SP group exhibited a negative ATU for smartphones because of the physical discomfort caused by these devices (e.g., eye fatigue and hand soreness). Regarding AU, the two groups exhibited significant differences: the e-Book viewing time was approximately 18 min and 33 min for participants in the SP and TPC groups, respectively. A relatively long viewing time was observed in the TPC group possibly because the participants in this group experienced higher satisfaction regarding screen size and less physical discomfort compared with the SP group.

The TPC and SP groups did not exhibit significant differences regarding PU and ITU. The following are possible reasons for this result, particularly for PU: First, the participants in both groups indicated that Tablet PCs and smartphones are equally convenient for learning and use in daily life. Second, the participants stated that both Tablet PCs and smartphones present the subject matters and nursing skill operation processes, which is highly conducive to coursework review. Third, in an era of advanced Internet technology and extensive amounts of information, adolescents typically perceive autonomous e-learning as interesting and, thus, exhibit greater PU compared to the results of face-to-face teaching. Fourth, the participants unanimously indicated that using mobile devices for learning was a novel experience, and that e-Books and mobile devices are unrestricted by space or time, allowing them to self-learn content when they have difficulty understanding in class. These results are consistent with those reported by Liaw, Hatala, and Huang (2010), who found that learner acceptance of mobile learning was correlated with whether learners were autonomous learners and whether the learning system functions were powerful and interactive, rather than with the mobile device type. The TPC and SP groups did not exhibit significant differences regarding ITU. This finding may be explained by the following reasons: First, the e-Book used in this study was displayed in the Flash format. However, unstable network connection caused lagging in the presentation, thereby influencing the ITU of both groups. Second, the participants were required to return the mobile devices to the researchers upon completion of the experiment. This reduced the accessibility of devices and affected the participants’ ITU. Third, the participants in both groups demonstrated considerable support for the use of mobile devices in learning and expressed the desire for their schools to obtain funds to invest in and acquire related mobile devices. Sung & Mayer (2012) asserted that factors leading to successful mobile learning include the mobile learning device, communication infrastructure, and learning activity model. The use of mobile technology in education could provide better flexibility for learners. However, mobile learning requires organizational change and careful planning for which existing course materials must be converted and new ones developed for delivery on mobile technology. Moreover, it is necessary to establish a telecommunication infrastructure, train staff and faculty, and so forth.

7. Conclusions

Although the results of this study did not fully confirm that Tablet PCs surpass smartphones in all aspects of acceptance, Tablet PCs achieved significantly higher scores in overall acceptance than smartphones did. In addition, open-ended questions were used to analyze reasons for the similarities and differences in the scores of participants between the two groups. The results of this study mitigated the deficiencies of previous studies regarding the acceptance of Tablet PCs and smartphones in nursing education. The research findings suggested that students may benefit from the functionality of mobile devices. Considering the rapid advances in the field of mobile devices in recent years, the following recommendations are proposed for future studies: the comparison of the differences in acceptance and learning effectiveness between (a) iPad tablets and smartphones; (b) between Tablet PCs using the
Android 4.0 platform or above and iPad Tablets.

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