



UNIVERSITY  
OF WOLLONGONG  
AUSTRALIA

University of Wollongong  
Research Online

---

Sydney Business School - Papers

Faculty of Business

---

2018

# Continuance of E-Textbook Use by Tertiary Students: A Qualitative Approach

John D'Ambra

*University of New South Wales, [j.dambra@unsw.edu.au](mailto:j.dambra@unsw.edu.au)*

Concepcion S. Wilson

*University of New South Wales*

Md Shahriar Akter

*University of Wollongong, [sakter@uow.edu.au](mailto:sakter@uow.edu.au)*

---

## Publication Details

D'Ambra, J., Wilson, C. S. & Akter, S. (2018). Continuance of E-Textbook Use by Tertiary Students: A Qualitative Approach. *Journal of Computer Information Systems*, Online First 1-10.

Research Online is the open access institutional repository for the University of Wollongong. For further information contact the UOW Library:  
[research-pubs@uow.edu.au](mailto:research-pubs@uow.edu.au)

---

# Continuance of E-Textbook Use by Tertiary Students: A Qualitative Approach

## **Abstract**

Textbooks are an important information resource for tertiary students. E-textbooks are now widely available and accessible to students offering them distinct advantages over print books at lower costs. However the uptake of e-textbooks has been slow and student preferences for either medium are not well understood. This study adopts a qualitative approach using an expectation-confirmation theory (ECT) lens and revealed causal mapping to understand from students participating in focus groups, their intentions to continue using e-textbooks. We extend ECT by including two new constructs: perceived quality and perceived value. The results assist in interpreting students' behavior regarding intentions to continue using e-textbooks and the efficacy of the extended ECT model.

## **Disciplines**

Business

## **Publication Details**

D'Ambra, J., Wilson, C. S. & Akter, S. (2018). Continuance of E-Textbook Use by Tertiary Students: A Qualitative Approach. *Journal of Computer Information Systems*, Online First 1-10.

# CONTINUANCE OF E-TEXTBOOK USE BY TERTIARY STUDENTS: A QUALITATIVE APPROACH

## ABSTRACT

Textbooks are an important information resource for tertiary students. E-textbooks are now widely available and accessible to students offering them distinct advantages over print books at lower costs. However the uptake of e-textbooks has been slow and student preferences for either medium are not well understood. This study adopts a qualitative approach using an expectation-confirmation theory (ECT) lens and revealed causal mapping (RCM) to understand from students participating in focus groups, their intentions to continue using e-textbooks. We extend ECT by including two new constructs: perceived quality and perceived value. The results assist in interpreting students' behavior regarding intentions to continue using e-textbooks and the efficacy of the extended ECT model.

Keywords: e-textbooks, e-books, expectation-confirmation theory, ECT, causal mapping, RCM.

## INTRODUCTION

Textbooks are an important resource used by students. The wide adoption of smart devices has been accompanied by the emergence of e-books and e-textbooks. Research has shown that although e-books do offer distinct advantages over print books readers of books and textbooks do prefer print books in some contexts. E-textbooks are now widely available and accessible to students offering them distinct advantages over print books at much lower costs.

E-textbooks are an application, a digital artifact that runs on smart devices. Users are able to use the functionality of the digital artifact, the e-textbook, as well as the device on which they are reading the textbooks to support their reading and learning. We, therefore, consider e-textbooks on smart devices as an information system as they are an information resource offering functionality to users that can assist in resolving uncertainty that arises in the context of using the e-textbook.<sup>1</sup>

Bhattacharjee<sup>2</sup> argued that if a technology is perceived to be useful, an individual is more likely to adopt, purchase and use it in the future. When information systems use is mandatory, adoption is assumed and satisfaction is an important indication of success.<sup>3,4</sup> Rai, Lang and Welker<sup>5</sup> defined "quasi-volitional IT use" as un-mandated use of the system but not completely volitional because of social pressure and subjective norms in the environment. This means that an individual may not be required to use the system but the contextual influences suggest that individuals should use it. Stone and Baker-Eveleth<sup>6</sup> outline the volitional nature of students' choice to purchase either a print or e-book version of a textbook.

Our focus is on students' intentions to continue using e-textbooks once they have used an e-textbook. In the literature, the intent to adopt again is referred to as continuous intention. The contribution of the paper is twofold. *First*, the study contributes to our understanding of continuous intention in an e-textbook context characterized on quasi-volitional choice. *Second*, it problematizes the operationalization of Expectation Confirmation Theory (ECT) in this context and suggests appropriate construct items to measure and, in a qualitative context, considers the causality of the appropriate constructs and intention to continue to use. The approach to causality is achieved through revealed causal mapping (RCM).<sup>7</sup> Our

approach is in line with recent calls for more elaborate contextualization of information systems research findings.<sup>8</sup>

The paper proceeds as follows. The next section provides the literature review of the adoption and use of e-textbooks. The methodology section outlines the method followed in collecting and analyzing the data. The fourth section outlines the results. In the fifth section the results are discussed and conclusion presented.

## LITERATURE REVIEW

Although the literature in the domain of e-books and related technologies has been growing for the last decade<sup>9-12</sup> the sub-literature of e-textbook usage in higher education has exploded only about a decade ago.<sup>13-16</sup> D'Ambra, Wilson and Akter<sup>1</sup> provide a table summarizing aspects of frequently cited research papers on the use of e-books (including e-textbooks) by faculty and students in academic environments.

In the review below p-textbook refers to the traditional hard copy or printed textbook; e-textbook to an electronic or digital format of a textbook; and textbook to both or all formats of textbooks. Some key general characteristics of research publications on this topic include: global coverage, journal and discipline diversity, methodological diversity, commonality in findings, and recommendations for future e-textbooks.

### *Global coverage*

From June to September 2012, nearly 10,000 students in eight countries (India, Germany, US, UK, Denmark, Sweden, Netherlands and Norway) expressed their opinions on e-textbook versus p-textbook for reading and learning via an online survey.<sup>17</sup> Close to 90% found p-textbooks too costly. Overall 58% preferred e-textbooks for their portability, ease of reading and cost with the US leading, while Dutch students “never get tired of flipping real pages”. Of all students preferring p-textbook (42%), ease of reading and taking notes ranked high. Most German students refused to buy required textbooks while almost half of the Swedish students realized that they need only a few chapters. Baron<sup>15</sup> surveyed over 300 university students online from the US, Japan, Germany, and Slovakia; she found a near-universal preference for print, especially for serious reading. Warner, Doorenbos, Miller and Guo<sup>18</sup> mined 6.8 million log events between 2012-2014 from over 43,000 people worldwide interacting with “How To Think Like a Computer Scientist”, a freely available interactive Web-based textbook for learning computer programming. The authors compared engagement (use) patterns among three populations (high school students, college/university students and online website viewers) and discovered: (a) that people made extensive use of interactive components such as executing code and answering multiple-choice questions; (b) engaged for longer periods when taking high school or college/university courses; and (c) frequently viewed textbook sections out of order. Their study goes beyond adoption (or intent to use) behavior to one of actual usage and engagement behavior.

### *Journal and discipline diversity*

Not surprising, over one-third of mostly journal and conference papers on the topic of e-textbooks in academic environments are in education or educational research; for example, deNoyelles, Raible and Seilhamer<sup>19</sup> found that e-textbook use has increased and become broader demographically. Lower cost and convenience remain the top reasons students purchase e-textbooks, not the interactive features designed to enhance learning. Pata, Eradze and Laanpere<sup>20</sup> provide an extensive concept map of e-textbook properties and functions to explore novel applications in learning: e-textbook as an “artifact ecosystem” or as a “new socio-technical regime”. Lee and Yau<sup>21</sup> used findings in the literature and their interview results to identify four major IT-based challenges associated with e-textbooks: “standardizing

format of content, improving service reliability, improving quality and accuracy of content, and improving readability”.

Using e-textbook analytics, Junco and Clem<sup>22</sup> built a predictive model of student success. The authors found that ‘time spent reading’, one of the variables comprising an “engagement index”, was a strong predictor of final course outcomes. Miller, Nutting and Baker-Eveleth<sup>23</sup> used survey data of undergraduate students to estimate the determinants of e-textbook use. Their findings show that younger students from lower-income families who went to larger high schools were more likely to use e-textbooks. Additionally, use was higher among students in technically-oriented fields, especially in business where competence in IT is required.

### *Methodological diversity*

Qualitative, quantitative and mixed methodologies are used to study e-textbook usage in academic environments. Using the case study of Indiana University’s e-textbook initiative, Abaci, Morrone and Dennis<sup>24</sup> report on the importance of instructors in e-textbook adoption: “when instructors engage with e-texts, so do their students.” McNeish, Foster, Francescucci and West<sup>25</sup> used focus groups to elucidate the characteristics that make students resist complete replacement of p-textbooks with e-textbooks. Resistance to give up paper is a “typical reaction of existing market to a disruptive technology.” Nicholas, Rowlands and Jamali<sup>26</sup> found that e-textbooks could be popular and widely used mainly for small “snippets of information and for fact finding”. Additionally e-textbooks provided ease of access and convenience. Many quantitative studies of the use of e-textbooks in academic environments include theoretical intention-based models of technology acceptance. Hsiao and Tang<sup>27</sup> assessed five such models: Theory of planned behavior (TPB), technology acceptance model (TAM), decomposed TPB model (DPTB), combined TAM and TPB (C-TAM-TPB) and the unified theory of acceptance and use of technology (UTAUT). The authors used the survey methodology and structural equation modelling (SEM) to assess the five models and found that UTAUT appeared to be the “best model in terms of the metrics of parsimonious fit and explanatory power”; C-TAM-TPB was superior to TAM or TPB alone.

Stone and Baker-Eveleth<sup>6</sup> used the expectation-confirmation model (ECT) of Information Systems and included the constructs of e-textbook usability and its dimensions. They found that continuance intentions are driven by the students’ satisfaction and perceived usefulness of e-textbooks. Furthermore, “students’ expectation-confirmation and e-textbook usability positively influence both students’ satisfaction and perceived usefulness and hence the intentions for continued e-textbook adoptions”.

D’Ambra, Wilson and Akter<sup>1</sup> used task-technology fit (TTF) model to structure and evaluate the adoption of e-books (including e-textbooks) by academics, while Gerhart, Peak and Prybutok<sup>14</sup> used TTF “to understand how students perceive their task of learning to fit with e-textbook technology and how that fit influences e-textbook usage and expected performance in their classes.” Their findings showed that “four factors impact a student’s perceived TTF: substitution, habit, hedonic motivation and facilitating conditions.” Surprisingly, price value showed only a minor effect on e-textbook utilization.

### *Commonality in findings*

Although nearly all the literature reviewed acknowledged that students do read electronic text onscreen for pleasure<sup>28</sup> or for obtaining specific information<sup>26</sup>, there is a near-universal preference for print especially for serious reading,<sup>15</sup> or for long form and academic reading.<sup>29</sup> Some 80% of students prefer printed text when reading for study.<sup>28</sup> Reasons often given for print preference include the ability to highlight or underline text and write notes in the

margins.<sup>16,30</sup> Many results state that students can focus or concentrate better with printed text than onscreen text; furthermore, comprehension and retention when reading print is greater than when reading e-textbook.<sup>31</sup>

Mizrachi<sup>32</sup> provide other reasons for print preference from student comments including: “less eyestrain and fatigue; advantages of the tactile aspects of holding, flipping and thumbing through a printed work; sustained concentration seems easier when reading in a linear progression than vertical scrolling; printed pages offer better memory cues.” Finally, Millar and Schrier<sup>33</sup> state that “the primary reason for their [students’] preference was because the students simply prefer print to digital”.

*Summary:* In spite of the p-textbook preference for learning by the vast majority of students studied to date, nearly all would say that e-textbooks offer the following advantages over p-textbooks: easier accessibility; cost savings; ease of updating; ease of correcting errors; portability and weightlessness; internet connectivity for answering brief information needs.<sup>34</sup>

## THEORY

One of the objectives of this paper is to understand users’ post-adoption intentions toward continued use of e-textbooks applying the theoretical lens of Expectation-Confirmation Theory. ECT is rooted in the consumer behavior research domain,<sup>35,36</sup> which was later adapted into IS research by Bhattacharjee<sup>2</sup> and Bhattacharjee and Lin<sup>37</sup> to understand continuance intentions of IS users. This theory focuses on post-adoption stage where technology use transcends conscious behavior and becomes part of normal, routine activity. We propose that the future use of e-textbooks is uncertain; that users now have two options: traditional textbooks and e-textbooks. The veracity of how well e-textbooks confirm expectations of users is still to be determined, thus continuance intentions of e-textbooks is the focus of the proposed research.

ECT theory focuses on user’s psychological motivations that emerge after initial adoption of an information system.<sup>36</sup> This theory has proven to be successful across different digital service contexts due to its solid theoretical foundations.<sup>38</sup> It assumes that ‘continuance’ depends on three variables: confirmation of expectation, perceived usefulness and satisfaction. The extant IS literature on ECT perspective has predominantly focused on perceived usefulness as the only post-adoption expectation belief. The perceived usefulness of an IS (e.g., e-textbooks) is the completion of a task. It is defined as users’ perception of the expected benefits of e-books use.<sup>39</sup> Confirmation is the outcome of a rational process of comparing initial expectations with actual experience of using the IS artifact. It is defined as users’ perception of the congruence between expectation of e-book use and its actual performance.<sup>2</sup> Finally, continuance refers to the ultimate outcome construct, which indicates sustainability of the technology platform.<sup>38</sup> It is defined as the behavioral patterns reflecting continued use of ICT services. IS researchers<sup>40</sup> treat continuance as post-implementation, whereas others recognize it as post-adoption<sup>41</sup> which draws equal attention to first time adoption ensuring successful implementation of an e-service platform.

Bhattacharjee and Lin<sup>37</sup> argue that it is important to consider alternative theoretical perspectives to provide for an improved explanation of IT continuance where different theoretical perspectives can stimulate the development of more encompassing theories. Inclusion of other beliefs with perceived usefulness, in most cases, is driven by the nature of a particular digital platform in a particular context to improve the explanatory power of the theory.<sup>42</sup> Following this tradition, based on the findings of qualitative research, the study proposes two additional post-adoption beliefs: perceived quality and perceived value, which play an instrumental role in promoting continuance intentions of e-books. The growing

importance of these constructs has been evidenced in reference disciplines (e.g., marketing, consumer behavior, service science and corporate strategy) in explaining continuance intentions, greater market share and profitability.<sup>43</sup> Perceptions of poor quality and value may dissuade academics and students from using the available e-books because learning concerns are among the most salient of members in academia.<sup>1</sup> Perceived quality is defined as users' perception of the expected excellence or superiority of the e-book platform.<sup>44</sup> The study identifies perceived quality as a higher-order construct which consists of system quality, interaction quality and information quality. System quality refers to the user's perceptions regarding the technical level of service regarding availability, reliability, and flexibility. Interaction quality indicates the quality of the interaction between a service provider (library/e-books developer) and an end-user. Information quality refers the degree to which it is helpful in completing a particular task in terms of completeness, currency and format.<sup>45</sup> On the other hand, perceived value is defined as users' trade-off between benefits and costs as measured by their perception of the monetary value proposition of e-textbooks.<sup>46</sup> E-textbooks and related aggregated products present a favorable value proposition for users. This value proposition may be a factor both for academics and students when considering the prescribing and purchase of textbooks and thus have an effect on their intention to continue prescribing or purchasing e-textbooks. Therefore we propose to explore how users contextually attach meaning to the established and additional constructs in the proposed ECT with the additional constructs of perceived quality and perceived value. It is proposed that the integration of the additional constructs into the traditional ECT model will emerge from the qualitative and causal approach outlined below. The two research questions explored in this paper are:

- (1) What are the salient drivers of IT continuance for e-textbooks?
- (2) How do these drivers influence each other and continuance behavior?

Our research approach is qualitative examining the use and continuance of e-textbooks in context.<sup>8</sup>

## **METHOD**

One of the aims of this paper is to represent and analyze the cognition of individuals and groups regarding attitudes towards e-textbooks. To achieve this we elicit the relevant cognition of participants in focus groups and capture the structures of their causal assertions in causal maps within the context of students using e-textbooks and their intention to continue using e-textbooks. Revealed causal mapping is a technique that can be used to explicate and assess the structure and content of mental models. In the current research focus groups allow us to capture the cognitive structure of users' perceptions of e-textbooks to ascertain how domain knowledge is linked in their mental models in terms of the usage of e-textbooks.

The study commenced after appropriate ethics approval was obtained. A convenience sample drawing from the undergraduate and postgraduate student population of a major research university in Sydney, Australia was the population for the focus groups. This approach was appropriate as the artifact of focus is e-textbooks and students are users of e-textbooks. To be eligible to participate in the focus groups students were required to have used e-textbooks for at least one semester. The approach in the study is confirmatory (deductive) therefore a semi-structured approach to the questions was adopted. Questions were based on each construct, including the new constructs of perceived quality and value of the ECT model.

### *Descriptives of participants*

The focus groups were facilitated by the first author. The length of time for each group ranged from 45 mins to 60 mins. Each focus group discussion was recorded and transcribed

resulting in a document of 13,229 words. The transcribed discussions were the artifact used for the initial coding. The details of the focus groups are as follows:

*Focus Group 1:* Two participants, 19 and 24 years of age, were both male and business school undergraduates using e-textbooks for more than three years.

*Focus Group 2:* Five participants ranged in age from 18 to 28 years: two females and three males; three undergraduates and two postgraduates all with more than five years of experience using e-textbooks; two from the business school, two from engineering and one from optometry.

*Focus Group 3:* Eight participants ranged in age from 18 to 40 years: four females and four males; five undergraduates and three postgraduates with experience in using e-textbooks ranging from one to more than three years; two from science, two from medicine, one from the business school, one from arts and the social sciences, and two did not disclose their school affiliation. Saturation (or point of redundancy) was achieved with this group.

### *Coding and mapping*

The first task was to identify the causal statements that imply a cause-effect relationship using key words such as “if-then”, “because”, “so”, “I think”, “then”, “it depends on”, “instead”, “but”, “it’s like”, “otherwise”. Two approaches were used in coding: *Manifest* which included searching for specific linkage words and associated cause and effect statements; and *Latent* to identify causal statements where the key linkage words were not used but the causality of the statements were clearly within the context of the text.<sup>47</sup>

Following the identification of the causal statements, raw causal maps were constructed separating the causal statements into *causes* and *effects*. Inter-coder reliability was conducted to validate the coding: author 1 coded all transcripts; author 2 coded transcripts for FGs 1 and 2 and author 3 coded FG3, the longest transcript. The inter-coder reliability was 82%.

The maps contain “raw” statements which must be aggregated through coding into generalized concepts.<sup>48</sup> Given that the current context is theory-driven, the approach to coding the content of the raw causal maps was framed by categories salient in the literature on e-textbooks and constructs of ECT theory. Once this *concept-level coding* was completed a *construct-level classification* was developed. These construct-level classifications were recast into three revealed causal maps, one for each focus group. These individual maps were then aggregated into a single aggregated map.<sup>47,49</sup> To ensure accurate and comprehensive representation the single aggregated map was validated by one representative from each focus group. Overall the map accurately reflected concepts, linkages and constructs.

To determine the strength of the relationships two key measures were undertaken: *reachability* and *centrality*. Reachability is an indicator of the total strength of the connection between constructs;<sup>50</sup> it is calculated as the sum of the direct and indirect effects of one construct on another: the higher the reachability between two concepts, the stronger the connection (direct effect) and/or the higher the number of different paths that can be used to connect the first concept to the second (indirect effect). A causal connection is indicated by an arrow originating from a cause (i.e., reason) concept and terminating at the effect (i.e., outcome) concept, the reachability value is reported on the line connecting two concepts on the map. Centrality is an indicator of how central or important a concept is to the map;<sup>51</sup> it is calculated by dividing the number of direct linkages for a construct by the total number of linkages in the map. Figure 1 shows the centrality and reachability of the constructs.

## RESULTS

*Firstly*, we consider the contextualization of the constructs. The analysis revealed the dimensionality of our theoretical model including the new high order construct of perceived quality and unidimensional construct cost. The dimensionality of the constructs is illustrated in Figure 1 as well as discussed below. In the interest of brevity we report in detail the stronger dimensions only; however, other dimensions are noted.

### USEFUL/USE

We found convergence between the constructs useful/use where respondents indicated the following attributes of e-texts and the devices on which they are read are significant in enabling use: portability; cost/accessibility; functionality; additional content and resources; state-of-the-art, and sustainability.

*Portability*: The attribute of portability enabled students to read (and therefore study) anywhere anytime. Respondents indicated that this increased their productivity as they could study at times that would otherwise be idle.

*“E-textbooks are versatile. You don't have to put them in your bag and carry them around. It's less weight, something that you can just pop up whenever you want so I use e-textbooks on my phone so whenever I was on the train I just pop it out and listen to music at the same time as I was reading through my textbook.”*

*Accessibility*: Accessibility is coded as two dimensional: e-texts are perceived to be less expensive than print (therefore more accessible); and it is easier to obtain copies of e-texts than print. There are multiple channels through which e-texts can be accessed and obtained; these channels are seen as more accessible and cheaper than acquiring print textbooks.

*“.....generally I use e-textbooks when I can't find the physical text book so if it's not in the library but the e-book is available to read online then I use the e-book...”*

*Functionality*: The ability to execute study related tasks coupled with being able to study anywhere/anytime was considered an advantage.

*“I like how you can search the keywords so let's say it was a PDF file, you can actually type the words in there and search the book for the keywords, so it's just a lot easier to go to the page where I could....”*

*Additional content and resources*: Respondents found that e-texts offered additional learning content to print books. Often this material was interactive and perceived as more engaging than using print texts. Respondents also found that the accessibility of e-texts provided them with additional resources as other online e-texts could be acquired.

*State-of-the-art*: Respondents found that using a digital resource was in line with and a good fit with digital learning environments (learning management systems and other digital resources).

*Environment sustainability*: Two respondents used e-texts as they saved paper and are therefore environmentally sustainable.

## CONFIRMATION

Respondents perceived that their expectations regarding using e-textbooks were met. Confirmation was experienced through: e-textbook content being the same as in print book; e-textbook containing additional content; e-textbook functionality, particularly searching and navigation, was available.

### *Fatigue and distraction*

Some negative expectations did emerge from the use of e-texts. Respondents indicated that using a screen for a prolonged period did lead to eye fatigue and general fatigue. Functionalities offered by devices on which e-texts could be read did give rise to the negative confirmation of distraction. Respondents were distracted from their reading of texts by web browsers, email and social media notifications.

*“Yes search is easier but fatigue is an issue for me. I find that I can’t concentrate as I start checking up links and checking emails. It would be easier if I could focus on reading and not be disturbed by other apps.”*

### *Functionality*

Respondents indicated that they compared the use of e-textbooks to print texts and it is in this context that benefits were perceived and confirmed. The functionalities of search and highlighting were a significant benefit.

*“Yes (easier to navigate) because there is always the search, control-find function, but with the physical textbook you have to go to the index, then search for it, if it’s not the correct one, you have to go back again.”*

### *Attributes of the device*

Positive attributes of e-texts and the devices on which they are read was the ability to adjust font size across platforms.

*“It’s been optimised so all the words fit perfectly on the screen and you don’t have to zoom in and zoom out each time.”*

### *Same as print and extra content*

Respondents’ experience of using e-texts confirmed their expectations that the content would be identical to that in print texts. However their experience also developed an expectation that e-texts should contain additional content/resources to the print versions.

*“I expect them to be just as useful as (hardcopy) textbooks it’s much the same thing unless it has videos... so I guess the expectation is it’s going to be the same or more they’re not going to be any less than them (hard copy texts).”*

### *Difficult to manage*

Some students’ study behaviors included using multiple print-textbooks concurrently. E-textbooks proved to be difficult to manage in this practice.

## **PERCEIVED QUALITY**

### *Information quality*

Information quality is the perceived quality of the content of e-textbooks. It is concerned with the content of the e-textbook in isolation of the attributes of system quality and interaction

quality. There was an expectation that the content of the e-textbook would be the same as the print textbook. Respondents indicated that there should be additional content in e-textbooks not available in the print version. Respondents were aware of copyright issues and this may be a disincentive to use or acquire copies of e-textbooks.

### **SYSTEM QUALITY**

On being questioned on the attributes of the systems on which they read e-texts (smart devices; tablets, laptops, desk tops, connectivity) respondents focused on the attributes of the devices that enable readability and use in an anytime/anywhere context. The significant attributes of devices were screen size, weight (portability), and readability enabled by an appropriate screen size. Respondents displayed a preference for tablet devices for reading e-texts.

*Device dependent/Screen size*

*“.....that depends firstly on screen size. Phones, forget about it, tablets are much better.”*

*“I think tablet is a good medium, they are really compact and small unlike a smart phone where it's a bit too small....”*

*Portability:* Laptops were considered bulky; iPhones too small; tablets were just right.

*Reliability* was reported in two dimensions: internet connectivity and limited access to e-texts from the library.

The functionality offered by smart devices was seen as a significant dimension of system quality. Respondents associated the ability to search and highlight content as an attribute of the system.

### **INTERACTION QUALITY**

In responding to the question on perceived interaction, participants referred to their need to annotate text books as a learning aid and compared the action of annotating e-texts to annotating print texts. E-texts were considered more difficult to annotate than print texts.

*“I find it difficult to write notes and stuff because with an e-book, I just look at it online so then (to make notes) I had to open notepad; it feels kind of inefficient because I'm typing on the side. It feels easier when I'm just reading a (hard copy) book and typing.”*

Searching and navigating were also related to interacting with the e-text.

*“Yes (easier to navigate) because there is always the search function, control-find function, but with the physical textbook you have to go to the index and then search for it. If it's not the correct one, you have to go back again.”*

### **VALUE**

Overall respondents were of the view that e-texts should be cheaper than print and that e-textbooks can be acquired illegally.

*“Yeah, the price should be lower than the original (print copy) then you compare the cost, your convenience and other issues.”*

*“Who pays for e-textbooks?”*

### **SATISFACTION**

Satisfaction was conditional on students' experience with both e-textbooks and print texts. In discussing their satisfaction of e-textbooks, respondent's satisfaction was premised on the alternative use of print texts. Cost was a significant factor with respondent sentiment being that e-texts should be cheaper than print texts. Along with cost there was an expectation that the e-texts would have the same content as the print book and that coupled with accessibility would be a good value proposition to purchase the e-text.

Some system attributes were also important in respondents being satisfied with e-texts: internet connectivity, battery life and storage capacity.

*"If it is identical with the (print) textbook, then why not (purchase)."*

*"The battery capacity is also a big thing so, I need it to look at my lecture notes, search the web, Youtube, whatever. Also, I need it for my e-textbook."*

*"Internet connection all the time, every day."*

### CONTINUE TO USE

In responding to this question participants recognized that e-textbooks are useful resources enabling study in contexts that are not possible with print texts and that this is a significant motivation to continue using e-texts. The facilitating of studying using e-contexts not previously available with print texts is enabled by the manifest factors that have been identified on considering the latent constructs of ECT by the focus groups discussed above. In terms of intention to continue using e-textbooks, respondents identified the factors of: accessibility (enabling use anywhere/anytime); additional content; functionality of the e-textbook; cost. A number of respondents indicated that they will continue to use both e-texts and print texts as this facilitates positive study outcomes.

*"Yeah, I would because of two things, one is convenience, my textbooks are always with me and also, I have all the books I have previously read."*

*"I will still buy my hard copy because I bought an e-book last semester but I still bought the hard copy. Even if the e-textbook is cheaper and you can access the contents anywhere if you have devices different from the hard copy book and for me it was much easier to read a paper book, rather than reading e-textbook."*

*"I think I will continue using e-textbook because other people are using them. What I mean by that is I'm using e-textbooks because I can get it from other people for free so you can redistribute them."*

>>>Insert Figure 1 about here<<<

Secondly, we consider the resultant aggregate causal model as well as the contextualized dimensionality of each construct of the model, as illustrated in Figure 1. The causal map confirms ECT theory through the relationships between the traditional constructs of use, confirmation, satisfaction, and continue-to-use. Furthermore, the map reveals the relationships that emerge from the analysis of the new constructs of perceived quality and value into the ECT model: perceived quality is a high order construct composed of system quality, information quality and interaction quality. Reachability represents the strength of a connection between two constructs and is shown on the lines connecting two constructs. The centrality for each construct is shown within each ellipse. Constructs with higher levels of centrality are directly involved in more linkages of the map. The following constructs have high centrality: useful/use (.3); confirmation (.3); system quality (.2); interaction quality (.2); satisfaction (.3) and cost (.2).

Our research question, as outlined in the introduction, is answered within two dimensions: understanding of ECT in an e-textbook context by identifying the dimensionality of the ECT constructs and exploring causality in terms of intention to continue to use in a qualitative approach. In order to improve the explanatory power of the theory we propose two additional post-adoptive beliefs: perceived quality and perceived value. It is proposed that these play an instrumental role in promoting continuance intentions of e-textbooks.

## DISCUSSION AND CONCLUSION

Previous quantitative studies of students perceptions of how e-textbooks usability influences their continuance intentions<sup>6,52</sup> have contributed to some understanding of e-textbook continuance however a significant limitation of these studies is the use of non-contextual scales resulting from research approaches that lack ecological and contextual validity. This limitation is addressed in the current research by a qualitative approach immersed in the perceptions and beliefs of e-textbook users.

In answering research question 1 (What are the salient drivers of IT continuance for e-textbooks?), the findings in terms of the dimensionality of the constructs are consistent with the literature, as shown in Table 1. However the current research has uncovered further attributes of the ECT constructs within the e-textbooks context. There is some efficacy for the extended ECT model including the additional constructs of perceived quality and value/cost.

>>>Inset Table 1 about here<<<

Since the current study explores how users contextually attach meaning to usefulness, the scope is larger than that of usefulness reflected by other studies. Bhattacharjee<sup>2</sup> described how usefulness is an ex post adoption variable. Student users of e-textbooks perceive useful as: accessible (accessibility) and portable (portability) enabling them to study anywhere and anytime; e-textbooks have technical functionality and content that support learning; e-textbooks are consistent with students aspirations regarding sustainability and to “participating in a “new socio-technical regime”.<sup>20</sup> Overall beliefs towards usefulness were explicitly and implicitly directed towards how e-textbooks enable students to study.

Bhattacharjee<sup>2</sup> outlines that the confirmation construct as the users’ confirmation of their expectations of the IS following actual use, along with disconfirmation (lagging negative expectations). In the study students did have lagging expectations: difficulty to read more than one e-textbook at a time; eye fatigue (tiredness) and distraction by other applications on the smart device. In terms of the content, expectations were met in that the content of the e-textbook should be, at a minimum, the same as the print book. There is an expectation that e-texts should have additional content and learning activities. Expectations regarding functionality to support reading and learning were met.

In our extension of the IS continuance model we include the post adoption belief of perceived quality. Perceived quality is a high order construct consisting of system quality, interaction quality and information quality. Once again the post adoption beliefs of students were clearly articulated. Figure 1 indicates that system quality is perceived by the functionality offered: the physical attributes of the device and the device’s connectivity to the Internet. Information quality is clearly drawn from the users’ expectation that the content of the e-textbook be the same as the print copy; an expectation that e-texts contain extra content not available in the print version; copy right concerns appear to be related to the manner in which e-texts were

acquired. Interaction quality drew from users' experience of technical functions that allowed them to interact, along several dimensions, with the content of the e-textbook.

We also extend the IS continuance model with the value construct of cost. Users had a clear expectation that the monetary value of e-textbooks should be less than print texts. They also believed that there are alternate means to acquiring texts other than to purchasing them.

Bhattacharjee<sup>2</sup> argues that satisfaction is positively associated with use. It is clear that in the current research users' post adoption beliefs draw from usefulness rather than ease of use of e-textbooks. We have evolved from the era where IS were mainly corporate systems with varying levels of complexity to ubiquitous smart devices with globally intuitive operating systems. Therefore users' beliefs of satisfaction are related to the accessibility of e-texts, the cost of e-textbooks, and the content of e-textbooks.

Users attached meaning to their continuance intention for e-texts drawing from all constructs: students expected to continue to acquire e-texts both legally and illegally; they found the extra content useful and of value; the accessibility of e-texts enabled them to study anywhere/anytime; functionality of devices enabled their study productivity and they expected to continue to use both print and e-textbooks.

To answer research question 2 (How do these drivers influence each other and continuance behavior?) we consider the relationships that are defined on the causal map of the proposed constructs. Recall that reachability represents the strength of a connection between two concepts or constructs. Figure 1 presents the reachability measure for each pair of constructs. The more significant relationships in the map are: confirmation to systems quality (.25); systems quality to perceived quality (.37); perceived quality to satisfaction (.5).

The confirmation construct is strongly connected to use, system quality and information quality. Clearly respondents' expectations of the artifact influenced the use of e-textbooks. Expectations were both positive and negative. Confirmation was also strongly connected to system quality and information quality. System quality was perceived as a function of the technical attributes of the artifact so it is not surprising that expectations based on system functionality would be related to the construct system quality. The negative expectations of difficulty to manage more than one e-textbook concurrently, eye fatigue and distraction are a consequence of systems attributes or limitations. Confirmation is also strongly linked to information quality. Respondents had expectations regarding extra content and that an e-textbook should have the same content as p-textbooks: an attribute of information quality.

Perceived quality is strongly connected to satisfaction. Satisfaction is derived through accessibility (access/read anywhere anytime), cost (e-textbooks should cost less than p-textbooks; e-textbooks can be acquired for free), availability of internet access, e-texts should have extra content and the e-textbook has the same content as the p-textbook.

ECT posits that user satisfaction is determined by two constructs: conformation and use<sup>2</sup> Figure 1 confirms this relationship. Confirmation is positively related to satisfaction and use because it implies realization of the expected benefits of the IS use, while disconfirmation denotes failure to achieve expectations. Figure 1 illustrates that users draw satisfaction with e-textbooks from their accessibility, cost, content and that e-textbooks are the same as p-textbooks, though other drivers of satisfaction are reliable internet access and battery life.

Interestingly cost is a mediating factor. Additional value was expected in terms of extra content: e-textbooks can be acquired free of charge (pirate copies) and they should cost less than p-textbooks. Therefore, satisfaction is dependent on e-textbooks costing less than p-textbooks; being available free of charge (pirated); and if purchased, priced lower than p-textbooks. This is reflected in respondents' intention to continue to use e-textbooks. So,

respondents intend to continue to use e-textbooks provided they cost less than p-textbooks, continue to be freely accessible, contain extra content, and offer functionality not available through the traditional medium of p-textbooks. A significant factor for intention to continue using e-textbooks is respondents' intention to use both e-textbooks and p-textbooks.

This research illustrates that a qualitative approach can enrich theoretical models by testing the efficacy of the approach in an ecological context. By exploring the extended ECT model we have identified the dimensionality of the constructs in the ontological model as well as the relationship between the model constructs. Such an approach enables the development and application of contextual scales for constructs that are ecologically valid for the artifact in its adopted context. This then should enable future efficacious quantitative studies. The causal mapping approach confirms the ECT approach as well as the inclusion of additional constructs of perceived quality and value/cost.

This study reports several findings of potential interest for future research on IT continuance: it provides an extended theoretical perspective that may inform IT continuance behavior in the context of e-textbooks. Previous research on IT continuance in the domain of e-textbooks draws from usability<sup>52</sup> but, to the knowledge of the authors, no research has been done to integrate perceived quality in investigating continued IT usage. Our research advances extant research in the area by presenting a theory-driven research model that not only extends ECT, but can also guide future research on IT continuance.

## References

1. D'Ambra J, Wilson CS, Akter S. Application of the task-technology fit model to structure and evaluate the adoption of e-books by academics. *J Am Soc Inf Sci Technol*. 2013;64(1):48-64.
2. Bhattacharjee, A. Understanding Information Systems Continuance: An Expectation-Confirmation Model. *MIS Q*. 2001;25(3):351-370.
3. Gelderman M. The relation between user satisfaction, usage of information systems and performance. *Inf Manag*. 1998;34(1):11-18.
4. Doll, WJ, Deng X, Raghunathan TS, Torkzadeh G, Xia W. The meaning and measurement of user satisfaction: A multigroup invariance analysis of the end-user computing satisfaction instrument. *J Manag Inf Syst*. 2004;21(1):227-262.
5. Rai A, Lang S, Welker RB. Assessing the validity of IS success models: An empirical test and theoretical analysis. *Inf Syst Res*. 2002;13(1):50-69.
6. Stone RW, Baker-Eveleth L. Students' expectation, confirmation, and continuance intention to use electronic textbooks. *Comput Human Behav*. 2013;29(3):984-990.
7. Nelson KM, Nadkarn, S, Narayanan VK, Ghods M. Understanding software operations support expertise: A revealed causal mapping approach. *MIS Q*. 2000;24(3):475-507.
8. Te' en, D. IS current issue and future submissions. *Eur J Inf Syst*. 2015;24(4):361-363.

9. Ramaiah CK. An overview of electronic books: A bibliography. *Electron Lib.* 2005;23(1):17-44.
10. Slater R. Why aren't e-books gaining more ground in academic libraries? E-Book use and perceptions: A review of published literature and research. *J Web Libshp.* 2010;4(4):305-331.
11. Staiger J. How e-books are used: A literature review of the e-book studies conducted from 2006 to 2011. *Ref User Serv Q.* 2011;51(4):355-365.
12. Yu K-T, Lu HP, Luor T, Zheli R. Ebooks research: Literature review on trends and contributions, 1998 to January 2014. *Appl Mech Materials.* 2014;631-632:1421-1430.
13. Valjataga T, Fiedler SHD. Going digital: Literature review on e-textbooks. In: Zaphitis P, Ioannou A, editors. *Learning and collaboration technologies. Designing and developing novel learning experiences. 1st international conference, LCT 2014, Part 1. Lecture Notes in Computer Science 2014.* 8523:138-148.
14. Gerhart N, Peak DA, Prybutok VR. Searching for new answers: The application of task-technology fit to e-textbook usage. *Decis Sci J Innov Educ.* 2015;13(1):91-111.
15. Baron, NS. *Words onscreen: The fate of reading in a digital world.* New York (NY): Oxford University Press; 2015.
16. Rodriguez JR, Bruillard E, Horsley M. (eds.) *Digital textbooks: What's new? A* Coruna, Spain: Universidade de Santiago de Compostela; 2015. [accessed 2016 Mar 16]. [http://laeremiddel.dk/wp-content/uploads/2015/01/759-99z\\_manuscrito-de-libro-1085-1-10-20141218-2.pdf](http://laeremiddel.dk/wp-content/uploads/2015/01/759-99z_manuscrito-de-libro-1085-1-10-20141218-2.pdf).
17. Bookboon. 9 out of 10 students find textbooks too expensive – The big bookboon textbook survey. 2012 Sep 11 [accessed 2017 Oct 19]. <http://bookboon.com/blog/2012/09/the-big-bookboon-textbook-survey-read-the-opinion-of-almost-10-000-students/>.
18. Warner J, Doorenbos J, Mille BN, Guo PJ. How high school, college, and online students differentially engage with an interactive digital textbook; 2015 [accessed 2016 Mar 16]. [http://pgbovine.net/publications/interactive-cs-digital-textbook-usage\\_EDM-2015.pdf](http://pgbovine.net/publications/interactive-cs-digital-textbook-usage_EDM-2015.pdf).
19. deNoyelles A, Raible J, Seilhamer R. 2015. Exploring students' e-textbook practices in higher education. *Educause Rev*; 2015 Jul 6 [accessed 2017 Oct 19]. <https://er.educause.edu/articles/2015/7/exploring-students-etextbook-practices-in-higher-education>.
20. Pata K, Eradze M, Laanpere M. E-textbooks: Towards the new socio-technical regime. In: Cao Y, Tang JKT, Laanpere M, editors. *ICWL 2014 international workshops.* 2014 Aug 14–17. Tallinn, Estonia. *Lecture Notes in Computer Science 2014.* 8699:226-235.

21. Lee, HJ, Yau KLA. Addressing the major information technology challenges of electronic textbooks. *J Comput Inf Syst.* 2015;55(2):40-47.
22. Junco R, Clem C. Predicting course outcomes with digital textbook usage data. *Internet High Educ.* 2015;27:54-63 [accessed 2017 Oct 19]. <http://www.news.iastate.edu/news/2015/09/23/digitaltextbooks>.
23. Miller JR, Nutting AW, Baker-Eveleth L. The determinants of electronic textbook use among college students. *Am Econ.* 2013;58(1):41-50.
24. Abaci S, Morrone A. Dennis, A. Instructor engagement with e-texts. *Educause Review*; 2015 Feb 23 [accessed 2017 Oct 19]. <https://er.educause.edu/articles/2015/2/instructor-engagement-with-etexts>.
25. McNeish J, Foster M, Francescucc, A, West B. Exploring e-book adopters' resistance to giving up paper. *Int J Book.* 2014;11(4): 23-35.
26. Nicholas D, Rowlands I, Jamali HR. E-textbook use, information seeking behaviour and its impact: Case study business and management. *J Inf Sci.* 2010;36(2):263-280.
27. Hsiao CH, Tang KY. Explaining undergraduates' behavior intention of e-textbook adoption: Empirical assessment of five theoretical models. *Lib Hi Tech.* 2014;32(1):139-163.
28. Cull BW. Time for reflection? Digital text and the emerging paper divide. *Against the Grain.* 2015;27(1), 32-34. [accessed 2017 Oct 19]. <http://www.against-the-grain.com/2015/03/v27-1-time-for-reflection/>.
29. Foasberg N. Student reading practices in print and electronic media. *Coll Res Lib.* 2014;75(5):705-723.
30. Sheen KA, Luximon Y. The future of electronic textbooks from a user perspective. In: Zaphiris P, Ioannou A, editors. 2nd international conference on learning and collaboration technologies held as part of 17th international conference on human-computer interaction (HCI international). *Lecture Notes in Computer Science* 2015. 9192:704-713.
31. Zabukovec V, Vilar P. Paper or electronic: Preferences of Slovenian students. In: Špiranec S, Virkus S, Kurbanoglu S, Grassian E, Mizrachi D, Roy L, Kos D, editors. Third European conference on information literacy (ECIL); 2015 Oct 19-22, Tallinn, Estonia. [accessed 2016 Mar 16]. [http://ecil2015.ilconf.org/documents/ecil2015\\_abstracts.pdf#page=121](http://ecil2015.ilconf.org/documents/ecil2015_abstracts.pdf#page=121).
32. Mizrachi D. Undergraduates' academic reading format preferences and behaviors. *J Acad Libshp.* 2015;41:301-311.
33. Millar M, Schrier T. Digital or printed textbooks: Which do students prefer and why? *J TeachTravel Tour.* 2015;15:166-185.

34. Pace S. The evolution of a free online textbook. In: Horsley M, Brien DL, editors. TEXT Special Issue No 23. Textbooks and educational texts in the 21st century: Writing, publishing and reading, 2013. p.1-11.
35. Oliver RL. Effect of expectation and disconfirmation on post exposure product evaluations: An alternative interpretation. *J Appl Psychol.* 1977;62(4):480-486.
36. Oliver RL. A cognitive model of the antecedents and consequences of satisfaction decisions. *J Market Res.* 1980;17(4):460-469.
37. Bhattacharjee A, Lin C. A unified model of IT continuance: Three complementary perspectives and crossover effects. *Eur J Inf Syst.* 2015;24(4):364-373.
38. Limayem M, Hirt, SG, Cheung MK. How habit limits the predictive power of intention: The case of information systems continuance. *MIS Q.* 2015;31(4):705-737.
39. Davis FD, Bagozzi RP, Warshaw PR. User acceptance of computer technology: A comparison of two theoretical models. *Manag Sci.* 1989;35(8): 982-1003.
40. Saga VL, Zmud RW. The nature and determinants of IT acceptance, routinization, and infusion. Proceedings of the IFIP TC8 working conference on diffusion, transfer and implementation of information technology. New York (NY): Elsevier Science Inc; 1994. p. 67-86.
41. Jasperson J, Carter PE, Zmud R. A comprehensive conceptualization of post-adoptive behaviors associated with information technology enabled work systems. *MIS Q.* 2005;29(3):525-557.
42. Akter S, D'Ambra J, Ray P. Development and validation of an instrument to measure user perceived service quality of mHealth. *Inf Manag.* 2013;50(4):181-195.
43. Lai F, Griffin M, Babin B. How quality, value, image and satisfaction create loyalty at a Chinese telecom. *J Bus Res.* 2009;62(10):980-986.
44. Brady M, Cronin J, Jr. Some new thoughts on conceptualizing perceived service quality: A hierarchical approach. *J Marketing.* 2001;65(3):34-49.
45. Nelson RR, Todd PA, Wixom BH. Antecedents of information and system quality: An empirical examination within the context of data warehousing. *J Manag Inf Syst.* 2005;21(4):199-235.
46. Parasuraman A, Zeithama VA, Malhotra A. E-S-QUAL: A multiple-item scale for assessing electronic service quality. *J Serv Res.* 2005;7(3):213-233.
47. Axelrod R. Structure of decision. Princeton (NJ): Princeton University Press; 1976.
48. Carley K, Palmquist M. Extracting, representing, and analyzing mental models. *Social Forces.* 1992;70(1):601-636.

49. Bougon M, Weick K, Binkhorst, D. Cognition in organizations: An analysis of the Utrecht Jazz Orchestra. *Admin Sci Q.* 1977;22(4):606-639.
50. Knoke D, Kuklinski JH. *Network analysis.* Newbury Park (CA): Sage publications; 1982.
51. Nadkarni S, Narayanan VK. Validity of the structural properties of text-based causal maps: An empirical assessment. *Org Res Meth.* 2005;8(1):9-40.
52. Baker-Eveleth L, Stone, RW. Usability, expectation, confirmation, and continuance intentions to use electronic textbooks. *Behav Inf Technol.* 2015;34(10): 992-1004.

**Figure 1: The Causal Model**

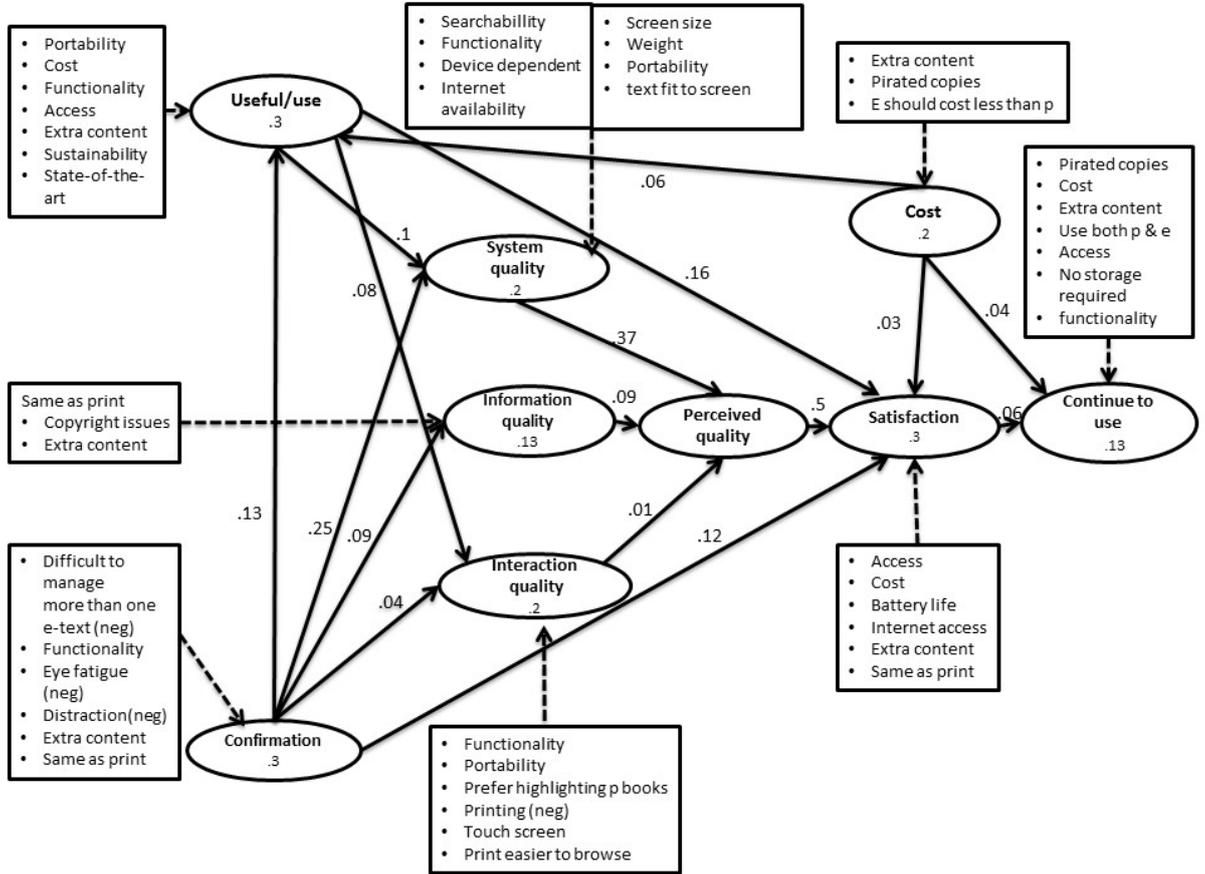


TABLE 1: Emergent themes and the literature

Emergent themes	References
Cost	Bookboon <sup>17</sup> deNoyelles, Raible, Seilhamer <sup>19</sup> Miller, Nutting, Baker-Eveleth <sup>23</sup> Pace <sup>34</sup>
Prefer print text book	Bookboon <sup>17</sup> Baron <sup>15</sup> Foasberg <sup>29</sup> Cull <sup>28</sup> Zabukovec, Vilar <sup>31</sup>
Annotation	Bookboon <sup>17</sup> Rodriguez, Bruillard, Horsley <sup>16</sup>
Engagement with interactive components	Warner, Doorenbos, Mille, Guo <sup>18</sup>
Convenience	deNoyelles, Raible, Seilhamer <sup>19</sup> Nicholas, Rowlands, Jamali <sup>26</sup> Pace <sup>34</sup>
Time spent reading (access anywhere anytime)	Junco, Ciem <sup>2</sup> Nicholas, Rowlands, Jamali <sup>26</sup>
Fatigue	Mizrachi <sup>32</sup>
Browsing	Mizrachi <sup>32</sup>