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Among College and University Students

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Abstract

Over the past 20 years, the faculty and administration of colleges and universities have been debating how technology will change the face of higher education in delivering content to students. Associated with the discussion is research on the acceptability of various devices (e.g. desk-top computers, laptop computers, e-readers, tablets) as replacements for paper textbooks. In most studies, students report their preference for paper textbooks over digital materials for studying and learning. A recent Canadian study examined the preference for paper textbooks. In this study, we repeat key areas of that study with Israeli students and collect comparison data using an online survey. Students in both countries believe that paper textbooks better support their learning and studying processes and are more likely to lead to academic success. However, we note some differences in terms of the Israeli students being less distracted when online, and reporting greater comfort using digital content when searching for information. What has been overlooked in the change from paper to digital delivery of information is how students will make the transition from learning and studying on paper to digital only or simultaneous use of both paper and digital. This study provides ideas as to how educators can better support students and areas where additional research is needed.

Key words: paper textbooks, e-textbooks, digital content, students' resistance to giving up paper textbooks, students' attitudes toward technology

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Introduction

The dissemination of information to students in digital instead of paper format has become an integral part of contemporary teaching practice. Administrators in educational institutions demand and support their faculty's growing use of digital content and tools. Consistent with this trend, university and college instructors eagerly embrace the electronic dissemination of information because of its practical advantages in cost and effort. Those who strongly advocated for the digitization of learning material believed that millennial students would embrace the paperless classroom and, in particular, the electronic textbook (e-textbook) with little or no resistance (OECD, 2005). However, research suggests that students have proven reluctant to give up paper documents and textbooks (Sheppard et al., 2008).

Recent research focuses on the acceptability of various devices (e.g. desk-top computers, laptop computers, e-readers, tablets) as replacements for paper textbooks. Some studies have found benefits to the use of laptops in the classroom because students are more engaged with the content due to the more intimate experience of their laptops rather than a large screen at the front of the classroom (e.g. Lauricella & Kay, 2010). However, other studies (Fried, 2008) found that students were distracted by their own or other students' use of laptops for non-course activities. This suggests that students are aware that technology may interfere with their learning and studying, and possibly impact their academic progress. Moreover their perception is borne out by at least two studies that found that students reading on paper had higher levels of comprehension than those reading digital content (Ben-Yehudah & Eshet-Alkalai 2014; Mueller & Oppenheimer, 2014).

One way for students to balance the distractions of technology with their academic goals is to make use of paper-based technologies. McNeish et al. (2012) explored university students' attitudes toward paper and e-textbooks. Students were questioned as to their intention to resist discontinuing paper textbooks, and this wording gave students psychological permission to identify the benefits of paper textbooks for learning and studying. One of the limitations of the study was that the study was done in one country, Canada. While Canada is known to be an innovative country, Israel is a global leader in innovativeness and as such represents an important country in which to conduct a second study of the resistance to discontinuing paper textbooks. A qualitative study (McNeish and Kolan, 2014) found that Canadian and Israeli students shared some attitudes in common when asked how they made the decision to print digital content on paper. This study continues the comparison of the two countries using an online survey, thereby filling a gap in the literature about non-Canadian students' resistance to giving up paper textbooks.

Literature Review

The parents of the current generation of university students made computers and the internet available to them in their homes, and communicated their beliefs in the power of these technologies to support academic success (Turow, 1999). Some parents even considered that homes without computers would place children at a disadvantage (Subrahmanyam et al. 2001). Millennial students are those born after 1982, and are considered to have no memories of a time before computers and the Internet. Some research suggests that they process information differently due to their relatively short attention span compared to previous generations (Oblinger, 2005). Since Prensky (2001) coined the term 'digital natives,' it has been widely used

to suggest that members of this group, having been exposed to technology from a very early age, have a natural inclination to utilize technology and a preference for digital content.

As technology became more common in university classrooms and in distance education, researchers investigated the perceptions of instructors and students around its use. Daugherty and Funke (1998) found that both groups identify notable benefits in increased access, in the amount of course content available, and in the integration of course content with computer software. Moreover, the authors cite a marked increase in motivation and convenience. Based on these and similar findings, it was believed that students demand the use of technology in the post-secondary classroom (OECD, 2005). In early research, the potential for instructor resistance was considered to be more likely than student resistance (Berge & Collins, 1995). Students' skills and comfort with technology in the context of learning and studying was assumed (Laurillard, 1995; Yazon et al., 2002).

However, more recent studies have begun to explore university and college students' limited use of digital technologies for learning. Kennedy et al. (2008) report that first year students are heavy users of computers, mobile phones, and email, yet, their use of, and comfort with educational technology varies widely. Margaryan et al. (2011) determined that university students make limited use of technology for learning unless specifically directed to do so by their instructors.

In particular, the idea of university students as 'digital natives' who eagerly adopt technology is challenged when students are offered electronic devices for learning and studying (Kennedy et al., 2008). Several studies indicate that students are not adopting e-textbooks as quickly as expected by their professors and researchers even when offered 'for free' (Robinson, 2010). Research shows that students prefer paper textbooks (Levine-Clark, 2006; Noorhidawati & Gibb,

2008; Woody et al., 2010), and when using e-textbooks students will print pages from them before reading the information. Further studies have found that, in students' opinions, paper-based technology is superior to digital technology for the acquisition and comprehension of knowledge that will be evaluated on tests or exams (Margaryan et al., 2011; McNeish & Kolan, 2014; Mueller & Oppenheimer, 2014). Thus, a growing number of studies show students' preferences for paper textbooks and for printing digital content on paper when it is connected to academic outcomes.

Rogers (2003) conceived five characteristics of innovations to explain the rate of their adoption. *Relative advantage*, the strongest predictor of adoption, is defined as the degree to which the innovation is perceived as better than the technology it replaces. Thus, e-textbooks have some benefits that students want. These include being less expensive and less heavy when carrying several books at once, and the fact that a large amount of text can be rapidly scanned to find specific information items (Camacho & Spackman, 2011; Gerlich et al., 2010; Pattuelli & Rabina, 2010). However, these benefits have little to do with the goals associated with using textbooks.

The purpose of textbooks and other course content is to provide information to students that the instructor feels will build their knowledge. The instructor will also establish the evaluation components of the course from the assigned content. The goal of using textbooks and course content is that the knowledge gained will lead to academic success as measured by assignments, tests, and exams. Following McNeish et al. (2012), this study takes the perspective that students' resistance to giving up paper textbooks is a rational reaction to the limitations of e-textbooks for academic success. We examine the attributes of the paper textbook that students believe are necessary for knowledge transfer and which they believe are not present in e-textbooks. In

addition, we compare the attitudes of Israeli students toward paper and digital content with those of Canadian students to determine if the attitudes are the same or different in the two countries.

Method

Undergraduate marketing students from an urban Canadian university and teacher trainees from a rural Israeli college were invited to complete an online questionnaire. The data was collected from the Canadian students in 2011 and from Israeli students in 2013. To qualify for the study, students had to have experience using an e-textbook or digital resource that replaced or supplemented the paper textbook in one of their courses. A total of 371 Canadian and 64 Israeli students completed the online survey.

To explore the reasons why students resist discontinuing paper textbooks as part of learning and studying, we asked them to respond to a series of attitude questions about paper and e-textbooks. Canadian students' resistance to giving up the paper textbook positively relates to the way in which paper textbooks facilitate learning and study processes, and the fact that the content is under the students' control whether or not they have access to computers or the internet (McNeish et al., 2012). Qualitative research conducted on Israeli students (McNeish & Kolan, 2014) demonstrated that Canadian and Israeli students have many attitudes in common when asked about printing course content on paper. Thus, the attitude questions drawn from the Canadian survey can be confidently used to solicit perceptions about the key benefits of paper textbooks among Israeli students. The scale used was a seven-point Likert scale ('strongly disagree' to 'strongly agree'). Answers to the attitude statements about paper and e-textbooks are summarized in two tables in order to identify the similarities and differences between the two countries.

Findings

We asked students from both countries to specifically consider paper textbooks versus e-textbooks on a series of attitude statements. Mean scores are presented in two tables. Attitude statements where the differences between the two groups are not significant are presented in Table 1. Attitude statements where the differences between the two groups are significant are presented in Table 2.

Students from both countries strongly agree that certain functional qualities make paper textbooks superior to e-textbooks (e.g., never freeze, available when they don't have access to a computer or the internet) (Table 1). In addition, paper documents and textbooks are seen as the best formats for extended reading and studying. Both groups report physical eye fatigue that results from using e-textbooks for long periods of time. Students want to customize their learning and studying process and feel that paper textbooks offer that option. Students from both countries tend to be neutral regarding the greater credibility of information in paper textbooks.

Table 1

Attitude Statements with No Significant Difference (two-tailed test; p, .05)

	Canadian Students N=387	Israeli Students N=64
Paper textbooks and documents never freeze or stop working unexpectedly.	6.30	5.71
I can use paper textbooks even if I don't have access to a computer or the Internet.	6.40	5.82
It is easier to read for long periods of time from paper textbooks than from e-textbooks or digital content platforms.	5.99	5.38
Paper documents are the best format for extended reading and studying.	5.92	4.73
It bothers my eyes to read for long periods of time from e-textbooks or digital content platforms.	5.74	5.14
Everyone has different ways of learning, and studying. Paper textbooks and documents allow me to learn and study in the way that I want.	5.74	5.11
Marking up or highlighting information in paper textbooks is more efficient than in e-textbooks or digital content platforms.	5.56	5.06
Information in paper textbooks is more credible than information in e-books or digital content platforms.	4.10	3.73

There are some differences in attitudes between the two groups. Canadian students are more likely than Israeli students to report being distracted using e-textbooks or digital platforms and feel they learn more when studying from paper textbooks (Table 2). Canadians report that it is easier to compare multiple pages of their paper textbooks and can scan quickly to find information that they need. Israeli students were neutral in their evaluation of being distracted, believe that they learn more from paper textbooks, and that it is easier to compare the pages of a paper textbook. Canadian students are closer to neutral in their evaluation of paper textbooks as the best formats for browsing for information or searching for facts, while Israeli students disagree that paper textbooks are better for searching for information.

Table 2

Attitude Statements with Significant Difference (two-tailed test; p, 0.05)

	Canadian Students	Israeli Students
	N=387	N=64
I am more distracted when I study using an e-textbook or digital content platform than when I study using a paper textbook.	5.79	4.28
I learn more when studying from paper textbooks.	5.55	4.11
I can compare multiple pages of my paper textbooks without much effort.	5.30	4.01
I find it quicker and easier to scan through paper textbooks to find the information I need.	5.16	3.97
Paper documents are the best format when browsing for information.	4.59	3.28
Paper documents are the best format when searching for specific facts.	4.12	2.96

Discussion

The purpose of this research is to compare the reactions of Canadian and Israeli students to paper and e-textbooks. While Israel is a world leader in innovativeness, Canada is also ranked highly for this characteristic. Despite their use of computers and the Internet since childhood, students present strong evidence of resistance to giving up paper textbooks for e-textbooks in both countries.

The use of technology in educational institutions has been presented to students without training and support. We have assumed that students' ability to use them for games and

entertainment meant that they had the necessary expertise for serious work in an academic setting. By resisting discontinuing the use of paper documents and textbooks, students are signaling their concern about the role of e-textbooks in supporting their academic success. It is also possible that the lack of training and support is contributing to this resistance and students are signalling their need for this training.

Another important outcome of the presumption that this generation is comfortable with technology in all situations is that researchers and instructors conclude that using games and other 'fun' interactive tools to encourage studying and learning is a solution to the lack of attention and focus exhibited by millennial students (van Meegen & Limpens, 2010). We wonder whether these types of approaches have had the opposite effect than what was intended, particularly when it comes to acquiring knowledge on which students will be tested. Van Eck (2006) cautioned that the use of digital game-based learning is not as simple or straightforward as its advocates suggest.

Students behave rationally in not giving up paper textbooks because they perceive that paper textbooks better meet their needs in a learning and testing environment. Canadian students resist giving up paper textbooks for e-textbooks because they understand the potential to be distracted by the entertainment and social tools available to them online (McNeish et al., 2012). Israeli students are better able to manage the distractions, possibly due to the different course content, learning platform used, their maturity or additional training. Unlike students in many other countries, Canadian students go straight from high school to university without the gap year experience of European students, or army experience of Israeli students.

Students from both countries tend toward being neutral over the greater credibility of information in paper textbooks. Since the information itself is unaltered by its transition from

paper to digital format, it is surprising that students would not strongly disagree with the higher credibility of paper-based information. What is overlooked in providing digital content to students is that they have experience with, and an understanding of how to manipulate digital and online content.

This research fills a gap in the literature by identifying and testing the key attributes that lead to students' resistance to discontinuing the use of information on paper. From a practical perspective, the study offers new insights for educators about the attitudes and behaviours of post-secondary students in relation to their technology preparedness and willingness to adopt/adapt to new learning resource formats.

Although these students are considered "digital natives," they have not mastered skills necessary for effective study using e-textbooks (Conole et al., 2008). We suggest that these students feel more comfortable with paper textbooks where they know how to personalize information, highlight important content and make it easily accessed for review. Instructors who hold the illusion of students' expertise in managing technology should confront the attitudes expressed by students in this study and, if necessary offer direction in how to develop necessary skills for academic success. As a first step, instructors should assess the skill level and training of their students for using digital content and learning platforms rather than assuming that students don't require it, or have received it elsewhere.

In preparing "digital natives" to teach others, we must consider both the content requirements along with the methods and types of content formats with which they will be teaching (Bull, 2010). Communicating course content remains the first priority. However, if they have doubts about how to effectively communicate course content through electronic means, they will be reluctant to use digital content except for minor information requirements. Both the Canadian

and Israeli respondents believe that paper textbooks are linked to the ability to customize their own learning and studying experience. For the Israeli teacher trainees, this belief is likely to inform their ideas about how their future students will learn. If they are unwilling to view e-texts as a serious tool for their own learning, they may use technology to motivate pupils and to add enjoyment to classroom work, but continue to doubt its efficacy in disseminating information.

Two recent studies compared the knowledge outcomes of using paper or digital content and found that students reading on paper had higher levels of comprehension than those reading digital content (Ben-Yehudah & Eshet-Alkalai 2014; Mueller & Oppenheimer, 2014). While research indicates that comprehension is higher on paper (than digital), we recommend a simultaneous approach to using digital and paper formats. Effective learning can take place using both formats. As instructors we need to recognize the efficacy of the various tools, paper and digital, in order to guide our students in determining how they can best understand and retain information. Digital formats can be used to provide students with examples that illustrate or clarify content, during experiential learning activities and class discussion, and to supplement paper-based content. Digital formats in time may be able to replace many paper-based formats if students are sufficiently trained, supported and had practice using them. However, personal preference and certain tasks such as sharing or working in groups or with multiple documents may continue to be more easily achieved using paper-based formats.

We conclude that educators must address the issues raised in this study, which reflect students' lack of confidence in digital content. While some of these complaints may seem technical in nature, our impression is that in spite of being "digital natives," the participants in our study showed a deep-seated lack of faith in the reliability of digital content as the best option to enable them to attain their academic goals. In their responses, the advantage of paper

textbooks and documents was expressed in terms of their technical reliability: they never freeze or stop working unexpectedly, they are consistently accessible, easier to read, and put less strain on the eyes. Although highlighting techniques in electronic information are being refined, students still show a preference for physical marking up or highlighting information in paper textbooks, which they believe allows them to learn and study in the way they want and provides additional memory support in a way that current digital tools do not.

Some suggestions for coping with these attitudes might include expecting students not to have the study skills required for electronic learning despite their abundant experience with electronic devices. Educators should plan to train students how to use these electronic devices for learning and studying and improve students' understanding of the procedures for information gathering and analysis. In addition, students need to understand why they are doing an activity online, for instance whether to gain knowledge or to be tested, even though the instructor takes it for granted that this would be understood. Furthermore, in planning courses, instructors should offer more choice in terms of digital or print textbooks or both. Printouts of course material such as course outlines, lecture notes, supplementary reading on which they will tested should be allowed. More attention should be paid to different learning styles when selecting e-textbooks or online platforms.

Further research should examine whether this snapshot view of current attitudes among Canadian and Israeli students is truly global and persistent or whether improvements in technological convenience may result in evolving beliefs regarding the personalization of learning and the reliability of digital content. If indeed, as we suggest, paper books have an aesthetic effect, what would students be giving up to use only digital content and would this

result in a learning process depending wholly on visual factors at the expense of engaging other senses?

While the introduction of technology into the classrooms began approximately 20 years ago with the introduction of online learning platforms, the associated educational and psychological research has not matched this developmental pace. Teachers and learners need to be offered tools to support the acquisition of knowledge if we continue to believe that permanent knowledge acquisition is important. Outside of the scope of this research, but critical to the development of new technology tools or the use of existing tools, is the question of what knowledge our students need to know in order to live and learn in the society of the future.

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