I MIGHT NOT BE AS TECH AS YOU THINK: COLLEGIATE PRINT VERSUS DIGITAL PREFERENCES

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ABSTRACT

Participants in this study (N=1,986) were college students from four different regions of the United States: northeastern, southeastern, southwestern, and northwestern. Using survey methodology, participants indicated technology preferences and frequency of use as well as demographic information. Findings reveal a strong preference for print text; however frequency in digital use for contextualized purposes. Educational implications include professional development for educators to further understand these nuances and utilize tools and technology which most fit course and students' differentiated needs.

KEYWORDS

Print, Digital, e-Books, College Students, Preferences

1. INTRODUCTION

In an attempt to keep current with students, many professors are offering digital formats for their required readings. Society is increasingly moving toward digital reading formats. Mobile devices, such as tablets and e-readers have expanded reading in any location, at any time. Daily newspapers and news magazines such as Newsweek and U. S. News Report added a digital format to their print option and now send daily electronic communications. Some publications have stopped offering a print version altogether. Many book companies have moved to digital imprints and have become digital-only publishers (Thompson, 2013). Current trends in education have taken a similar course. Many grade schools have encouraged teachers to move toward digital books. School Library Journal reports 66% of schools across the United States offer e-books as of 2014 (Maughan, 2015). College students are now often required to read and submit work digitally. Entire collegiate courses and degrees are delivered digitally (Nelson, 2008). The acceleration toward digitalization in all areas of literacy is spiraling more rapidly than research about the implications of using digital devices including their impact upon learning (Niccoli, 2015).

The push for digital text affects courses delivery and the way students receive information. Renes (2015) suggests that because of e-learning options, higher education is becoming more accessible to students with disabilities, rural students, students with parental responsibilities and students serving in the military. The digital text can play a large role in such accessibility.

Many of these changes from print to digital are happening quickly, with limited and contradicting study on student preferences. Current research predominantly evaluates the technology used in educational situations and not actual student preference or what might be influencing these preferences. Many factors influence students' preferences and the question remains whether is it age alone, as those supporting digital native theories would suggest (Prensky, 2001), or potentially other demographic factors.

Educators, librarians, and researchers are questioning when and where texts should shift from print to digital (deNoyelles et al., 2015). The use of digital texts and more self-directed learning methodology is often fostered in online learning settings. The assumption of these learners being facile with such a setting is sometimes false since these constituents are often older, working adults who may have less experience with technology (Blondy, 2007). Sharpe et al. (2005) notes the need for more in-depth study on student perceptions of technology for learning purposes and how students are actually using that technology in their

formal studies. After an initial study with undergraduates at one college, Patton (2014) also recommends analyzing perceptions of text and academic success using a larger population base. This paper provides a brief review concerning digital and print texts, and then examines survey results concerning technological preferences and practices of collegiate students of varied ages, diverse schools and geographic locations.

2. LITERATURE REVIEW

For the purpose of this paper, electronic reading (e-reading) will be called digital reading and print will be referred to as reading on actual paper. Each format may contain the same content but readers use different strategies to access that content, as well as interact and interface differently with those formats. The manner in which a digital text and print text can be utilized in courses also differs; both can be the main resource, supplementary reading, research resources, or just reference material. In situations where digital texts options are offered and students must choose, often students express uncertainty in which way to choose and for what reason (Patton, 2014). Instructors also wrestle with how and when to use digital texts understanding obvious pros and cons for each exist.

Niccoli, (2015), found 63 percent of colleges are using e-textbooks and others reporting they soon would be as well. The University of California and Springer Publishers surveyed college students about academic texts finding 49 percent of respondents' preferred print texts (Li, et al., 2011), and digital preferences increased with each academic degree level, with post-doctoral students most preferring digital. This finding differed from a University of Maryland survey where format preferences were more based on factors such as the text purpose (i.e. course text, conference proceedings, reference works) (Corlett-Rivera & Hackman, 2014). Similarly, Foasbergs (2014) tracked reading formats and practices using student journaling and found preferences for print related to academic purposes and digital for brief, non-academic pursuits. The shorter the passages, the more students tended to favor digital reading. With the continued technology experiences at younger ages, is it possible that the past preferences for print over digital for academics will reverse?

2.1 Text Choices

Digital books are changing how textbooks are used (McFall, 2005) so there are many considerations when instructors choose academic texts, such as whether the text meets the needs of the course and whether it is best accomplished through print or digital (Durwin & Sherman, 2008). Additionally, if an instructor's chosen text is not read by students, the objects and goals for using that text cannot be obtained, thus choosing text that will best engage students becomes paramount.

Textbooks and accompanying lectures are often the main delivery modes of information in courses, especially online courses. Landrum and colleagues (2012) remark that textbook remains a dominant part of collegiate courses. They assessed how these texts were used and subsequently impact academic performance. Whether students place value on using any digital or print text, according to Ainsa (2015), depends largely on how it is incorporated into the course (i.e. necessary for exams, papers, or assignments).

2.1.1 Print Benefits

Many describe comfort in printed text familiarity, noting a sensory experience of holding a printed book, with its marked pages and weighted essence. Print text, even for a range of media types, is regarded as personal and aesthetically pleasing (Krishen, et al., 2016; Mizrachi, 2015). Readers embrace the content structure familiarity of turning pages (Rose, 2011). Academic printed texts have been the standard in college courses until the recent proliferation of electronic media venues. Mizrachi (2015) acknowledges that contrary to popular stereotypes, college students continue to prefer academic text in print, but acknowledges the accessibility and affordability of digital influencing their practices.

2.1.2 Digital Benefits

Eden and Eshet-Alkalai (2013) purport students are gaining in proficiency of use with digital means simply because of societal increase in digital experience. They contend that it is no longer the case of just digital natives (Prensky, 2001) being comfortable with digital text, all ages now engage digitally.

Digital text offers an option that saves trees and the cost of making and shipping paper for printing. It is said to be convenient, cheaper and more portable (deNoyelles et al., 2005; Krishen, et al., 2016; Mizrachi, 2015). As compared to print, digital collections are less expensive, require less space and are easily accessed.

Digital texts also allows for rapid searching within the text (Mizrachi, 2015). These texts can be easily updated and sometimes provides additional multimedia features to enhance learning. Another benefit of digital course materials is that students in remote locations can receive their books much faster and do not have to order their print copies months in advance.

2.1.3 Digitization Issues

The rapid reproduction of texts in digital formats has resulted in some problems. When actual books designed for a printed page are scanned for digital reading, they often are more difficult to read; when text is digitized, the font and format changes, losing the original "feel" and look of the document (Rose, 2011). Differing page layouts (i.e. number of columns) or lack of page endings, make the digital reading experience different from the print experience (Niccoli, 2015). Rather than flipping page by page through a book, digital readers scroll, skip sections, brows for keywords, and other such habits that often cause "short-circuit comprehension" (Liu, 2005; Niccoli, 2015).

The physical experience of digital reading varies from print reading. Hillesund, (2010) observed reading patterns tend to differ between digital and print and noted digital readers tend to move from place to place in the text as they read rather than systematically across the page, thus impacting reading performance. While reading from a screen, many tend to become easily distracted and less emotionally engaged (Carusi, 2006). Additionally, when individuals focus on print on a screen, eye strain often occurs from the screen type or distance from the screen, resulting in quicker fatigue, and slower reading (Altonen et al. 2011; Eden & Eshet-Alkalai, 2013). Despite these noted digital text issues, Eden and Eshet-Alkalai (2013) found no significant difference in performance between digital and print college students' active reading abilities.

2.1.4 Digitization Preferences

As technological consumers become increasingly younger, there is more familiarity with digital media and modes of transforming information. Falc (2013) documented favorable attitudes towards academic digital text. There is seemingly a range of use and willingness to adapt to digital reading. Walton (2007) found more negative digital text use perceptions by faculty while there was more willingness toward digital utilization by students. Walton concluded this was in part faculty being unfamiliar and less comfortable with technology. Yet, even when the faculty member is familiar and comfortable with technology, digital text is often compartmentalized for specific use such as quick searches and news updates. Liu's (2006) found graduate students initially accessed academic readings digitally, then often printed them to read and study.

There continues to be mixed reports on how the type of text actually affects learning. Eshet-Alkalai and Geri (2007) found peoples' format preferences affects their performance with the information. Yet, Ainsa (2015) found the type of text students preferred did not affect their academic performance. Patton (2014) concluded that students' perceptions about print and digital text play a large role in the academic success while using that particular text. Since preferences seem to matter, Patton stresses the importance of letting the student choose the text format with which they most feel comfortable.

2.2 Learning Theory and Preferences

Preference theory (Hakim, 2003), recognizes there are lifestyle factors which become predictors of behavior. In essence, people have experiences, social expectations, and economic pressures that combine to influence preference decisions. Both faculty and students have preferences for text format. Both play a role in the success of the medium used as their preferences and opinions affect student learning. Preferences for different reading formats (digital or print) may be representative of how students learn differently. Many theorists such as Gardner (2003) and McCoog, (2007) understand that students have multiple ways of learning; however, when an educator can tap into preferred learning experiences, students will be more engaged, thus potentially maximizing potential learning. McCoog (2007) purports that multiple intelligence and technology should be utilized through differentiated instruction to effectively prepare students in today's global society and marketplace. Integration of technology into instruction offers different ways of presenting information, allowing for different ways of processing that information, resulting in potentially increased comprehension and understanding (Novak, 2003).

Both digital and print texts currently are playing a role in learning situations. Educators are beginning to see that the influx of technological tools, applications, and resources are indeed changing the way we teach, learn and assess learning. Research supports technologies are impacting the ways in which students learn (Conolea, et al., 2008; Oblinger & Oblinger, 2005, Prensky, 2001). As noted, classrooms from Kindergarten through graduate school have begun to utilize technological resources including digital texts. However, the use of such texts does not always come naturally to all learners. Wilson, et al., (2013) stress that it is necessary to prepare students for digital reading and the use of mobile devices in learning situations. In order to prepare, educators need deeper understanding of student preferences as means to further engage learning.

2.3 Research Questions

Since the interjection of technology and digital texts into the academic arena, there have been a few studies that examine print and digital preferences and their use in a comparative manner (Chen, et al., 2014; Eshet-Alkalai, & Geri, 2007; Falc, 2013; Foasberg, 2014; Liu, 2006; Maxwell, 2005; Rowlands, et al., 2007; Walton, 2007). Some of these studies emphasize specific areas such as cognitive load, reading patterns and library-related use. More information is needed in understanding the nuances of technology use in learning situations (Conole, et al., 2007). This paper takes the unique perspective of going one step further and delineating if any of these text versus print preferences are also affected by demographics such as age, gender, ethnicity, type of institution attended, major area of study and the purpose for reading.

1) Do college students prefer digital or print text?
2) What demographics or purposes for reading impact digital or print preferences?
3) What are the educational implications based upon digital and print preferences?

3. METHOD

This study was descriptive comparative and utilized survey methodology. This paper is part of a larger study that expanded upon previous work comparing college students' academic and non-academic technology use (author). Previous studies reviewing print versus digital use have stressed the need for increased demographic data (Sharpe et al., 2005). The study follows survey methodology suggestions of Busha and Harter (1980) seeking representative samples of collegiate experiences but also had the goal of increased demographic data enhancing comparative analysis.

3.1 Participants

Participants in this study (N=1,986) were college students from four different regions of the United States: northeastern, southeastern, southwestern, and northwestern. The institutions represented were coeducational, three public, one private, and had undergraduate through doctoral programs. Students, 31% male and 65% female, were enrolled in traditional, blended, or online programs (Table 1). Since there was a diversity in program types at these institutions, the age range of students covered a more wide span that just traditional undergraduates: students under 18 years (1%), 18-26 years (53%), over 27 years (44%), and 2% preferred not to answer. The largest area of academic study represented was social and behavioral sciences (47%) followed by applied science (22%) and natural sciences (10%).

Demographic self-reporting revealed cultural ethnicity representation including the following: African American (8%), Asian (5 %), European American (68%), Hispanic (11%), American/Alaskan Indian (8%), other (4%), and 6% preferred not to answer. Although 40 countries were represented, students' citizenship was reported as 89% from the United States, 3% international, 2% holding dual citizenship, and again 5% preferring not to answer. A total of 33 languages were identified as student's first language, in addition to English.

3.2 Survey

Data collection was completed using a self-report, anonymous Internet survey administered through Survey Monkey. Internal Review Board Approval was obtained at all four institutions. Students were invited by email to complete the survey and were offered the opportunity then to be entered into a random drawing for $25 gift certificates. The email invitation was sent to a potential of 23,319 students and gleaned a response of 1,986, resulting in a response rate of 9%.

The survey consisted of 21 questions including check-off boxes and ranking for Likert-type scaled responses, which indicated students' technology preferences and frequency of use as well as demographic information. Open-ended response boxes were also provided for comments.

Table 1. Comparison of survey respondents' enrollment by percent

Institution	Gender		International	Emer. Adult	Coursework			
	M	F			Traditional	Blended	Online	Other
A (Pri)	25.5	72.8	**	100	99	1	0	0
B (Pub)	21.1	75.7	2*	74	73.9	30.9	14.1	5.9
C (Pub)	40.7	58.7	2*	22	31.5	40.4	35.4	0.6
D (Pub)	32.2	65.7	5*	48	48.4	28.7	31.9	4.8
Total	31	65		53				

Note: *estimate as some preferred not to answer this, **citizenship was not asked for this institution. *Pri* represents private institutions and *Pub* represents public.

4. RESULTS

The results of the study are reported in response to the following research questions: 1) Do college students prefer digital or print text? 2) What demographics or purposes for reading impact digital or print preferences? 3) What are the educational implications based upon digital and print preferences?

4.1 Digital and Print Preferences

The preferences for digital versus print text varied by purpose (Figure 1). Most students preferred print text for academic reading (72%) and non-academic reading (64%). Preference for academic text type had a positive correlation for preference in leisure text $r(1964) = .283$, $p < .01$, $R^2=.080$. Virtual students were more likely to prefer digital reading for leisure, $r(1913) = .123$, $p < .01$, $R^2=.015$. However, there is a smaller relationship between classroom format and academic print preference, $r(1913) = .068$, $p < .01$, $R^2=.005$.
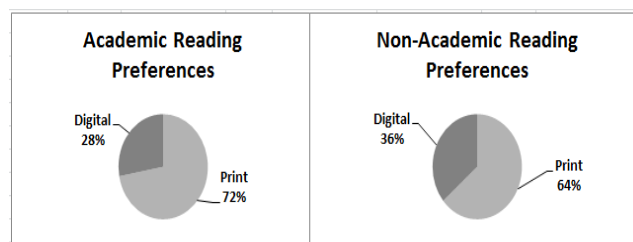

Figure 1. Digital versus Print Preferences

4.2 Demographics Impacting Preferences

4.2.1 Type of Institution

When preferences were examined in light of the type of institution, the pattern of preferring print for academics remained consistent. Each institutions mean response to preference for print over digital was low (print=1, digital=2). The private mostly undergrad institution had the strongest preference for print with a mean of 1.15 (SD = .362) for print and a mean of 1.26 (SD = .439) for leisure reading preference.

4.2.2 Gender and Age

Analysis of preferences for reading differed slightly by gender. Males reported preferring academic text in print (65%) over digital (35%) R^2=.016, and non-academic text also in print (56%) closely followed by digital (44%) R^2= .010. Females were slightly higher indicating preference for academic print (76%) to academic digital (24%) reading. Non-academic preferences for females were 68 % print and 32% digital.

Although most students reported preferences for print for academic text, age had some bearing on college student choices for reading preferences. With 1 indicating print preferences and 2 representing digital preferences, most respondents indicated a preference for print text particularly for academic use (academic M=1.28 SD=.449; digital M=1.36 SD=.481). Younger respondents were 2.1% more likely to prefer print over digital text in their leisure reading, r(1937) = .145, p< .01, R^2=.021, and 1.6% more likely to prefer print over digital text in their leisure reading, r(1933) = .129, p< .01, R^2=.016. Emerging Adults, ages 18-26 years who responded stated that they preferred print text for academic (77%) over print for leisure (66%). However, non-emerging adults over 27 years who responded stated they preferred print over digital for academic reading (71%) to print for non-academic text (47%). Non-emerging adults are increasingly utilizing digital for reading.

4.3 Educational Implications

Tools that students use to access academic material may play a large role in their frequency patterns for choosing their preferred reading mode for academic texts. Students in this survey reported daily use of their personal computer (87%) for academic purposes and non-academic purposes (82%). Computers are integral in today's educational process, whether to access text since they are already using that medium, or to complete assignments, etc.

Cell phones were also ranked high for both academic (65%) and non-academic (94%) uses. These mobile devices have become the most used technological tool by all students regardless of their age, institution, or type of program. This has significant implications for expanding pedagogical practices that utilize mobile technology.

Approximately half of the students surveyed stated they never use an iPad or tablet for academic (57%) or non-academic purposes (51%). Emerging adult students were 4.6% less likely than non-emerging adults to use an iPad or tablet for academic purposes *r*(1899) = .214, *p* < .01, R^2=.046 and were 6.1% more likely to use email for academic purposes *r*(1899) = -.247, *p* < .01, R^2=.061. Looking more deeply, the use of these devices becomes divided by age, leading to questions about what technology use represents developmentally and the impact of the context in which interactions with technology occurs.

Additionally, when examining time and tools, 50% of non-emerging adults reported spending 6-15 hours a week engaged in academic work outside of class and another 30% reported they spent 16 or more hours. Over half state 75 to 100% of that time was utilizing a technological tool. While 59% of emerging adults reported spending 6-15 hours a week on academics, a little less (27%) report spending more than 16 hours. Even though non-emerging adults report spending more devoted to academic, over half of both groups say 75-100% of that time involves technology. These findings confirm the importance of recognizing technology plays a significant role in collegiate education today.

5. CONCLUSION

Although the findings supports Conolea and colleagues (2008) earlier finding that students often by-pass institutional platforms in favor of their own personalized approach or preferred tools, there is evidence that institutional computers are accessed daily, evidence of a continued need for technological tools provided by institutions. Additionally, findings in this study reveal that individuals, who rely on institutional computers, did not prefer digital text. This population can take printed material with them without the need for a technological tool, which may not be suited for long readings (i.e. mobile phone). As a social justice issue, understanding resources among students vary, thus the authors highly recommended institutions provide access to computers. In the same manner, offering online course work also increases access to education for those who cannot be in a traditional class room for a multitude of reasons (Renes, 2015). The availability of digital texts are an asset in online education.

Demographics showed slight influence over preferences but still reflected the same dominant academic print preference. Males had a slightly higher preference for digital, especially in the area of non-academic print. Age followed a similar pattern with print having dominance, however, age had a positive correlation with digital academic text preference. One possible explanation for older college students using more digital would be that many of today's emerging adults have been introduced to technology as entertainment while non-emerging adults may likely have used technology for employment purposes. The purposes for which technology has been accessed may differ, thus, educational instructors need to clearly explain and demonstrate the use of digital texts in authentic and purposeful ways. "Choices are not made in a vacuum" (Hakim, 2003, p. 56) thus, instructors can help with guide choices.

The results in this study support other recent research that college students generally prefer print over digital reading for learning purposes (Mizrachi, 2014). College students from varied regions of the United States as well as students with international backgrounds continue to report print preference. However, most report that the time they spend on academics involves a technological tool. Regardless of this preference, they are immersed in the use of technology daily, often hourly. These findings support that college students are tightly connected to technological devices and utilize them for most academic purposes, truly "Technology is at the heart of all aspects of their lives" (Conolea et al., 2008, p. 519). It seems the point of access and communication has become through technology regardless of preferences. Students then adapt the technology to fit their needs and appreciate the accessibility and flexibility provided with technology.

Printed text and digital text both have value. The key is finding ways to help students benefit the most from technology within learning situations. Demographics slightly influence preferences for digital or print. Educators need to find the balance, as there is a time and place for technology use. Helping students adapt their technological skills for educational purposes will benefit college students. Providing further professional development related to technology use, and specifically in the use of digital texts, will assist instructors as they learn to model and facilitate appropriate ways to engage students with digital texts (deNoyelles et al., 2015). Educators need avoid technology related assumptions, and rather seek to recognize use patterns and preferences, and then adjust instruction to meet student needs, resulting in greater achievement, regardless of their preferences.

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