

Screen reading habits among university students

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ABSTRACT

Among the numerous areas of education which have been impacted by technology, the growth of reading texts from computer screens is one of the most widespread. This trend is perhaps most evident at universities with academic journal articles increasing being stored and accessed in this format. As with any technological changes, the spread of screen reading presents educators and students with a range of challenges and opportunities. This paper seeks to examine the general preferences and habits of university students when reading academic articles, specifically their use of annotations and other means of interacting with a text. An on-line survey was conducted and the views of 630 students analyzed. The data reveals several tensions in the preferences and habits of these students and suggests that a knowledge gap may exist which could hamper their ability to interact with digital texts. The article ends with teaching implications and opportunities as well as suggestions for further research in the area.

INTRODUCTION

The past 20 years have seen a dramatic change in the area of reading, a cornerstone of education at any level. In the past, developments in reading would have changed what is read, why it is done or how it is taught or assessed, but the growth of internet and communications technology (ICT) has heralded a shift in how reading material is distributed and accessed. Reading increasingly has little to do with books or paper, a development few would have predicted 20 years ago. As with change of any kind, not all have been supportive of the growth of screen reading (reading digital texts from computer screens). Rose (2011, p.516) noted that opponents went so far as to argue that 'electronic text ultimately diminishes both the personal growth of individuals and the stability of our society.' Despite those and other reservations, screen reading has become so integrated into society and education that some researchers now claim that students accustomed to reading from a computer screen have trouble engaging with traditional paper books (Burke & Roswell 2008) and the assumption that electronic texts will increasingly dominate reading seems a safe one.

That dominance is perhaps most evident in regards to academic journals in universities, where reading is increasingly screen-based (Kol & Scholnik 2000). Electronic storage of articles is now commonplace and the ease of access and storage that they provide students and researchers mean that few libraries maintain a stock of bound analogues. Portable Document Format (PDF) files are a global standard and are easily displayed via free software (Adobe Reader).

The primary aim of this paper is to examine the habits and preferences in the use of electronic texts in university settings and by university students. Any group of university students, however, is comprised of students from different backgrounds and for that reason, the linguistic backgrounds of respondents was a controlled variable in the survey. Consequently, a secondary aim is to examine the habits of non-native speakers of English (NNS).

Though substantially larger in terms number of respondents than other studies known to the author, this remains a relatively small study. Its goal, then, is not to arrive at any firm conclusions but to broadly examine the issue and provide avenues and questions for further research.

LITERATURE REVIEW

Given the scope of the change, it is perhaps unsurprising that the issue of screen reading is multi-faceted and that its expansion has presented a myriad of challenges and opportunities for those affected. The speed of reading from a screen is an area which has received considerable attention and there had previously been general agreement that reading from a screen is slower. Dyson and Haselgrove (2001) found that though screen reading is slower, there is a link between relative speed and familiarity with reading from a computer. However, by 2010 researchers could cite studies indicating that advances in screen quality along with increasing exposure led to comparable reading rates between the media (Al Shehri & Gitsaki 2010).

The integration of vocabulary support is a feature of screen reading that can be approached as an opportunity rather than a challenge. Paper-based reading relies on either a glossary or the use of dictionaries, both of which can be easily integrated into screen reading. Readers of electronic texts have access to a number of resources including online dictionaries/thesaurus and corpora and instructors can add vocabulary glossing to texts. A number of studies highlight the importance of this issue. Chun (2001) noted that dictionary support led to increased comprehension of texts, particularly among less proficient readers. Further, students in that study in general responded positively to the support offered by on-line dictionaries and preferred them to traditional paper dictionaries. In terms of glossing, there was an overall conclusion that 'instantaneous vocabulary help from an internal glossary can be beneficial to L2 reading' (Chun 2001, p.390). Burke and Roswell (2008) found that younger students also found online dictionaries far easier to use and Al Shehri and Gitsaki (2010) also concluded that online vocabulary support aids comprehension. Issues relating to vocabulary are particularly relevant to this study given that in a survey of nearly 5000 English for Academic Purposes (EAP) students, Evans and Green (2007, p.14) reported that 'inadequate receptive and productive vocabulary in English is the main problem' facing the students in question.

Another opportunity presented by screen reading is the ability to integrate questions within a text. Whereas in paper reading questions are generally separate from or at the end of a text, electronic versions allow for their insertion at various points within the text. The results indicate that integrated questions led to higher comprehension and that the best results on the task were from students who read a text with integrated questions and had on-line dictionary support (Al Shehri & Gitsaki 2010).

One area which is seen as more problematic to screen reading is the ability (or lack thereof) to annotate texts. Numerous studies (O'Hara & Sellen 1997, Marshall 1997; Pearson, Buchanan & Thimbleby 2009; Rose 2011; Mercieca 2011; Chou 2011) report that annotation, be it highlighting, underlining or taking notes directly on what is being read, is an important feature of reading and one often utilized by students and seen as beneficial to their reading process. The inability to annotate digital texts is noted as a hindrance in several of the above studies. Pearson, Buchanan and Thimbleby (2009) argue that the issue is partly technological and that digital document software lack the features to allow for annotation. However, Mercieca (2011, p.6) discovered an interesting contradiction in the views of students and their behaviour as regards digital annotation:

While the students suggested that paper-based reading assisted in their content interpretation because they could highlight and annotate the text, none of them used the electronic equivalents made available through the Microsoft reader interface. When made aware of these functions during the focus group discussion, they did not show enthusiasm for the use of such annotation processes. There appeared to be a mindset of acceptance of print as being the main way to engage with the textual content.

This trend seems to speak to a reluctance on the part of the students to accept screen reading and also could signify a knowledge gap impeding their ability to efficiently transfer reading skills and habits between the media.

As noted above, almost any student body now includes non-native speakers (NNS). There are several important studies relating to EAP and NNS students and screen reading. Reading is a key skill for academic study and EAP and, according to Chou (2011, p.2), 'the ability to read academic texts is considered one of the most important skills that university students need to acquire'. While there is no reason to suggest NNS students have better or worse screen reading abilities than NS learners, some NNS students report that screen reading in a second language is more taxing than first language reading (Chou, 2011). Other studies have indicated that NNS learners use a range of strategies when screen reading (Konishi 2003; Chou 2011) but that 'students engaging more in on-screen reading tended to be more strategic when reading on a computer screen than those who did less on-screen reading' (Chou 2011, p.12), a finding supported by a similar study (Kol & Schcolnik, 2000). Jarvis (2001, p.212) drew attention to an 'increasing recognition of the need to include ICT training for NNS on EAP courses'.

Similarly, adult NNS learners are another group which seem to face increased difficulty when reading from a screen. Murray and McPherson (2006) report that this group requires and indeed benefit from explicit training in screen reading techniques. They also argue that students who had received such instruction seem to be more willing to engage in screen reading.

Moving away from specific groups or challenges, there seem to be few medium- or large-scale studies attempting to discover or describe student views or habits relating to this topic. Rose (2011) conducted interviews with 10 native speaker university students and found that they generally prefer paper-based reading, partially due to the ability to annotate. The participants indicated that they did not print articles for financial and environmental reasons (Rose, 2011). Chou (2011) performed a similar study with 5 EAP students and identified a similar preference for paper reading, particularly when doing so in a second language.

Though a considerable body of research on screen reading and related issues does exist, there remain several areas seemingly worthy of more in-depth examination. Of the previous studies known to the author, most are relatively small in terms of number of participants. While they have clearly yielded valuable insights, they do little to reveal some wider trends, specifically student preference of paper or screen reading and student knowledge and use of annotation functions when doing so.

METHODOLOGY

In order to better understand student views and habits relating to screen reading, a survey was conducted using an on-line survey tool (Appendix 1). An invitation to participate in the survey was sent to all students via the university email system at the University of Limerick, Ireland. A total of 630 students completed the survey. Participation was strictly voluntary and no inducements were offered or given. The majority of respondents (93%) are native English speakers, the remainder coming from different L1 backgrounds. As all participants voluntarily and successfully completed an on-line survey, it seems safe to assume that they have at least basic computer skills.

The survey consisted of 10 questions, two relating to the age and linguistic background of the respondents and the remaining eight to their paper and screen reading habits. The survey attempted to examine the general views of university students in regards to screen reading compared to paper reading as well as to gather information on the use of traditional and digital

means of annotation. Of the issues related to screen reading, that of annotations is one of the most prominent and one for which data can be reliably collected via a survey. The study only examined the reading habits relating to academic journal articles in PDF format.

RESULTS

The full results from the survey are found in the appendix.

The most salient result of the study is the preference for paper reading with 74% of participants replying in favour of paper-based reading. Despite that clear preference, students in general do not print many articles. More than 60% of students print less than 30% of the articles that they read. The reasons for not printing are similarly clear, with 82% of students citing cost and 33% listing environmental concern as the major reasons to not print articles. Students contacted in this survey are more likely to print an article if they believe it is important for an assignment (77%) or an exam (62%).

Table: Comparison of Overall Results to NNS Students

Habit	All Respondents (n= 630)	NNS (non-native speakers) (n= 42)
Prefer paper reading	74%	74%
Print less than 30% of articles read	62%	60%
Print more than 80% of articles read	17%	21%
Paper Reading Annotation Habits		
Highlight/underline on paper	87%	86%
Write comments on article	65%	64%
Take notes on separate paper	55%	48%
Knowledge of Digital Annotation Techniques and Screen Reading Annotation Habits		
Know how to use digital underling/highlighting	49%	57%
Use digital highlighting/underlining	29%	40%
Add digital comments	12%	17%
Take notes on paper when screen reading	70%	69%

The use of annotations when reading from paper is another item that yielded clear results. A clear majority of students, 87%, report using highlighting or underling and more than half take notes on the article itself or on separate paper (65% and 55% respectively). Just 16% take notes on computers, by far the lowest form of annotation or note taking.

In terms of technical knowledge, just under 50% of students know how to use highlighting or comment functions when reading PDF files from a screen. Only 29% of students use digital highlight or underlining functions and 12% add electronic comments to the article itself. A clear

majority, 70%, take notes on paper when reading from a screen and 28% use a word processor to record notes.

Though the sample sizes for NNS is quite small (40 respondents) it is nonetheless worthwhile to compare results across the groups while bearing in mind the caveat that these results come from a very small sample. The results are largely similar between these groups and the respondents as a whole with few results having notable deviations from the respondents as a whole.

DISCUSSION

The survey revealed four main findings. While each individual result is interesting, it is only when they are contrasted against each other that their full implications can be assessed and the issues raised addressed. The first issue raised is the tension between a preference for paper-based reading and an unwillingness to print articles, possibly signalling a begrudging acceptance of the dominance of screen reading. From a pedagogical perspective, perhaps more troublesome is the widespread use of a variety of annotation techniques when reading on paper but an lack of knowledge as to how to perform those same functions when reading an electronic text and a possible unwillingness to do so.

A central finding of the study is a clear preference for reading academic journal articles from paper rather than from a screen, with nearly 75% of all students replying in this way and similar results among NNS students. Despite that apparent dislike for the medium of screen reading, the data suggests that it is very much a part of student's lives and that few of them are willing to print a large portion of the articles that they read, a clear majority printing less than 30% of the articles that they read. However, students do print articles when they feel that what they are reading is important to their studies, a finding similar to that of Chou (2011). Students in this study report that they do not print more articles due to economic pressures, which mirrors data from a smaller study (Rose 2011).

The area of annotation is another in which there seems to be a tension. As noted by a number of previous studies, students frequently annotate journal articles as they read and a very high percentage of respondents from this group indicate that they regularly do so. One of the more revealing results of the survey is the use of separate paper to record notes. When reading from a screen, this is the most popular way of interacting with a text, 70% of respondents identifying it as their preference, far higher than any other form of annotation (digital highlighting is the next highest method at 29%). The only form of interaction that is higher for either media is manual highlighting or underlining a printed article, a technique used by 87% of respondents. These results suggest that students see annotation as important but want it to have a physical quality, a trend also identified in a smaller study (Rose 2001). This finding should in no way be meant to be interpreted as problematic.

Overall rates for digital annotation are much lower despite their relative simplicity and the ability to consolidate comments into the text itself rather than have two separate documents. This may in part be due to the fact that nearly half of respondents do not know how to use digital annotations. Even amongst participants who replied that they do know how to use these functions, the trend of opting for paper remains strong. Taking notes on separate paper remains the most popular form of interacting with the text, used by 67% of students compared to 51% for digital highlighting or underlining and 23% who add digital comments. These findings seem to match those of Mercieca, who found that some students were somewhat reluctant to use digital annotations (Mercieca 2011).

The number of students who do not know how to use relatively simple annotation features is also quite high. This suggests a gap in their knowledge that, if addressed, could make them more willing or confident to read from computer screens.

Given that previous research reports that reading in a second language adds a level of difficulty to screen reading, it is perhaps something of a surprise that the results from NNS respondents in this survey are largely similar to those of participants as a whole. Possible explanations for this might include factors such as length of study. The survey was administered mid-way through the second semester, meaning that respondents had at least six months of university study when they completed the survey. Again, the NNS component of the study was very small and this seems to be an area which would benefit from further research.

The contradictions here are quite evident. It seems that that despite their preference for reading from paper, students are far more likely to read academic articles from a screen. Additionally, students are less likely to transfer the annotation techniques they use when reading from paper to reading from a computer screen or simply are unaware of the techniques available to them or do not know how to use them. Taken a whole, data from both the current and previous studies appears to signal a need for screen reading to be incorporated into reading classes for all students, both NS and NNS. If more students were aware of the ways in which they can interact with digital texts, they might feel more comfortable with reading in this medium which, regardless of their preference, they seem to have accepted as part of their studies. Furthermore, studies have shown that students who do not regularly read from screens have trouble adapting their strategies when doing so (Chou 2011; Kol & Scholnik 2000). The teacher's task, then, seems to be to help students 'overcome old reading habits related to traditional print-based texts while, at the same time, acquiring and exploiting new, innovative approaches that take into account the nature of electronic texts' (Chou 2011, p.3).

IMPLICATIONS AND TEACHING SUGGESTIONS

The main implication of this research for teachers would seem to be that university students could benefit from explicit instruction in screen reading techniques and that an increased familiarity with some of the unique benefits that the medium provides (such as annotation and vocabulary support) might increase their comfort and ability in this regard.

As it would surely be unwise to enforce any habit on learners, the purpose of any instruction in this regard would be not to change students' preference to use paper when reading or annotating but to give them explicit training in a type of reading that they seem to accept, if begrudgingly, as integral to their learning. Indeed, 'confidence comes through familiarisation with the literacies required to perform successfully and autonomously in the academic environment' (Slaouti 2002, p.111) and several studies suggest that increased exposure to and practice with screen reading leads to higher performance in reading tasks (Chou 2011; Kol & Scholnik, 2000; Dyson & Haselgrove 2001). It has been further noted that a key aspect of such teaching is 'to help overcome student frustration with technology' (Sutherland-Smith 2011, p. 666). Murray and McPherson (2006) similarly report increased student confidence and willingness to engage in screen reading after explicit instruction. Combined with explicit instructions in strategies, techniques and technical aspects of screen reading, it is hoped that such an approach would lead to greater confidence and ability when reading from a screen.

The question then becomes how and when to give this instruction to students. The data gathered from the survey suggests that there is little difference between the screen reading habits of these students in general and the habits of NNS and both groups may require screen reading training. In this case, NNS learners may be at an advantage as such instruction could easily be

incorporated into either a pre-existing reading syllabus or as part of the broader strand of ICT instruction, something seen to be lacking in exiting English for Academic Purposes instruction (Jarvis 2001). It should be again noted that being a native speaker in no way implies proficiency in screen reading or ICT skills. In the case of native speakers, perhaps the best forum for such instruction would be incorporating it into a workshop on broader research skills for new university entrants (which would also include NNS students). The rationale for this would be to illustrate both how easily screen reading skills can be incorporated into a reading course as well as to demonstrate the inherent link between academic reading, screen reading and related research skills. Helping students become more proficient readers of journal articles is of little use if the students cannot independently find the articles they need to read. These research skills are also noted in the literature as being important for EAP students (Jordan 1997, Slaouti 2002). If, as the results of this and other papers suggest, the main way in which they will read the articles will be from a computer screen, then it seems logical to use this medium in instruction. Again, new entrant native speaking students would also benefit from and indeed often need this instruction as they would be unlikely to be familiar with the database or search systems at a university.

Ideally, these sessions or workshops would take place shortly after students begin their first semester of university study. A computer lab would be the best setting as it would allow for demonstration as well as hands-on practice.

By the end of such training, students would have had hands-on training in screen reading along with a series of other ICT tools which will be of use to them. It is hoped that through this course, the participants will become more familiar with screen reading as well as more confident in their ability to read and interact with electronic texts.

CONCLUSION AND SUGGESTIONS FOR FURTHER RESEARCH

The temporal space of this paper is interesting. As time progresses, students will increasingly be familiar with screen reading and at some point not require specific training in that regard or the training they receive as part of their primary and secondary education will implicitly address any issues specific to reading from a screen. The growth of tablet computers as well as e-readers will likely only hasten this trend. The current period is very much one of transition and 'we cannot assume that students can in fact effectively read from the computer screen, and educators need to focus on the issues created by the emerging technologies.' (Kol & Scholnik 2000, p.74-75).

The possibilities for further research in this area are numerous. As noted, the current study, while larger than many of its predecessors, is rather small in terms of the number of respondents. An important step for any further research would be to conduct a larger study, particularly in terms of the number of non-native speakers. Another option would be to design and pilot elements of the proposed instruction and evaluate their efficacy through pre- and post-course surveys, interviews or focus groups. As there is less data on how NNS students approach screen reading, another potential research area is that of the ways in which university/EAP students use annotations in digital documents in isolation or in comparison to their habits when reading from paper. Having students submit annotated versions of texts they have been assigned to read could result in large amounts of quantitative data (number of annotations, items highlighted and so forth) but the use of cameras to record students reading these texts in a controlled setting could yield more in the way of qualitative data. If researchers were able to observe how a student reads an electronic text (possibly in conjunction with a read aloud protocol) and could track what functions are used (dictionaries or other on-line support) the resulting data could be of use to researchers, teachers and those involved in materials development. Finally, the growth of tablets presents another medium that could be deserving of attention from the research community.

With a better understanding of how students interact with digital documents, teachers and material developers can better direct resources aimed at improving instruction in this regard and help learners develop competence in a skill and medium that will only grow in prominence in the years to come.

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APPENDIX- SURVEY QUESTIONS AND FULL RESULTS

1) Please enter your age group

a) under 20	154	24.44%
b) 20-24	323	51.27%
c) 25-29	61	9.68%
d) 30-39	55	8.73%
e) over 40	37	5.87%

2) Is English your first language?

a) Yes	588	93.33%
b) No	42	6.67%

3) When reading academic journal articles, do you prefer reading from a computer screen or reading from print outs/paper?

a) computer screen	163	25.87%
b) paper	467	74.13%

4) How often do you print articles from academic journals?

a) 10% of articles you read	287	45.56%
b) 20% of articles you read	62	9.84%
c) 30% of articles you read	44	6.98%
d) 40% of articles you read	34	5.40%
e) 50% of articles you read	48	7.62%
f) 60% of articles you read	22	3.49%
g) 70% of articles you read	25	3.97%
h) 80% of articles you read	46	7.30%
i) 90% of articles you read	44	6.98%
j) 100% of articles you read	18	2.86%

5) What are the reasons that make you less likely to print articles? Please check all that apply.

a) cost	515	55.74%
b) environmental concern	210	22.73%
c) preference to read on-screen	91	9.85%
d) other (please list below)	108	11.69%

6) What are the reasons that make you more likely to print articles? Please check all that apply.

a) the article is interesting	128	11.90%
b) the article is important for an assignment	486	45.17%
c) to use the article to study for an exam	389	36.15%
d) other (please state below)	73	6.78%

7) When you read from paper, do you use any of the following techniques? Please check all that apply

a) highlighting/underlining	546	38.08%
b) writing in margins	410	28.59%
c) taking notes on separate paper	347	24.20%
d) taking notes on computer	102	7.11%
e) none	22	1.53%
f) other (please list below)	7	0.49%

8) Do you know how to use commenting/highlighting functions when reading PDF files on a computer?

Yes	310	49.21%
No	320	50.79%

9) Do you know how to use the search/find function when reading PDF files on a computer?

Yes	477	75.71%
No	153	24.29%

10) When you read from a computer screen, do you use any of the following techniques? Please check all that apply

a) digital highlighting/underlining	182	18.59%
b) adding digital comments	75	7.66%
c) taking notes on separate paper	438	44.74%
d) taking notes on computer	179	18.28%
e) none	97	9.91%
f) other (please specify below)	8	0.82%

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