# Does a Split-View Aid Navigation Within Academic Documents?

# MOTIVATION

# Reading Habits

Paper is still the dominant medium for reading academic documents [2].

#### Reasons are:

- Ease of Annotation
- Physical Comfort
- Tangibility
- Portability
- Ease of Navigation
- Better Comprehension

# Prior Research Findings

Paper-like navigation provides more flexibility and better support for reading and working with academic documents [1, 6, 7,9].

#### Pearson et al. [6]:

- Digital version of reading desk
- Mimicked key properties of physical book on a desk

#### Chen et al. [1]:

- Multiple interconnected devices
- Spread out papers to remove space limitations

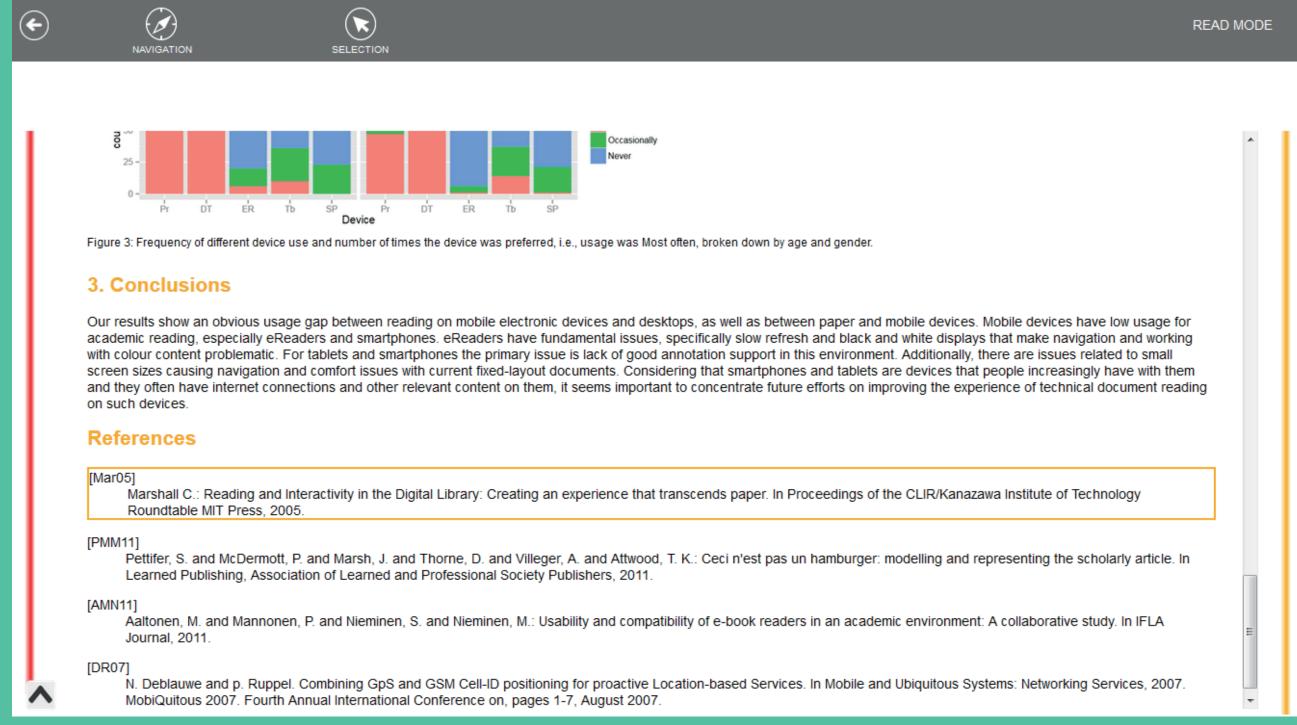
# Our Investigation

We designed two distinct navigation options on an electronic device.

#### Provide:

- More paper-like handling
- Better intra-document navigation
- Support hyperlinked navigation without scrolling through the text
- More freedom to layout the text according to the readers needs
- Least possible distraction of reading flow

# PROTOTYPE



1-column layout / single reading view

WebView



READ MODE STEM (other sciences, engineering and mathematics) NSTEM (everything else including the humanities, law and business and The first question on the survey asked respondents to check a box indicating how often they read academic papers using: Print, EReader, Desktop, Tablet and Smartphone. The allowed responses were: Most often, Often, Occasionally and Never. From the responses we extracted two data sets: Frequency and Preferred. Frequency gave for each device a ranking of Never, Occasionally or Often where Often was true if the respondent had indicated either Most often or Often for that Figure 2: Frequency of device use for reading academic papers. Key: Print (Pr); Desktop (DT); eReader (ER); Tablet device. Preferred was a Boolean indicating if the participant response indicated that that medium was their most often used. The results are shown in Figure 2 To better understand the reading habits and reading demands of researchers, we conducted an online We see that smartphones and eReaders are by far the most frequently used survey of 162 academics. We asked the participants for their preferred reading media. devices for reading academic papers, followed by tablets. Print and desktops are While reading digitally used to equate to reading at a desktop computer the prevalence of tablets and uncommon. We confirmed that this difference was significant at the 0.05 confidence smartphones means this is no longer the case and we were interested to investigate whether these level. This device preference was supported by the data on most preferred device, new devices were being used for reading academic papers. i.e., Print and Desktop were used most often for reading academic papers, followed We found that paper and desktop computers are the most popular medium for reading academic by tablets. Smartphones and eReaders are very uncommon. We used a x2 test with papers, both being used about equally. Smartphones are almost never used for reading, nor are equal probability null hypothesis (x2(4) = 159.6567, p < 2.2e-16). We used a two-way E-readers. The explanations given by participants from a variety of backgrounds were surprising for x2\$ test and Fisher's exact test to examine if gender, age or field of study affected the strikingly similarity between participants. As such, we feel this research presents the first complete selection of Print or Desktop as the preferred device. We found that this significantly clear view of the reasons for the continued preference for paper use by academics and the low adoption for digital reading of academic documents on mobile devices. 2. Survey It is perhaps not surprising that smartphones are rarely used. Small screen sizes A total of 162 participant surveys were analysed. The gender distribution was slightly uneven: 58% females to 42% males, with 5 respondents not giving their gender. The sample consists of a diverse very difficult on such devices. Similar issues occur for eReaders. This result range of ages from under 25 to above 65. The distribution of ages is quite uneven, with 60% of them reaffirms several previous studies including that of Hillesund [AMN11]. We then being under 35, presumably reflecting the demographic for active researchers with the time to answer looked at whether gender, age or field of study affected device preference. The on-line surveys. The age bracket "26 to 35" contained the highest proportion with 41% of the results are shown in Figure 3. Because of the difficulty of performing a multi-way test on ranked data we used a Kruskal-Wallis \$H\$ test for significance differences for



2-column layout / reading view + contextual view

SplitView

# FINDINGS

# **User Study**

Qualitative user study / 8 participants (23 - 36ys) Comparison of WebView and SplitView 2 texts / 8 errors

- 1. Task: Performance
  - Read text
  - Find errors
- 2. Task: Preference
  - Provide feedback on preferred views
  - Suggest improvements

## Results

VS.

#### Performance:

- Participants did not identify many errors
- The faster they read the less errors were found
- The type of view used did not affect performance

### Preference:

- SplitView navigation was preferred (7 of 8)
- Only one person (a frequent digital reader) preferred the WebView

## **Future Work**

#### Suggestions:

- More interactive exchange between columns
- Additional columns, e.g. for overview
- "SelectView" for placing selected items
- Provide hyperlinked overviews for each reference (link to appearance in text)
- Enhance viewing options of graphics

#### References:

[1] N. Chen, F. Guimbretiere, and A. Sellen. Designing a multi-slate reading environment to support active reading activities. ACM Transactions on Computer-Human Interaction, 19(3):18:1–18:35, Oct. 2012.

[2] J. Franze, K. Marriott, and M. Wybrow. What academics want when reading digitally. In Proceedings of the 2014 ACM Symposium on Document Engineering, 99–202. ACM, 2014.

[3] T. Hillesund. Digital reading spaces: How expert readers handle books, the web and electronic paper. First Monday, 15(4), 2010.
[6] J. Pearson, G. Buchanan, and H. Thimbleby. The reading desk: Applying physical interactions to digital documents. In Proceedings of the SIGCHI Conference on Human Factors in Compu-

ting Systems, CHI '11, pages 3199–3202. ACM, 2011.
[7] A. J. Sellen and R. H. Harper. The Myth of the Paperless Office. MIT Press, 2003.

[9] K. Takano, H. Shibata, J. Ichino, H. Tomonori, and S. Tano. Microscopic analysis of document handling while reading paper documents to improve digital reading device. In Proceedings of the 26th Australian Computer-Human Interaction Conference on Designing Futures: The Future of Design, OzCHI '14, pages 559–567. ACM, 2014.

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