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Center Spotlight



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An Investigation into Ecologically Friendly Typography

A 2010 announcement, "[Going Green with Century Gothic](#)," by the Computing Information & Technology department at the University of Wisconsin Green Bay, claimed that changing the default font when printing from email and office applications could reduce printer ink consumption by 30%. This announcement also stated that printer ink costs \$10,000 a gallon and constitutes about 60% of the cost of a printed page. This announcement, although intriguing, contained very little data or resources and thus sparked several questions about the ink-saving capabilities of different font choices.

This month's research study—[Sustainable by Design: An Investigation into Ecologically Friendly Typography \(PICRM-2011-03\)](#), by Charles Bigelow, Dealva J. Dowd-Hinkle, Daniel Horowitz, & Garret Voorhees, which was inspired by this press release—focuses on investigating the claim of attaining ink savings by font changes, as well as the more general question of how typographic choices affect paper and ink consumption and, in turn, the environmental impact of the goods consumed.

The subject of this study was academic document printing at Rochester Institute of Technology (RIT). The preliminary research showed that the printing of documents is ubiquitous yet so varied in methods, applications, and standards that it is difficult to measure overall ink consumption for every department at RIT. Therefore, the area of study was reduced so that the parameters of printing, ink, and paper consumption could be more precisely

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Sample Fast Fact:

Traditional media advertising remains a more effective driver of online traffic than social networking, a multinational study conducted by consultants Deloitte UK and research firm YouGov has found.

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defined and measured. In particular, this research was focused on academic printing by graduate students within the RIT School of Print Media.

Methodology

Graduate students, during their thesis research, writing, and ultimate printing, consume the most paper among students, with **a base total of 856–896 pages printed**. This number is considered a minimum amount printed, as graduate students also print papers for classes, copies of articles and studies for their thesis research, rough drafts of their thesis (possibly in several iterations), and printed copies of the final thesis for editing. Taking all this into account, **an average total of 1,000 printed pages** per graduate student is a conservative estimate.

A sample text was created with Latin filler text at a standard thesis page length to test the full effects of the changes. In the School of Print Media, the average thesis length from 2007 to 2010 was 97 pages; this was rounded up to **100 pages** to give an even number for calculations.

The sample text was then formatted according to three different sets of parameters: **"Original,"** which followed the current guidelines in the most page-consuming way; **"Page Saving,"** which continued to use the current guidelines but in a more page-saving way; and **"Super Saving,"** which adjusted the formatting beyond what was defined by the current guidelines. The results were then compared to determine the kinds of formatting changes that had the most potential for reducing page use.

The choice of typeface as a means of saving printer ink was also investigated. The estimated ink consumption was compared not by measuring actual ink used, which was impractical given the wide range of devices and image marking technologies, but **by measuring the number of black pixels used to image each typeface at the same size, resolution, and text**. Figure 1 shows the number of black pixels used for a fixed amount of text in each typeface tested in the study.

Figure 1. Eco-font comparison

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About the eReview

The *eReview* is a monthly publication of the Printing Industry Center at RIT for registered Affiliate companies. Articles are also published in the quarterly printed publication *PrintReview*.

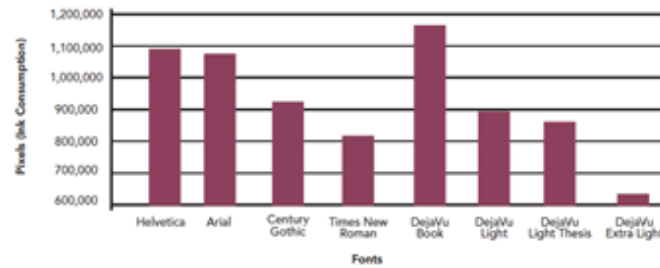
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Results

A high measurable potential for waste reduction was found. Specific results were as follows:

- Three typographic and page formatting changes resulted in **average page length reductions of 36%** for the sample thesis used in this analysis. Two additional formatting changes increased the page reduction to 48% overall (see Table 1).

Table 1. Page saving format changes on a 100-page sample text

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| Formatting Options | Original (100 pages) | Page-saving (63.5 pages) | Super-saving (51.2 pages) |
|-------------------------|---------------------------------------|---|--|
| Typeface | Arial | Times New Roman (8 pages*) | Times New Roman |
| Spacing | 2 | 1.5 (23 pages*) | 1.5 |
| Paragraph Spacing | line spacing after paragraph (24 pt.) | no line spacing, tab at beginning of paragraph (7 pages*) | no line spacing, tab at beginning of paragraph |
| Size | 12 pt. | 12 pt. | 11 pt. (9 pages*) |
| Margins (T x L x R x B) | 1.25 x 1.5 x 1 x 1.25 | 1.25 x 1.5 x 1 x 1.25 | 1 x 1.5 x 1 x 1 |

* Amount of pages saved per formatting change is rounded up to a whole number.

- The use of Century Gothic without other page formatting changes will not result in page reduction and the associated cost savings as reported in the media. Although potentially ink saving, Century Gothic was not found to be a good choice for the final suggested format.
- Through font modification conducted using industry standard software, it is possible to gain up to 19% ink savings over typefaces such as Arial by changing the

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About the Center

Dedicated to the study of major business environment influences in the printing industry precipitated by new technologies and societal changes, the Printing Industry Center at RIT addresses the concerns of the printing industry through educational outreach and research initiatives.

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attributes of other similar fonts.

Conclusions

Measurement of ink and paper consumed in the printing of documents must take into account not only font choices but also their spacing and arrangement within the defined parameters and pragmatic goals of specified documents. The typefaces and document layouts common in academic printing were not designed with the goal of reducing ink and paper consumption, but moderate changes in typographic format and fonts can result in substantial savings in ink and paper. Compared to thesis composition in Arial, the use of Times New Roman or a modified DejaVu Sans font can result in savings of ink from 19-25%. Compared to typical RIT thesis guidelines, thesis formats designed for economy can result in paper savings of 27-48%. **When dealing with students whose average page consumption numbers in the thousands, such as the graduate students at RIT, a reduction of even 27% (about 270 pages out of 1,000) can be a huge savings.**

Future Research

Anecdotal evidence suggested that the modifications in document formats and fonts did not appreciably reduce document readability or congeniality, but these factors should be investigated more rigorously. The goal of printing is, after all, communication, so modifications made to increase sustainability must not decrease readability or congeniality if printed communication is to remain effective. Another area of future research would be to determine the ink consumption and composition economy of additional typefaces and fonts and to make additional experimental modifications of fonts to achieve greater ink savings.

Complexity Rating: 1

Rating reflects complexity level of statistical analysis: 1=none, 2=moderate, 3=difficult.

2010-2011 Research Monographs

To read about this research in detail, download the monograph from: print.rit.edu/pubs/picrm201103.pdf

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