

Student Paper Waste Reduction

By Laura Hauser

Sustainable Campus

Professor Dick Hansis

Fall 2002

Problem

Three million sheets of paper are used in Academic Computing labs at Humboldt State University each year (Appendix A). If all 7,400 students use the labs, this means that each of the 7,400 students at HSU uses over 200 sheets of paper per semester. This paper is purchased from Boise, a large corporation that owns or controls over 2.3 million acres of timberland in Idaho, Minnesota, Oregon, Washington, Alabama, Louisiana, and Brazil. While Boise at least claims to be sustainable, even sustainable forestry has negative environmental impacts. Much of student paper use is unnecessary. Recycle bins in the computer labs often contain paper with headers from internet documents without any content at all as well as multiple copies of the same document. I decided to attempt to reduce this excessive paper usage.

Objective

To limit the amount of paper wasted in Academic Computing labs by making students more aware of their paper usage, and educating them about printing conservatively.

By how much 2,999,999 are used. Does that make a successful solving of the problem?

Alternative Solutions

Discussion

After meeting with Michael Winkler who has worked on many projects concerning paper usage on campus I decided to continue some of his previous work and consider the following:

Alternative One

Work with Academic Computing to have print quota software installed which would keep track of and put a limit on each student's printing.

Alternative Two

Design and display large laminated signs in all Academic Computing labs to educate students about how to reduce their paper usage.

Decision

Discussion

After researching many different print quota software programs I found one called Print Manager Plus that I thought would work well for our university. I presented the information to RJ Wilson, the manager of Academic Computing, and was told that quota software was too expensive and there was no interest in installing it. Through my research I learned that very few schools have the open printing policy of HSU. It seemed clear that there must be financial benefits from print quota systems; otherwise its use would not be so widespread.

When I discussed this with Mr. Wilson he stated that it was a \$100K/yr program to manage the software and keep track of student printing. It is his position that we are in the business of using paper and that paper is not really wasted very much on campus. I worked with Danny Byrnes, a Print Manager Plus Representative to build a case for the benefits of the software, but to no avail. Mr. Wilson was firm in his position. Clearly, encouraging the implementation of print quota software was no longer an option.

Educational Signs

I decided to carry through with a long-term educational component of the fall 1999 Sustainable Campus Purchasing Group's project by creating large laminated signs that inform students how they can reduce paper usage. I researched information to include on the posters by observing the content of paper left behind at printers and in recycle bins. I also requested suggestions from computer lab and Campus Recycling Program (CRP) employees as to what to include on the signs.

I designed a few draft posters and met with Mr. Wilson to get his input and suggestions, which were very helpful. I decided to include the following tips:

- Press print once ONLY...be patient when printing from the internet.
- Print multiple pages on each sheet of paper (option in the PC print dialog box)
- Use Print Preview and print only what you need.
- Cut and paste from the Internet into Word and shrink unnecessarily large text.

After the informational content was decided, I revised the poster graphics many times using Adobe Photo Shop in order to attract the attention of students. There are many administrative-looking signs that seem to be ignored so I did not want the poster to look boring and get ignored like the rest (see Appendix B).

Funding and Implementation

While working on the project I discussed funding with CRP office manager Phyllis Kellogg who said that they could fund the posters, although she was not sure in what time frame it could be accomplished. I was very anxious to get the signs printed and displayed before the end of the semester because I will not be here next semester to make sure it happens.

I was planning to fund the posters myself, however Mr. Wilson very generously offered to have Academic Computing pay for both the color printing and laminating of fifteen 11x17in signs. They were completed by University Graphics and hung in the labs on December 17, 2002.

Monitoring

Paper usage needs to be calculated again in one year in order to assess the impact of the posters on students' printing practices.

Computer Laboratory Printer Paper Test

Introduction

In order to see whether it would be feasible to use 100% recycled paper in the Academic Computing computer labs we conducted a 9-month test in two of our labs, GH218 and LIB121. Both labs had new HP LaserJet 8000 printers (four in GH218 and three in LIB121) installed. We used 100% recycled Badger Envirographic paper in GH218 and 100% virgin Matrix paper in LIB121. Close to one-half million pages were printed in each lab: 531,751 pages were printed in GH218 and 495,909 pages were printed in LIB121.

We compared the following between the two labs: number of paper jams that were reported to Academic Computing, paper dust accumulation, mechanical roller wear, and assessment of parts needing to be replaced.

Results

The following is a brief description of findings as a result of the 100% Recycled paper test:

Cleanings

The printers using 100% recycled paper had extensive paper dust. Therefore, additional cleanings would need to be done if Academic Computing switched to using only 100% recycled paper. Printers using 30% recycled paper, currently need to be cleaned four times per year depending on environment and usage. Extensive cleanings would be done two times per year by professional staff, and regular cleanings would be done two times per year by student staff. After visual inspection and analysis of the amount of dust residue, it was estimated that by using 100% recycled paper, the printers will need to be cleaned monthly. The breakdown of cleaning types would be as follows: four times per year extensive cleanings would be done by professional staff and eight times per year regular cleanings would be done by student staff.

Regular cleanings take 60 minutes per printer and can be done by trained student staff at \$8.50 per hour. Extensive cleanings take 120 minutes per printer and require taking out and cleaning some of the internal parts of the printer. An individual in a regular staff position such as the Equipment Systems Specialist would perform the extensive cleanings at \$20.00 per hour. This more detailed and technical level of service would include checking for worn parts and identifying problem conditions a student assistant might not necessarily recognize.

Academic Computing

Rollers

12/20/02

Rollers also wear faster on machines using the 100% recycled paper. Rollers in printers using 30% recycled paper need to be replaced every 125,000 pages. Rollers in printers using 100% recycled paper need to be replaced every 50,000 pages. There are six rollers per printer. Four rollers cost \$20 each and two rollers cost \$10 each for a total cost to replace the rollers on a single printer of \$100, including shipping and tax. Last fiscal year (7/1/00-6/30/01) we printed about 3,000,000 pages in the 13 computer labs managed by Academic Computing. Therefore, the costs for replacing rollers every 120K pages is 3-million / 120-thousand x \$100 = \$2,400.; and likewise replacing rollers ever 50K pages is 3-million / 50-thousand x \$100 = \$6,000.

Paper Jams

There were almost twice as many paper jams reported in the lab using the 100% recycled paper (average of 9.2 jams per 100,000 pages printed) as in the lab using 100% virgin paper (average of 4.7 jams per 100,000 pages printed). There are probably a large number of paper jams that go unreported and are simply cleared by users in the lab or the Help Desk, but these would probably be equally unreported in both labs. However, paper jamming does not seem to be a serious repair related problem as it does occur over twice as often with 100% paper as with 30%. Jamming does harm the students' progress toward completing their work as the jam takes time to clear and no printing can occur while the machine is being cleared. Additionally, most students know little about managing print queues holding stalled print jobs that stack up behind a jammed printer. Consequently, students either leave without the queued printouts (which print after the jam is cleared) or move to another computer connected to another printer, print their work and leave. In both cases, unclaimed printouts that print after the jam was cleared generally will cause more wasted paper. It is impossible to assign a cost to the wasted staff time clearing jams and wasted time of students who follow a jam (but don't know how to clear their jobs from the print queue). It is also impossible to assign a cost to any wasted paper due to jamming. Our main concern is still long term failures undetectable by this short duration test.

Supplies

Because of the extra cleanings that would be needed, there would also be additional supplies that would be used. These include toner vacuum bags and filters, plus brushes. There would also be additional staff time spent researching, ordering, and receiving the additional

Academic Computing

12/20/02

supplies. Thirteen additional Type 2 toner vacuum filters for toners and would be needed each year at a cost of \$62.40. The additional whisk brushes needed would cost approximately \$25.00 per year. Because we clean in teams, and due to normal wear and tear, two additional toner vacuums would be required per year at a cost of \$540.00. Total extra supplies cost for 36 printers will be \$630.

Additional costs associated with switching to 100% recycled paper

For the use of 30% recycled paper in all of the labs, the actions and events associated with maintaining the printers would be 2 regular cleanings per year, 2 extensive cleanings per year. Roller replacement every 125,000 pages. If we used 100% recycled paper in all of the labs, the costs associated with maintaining the printers would be 8 regular cleanings per year, 4 extensive cleanings per year. Roller replacement every 50,000 pages and extra cleaning supplies. The table below details various cost items.

Error! Not a valid link.

The additional maintenance costs therefore that would be incurred if we changed from 30% recycled paper to 100% recycled paper would be \$8,316 plus \$630 for extra supplies for a total of around \$9,000, for our yearly paper consumption of approximately 3 million pages and the current 36 printers.

Price Difference Between the Paper Types

The 100% recycled paper is about 30 percent more expensive than either 100% virgin or 30% recycled paper (100% virgin and 30% recycled paper are priced similarly). Paper prices can vary considerably day to day. The following table reflects the most current prices:

	100% virgin or 30% recycled paper	100% recycled paper
Price per ream (based on truckload)	\$2.35	\$3.05
Total costs based on 6000 reams printed in FY00/01	\$14,100	\$18,300

Paper costs per year would be \$4,200 higher if 100% recycled paper was used compared to either the 100% virgin or the 30% recycled paper (based on current prices, subject to change). If the amount of printing in the labs doubled, the cost differential would be about \$8,400. Currently, there are only two paper mills in the United States that produce 100% recycled paper. If that changes, the price of recycled paper could be affected.

Conclusion and Observations

Page 3 of 4

Academic Computing

12/20/02

The total additional yearly costs of utilizing 100% recycled paper in the Academic Computing lab with 36 printers would be \$9000 in extra maintenance items and \$4,200 in extra paper costs for annual consumption of approximately 3 million pages. That is estimated to be approximately \$13,200.

Proportionate additional increased costs would be affected by increased demand on printing (students printing more or Faculty making assignments needing more printing), additional labs with more printers or faster printers. All of the afore mentioned factors could increase costs either individually or in any combination.

One fairly ominous issue is the question of long term printer wear, which several equipment engineers cautioned us about. The hypothetical situation would cause premature printer wear and tear causing early replacement, before the printers reached the designed 1-million page count retire point. If this were to occur (and we really can't tell because of the relatively short duration of our test) extraordinary costs would be catastrophic for our limited budget to handle. At a 1/2 life expectancy replacement due to this hypothetical premature wear out there would be an extra replacement cost of \$2-\$3,000 per printer plus labor. If the printers lasted 3 years normally, for example, that would mean replacement in half that time because of wear and tear. For this fairly pessimistic hypothetical example, we could be replacing 24 printers annually (instead of 12) and possibly doubling our replacement costs of around \$24 to \$30,000 per year.

As you can see, there is a considerable amount of uncertainty to switching, once we have an acceptable formula; and if we switch because of outside pressure, how would we ever cover such open-ended costs that could potentially be budget busting.

Page 4 of 4