The One-Armed Bandit Syndrome: Overuse of the Internet in Student Research Projects

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I. Introduction

That students use the Internet for research is no secret; how they use it and how instructors should craft assignments so that students use it effectively are far more mysterious matters. A fair amount of research and writing has appeared in the recent past concerning the use of the Internet in instructional settings within the field of political science. Much of this work reflects upon and analyzes the incorporation of web-based techniques and tools for classroom instruction and for structuring the overall format of course content and administration (e.g., Young 1998; Crawford 1998; Kuzma 1998; Garson 1998; and Pollock and Wilson 2002). These studies generally indicate that there is a high degree of potential for the use of web-based instruction and note the proliferation of linkages between traditional textbooks and the Internet. Few, however, focus on the ways in which students use the Internet as a tool for traditional research papers and similar research-based projects.

Teaching faculty may be erroneously assuming that the Internet is simply a new arrow in the students' research quiver. While the arguments and findings presented here are not in the neo-Luddite vein—I am a great champion of instructional technology—they present a far less sanguine picture of the presumably neutral nature of this technology. The very real possibility exists that students overuse the Internet, much to their detriment and, most likely, to the growing consternation of their instructors, who are not yet fully aware of how patterns of student web usage contribute to poorer quality work. Moreover, there may also be a subtle, yet important, transformation taking place in terms of the topics students choose to research and in the ideological tincture of the information they acquire via the Internet. It is incumbent upon instructors to take these changes into consideration when crafting student research assignments.

The findings presented here are based on the first phase of what is planned as a larger study of Internet use patterns of undergraduates. The problems associated with overuse of the Internet as a research tool for undergraduates are discussed in light of the findings from this study. Possible strategies for avoiding these pitfalls are also offered.

II. Background—The Problem

Gamblers, especially slot machine players, tend to believe that their investment of time and money in gambling will pay off if they stick with a particular machine. The thinking goes along these lines: "My money is in that thing. It has to pay off sometime. Therefore, I should keep playing." The hypothesis presented in this paper works along the following logic: Students doing research on the Internet are very much like gamblers playing slot machines; time has been invested, effort has been invested. Since most, if not all, information is somehow accessible via the Internet, there is the assumption that they should keep searching for the information jackpot.

The hypothesis begs a question: So what? That is, so what if students spend large amounts of time searching the Internet for information? The problems fall into three categories: (1) the scope of information available; (2) the ways in which information is used; and (3) the effects of the trend towards online research on traditional research sources.

(1) The Internet does not contain everything and, increasingly, information is walled off behind subscriptions and other barriers. Conversely, in some instances, so much information is available that it can overwhelm student researchers. Also, the ways students use the Internet necessarily limits the type and amount of information they will get on a subject. (For example, there is the "hidden" Internet, which is not accessed by most popular search engines. In some cases, search engine companies have bowed to legal and other pressures to eliminate "offending" pages from their search matrices.)

(2) Some students find a strong temptation to use the Internet in academically questionable ways, such as the many forms of plagiarism.

(3) The convenience of Internet-based research takes a toll on traditional library-based resources, making these long-established tools underutilized by student researchers. The budgets for materials acquisition seem to get tighter every year, making it harder to expand collections while, at the same time, the slackening use of these resources undercuts arguments for their continued expense. Sadly, students may see hardcopy and other more traditional research materials as less worthy of their attention, robbing them of excellent resources already in the collection of a campus library. Such is the aura of the Internet to award legitimacy.

Do students undertake research in ways that fit with the collection of potential problems just described? Are they "problem" researchers in ways similar to those viewed as "problem" gamblers?

Anecdotally, there is abundant evidence that this is the case. If you are a classroom instructor, you have probably had the experience of students discussing research projects, lamenting "I can't find much information on my topic. I spent hours looking on the Internet and its just not there." Also, it is clear that research papers for courses are increasingly based on research done on the Internet. Reference lists are now populated with *http://www* . . . and, arguably, the quality of information and the argumentation can suffer for this. Instructors are often aware of sources (usually books and articles—often noted in the syllabus and contained in the bibliographies of assigned readings for the course) that are superior to online resources and which would have greatly improved the quality of their students' work. These hardcopy resources often go to seed.

III. Research Design

For this first phase of the study, 119 students were surveyed from six courses

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taught by members of my department. Demographically, the sample was fairly representative of students on this campus in terms of basics such as age and gender. The typical student in the study reported a 3.00 GPA overall, and a GPA of 3.25 in his or her major, average research, writing, and computer skills, and a better than average feeling of comfort with technology in general.

Each student was asked to answer a set of questions designed to test the hypothesis concerning overuse of the Internet for research projects. As with gambling, it was likely that social stigma and personal delusion would color the ability of the subjects to candidly respond to questions about the exact amount of Internet use on research projects. Therefore, a series of questions designed to elicit this information in less confrontational tones was included in the survey battery.

IV. Findings

The students sampled for this study clearly use the Internet for all major phases of the research process. The survey data that illuminate this general finding are discussed here in a linear progression reflective of these phases.

Phase One—Topic Selection and Student Perception of Research Tasks

Students gravitate toward the Internet from the very beginning of the research process. Respondents were asked, "When you are picking a topic for a paper or a project, do you consult the Internet before you make your choice?" Figure 1 depicts the results.

While a third of the sample indicated that they never consult the Internet in the topic selection phase, the other two thirds did employ it, at least some of the time. Most interestingly, 8% indicated that they always used the Internet before finalizing the selection of a research topic. Additionally, when asked "In general, what is your first step when you do research?" 76% responded that they seek the Internet over library personnel, old-fashioned hard-copy sources, and their professors. These findings indicate that the web seems to act as both a muse for ideas and topics as well as a source of validation for topic selection. Students gain comfort in this early stage of research from the knowledge that germane material exists at the click of a mouse. Perceptive instructors may feel a pang of loss at this notion, given the fact that the popularity of a topic does not always directly correlate with the topic's import or its appropriateness for an assignment. Once the topic is chosen, the majority of students surveyed continued to work the Internet as the main source of their information and data, as shown in Figure 2.

Figure 1
Percent Consulting Internet for Topic Selection*

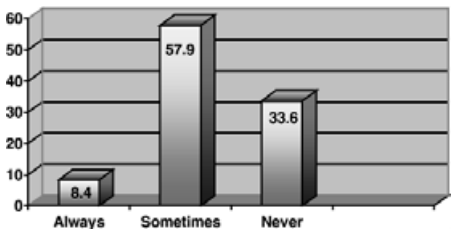


*Figure totals may not equal 100% due rounding.

While the 36% of respondents who rely on the Internet for half or more of their research is a substantive finding in and of itself, the nearly 17% of students using the Internet for three quarters to all of their research should give instructors pause. If the overall trend for the future is to hope that the Internet will carry the weight of research resources—as opposed to investment in, say, hard-bound volumes—then the percentage of students exclusively, or nearly exclusively, employing web-based research strategies will grow out of necessity as well as predilection. Therefore, instructors and academic resource managers must evaluate the effects of this shift on the quality of the educational experience enjoyed by students.

Are instructors stoking a misplaced faith in the power of the Internet to pay off with data jackpots? A question in the survey battery concerning just how often students believed that they were given assignments that could be done primarily via Internet research provides some provoking results, as indicated in Figure 3.

Whether the responses found in figure 3 are the result of the misimpression of the students or the intentional crafting of assignments by instructors cannot be known from the survey question. However, the findings are clear that the students sampled believe that, in their experience, only a few research tasks fall outside the scope of Internet coverage.

Phase Two—Student Internet Research Techniques

Once the topic has been selected and the gathering of data has commenced, how do students use their most relied upon tool? Where do they first turn for knowledge on a subject? Figure 4 contains the findings for the following question: "When you use the Internet as a research tool, what do you usually do first?"

Figure 2
Percent of Research Done Via Internet

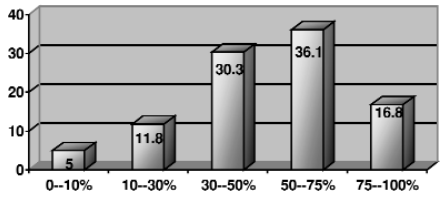
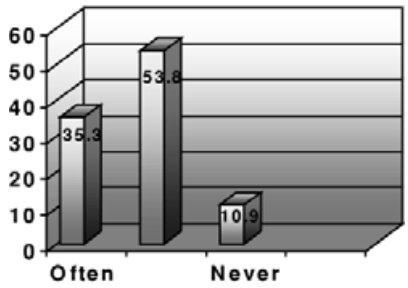
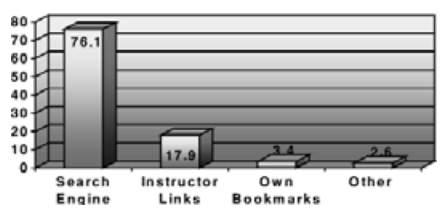


Figure 3
Percentage of Assignments Done Using Internet



Commercial search engines like Yahoo!, Excite, or Google are the clear preference for student researchers. Such engines are quite useful for churning out vast numbers of hits on key words. As most Internet users know, however, the quantity and quality of hits are not always positively correlated. It is additionally worrisome to note that popular search engine companies function more as information filters than direct reflections of the complete universe of data and available knowledge. For example, researchers with the Berkman Center for Internet and Society, part of Harvard Law School, note sizeable variations in the content of searches done via Google by U.S. users and those done by users in

Figure 4
First Move on the Internet



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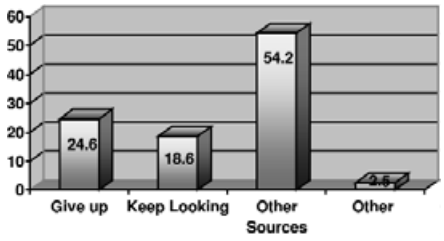
France and Germany. A rather high profile incident between the Church of Scientology and Google resulted in the search engine company's removal of a number of sites from Google's search matrix that the Church found objectionable (*New York Times,* 22 April, 2002). Woe be it to the student seeking web sites vanquished in the name of the Digital Millennium Copyright Act, the basis for numerous lawsuits designed to constrain web content. While Google does not stand as the lone search engine company to feel the pressures to curtail its content, its trials do serve to remind us that the most popular means of searching the web are restricted in scope. While information limits were always the case in the days when hard copies reigned, facing the boundaries of the library's holdings usually instilled a desire to know what was out there in the larger base of knowledge that might just exist somewhere. This points out one of the key challenges for the student researcher in the information age; an Internet search that comes up dry may erroneously signal the end of the world's knowledge when, in fact, this is not true.

In addition to the limitations concomitant with the use of search engines, the Internet is increasingly a pay-as-you-go proposition. Sites that once offered content for free are drying up as content providers attempt to find a way to make the web profitable. Even when colleges and universities spring for the cost of accessing content, a troubling trend is for publishers to spike the price of hardcopy versions of their offerings as a way of steering a course toward adopting electronic versions of the same material offered at a lower starting cost. Once the users are habituated to the new online format, the providers may then bundle the desired service with other unwanted items, all of which are used to justify a higher price. Institutions with limited budgets may feel the way consumers of cable television do when they realize they pay a great deal to get very little of what they truly want.

Phase Three—When Trouble Strikes . . .

A frustrating aspect of even the most brilliantly conceived research strategy is that posed by the numerous dead ends that populate the endeavor. Professional academics, veterans of long days spent in search of lost documents and incorrectly shelved books, know of these happenings and even expect their research to hit the occasional snag. How do undergraduate students, now inculcated with at least the penumbra of

Figure 5
When Internet Doesn't Produce . . .



belief in the totality of the information on the web, react to research set backs?

To plumb this subject, the study's survey questionnaire asked the following question: "If you can't find much information on a topic on the Internet, you would be most likely to use other sources (such as the hardcopy collection the library), give up, try another topic, keep looking, or other? The results of this question are depicted in Figure 5.

While the approximately 57% of the respondents who indicated that they would use other means besides the Internet is heartening, the nearly 44% who would either fold or plod on is a finding of concern. 24.6% would rather switch topics than seek other sources of information and data. Assuming that humans are rational beings makes this understandable. Again, as argued above, the Internet acts to validate the intellectual worthiness of a student's choice of topic; no hits on a Yahoo! search must mean that the topic is no good. Moreover, the ease of asynchronous, remote data gathering is a variable worth considering in any calculation of costs and benefits. More arresting is the 18.6% of respondents that will continue to search the Internet for what may not be available. Of course, if one were to understand the workings of the "hidden" Internet, the part of the web not search engine-accessible or that otherwise cloaked from ready access, then the result here is less a cause for concern. However, such understanding does not seem to be the case. The open-ended comments on the survey did not indicate much in the way of alternate knowledge of searching the Internet beyond the use of major brand search engines. It is more likely that the respondents in this category are "problem" researchers.

The Return of the Slot Machine Metaphor

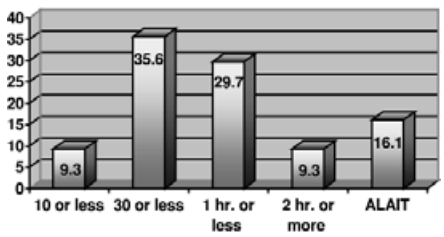
If the hypothesis of this study, based on the belief that some students overuse the Internet in much the same way gamblers waste their efforts on slot machines, is valid, then knowing how much time students spend in their research quests is important. Figure 6 provides a breakdown of the responses to just such a question.

The easy majority of respondents spend an hour or less before they move on or give up. Less than 10% labor for two or more hours. It is as though a gambler hits the floor of the casino for a few hours of risk taking, loses more money than projected, or sees the fates allied against him or her, and heads for the parking lot. If this were true of all gamblers and students, then there would be little problem. However, the far left segment of Figure 6 carries the abbreviation A.L.A.I.T., standing for "As Long As It Takes." Just as the problem gambler is unwilling to give up his or her slot machine ("My money is in that thing!"), a problem researcher waits for the investment of time online to pay off in an information jackpot. If this is the case, over 16% of respondents involved in this study might fall into the category of "problem" researchers, a higher percentage than the number of problem gamblers in the U.S. today.

Borrowing here from the study of the psychology of slot machine gambling, researchers (e.g., Griffiths and Parke 2001) note several "player-specific" factors limit survey research:

- **Activity engrossment.** "Tuning out." Becoming so involved that you lose track of time. Are students simply unaware of how long they are surfing? This seems highly probable and may indicate an underreporting of the percentage of students engaged in counterproductive research behavior.
- **Dishonesty and social desirability.** Excessive gambling is a vice—it has a social stigma, therefore survey respondents in studies of slot machine gambling lower their estimations of time spent on the machines. Do students sense that professors conducting survey research want them to

Figure 6
Time Spent Researching Topic on the Internet



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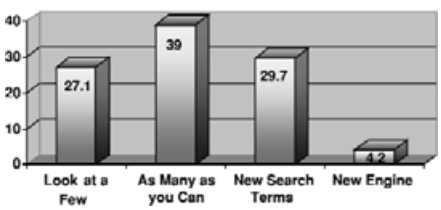
use a plurality of resources for their course projects and papers? As with the issues associated with activity engrossment, probably so. Do students dissemble when faced with reporting their own wasteful use of time? Again, the logical answer is likely yes.

Even a brief dive into the research on the social psychology of slot machine gambling indicates that researchers in this field often encounter factors, such as activity engrossment and the like, that make reliable data collection difficult. This reality provides reason to believe that using survey instruments to measure student use of the Internet suffers from very similar limitations and seems to counsel the use of experimentation in the future. However, there is some evidence for engrossment and dishonesty coloring responses in this study's survey results. For example, consider this question: "If you are confronted by a long list of web sites produced on your topic by a search engine, which are you more likely to do?" Figure 7 contains the data reported by the respondents.

Having nearly 40% of the respondents indicating that they are willing to plug away in order to investigate as many of the hits as they can raises the suspicion that, if this finding is accurate, the other survey results concerning the amount of time spent in pursuit of elusive or nonexistent information may be much higher than indicated here. That is to say, it may mean that students are dissembling when they provide information about the amount of time they waste in unproductive endeavors.

While this study is exploratory in nature and, clearly, experimentation with student subjects may be necessary to get at the questions raised about engrossment and dishonesty, one key point is now evident: If just 15–20% of this study's respondents are overusing or misusing the Internet as a research tool (those going through as many hits as possible, spending as long as it takes to find information), then a sizeable population of students are in need of help.

Figure 7
If Confronted with a Long List of Hits . . .



V. Suggestions

What follows are a few tactics that could help students broaden their palate of research methods and sources. They generally involve some limitations on students' use of sources and require a significant upfront investment of an instructor's time and imagination.

Keep the Baby, Change the Bathwater

Create research assignments that come with a set of instructor-prepared links to specific web sites and require students to use these sites exclusively or as a large part of the research portion of a project. For example, students may shy away from using a site as potentially daunting as the one maintained by the Federal Elections Commission. It does not dump fully digested information in your lap. One must use it as a tool to compile data. This means the instructor should demonstrate the use of such web sites prior to turning students loose on them.

Require the use of a Multiplicity of Resources

This is an age-old method of ensuring against data mining from one or only a few sources. Create assignments that require a specific amount of citations from "X" number of books, from "X" number of scholarly journals (hardcopy), and so on. Students sometimes chafe at the notion of thresholds for different sources, calling them limiting or, worse yet, busy work. However, requirements that get students into the campus library and into the stacks and journals can only serve to reinforce the notion that the Internet is but one of a plurality of sources for the researcher committed to his or her task.

Reconsider "Free Range" Student Research

The Internet is an increasingly rich trove of information, but its present limitations make it unwise to allow students to use it as their exclusive source for research projects. The standard model of research papers—letting the student have control of the topic and the sources used (what is termed here as "free range" student research)—is still a useful format of assignment, especially for upper division courses where students have previous exposure to the formal collegiate writing style and the expectations academics have about the thoroughness of research and the subsequent documentation and citation of that research.

Unfortunately, it is with increasing ease that marginal students can resort to the ultimate academic research sin—plagiarism. This study asked its respondents about the need to cite sources and the use of papers purchased over the Internet, and the responses were overwhelmingly positive—they know they must cite all sources and that using the work of others as your own is not a tolerable practice—yet if an instructor is set on a free range approach to research projects, they might consider the use of anti-plagiarism technology to screen papers. On many campuses (my own included), faculty can use Turnitin.com, an electronic data base of papers and web pages, to scan electronically submitted papers for "cut and paste" plagiarism—taking verbatim sections of documents on the Internet and pasting them into a paper without citation. Much of this type of plagiarism is easy to spot, especially when students who are poor writers suddenly sound like polished scholars mid-paper, but the task gets harder for the instructor as more papers written by students show up on the web on things like Internet-based scholarly conferences for undergraduates and on course web sites featuring peer review of written work.

At present, requiring an electronic version of papers and projects for analysis by anti-plagiarism software is a fairly simple additional requirement that hardly raises a student eyebrow. Some students even seem to prefer "paperless" papers in that they solve the problems of sputtering ink cartridges and faulty staplers.

Switch to Critical Analysis and Student Data Gathering

Undergraduate students are often well served by assignments based on the critical analysis of scholarly works of research coupled with their analysis of data gathered on their own. For example, having students read two opposing views from the findings of scholars focused on the public's opinion of the presidency or Congress dovetails nicely with their own analysis of data gathered from existing polls or from surveys conducted themselves. The opportunity to compare the arguments, findings, and methods of scholars with their own work is a valuable experience

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that underscores the nature of quality research.

VI. Summary and Conclusions

Most students—and many academics themselves—see the Internet as a somewhat magical font of wisdom. So much is "out there" that one may deceive him or herself into thinking that everything is, indeed, "out there." Of course this is not true. Moreover, search engines, the most popular means of interfacing with the vastness of the Internet, fail to uncover some forms of data. This camouflaging may be by innocuous omission, structural limitations of the technology involved, or, most troubling of all, by the capitulation of search engine companies to the demands of various interests. One must not forget that the brave new world of the web is still tethered to the old world of profit, loss, and pressure. In this way, the Internet is a microcosm of politics, and power is relevant here, too.

A percentage of students overuse and even abuse the Internet as a research tool, just as a segment of society falls prey to the get-rich-quick promises of the gambling industry. Both problem recognition and definition are key to solving any problem and, as illustrated by this study's findings, the Internet poses problems for student researchers. Since instructors are policy makers, in the sense that they attempt to direct some aspects of their students' academic actions, gaining a higher level of recognition about the patterns of student Internet usage and adopting appropriate techniques to help students use it wisely are now a requisite part of the instructional experience.

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