

Growth in Internet-based research amongst researchers

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From evidence derived via online statistics it is clear to see that the Internet is still growing in terms of users and in terms of researchers. This article explores the growth in Internet-based research for the purpose of secondary data mining and primary data gathering, by reviewing Internet use on the part of various researchers in various disciplines. The use of the Internet for qualitative research is reviewed and comments on the debate on the value and validity of on-line research is made. Specific scholarly research is reviewed and the use of the Internet by librarians, research assistants and scholars is explored. Ultimately growth in Internet based-research cannot be argued, however validity and accuracy in on-line research can be further explored.

Key phrases: electronic resources, Internet-based research, online research, qualitative research, research, Web research

INTRODUCTION

Advantages of the Internet, as a medium, compared with other traditional forms of communication, in terms of flexibility, speed and volumes of data, make it an obvious choice for researchers. Growth in general Internet use over the last five years has seen Internet users rise from 500 million at the end of 1999 (Treese 1999:Internet) to 972 million in November of 2005 (Internet World Stats 2005: Internet). With the target set on 1 billion by the end of 2005, this communication medium is still the fastest growing communication channel of present time. According to New Media Review (2005: Internet) nearly 60 million people in the US use search engines on an average day. Search engines have become an increasingly important part of the online experience of American Internet users, according to New Media Review.

A study performed by Pew Internet & American Life derived the following data: Over the past year there has been a sharp increase in search activity. From June 2004 to September 2005, the use of search engines on a typical day rose from 30% to 41% of the Internet-using population, which itself has grown in the past year. During the same period, the total number of people using search engines on an average day jumped from roughly 38 million to about 59 million, an increase of approximately 55%. It is clear that the use of search engines is edging up on e-mail as the primary Internet activity on any given day. However, the Pew data shows that on a typical day, e-mail use is still the most popular Internet activity. On any given day, about

52% of US Internet users send and receive e-mail, up from 45% in June of 2004. Pew data shows that 91% of all Internet users have at one time sent or receive e-mail, compared to 90% of Internet users have used search engines.

To put e-mail use and search-engine use in perspective, Pew compared them to other Internet activities on an average day. Online activities of US adult Internet users in September 2005 (as a % of respondents) were as follows:

- E-mail: 77%
- Search engine: 63%
- Get news: 46%
- Do job-related research: 29%
- Use Instant messaging: 18%
- Do online banking: 18%
- Take part in chat room: 8%
- Make a travel reservation: 5%
- Read blogs: 3%
- Participate in online auctions: 3%

From the evidence above it is clear to see that this growth includes people from all facets of society, inclusive of researchers. This article intends to explore the growth in Internet-based research for the purpose of secondary data mining and primary data gathering.

COMMENTS ON INTERNET USE IN VARIOUS RESEARCHED DISCIPLINES

Duffy (2000:350) comments on the use of the Internet for research in the health sector, in an article published by Oxford University Press. She states that the advantages of the Internet over more traditional research media are numerous. In this new electronic environment, flat, paper-based research articles can become multi-layered, cross-referenced, live resources with integral audio and visual material and links. Users can, from a single entry point, explore and capture numerous additional bundles of information from organisations and individuals across the world. Through a growing number of e-mail newsgroups and focused discussion forums, researchers and research users can communicate and collaborate with extensive networks of professionals and public interest groups. Here they can keep pace with many developments long before they reach a print outlet (indeed, assuming they ever do). It is this speed and flexibility of information exchange that represents probably the single most important benefit of the Internet.

Ongoing software advances bring new possibilities. All the time-user profiling, for example, paves the way for the specific information needs of different users to be anticipated and for personalised channels to be provided through web sites in the search for the required information. The Internet also provides an outlet for a wealth of research material that is typically missed by the mainstream journals and print publications. The main reasons are because it does not meet their requirements of evidence, because it is not considered unique or newsworthy enough, or simply because the researchers (frequently non-academic) have too many other priorities and never find the opportunity to produce the findings in a suitable format.

The Internet allows this 'grey literature', which contains valuable information of use to many health researchers and practitioners, especially about work at a local level, to be provided on a widely accessible platform.

And not least, the Internet represents a powerful democratising force in research. The accessibility of many 'professional' sites by lay members of the public and the increasing attention being paid by organisations to the rights of 'consumers' to have access to research information, especially when it is publicly funded, are making researchers more accountable. This will increase the expectation on researchers and research translators to present findings in different formats, with different audiences in mind, in plain language and in summary rather than only in the often overlong and overblown academic style. This in turn is likely to lead to more diversity and improved design in the web sites of large national bodies catering to many different user needs (the excellent and extensive Health Canada site is a good example here).

According to Duffy, the potential of the Internet as a research dissemination resource is to an extent bounded only by the imagination and skills of those who build and use it. But it is no panacea. At the 1999 launch of two web sites from the Health Education Board for Scotland, the keynote speaker, Nicky-Sinead Gardner, Professor of Academic Innovation at the University of Stirling, reminded the audience that 80% of the world's population had yet to make their first telephone call. From the point of view of lay users, limited access is an ongoing concern because it maps onto existing patterns of exclusion, the growth of Internet use being predictably in the homes and in the workplaces of those who are economically better off.

However, the Internet is increasingly appearing in public spaces, community centres, libraries and other places where wider access is encouraged. Schools now bring it to those who might otherwise miss out, helping to make children more computer literate

and less afraid of the new medium, and accounting in part for why the highest level of use is among the young. Moreover, the ubiquity of free subscriptions to Internet Service Providers (ISPs) is already reducing the cost burden that was formerly the single biggest identified barrier to use. As technology advances, more user-friendly modes of access will open up, entry-level prices for hardware and software will be driven down, and usage figures will inevitably increase further and faster over the next few years.

Duffy (2000:352) concludes by stating that in one respect the Internet is simply another medium for transferring information and it is constrained by many of the same factors that impinge upon books, journals, seminars and other formats. Like them, it is only as good as the information it carries: if research is low grade, if shoddy work could not for good reasons get published elsewhere, making it available through the Internet will not make it better. If good research is presented in an inaccessible way, or without the implications for different audiences clearly drawn out, people are as likely to be put off as when faced with an over-technical journal article or a thick, single-spaced, paper report. Many of the common sense lessons we have learned about how to present information in print apply equally to the Internet. However, there are also unique features of this new medium that allow us to do things not possible before and have the potential to really change the way we think about, carry out and communicate research, creating a linked global research community and linking this in turn to research users in all sectors and at all levels of society. The fact that, by the time this paper appears in print most of its facts and figures will be out of date, testifies to the growing importance of the Internet in public and professional life.

A final sobering thought amid the enthusiasm for new technology is that, even if all key research findings and their implications were available on the Internet in an appropriate format and at the right time, and even if all health practitioners and policy-makers were online and adequately skilled to access and absorb them, decision-making would remain a complex process, rarely based only on a rational appraisal of evidence. Duffy's argument is simply that building, refining and extending the reach of research through the Internet, while in itself not a sufficient step towards an evidence-based Nirvana, is without doubt a necessary one.

Studt (1998:20) reviewed how researchers use the Internet. Although this study is seven years old, the relevance today comes from the early adopters' attitudes toward research via electronic media. Studt received feedback to the survey and comments

as follows: "The Web has become a black hole, using too much time to get nothing," noted one PhD government chemistry researcher in a recent R&D Magazine reader survey on how they use the Internet in their research and work. But for the majority of the readers who responded to the survey, the Internet has become a vital tool for their work, affecting how they communicate, collect data, publish reports, and do their research.

While most of the respondents indicated the numerous limitations of using the Internet in their work (and possible ways to correct those failings), almost all of the respondents said they would continue to use the Internet in their work. Most said that their use, as extensive as it is now, would expand over the next several years as new technologies become available that improve its performance and utility.

More than 600 researchers responded to the survey from a typical cross-section of science and engineering disciplines; industry, government, academic settings and educational and work experience levels. Of those responding, nearly 90% indicated that they use the Internet in their work or research. Since the Internet and its current implementation via the World Wide Web originated as a communication tool for researchers nearly 30 years ago, it should not be surprising that the level of Internet activity is as high as it is. Neither should it be surprising that since the respondents, in general, were early adopters of the Internet's current technologies, that they should also favour Netscape's original version of the World Wide Web browser by a three-to-two margin over the "upstart" Microsoft Internet Explorer browser. In reality, many researchers use both browsers, since 73% of the respondents said they use Netscape and 54% said they use Microsoft IE. Only 7% of the respondents indicated that they use other browsers, including Mosaic (the pre-Netscape creation of Marc Andreessen while at the University of Illinois, Urbana-Champaign) and Opera.

About half of the respondents said they made their Internet connections through a local Internet service provider (ISP). A significantly smaller number said they made their connections through, what some referred to as an "outdated" AOL (America Online) interface. On the other hand, about a third of the respondents, since they made their connections through their employers' services, used the connections without even knowing how it was made.

While Internet-based collaborations are currently hot topics in the research arena, especially in chemical software analyses, actual applications and use compared to other applications is relatively small, garnering responses from only about 6% of the

survey respondents. Remote monitoring and virtual reality are even smaller applications with only about 3% of the researchers surveyed working in these areas.

Asked what Internet application areas would increase the most over the next two years, R&D respondents indicated that the present relationships would just improve. Finding technical information would get stronger as would finding new product information and communicating via email with peers. Text, images, and non-spectral data were the three most dominant types of information transmitted by researchers over the Internet, according to the R&D Magazine survey, garnering nearly 100%, 50%, and 50%, respectively, of the respondents' choices.

Since most researchers use search engines and Studt's survey showed that in 1998 as many as 90% of researchers used the Internet for research, the use of search engines becomes an obvious place to explore Internet-based research activity.

Hawkins (2005:37) reports on the association of information and dissemination centers (ASIDIC) March 2005 meeting as well as the Infonortics Ltd. 10th Annual search engine meeting. While both meetings covered search engines, Infonortics covered more specifically new technologies and research advances using search engines. Much anticipation was shown by librarian and research assistants towards the new "Google Scholar" software, with more than half the respondents at the meeting saying it would improve research performance.

THE INTERNET FOR QUALITATIVE RESEARCH

O'Connor & Madge (2003:133) concluded a paper which contributes to the debate on the value of online research whilst looking at the virtual synchronous group interview. They claim the Internet is a valuable methodological research tool and is increasingly being recognised by both market researchers and academics. Their paper specifically introduces the use of a software conferencing technique called *Hotline Connect* and discusses the implications of using the technique for Internet-based research. In particular, issues of interview design, developing rapport and the virtual venue are considered. The paper draws on the experience of a recent research project entitled "cyber-parents" and concludes that the use of conferencing software holds great potential for synchronous online interviewing.

O'Connor & Madge conclude that cyberspace technologies are without doubt "... transforming space-time relations and creating new social spaces that lack the formal

qualities of geographic spaces" (Kitchin 1998:386). This can provide several innovative potentials when considering using Internet-based methodologies, as highlighted in their paper. In particular, the use of Hotline Connect conferencing software enables researchers to synchronise interviews in a virtual space and to interface with groups, such as new parents, who may be difficult to reach through conventional research approaches.

Problems encountered were that the researcher is reliant upon participants having access to a suitable computer, and there is a dependency upon a considerable level of motivation, interest and some technical knowledge on the part of the interviewees. Not least the physical aspect of interviewing online should be considered, as it is more demanding than it would appear. A final yet perhaps most important consideration lies in the fact that Internet access remains restricted to certain groups of people; therefore, the potential for research outside these user groups is limited. Whilst there clearly are reasons for caution in carrying out online research, the advantages, such as low costs, the ease of transcription and the possibilities for international research, continue to make it an attractive option.

In addition to interviewed research, some research requires importance be given to ascribing some cognitive authority to Internet information. Fritch & Cromwell (2002:242) discuss in their paper "Delving deeper into evaluation" basic evaluative criteria for ascribing authority, they also discuss descriptive technical tools for investigating authorship and conducting more advanced research. It is concluded that librarians and information scientists need to be devoted to maintaining their professional expertise in determining the trustworthiness of networked sources. They need to dedicate time and effort to making distinctions between different types of authority, developing criteria that may be drawn from them, and contributing to the future evolution of mechanisms for authenticating electronic information.

INTERNET BASED ELECTRONIC RESOURCE FOR SCHOLARLY USE

Zhang (1999:746) set a baseline for scholarly research using electronic resource it was done by surveying a group of library and information science (LIS) scholars. Results reported here include researchers' demographic information, frequency of use of various Internet tools and resources, ways of accessing various Internet tools and applications, strategies of locating e-sources for research, opinions on citing e-sources, evaluation of e-sources, and suggestions for improving scholars' use of e-sources for research.

Zhang reported a trend of increased use of e-sources for scholarly purposes. However, the details regarding scholars' use of these sources were still unclear as were the problems and concerns scholars have when they use e-sources for research. Zhang's survey was part of a larger project on scholarly use of Internet-based e-sources and aimed to establish a baseline of the uses as reported by a group of library and information science researchers. Moreover, this survey investigates how to improve scholarly use of Internet based e-sources from researchers' perspectives.

Zhang's results were interesting, to say the least. 37.4 percent of the survey respondents claim to have used e-sources but not cited them in their bibliographies. Reasons ranged from not knowing how to cite them correctly, to having cited paper version of the same article. The average respondent's Internet usage was 8.9 years. Half of the respondents rated themselves as above average Internet users on a Likert scale of 1 to 5. Ultimately it appeared that the workplace was the primary location for gaining access to Internet resources and the home was secondary. Libraries did not serve as a major access point.

Hirt-Marchand (2005:30) claims that web-based research can be very effective in supplementing competitive data analysis by providing both quantitative and qualitative perspectives. She claims that there has been a growth in online research and that it can be attributed to its many advantages – timely, reliable data collection providing real-time, instant access to target audiences' opinions at reduced costs. She states that the Internet allows responses that are automatically tracked, to be collected in a matter of hours. Since web surveys are easier and more convenient to complete response rates can be significantly higher, resulting in increased data accuracy and reliability. With fewer resources needed for recruiting and incentivising respondents, significant cost savings are achieved. There is also the potential for efficiently locating hard-to-find respondents or those who are reluctant to participate in more traditional research. It is ultimately claimed that for anonymity and 24-hour-a-day convenience, no other methodology rivals the Internet.

CLOSURE

Not all sources show the Internet as the panacea for research material. McCausland (2001:24) claims that tax practitioners are embracing web-based research with varying degrees of enthusiasm, depending on vendor costs, client needs, and local

bandwidth infrastructure. Search engine ease of use and availability of printed material tend to keep tax practitioners away from the Internet as a medium for research.

While some industries are keeping away from the Internet, it would seem the most are embracing the Internet as a research medium. Further research should be done in verifying the accuracy of data involved with Internet-based research.

As a final point: this article was written solely on the basis of e-research. The following methods of research were followed:

- Research assistance via local university by way of a research assistant
- Use of e-mail correspondence.
- Internet research via search engines, mainly Google and Yahoo.
- Direct site visits to statistic researchers and demographic analyses sites.
- On-line journals.

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