THE INTERNET AND HIGHER EDUCATION:
DISSERTATIONS USING INTERNET CITATIONS
FROM 1989-1998 AT
OKLAHOMA STATE UNIVERSITY

By

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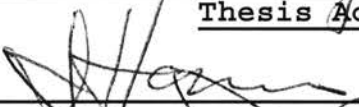Oklahoma State University
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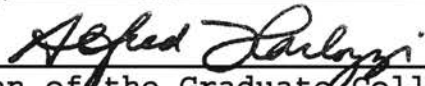OKLAHOMA STATE UNIVERSITY

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CHAPTER I

INTRODUCTION

The Information Revolution

Like the ancient scholars who turned to the legendary
Library of Alexandria, in the modern world, students are
now turning to what one might call the modern-day Library
of Alexandria - the Internet. Campbell (1995) explains how
the world of information is virtually at one's fingertips:

> Today, the Internet extends any student's learning
> resources to schools and organizations around the
> globe. Students can read articles and text stored on
> computers in Europe or Australia as easily as they can
> access materials in their campus library. (p. vii)

The full potential of the Internet in association to
education is still being explored. In the earlier days of
the Internet, only a few students had the opportunity to

access the increased database of knowledge being provided by the Internet. Hardin and Ziebarth writing for the National Center for Supercomputing Applications at the University of Illinois (1996) describe that the early application of the Internet to education was limited, "It (the Internet) did provide an opportunity to expand learning options for teachers and students who were fortunate enough to have Internet access, a few computers, and appropriate guidance on usage" (p. 1).

Even for those students who were fortunate to have Internet access, resistance to using the Internet in the classroom existed. One possible reason might have been due to the fear of what type of information was being found available on the Internet. Oppenheimer in his 1997 article, "The Computer Delusion," interviewed Stephen Kerr, a professor at the College of Education at the University of Washington. Kerr edited the book, *Technology in the Future of Schooling* (1996). Kerr voiced his prevailing concerns about using the Internet in conjunction with the classroom, "It's information by anyone, for anyone. There's racist stuff, bigoted, hate-group stuff, filled with paranoia; bomb recipes; how to engage in various kinds of crimes, electronic and otherwise; scams and swindles. It's all there. It's all available" (p. 12).

Oppenheimer (1997) explains another reason for resistance is a result of the inherent complexity of the Internet:

Older students may be sophisticated enough to separate the Net's good food from its poisons, but even the savvy can be misled. On almost any subject the Net offers a plethora of seemingly sound "research." But under close inspection much of it proves to be ill-informed, or just superficial. (p. 12).

How the Internet may revolutionize education is unknown at this point. However, it is certain, the World Wide Web can no longer be ignored in connection to education. Hardin and Ziebarth (1996) illustrate why the Internet must be acknowledged now:

The difference is that the Web represents information, and information cannot be disregarded the way that computers can be ignored. Teachers cannot choose to ignore or have their students omit available information on any subject when the goal is for them to learn. A revolution is taking place in education. (p. 2)

As educators, scholars and students begin to embrace the new technology, the face of research may also change. As the Internet continues to grow, so too will the endless

opportunities to combine research projects and the vast resources of the Internet.

Background

The Internet

The extent of the impact of the Internet is unlike its technological predecessors and is difficult to gauge. The current cliché is the world has become a much smaller place due to the Internet. Like many clichés, there is truth within the saying. Previously, many researchers were often restricted by various constraints which included time, money, location, and/or availability of information. The Internet is one way to overcome a few of these long-standing obstacles. For example, students are no longer strictly bound by what is sitting on the local library's shelves. Campbell (1995) explains, "The Internet offers the researcher access to a vast source of information scattered at locations around the world … The Internet offers vast stores of text, databases of information, electronic journals, bibliographies, software programs, and forums for information" (p. 7).

Although not a brand new medium in the traditional sense, the Internet is the latest method of communication to be developed. The Internet integrates elements of radio,

television and film, along with computer technology, into
an ever-evolving, interactive communications field. One can
watch a film on-line; download sound bites from newscasts;
even communicate instantaneously with a distant friend via
Internet Relay Chat. As to which direction the medium of
the Internet is headed and where it will end remains to be
seen.

<div align="center">Statement of the Problem</div>

Instead of scrolls of papyrus tucked away in numerous
pigeonholes like the famed Library at Alexandria, knowledge
on the Internet is found squirreled away on servers housed
around the world. College students, now more than ever
before, have ready access to the Internet's servers via
campus connections. Students may connect to the Internet on
campus by using computers at the library or in computer
labs. Or students may, from the comfort of their own home,
access the Internet. Even though the Internet is now
available to most college students, the Internet appears to
remain the domain of science-oriented fields. Campbell and
Campbell (1995) explain it is predominantly tech-oriented
students who benefit most from the Internet, "Although the
technology and resources … are available on many college

campuses today, it is primarily the graduate engineering and science students who are tapping into this resource potential" (p. vii).

The underlying question of this study, therefore, is if college students do have access to the Internet as a research tool, are students beginning to incorporate electronic information into their research projects? To be more specific, the major problem identified for this study is: "To what degree are doctoral students at Oklahoma State University utilizing the Internet by citing Internet sources as part of their dissertation research?"

Purpose of the Study

The purpose for this study was multi-fold. In as little as 10 years, the manner in which research is conducted has changed dramatically as a result of computerization. No longer do students flip through hundreds of paper cards in a library catalog. Instead, researchers are able to access via computer valuable data within minutes, even seconds, instead of days or weeks. Along with the decreased time element, the amount of information available to the researcher has also increased, posing new problems. The quality and quantity of

information now readily available is both a boon and a
dearth to a researcher. Being able to "hop-online" and
retrieve reams of information can have tangible benefits.
However, having to wade through numerous unnecessary (and
at times questionable) web sites, databases and files, can
be frustrating at best, time-consuming at worst.

Researchers, faculty and students today face the
challenge of adapting to ever-changing technological
advances. With the increase of available data, so too,
research techniques are being examined and revised. Just as
the blackboard revolutionized the schoolroom at the turn of
the century, the Internet is beginning to affect current
methods of research. The purpose of this study was to
examine to what extent change has taken place in the field
of doctoral dissertation research done by graduate students
at Oklahoma State University in the Colleges of
Agriculture; Arts and Sciences; Education; Engineering; and
Human Environmental Sciences.

Research Questions

Researchers are constantly striving for ways to
improve the quality of their research. Improvement can
occur in a variety of ways, using a number of methods. Even

though the Internet has been available at the university level since the late 1960s, the Internet did not become mainstream until the introduction of the browser *Mosaic* in 1993. Today, the Internet is a readily-accessible tool researchers can use to improve their studies. For people who have a computer, modem and Internet service provider, the Internet is just a phone call away. Teachers, students, and scholars from all levels of education, are able to use the Internet as a vehicle for research. Due to the increase of access, availability and acceptance, this study looks to examine the usage of the Internet by scholars over the past decade.

Moreover, this study examined to what extent change has taken place in the field of doctoral dissertation research done by graduate students at Oklahoma State University in the Colleges of Agriculture; Arts and Sciences; Education; Engineering; and Human Environmental Sciences.

The following research questions were formulated pertaining to Oklahoma State University students and the Internet:

1) To what extent have doctoral students before 1993 and after 1993 utilized information from the Internet within their dissertation research?

2) To what extent are there differences in usage of Internet citations by the students in the Colleges of Arts and Sciences; Agriculture; Education; Engineering and Human Environmental Sciences?

3) To what extent are there overall differences by the colleges in number of total citations?

Significance of the Study

The Internet connects not only servers to servers, information packets to information packets, and people to people, it is also now woven into the warp and weft of American society. Almost all areas have been touched by the Internet: government; media; business; communications; and especially education. The significance of this Internet study lies within the potential application of its results to several aspects of education. If the results indicate an increased usage of the Internet by doctoral students within their dissertations, this finding can be generalized to the whole of the university. Not only graduate students, but also undergraduate students, it can be inferred, are turning to the Internet as a research tool. Indeed, if this is the case, curriculum changes may be necessary to better

serve the student population. For example, additional classes in computer literacy, writing research papers and research ethics might be added to course offerings.

Also, as this study will have provided background information on research methods of graduate (doctoral) students, results of this study should be of interest to college libraries. By having accurate data on the usage of the Internet, library administration can help better meet the needs of all patrons.

College administrators may also find results of this study significant. An increase or a decrease of usage of the Internet over the 1989-1998 period may aid in decisions by administrators in reference to allocating more, less, or the same amount of funding to the technology development budget.

Administrators may also find the results useful in other ways. For example, retaining students; requesting funding from the state legislature; and in developing the state's economy. Education and economic development are closely tied together. Today's university graduates must be computer literate to compete in the work-place. Retaining computer-literate graduates in Oklahoma should serve to attract higher-paying technology jobs to the state. With the university administrators recognizing the need for

curriculum changes – adding computer courses which include information on how to best utilize the Internet – students will be better prepared upon graduation to enter the work-place and compete for higher paying jobs.

Perhaps, most importantly, Oklahoma State University can benefit directly from the results of this study. OSU is a land grant institution with its mission being teaching, research and extension. As part of its extension mission is in bringing the OSU to the people of Oklahoma. Long-distance learning is one method of reaching students whom otherwise would not be able to attend courses. Also, the Internet just might be the fastest, easiest and most efficient method available for students to conduct graduate research.

To summarize, this study and its results are significant college administrators, undergraduate and graduate students, as well as in the process of economic development.

<center>Limitations of the Study</center>

The study is limited in a number of ways. First, identifying trends can be an exercise in prognostication. How change was effected and affected other changes, is much

easier to identify in retrospect. Therefore, the study limits itself to examining the guiding question, "Are doctoral students citing Internet sources in their dissertations?"

The study was limited in scope. Only doctoral dissertations in five colleges at Oklahoma State University were reviewed: Arts and Sciences; Agriculture; Education; Engineering; and Human Environmental Sciences. It must be noted that in 1994, the College of Home Economics changed its name to the College of Human Environmental Sciences. Thus, it was necessary to adjust research methodology to incorporate the change. Before 1994, dissertations which were published under the subject index of "home economics" were reviewed. After 1994, dissertations published under the subject index of human environmental sciences were reviewed.

Additionally, the time frame under study was for a period of 10 years, from 1989-1999. Although dissertations about the Internet were written as early as 1985, the use of the Internet as a source of data became mainstream in about 1993 with the introduction of user-friendly Internet software. The underlying assumption framing this dissertation was that within the last six years, doctoral research students have recognized the benefits of the

Internet and thus have begun to utilize the Internet as a research tool.

Limits of Citation Analysis

One more limitation was related to the form of the dissertation bibliography itself and falls under the category of citation analysis. Citation indexing is based on the theory that writers cite works falling within the subject area they are researching. Larson (1996) explains that citation analysis was developed in information science, "as a tool to identify core sets of articles, authors, or journals of particular fields of study" (p. 1). Therefore, through the process of examining similarities, groups of comparable works are compiled. An example of the theory would be of a higher education student citing John Dewey within their work.

Larson (1996) points out six possible problems with the process:

- Invisible or assumed references (i.e. classic works in the fields become "common wisdom" and are not cited.

- Self-citation

- Fraternal citation (citing of colleagues)

- Reference list padding

- Inconsistencies in citations styles (i.e. spelling variants, incomplete citations, etc.)

- Missing citations. (p. 1)

Larson's reservations of citation analysis also stand to serve as limitations for this dissertation about dissertations.

Organization of the Study

The remainder of the research encompasses a Review of the Literature in Chapter II; Methodology in Chapter III; Analysis of the Data in Chapter IV; Summary and Conclusions in Chapter V; as well as suggestions for further study.

CHAPTER II

REVIEW OF THE LITERATURE

General

This chapter focuses upon the role of the Internet in relation to the practice of research and the potential effect of availability of Internet data upon the researcher. Firstly, defining Internet-related terminology will aid in the process of understanding the relationship.

Definition of Terms

As any field develops, there are of course, new words and phrases invented to describe what is occurring. In the technology area, jargon such as "Information Superhighway," and "e-mail," have easily slipped into the vernacular. But what do these terms mean? In order to help facilitate understanding, the following definitions are pertinent to this specific study of the Internet.

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Browser is defined as:

> A software program that is used to access various kinds of Internet resources. Netscape and Internet Explorer are examples of Web browsers. (McGuire, Stilborne, McAdams and Hyatt, 1995, p. 227)

Electronic mail or e-mail is defined as:

> A fast, easy, and inexpensive way to communicate with other Internet users around the world. In addition, it is possible for Internet users to exchange e-mail with users of other independent networks such as CompuServe, Applelink, the WELL, and others. (Tennant, 1992, p. 1)

HTTP or Hypertext Transport Protocol is defined as:

> The protocol that allows the World Wide Web to function on the Internet. (Gay, 1996, p. 231)

Internet is defined as:

> A worldwide network of computer networks. It is comprised of thousands of separately administered networks of many sizes and types. Each of these networks is comprised of as many as tens of thousands

of computers; the total number of individual users of

the Internet is in the millions (Tennant, 1992, p. 1)

Internet Relay Chat or IRC is defined as:

A software tool that lets you hold keyboard

conversations. (McGuire et al., 1995, p. 232)

Search engine is defined as:

Search engines compile indexes of material on the Web.

They search theses indexes for the keywords or phrases

you give them, then provide a list of matches.

(McGuire et al., 1995, p. 59)

Server is defined as:

Equivalent to a host, a machine that works with client

systems. Servers can be anything from PCs to

mainframes that share information with many users.

(McGuire at al., 1995, p. 234)

Newsgroup is defined as:

The Internet version of an electronic discussion

group, where people can leave messages or post

questions. (McGuire et al., 1995, p. 233)

Website is defined as:

> A sequence of related Web pages normally created by a
> single company or organization. (McGuire et al., 1995,
> p. 236)

World Wide Web or WWW is defined as:

> ...a hyper-text based collection of computers on the
> Internet that lets you travel from one linked document
> to another, even if those documents reside on many
> different servers. (McGuire et al., 1995, p. 236)

Uniform Resource Locator or URL is defined as:

> The "address" needed to activate a Web browser. It is
> written in the minimal form http://www.olympus.net/ if
> it refers to a web-based (HTTP) document or page.
> (Gay, 1996, p. 234)

With these basic operating definitions in mind, an
examination of the Internet in the context of its past,
present and future is provided.

Historical Significance

Technology, like the proverbial river, is ever-shifting. To borrow further from antiquity, one can never step in the same "technology-river" twice. Change can be slow or quick, anticipated or unexpected, welcomed or reviled.

In the academic setting, change can be slow when it comes to technology. Barzun (1992) relates advice from his first edition of, *The Modern Researcher*, written in 1957:

> When our First (sic) edition was published, the ballpoint pen was a recent invention and we recommended that writers in lead pencil use a fixative on their notes to keep them from blurring. (p. iv)

In the span of 43-years, research advice for scholars has shifted from what is the best way to take notes by hand; to what type of software works better for note-taking on the personal computer. Now, at the end of the Twentieth-century and the beginning of the Twenty-First century, researchers are facing another type of challenge - how to quickly adapt to the technology changes occurring today. Possibly, an even greater challenge is how to best harness

the vast resources available on the Internet for research purposes.

The Internet, as it is known today, started taking shape in 1991 when HTTP servers were created at Stanford University (Gay, 1996, p. 54). Long before 1991, the Internet was a way for the United States Government to connect with ongoing defense projects at the University of California, Los Angeles; Stanford Research Institute; the University of Utah; and the University of California at Santa Barbara. Gay (1996) explains, "The ARPAnet - what would become the Internet - was commissioned in 1969 by the Department of Defense for the purpose of doing research" (p. 49).

Other historical technological firsts shaping today's Internet were soon to follow, including briefly:

- Lexitron introducing the word processor in 1971
- Intel releasing a chip with 64 KB of memory in 1974
- Microsoft being founded by Bill Gates in 1975
- Desktop publishing begins when Aldus introduces PageMaker in 1985
- ARPAnet connects with more than 10,000 hosts in 1987; ARPAnet ceases existence in 1990 with the introduction of NSFnet

- Servers are created at Stanford University in 1991, bringing forth new Web protocol

- The NSFnet ceases to exist, shifting Internet traffic to commercial systems in 1995. (Gay, 1996, p. 55)

But it would take a development in software to open the Internet to non-student and non-government personnel - the first web browser known as Mosaic. Hardin and Ziebarth (1996) explain, "In November 1993, the National Center for Supercomputing Applications released Mosaic, the first World Wide Web browser for all three computing platforms (UNIX, PC, and Macintosh)" (p. 1).

With the introduction of software, which could operate on all computers in an easier-to-use way, computers underwent another critical step in the information revolution. Again, Hardin and Ziebarth (1996), "The Internet had become the World Wide Web, and now Mosaic allowed anyone who knew the basics about using a computer and a mouse to go out onto the Web and easily and quickly locate multimedia information" (p. 1).

The importance of the introduction of Mosaic cannot be underestimated. Recognizing there is a technical difference between the Internet and the World Wide Web is crucial. The

Internet can exist without the World Wide Web. But, the World Wide Web cannot exist without the Internet.

The Internet has become globally-available. There are an estimated 359.8 million users on-line as of July 2000 (NUA Surveys, p. 1). Once the flood-gates of information opened, it has been a never-ceasing tide of data ever since.

Today

The range of information obtainable on the Internet is unbelievably vast and ranges from beneficial medical sites such as http://www.drkoop.com; to entertainment sites, such as the annoyingly inane Hamsters Dance Page http://www.hamstersdance.com and everything in-between.

Despite all of the questionable sites dotting the World Wide Web, the Internet has effected change in the information sciences. Perhaps, the best example of this is found in the traditional library. In less than eight years, most public and private libraries have eliminated the traditional stand-up card catalog in favor of electronic databases. Some researchers are less willing to accept such quick change and replacement of the card catalog did not occur without lament. Stoll (1995) writing in *Silicon Snake Oil,* recalls:

Notebook under my arm, I strolled over to the card

catalog to do a subject search. Something was missing.

Someone stole the card catalog. A quick inquiry told

me that librarians had conspired to steal my card

catalog. They'd replaced it with an invisible

database. Instead of fifty beautiful wooden cabinets,

I now find two dozen computer terminals. My most

important reference tool had disappeared. (p. 198)

But in 2000, the debate as to whether or not

technology, like electronic databases, should be included

in the research world is not at issue for most researchers.

What is at issue is *how* technology is to be developed.

Siegel (1995) presents the problem:

Technology development is a lot like the

axiom about putting money away for a rainy day.

Most people you ask will tell you how important

it is. They'll say they are doing it religiously. But

if you were given a chance to take a peek inside their

bank accounts, you'd discover that intention is often

a far cry from reality. (p. 43)

Adding to the confusion, the reality of the Internet

itself can be daunting. For example, the California

software company Inktomi and the NEC Research Institute

released results of a study revealing the World Wide Web

passed the one-billion page mark as of January 31, 2000.
Lawrence (2000) confirms: "Together with Inktomi, our study
has verified the existence of over one billion unique
indexable Web pages on the Internet" (p. 1).

With one billion pages of information available now, just
how much more information will be available in the future?

The Future

Attempting to predict what the future may be like in
five years, much less 20 years, with the Internet is nearly
impossible. Vinge (2000) writing for *Wired* imagines how the
future will shape the structure of the Internet:

> In the early years of the 21st Century, we continue to
> expand the Internet. The overhead costs of business
> continue to decline. We build embedded networks that
> spread beneath the Net, supporting it much as plankton
> supports the ocean ecology. This added power makes the
> 20th-Century Internet seem like a rehearsal (p. 75).

Personal computers and computer technology have
infiltrated the lives of society's members in such a
manner, many people cannot perceive of living without
access to a computer at work, home or school. The next step
is to have access to the Internet without having to be at

work, home or school. The move to becoming a wireless Web
society is occurring today. For those able to afford the
price of a compatible cell phone and the necessary
service/plan and provider, one can send and receive e-mail,
access web-based address books, and surf sites modified for
the Wireless Web.

Parks (1999) relates his experience with being
wireless:

> To check out the Wireless Web, I used the sparkly new
> NP-1000 phone, made by NeoPoint (see "The 11 Factor,"
> in Wired Tools). The InfoSpace.com service beats 411
> in tracking down phone numbers via the Net. And if you
> keep your My Yahoo! portal current, the phone is a
> great way to get your latest set of names and numbers.
> Using the phone's mini browser is fun and even quicker
> than my PC. It reminds me of surfing the Web using the
> old, text-only Lynx browser - there's no eye candy,
> but it allows almost instant access to data services.
> (p. 1)

Instant access to information is the reason for
existence of the World Wide Web and the most intriguing
prediction concerning the future of the Internet is made by
the inventor of the Web, Berners-Lee: "We won't use the

word 'Internet' in 2020. People will simply talk about the information itself." (*Wired*, 2000, p. 103)

<u>Internet and Research</u>

The origin of the Internet's was grounded in research and in the decades since has facilitated alterations to the research process in a number of ways. Access to numerous resources can shape and mold a researcher's inquiries. In fact, too many resources can be overwhelming. Consequently, researchers must learn how to handle being inundated by data. McGuire et al., (1995) address the issue of information overload:

> The World Wide Web is a seductive place, especially for curious people. It's all too easy to follow one link after another, reading fascinating material from sources all over the world. But before you know it, hours have passed, and you have gleaned very little about the subject you set out to research. (p. 116)

Being engulfed with information can have other effects on a research study. The sheer volume of data waiting to be mined by researchers poses the problem of what to include as background information of a study. The possibility of becoming mired by or distracted by superfluous data is

real. And at times, not knowing exactly what to look for can add to the quandary. Formulating a problem statement can also become difficult due to having far too much input, leading the researcher in an unrelated direction. Additionally, the original research question may actually raise more questions than answers. McGuire et al., (1995) offer the following Internet-specific research advice:

- Follow a map. Stay focused. Especially when you're navigating the Web, always remember where you are going and why, and discipline yourself to resist distractions.

- Bookmark with care. If you bookmark everything you think might be useful someday, your bookmark list will quickly become unmanageable ... Bookmark only those sites you know you will return to over and over again.

- Don't waste hard-disk space. Be selective about what you keep. Much of the information you need is only a few clicks away on the World Wide Web.

- Keep one eye on the clock. Taking the scenic route may be OK when you're on vacation. But when you're

under the pressure of a deadline, you can't afford

to get lost wandering among Web sites. (pp. 116-117)

Sifting, sorting and selecting information to be

incorporated into a study is an integral part of the

research process. Sometimes finding information is as

simple as typing in keywords into a search engine. At other

times, accessing virtual libraries or virtual reference

desks, can be a better choice to linking to the wanted

information. Not infrequently, researchers must choose

between precision and recall:

> In information retrieval, there is typically a
>
> tradeoff between precision (the fraction of returned
>
> documents that are relevant), and recall (the fraction
>
> of all relevant documents that are returned). Web
>
> users tend to make simple queries that can return
>
> thousands or millions of documents... Formulating a
>
> more precise query can be very helpful. (Lawrence,
>
> 1999, p. 1)

Search techniques may have to be re-learned when using

the Internet. Depending upon the information sought,

careful formulation of inquiries may exact the desired

data. Lawrence (1999) clarifies:

Ways to improve the precision of results include using more query terms, telling the search engines that relevant documents must contain certain terms (required terms), using phrases or proximity (e.g. searching for specific phrases rather than single terms), and using constraints provided by some engines (e.g. results must be within a certain date range or geographic area, or keywords must be within the title or URL). (p. 1)

Methodology can also be affected in other ways; for example, the potential sample size for a study can be increased dramatically. Specific populations can be addressed via e-mail or newsgroups, as well as, questionnaires can be sent with the added bonus of not having to pay high mailing costs.

Along with information overload, Internet sites pose the researcher with the issue of accurate information. Accuracy of information has always been a problem in research, but now has a different twist due to the Internet. McGuire et al., (1995) find it can be one of the biggest challenges in research, "The quality of the information varies tremendously, just as it does among books, magazines, and newspapers" (p. 115). As in any research project, caution is advised when utilizing any

informational resource. But, the Internet poses its own hazards. Some additional Internet-specific precautions are advised:

- Check the currency of the material. Many sites indicate the date when something was posted and when it was last revised. If not, do not assume the material is up to date.

- Check the context of the material. Bear in mind that search engines locate Web pages out of context.

- Beware of hackers. Remember that Web pages can be altered deliberately by hackers, or even sometimes accidentally by users. (McGuire et al., 1995, p. 116)

Accuracy goes hand-in-hand with another research element, credibility. By carefully choosing information and evaluating the source of the information, a research study is judged to be sound. A study's findings and conclusions based on inaccurate or non-credible sources in invalid. McGuire et al., (1995) also caution against using website pages where the authority and the accuracy of material is unknown:

- Check the authority of the person or institution
  that published the material. Who sponsors the site?
  Look for a phone number or an address that you might
  use to verify the sponsor's legitimacy. If the
  author is an individual, what are his or her
  credentials? In the case of personal home pages,
  it's virtually impossible to determine an author's
  legitimacy; for that reason, personal Web pages
  should be used only as source of opinion, not a
  source of fact.

- Check the accuracy of the material. Does the
  material appear to have been edited? Would the facts
  have been checked by someone other than the author?
  If you find spelling, grammatical, and typographical
  errors, it is probably safe to assume the material
  has not been edited. You should take this a clue the
  information still needs to be verified. But even in
  the absence of any such mistakes, you must verify,
  verify, verify. (p. 116)

The Internet does not function as one uniform source
of information, like an encyclopedia. Resources can be
found in various places including the World Wide Web,

newsgroups, Internet Relay Chat, list-servs, and more. Due to the Internet's original design as an open system, rules and regulations governing the use of the Internet have not been firmly established. Woodward (1998) explains, "…as far as the information professional is concerned there is no single authority which decides what information should be made available, or in what form. As a result, individuals and organizations are, by and large, free to do exactly what they wish" (p. 4).

The Internet and Researchers

As the new Information Revolution continues, researchers are finding the Internet provides benefits unknown to previous generations of researchers. Researchers are also finding the potential of the Internet is at its beginning. One advantage is that more and more barriers to data retrieval are being virtually eradicated. Campbell (1995) "A quick look at how it eliminates some of the constraints of the past, paints a picture of the changes that are just beginning to affect what is possible for students doing research" (p. 2).

At all levels, researchers are increasingly having access to information despite yet another previous

obstacle, socio-economic background. Campbell (1995)
asserts, "The Internet levels the playing field, making it
possible for students at schools with limited resources to
access the same material as students in schools with large
endowments and well-stocked libraries" (p. 2).

Scholars are finding yet another long-standing and
frustrating research barrier – time – is also being tamed.
Campbell (1995), "The Internet is available 24 hours a day,
making it possible for the student who leaves work at
midnight to be able to work into the wee hours of the
morning" (p. 2)

Another advantage of using the Internet as a research
tool can be found in the creativity factor. Students can
connect in real-time to other students and scholars for
help – without having to travel. Through using e-mail or
instant messaging, a researcher can enlist the aid of
professionals, colleagues and peers, in a one-on-one
brainstorming session or receive mentoring from a group of
respected authorities. Campbell (1995) "Students can share
ideas with others on the Internet via chat or e-mail. This
opportunity to bounce ideas off others often adds
creativity to the final efforts" (p. 2).

The Internet has functioned to diminish long-standing
obstacles researchers have had to endure while searching

for information and data. Barriers such as time, money and location are no longer such overwhelming hindrances to research.

As researchers learn new methods, accordingly, the face of research changes. Just as there are advantages in using the Internet, disadvantages do exist. Peer review, long a standard of judging an article or documents credibility, exists on the Internet in an unusual way. Although currently the Internet itself is not subject to peer review, many of its electronic journals and databases follow a peer review process. Woodward (1998) points out it is the researcher who should evaluate the proffered information: "Be able to assess value, currency and authority quickly and accurately without having necessarily knowing the publisher, the author, or the extent of which the information has been checked by peer review" (p. 4).

The lack of hardware and knowledge of its proper usage is also a problem. Even when schools and students have the hardware and Internet access, Hardin and Ziebarth (1996) found there is a resistance which is a disadvantage:

There are many factors affecting this slow implementation of computing and communication technology in schools, including administrations with no knowledge of its value or no willingness to realign

school budgets to include computational technology; insufficient in-service professional development programs for teachers; a lack of specific curriculum benefits or of resources for teachers to use in their courses; and deficient preservice preparation of teachers in technology or computation. (p. 2)

Yet another example of a disadvantage results from a lack of awareness upon the part of the researcher. A researcher may not recognize or is unwilling to accept the Internet as a viable resource due to lack of exposure to the Internet. Establishing the practical relevance between a scholar's works and the Internet is a necessary step before acceptance of the Internet as a resource occurs.

Mayfield and Ali (1996) describe how the Internet can help:

Internet access allows educators and students to remain on the cutting edge of technology. Using the Internet as a reference resource in teaching classes has the immediate advantage of allowing quick access to vast resources, also the Internet may be used a communications tool. (p. 21)

Summary

The Internet began as a way for researchers to connect with other researchers at the university level. Over time, the Internet's original purpose grew as technology grew. Currently, the Internet provides a multi-media platform for information, entertainment, news and a method of communication between people all over the world. Today's researcher is now able to circumvent previous obstacles to research via the Internet. Once insurmountable barriers such as time, money and access, are being overcome or at least are no longer as prohibitive to the process of research. However, as with any medium, advantages and disadvantages of usage exist. Ultimately, it is the researcher's responsibility to decide whether or not the benefits outweigh the costs.

CHAPTER III

METHODOLOGY

General

This study was conducted to collect information concerning the use of Internet gathered data in graduate student research as evidenced by citation listings in the bibliographies of dissertations published at Oklahoma State University.

The subject of the study was doctoral dissertations published in the five colleges of Agriculture; Arts and Sciences; Education; Engineering; and Human Environmental Sciences (formerly known as the College of Home Economics). The time period under investigation was a 10-year period from 1989-1998. The target sample for the study was originally set at 1,000 dissertations.

Population

The total number of dissertations shelved and listed

as available at the Edmon Low Library is 1,930 for the period of 1989-1998. A total of 100 dissertations per college, per year, were targeted for review for a sample size of 1,000. Every attempt was made to locate and review 20 dissertations per year per college. However, it was found during the collection process dissertations listed as being on the shelf were not; or incorrectly cataloged; or checked out to another patron. Additionally, it was also learned during data collection certain colleges did not produce and publish the target total of 100 per year, every year. For example in 1993, HES only published 13 dissertations. The College of Engineering also fell short in sample size due to checked out, lost, mis-shelved or loaned to another library dissertations. The total number of doctoral dissertations reviewed for Engineering was 170. Therefore, the final sample size was 830 of 1,000.

Any additional anomalies will be noted in the research question tables of data.

<u>Content</u>

The content of the dissertation topics varied from college to college. Dissertations in the technical fields examined engineering or construction problems, for example. Dissertations being published in the Arts field also varied in composition. One English dissertation was a novella;

another English dissertation was comprised solely of poetry and did not have a bibliography. A dissertation published by HES was the study of marital satisfaction of Oklahoma minister's wives.

Actual length of dissertations were also noted to deviate from more than 500 pages to the smallest of 25 pages. In accordance, the bibliography length also ranged from as short as half a page (four citations) to more than 40 pages (300 citations).

The bibliography-style of students were found to reflect the accepted style of a student's originating college. For example, students in the technical field tended to utilize a highly abbreviated style of references. While students in Arts and Education fields primarily used APA format. However, even in these fields, manuscript style was inconsistent and differed from dissertation to dissertation.

Traditionally, bibliographies are to be included at the end of a work. In some cases, bibliographies were placed at the end of each chapter. Normally, these would constitute "end-notes." End-notes are then supposed to be compiled into a stand-alone bibliography at the end of a work. However, in several chemistry and engineering dissertations, end-notes were not compiled into a stand-

alone bibliography at the end of the dissertation. Therefore, references at the end of chapters were considered as bibliographies and thus reviewed for citations.

Procedure

Before selecting dissertations from the Edmon Low Library's shelves, a clustering procedure was performed. The researcher gathered a listing of titles by accessing Edmon Low's Library operating system of PETE. The method performed in procuring the sample was to input the following keywords into the library's computer for every year under review:

K=THESES AND 1989.DT1 AND AGRICULTURE

K=THESES AND 1989.DT1 AND EDUCATION

K=THESES AND 1989.DT1 AND ENGINEERING

K=THESES AND 1989.DT1 AND HOME ECONOMICS

This step was repeated for all ten time periods: 1989; 1990; 1991; 1992; 1993; 1994; 1995; 1996; 1997; and 1998. Due to the fact that the keyword search did not always produce the desired result, especially under the heading of Arts and Sciences, sub-headings were substituted. For example, the researcher substituted subheadings of psychology, English, history and art, until PETE yielded the target number of dissertations. For example, K=THESES

AND 1989.DT1 AND ENGLISH is an example of a substitution. Again, due to the name change of the college of Home Economics in 1994, the descriptor "Home Economics" was changed to Human Environmental Sciences after 1994. Thus, K=THESES AND 1994.DT1. AND Human Environmental Sciences was used.

Also, the first page of PETE results do not differentiate between theses and dissertations, therefore the researcher would scroll down the list of titles returned on the index page and enter the respective number of 1, 2, 3 etc. The next screen would return the author's full name; the work's title; issuing college; and whether or not it was a dissertation or a thesis. If the book was listed as a dissertation, the next step was to enter for HOLDINGS, and if it were said to be available, then a print-out was made.

With the print-outs, the researcher alphabetized the students' names, grouped the names under the respective colleges, and time-period, then pulled the dissertation off of the shelves to examine the bibliography for citations. To help insure accuracy the dissertation's title, author and date of publication were cross-referenced with the original print-out.

The citation information was gathered by the researcher through a method of reviewing a dissertation's bibliography. Each dissertation's bibliography was thoroughly examined for potential Internet addresses. In the earlier years, citations began with ftp:// (file transfer protocol) were found. In later years, the researcher found URL:// or HTTP:// and/or WWW addresses. Dissertations with electronic citations were noted and appropriately categorized by year and by college.

Analysis

General

The purpose of this study was to gather information about the nature and extent of usage of the Internet and its electronic databases as tools of research by graduate students in the writing of their doctoral dissertations published at Oklahoma State University.

Therefore, for the most part, the analysis was descriptive only with few computations beyond the reporting of percentages, means and rankings of the findings. The method of status or descriptive survey was applied to this dissertation in order to obtain a baseline of citation information.

Fink (1995) produced a how-to-do survey manual in which she defined status surveys as being descriptive in nature: "Descriptive designs produce information on groups and phenomena that already exist. No new groups are created. Descriptive designs are also called observational designs" (p. 25).

Babbie (1990) also explains the primary purpose of surveys:

Surveys are frequently conducted for the purpose of making descriptive assertions about some population, that is, discovering the distribution of certain traits or attributes. In this regard, the research is concerned not with why the observed distribution exists but merely with what that distribution is. (p. 53)

Status surveys are designed to learn what the current state of being of whatever is under study. For example, the 2000 Census is a status survey. Kerlinger (1984) finds status surveys an essential part of research: "… the aim of (status surveys) is to learn the status quo rather than to study the relations among variables. There is no intention of derogating the status surveys; they are useful, even indispensable" (p. 377).

Therefore, the design of status survey was selected as appropriate for this study to provide information on the current state of usage of Internet citations within OSU dissertations and to provide a stimulus for further research.

Research Questions

According to Campbell and Campbell writing in *The Student's Guide to Doing Research on the Internet* (1995):

> Students can read articles and text stored on computers in Europe or Australia as easily as they can access materials in their campus library... Although the technology and resources to do all of this are available on many college campuses today, it is primarily the graduate engineering and science students who are tapping into this resource potential. (p. vii)

The idea of students only in the technical fields are taking advantage of the Internet helped to formulate the three following guiding research questions. The first research question examines the overall extent to which students are using the Internet before the introduction of the browser Mosaic and after the introduction of Mosaic.

1) To what overall extent have doctoral students before 1993 and after 1993 utilized information from the Internet within their dissertation research?

If Campbell and Campbell (1995) are correct in their assumption, dissertations in the Sciences and Engineering fields should have more citations than dissertations in Agriculture, Education and HES. The second research question examines differences by academic area.

2) To what extent are there differences in usage of Internet citations by the students in the Colleges of Arts and Sciences; Agriculture; Education; Engineering and Human Environmental Sciences?

Again, Campbell and Campbell (1995) predict students in the sciences and engineering fields will be the researchers who are most likely to turn to the Internet for information. Building upon the first two research questions, the third research question seeks to examine the following:

3) To what extent are there differences by the colleges in number of total citations?

Examining the number of citations per dissertation by college will provide evidence as to the extent of differences in the number of citations by college.

Citation Analysis

Citation indexing or analysis is an information science theory developed in the 1950s. An example of citation analysis is when an education scholar cites Dewey or Rudolph within their work. Citation indexing is also a method of determining the value of information:

> The concept behind citation indexing is fundamentally simple. By recognizing that the value of information is determined by those who use it, what better way to measure the quality of the work than by measuring the impact it makes on the community at large. The widest possible population within the scholarly community (i.e. anyone who uses or cites the source material) determines the influence or impact of the idea and its originator on our body of knowledge. Because of its simplicity, one tends to forget that citation indexing is actually a fairly recent form of information management and retrieval. (ISI, 2000, p. 1)

Therefore, through the process of examining similarities in scholarly works, groups of comparable works

are compiled. After compilation, the next step in indexing
is to develop clusters. Larson (1996):

> Clustering based upon citation similarities can be
> used to determine if new fields are emerging. This
> could indicate the need for new indexing terms,
> classifications, and/or new publications … Citation
> patterns can be analysed (sic) to determine the
> importance of a work (the impact) as determined by
> other scholars. (p. 1)

The theory of citation analysis was adapted
specifically for this research. Because a study of this
nature is as new as the application of the Internet to
education, what was examined was whether or not students
were citing *any* Internet source as evidenced by their
work's bibliography.

Limitations

Some limitation included dissertations not properly
shelved or lost. Physical re-shelving of the books also
posed certain problems, until the researcher devised a
system of alphabetizing which aided in the tedious process.
Additional problems included certain colleges such as Home
Economics/HES not producing the goal of 20 dissertations
per year and bibliography pages not being properly situated
within a dissertation or simply not included at all.

It was also learned during the process of research, certain fields, such as engineering, were more likely to have dissertations loaned-out to other universities libraries. Thus, these loaned-out dissertations were unable for review.

CHAPTER IV

ANALYSIS OF DATA

General

Of the 1,000 dissertations targeted for sampling, approximately 830 dissertations were available for review. The sample contained 200 dissertations from the College of Agriculture; 200 dissertations from the College of Arts and Sciences; 200 dissertations from the College of Education; 170 dissertations from the College of Engineering; and 60 dissertations from the College of Human Environmental Sciences. From the pool of 830 dissertations, a surprisingly low number of only 18 were found to have had Internet citations.

Findings

Overall, the College of Agriculture had six dissertations with Internet citations; the College of Arts and Sciences had two dissertations with Internet citations;

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the College of Education had five dissertations with Internet citations; The College of Engineering had four dissertations with Internet citations; and the College of Human Environmental Sciences had one dissertation with Internet citations.

Since the number of dissertations with Internet citations equaled about 1 percent of the total population of dissertations, a sub-analysis was performed on the citation entries in the bibliographies.

There were a total of 83 Internet citations found in the 18 dissertations. The College of Agriculture had 15 total entries; the College of Arts and Sciences had eight total entries; the College of Education had 20 total entries; the College of Engineering had a total of 20 entries; the College of Human Environmental Sciences had 20 entries.

The citations were then separated by college and by nomenclature. It should be noted when sites are established on the Internet, they are given designations at the end of the address to indicate the source of information. Thus, websites are found with designations of .com; .edu; .gov; .mil and .org. A commercial website ends with .com; an education website ends with .edu; a government website ends with .gov; a military website ends with .mil; and a non-

profit website ends with .org. Other website designations do exist, for example .uk stands for United Kingdom.

After the sites were separated by college and nomenclature, the citations were checked for availability. In other words, the researcher took a compilation of the websites listed in the dissertations and verified their existence on the World Wide Web. A total of 83 citations were checked. The researcher further categorized the websites in levels of accessibility. If a cited article was found by simply typing the address into a browser, yielding instant access, it was classified as "Active."

If an address was typed-in, did bring up the website, however did not immediately go to the cited information, but the researcher was able to find the information on the website, the website was classified as being "Active and Able."

If an address was typed-in, did bring up website, but after a site search did not bring up the cited information, the website was classified as being "Active, but Unable."

Additionally, a few dissertation students only credited the article as being "online." The researcher conducted an Internet search by author's name and article title as it was credited in the bibliography. If the

bibliography did not list the address, but the researcher was able to locate the information anyway on the Internet, it was classified as being, "No-Site, Found."

If the bibliography did not list an address, and the researcher was unable to locate the information, this was classified as being, "No-Site, not Found." The classification of "Other" was used in several instances to cover miscellaneous results and will be noted in the appropriate sections.

Dissertations with Internet Citations

The first research question under investigation asked for a total number of dissertations with Internet citations found in dissertations before 1993 and after 1993. The introduction of Mosaic in 1993 was thought to have had an impact on the usage of the Internet after 1993.

After reviewing 830 OSU dissertations, a total of 18 dissertations with Internet entries were found. Only one dissertation in 1993 was found to have an Internet citation and was published by the College of Engineering. After 1993, there were 17 dissertations found to have Internet citations.

After 1993, six dissertations were published by the College of Agriculture with citations. After 1993, two dissertations were published by the College of Arts and

Sciences. After 1993, five dissertations were published by the College of Education. After 1993, four dissertations were published by the College of Engineering. After 1993, one dissertation was published by the College of Human Environmental Sciences. TABLE I shows the results.

TABLE I

DISSERTATIONS BY COLLEGE
BEFORE 1993 AND AFTER 1993

	Before 1993	After 1993
AG	0	6
AS	0	2
ED	0	5
ENG	1	3
HES	0	1
Total:	1	17

The total of dissertations before 1993 with citations was one. The total number of dissertations, after 1993 was 17.

Most dissertations with Internet citations were found in the year of 1998, almost five years after the introduction of Mosaic. Because of this finding, the dissertations were then tallied under the category of college and specific year. Overall, there were two dissertations in 1995 with citations. There was one

dissertation with citations in 1996. In 1997, there were two dissertations with Internet citations. There were 12 dissertations with Internet citations in 1998. TABLE II reports the number of dissertations by college and year.

TABLE II

DISSERTATIONS BY COLLEGE AND BY SPECIFIC YEAR

1989-1998

	AG	AS	ED	ENG	HES	Total:
1989	0	0	0	0	0	0
1990	0	0	0	0	0	0
1991	0	0	0	0	0	0
1992	0	0	0	0	0	0
1993	0	0	0	1	0	1
1994	0	0	0	0	0	0
1995	0	1	1	0	0	2
1996	0	0	0	1	0	1
1997	1	0	1	0	0	2
1998	5	1	3	2	1	12
Total:	6	2	5	4	1	18

The year 1998, with 12 dissertations with citations, can be noted as the beginning of usage of the Internet as a reference for OSU doctoral students.

The third research question concerned the total amount of citations by the five colleges over the time period of 1989-1998. The College of Agriculture had more dissertations with citations than any other college, a total of six dissertations with citations.

The College of Education ranked second in the number of dissertations, with a total of five with Internet citations. The College of Engineering ranked third, with a total of four dissertations with Internet citations. The College of Arts and Sciences ranked fourth, with a total of two dissertations with Internet citations. The College of Human Environmental Sciences ranked fifth, with one dissertation with Internet citations. TABLE III provides the breakdown of number of citations by college.

TABLE III

TOTAL CITATIONS BY COLLEGE

1989-1998

AG	6
AS	2
ED	5
ENG	4
HES	1
TOTAL:	18

The College of Agriculture had more dissertations with citations than any other college over the 10-year-period.

Technical fields were thought to have the most dissertations with citations. The researcher found evidence to support the assumption. The College of Agriculture had six dissertations, arts and sciences had two dissertations (one was a computer science dissertation, the second a physics dissertation) and engineering had four dissertations, for a total of 12.

The College of Education had five dissertations, while the College of Human Environmental Sciences had one dissertation, for a total of six dissertations. Table IV provides information on the division of dissertations.

TABLE IV

TECHNICAL VS. NON-TECHNICAL FIELDS BY COLLEGE

	Technical	Non-Technical	
AG	6		6
AS	2		2
ED		5	5
ENG	4		4
HES		1	1
Total:	12	6	18

Again, dissertations in the technical fields were more likely to be found using the Internet as an information resource.

After reviewing the dissertations, the researcher also decided to count the number of Doctor of Philosophy dissertations and the number of Doctor of Education dissertations with citations. The number of Ph.D's were 14, compared to Ed.D's at 4.

Post Hoc Analysis

Characteristics of Website Citations

Due to the unexpected low result of dissertations with citations, the researcher decided to perform an analysis of the websites given as references. Overall, the College of Agriculture had 20 citations. These citations consisted of: five commercial websites; four education websites; two government websites; one military website; one non-profit website; and two "other" websites. In this instance, the other signifies one website located in the United Kingdom, the second "other" website is a commercial website, but does not appear to be the one listed as referenced by the author.

The College of Arts and Sciences cited eight education websites.

The College of Education cited one commercial website; six education websites; and 10 government websites; and three "other" websites. In this case, the three references were noted simply as being "online." Two out of the three articles were located, one is by Dickerson, K. (1995); the second article is by Klemm, W.R. (1994). The last entry was not found and was written by Longworth, N. (1997).

The College of Engineering had 20 citations. They included: three commercial websites; eight education websites; one government website; one military website; five non-profit websites; and two "other" websites. In this instance, the "other" websites were found by locating a software package online, SIPP 2.0 (1993). And the second citation was for *Christian Social Action* magazine which was not found.

The College of Human Environmental Sciences had 20 citations. There were four commercial websites; 15 education websites; and one "other" website. In this instance, the "other" was for a "backgrounder" on food technology. TABLE V provides the results of the five colleges by website classification.

TABLE V

COLLEGES and WEBSITE CLASSIFICATIONS

	.com	.edu	.gov	.mil	.org	Other	Total
AG	5	4	2	1	1	2	15
AS	0	8	0	0	0	0	8
ED	1	6	10	0	0	3	20
ENG	3	8	1	1	5	2	20
HES	4	15	0	0	0	1	20
Total:	13	41	13	2	6	8	83

Education websites were three times as likely to be used as a reference than any other website by the five colleges combined.

Citations and Availability

Curious as to whether or not the bibliography entries were still available, the researcher proceeded to document accessibility of the citations by surfing the Internet. The procedure for checking availability was to directly type in each citation address as listed into Netscape Navigator 4.0, enter, and check the results.

The College of Agriculture had a total of 15 citations. These citations were investigated for their level of accessibility. The College of Agriculture had 10 active websites; three active and able websites; and two active and unable websites.

The College of Arts and Sciences had two active websites; four active and able websites; two active and unable websites; for a total of eight websites cited.

The College of Education had a total of 20 websites cited. There were four active websites; 11 active and able websites; one active and unable website; three no-site, found websites; and one no-site and unable to find website.

The College of Engineering had a total of 10 websites cited. There were nine active websites; three active and able websites; six active and unable websites; one no-site, found; and one "other" website. In this instance the other was now a pay-per-search site, therefore the researcher did not register to search.

The College of Human Environmental Sciences had 13 active websites; five active and able cites; two active and unable cites for a total of 20. TABLE VI shows websites by college and accessibility.

TABLE VI

WEBSITES BY COLLEGE AND ACCESSIBILITY

	Active	Active and Able	Active and Unable	No-Site, Found	No-Site, Not Found	Other	Total:
AG	10	3	2	0	0	0	15
AS	2	4	2	0	0	0	8
ED	4	11	1	3	1	0	20
ENG	9	3	6	1	0	1	20
HES	13	5	2	0	0	0	20
Total:	38	26	13	4	1	1	83

Overall, the five colleges had 38 websites found to be active; 26 websites active and able; 13 websites active and unable; four no-site, found; one no-site, not found; and one other for a total of 83.

Summary

In summary, the number of dissertations found with Internet citations was surprisingly low. Only 18 out of 830 dissertations at Oklahoma State University published within a 10-year-period were found to have citations. The largest portion of these dissertations were published in 1998, approximately five years after the introduction of Mosaic.

Twelve out of 18 were published in 1998, leaving one dissertation published in 1993; two in 1995; three in 1997. Campbell and Campbell (1995) stated students in the technical fields would be the most likely persons to utilize the Internet as an information source. Evidence was found to support their statement. Dissertations in the technical fields did indeed have more dissertations with citations than the arts, education and human environmental sciences.

Additionally, the number of citations were lower than expected at 83. What was not as surprising was the source of information for the citations. More citations came from .edu (or education) websites and .gov (government) websites than commercial websites. What was unexpected was the number of active and able to find websites. The Internet is considered to be dynamic and ever-evolving, implying "old" information would no longer be available. Yet, up to two or

more years after being cited, articles were still accessible on the Internet. Granted, the address may have changed from the original citation, nonetheless, once inside the website the information was retrievable. This may be the case due to the fact the websites cited were education and government sources and have information easily stored in an archival fashion.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

General

From the beginning, the Internet has had ties to
education and research. Over the last three decades, the
Internet has undergone many changes. The Internet is a
diverse, dynamic and nearly infinite resource for
information, entertainment and communication. However, its
original connection to education still remains. As
education and the Internet are linked, the purpose of this
study was to examine the extent of usage of the Internet in
relation to education. Specifically, the research examined
the connection between the Internet and doctoral
dissertations at Oklahoma State University. The study was
descriptive in nature, seeking to give a snapshot or a

historical record of understanding of current uses of the
Internet for future researchers.

Three primary questions guided this research study:

1) To what extent are there overall differences by the
colleges in number of total citations?

2) To what extent have doctoral students before 1993
and after 1993 utilized information from the
Internet within their dissertation research?

3) To what extent are there differences in usage of
Internet citations by the students in the Colleges
of Arts and Sciences; Agriculture; Education;
Engineering and Human Environmental Sciences?

Summary

The method for obtaining answers to the research
questions was to study the content of dissertation
bibliographies available for analysis through the Edmon Low
Library. Bibliographies were reviewed for listings of
Internet citations, including WWW and HTTP:// addresses.
The data covers a period of 10-years from 1989 to 1998 and
encompasses the five following fields of arts and sciences;
agriculture; education; engineering; and human

environmental sciences. Approximately 20 dissertations per the five OSU colleges, were chosen for review. The sample size equaled 1,000 out of 1,930 dissertations published within this time period. Of the 1,000 targeted dissertations, approximately 830 dissertations were found to be available and reviewed.

Only 18 dissertations over a span of 10-years were found to have citations. The first research question concerning dissertations before and after 1993 was answered with only one dissertation being published in 1993 with Internet citations and 17 dissertations after 1993 with Internet citations.

The second research question was answered by the result of finding 18 dissertations with citations. The College of Agriculture had six dissertations with citations; the College of Arts and Sciences had two; the College of Education had five; the College of Engineering had four; the College of Human Environmental Sciences had one.

The 18 dissertations had a total number of 83 citations. To answer research question number three, the results show no difference in the number of citations between the following colleges. The College of Education had 20 citations, the College of Engineering had 20

citations, and the College of Human Environmental Sciences had 20 citations. (Although, again, it is important to note HES had one dissertation, but this dissertation had 20 citations). The College of Agriculture had a total of 15 citations and the College of Arts and Sciences had a total of eight citations.

Post Hoc Analysis

In addition to describing the extent of Internet usage in relation to education, it was learned through review of the population of dissertations at Oklahoma State University an unexpectedly low number of dissertations were found with citations. Because of this fact, the researcher then proceeded to do a sub-analysis on the citations listed in the dissertations in effort to ascertain an understanding of the chosen websites. Secondary research questions were formulated and information was gathered in order to answer these following questions.

1) What type of websites are being cited?

2) What type of websites are being used more frequently?

3) Which college used what type of website more frequently?

To answer the secondary questions, the citations were

sorted by classifications as indicated by their respective Internet addresses. Dissertations used as information sources .edu, .com, .gov, .mil and .org websites. Rarely was another type of website was used, but, occasionally a source from another global location was cited.

The next question was, "What type of websites are used more frequently?" Overall, it was found dissertations used more .edu (or education) than any other type of website. However, it should be noted, .com (commercial) and .gov (government) websites were used at the same rate of frequency, placing second. Other types of websites, such as .mil, .org, or other types of websites were the least used.

The answer to the third question as to which college used what type of website more frequently found the College of Agriculture using .com websites more so than any other type of website. The College of Arts and Sciences relied solely on .edu websites. The College of education used .gov or government websites more so than any other type of website. The College of Human Environmental Sciences used .edu websites more than any other type of website.

Surprisingly, many of the websites cited were still in existence and even more noteworthy, the vast majority of information articles were still accessible. Information

from .edu and .gov websites were retrievable more so than other websites.

<div align="center">Implications</div>

Theory

It is apparent from the results of this study there are still barriers to using the Internet as a research tool. As of the year 2000, doctoral students, at least those at Oklahoma State University, have not fully utilized the Internet within their research. The issues of change and risk may be two reasons as to why this is occurring. Accessibility to the Internet does not guarantee adaptation of the Internet as a reference source. Students who quickly embrace technological change will be the first to determine whether the benefits of using the Internet outweigh the potential risks.

Research

The perceived instability of the World Wide Web may add to the researcher's reluctance in using the Internet for research. Because articles can change addresses or even completely disappear from the Internet rapidly, it is important for a researcher to keep a printed copy of the cited material. Additionally, because of the very nature of the Internet, any person or group can publish anything. The Internet does not have peer review as it is traditionally

defined, although some journals provide readers a forum to give comment to on-line published articles. Therefore, until a method of peer review is developed, the use of material from well-established refereed journals is recommended.

Recommendations for Further Study

The number of dissertations using the Internet as a research tool was remarkably low. One potential explanation is that students who used the Internet as a source of information *were already* a part of an education system. Students who also were teaching assistants, school administrators, public school teachers and staff, and others who had been exposed to the Internet via their work-place might have been more willing, able, and/or comfortable, with using the Internet as a reference because of their professional roles. Additionally, perhaps these same students simply had more access at work, home or school, to the Internet. Unfortunately, this study does not and cannot address the reason why a person is comfortable or is uncomfortable with the Internet. Although this type of question would led to an useful follow-up study.

Also, it is possible that students may have actually used Internet sources, but failed to note them as such.

This may have occurred for several reasons. One, it is possible the student was unsure or unwilling to cite the Internet as a source as a result of not knowing the currently accepted method of citation. Moreover, another potential reason is the student may have had both a published copy of a book, article or journal, and chose to cite it rather than the same information (book, article, journal) found on-line.

Moreover, it is possible, dissertation committee members did not accept a student's Internet source for various reasons, thus, the electronic citation was eliminated from the final version.

Furthermore, it may be possible that Oklahoma State University doctoral dissertation students just may not have been exposed to the Internet as a reference tool.

Now, that this baseline study has been completed, future researchers may build upon this information to formulate new studies. Possible future studies could include replicating this study from the time period of 1998 to 2008.

Another potentially beneficial study would be to learn the rate of usage of the Internet in research at other public and private institutions, not only statewide, but

nationwide. This type of study could conceivably compare the works of master's students with doctoral students.

Perhaps, the most interesting study of all, would be to canvass professors at the university level in effort to ascertain their level of comfort with the Internet from their own research viewpoint and in relation to their acceptance of Internet usage by their own students.

Conclusion

Loathe the Internet, or love the Internet, it is apparent it is becoming an accepted mainstay in today's society. By all indications… voices in the media… references in popular culture… computers in the work-place school and home environment… America has been decreed a computer-driven society. As such, the modern researcher should not be fearful of the Internet as a research tool. Instead, today's researcher and future researchers, should look toward the Internet as a viable information resource just as past researchers looked toward using the library catalog.

One caveat should be made, however. A lesson the modern researcher should keep in mind from the past: No resource (whether it is printed, auditory or visual) should ever go unverified.

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