Using the open Web as an information resource and scholarly Web search engines as retrieval tools for academic and research purposes

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ABSTRACT

This study provided insight into the significance of the open Web as an information resource and Web search engines as research tools amongst academics. The academic staff establishment of the University of South Africa (Unisa) was invited to participate in a questionnaire survey and included 1188 staff members from five colleges. This study culminated in a PhD dissertation in 2008. One hundred and eighty seven respondents participated in the survey which gave a response rate of 15.7%. The results of this study show that academics have indeed accepted the open Web as a useful information resource and Web search engines as retrieval tools when seeking information for academic and research work. The majority of respondents used the open Web and Web search engines on a daily or weekly basis to source academic and research information. The main obstacles presented by using the open Web and Web search engines included lack of time to search and browse the Web, information overload, poor network speed and the slow downloading speed of webpages.

INTRODUCTION

South African universities made the Web widely available to the higher education community as there is a high Web penetration rate amongst academics. Universities played a major role in the development of the Web in South Africa and were amongst the first to take advantage of Internet technologies. Most academics are Web-literate and are high-level information consumers seeing that information forms an integral part of their research, teaching and learning (Adika 2003:33). Although research shows that access to the Web changed the academic milieu and working patterns of academics, research about the usage of the Web in higher education institutions in developing countries is limited (Uddin 2003:226).

Academics have access to the academic library and the open Web as information providers and they can choose between the open Web information resources and retrieval tools (e.g. Web search engines), or alternatively, the academic library's information resources and retrieval tools (e.g. catalogues or databases), or both.

The Web transformed the academic's interaction with information and the process followed to retrieve research literature. Between 2001 and 2005, scholarly Web-based search tools were developed for the academic market, for example, Scirus™ and Google Scholar™ (Pradt Lougee 2002:2) to provide direct access to valuable free information discovery tools and open access resources.

For the purpose of this article, open Web resources are defined as non-library, freely available and publicly accessible Web-based scholarly and/or academic information resources, accessible by academics via the Web; these resources are accessible without user authentication or without accessing sites that require some form of registration (Pedley 2001:14; Sherman & Price 2001:1). It also excludes fee-based information (i.e. commercial e-resources accessed via the Web, but with charges associated) and the online and Web resources of the academic library (Hoggan 2002:2). This article is an abstract from a PhD thesis completed at the University of Johannesburg in 2008.

WEB-BASED INFORMATION RESOURCES FOR ACADEMICS

International literature indicates increased usage amongst academics of open Web-based information resources and retrieval tools, such as search engines when searching for academic and research information. Data gathered by Bao (1998) shows that daily use of the Web more than doubled between 1998 (40.2%) and 2001 (84.3%) and that the levels of satisfaction for Web search results increased from 5% in 1998 to 10% in 2001.

Various studies show that academics tend to use Web-based information resources on average 3–10 hours per week. Intense users average about 10–15 hours per week (Fortin, 2000; Wang & Cohen 2000:312; Xiaoying 2002). In addition, academics tend to access the Web on a daily or weekly basis for information searching purposes (EPIC 2003; Gardiner, McMenemy & Chowdhury 2006; Harypursat 2003; Kibirige & DePalo 2000; Zhang 2001).

Applebee, Clayton, Pascoe and Bruce (2000) found that 95.6% of academics classified themselves as competent computer and Web users. The majority of academics in the Fortin study (2000) regarded themselves as expert or intermediate Web searchers in terms of skills levels and stated that they required minimal assistance with Web searching.

Of the respondents surveyed by Ramirez (2003:10), 70% stated that they were competent at accessing and searching the Web and 87% required no training. Results from a study by Bar-Ilan, Peritz and Wolman (2003) indicate that 85% of respondents considered themselves to be Web-literate and competent in searching e-resources.

In the British Academy study (2005:38), 68% of academic researchers indicated that the new electronic materials and e-discovery tools changed the way research was being conducted. It was noted that the following enhancements occurred:

- improved discovery and access to a much wider range of information resources via Web search engines and portals
- improved convenience and speed
- removal of time and space constraints
- the ability to capture, create, store, search, manipulate and enhance data.

When Reed and Tanner (2001:232) asked academics to rank the Web as an information resource, 50% considered the Web valuable for general topics and 41.8% considered it to be valuable for scholarly materials. A survey by Wang and Cohen (2000) found that 74% perceived the Web as a very important tool to support teaching and research. The Web is often used to gain a quick overview of a topic (Hewitson 2002) as well as to obtain specialised subject information, to remain up to date with developments in a field of expertise or subject field by updating academic knowledge and to obtain information not available elsewhere (Xiaoying 2002).

Academics in the Hewitson study (2002) reported that the Web provided contemporary, up-to-date information that was easy to incorporate into teaching activities. Moreover, the Web was perceived as a useful tool to illustrate real-world application scenarios, especially for vocational-based courses. Data gathered by Bao (1998) showed that when searching the Web, 84.7% of the respondents preferred using Web search engines to retrieve information.

Fortin (2000) found that a variety of Web search engines were used to find information on the Web, but that the use of meta search engines was low. These results are supported by Gardiner, McMenemy and Chowdhury (2006), who found that Web search engines were the most frequently used retrieval tool and that meta search engines were used less frequently, or not at all.

Patitungkho and Deshpande (2005) found that 37% of academics used the Web daily and all the respondents used Web search engines, with Google™ being the most popular, followed by Yahoo!™. Similar results are reported by the British Academy (2005:38) which also found that the most important electronic discovery tools were Google™ and other Web search engines (47%), online catalogues (18%) and abstracting and indexing services (11%).

It appears that, in general, Web search engines like Google™ are used as a first resort approach for resource discovery, ahead of more traditional tools such as online catalogues, abstracting and indexing services or subject portals compiled by the academic library. Therefore the Web and Web search engines have a profound impact on the researcher's ability to access, search and locate resources.

The literature review also revealed that there was a knowledge gap in terms of the open Web information-searching practices of South African academics.

EMPIRICAL SURVEY

Research design and methodology

The opinions and attitudes of academics were solicited using a questionnaire survey designed in conjunction with the Statistical Consultation Service (STATCON) at the University of Johannesburg. The aim of the questionnaire was to collect quantitative data on the information seeking habits of Unisa academics in terms of the open Web and to ascertain how these academics use and perceive the open Web. Furthermore, the investigation aimed to shed light on the extent to which Unisa academics use the open Web when retrieving academic and research information. Unisa is South-Africa's oldest

university and came into being in 1873 and was established as a distance learning institution in 1946. In 2004, the new Unisa was established through the merger of the former Unisa with Technikon SA and the incorporation of the distance education component of Vista University Distance Education Campus (VUDEC) (Unisa 2004).

The questionnaire was designed to gather evidence relating to the following:

- To establish Web related trends regarding frequency of use, experience and perception of the usefulness of the scholarly Web by academics.
- To determine their levels of experience and ability in finding information on the open Web.
- To explore to what extent academics currently access information on the open Web and the perceived barriers of accessing information in this way.
- To gain insight into the relative significance of the open Web as a research tool for academics.
- To determine Web and Web search engine usage frequency and access location.

Scholarly Web search engines are a relatively new development and many respondents might not be aware of or familiar with this category of search tools. For this reason, the questions included a definition of the term 'open Web' to clarify the concept for the respondents. Open Web resources were defined as:

Non-library, open, freely accessible and available Web-based information resources accessed via a Web browser, available to anyone searching or browsing the Web. It includes using general Web search engines such as Google™ or Yahoo!™'s Web search engine and scholarly Web search engines such as Google Scholar™ and Scirus™.

The questionnaire covered the following issues:

- Web utilisation (question 1)
- experience and skills of the open free Web (question 2)
- history of Web usage (question 3)
- Web access location (question 4)
- frequency of Web use (question 5)
- usefulness and importance of the Web and Web search engines (questions 6 and 7)
- 12 possible barriers to using the Web as a resource (question 8).

The initial draft questionnaire was piloted and then modified based on the responses and suggestions received. StatPac online survey software was used to host the questionnaire on the Web.

This study selected all the academic staff members located at the Florida and Pretoria campuses as its target population. A covering letter accompanied the questionnaire and assured respondents of their anonymity and provided general background on the study. The Unisa academic staff comprised approximately 1188 members who were invited to participate in the survey. Firstly, email invitations were distributed to all academic staff via the offices of the Deans of the five Unisa Colleges. Secondly, academic staff was invited to participate via the Unisa intranet's general daily electronic notices circulated to all Unisa staff. The Web-based questionnaire was available for completion for a period of 12 working days (i.e. 16 calendar days). The findings reported are based upon 187 academics which give a response rate of 15.7%. The majority of the 187 respondents were males between the ages of 40 and 49 years with 11–20 years of experience; these respondents were employed as lecturers. Furthermore, most of the respondents were from the College of Science, Engineering and Technology, had a doctoral degree and had published at least 1–3 publications in the last five years. Participation in the survey was voluntary and it was thus a self-selected sample.

Results of the survey

The data collected enabled the researchers to understand how the academic staff interact with and utilise open Web resources to satisfy academic and research information needs.

TABLE 1
Cross-tabulation of Web use and Unisa College

| | Web use | | | | | |
| | Yes | | No | | | |
Unisa College	Total	%	Total	%	Total	%
Agriculture & Environmental Sciences	9	5.60	0	0.00	9	5.10
Economic & Management Sciences	35	21.9	7	38.9	42	23.6
Human Sciences	30	18.8	2	11.1	32	18.0
Law	31	19.4	4	22.2	35	19.7
Science, Engineering & Technology	49	30.6	3	16.7	52	29.2
Bureaus, institutes & centres	6	3.80	1	5.60	7	3.90
Not indicated	0	0.00	1	5.60	1	0.60
Total	**160**	**100**	**18**	**100**	**178**	**100**

The following are some of the questions posed to the respondents in the questionnaire survey with an interpretation of the results.

Question 1: Have you used the open Web in the past year for academic or research information needs?

The vast majority of respondents used the open Web for academic and research purposes. Of the 187 respondents, 165 (90.2%) respondents had used the open Web in the past year compared to only 18 (9.8%) respondents who indicated non-use. Four respondents (2.1%) did not answer this question.

As Table 1 illustrates, academics in the College of Science, Engineering and Technology were the most frequent users of the open Web, followed by the College of Economic and Management Sciences.

The results indicate that Web search technology is driving changes in information searching and that the Web search culture has altered academics' interaction with information. Access to the vast amounts of useful, easily accessible, free academic information on the open Web has transformed the literature research and academic information retrieval process

because academics include the open Web as a tool for literature review.

Question 2: How would you rate your ability to find academic and research information on the open Web?

Figure 1 shows that 39.5% of respondents rated their skills to find information on the open Web as good, 24.6% respondents rated their skills as very good, 24% of respondents rated their skills as fair and 9% of respondents rated their skills as excellent. Only 3% of respondents indicated that their skills were poor. Generally, most of the respondents (73.1%) felt that their skills and ability to find information were adequate to very good. The search skills and confidence level of respondents suggest that academics are increasingly self-sufficient in locating, accessing and using open Web information.

Question 3: Indicate the number of years that you have been using the Web.

Figure 2 reveals that 30.4% of the respondents had been using the Web for more than nine years, 20.8% for 7–8 years and 29.2% for 5–6 years. Only 11.3% indicated that they had been using it for three to four years and 8.3% were novice users (less than two years). As indicated in figure 2, a large percentage of respondents (80.4%) were experienced users, having used the Web for five years or more. The results show that most academics regularly use the Web and are at ease with the technology.

Question 4: How often do you access the Web for academic and research purposes from each of the following locations: office, home, academic library, other?

As illustrated in figure 3, the office and home were the most popular locations for Web access; 40.8% of respondents accessed the Web for academic and research purposes from the office on a daily basis, 32% accessed it weekly, 16.6% monthly and 7.7% quarterly. Very few respondents indicated lower usage. When asked about their Web usage from home, 9.5% used it daily,
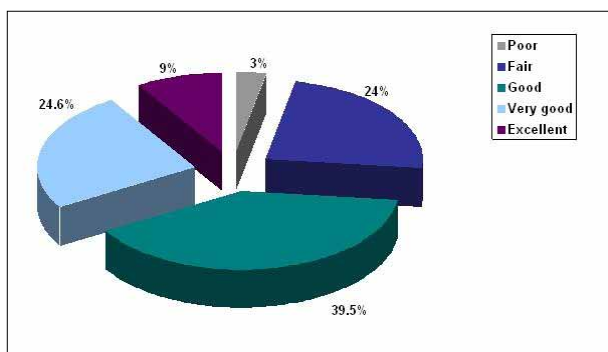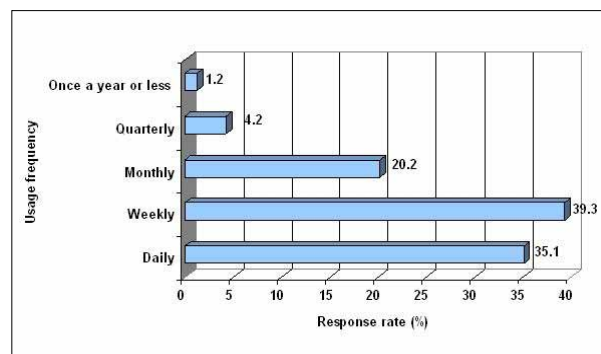

FIGURE 1
Ability to find academic and research information on the open Web
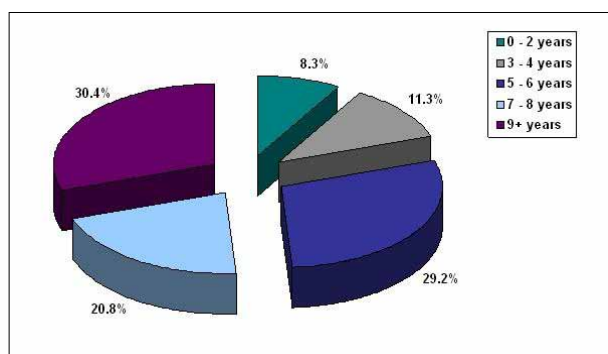
FIGURE 2
Number of years using the Web

FIGURE3
Frequency of use and Web access location

27.2% weekly, 7.7% monthly and 11.2% quarterly. The academic library was not a popular location to access the Web.

It is evident that academics prefer to use the Web from the comfort of their office or home with on-campus office access the location most often used for connecting to the Web, followed by the home.

In terms of frequency of use, 36.7% of respondents accessed the Web from home on a daily or weekly basis and 72% of respondents accessed the Web from the office on a daily or weekly basis. It can be concluded that academics have incorporated the open Web as an everyday tool into their lifestyle and daily or weekly activities.

Question 5: On average, how often do you use Web search engines (e.g. Google™, Yahoo!™) to find information for academic or research purposes?

This question assessed how often Web search engines were used by academics to find information for academic and research purposes. As reflected in figure 4, academics used Web search engines on a weekly (39.3%), daily (35.1%) or monthly (20.2%) basis.

There is a high rate of participation in Web activities by the academic community, with 74.4% of respondents using Web search engines to find academic and research information on a daily or weekly basis. It can be deduced from the results that Web searching is becoming habitual and that Web search engines are an important search and retrieval tool used regularly. It is clear that academics have integrated Web-based search services like Web search engines into their daily life.

Question 6: How useful do you find the open Web and Web search engines (e.g. Google™, Yahoo!™) as tools for your academic and research purposes?

A perusal of figure 5 reveals that grouped together, 81% of respondents found the open Web and Web search engines useful (26.2%), very useful (34.5%) or indispensable (20.8%) when gathering information for academic and research purposes.

The responses illustrate that academics are positive towards the open Web and Web search engines and that it is widely used to conduct desktop research. The results indicate that the open Web is an important gateway to academic information and is used extensively to fulfil information needs. Despite the gaps and flaws in the coverage and content, the open Web is an important channel and research tool in information retrieval.

Question 7: Indicate the extent to which you agree or disagree with the following statement: 'Information on the open Web has become an important resource for academic and research work'

Respondents were prompted to indicate agreement or disagreement on a five-point Likert scale as detailed in figure 6.
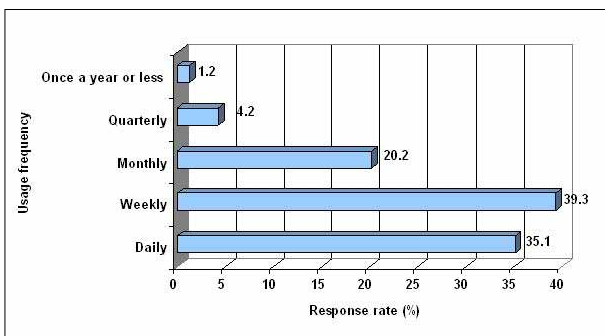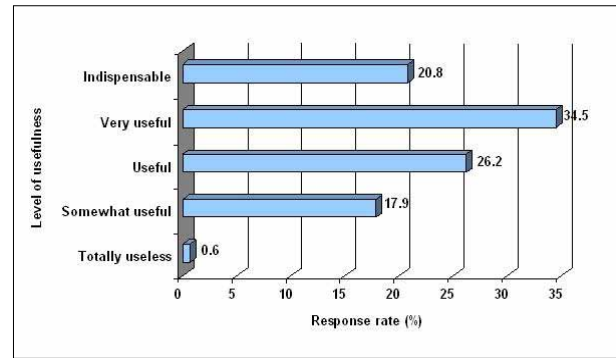
FIGURE 5
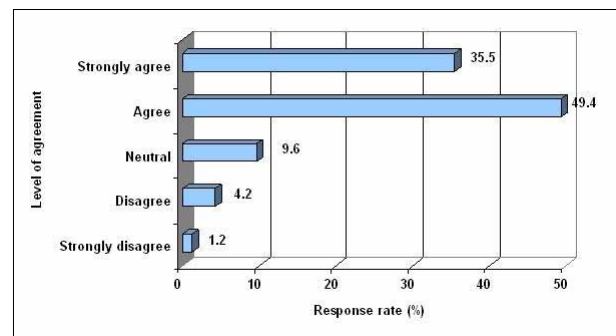Usefulness of the open Web and Web search engines

Overall, 84.9% of respondents indicated that they agreed (49.4%) or strongly agreed (35.5%) with the statement. Only 5.4% of the respondents indicated that they disagree (4.2%) or strongly disagree (1.2%).

Despite search, retrieval and quality issues, the open Web as an information-rich environment has value and importance in terms of the information-gathering activities of the academic community. The results imply that e-research is increasingly being undertaken by academics in the open Web realm, outside the virtual and physical academic library. Thus, the open Web as an information resource supports research and teaching activities and is becoming more and more valuable as research tool.

Question 8: To what extent do you experienc experience the following issues as barriers to using the open Web and/or Web search engines for research and academic work?

The aim of the question was to elicit academic perceptions of obstacles in using the open Web and Web search engines for academic and research work. Respondents were required to indicate to what extent the 12 issues or concerns listed in Table 2 limited them from using the open Web ranked from 1 (the most important) to 12 (the least important). The top three barriers that emerged were, (1) lack of time to search and browse the Web, (2) information overload and (3) poor network speed and slow downloading of webpages. The ranking was calculated by adding the percentages of the columns 'moderate extent', 'large extent' and 'very large extent'.

Of the respondents who answered this question, 63.3% experienced a lack of time to search and browse the Web as a problem to a moderate (26.6%), large (26.6%) or very large extent (10.1%). As the tabulated data indicate, information overload was a drawback for 58% of respondents to a moderate (34.3%), large (14.8%) or very large extent (8.9%). Poor network speed and slow downloading speed of webpages was an impediment

FIGURE 4
Frequency of Web search engine usage

FIGURE 6
Importance of the open Web as an academic and research resource

TABLE 2
Barriers to using the open Web and/or Web search engines

Barriers	Extent				
	Very small	Small	Moderate	Large	Very large
1. Lack of time to search and browse the Web (63.3%)	32	25	45	45	17
	18.90%	14.80%	26.60%	26.60%	10.10%
2. Information overload (58%)	36	30	58	25	15
	21.30%	17.80%	34.30%	14.80%	8.90%
3. Poor network speed and slow downloading of webpages (49.1%)	30	52	43	26	14
	17.80%	30.80%	25.40%	15.40%	8.30%
4. Eye strain when reading on the PC screen (37.3%)	52	48	37	20	6
	30.80%	28.40%	21.90%	11.80%	3.60%
5. Too many advertisements (34.9%)	62	43	21	27	11
	36.70%	25.40%	12.40%	16%	6.50%
6. Web information constantly changes and disappears (30.2%)	64	47	36	12	3
	37.90%	27.80%	21.30%	7.10%	1.80%
7. Lack of skills to use the Web effectively (27.3%)	84	35	26	15	5
	49.70%	20.70%	15.40%	8.90%	3%
8. Fear of viruses and hackers (26.1%)	65	56	22	18	4
	38.50%	33.10%	13%	10.70%	2.40%
9. Computer problems (hardware & software inadequacies) (25.5%)	68	53	23	15	5
	40.20%	31.40%	13.60%	8.90%	3%
10. Fear of copyright infringement and/or plagiarism (24.3%)	73	50	22	16	3
	43.20%	29.60%	13%	9.50%	1.80%
11. Fear of accidentally accessing undesirable Websites, e.g. pornography, gambling (15.4%)	98	41	13	11	2
	58%	24.30%	7.70%	6.50%	1.20%
12. Fear of electronic surveillance/ spyware (lack of privacy) (13.6%)	101	38	15	7	1
	59.80%	22.50%	8.90%	4.10%	0.60%

for 49.1% of respondents to a moderate (25.4%), large (15.4%) or very large extent (8.3%).

Respondents also had the opportunity to report other barriers (not covered in Table 2) experienced when searching the open Web. The main issues raised were:

- the inaccessibility of Web content due to payment or subscription requirements, bias, quality and credibility issues with the open Web
- Web search engine searching and retrieval problems
- the transient nature of Web information
- technical, network and software issues
- the cost of accessing the Web from home.

Conclusions and recommendations

This study explored how Unisa academics perceive the open Web in the constantly evolving information resource landscape and to what extent they apply the many new free Web retrieval tools and applications. The questionnaire survey collected quantitative data on the information seeking habits of academic on the open Web.

The results clearly show that respondents have indeed accepted the open Web as a useful information resource and Web search engines as a suitable retrieval tool when seeking information for academic and research purposes. An overwhelming 90.2% of the respondents stated that they had used the open Web in the past year for academic and research purposes. The majority of respondents (81%) reported that they found the open Web and Web search engines useful or indispensable for academic and research purposes. The open Web was viewed as an important information resource for academic and research work by 84.9% of the respondents.

The results of the study compare favourably to the findings of various international studies. Fortin (2000), Herring (2001a, 2001b), Wang and Cohen (2000) and Dewald (2005) found intense use of the Web among academics. Surveys by De Vicente, Crawford and Clink (2004) and the Research Support Libraries Group (2002) also support the fact that academics deem Web search tools and browsing the Web an effective method to find academic information resources for research projects.

Frequent use of Web search engines as a mode of retrieval and information discovery was favoured amongst academics, with 74.4% of respondents using it on a daily or weekly basis to source academic and research information. This supports the research of De Vicente, Crawford and Clink (2004), Friedlander (2002), Research Support Libraries Group (2002) and Xiaoying (2002). The research studies of Kibirige and DePalo (2000) and De Vicente, Crawford and Clink (2004) support the findings of this study that Web use is a daily or weekly activity among academics.

The office (72%) and home (36.7%) were the most popular locations for Web access, on a daily or weekly basis. Several researchers in the literature point out that the office is the most popular point for Web access, followed by the home, rather than the academic library (Applebee, Clayton, Pascoe & Bruce 2000; Bao 2002; Research Support Libraries Group 2002; Uddin 2003).

Personal factors such as skills, ability and experience were investigated as possible factors in the usage of the open Web as information resource. The study revealed that 80.4% of respondents had been using the Web for quite a number of years, with usage varying between five or more years. Respondents (73.1%) felt that their skills and ability to find information on

the open Web ranged from satisfactory to very good. Studies by Fortin (2000) and Zhang (2001) also showed that, in general, self-perceived ability and skills to use the Web among academics was high.

The system factors that had a negative impact on open Web usage were information overload, reported by 58% of respondents, as well as poor network speed and slow downloading of webpages, reported by 49.1% of respondents. Information overload was also emphasised as a problem in the studies conducted by Fortin (2000), Hewitson (2002), Jankowska (2004), EPIC (2003) and Gardiner, McMenemy and Chowdhury (2006). Several researchers identified slow response times when downloading webpages as a barrier (Fortin 2000; Harypusat 2003; Gardiner, McMenemy & Chowdhury 2006).

The results of this study provide insight into the approach and perceptions of academics as information users towards the open Web as an information resource. A better understanding was gained as to how academics use the open Web and web search engines in conducting research.

This study has found that Unisa academics have accepted the open Web as a useful information resource and Web search engines as search and retrieval tools for academic and research purposes.

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