

**An empirical investigation of Information Retrieval skills among
undergraduate students at Dhaka University**

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Submitted by

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Registration: Ha-4222

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Department of Information Science and Library Management
University of Dhaka

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Declaration

This is to certify that the research entitled “An empirical investigation of Information Retrieval skills among undergraduate students at Dhaka University” is my own work and to the best of my knowledge and belief it contains no material previously published or written by any other person. The whole research work was counted by me under the guidance and kind supervision of my supervisor.

I further submit the thesis has not been previously submitted in partial or in full by me for any degree or diploma to any University or Institute.

Examination Roll: 3050

Registration: Ha- 4222

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**DEDICATED
TO
MY PARENTS**

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Contents

Table of contents	Page
Acknowledgements	i
Table of contents	ii
List of tables	vii
List of figures	ix
Chapter One: Introduction and Background	
1.1 Introduction	1
1.1.1 Information literacy skills	1
1.1.2 Effective search skills	3
1.1.2.1 Planning for a search	3
1.1.2.2 Entering search terms	4
1.1.2.2.1 Boolean Operators	4
1.1.2.2.2 Parentheses (Brackets)	7
1.1.2.2.3 Truncation and wild card	7
1.1.2.3 Reviewing and modifying the search	8
1.2 Aims and objectives	8
Chapter Two: Literature Review	9
2.1 Information system	12

2.2 Information retrieval	13
2.3 Information retrieval (IR) system	13
2.4 Information retrieval interaction	14
2.5 Information retrieval skills	14
2.6 Concept of information retrieval skills	15
2.7 Information Literacy standards	18
Chapter Three: Research Methodology	26
3.1 Participants	26
3.2 Questionnaire construction	26
3.2.1 Type of questions	27
3.2.2 Reliability test	27
3.3 Questionnaire survey	29
3.4 Data analysis	29
Chapter Four: Results of the Study	30
4.1 Students' faculty by gender	30
4.2 Students' year of study by gender	31
4.3 Students' age by gender	32
4.4 Students' use of IT equipment by gender	33
4.4.1 Students' use of desktop by gender	33

4.4.2 Students' use of laptop by gender	34
4.4.3 Students' use of smart-phone by gender	35
4.5 Students' own personal computer by gender	36
4.6 Students' computer experience by gender	37
4.7 Students' computer skills by gender	39
4.8 Students' internet experience by gender	40
4.9 Students' internet connection in home by gender	41
4.10 Students' frequency of internet use by gender	42
4.11 Students' preferred search engine by gender	43
4.12 Students' use of information sources by gender	45
4.12.1 Students' use of book as an information source by gender	45
4.12.2 Students' use of journal as an information source by gender	46
4.12.3 Students' use of magazine as an information source by gender	47
4.12.4 Students' use of internet as an information source by gender	48
4.13 Students' use of online sources by gender	49
4.13.1 Students' use of e-journal as an online source by gender	49
4.13.2 Students' use e-book as an online source by gender	50
4.13.3 Students' use of Wikipedia as an online source by gender	51
4.13.4 Students' use of other online sources by gender	52

4.14 Knowledge about information sources and search techniques	53
4.15 Data analysis	63
4.16 Test of hypotheses	64
4.17 Questionnaire about student's information search knowledge	65
4.18 Test for statistical significance	65
4.19 Gender difference	66
4.19.1 Group statistic (<i>t</i> -test)	66
4.19.2 The independent sample <i>t</i> -test for gender difference	66
4.20 Analysis of variance (ANOVA)	67
4.20.1 Age difference	68
4.20.2 Status of the user	70
4.20.3 Students' Faculty	72
4.20.4 Computer experience	73
4.20.5 Internet experience	75
Chapter Five: Discussion, Recommendation and Conclusion	78
5.1 Discussion	78
5.1.1 Demographic perspectives	78
5.1.2 Students' computer and internet experience	78
5.1.3 Students' preferred information sources	78

5.1.4 Students' search knowledge	79
5.2 Problems	79
5.3 Recommendations	80
5.4 Conclusion	81
References	82
Appendices	87
Appendix-1	87
Appendix-2	91

List of Tables

	Page
Table 3.1 Cronbach's alpha for internal consistency	28
Table 3.2 Reliability Statistics	28
Table 4.1 Students' faculty by gender	30
Table 4.2 Students' year of study by gender	31
Table 4.3 Students' age by gender	32
Table 4.4 Students' use of desktop by gender	33
Table 4.5 Students' use of laptop by gender	34
Table 4.6 Students' use of smart phone by gender	35
Table 4.7 Students' own computer by the gender	36
Table 4.8 Students' computer experience by gender	38
Table 4.9 Students' computer skills by gender	39
Table 4.10 Students' internet experiences by gender	40
Table 4.11 Students' Internet connection at home by gender	41
Table 4.12 Students' frequency of using internet by gender	42
Table 4.13 Students' preferred search engine by gender	44
Table 4.14 Students' use of book as an information source by gender	45
Table 4.15 Students' use of journal as an information source by gender	46
Table 4.16 Students' use of magazine as an information source by gender	47
Table 4.17 Students' use of internet as an information source by gender	48
Table 4.18 Students' use of e-journal as an online source by gender	50
Table 4.19 Students' use of e-book as an online source by gender	51
Table 4.20 Students' use of Wikipedia as an online source by gender	52

Table 4.21 Students' use of other online sources by gender	52
Table 4.22 Knowledge about volume and issue	54
Table 4.23 Knowledge about finding journal articles	55
Table 4.24 Knowledge about citation	56
Table 4.25 Knowledge about finding background information	57
Table 4.26 Knowledge about keyword	58
Table 4.27 Knowledge about scholarly journal article	59
Table 4.28 Knowledge about Boolean operator (AND)	60
Table 4.29 Knowledge about Boolean operator (OR)	61
Table 4.30 Knowledge about up-to-date information	62
Table 4.31 Knowledge about truncation	63
Table 4.32 Search skills questions	65
Table 4.33: Group statistics for t-test by gender	66
Table4.34: Independent sample t-test for gender	67
Table4.35: ANOVA for age groups	68
Table4.36: ANOVA for student status	70
Table4.37: ANOVA for faculty	72
Table4.38: ANOVA for computer experience	74
Table4.39: ANOVA for internet experiences	76

List of Figures

	Page
Figure 1.1 Boolean operator AND	5
Figure 1.2 Boolean operator OR	6
Figure 1.3 Boolean operator NOT	6
Figure 4.1 Students' faculty by gender	31
Figure 4.2 Students' year of study by gender	32
Figure 4.3 Students' age by gender	33
Figure 4.4 Students' use of desktop by gender	34
Figure 4.5 Students' use of laptop by gender	35
Figure 4.6 Students' use of smart-phone by gender	36
Figure 4.7 Students' own Computer by the gender	37
Figure 4.8 Students' Computer experience by gender	38
Figure 4.9 Students' Computer skills by gender	39
Figure 4.10 Students' internet experiences by gender	40
Figure 4.11 Students' Internet connection at home by gender	41
Figure 4.12 Students' frequency of using internet by gender	42
Figure 4.13 Students' preferred search engine by gender	45
Figure 4.14 Students' use of book as an information source by gender	46
Figure 4.15 Students' use of journal as an information source by gender	47
Figure 4.16 Students' use of magazine as an information source by gender	48
Figure 4.17 Students' use of internet as an information source by gender	49
Figure 4.18 Students' use of e-journal as an online source by gender	50
Figure 4.19 Students' use of e-book as an online source by gender	51
Figure 4.20 Students' use of Wikipedia as an online source by gender	52
Figure 4.21 Students' use of other online sources by gender	53
Figure 4.22 Knowledge about volume and issue	54

Figure 4.23 Knowledge about finding journal articles	55
Figure 4.24 Knowledge about citation	56
Figure 4.25 Knowledge about finding background information	57
Figure 4.26 Knowledge about keyword	58
Figure 4.27 Knowledge about scholarly journal article	59
Figure 4.28 Knowledge about Boolean operator (AND)	60
Figure 4.29 Knowledge about Boolean operator (OR)	61
Figure 4.30 Knowledge about current information source	62
Figure 4.31 Knowledge about truncation	63

Chapter 1
Introduction and Background

Chapter 1: Introduction and Background information

1.1 Introduction :

This is the time of information. Information seekers are always looking for new, updated information in their life-journey. Specially, students need up-to-date information in their subject areas. At this age of information explosion, it is difficult to pick up the right information. Studies have indicated time and time again that students have real difficulties in accessing the information they require.

As the Web, digital libraries, and information retrieval (IR) systems become a major form of information access for most students, researchers need to learn more about their interactions with these technologies. This current research seeks to investigate students' search knowledge in interactive environment.

1.1.1 Information Literacy Skills

Information literacy is rooted in the concepts of library instruction and bibliographic instruction. It is the ability "to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information" (American Library Association Presidential Committee on Information Literacy, 1989). Thus, it is the basis for life-long learning. Julien (2002) observes that in order to make efficient and effective use of information sources an information literate person today should possess specific online searching skills, which include the ability to select appropriate search terminology, construct a logical search strategy, and evaluate information appropriately.

An information literate individual is expected to possess some qualities as observed by Association of College and Research Libraries (Information Literacy Competency Standards, 2006). These include the abilities to:

- determine the extent of information needed;
- access the needed information effectively and efficiently;

- evaluate information and its sources critically;
- incorporate selected information into one's knowledge base;
- use information effectively to accomplish a specific purpose; and
- understand the economic, legal and social issues surrounding the use of information and access and use information ethically and legally.

Corroborating ACRL's observation, Wikipedia (Information Literacy, 2007) states that an information literate person is one who:

- recognizes that accurate and complete information is the basis for intelligent decision making;
- recognizes the need for information;
- knows how to locate needed information;
- formulates questions based on information needs;
- identifies potential sources of information;
- develops successful search strategies;
- accesses sources of information including computer based and other technologies;
- evaluate information no matter what the source;
- organizes information for practical application;
- integrates new information into an existing body of knowledge;
- uses information in critical thinking and problem solving (Doyle,1992); and
- uses information ethically and legally

September (1993) asserts that students need some level of these skills to make decisions about academic matters and other aspects of their daily lives. Julien (2002) identifies the skill domains that are involved and classifies them as cognitive, affective, and physical, i.e., thought, attitude, and operation.

Kari (2004) explained that skills required using electronic resources are higher than the one required for searching printed sources and that students need to master certain skills to exploit and use the growing range of e-resources. Undergraduates therefore need skills such as, informational retrieval, operational retrieval and strategic retrieval skills for speedy retrieval of the exact information needed from electronic resources. Undergraduates with informational retrieval skills should also be able to recognize information need for learning and research, distinguish ways of addressing gap and locating information stored in electronic resources. Moreover, they should be able to perform literature searches, organize and communicate the information retrieved, satisfactorily in their research work. However, undergraduates need to be guided to acquire these skills so as to cope with the 'Information-rich environment'.

1.1.2 Effective search skills

Electronic sources hold vast amounts of information which may be of relevance to students' research. The application of effective search skills will enable them to quickly locate the information required and to avoid the frustration of being overwhelmed by hundreds or thousands of irrelevant search results.

There are three key skills that are required for effective searching:

- Planning a search
- Entering a search query
- Reviewing and modifying your search

1.1.2.1 Planning for a search

It is vital to spend time planning a search in order to identify exactly which sources are to be searched and exactly what information are needed. It is useful to adopt a step-by-step approach as outlined below:

Step 1: Selecting the database

An ever-increasing number of resources are available in electronic format via the web, which usually means that a user can access them both on- and off-campus. Research databases are one type of electronic resource that will find very useful for researchers. These databases index the contents of publications such as books, journals and conference proceedings covering all major subject areas.

Step 2: Identify Keywords and Phrases

Analyzing and selecting the keywords and/or phrases which express the key concepts are needed; these will form the basis of an online search. This stage is very important. If a wrong keyword is selected, it will not find the information a researcher is looking for. Not using all the relevant keywords may miss out some relevant information or the information retrieved may only be of partial interest.

Step 3: Use of Synonyms and Related Terms

Researchers should also consider if there are any alternative or related terms for the keywords that have been identified.

Step 4: Broader and Narrower Terms

When a search term is entered into a database, there might be too many or too few results, so of the searcher might need to use narrower and broader terms that could help improving the search.

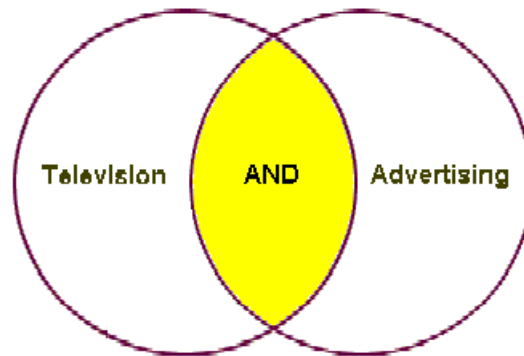
1.1.2.2 Entering Search terms

1.1.2.2.1 Boolean Operators

Boolean operators are link words that are used to combine keywords and phrases in ways that enable efficient, focused searching.

The three most common link words are: AND, OR and NOT.

Figure 1.1 Boolean operator AND

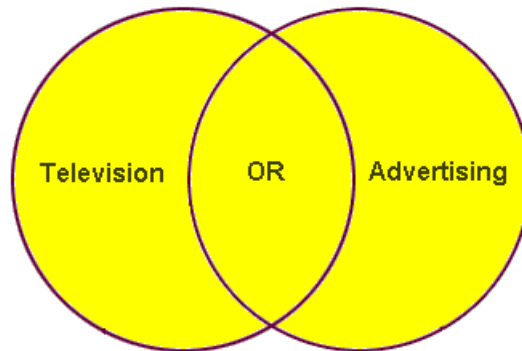


AND

- Narrows a search
- Looks for articles containing both/all keywords

Example: TELEVISION AND ADVERTISING

Figure 1.2 Boolean operator OR

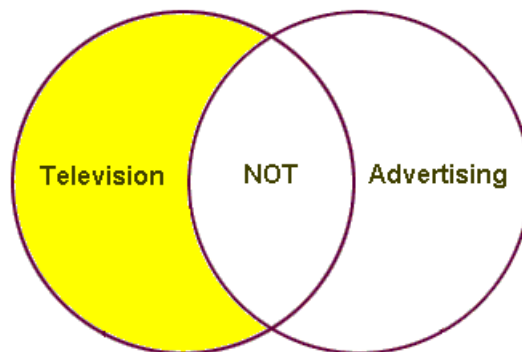


OR

- Broadens a search
- Looks for articles containing one or other or both keywords

Example: TELEVISION OR ADVERTISING

Figure 1.3 Boolean operator NOT



NOT

- Excludes terms from a search

TELEVISION NOT ADVERTISING

TELEVISION ANDNOT ADVERTISING

1.1.2.2.2.Parentheses (Brackets)

The researchers should use parentheses to group search elements together and to tell the database in what order it should process the search terms. For example:

(Teenagers OR adolescents) AND crime

Avoiding brackets in the example above would effectively perform two searches and provide results for both, i.e.

1) all articles about teenagers,

But also,

2) all articles about both adolescents and crime.

1.1.2.2.3. Truncation and Wild Cards

These are time saving search features.

Truncation

- Allows to search for any words beginning with the same word stem

For example:

Advert? or **Advert*** or **Advert!**

to find not only **advert** but **adverts, advertisement, advertised, advertising** etc.

Wildcards

- Allow to substitute for one or no letters

For example:

Wom?n will find **woman** and **women**

Globali?ation will find **globalisation** and **globalization**.

1.1.2.3 Reviewing and modifying our search

In some cases, even after spending time for planning a search, a searcher will still find too many or too few results, or the results may not be as relevant as it was hoped. It is therefore necessary to analyze the search and identify why it has been unsuccessful. It might be necessary to use alternative or additional keywords, or to review the use of link words and truncation. It may also necessary to try the search in a number of different databases to find all the information needed.

1.2 Aims and objectives:

The aim of this research is to assess the information retrieval skills of the undergraduate students at the University of Dhaka. The objectives are to:

1. explore students' knowledge about Boolean operators, truncation, bibliography, citation and journal articles;
2. find out the effect of students' computer and internet experiences and their individual characteristics on their search skills; and
3. provide recommendations on how to integrate information literacy instruction programme in the existing course curricula.

Chapter 2

Literature Review

Chapter 2: Literature Review

A comprehensive literature review is a prerequisite to generate new knowledge and it is the basis for new research. It helps understand the topic deeply. It also provides a basis for theoretical framework of the study and interpretation of findings. There have been only few studies conducted on information retrieval skills by students, very few of which allied to the current research.

Numbers of research papers have been published so far covering the basic concept of IL (Breivik, 1999; Owusu-Ansah, 2005; Lloyd 2005; Matoush 2006; Harris and Millet, 2006; Ramesha, 2008; Lloyd, 2008; O'Connor 2009), the range of IL standards and models (Donaldson 2004; Mackey and Ho 2005; Loo and Chung,2006; Keene and others, 2010), designing of IL programmes for different types of users (Fjällbrant 2000; Harley, 2001; Hartmann, 2001; Satish and Vishakha 2006; Stephenson and Schifter Caravello 2007; Sales 2008; Pinto 2010; Zuccala (2010), IL education, (Ercegovic, 1998; Elmborg, 2003; Krooden, 2004; Andretta, 2007; Limberg and others, 2008; Andretta 2008; Secker 2010), IL skills learning and instruction and technology (Ramalho, 2003; Berk and others, 2007; Godwin, 2009; Walsh, 2010) with in IL programmes.

The literature published on IL skills reveal some useful and interesting findings that assist in planning, designing and implementing programmes to develop as well as measure IL skills of specific user communities. A digital information literacy programmes at university of Texas at Austin serve as a case study for implementing information literacy skills into traditional library services and collaborative activities (Dupuis, 1997). An ongoing survey of information literacy competencies of graduate students of University of California- Berkeley (Davitt Maughan 2001) also examines the extent of which undergraduate students are information literate. The conclusions reveal that the students think they know more about accessing information and conducting library research than they are able to demonstrate when put to the test. These findings reiterate the earlier study findings that students continue to be confused by the elementary conventions and procedures for organizing and accessing information.

New methods of teaching information literacy skills, combining with problem solving techniques, to develop, promote and assess critical and analytical thinking of students further using information technology available in the contemporary environment have also been highlighted (Macklin, 2001). Efforts were also made to develop an instrument for measuring of IL skills of University students. This instrument will be administered to students to assess entry skills upon admission to the University and longitudinally to ascertain whether there is significant change in skills levels from admission to graduation (O'Connor, 2002). Another study by Feast (2003) evaluated the impact of an action plan that aimed to assist in integrating information skills into teaching and learning practices of eight first-year core business courses at University of South Australia. Content analysis and staff interviews were made to evaluate the success of the action plan. The findings show that the action plan had not delivered the expected outcomes.

Brettle (2003) conducted a study to undertake a systematic review of literature on IL skills to determine the effectiveness of information skills training, to identify effective methods of training and to determine whether information skills training affects patient care. The majority of studies took place in US medical schools. Wide variations were found in course content and training methods. Eight studies used objective methods to test skills, two compared training methods and two examined the effects on patient care. There was limited evidence to show that training improves skills, insufficient evidence to determine the most effective methods of training and limited evidence to show that training improves patient care. Further research was suggested in a number of areas. A project was conducted at the University of Melbourne during 2002 to evaluate effectiveness of different methods adopted for teaching information literacy skills to students in the Arts Faculty. The three programs that were evaluated used different modes of delivery. The paper discusses the rationale of the project, the methodology and the results of the evaluation (Fiona and Ellis, 2003).The need for the

training the library and information professionals in the planning and implementation of IL programmes working in Indian University libraries was emphasized by Nyamboga (2004).

Ramakrishna and Valmiki (2004) conducted in KUVEMPU University to assess the computer literacy and information literacy of the post graduate students reveal that majority of the students lack awareness regarding the printed reference sources, highest percent of them do not possess the ability to identify the key concepts in the given information environment. About 44 percent of the respondents are unable to use the computers and many of them do not possess the knowledge about software, hardware and storage devices. Significant percent of them are not able to use the Internet. Majority opined that the computer literacy and information literacy programmes are “very important for them”. These findings suggested the design and implementation of IL programmes for students at PG and UG level and the librarian need to play crucial role in imparting information literacy education to students. The importance of incorporating courses on information literacy skills to address the individual needs of students with disabilities for successfully meeting the academic standards for all the students has been demonstrated by Vreeburg Izzo and others (2003).

Alfino and others (2008) explains the importance of integrating library skills into course goals to add coherence to the curriculum. In this project, staff were included in the instructional team, and information literacy skills that relate to critical thinking. Critical and philosophical arguments for constructivist based approaches to teaching critical thinking skills through online library instruction has been provided by Allen (2008). Kupier and others (2008) have conducted a study on the adequacy and specific characterizes of school students’ use of web literacy skills and strategies.

Morgan and Walton (2008) reported how librarians embraced new methods of working to general library and IT inductions at higher education level. In another project by Sounders and Coles (2008), the creation of a new research interface for academic users to improve their information literacy suggests that the diverse information literacy

practices the users demonstrated could be enhanced if on – screen clarity and consistency of terminology were improved.

Gross and Don Lathan (2009) focused on student conceptions of and experiences with interacting with information. Using interview technique the students been assessed in terms of their information literacy skills. Findings reveal a general view of IL focused on product rather than process, a perception of achieving information skills on their own, a performance for people over their information sources and an emphasis on personal interest as key to successful information seeking. Contemporary research has also focused on digital literacy and its relationship to information literacy (Kenton and Blummer, 2010). They suggest the application of novel educational techniques in institutions of higher education using for imparting IL programmes. Librarians could develop tools to support students’ interaction in course management system and virtual worlds, assist faculty in the creation of course curriculum as well as moderate online book discussions.

Pinto and others (2010) propose a methodology known as creating concept maps what helps in diagnosing and improving information analysis, synthesis, organization and representation skills and competencies of students. They have tested its usefulness using action research methodology on a group of university students of library and information Science. This method provides information on the strengths and weakness of the students’ skills, thus enabling their training to be improved by means of specific actions.

2.1. Information system

An information system is “a linked and related system of entities (including one or more information devices) that provides access to one or more bodies of knowledge and acts as a mechanism through which individuals can inform other people or become informed” (Allen, 1996: 5). These information devices can include journal articles, books and electronic databases. In the context of this study information system is used synonymously with information retrieval system.

Keenan and Johnston (2000: 137) define an information system as "... a system, which allows the collecting, processing, storing and retrieving of information to meet users' needs." An information system therefore deals with information in various capacities.

2.2 Information retrieval

Ingwersen (1992: 228) defined information retrieval as "... processes involved in representation, storage, searching, finding, and presentation of *potential information* [italics in the original] desired by a human user." Van Rijsbergen (1979:4) argued that information retrieval has to do with the retrieval of documents likely to be relevant to a particular request from a searcher with an information need. More than two decades later Keenan and Johnston (2000: 136) stated that information retrieval is the "process of searching (emphasis in the original) a collection of items in order to identify those documents (emphasis in the original) that deal with a particular subject." From these definitions it seems that information retrieval excludes non – relevant documents. However, information retrieval encompasses finding relevant as well as non – relevant records of documents or actual documents.

2.3 Information retrieval (IR) system

Ingwersen (1992: 228) defines an IR system as "an information system which is constituted by interactive processes between its *system objects*, *system setting*, and the environment, capable of searching and finding *information* of potential value to an actual searcher of information." This capability of the IR system is endorsed by the searcher's ability to formulate search strategies to retrieve relevant information.

Johnston (2000: 136) stated that an IR system "...allows for the collection, processing, storing and retrieving of information." An IR system is therefore also a search tool and repository for storing information.

2.4 Information retrieval interaction

Information retrieval interaction processes that occur during retrieval of *information* by involving all major participants in IR, i.e. the user, the *intermediary*, and the *IR system* - the latter consisting of *potential information*, mainly in the form of text and text representations as well as *IR system setting* (Ingwersen, 1992: 228). Contextually, the user would refer to the student, while the intermediary would refer to any other human being searching on behalf of the user. To Keenan and Johnston (2000: 140), this interaction takes place in real time with the user directing the flow of work.

2.5 Information retrieval skills

Information retrieval skills are the skills to seek relevant information to the subject from different sources. There is large variety of information available on the web, all of which may not be relevant, so student should have knowledge about relevancy.

Information seeking skills are needed throughout life in studying, working and private life. In the information society of today, along with the possibilities created by the Internet, they have become one of the most essential skills of a university student. Also the fact that an increasing number of courses is taught in web-based environments requires versatile skills of both information seeking and using and evaluating information sources. .

Recognizing information seeking skills as a major part of studying facilitates the entire learning process. Students need to be self-directed and they must take on the idea of lifelong learning. Students must learn how to take responsibility for their own work and how to get to know their field of study. They must also be able to solve problems independently and critically. Information seeking skills are useful in:

- seeking and finding information
- evaluating information
- using all kinds of information
- planning and designing individual projects

In addition to them, libraries provide access to databases, electronic publications and information reserves on the Internet.

2.6 Concept of information retrieval skills

Vigil (1988) opined that strategy is significant in information retrieval and that using strategy is a two-fold process. The first process, he explained, is to know what to do while the second process is to know when to do it. Knowing what to do and when to do it are important in information retrieval for instance, for database search.

Oliver (1995) stated that users should have appropriate instructions and frequent activity with electronic information system. Strategic retrieval skill is also significant in information retrieval. It assists in improvement of search skills. Students' improvement in search skills could speed up the whole information search process and equally contribute to a more effective and comprehensive search (Chu and Law, 2008). However, students might map out strategies to ascertain the process that would best retrieve the exact information needed for their goal.

Aina (2004) suggested that the student can use a single term or a combination of terms but however explained that the combination of terms may be more appropriate. Selecting an appropriate strategy can help reduce the retrieval of unrelated literature.

A number of researchers (Adesanya, 2002, Greaves, 2002, and Aina, 2004) explained that some search strategies such as, Boolean logic, truncation and proximity features are useful for retrieval of information

Kari (2004) stated that information skill is necessary for students so as to equip them with knowledge to cope with information. Furthermore, Kari (2004) posited that students require adequate knowledge of information skills.

Thomas (2004), the Pew Research Center in 2001 reported that 94% of teenagers with access to Internet rely on online information for research tasks and 71% of them used the Internet as the major source for their most recent school projects. Fifty-eight

percent (58%) of the students have used websites set up by the school or a class, 34% have downloaded a study guide while 17% have created a web page for a school project. Electronic resources, are beneficial for teaching, learning and research, however lack of skill would probably inhibit students' retrieval of information from electronic resources. Therefore, skill is necessary for retrieval of relevant and up- to-date information for student's work.

Chu (2007) reported on a study of the development of information searching expertise by 12 postgraduate research students. Six of the students were studying education, and six were studying engineering. The paper focused on the students' perception of the importance of searching skills and the growth of their knowledge with these skills as they progressed through their studies. The study took a longitudinal approach, using surveys, interviews, direct observations of students' searching behavior, as well as analysis of their thoughts over a one-year period. Findings reveal that, in the beginning, students performed more questionable subject searches and fewer keyword searches; later, as they understood more about subject searching and the power of keyword searches, they performed fewer subject searches but with greater accuracy and more keyword searches. The study also found that education students tended to use more complex keyword searches and formed more sophisticated search queries than did engineering students and that students' perception of the importance of searching skills increased as these skills became more familiar; this, in turn, led to more frequent use of the skills.”

Ahmed and Cooke (2008) indicated that utilization of electronic resources and the improvement of information skills are important for end users. They also revealed that respondents' had their computer skills improved to enhance their use of information sources.

Okello-Obura and Magara (2008) stated that computer skills of students should be improved for accessibility and utilization of e-resources. Mutshewa (2008) stated that

skill is improved through practice and frequent use of information retrieval system. Mutshewa pointed out that there is need for well-defined development programmes that could help people to be competent in the use of information retrieval system.

Saunders (2008) asserted that information cannot be retrieved if one cannot operate the system. Lack of operational skills pose challenges for students to retrieve information to accomplish their research goals.

Porter (2009) performed a lot of literature review using databases in the fields of library, computer, and information sciences producing articles on topics including: student search processes, student use of Internet and library online IR systems, differences between Web based and library information retrieval systems, and the current arrangement of online library IR systems. Literature described the steps needed to complete successful searches, studies and theories about how students conducted research, where students went for information and generally what they thought about the information they retrieved, the types of online information retrieval systems available along with strengths and weaknesses, what each of these systems was doing to compensate for shortcomings, and finally what was really needed systematically for better IR systems. The literature supported the observation that a common library student search interface, which models popular Web retrieval system search characteristics did not exist and a potential consequence was that students might miss a large portion of relevant, scholarly materials that were available. Ultimately, where the literature failed to present theory was in detailed information about specific search habits of millennial in current online IR systems and how this knowledge might affect better IR system design.

Islam and Tsuji (2010) assessed the information literacy competency of undergraduate students in Information Science and Library Management (ISLM) at the University of Dhaka, Bangladesh to determined their strengths and weaknesses. In general it was found that students had limited skills in the area of information literacy, as it is not discussed extensively in their academic course curriculum. This study urged the

incorporation of an information literacy program in the course curriculum, and more writing, discussion and other relevant issues that will make the students more information literate.

Herring (2010) revealed that to effectively retrieve information students need to value and implement information retrieval skills effectively as this would have an effect on how they find and use information, concepts and ideas for their assignments.

Operational retrieval skill which is the ability to exhibit some level of competence in the use of computers and the network connections is very crucial for information retrieval. Therefore, students are expected to have frequent interactions with the systems' hardware and software to enhance competences required for information retrieval.

2.7 Information Literacy Standards

The student who is information literate:

1. accesses information efficiently and effectively;
2. evaluates information critically and competently; and
3. uses information accurately and creatively.

Frasca *et al.* (1992) conducted a study of the effectiveness of a collaborative course in teaching library and critical appraisal skills at the University Of Illinois College Of Medicine. A critical appraisal and library skills course was taught at the Peoria site during the third-year medical clerkship. The performance of Peoria students on a twenty-item multiple choice posttest was compared to that of third-year students in Rockford, who received no library or critical appraisal instruction during their medicine clerkship. The two groups were similar in self-perceived library skills, critical appraisal skills, and other demographic values. Peoria students scored significantly higher on library, critical appraisal, and total posttest questions. An improving trend during the year was not observed at either site, implying that students were not acquiring these skills in day-to-day clerkship activities. Results suggest that this multidisciplinary course is effective in teaching library and critical appraisal skills.

Hill, Macheak, and Siegel (2000) developed a number of information literacy assessment instruments. Widely-used assessment tools administered to undergraduates at universities across the United States include Project SAILS, ETS iSkills, Madison Assessment Information Literacy Test, and the South Dakota Information Literacy Exams. Developed by Kent State University with assistance of grant funding from the Institute of Museum and Library Services (IMLS), Project SAILS provided a multiple-choice knowledge test targeting a variety of information literacy skills. As Blixrud indicates, the SAILS instrument was developed to assist universities in determining the level of student information literacy skills at the point of admission and graduation with the intent to correlate the skills to student success and retention.⁸ The goal of SAILS was to be “an instrument for programmatic-level assessment of information literacy skills that is valid – and thus credible – to university administrators and other academic personnel.⁹”

SAILS questions cover the following eight research skills:

1. Developing a research strategy
2. Selecting finding tools
3. Searching
4. Using finding tool features
5. Retrieving sources
6. Evaluating sources
7. Documenting sources
8. Understanding economic, legal, and social issues of information.

The University of Arkansas at Little Rock (UALR) is a metropolitan institution that served a large number of students from nontraditional, first-generation, and ethnically diverse populations in an increasingly online environment. One challenge for UALR is how the university can encourage student retention and graduation, as undergraduate student success is a major focus of current campus initiatives. Recognizing that information

literacy skills contributed to student success, UALR conducted an assessment of undergraduates using the Project SAILS cohort test. Collecting data using a combination of the SAILS instrument, a Blackboard community, and WordPress forms, librarians at the Ottenheimer Library collected information literacy data for freshmen students in ten sections of lower-level courses and senior students in twenty-four sections of upper-level level courses. The results of the SAILS assessment indicated that students are arriving on campus without the research skills needed for academic success. Consequently, librarian and faculty partnerships are important to provide research intensive experiences throughout the curriculum to promote the development of research skills and student success.

The Association of College and Research Libraries (ACRL) has established *Information Literacy Competency Standards for Higher Education* that define information literacy as “the set of skills needed to find, retrieve, analyze, and use information.” According to the ACRL competency standards, an information literate person should be able to:

1. Determine the extent of information needed
2. Access the needed information effectively and efficiently
3. Evaluate information and its sources critically
4. Incorporate selected information into one’s knowledge base
5. Use information effectively to accomplish a specific purpose
6. Access and use information ethically and legally
7. Understand the economic, legal, and social issues surrounding the use of information.

Bond stated that when trying to locate information on the Web people are faced with a variety of options. This research reviewed how a group of health related professionals approached the task of finding a named document. Most were eventually successful, but the majority encountered problems in their search techniques. Even experienced Web users had problems when working with a different interface to normal, and

without access to their favorites. No relationship was found between the number of years' experience Web users had and the efficiency of their searching strategy. The research concludes that if people are to be able to use the Web quickly and efficiently as an effective information retrieval tool, as opposed to a recreational tool to surf the Internet, they need to have both an understanding of the medium and the tools, and the skills to use them effectively, both of which were lacking in the majority of participants in this study.

Warlick (2005) concluded, "We live in a time when the very nature of information is changing: in what it looks like, what we use to view it, where and how we find it, what we can do with it, and how we communicate it. If this information is changing, then our sense of what it means to be literate must also change...If we can establish an expanded sense of what it means to be literate in this new information environment, then we may achieve more progress, in terms of better preparing children for the 21st century, by integrating contemporary literacy, instead of integrating technology" (Warlick, 2005).

Gross and Latham both have a common opinion about their research are the variables IL, information skill, and self-assessment of skill. The concept of IL has a long history (Behrens, 1994; Bruce, 1997) and, in recent times, has been the subject of much discussion as the need for new media and technology literacies related to IL have become increasingly apparent (Buschman, 2009; Tuominen, Savolainen, & Talja, 2005). However, The American Library Association states that to be information literate, a person must be able to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information.... Ultimately, information literate people are those who have learned how to learn. They know how to learn because they know how knowledge is organized, how to find information, and how to use information in such a way that others can learn from them. They are people prepared for lifelong learning, because they can always find the information needed for any task or decision at hand. (ALA, 1989, para. 3) This definition is codified by the

Association of College and Research Libraries (ACRL) and the American Association of School Libraries (AASL) as competencies or standards for students that guide the work of information professionals, and interest in IL has begun to be reflected in accreditation standards for institutions of higher learning. professionals, and interest in IL has begun to be reflected in accreditation standards for institutions of higher learning.

Assessing Skill

Despite this longstanding interest in IL, only recently has research on IL integrated objective skill assessment into IL research. This is likely because of the fact that until recently, objective tests of IL skills have not been available. Rather, efforts at assessing IL have occurred at the local level and have focused on the evaluation of educational interventions developed in specific contexts for specific purposes, for example, the assessment of IL instruction performed at a specific university or college in conjunction with a presentation or workshop. Although these data collection instruments are valuable tools for assessing student learning and the efficacy of these educational interventions, they do not provide an objective measurement of the skills attained by students in a way that allows for comparison to other students at other institutions or at a national level. The need for a standardized test of IL skills began to be addressed at Kent State University through *Project SAILS* (Standardized Assessment of Information Literacy Skills) in 2001 (Kent State University, 2011). Funding for this project was provided by the Institute for Museum and Library services in 2002. Shortly after this, the Educational Testing Service (ETS) undertook development of a standardized test to measure information and communication technology (ICT) skills (*ETS Launches ICT*

Self-Assessment of Skill

The Dunning-Kruger Effect (Morris, 2010) describes a situation in which people who are incompetent in certain domains have been shown to have a miscalibrated sense of their ability in that they think they are significantly more skilled than they are and tend to estimate their performance as better than average when asked to compare themselves

with peers. This miscalibration between actual skill and perceived skill has been demonstrated in the domain of IL (Gross & Latham, 2007). To measure perceptions of skill, participants are typically asked to estimate their performance on a test and asked to estimate how their score will compare with the scores earned by others (Kruger & Dunning, 1999). In the current study participants were asked to make these predictions both before and after taking the ILT in terms of the percent of questions they expected to answer correctly (e.g., 100% would be a perfect score) and how they felt their score would compare with other first-year students taking the test (e.g., an estimate of 80% means that 20% of students will score higher than the subject).

Barry (2012) intensified the need for information skills in academic research, in three categories: judgment; knowledge and operation of resources; linguistic/logical skills. There is a corresponding quantum leap in the information skills training requirement. Strategies for training within the doctoral supervision process are outlined. Qualitative data, from the Information Access project, on current practice among supervisors suggested that to train researchers successfully: (i) recognition of the size of the problem is required; (ii) a different model of library skills training needs to be adopted; (iii) the developmental nature of training needs to be recognized; (iv) research supervisors have an important role to play along-side librarians; (v) explicit discussion of metacognitive aspects of these skills is necessary; (vi) national and local institutions need to formulate training policy; (vii) supervisors themselves need training and support; (viii) academics and students need to take responsibility for their learning in this area.

Oyeniya (2013) investigated the gender differences in information retrieval skills and use of electronic resources in academic libraries in South-western Nigeria. The sample was selected from a population of 250 information professionals using a simple random sampling technique. Data for the study were collected by using structured questionnaire. Descriptive statistics of frequency counts, simple percentages and

inferential statistics of t-test and correlation analysis were used for data analysis. The findings did not reveal that gender differences exist between male and female information professionals on the basis of acquisition of information retrieval skills. Similarly, there was no statistically significant difference in respondents' use of electronic resources. However, the study showed that male professionals revealed a slightly higher mean score on their use of electronic resources. The paper discussed implications of these results on staff's development and capacity building in library and information centres with respect to ICT skills acquisition especially in a gender-sensitive environment.

Ilogho and Nkiko (2014) investigated the knowledge of information literacy and search skills of students in five selected private universities in Ogun state, Nigeria. It also examined students' ability to distinguish diverse information sources as well as assess the effectiveness of information literacy programmes of private universities. The sample consists of 359 respondents drawn proportionately from a population of 400 from the selected universities. Descriptive survey method was used to elicit data through the Monash University Library Questionnaire on Information Literacy in this study. The data collected were analyzed using simple percentages. It was found that preponderance of respondents have low knowledge of information literacy skills, showed high deficiency in identifying diverse information sources and the various information literacy programmes of the respondents' institutions lacked hands-on. The study concluded that sound information literacy skills is a desideratum in knowledge acquisition in the twenty-first century and recommended inter alia; that information literacy skills be integrated into the secondary and tertiary schools' curricula.

Thus, the need for an enhanced and continuous library user education geared towards empowering students to be sufficiently familiar with information sources, mutual collaboration between teachers and librarians to ensure integrated mode of lecture delivery, constant advocacy and sensitization outreaches.

Chapter Three

Research Methodology

Chapter 3: Research Methodology

This chapter discusses the methodology used in this thesis. The research design integrated qualitative and quantitative methodologies. Descriptive statistical analysis was complemented by in-depth descriptions from questionnaire survey. The following research method has been adopted to measure the information retrieval skills of undergraduate students.

3.1 Participants

The participants of this study were undergraduate students of the University of Dhaka. They were from all academic faculties and from all academic years. Both male and female participants took part in this survey. The fieldwork for this study was carried out over a period of one month in March 2013.

3.2 Questionnaire Construction

The questionnaire was the main data collection instrument for the survey. Based on the literature review and to meet the objectives of the research, a structured questionnaire was designed to collect data from students at Dhaka University. The questionnaire was made with simple, direct and familiar words keeping respondents' general level of search knowledge in mind. It was created to measure students' skills to retrieve information from various online information sources. There were both close and open-ended questions. Open-ended question helps us to find out student's knowledge about information searching and how they retrieve information from multiple sources. The questionnaire was divided into two sections. The first section was designed to gather students' demographic characteristics such as age, gender, status, etc. The second part assessed their search knowledge.

3.2.1 Type of questions

The questionnaire consisted of the following elements:

1. Students' demographic and individual characteristics such as gender, age, academic year's computer and internet skills;
2. Frequency of internet use;
3. Use of various information sources such as book, magazine, journal and others.
4. Use of online Information sources.
5. Their preferred search engine;
6. Use of electronic devices; and
7. Students' search knowledge required for retrieving information from online sources.

3.2.2 Reliability test

In statistics, Cronbach's alpha (α) is a coefficient of internal consistency. It is commonly used as an estimate of the reliability of a psychometric test for a sample of examinees. Cronbach's alpha will generally increase as the inter-correlations among test items increase. Because inter-correlations among test items are maximized when all items measure the same construct, Cronbach's alpha is widely believed to indirectly indicate the degree to which a set of items measures a single one-dimensional latent construct. However, the average inter-correlation among test items is affected by skew just like any other average. Thus, whereas the modal inter-correlation among test items will equal zero when the set of items measures several unrelated latent constructs, the average inter-correlation among test items will be greater than zero in this case. Indeed, several investigators have shown that alpha can take on quite high values even when the set of items measures several unrelated latent constructs, As a result, alpha is most appropriately used when the items measure different substantive areas within a single construct. Alpha treats any covariance among items as *true-score* variance, even if items cover for spurious reasons. For example, alpha can be artificially inflated by making

scales which consist of superficial changes to the wording within a set of items or by analyzing speeded tests.

Table 3.1 Cronbach’s alpha internal consistency

Cronbach's alpha	Internal consistency
$\alpha \geq 0.9$	Excellent (High-Stakes testing)
$0.7 \leq \alpha < 0.9$	Good (Low-Stakes testing)
$0.6 \leq \alpha < 0.7$	Acceptable
$0.5 \leq \alpha < 0.6$	Poor
$\alpha < 0.5$	Unacceptable

When alpha is greater than equal to 0.9, it signifies “Excellent”, if it is small than 0.9 and greater than equal to 0.7, it signifies “Good”. If it is small than 0.7 and greater than equal to 0.6, it signifies “Acceptable”. If it is small than 0.6 and greater than equal to 0.5, it signifies “Poor”. If it is small than 0.5, it signifies “Unacceptable”.

To examine the reliability of the overall questionnaire items, alpha coefficients were obtained.

Table 3.2 Reliability Statistics

Cronbach's Alpha	N of Items
.821	10

Here, N=10, alpha=0.821. It signifies alpha is greater than 0.7 and less than 0.9 ($0.9 > \alpha > 0.7$), so it is regarded as “Good”.

3.3 Questionnaire Survey

Total 250 questionnaires were distributed among the students through the university library. Among the 250 questionnaires, 199 were returned and included for analysis in the study.

3.4 Data Analysis

The data collected through the questionnaire were analyzed using SPSS to examine the stated objectives. Descriptive statistics were used to analyze demographic characteristics of the students in relation to their information retrieval skills. Then, *t*-test and ANOVA were conducted to further analyze the influence of students' demographic, computer and internet skills on their information retrieval skills.

Q-Q plots were used to check the normality of data before conducting ANOVA. The results is given in Appendix 2. The distribution of plots confirms that the data come from a reasonably normal distribution.

Chapter 4

Result of the Study

Chapter 4: Results of the Study

This Chapter presents the result of the survey on information retrieval skills by the undergraduate students of University of Dhaka. The data collected through survey questionnaire were analyzed using SPSS software. Descriptive statistics were used to examine demographic characteristics in relation to their information retrieval skills.

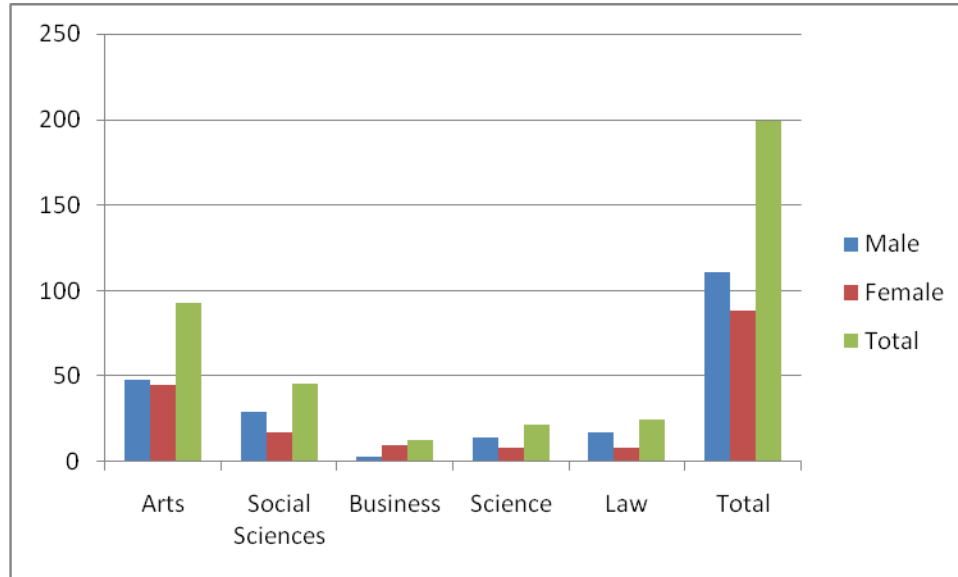
4.1 Students' faculty by gender

The number of total students participated in the survey was 199. Among the participants, the largest group 93 (46.73%) belongs to the Faculty of Arts. The second largest group belongs to Social Sciences faculty. The rest of the participants came from Law, Business and Science faculties.

Table4.1 Students' faculty by gender

Faculty	Male	Percentage	Female	Percentage	Total	Percentage
Arts	48	24.12%	45	22.61%	93	46.73%
Social Sciences	29	14.57%	17	8.54%	46	23.12%
Business	3	1.51%	10	5.03%	13	6.53%
Science	14	7.04%	8	4.02%	22	11.05%
Law	17	8.54%	8	4.02%	25	12.56%
Total	111	55.78%	88	44.22%	199	100%

Figure 4.1 Students' faculty by gender



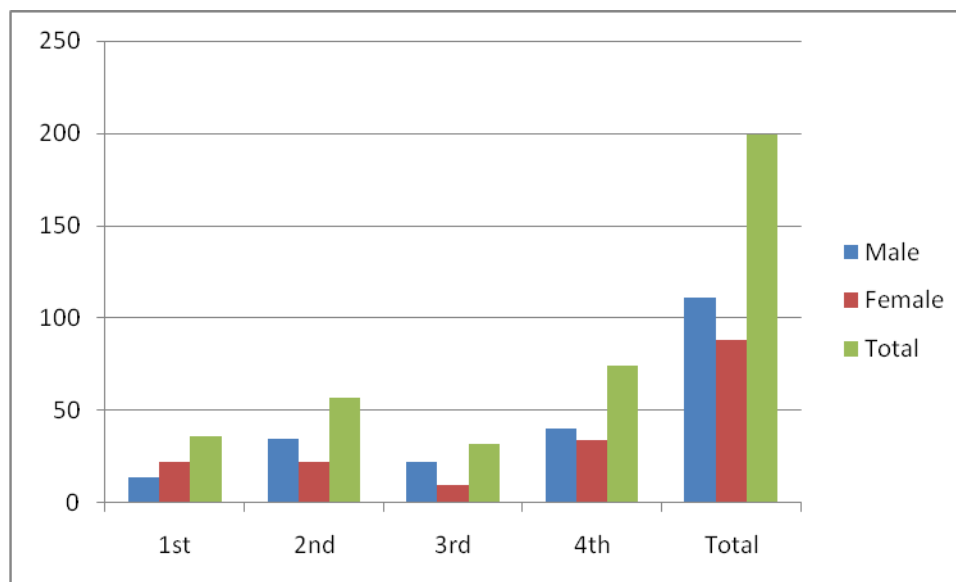
4.2 Students' year of study by gender

Among the participants, the largest group was 4th year students. The 2nd largest group was 2nd year students. The third largest participants are the students of 1st year. The lowest response came from 3rd year students.

Table4.2 Students' year of study by gender

Year	Male	Percentage	Female	Percentage	Total	Percentages
1 st	14	7.04%	22	11.06%	36	18.09%
2 nd	35	17.59%	22	11.06%	57	28.64%
3 rd	22	11.06%	10	5.03%	32	16.08%
4 th	40	20.10%	34	17.09%	74	37.19%
Total	111	55.78%	88	44.22%	199	100.00%

Figure 4.2 Students' year of study by gender



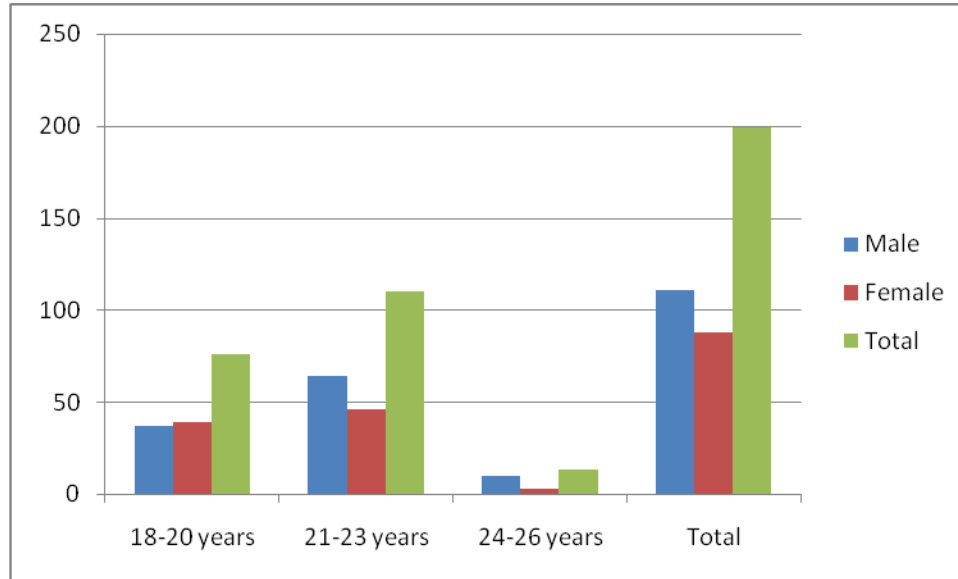
4.3 Students' age by gender

Among the participants, the largest portion belongs to 21-23 year age group. The 2nd largest group belongs to 18-20 year age group. The rest of the participants were in the 24-26 year age group.

Table 4.3 Students' age by gender

Age	Male	Percentage	Female	Percentage	Total	Percentage
18-20 years	37	18.59%	39	19.60%	76	38.19%
21-23 years	64	32.16%	46	23.12%	110	55.28%
24-26 years	10	5.03%	3	1.51%	13	6.53%
Total	111	55.78%	88	44.22%	199	100.00%

Figure 4.3 Students' age by gender



4.4 Students' IT equipment by gender

Among the total participants, 3(1.51%) students use both desktop and laptop. Three students use both smart phone and desktop; and 5 (2.51%) use both laptop and smart phone. Total 11 (5.53%) use two devices at a time.

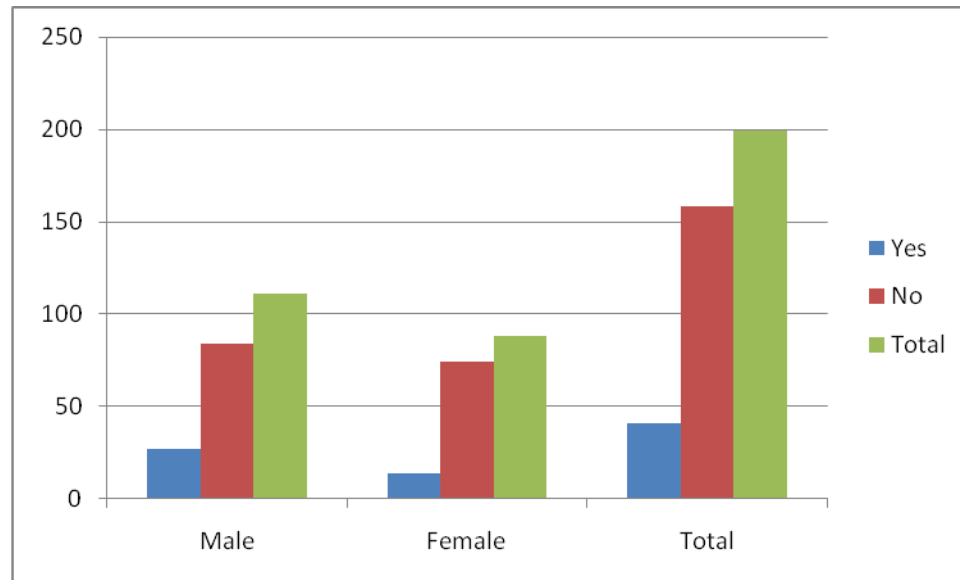
4.4.1 Students' use of desktop by gender

Among the 199 participants 41(20.60%) possess desktop computer. The remaining students 158 (79.40%) students do not have desktop computers.

Table 4.4 Students' use of desktop by gender

Desktop of the participant	Male	Percentage	Female	Percentage	Total	Percentage
Yes	27	13.57%	14	7.04%	41	20.60%
No	84	42.21%	74	37.19%	158	79.40%
Total	111	55.78	88	44.22%	199	100.00%

Figure 4.4 Students' use of desktop by gender



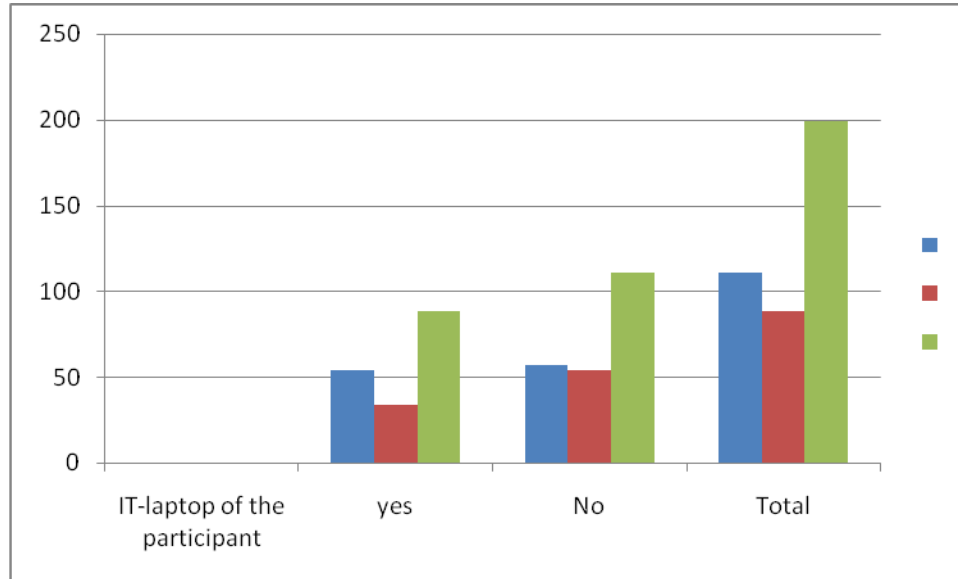
4.4.2 Students' use of laptop by gender

Among the 199 participants, 88 (44.22%) had laptop computers. The remaining 111 students (55.78%) do not have laptops.

Table 4.5 Students' use of laptop by gender

IT-laptop of the participant	Male	Percentage	Female	Percentage	Total	Percentage
yes	54	27.14%	34	17.09%	88	44.22%
No	57	28.64%	54	27.14%	111	55.78%
Total	111	55.78	88	44.22%	199	100,00%

Figure 4.5 Students' use of laptop by gender



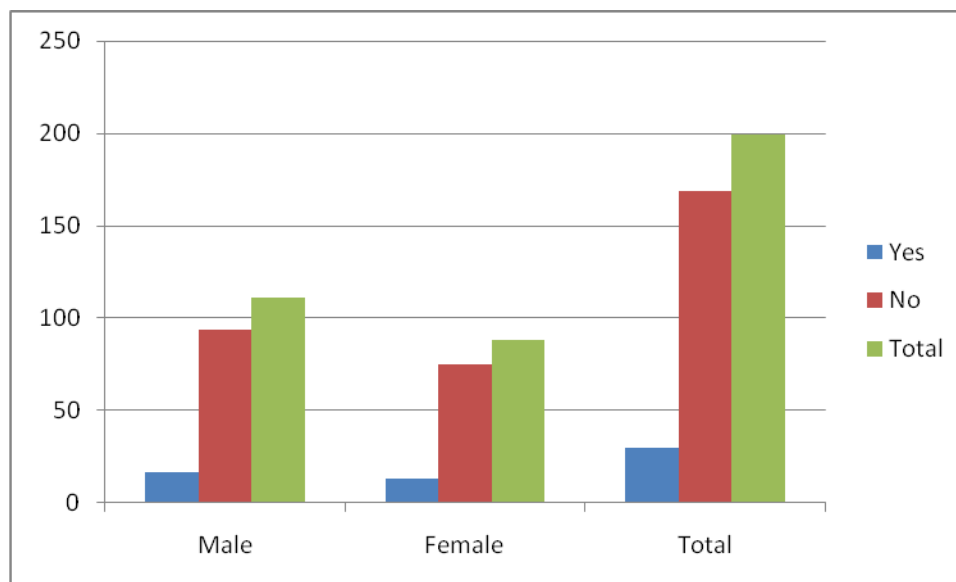
4.4.3 Students' use of smart-phone by gender.

Among the 199 participants (30, 15.08%) possess a smart-phone. The remaining 169 students (84.92%) do not have smart-phone.

Table 4.6 Students' use of smart-phone by gender

S-phone of the participant	Male	Percentage	Female	Percentage	Total	Percentage
Yes	17	8.54%	13	6.53%	30	15.08%
No	94	47.24%	75	37.69%	169	84.92%
Total	111	55.78%	88	44.22%	199	100%

Figure 4.6 Students' use of smart-phone by gender

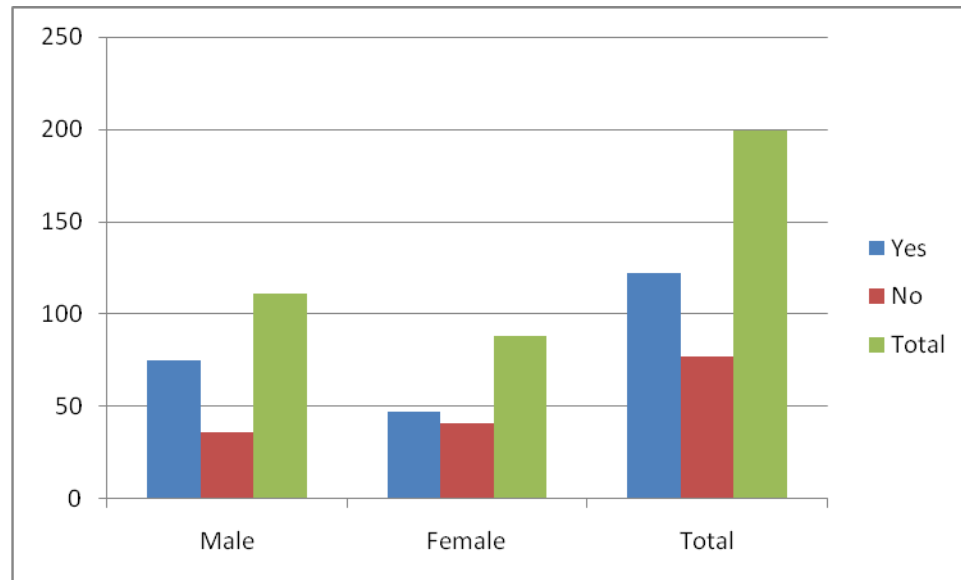


4.5 Students' own Computer by the gender

Among the total participants, 122(61.31%) posses their own computers.

Table 4.7 Students' Own Computer by gender

PC	Male	Percentage	Female	Percentage	Total	Percentage
Yes	75	37.69%	47	23.62%	122	61.31%
No	36	18.09%	41	20.60%	77	38.69%
Total	111	55.78%	88	44.22%	199	100.00%

Figure 4.7 Students' own Computer by gender

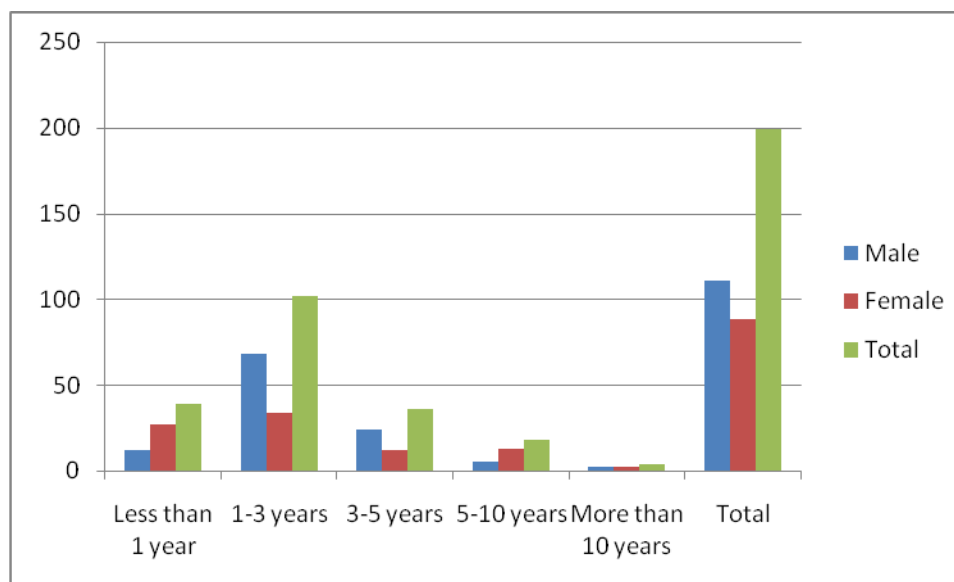
4.6 Students' Computer experience by gender

Among the participants, a large proportion of students were using computers for 1-3 years. A significant number of participants (39, 19.60%) use computer for less than 1 year. The highest number of students (102, 51.26%) was using computer for 1-3 years.

Table 4.8 Students' Computer experience by gender

Duration	Male	Percentage	Female	Percentage	Total	Percentage
Less than 1 year	12	6.03%	27	13.57%	39	19.60%
1-3 years	68	34.17%	34	17.09%	102	51.26%
3-5 years	24	12.06%	12	6.03%	36	18.09%
5-10 years	5	2.51%	13	6.53%	18	9.05%
More than 10 years	2	1.01%	2	1.01%	4	2.01%
Total	111	55.78	88	44.22	199	100.00

Figure 4.8 Students' Computer experience by gender



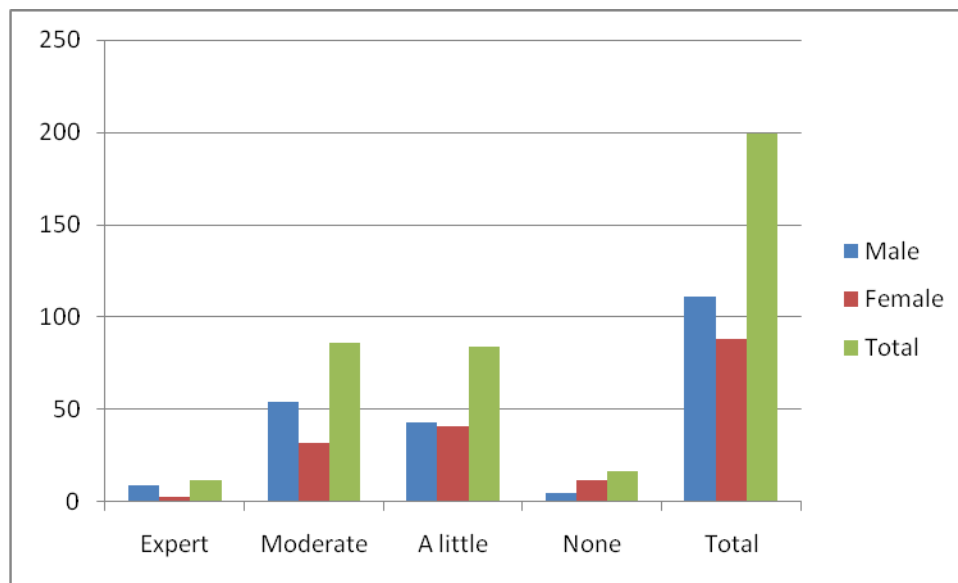
4.7 Students' computer skills by gender

Participants were told to rate their level of computer skills. Among the total participants, the largest group of the participants (86, 43.22%) had moderate computer skills. The second largest group of the participants (42.21%) had little computer skills. Only 12 participants (6.03%) claimed that they are expert in using computers. Seventeen (8.54%) students had no computer skills.

Table 4.9 Students' Computer skills by gender

Skills	Male	Percentage	Female	Percentage	Total	Percentage
Expert	9	4.52%	3	1.51%	12	6.03%
Moderate	54	27.14%	32	16.08%	86	43.22%
A little	43	21.61%	41	20.60%	84	42.21%
None	5	2.51%	12	6.03%	17	8.54%
Total	111	55.78%	88	44.22%	199	100.00%

Figure 4.9 Students' Computer skills by gender



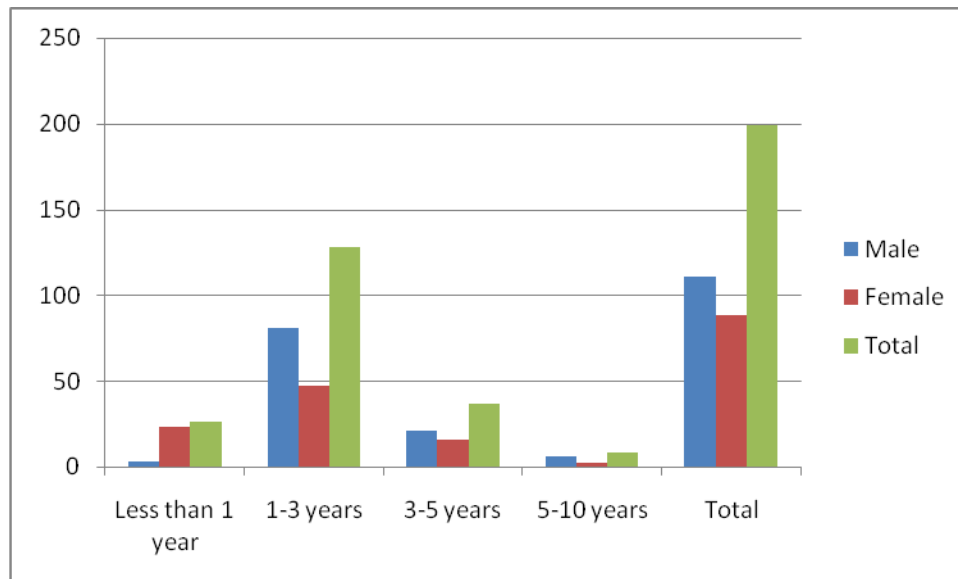
4.8 Students' internet experiences by gender

Among the total participant 26 participant (13.07%) used internet for less than 1 year. The largest group of students (128, 64.32%) were using internet for 1-3 years.

Table 4.10 Students' internet experiences by gender

Duration	Male	Percentage	Female	Percentage	Total	Percentage
Less than 1 year	3	1.51%	23	11.56%	26	13.07%
1-3 years	81	40.70%	47	23.62%	128	64.32%
3-5 years	21	10.55%	16	8.04%	37	18.59%
5-10 years	6	3.02%	2	1.01%	8	4.02%
Total	111	55.78%	88	44.22%	199	100.00%

Figure 4.10 Students' internet experiences by gender



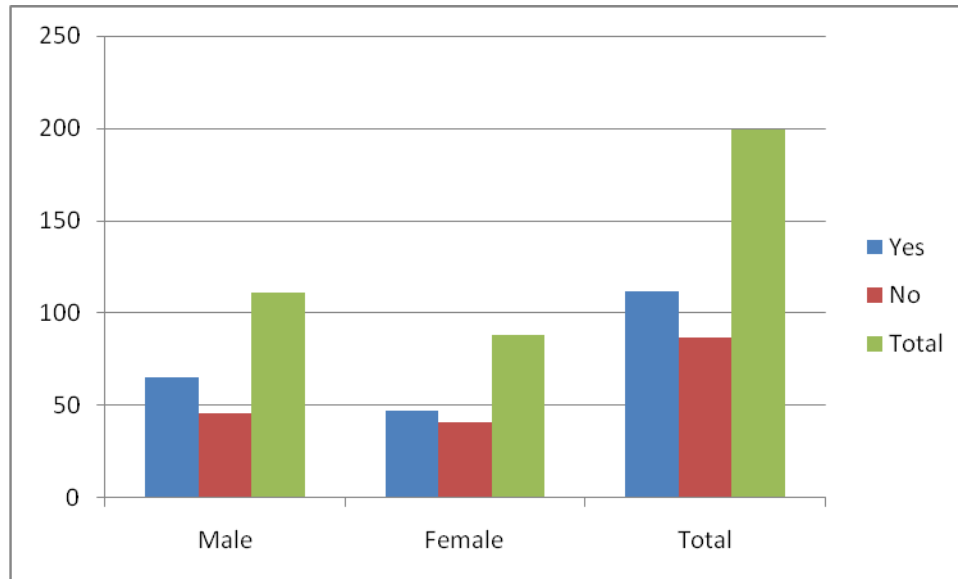
4.9 Students' Internet connection at home by gender

Among the 199 participants, 112(56.28%) participants had internet connection at their home. The remaining students do not have internet connection at home.

Table 4.11 Students' Internet connection at home by gender

Internet connection	Male	Percentage	Female	Percentage	Total	Percentage
Yes	65	32.66%	47	23.62%	112	56.28%
No	46	23.12%	41	20.60%	87	43.72%
Total	111	55.78%	88	44.22%	199	100.00%

Figure 4.11 Students' Internet connection at home by gender



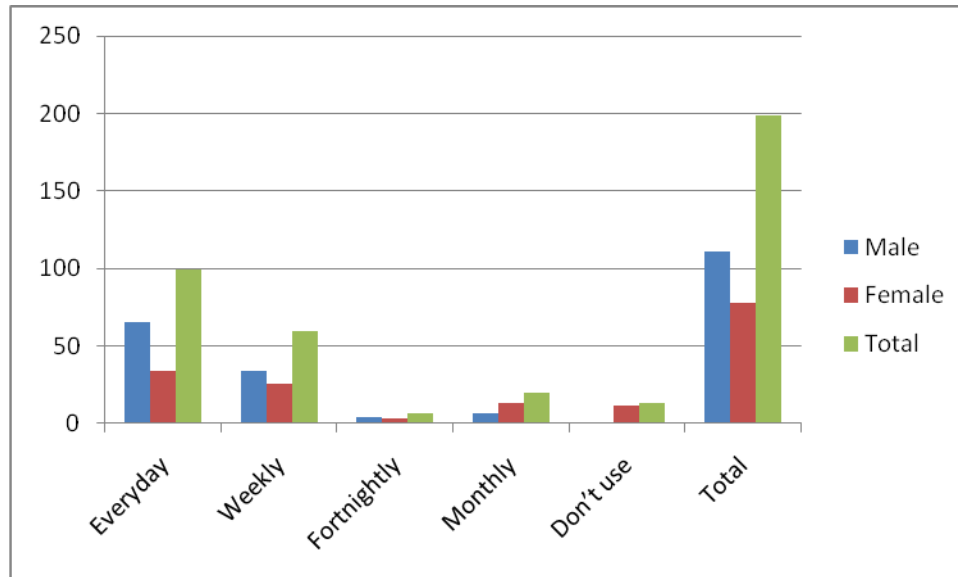
4.10 Students' frequency of internet use by gender

Among the total participant, the largest group of participants (99, 49.75%) used internet every day. The second largest group (60, 30.15%) used internet weekly. Only one student do not use internet.

Table 4.12 Students' frequency of internet use by gender

Time	Male	Percentage	Female	Percentage	Total	Percentage
Everyday	65	32.66%	34	17.09%	99	49.75%
Weekly	34	17.09%	26	13.07%	60	30.15%
Fortnightly	4	2.01%	3	1.51%	7	3.52%
Monthly	7	3.52%	13	6.53%	20	10.05%
Don't use	1	0.50%	12	6.03%	13	6.53%
Total	111	55.78%	78	39.20%	199	100.00%

Figure 4.12 Students' frequency of internet use by gender



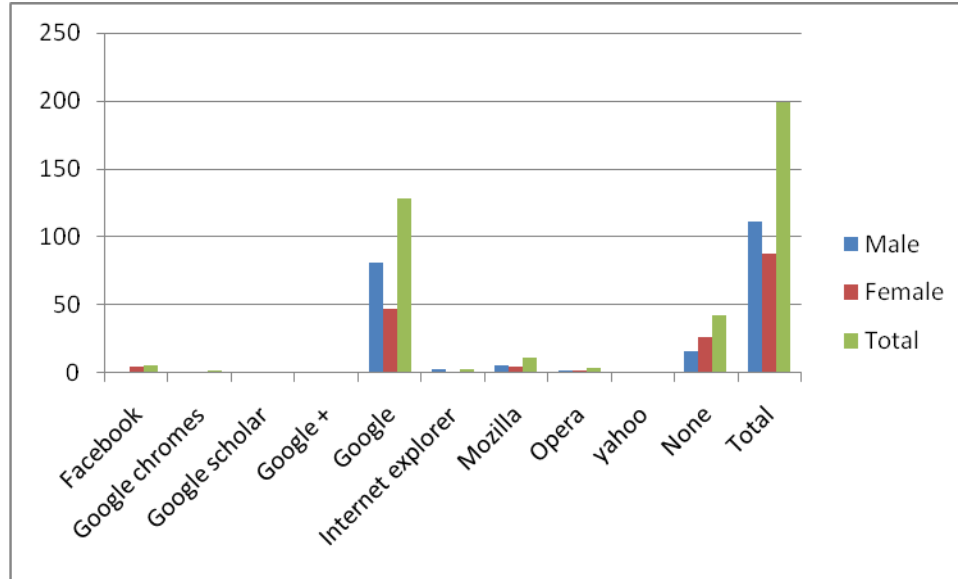
4.11 Students' preferred search engine by gender

The survey indicated that most undergraduate students (128, 64.32%) preferred Google. The second largest prefer Mozilla (6, 3.02%). It was remarkable that some students could not differentiate among search engine, browser and social network. Among 199 participants 6(3.02%) mentioned Mozilla, 2(1.01%) noted opera, 1(0.50%) mentioned Google Chrome as their favourite search engine. One (0.50%) student even mentioned Facebook as a search engine, which actually is a social networking site.

Table 4.13 Students' preferred search engine by gender

Search engine	Male	Percentage	Female	Percentage	Total	Percentage
Facebook	1	0.50%	5	2.51%	6	3.02%
Google chrome	1	0.50%	1	0.50%	2	1.01%
Google scholar	0	0.00%	1	0.50%	1	0.50%
Google +	0	0.00%	1	0.50%	1	0.50%
Google	81	40.70%	47	23.62%	128	64.32%
Internet explorer	3	1.51%	0	0.00%	3	1.51%
Mozilla	6	3.02%	5	2.51%	11	5.53%
Opera	2	1.01%	2	1.01%	4	2.01%
yahoo	1	0.50%	0	0.00%	1	0.50%
None	16	8.04%	26	13.07%	42	21.11%
Total	111	55.78%	88	44.22%	199	100.00%

Figure 4.13 Students' preferred search engine by gender



4.12 Students' use information sources by gender

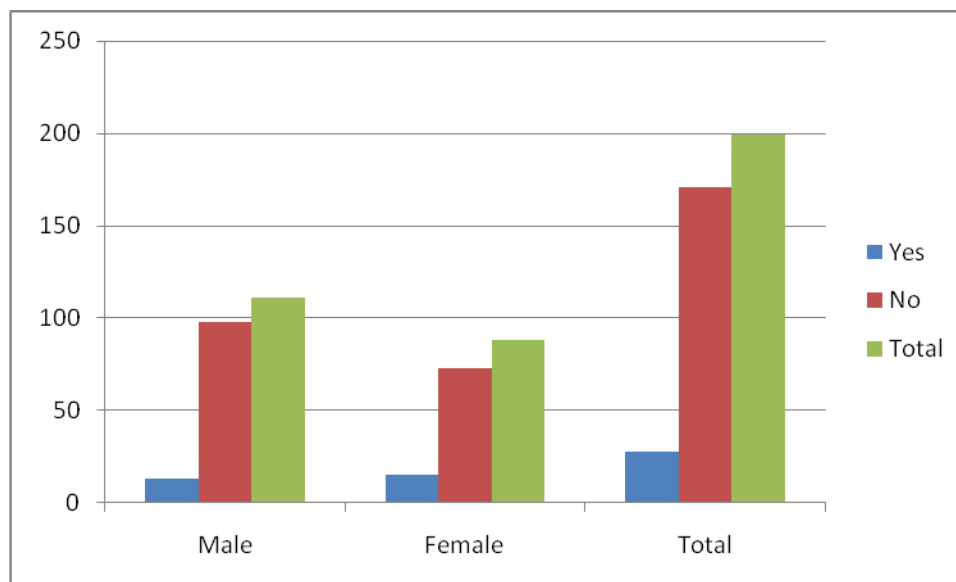
4.12.1 Students' use of book as an information source by gender

Among the total 199 students, 28(14.07%) used book as a major information source when they need.

Table 4.14 Students' use of book as an information source by gender

Book	Male	Percentage	Female	Percentage	Total	Percentage
Yes	13	6.53%	15	3.28%	28	14.07%
No	98	49.25%	73	24.75%	171	85.93%
Total	111	55.78%	88	28.03%	199	100.00%

Figure 4.14 Students' use of book as an information source by gender



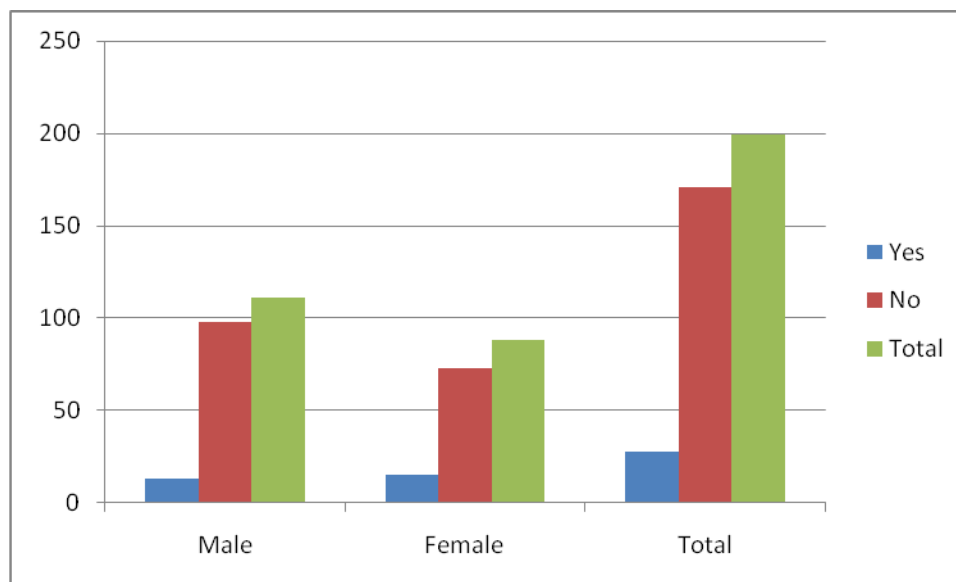
4.12.2 Students' use of journal as an information sources by gender

Among the total students, 28 (14.07%) participants used journal as a key information source when they need.

Table 4.15 Students' use of journal as an information source by gender

Journal	Male	Percentage	Female	Percentage	Total	Percentage
Yes	13	6.53%	15	7.54%	28	14.07%
No	98	49.25%	73	36.68%	171	85.93%
Total	111	55.78%	88	44.22%	199	100.00%

Figure 4.15 Students' use journal as an information source by gender



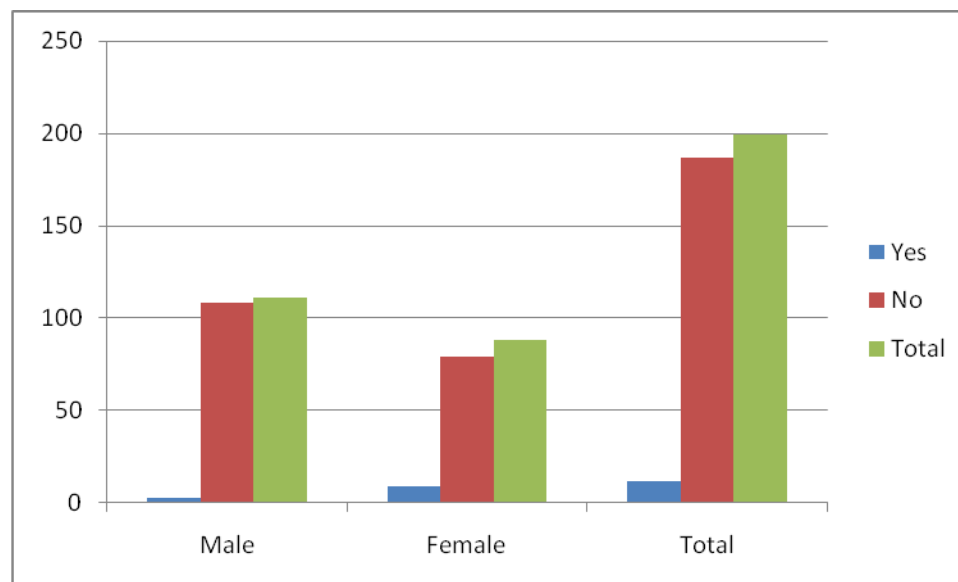
4.12.3 Students' use of magazine as an information source by gender

Among the total participants, 12(6.03%) use, magazine as a major information source.

Table 4.16 Students' use magazine as an information source by gender

Magazine	Male	Percentage	Female	Percentage	Total	Percentage
Yes	3	1.51%	9	4.52%	12	6.03%
No	108	54.27%	79	39.70%	187	93.97%
Total	111	55.78%	88	44.22%	199	100.00%

Figure 4.16 Students' use of magazine as an information source by gender

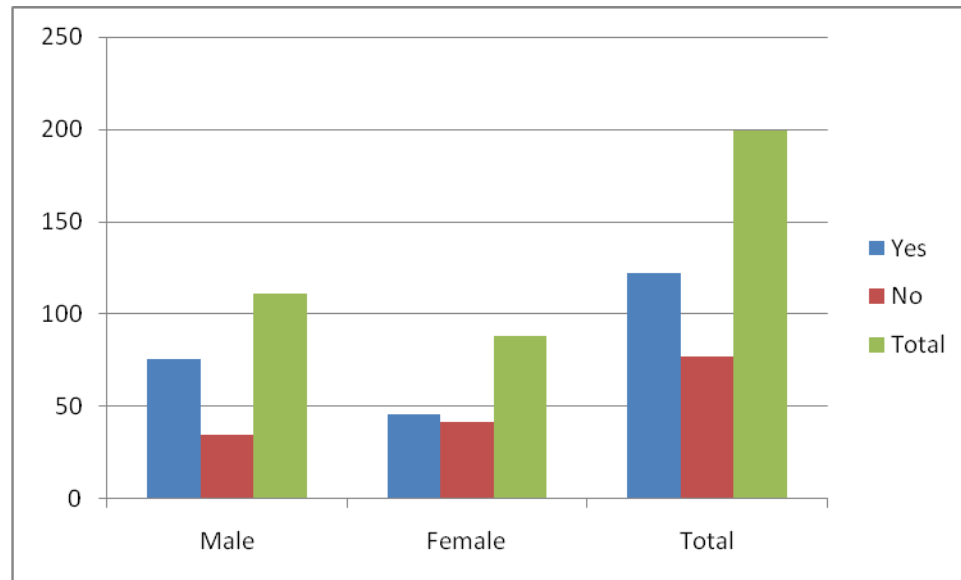


4.12.4 Students' use internet as an information source by gender

Among the total participants, 122(61.31%) use internet as a major information sources when they need.

Table 4.17 Students' use of internet as an information source by gender

Internet	Male	Percentage	Female	Percentage	Total	Percentage
Yes	76	38.19%	46	23.12%	122	61.31%
No	35	17.59%	42	21.11%	77	38.69%
Total	111	55.78%	88	44.22%	199	100.00%

Figure 4.17 Students' use of internet as an information source by gender

4.13 Students' use of online source by gender

Among the 199 respondents, only 3 (1.51%) use e-books, only one female use e-journal and e-book at a time and 10(5.03%) used more than two online sources at a time.

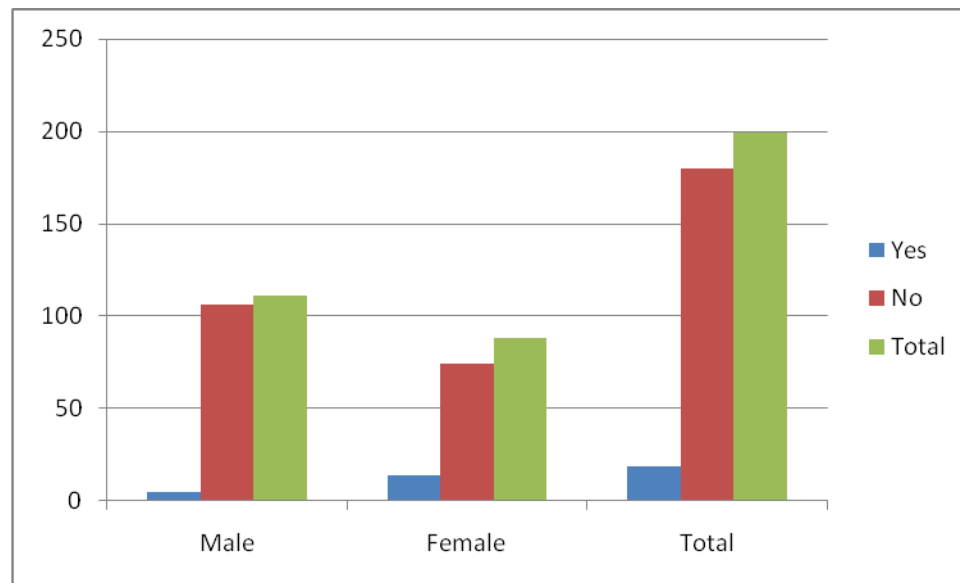
4.13.1 Students' use of e-journal as an online source by gender

It is clearly observed that participant's response is very low with regard to use of e-journal as an online resource. Only 19(9.55%) participants use e-journal overall. The rest of the participants do not use e-journals.

Table 4.18 Students' use of e-journal as an online source by gender

E-journal	Male	Percentage	Female	Percentage	Total	Percentage
Yes	5	2.51%	14	7.04%	19	9.55%
No	106	53.27%	74	37.19%	180	90.45%
Total	111	55.78%	88	44.22%	199	100.00%

Figure 4.18 Students' use of e-journal as an online source by gender



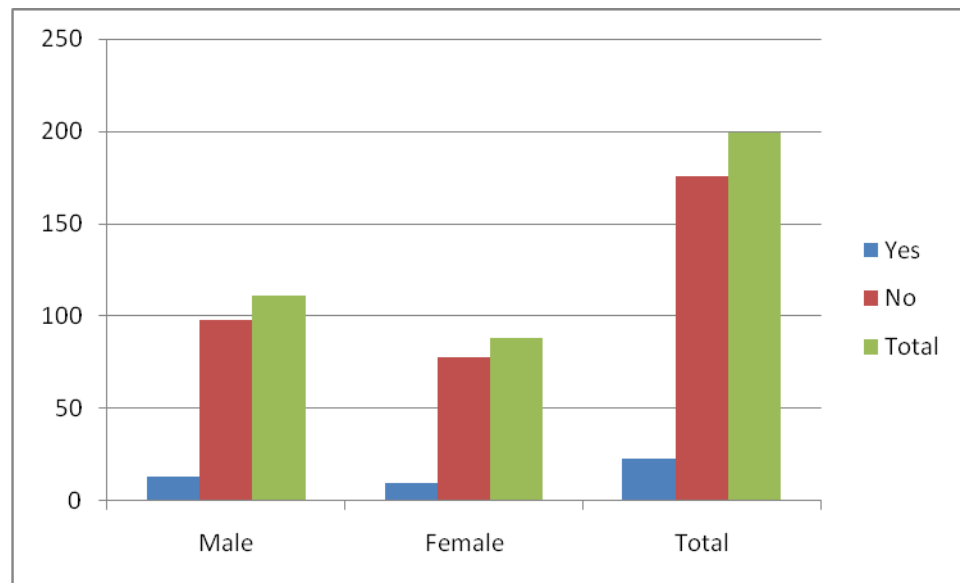
4.13.2 Students' use of e-book as an online source by gender

Among the total 199 participants, only 23(11.56%) used e-books. The rest of the participants do not use e-books.

Table 4.19 Students' use of e-book as an online source by gender

Book	Male	Percentage	Female	Percentage	Total	Percentage
Yes	13	6.53%	10	5.03%	23	11.56%
No	98	49.25%	78	39.20%	176	88.44%
Total	111	55.78%	88	44.22%	199	100.00%

Figure 4.19 Students' use e-book as an online source by gender



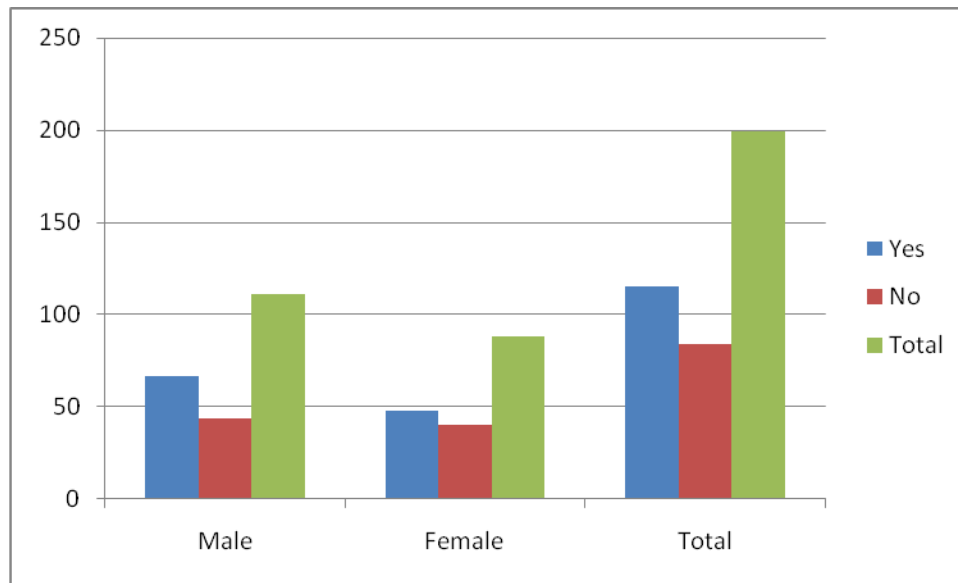
4.13.3 Students' use of Wikipedia as an online source by gender

Among the total participants, 115 (57.79%) used Wikipedia as an online resource.

Table 4.20 Students' use of Wikipedia as an online source by gender

Wikipedia	Male	Percentage	Female	Percentage	Total	Percentage
Yes	67	33.67%	48	24.12%	115	57.79%
No	44	22.11%	40	20.10%	84	42.21%
Total	111	55.78%	88	44.22%	199	100.00%

Figure 4.20 Students' use of Wikipedia as an online source by gender



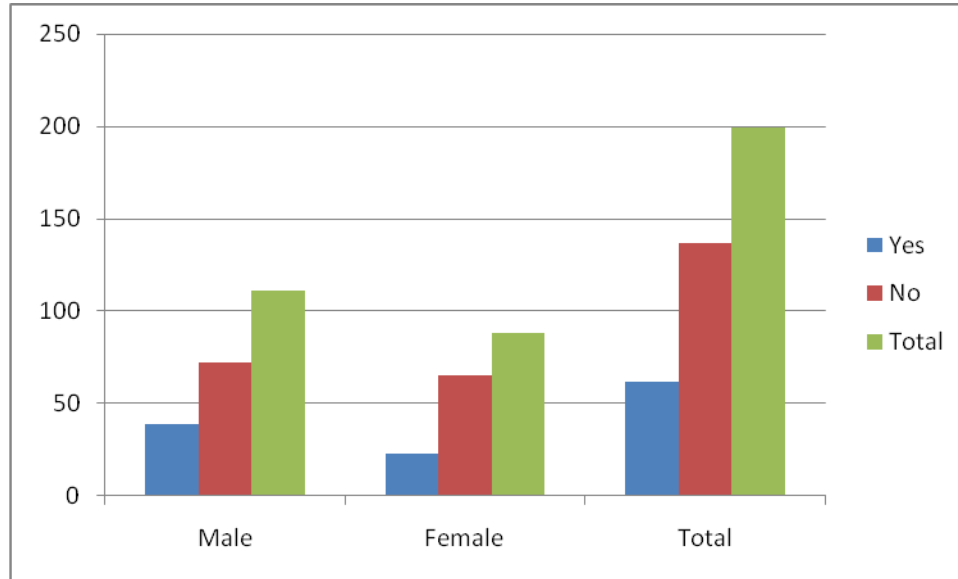
4.13.4 Students' use of other online sources by gender

Among the total participants, 62 (31.16%) use others online information resources.

Table 4.21 Students' use of other as an online source by gender

others	Male	Percentage	Female	Percentage	Total	Percentage
Yes	39	19.60%	23	11.56%	62	31.16%
No	72	36.18%	65	32.66%	137	68.84%
Total	111	55.78%	88	44.22%	199	100.00%

Figure 4.21 Students' use of other as an online source by gender



4.14 Knowledge about information sources and search techniques:

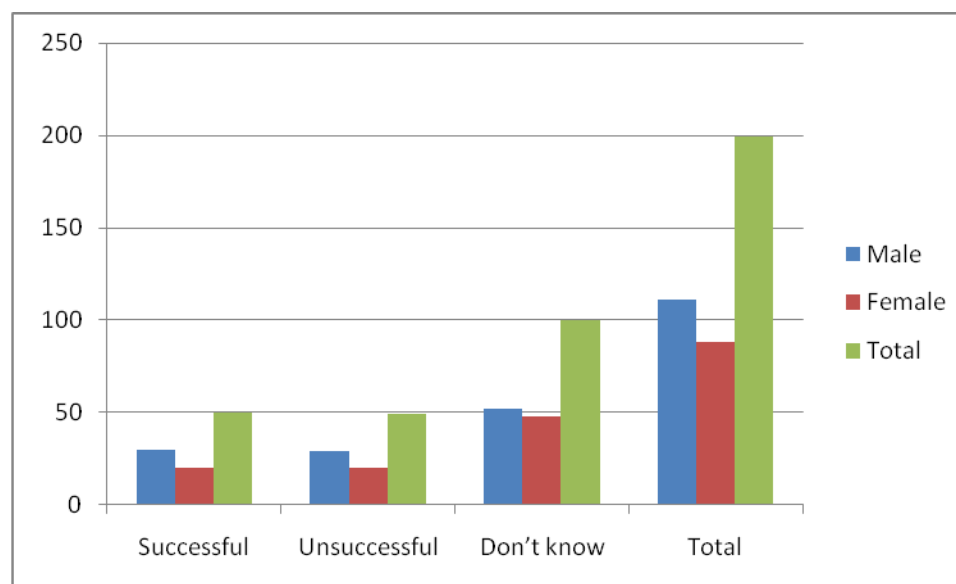
Question1. *In considering the following citation, what do 30(5) mean?*

Ahmed, S.M.Z., McKnight, C. & Oppenheim, C. (2004). A study of user performance with Web of science IR interface. Journal of information science, 30(5), 459-468.

Among 111 male participants 30(15.08%) succeeded in answering the question 1 correctly and 29 (14.57%) male participants failed to give the right answer. The remaining male students had no idea about the query. On the other hand, 20 female (10.05%) participants out of 88 gave the right answer and 20 failed to give a satisfactory answer. The rest of the female participants had no idea about the query.

Table 4.22 Knowledge about volume and issue

Q-1	Male	Percentage	Female	Percentage	Total	Percentage
Successful	30	15.08%	20	10.05%	50	25.13%
Unsuccessful	29	14.57%	20	10.05%	49	24.12%
Don't know	52	26.13%	48	24.12%	100	50.25%
Total	111	55.78%	88	44.22%	199	100.00%

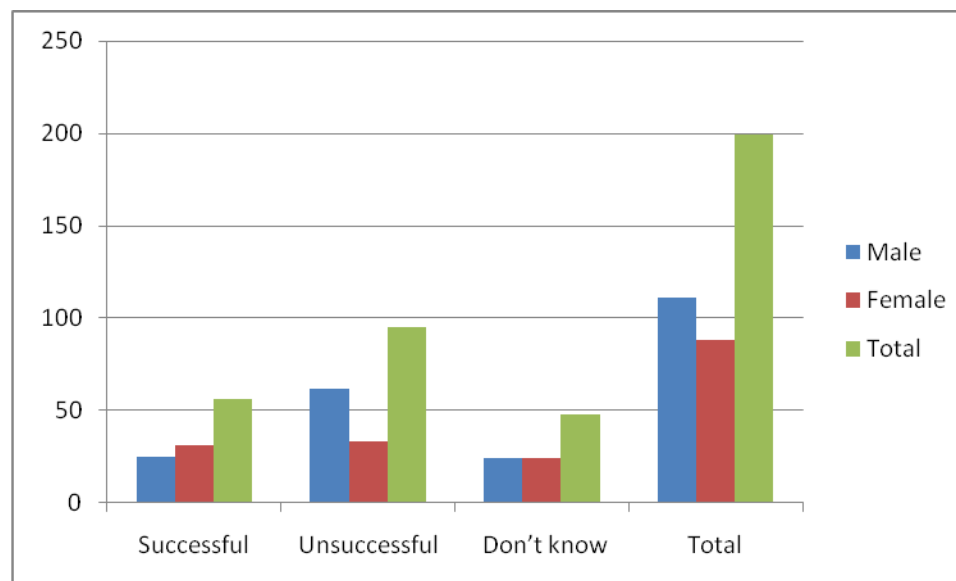
Figure 4.22 Knowledge about volume and issue

Question2. *If you find a good article on your topic, what is the most efficient source for finding related articles?*

Among 111 male participants 25 succeeded (12.56%) in answering the question2 and 62 (31.16%) male participants failed to give the right answer. Other male students had no idea about the query. On the other hand, 31 female (15.58%) participants out of 88 gave the right answer and 33 (16.58%) failed to give the right answer. Other female students had no idea about the query.

Table 4.23 Knowledge about finding journal articles

Q-2	Male	Percentage	Female	Percentage	Total	Percentage
Successful	25	12.56%	31	15.58%	56	28.14%
Unsuccessful	62	31.16%	33	16.58%	95	47.74%
Don't know	24	12.06%	24	12.06%	48	24.12%
Total	111	55.78%	88	44.22%	199	100.00%

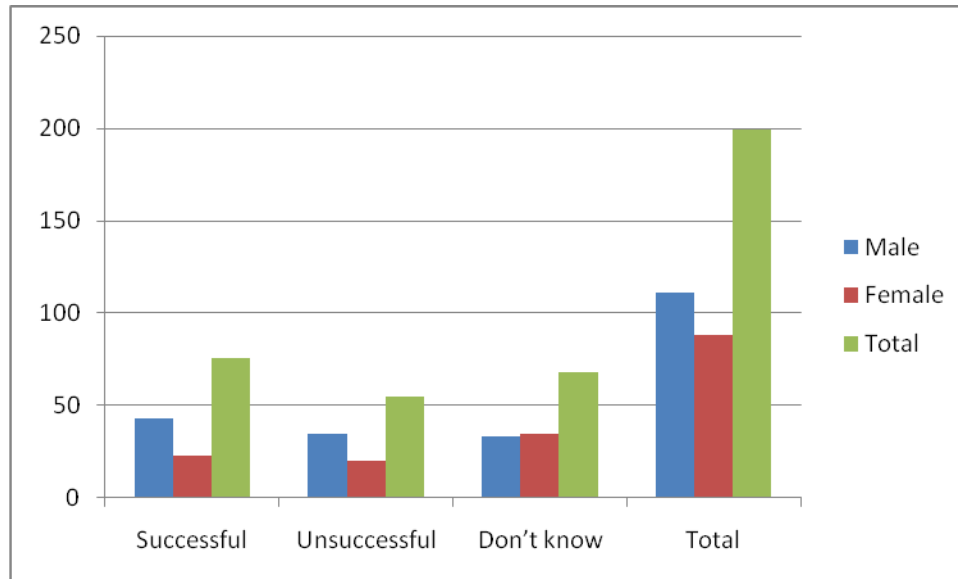
Figure 4.23 Knowledge about finding journal articles**Question3. A citation is:**

Among 111 male participants 43(21.61%) succeeded in answering the question 3 whereas 35 (17.59%) male participants failed to give the right answer. The remaining male students had no idea about the query. On the other hand, 23(11.56%) female participants out of 88 gave the right answer whereas 20 (10.05%) failed to give the right answer. Other female participants had no idea about the query.

Table 4.24 Knowledge about citation

Q-3	Male	Percentage	Female	Percentage	Total	Percentage
Successful	43	21.61%	23	11.56%	76	38.19%
Unsuccessful	35	17.59%	20	10.05%	55	27.64%
Don't know	33	16.58%	35	17.59%	68	34.17%
Total	111	55.78%	88	44.22%	199	100.00%

Figure 4.24 Knowledge about citation



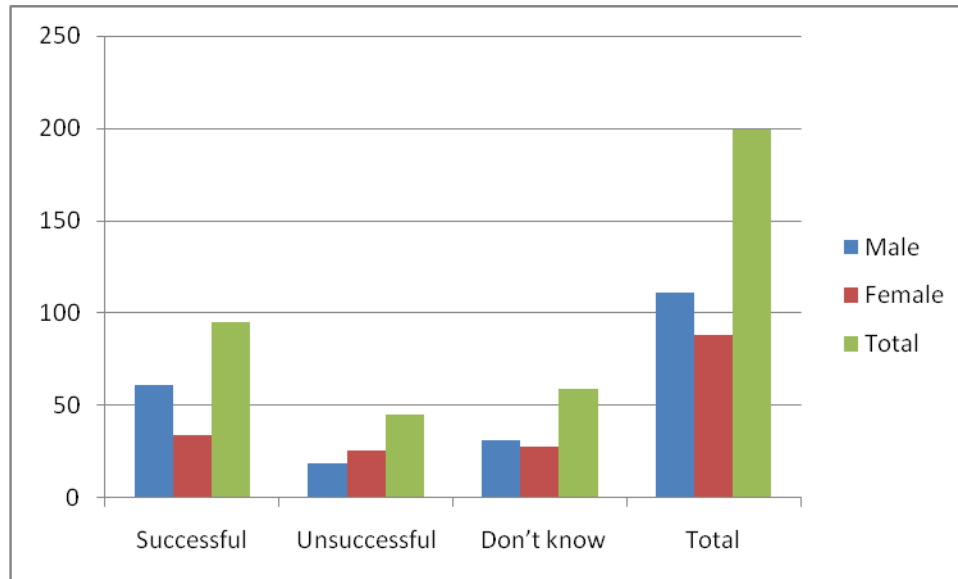
Question4. *If you do not know about your topic, the best way to get started is to find background information in:*

Among 111 male participants, 61(30.65%) succeeded in answering the question 4 and 19 (9.55%) male participants gave the wrong answer. Other male participants had no idea about the query. On the other hand, 34 (17.09%) female participants out of 88 gave the right answer whereas 26 (13.07%) gave the wrong answer. The remaining female students had no idea about the query.

Table 4.25 Knowledge about finding background information.

Q-4	Male	Percentage	Female	Percentage	Total	Percentage
Successful	61	30.65%	34	17.09%	95	47.74%
Unsuccessful	19	9.55%	26	13.07%	45	22.61%
Don't know	31	15.58%	28	14.07%	59	29.65%
Total	111	55.78%	88	44.22%	199	100.00%

Figure 4.25 Knowledge about finding background information.

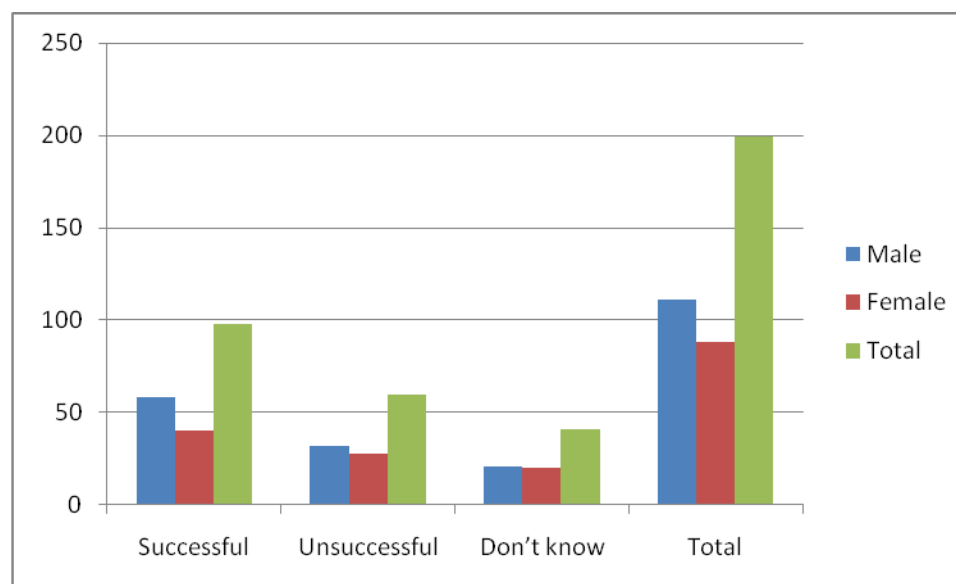


Question5. *If you are unable to find information on your topic, you may be using the wrong keyword/subject heading. A good way to proceed would be to:*

Among 111 male participants, 58(29.15%) answered the question 5 correctly and 32 (16.08%) male participants failed to give the right answer. The remaining male students had no idea about the query. On the other hand, 40 (20.10%) female participants out of 88 gave the right answer whereas 28 (14.07%) failed to give the right answer. The remaining had no idea about the query.

Table 4.26 Knowledge about keyword

Q-5	Male	Percentage	Female	Percentage	Total	Percentage
Successful	58	29.15%	40	20.10%	98	49.25%
Unsuccessful	32	16.08%	28	14.07%	60	30.15%
Don't know	21	10.55%	20	10.05%	41	20.60%
Total	111	55.78%	88	44.22%	199	100.00%

Figure 4.26 Knowledge about keyword

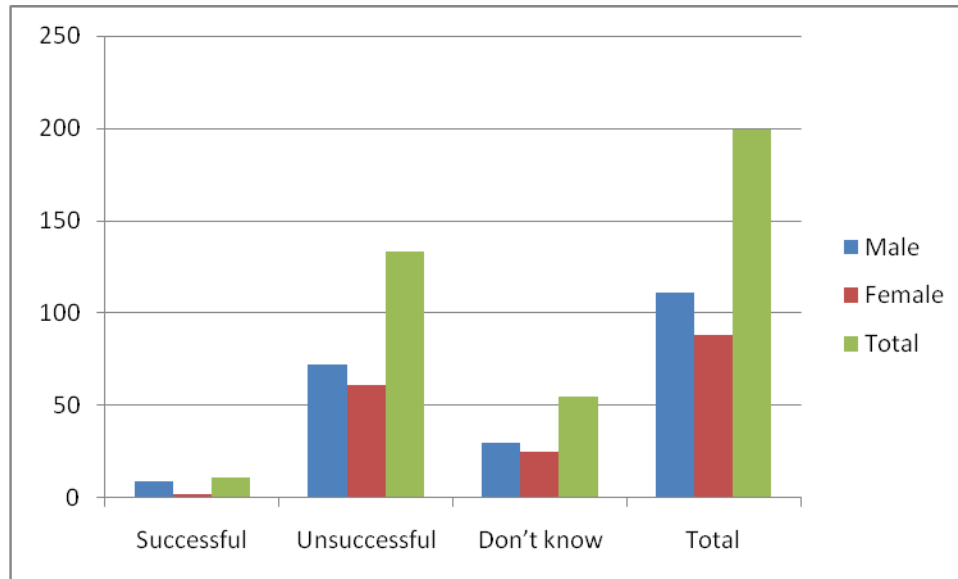
Question6. *What is the best way to find a scholarly journal article on a given topic?*

Among 111 male participants, 9(4.52%) succeeded in answering the question 6 correctly and 72 (36.18%) male participants failed to give the right answer. Other male had no idea about the query. On the other hand, 2 female (1.01%) participants out of 88 gave the right answer whereas 61 (30.65%) failed to give the right answer. The remaining female students had no idea about the query.

Table 4.27 Knowledge about scholarly journal article

Q-6	Male	Percentage	Female	Percentage	Total	Percentage
Successful	9	4.52%	2	1.01%	11	5.53%
Unsuccessful	72	36.18%	61	30.65%	133	66.83%
Don't know	30	15.08%	25	12.56%	55	27.64%
Total	111	55.78%	88	44.22%	199	100.00%

Figure 4.27 Knowledge about scholarly journal article



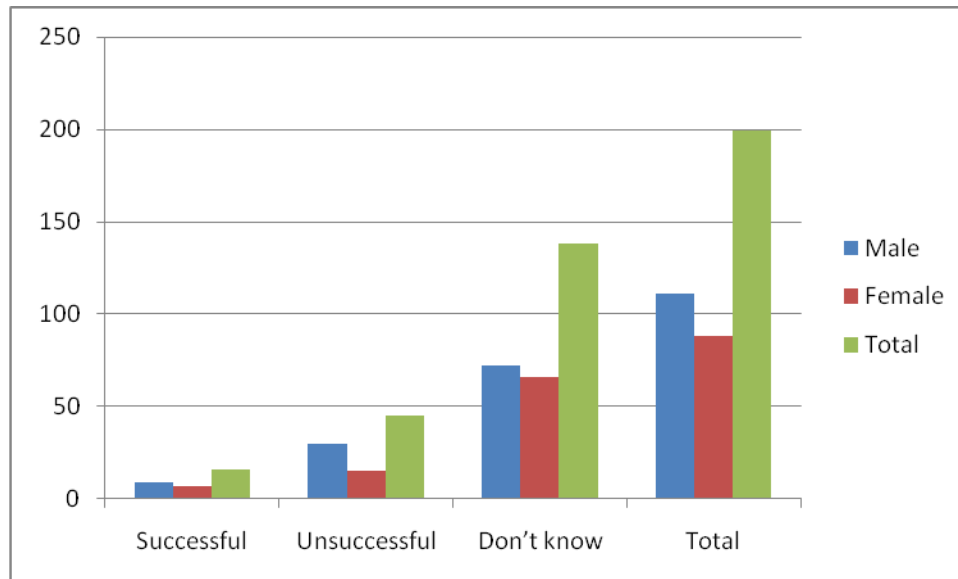
Question7. *If you need information about college and university. You use Boolean operator:*

Among 111 male participants, 9(4.52%) succeeded in answering the question 7 correctly whereas 30 (15.08%) male participants answered it incorrectly. The remaining male had no idea about the query. On the other hand, 7 female (3.52%) participants out of 88 gave the right answer and 15 (7.54%) failed to give the right answer. The rest of the female students had no idea about the query.

Table 4.28 Knowledge about Boolean operator (AND)

Q-7	Male	Percentage	Female	Percentage	Total	Percentage
Successful	9	4.52%	7	3.52%	16	8.04%
Unsuccessful	30	15.08%	15	7.54%	45	22.61%
Don't know	72	36.18%	66	33.17%	138	69.35%
Total	111	55.78%	88	44.225	199	100.00%

Figure 4.28 Knowledge about Boolean operator (AND)



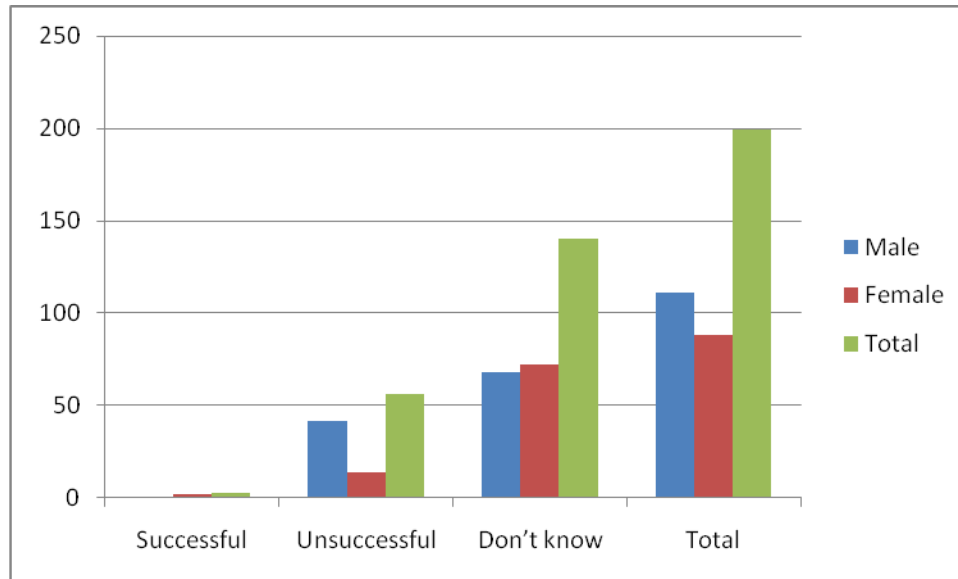
Question8. Which of this keyword searches should retrieve the most result in online database?

Among 111 male participants, 1(0.50%) succeeded in answering the question 8 correctly and 42 (21.11%) male participants failed to give the right answer. The remaining males had no idea about the query. On the other hand, 2 female (1.01%) participants out of 88 gave the right answer whereas 14(7.04%) provided the wrong answer. The remaining female participants had no idea about the query.

Table 4.29 Knowledge about Boolean operator (OR)

Q-8	Male	Percentage	Female	Percentage	Total	Percentage
Successful	1	0.50%	2	1.01%	3	1.51%
Unsuccessful	42	21.11%	14	7.04%	56	28.14%
Don't know	68	34.17%	72	36.18%	140	70.35%
Total	111	55.78%	88	44.22%	199	100.00%

Figure 4.29 Knowledge about Boolean operator (OR)



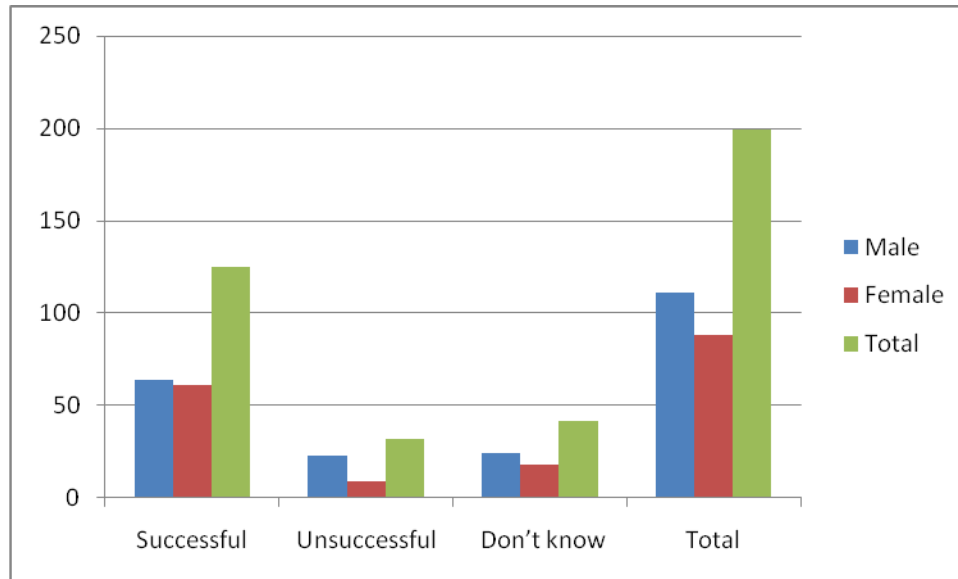
Question9. Which is potentially the most current or up-to-date source of information on any topic?

Among 111 male participants, 64(32.16%) answered the question 9 correctly whereas 23 (11.56%) male students provided the wrong answer. The remaining male students had no idea about the query. On the other hand, 61 female (30.65%) participants out of 88 gave the right answer whereas 9 (4.52%) failed to give the right answer. The rest had no idea about the query.

Table 4.30 Knowledge about up-to-date information

Q-9	Male	Percentage	Female	Percentage	Total	Percentage
Successful	64	32.16%	61	30.65%	125	62.81%
Unsuccessful	23	11.56%	9	4.52%	32	16.08%
Don't know	24	12.06%	18	9.05%	42	21.11%
Total	111	55.78%	88	44.22%	199	100.00%

Figure 4.30 Knowledge about up-to-date information



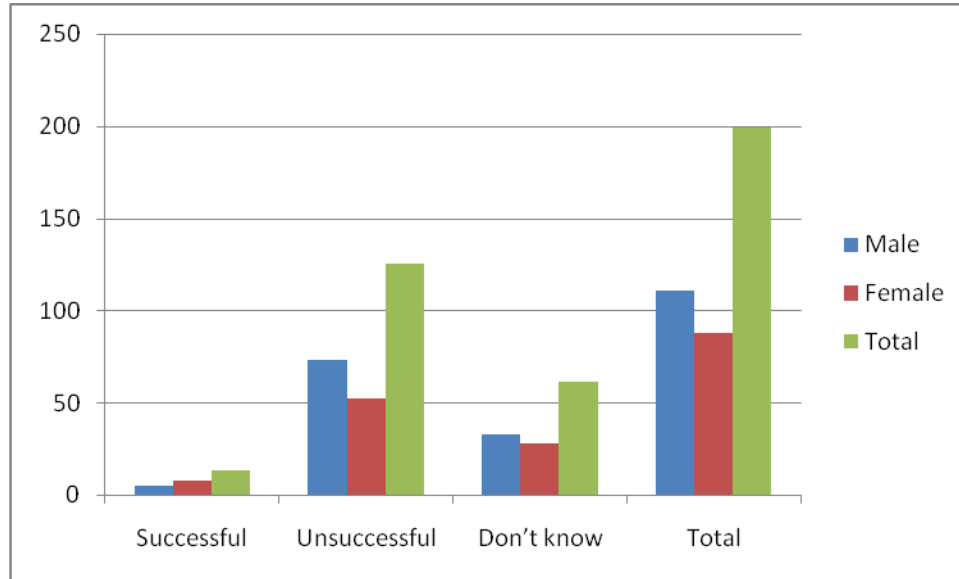
Question10. Suppose you need information about ‘advertise’, ‘advertisement’ and ‘advertising’-which search technique would you apply?

Among 111 male participants, only 5 (2.51%) succeeded in answering the question correctly. A large proportion of male participants (73, 36.68%) failed to give the right answer. The remaining male students had no idea about the query. On the other hand, only 8 (4.02%) female participants out of 88 gave the right answer. A large group of female participants 52 (26.13%) failed to give the right answer. Others had no idea about the query.

Table 4.31 Knowledge about truncation

Q-10	Male	Percentage	Female	Percentage	Total	Percentage
Successful	5	2.51%	8	4.02%	13	6.53%
Unsuccessful	73	36.68%	52	26.13%	125	62.81%
Don't know	33	16.58%	28	14.07%	61	30.65%
Total	111	55.78%	88	44.22%	199	100.00%

Figure 4.31 Knowledge about truncation



4.15 Data analysis

The data collected through the questionnaires were analyzed using the Statistical Package for the Social Sciences (SPSS). The t-test and ANOVA were carried out to examine the hypotheses discussed below.

4.16 Test of hypotheses

The null hypotheses explored were:

- H1: There is no significant difference between male and female in terms of their search knowledge.
- H2: There is no significant difference among various age groups in terms of their search knowledge.
- H3: There is no significant difference among the participants in search knowledge by student status.
- H4: There is no significant difference among the participants in search knowledge in the term of faculty.
- H5: There is no significant difference among the participants in search knowledge in term of their previous computer experience.
- H6: There is no significant difference in search knowledge among participants in term of their previous internet experience.

4.17 Questions about students' information search knowledge

Table 4.32 Search skills questions

No.	Questions
Q-1	In considering the following citation, what do 30(5) mean? Ahmed, S.M.Z., McKnight, C. & Oppenheim, C. (2004). A study of user performance with Web of science IR interface. <i>Journal of information science</i> , 30(5), 459-468.
Q-2	If you find a good article on your topic, what is the most efficient source for finding related articles?
Q-3	A citation is:
Q-4	If you are do not know about your topic, the best way to get started is to find background information in:
Q-5	If you are unable to find information on your topic, you may be using the wrong keyword/subject heading. A good way to proceed would be to:
Q-6	What is the best way to find a scholarly journal article on a given topic?
Q-7	If you need information about college and university. You use Boolean operator:
Q-8	Which of this keyword searches should retrieve the most result in online database?
Q-9	Which is potentially the most current or up-to-date source of information on any topic?
Q-10	Suppose you need information about 'advertise', 'advertisement' and 'advertising'-which search technique would you apply?

4.18 Test for statistical significance

ANOVA and *t*-test have been conducted for identifying statistical significances.

4.19 Gender difference

Comparisons were made in search knowledge between gender groups. There is no significant difference between male and female. The results of the test are shown in Table 4.33.

4.19.1 Group statistics (t-test)

4.33: Group statistics for t-test by gender

Question No.	Gender of the participant	N	Mean	SD
Q-1	Male	111	2.1982	.84013
	Female	88	2.3182	.82414
Q-2	Male	111	1.9910	.66736
	Female	88	1.9205	.79106
Q-3	Male	111	1.9099	.82627
	Female	88	2.0227	.88379
Q-4	Male	111	1.7297	.87330
	Female	88	1.9318	.84139
Q-5	Male	111	1.6667	.77850
	Female	88	1.7727	.79838
Q-6	Male	111	2.1892	.56429
	Female	88	2.2614	.49117
Q-7	Male	111	2.5676	.64133
	Female	88	2.6705	.62000
Q-8	Male	111	2.6036	.50953
	Female	88	2.7955	.45886
Q-9	Male	111	1.6396	.81790
	Female	88	1.5114	.81642
Q-10	Male	111	2.2523	.53033
	Female	88	2.2273	.60129

4.19.2 The independent sample t-test for gender difference

An independent sample t-test was run to see the difference between male and female participants. The result of the comparison is shown in Table 4.35.

Table4.34: Independent sample t-test for gender

Questions No.	t	df	Sig 2(tailed)
Q-1	-1.009	197	.314
Q-2	.682	197	.496
Q-3	-.928	197	.355
Q-4	-1.648	197	.101
Q-5	-.944	197	.346
Q-6	-.948	197	.344
Q-7	-1.141	197	.255
Q-8	-2.755	197	.006*
Q-9	1.100	197	.273
Q-10	.311	197	.756

Note: *significant at $p < 0.05$.

The results of Independent sample test show that there is no significant difference in undergraduate's student's skills in searching knowledge in questions 1, 2, 3, 4, 5, 6, 7, 9 and 10. So hypotheses are accepted and there is significant difference in question 8. So hypothesis is rejected.

4.20 Analysis of variance (ANOVA)

Numerous tests were carried out to check the homogeneity and normality of data before conducting the ANOVA. The homogeneity of variance test for different groups showed that there is not enough evidence to suspect that the variances are unequal. The results of the one *t*-test also showed that the data are from a normal distribution. Based on the above results, it can be seen that the two assumptions regarding the data hold. These are that each group is an independent random sample from a normal population, and the variances of the groups are equal. This makes it possible to perform the analysis of variance. The tests were carried out to see the difference in search performance among different age, gender, status, computer experience, and internet experiences.

4.20.1 Age differences

The ANOVA test results for search performance among different age groups (18-22 vs. 21-23 vs. 24-26) showed that there are significant difference in search knowledge among different age groups.

Table4.35: ANOVA for age groups

Questions No.	Group	S.S	DF	Mean Square	F	Sig
Question_1	Between Groups	7.614	2	3.807	5.748	0.004*
	Within Groups	129.823	196	0.662		
	Total	137.437	198			
Question_2	Between Groups	8.573	2	4.287	8.834	0.000*
	Within Groups	95.105	196	0.485		
	Total	103.678	198			
Question_3	Between Groups	7.755	2	3.877	5.591	0.004*
	Within Groups	135.924	196	0.693		
	Total	143.678	198			
Question_4	Between Groups	7.636	2	3.818	5.351	0.005*
	Within Groups	139.851	196	0.714		
	Total	147.487	198			
Question_5	Between Groups	2.949	2	1.474	2.414	0.092
	Within Groups	119.725	196	0.611		
	Total	122.673	198			

Table4.35: Continued

Question_6	Between Groups	3.895	2	1.948	7.288	0.001*
	Within Groups	52.376	196	0.267		
	Total	56.271	198			
Question_7	Between Groups	1.171	2	0.585	1.471	0.232
	Within Groups	78.035	196	0.398		
	Total	79.206	198			
Question_8	Between Groups	0.392	2	0.196	0.795	0.453
	Within Groups	48.292	196	0.246		
	Total	48.683	198			
Question_9	Between Groups	3.564	2	1.782	2.711	0.069
	Within Groups	128.818	196	0.657		
	Total	132.382	198			
Question_10	Between Groups	2.423	2	1.211	3.957	0.021*
	Within Groups	59.999	196	0.306		
	Total	62.422	198			

Note: *significant at $p < 0.05$.

The results of ANOVA show that there are significant differences in undergraduate student's knowledge in search questions 1, 2, 3, 4, 6, 10. So null hypothesis is rejected and null hypothesis is accepted for questions 5, 7, 8 and 9 because there is no significant difference among age groups.

4.20.2 Status of the users

Results of the ANOVA for search performance among different status groups indicated that there were significant differences among undergraduates in retrieving information .

Table4.36: ANOVA for student status

Questions	Group	S.S	DF	MS	F	Sig
Question_1	Between Groups	13.274	3	4.425	6.949	.000*
	Within Groups	124.163	195	.637		
	Total	137.437	198			
Question_2	Between Groups	15.844	3	5.281	11.725	.000*
	Within Groups	87.835	195	.450		
	Total	103.678	198			
Question_3	Between Groups	20.216	3	6.739	10.643	.000*
	Within Groups	123.463	195	.633		
	Total	143.678	198			
Question_4	Between Groups	7.432	3	2.477	3.449	.018*
	Within Groups	140.056	195	.718		
	Total	147.487	198			
Question_5	Between Groups	3.453	3	1.151	1.882	.134
	Within Groups	119.221	195	.611		
	Total	122.673	198			
Question_6	Between Groups	4.010	3	1.337	4.987	.002*
	Within Groups	52.262	195	.268		
	Total	56.271	198			

Table4.36: Continued

Question_7	Between Groups	2.316	3	.772	1.958	.122
	Within Groups	76.890	195	.394		
	Total	79.206	198			
Question_8	Between Groups	.638	3	.213	.863	.461
	Within Groups	48.045	195	.246		
	Total	48.683	198			
Question_9	Between Groups	6.549	3	2.183	3.383	.019*
	Within Groups	125.833	195	.645		
	Total	132.382	198			
Question_10	Between Groups	5.565	3	1.855	6.363	.000*
	Within Groups	56.857	195	.292		
	Total	62.422	198			

Note: *significant at $p < 0.05$.

The results of ANOVA show that there are significant differences in undergraduate student's search knowledge in questions 1, 3, 4, 6, 9, and 10. So null hypothesis is rejected and null hypothesis is accepted in questions 5, 7 and 8 because there is no significant difference among students' status.

4.20.3 Students' Faculty

Table4.37: ANOVA for faculty

<i>Questions</i>	<i>Group</i>	<i>S.S</i>	<i>DF</i>	<i>MS</i>	<i>F</i>	<i>Sig</i>
Question_1	Between Groups	8.033	4	2.008	3.011	.019*
	Within Groups	129.405	194	.667		
	Total	137.437	198			
Question_2	Between Groups	6.077	4	1.519	3.020	.019*
	Within Groups	97.601	194	.503		
	Total	103.678	198			
Question_3	Between Groups	7.239	4	1.810	2.573	.039*
	Within Groups	136.439	194	.703		
	Total	143.678	198			
Question_4	Between Groups	1.351	4	.338	.448	.773
	Within Groups	146.136	194	.753		
	Total	147.487	198			
Question_5	Between Groups	2.766	4	.692	1.119	.349
	Within Groups	119.907	194	.618		
	Total	122.673	198			
Question_6	Between Groups	1.552	4	.388	1.375	.244
	Within Groups	54.720	194	.282		
	Total	56.271	198			
Question_7	Between Groups	.861	4	.215	.533	.712
	Within Groups	78.345	194	.404		
	Total	79.206	198			

Table4.37: Continued

Question_8	Between Groups	.442	4	.110	.444	.777
	Within Groups	48.242	194	.249		
	Total	48.683	198			
Question_9	Between Groups	5.270	4	1.317	2.011	.095
	Within Groups	127.112	194	.655		
	Total	132.382	198			
Question_10	Between Groups	5.021	4	1.255	4.242	.003*
	Within Groups	57.401	194	.296		
	Total	62.422	198			

Note: *significant at $p < 0.05$.

The results of ANOVA show that there are significant differences in undergraduate student's knowledge in search questions 1, 2, 3 and 10. So null hypothesis is rejected and null hypothesis is accepted in questions 4, 5, 6, 7, 8 and 9 because there is no significant difference among the undergraduate students in term of faculty affiliation.

4.20.4 Computer experience

A separate ANOVA was run to find out if there was any difference in search knowledge among undergraduates students with different levels of computer experience. The results showed that there are significant differences in search knowledge among participants with different levels of computer experience.

Table4.38: ANOVA for computer experiences

Questions	Group	S.S	DF	MS	F	Sig
Question_1	Between Groups	9.825	4	2.456	3.734	.006*
	Within Groups	127.613	194	.658		
	Total	137.437	198			
Question_2	Between Groups	9.724	4	2.431	5.020	.001*
	Within Groups	93.954	194	.484		
	Total	103.678	198			
Question_3	Between Groups	13.523	4	3.381	5.039	.001*
	Within Groups	130.156	194	.671		
	Total	143.678	198			
Question_4	Between Groups	1.405	4	.351	.467	.760
	Within Groups	146.082	194	.753		
	Total	147.487	198			
Question_5	Between Groups	5.044	4	1.261	2.080	.085
	Within Groups	117.629	194	.606		
	Total	122.673	198			
Question_6	Between Groups	3.755	4	.939	3.467	.009*
	Within Groups	52.517	194	.271		
	Total	56.271	198			
Question_7	Between Groups	2.214	4	.553	1.395	.237
	Within Groups	76.992	194	.397		
	Total	79.206	198			

Table4.38: Continued

Question_8	Between Groups	2.062	4	.516	2.145	.077
	Within Groups	46.621	194	.240		
	Total	48.683	198			
Question_9	Between Groups	7.537	4	1.884	2.928	.022*
	Within Groups	124.845	194	.644		
	Total	132.382	198			
Question_10	Between Groups	1.442	4	.360	1.147	.336
	Within Groups	60.980	194	.314		
	Total	62.422	198			

Note: *significant at $p < 0.05$.

The results of ANOVA show that there are significant differences in undergraduate student's knowledge in search questions 1, 2, 3, 6, and 9. So null hypothesis is rejected and null hypothesis is accepted in questions 4, 5, 7, 8 and 10 because there is no significant difference among the undergraduates student in term of their previous computer experience.

4.20.5 Internet experience

A separate ANOVA was run to find out if there was any difference in search knowledge among students with different levels of internet experience. The results of the test are shown in table 4.39. The results showed that there are significant differences in search knowledge among undergraduates with different levels of internet experience (H6).

Table4.39: ANOVA for internet experiences

<i>Questions</i>	<i>Group</i>	<i>S.S</i>	<i>DF</i>	<i>MS</i>	<i>F</i>	<i>Sig</i>
Question_1	Between Groups	10.202	3	3.401	5.212	.002*
	Within Groups	127.235	195	.652		
	Total	137.437	198			
Question_2	Between Groups	4.161	3	1.387	2.718	.046*
	Within Groups	99.517	195	.510		
	Total	103.678	198			
Question_3	Between Groups	9.150	3	3.050	4.421	.005*
	Within Groups	134.529	195	.690		
	Total	143.678	198			
Question_4	Between Groups	2.814	3	.938	1.264	.288
	Within Groups	144.673	195	.742		
	Total	147.487	198			
Question_5	Between Groups	6.249	3	2.083	3.489	.017*
	Within Groups	116.424	195	.597		
	Total	122.673	198			
Question_6	Between Groups	1.517	3	.506	1.801	.148
	Within Groups	54.754	195	.281		
	Total	56.271	198			
Question_7	Between Groups	1.744	3	.581	1.463	.226
	Within Groups	77.462	195	.397		
	Total	79.206	198			

Table4.39: Continued

Question_8	Between Groups	2.567	3	.856	3.618	.014*
	Within Groups	46.116	195	.236		
	Total	48.683	198			
Question_9	Between Groups	1.594	3	.531	.792	.500
	Within Groups	130.788	195	.671		
	Total	132.382	198			
Question_10	Between Groups	1.533	3	.511	1.636	.182
	Within Groups	60.890	195	.312		
	Total	62.422	198			

Note: *significant at $p < 0.05$.

The results of ANOVA show that there are significant differences in undergraduate student's performance in search questions 1, 2, 3, 5 and 8. So null hypothesis is rejected and null hypothesis is accepted in questions 4, 6, 7, 9 and 10 because there is no significant difference among the undergraduates student in term of their previous internet experience.

Chapter 5
Discussion, Recommendations and
Conclusion

Chapter 5: Discussion, Recommendations and Conclusion

5.1 Discussion

The data analysis suggests that student's information retrievals skills are not good. They do not have adequate knowledge about how to retrieval information from various online information sources.

5.1.1 Demographic perspectives

This study shows that 111(55.78%) male and 88(44.22%) female students participated in this survey. Among all academic years, most responses came from 4th year students (74, 37.19%) and from 21-23 year age group.

5.1.2 Students' computer skills and internet access

The results show that most students are familiar with computers. Most of the students are computer literate and they have been using computers for one to ten years. The largest group of students claimed that they had moderate computer knowledge (86, 43.22%) and 122(61.31%) had their own computers. The largest number of the internet users use internet for 1-3 years. Most of the students had internet connection at home (112, 56.28%). A large number of students (99, 49.75%) use internet everyday. The largest group of students (128, 64.32%) preferred Google as their preferred search engine.

5.1.3 Students' information sources

Students use both manual and online information sources. Among the participants, 28 (14.27%) used books and journals as major information sources. Only 12 (6.3%) used magazine. A few students also used multiple information sources. Most undergraduates used internet as a major information source.

Most of the students (115, 57.79%) used Wikipedia as an online source. Among the participants, 10 (5.03%) used more than one online information sources at a time.

Comparatively more female participants used multiple online sources simultaneously than the male group.

5.1.4 Students' success in searching knowledge

The findings reveal that most of the students do not know how to get the right information. Only a few students gave the right answer. Among the participants, it is seen that knowledge of searching about volume and issue, only 50 (25.13%) students have been successful. Among them, 30 (15.08%) were male and 20 (10.05%) were female. Similarly, only 56 (28.14%) have been successful about journal articles and only 11(5.53%) students gave right answer in searching scholarly journal article. In terms of citation searching, a total of 76 (38.19%) students succeed among them 43(21.61%) were male and 23(11.56%) were female. Comparatively, a large number of students 98 (49.25%) gave right answer for keyword searching. On the contrary, students have low idea about Boolean operators; only 19 students gave the right answers in using Boolean searching. Similarly, only 13 (6.53%) gave right answer in using truncation. The biggest success of students (125, 62.81%) came in answer relating to up-to-date information. Comparatively male students' perform better in searching skills than the female group.

5.2 Problems in searching online resources

From the findings of this research, several problems were identified which may contribute to this poor search knowledge by undergraduates at Dhaka University:

- a. lack of adequate online information sources for students;
- b. gap in knowledge about different search techniques;
- c. digital divide amongst students;
- d. lack of appropriate training on how to use information resources.

Students make up a large portion of undergraduate students attending universities, and they have a variety of online resources available to them to complete academic information searches, primarily Web-based and library-based online information retrieval systems. The content, ease of use, and required search techniques are different from one information retrieval system to another. Students often prefer searching the Web, but in doing so often miss higher quality materials that may be available only through their library. Furthermore, each system uses different information retrieval algorithms for producing results, so proficiency in one search system may not transfer to another. Web-based information retrieval systems are unable to search and retrieve many resources available in libraries and other proprietary information retrieval systems, often referred to as the Invisible Web. These are resources that are not available to the general public and are password protected (from anyone not considered to be an affiliated user of that particular organization). These resources are often licensed to libraries by third party vendors or publishers and include fee-based access to content. Therefore, many students may not be accessing many scholarly resources available to them if they were to use web-based information retrieval systems. This current research showed that undergraduate students lacked detailed knowledge of online searching.

5.3 Recommendations

From this research, it is evident that students, especially undergraduates need detailed training on how to search various online information resources. The universities should recognize following areas for improving search skills by students:

- recognizes information needs and knows how to search for information
- recognizes different types of information sources and employs several sources in information seeking before decision-making

- accesses the information efficiently by choosing the most appropriate information retrieval systems and search strategies
- is able to evaluate information critically: to evaluate the relevance, , validity and scope of the information. The student is able to distinguish among fact, opinion and point of view as well as detect misleading information.
- incorporates selected information into his knowledge base and value system and applies it into practice
- applies information in critical thinking and problem-solving
- uses information effectively either alone or as a member of a group to accomplish a specific purpose
- understands many economic, legal, and social issues surrounding the use of information
- Information literacy competency standards for higher education

5.4 Conclusion

From the foregoing discussion on the information retrieval skills of the undergraduate students of the University of Dhaka, there exists gap in search skills among students. Only a handful of students were successful in answering questions relevant for information tasks. The main reasons for the difficulties in retrieving information were attributed to lack of online information resources, inadequate computer facilities, and lack of training.

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Appendix

Appendix-1

Questionnaire

An empirical investigation of Information Retrieval skills among undergraduate students at Dhaka University

1. Demographic information:

Gender: Male Female

2. Academic information:

Faculty:

Department:

Year:

Age group: 18-20 years 21-23 years 24-26 years More than 26 year

3. Information technology:

What type of electronic device do you use?

Desktop Laptop PDA Smart phone

4. Computer experience:

a) Do you have you personal computer? yes No

b) How long have you been using a computer?

Less than 1 year 1-3 years 3-5 years 5-10 years More than 10 years

c) How would you rate your experience with computers?

Expert Moderate A little none

5. Internet Experience:

a) How long have you been using internet?

Less than 1 year 1-3 years 3-5 years 5-10 years

b) Do you have you internet connection at your home? yes No

c) How frequently do you use internet?

Everyday Weekly Fortnightly Monthly

d) Which search engine do you prefer the most?

6. Information source:

a) What type of information sources do you generally use?

Book Journal Magazine CD/DVDs Internet

b) What type of online sources do you use? E-journal E-Book Wikipedia

others

7. Knowledge about information sources

1. In considering the following citation, what does 30(5) mean? Ahmed, S.M.Z., McKnight, C. & Oppenheim, C. (2004). *Journal of Information Science*, 30(5), 459-468.

The volume and the number of pages in the article The volume and issue number of the article

The year and issue of the article The volume and starting page number of the article

I do not know

2. If you find a very good article on your topic, what is the most efficient source for finding related articles?

Bibliography from the article Library catalogue search

Other issue/volume of the journal None of the above

I do not know

3. A citation is:

- A brief summary of what a book or article is about
- A book review
- A description of an electronic database
- A record of the identifying elements of a book, journal or website
- I do not know

4. If you are don't know about your topic, the best way to get started is to find background information in:

- Any current bibliography
- The vertical file
- A print or electronic encyclopedia article
- The fiction book section
- I do not know

5. If you are your unable to find information on your topic, you may be using the wrong key word/subject heading. A good way to proceed would be to:

- Try another computer
- Stick with broad terms and ideas
- Try to use synonyms in place of the keywords you were searching.
- Give up and change your whole topic, then try again
- I do not know

6. What is the best way to find a scholarly journal article on a given topic?

- Using a search engine like Google or Yahoo!
- Search a periodical database

- Browse through print-based academic journals
- Using the OPAC
- I do not know

7. If you need information about college and university. You use Boolean operator:

- AND
- OR
- NOT
- AND+OR
- I do not know

8. Which of this keyword searches should retrieve the most results in online database?

- Dyslexia OR adults
- Dyslexia NOT adults
- Dyslexia AND adults
- Dyslexia
- I do not know

9. Which is potentially the most current or up-to-date source of information on any topic?

- An article from a CD-ROM database
- A reference book
- An article or information from web
- A hard copy of a magazine
- I do not know

10. Suppose you need information about 'advertise', 'advertisements' and 'advertising' –which search technique would you apply?

- Advert*
- Advertis*
- Advertise*
- Advertising*
- I do not know

Appendix-2

