

# Encouraging to Improving the use and search techniques skills on the web-based e- scholarly Databases subscribed by UOBL

**Amira Haqqi Abdulrazzaq**  
College of IT /IS department  
University of Bahrain  
Bahrain

## Abstract

*This experimental and descriptive user study intend to focus in particular to improve search skills and encourage usage through certain techniques and tips required to formulate queries and searches to get best results of the information needed from the e-scholarly data bases prescribed by the University of Bahrain Library. A user study with 41 participants was conducted to experiment two e- scholarly database systems from Elsevier and EBSCO (Sciencedirect, Business source complete) as training tools and guidance given to the students' users by the researcher to search particular topics. Kirkpatrick's training evaluation model was used to analyze training session's effectiveness. Two questionnaires are distributed using type of Google application tool (On-line Google form) one pre-lab training session given and the second one post-lab training. It is found that although search results are significantly better through using structured rather than unstructured or simple searching, utilizing more complex searching operators may not worth the effort as it is more likely for users to employ them incorrectly. It is also found that a large number of respondents were using field searching and Boolean operators to access information from e- scholarly databases.*

**Keywords:** information retrieval, Query formulation, e-resources, information seeking, training

## Introduction

University of Bahrain provides 41 e-scholarly databases in different disciplines serving faculty members and students (post graduates and undergraduates) to support teaching, research and development through its Library. training sessions organized according to the demand (whether personal or required from certain department to train their students) usually the sessions given concerning introduction to the library facilities, how to perform a search whether through library OPAC or the e-scholarly databases using key words, title and author, skills of how to cite and how to quote from citations to prepare a report or a research.

Sciencedirect is a leading full-text scientific database offering journal articles and book chapters from more than 2,500 peer-reviewed journals and more than 11,000 books.

Business Source Complete is the world's definitive scholarly business database, providing the leading collection of bibliographic and full text content. As part of the comprehensive coverage

offered by this database, indexing and abstracts for the most important scholarly business journals back as far as 1886 are included. In addition, searchable cited references are provided for more than 1,300 journals.

To retrieve information from the above e-scholarly databases users should follow certain steps.

- a. accuracy of query formulation depends on user's familiarity with search tasks and of the subject matter,
- b. supported with the use of Boolean operators used in any database searching AND, OR, & AND NOT (frequently expressed simply as NOT),
- c. accompanied with other control search query facilities mentioned above,
- d. It is important for users to translate their information needs into reliable and valid queries.

This study is structured used multiple methods for data collection, the empirical investigation of the formulation of queries and search strategies with all limitations imposed by the sample students on the topics listed in table1, observing the results and giving hints to satisfy the goal of the study to improve the skills to get the of information needed, and to support the quantitative survey which was distributed before and after the lab training session. Section1 of the study presented the Objectives, section 2. Presented hypotheses, section 3. Presented Scope and limitations of this study, section 4.presented the methodology adapted, section 5a brief literature review, section 6 Presented an introduction, section7 a subjective view of how data was analyzed and conclude the results that have been obtained of the results, section 8 presented gained skills analyses and section 9 Presented the findings obtained and recommendations.

### **Literature review**

According to Marchionini (1992), the information-seeking task can be broken down into five functions: defining the problem, selecting the source, articulating the problem, examining the results, and extracting the relevant information.

Retrieving sufficient relevant information through subscribed scholarly e-scholarly databases is not an easy work for scholarly users in general and undergraduate students in particular without the support of library intermediaries as the searches are of few keywords to a complicated one. Usually the support tools are present and using them requires the awareness and skills needed from users. The role of the academic library is essential, as to organize training sessions

regularly, especially a senior project needed as partial fulfillment of their graduation. Thousands of articles were published concerning IR, as systems, structures, query formulation, supportive tools.....etc. Martzoukou, K. (2008) in his study stated that not only the ability or willingness to construct sophisticated strategies for locating information through online databases but also the awareness and understanding of the way in which information are found, Brusilovsky, P.et.al (2012) presented the use of interactive visualization in the non-traditional context of IR courses. In his paper suggested two well-known retrieval models as Boolean model and vector space model as educational tools for graduate course in IR, the students attitude toward them and the different aspects between them. Selvaretnam (2012).discusses IR techniques in the commercial search engines, and emphasizes the concept based IR which emphasizes the meaning of words or phrases rather than the presence of keywords within the index, and query expansion issues, the state of the Art and perspectives. In his attempt to improve the retrieval effectiveness and support of prior assumption of term consistency, Zhou, D. et al. (2012) proposed a novel query expansion framework to produce better results than both the classical non-personalized search approach and other personalized query expansion methods. Wang & Jin (2010) stated that retrieving more relevant result could be attempted through query adaptation to expand the terms of the users query with other terms. Retrieval performance and search performance was compared and evaluated by Chu and Rosenthal ( 2003) based on term specification through the use of Boolean operators, truncations, field search, word and phrase. Bradlow & Schmittlein compares between search engines structure and technical properties and the enhancement of usability. Users experience, type of search task (easy, complex, general and specific) are factors used by Johnson et al (1999) to investigate search behavior. Measuring users' interaction behavior and improving the use of science e-journal systems by users was the aim of a project funded by the NSF-national science digital library project, which observed how academic users interact with the Science Direct information retrieval system. This study is concerned with academic users experience with Science Direct and Business source premier to improve their search skill while experiencing simple, and other exploratory tasks. to Marchionini (2006) depicts three kinds of search activities under the exploratory search: lookup, learn, and investigate which is overlapped as people might engage in more than one kind of search in parallel. Shah,C. & Marchionini,G.(2010) developed collaborative information seeking system for exploratory search tasks. Morris (2007) stated that for exploratory search experience there are

four features: coverage, confidence, exposure, and productivity could be enhanced by explicit support for collaborative searches, Xiangming Mu, Kun Lu, & Hohyon Ryu .( 2010).

Investigated the relationships between users' search strategies and their prior topic knowledge

Jain, N. C. (2013). Stated the importance of open source movement to researchers and students gain increased access to knowledge, publications receive greater visibility and readership, the potential impact of research is heightened, increased access to and sharing of knowledge leads to opportunities for equitable economic and social development, intercultural dialogue, and has the potential to spark innovation. Hamada M.et al. (2011) proposed that given a query submitted to a search engine, suggests a list of queries that are related to the user input query, and suggested a method based on clustering process uses the content of historical preferences of users registered in the query log of the search engine. Studies concerned the length of queries and long phrases included, Arampatzis and Kamps (2008), found that the average query lengths vary from two to four terms. Phan et.al. (2007) concluded in his study while trying to correlate between length of queries and degree of specificity that users tend to use short queries, and this is what the present study found too that the sample students found difficulty while expanding the query with long phrases

## **Objectives**

The main goal of the study is threefold:

- To find ways to improve IT students' use of e-scholarly databases (specifically IS department students).
- Raise the degree of usefulness and utilization of e-scholarly databases available.
- Clarify the various factors leading to successful search formulation.

## **The study hypotheses**

H1. The Training sessions arranged by the UOBL are upon requests only

H2. Long phrases queries raise some complexity while searching

H3. There is a strong relationship between lab-training sessions given to student's users and overcome of the difficulties and complexities of query formulation

## **Methodology**

A user study is conducted to address the issue of improving and usage. The participant's size were a total of 41 out of 43 students, 27 female and 14 male. The participants were two sections of Undergraduate students enrolled in a fourth level IS core course ITBIS445 auditing and control. The students participant were asked to attend two sessions, each lasted for 2 hours. The pre- training session they were asked to search the tasks in table 1 which were categorized and based on previous studies Aula (2003), Broder (2002), Rose & Levinson (2004) and Jansen et al. (2008). using (Sciencedirect and business source complete), then answer an on-line questionnaire (appendix 1). In the second session they were given a detailed instruction and different features and techniques they suppose to know and follow such as, how to control the above search tasks through (parentheses, truncation, Controlled vocabulary which refers to the use of standard terms , field searching , Boolean searching, proximity searching, truncation and wildcards .....etc... The students conducted the searches after instructed to different techniques and facilities that are available in each of the above mentioned two E-resources systems, they received different results on the same subjects because of the: Subject coverage of each b. the search technique c. the searchers intentions and needs. Then they were instructed to exchange the terms with the synonyms to expand, narrow, other techniques to refine the search such as: nesting, adjacency, truncations, Parentheses, Wildcard, variations in spelling, the availability of controlled vocabulary, which could be termed subject headings, a thesaurus, descriptors, or authority control, field searching restriction, proximity operators that dictate how close to each other and Limit choices. The participants were asked to fill in a post-session questionnaire assessing two of the Kirkpatrick's model: 1- Reaction (motivation) which represent how well did the participants perceive and react in particular their attitude and whether they are satisfied. 2- Behavior (performance) which test the participants capabilities to perform learned skills while searching for the information needed in any of the e- scholarly databases. To carry the descriptive analyses of the data generated from surveys and the study questions, the statistical package SPSS was employed. Likert five point Scale ranging from strongly agree to strongly disagree was assigned to the items of the questionnaire.

## **Scope and limitations of the study**

The main purpose of this study is to improve search skills in the formulation of search strategies while retrieving information, enhance the level of use of e-scholarly databases and to draw the

attention on the different techniques and facilities available to get needed information. The present study examined only two of the 41 subscribed e-resources by UOBL for two reasons: first: because they cover students major. Second most of the students were required to attend library training session on retrieval of information through the subscribed e-scholarly databases arranged between the instructor and the library specialist in pre-request course (ITBIS324). Forty one (41) out of forty three (43) undergraduate students from IS discipline, specifically (ITBIS445 audit and control class) were surveyed 2 were absent. Two questionnaires were distributed, one before the interaction with the two subscribed e-scholarly databases (Sciencedirect, and Business Source Complete) under simulated-task scenarios in a lab training session

Table1

Tasks given to the students through a lab-training session

TASK	Express	QUERY	Comments
<b>Simple</b>	Straight forward fact-based focused (specific)	1.Any text book 2.GAAP (Generally accepted auditing standards)	Find things about particular thing : lead to precision
<b>informational</b>	(general) and complex	1.Auditing standards. 2.A good auditing package 3.How to become a professional auditor	General idea about a subject or topic. locating contents of a particular topic
<b>navigational</b>	Focused (specific)	IIA (Institute of internal auditors)	Locating a particular person or Org.
<b>Transactional</b>	specific	1.ACL 2.ISO 9000 standard?	Getting a product through the act of purchasing, downloading, or executing

### Subjective feedback analyses

In this part analyses of the first questionnaire distributed on line through Blackboard to the students after performing search on the tasks listed in table1 and answers the pre-training session

questionnaire which covered three related variables :First- the demographic information, with 3 questions related to Gender, E-Resources sessions experience, and the section student attend . 2- The library support, with 11 questions relates to the support, provision of training sessions by the library, and type of training provided. 3- Usage, with 14 questions on coverage and experience gained on search formulation from e-scholarly databases through the training session or sessions attended. The role of the questionnaire was to examine student awareness and skills gained through the training session/sessions given by the library (see tables 3, 4). Although questionnaire was not enough to a reliable evaluation, a proper usage and a positive skill increased after given a concentrated lab training session with the emphasis on the query formulation techniques Students were given the same tasks listed in table1 to find few and concentrated information, using all required strategies to do so then a Post-lab training session questionnaire was answered by them.

The data in Table 2 shows that most of the students attended more than one training session from the library on e-scholarly databases, which is supported by students' answers to question 4 in table 3, students agreed of taking at least one session.

Table 2  
Training session taken according to gender

e-scholarly databases Experience	Non	1 Session	2 Sessions	3-4 Sessions	More than 5	Total
<b>Male</b>	2	2	6	3	1	14
<b>Female</b>	1	6	3	6	11	27
<b>Total</b>	3	8	9	9	12	41

<b>Percentage of Male</b>	0.05	0.04878	0.1463415	0.073170732	0.02439024
<b>Percentage of Female</b>	0.02	0.146341	0.0731707	0.146341463	0.26829268
<b>Percentage of Total (Male &amp; Female)</b>	0.07	0.195122	0.2195122	0.219512195	0.29268293

Figure1: training session taken according to gender

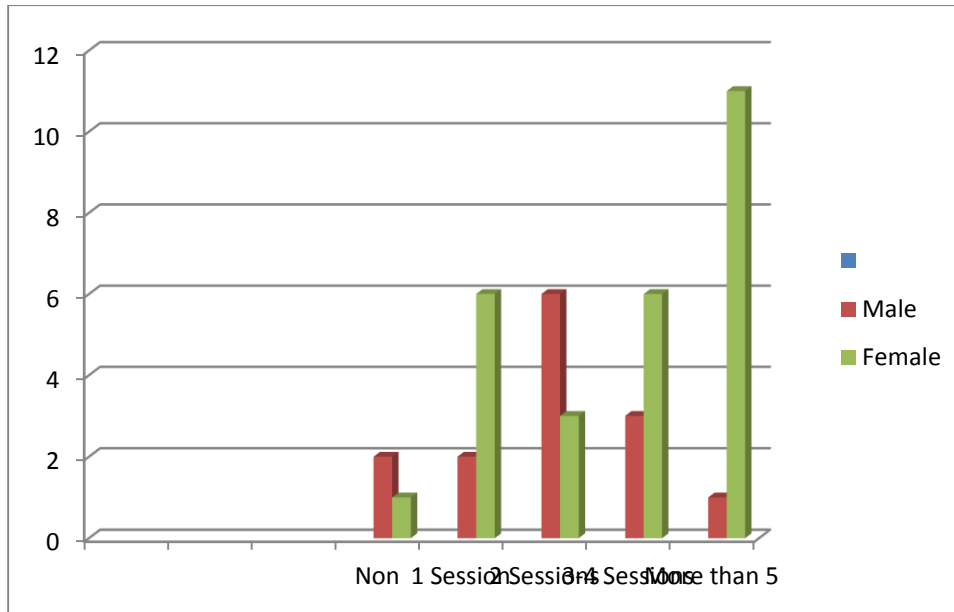


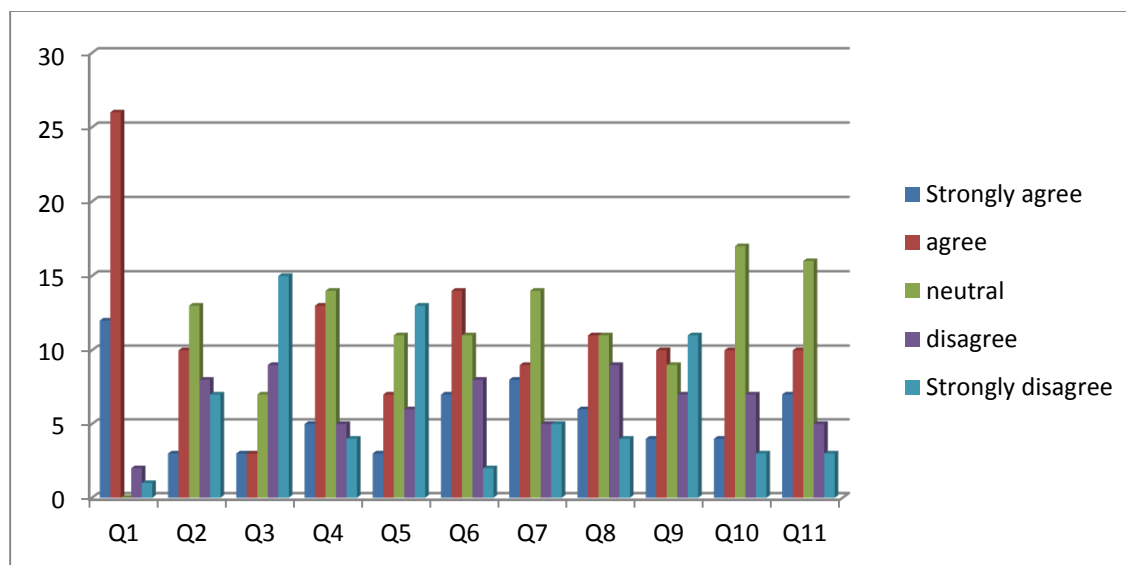
Table3

The distribution of students' answers of Library support

<b>The UOB Library support</b>											
<b>Table 3: The distribution of students answers</b>											
<b>question</b>	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11
<b>Strongly agree</b>	12	3	3	5	3	7	8	6	4	4	7
<b>agree</b>	26	10	3	13	7	14	9	11	10	10	10
<b>neutral</b>	0	13	7	14	11	11	14	11	9	17	16
<b>disagree</b>	2	8	9	5	6	8	5	9	7	7	5
<b>Strongly disagree</b>	1	7	15	4	13	2	5	4	11	3	3

Figure 2: The distribution of students answers of Library support





Answers of Q3 in table 4 (usage) showed that most of the students agreed that the training session/sessions given in the library were part of one of the courses requirements and this is a strong evidence in favor of the first hypotheses that UOB Library arranges training sessions upon request and that there are no fixed, arranged and frequently scheduled training sessions for students or faculty members arranged and to prepare students of the importance use of all resources available for the expected skills and knowledge needed to them .....The questions regarding assistance from the library, negative answers and less positive answers were submitted, moreover, the usefulness and skills gained were negative, this refers to timing and location of the training sessions, the students tend to be satisfied with the performance of the search engines as information seekers instead of attending sessions on e-scholarly databases. Questions 7-9 concerning the no. of e-scholarly databases covered and usefulness, negative answers more than positive, this is logically and practically acceptable because training on all e-scholarly databases available need not less than one semester. Students were positive in their answers of question 10, 11 and corresponding numbers are neutral regarding the relationship between their major and the awareness of the e-scholarly databases, although it is expected to have a positive answer from the clear majority, as they usually have more than one course in DB

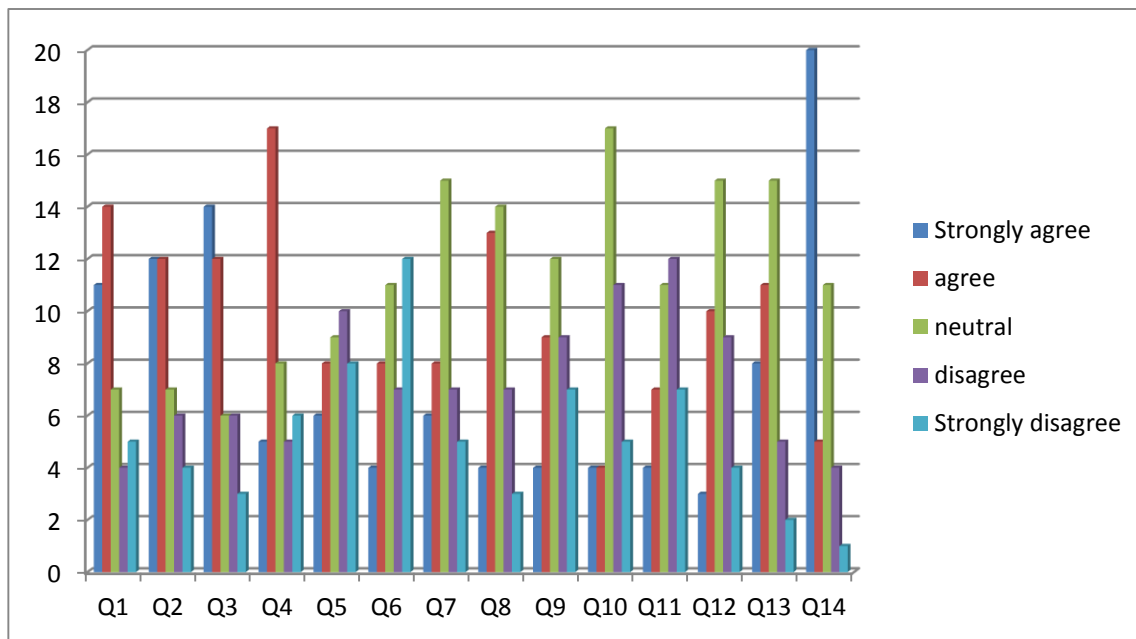
Table 4

The distribution of students answers according to the usage

Usage														
Tables 4: The distribution of students answers														
question	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14
Strongly agree	11	12	14	5	6	4	6	4	4	4	4	3	8	20
agree	14	12	12	17	8	8	8	13	9	4	7	10	11	5
neutral	7	7	6	8	9	11	15	14	12	17	11	15	15	11
disagree	4	6	6	5	10	7	7	7	9	11	12	9	5	4
Strongly disagree	5	4	3	6	8	12	5	3	7	5	7	4	2	1

The training session given is / was part of one of the courses requirement (Percentage)	0.34146341	Strongly Agree
	0.29268293	Agree
	0.14634146	Neutral
	0.14634146	Disagree
	0.07317073	Strongly disagree

Figure 3: The distribution of students answers of usage



### Skill gained analyses

As described before there was a post lab training session questionnaire2 with 10 questions mostly examines the knowledge and skills gained in general, skills with science direct and business source complete, the improvement of their skills in query formulation, and how to deal with the difficulties, complexities of the long phrases. Table5 Shows that there is an increased satisfaction in the knowledge gained and the usefulness and easiness while searching in Science Direct and business source premier by of the students, but the increase is quite moderate.

Students showed high level of satisfaction with the complexity of phrases in formulating search strategies covered in question 6 and an equal satisfaction about the differences between the two databases, with high neutral answers as it refers to the difficulty of the question to be asked regarding the finding of such thing in one session

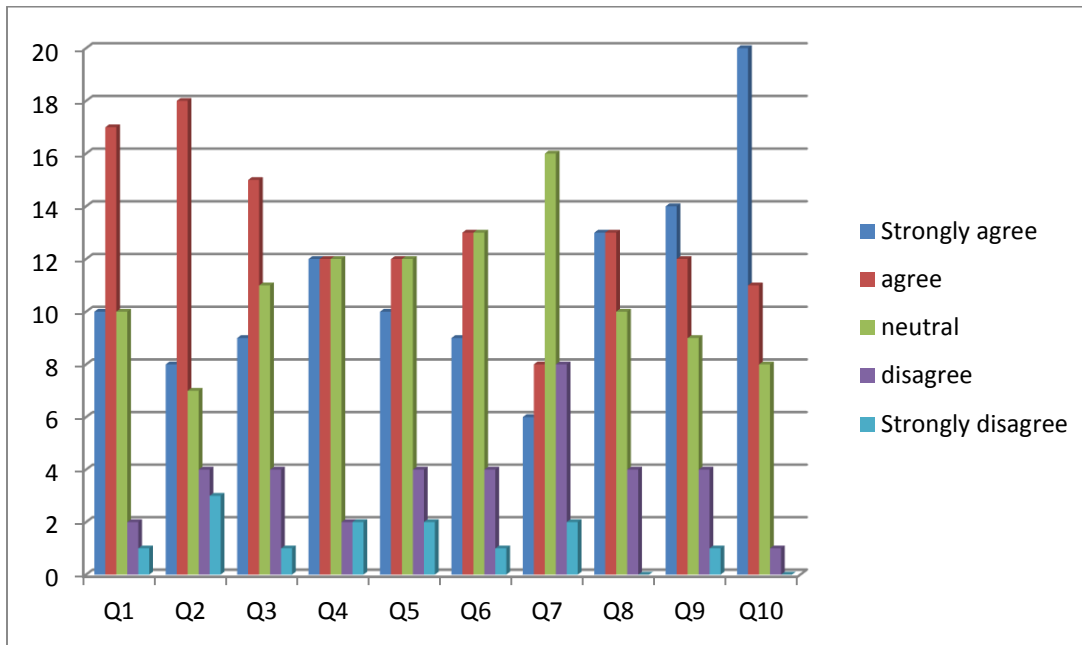
Table5

The distribution of students answers (post lab-training session)

Post –Questionnaire after instructed and trained : Science Direct and Business source complete										
Table 5: post lab-training session questionnaire										
question	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Strongly agree	10	8	9	12	10	9	6	13	14	20
agree	17	18	15	12	12	13	8	13	12	11
neutral	10	7	11	12	12	13	16	10	9	8
disagree	2	4	4	2	4	4	8	4	4	1
Strongly disagree	1	3	1	2	2	1	2	0	1	0

Did you find some complexity in query formulation of long phrased subjects (Percentage)	0.2195122	Strongly Agree
	0.31707317	Agree
	0.31707317	Neutral
	0.09756098	Disagree
	0.02439024	Strongly disagree

Figure 4: The distribution of students answers (post lab-training session)



<p><b>Did you find major differences between Science Direct and Business source complete in formalizing the search, design of the structure, and the information introduced (Percentage)</b></p>	<b>0.146341</b>	<b>Strongly Agree</b>
	<b>0.195122</b>	<b>Agree</b>
	<b>0.390244</b>	<b>Neutral</b>
	<b>0.195122</b>	<b>Disagree</b>
	<b>0.04878</b>	<b>Strongly disagree</b>

...

To confirm assumption 3 above an examination of the relationship between the experience gained through lab –training session and the overcome of the complexity of the long phrases (table 6 and figure 5) represented a positively strong relationship and statistically significant, Since the correlation was over 0.5...

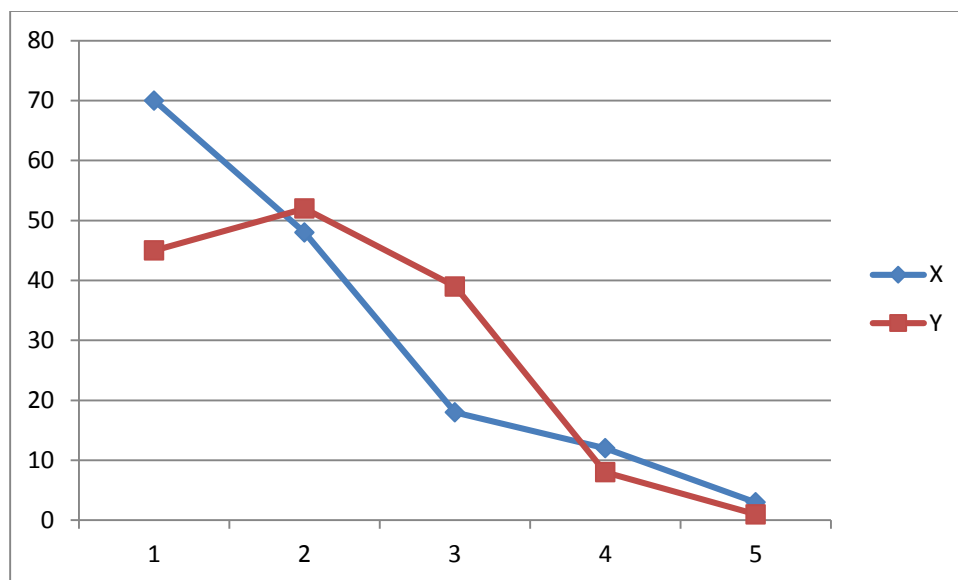
Table 6

Correlation of lab- training sessions and complexity of query formulation

<b>X</b>	<b>The training session given is/was part of one of the courses requirement</b>
<b>Y</b>	<b>Did you find some complexity in query formulation of long phrased subjects</b>

Weights	Answers	Number	X	Number	Y
5	Strongly agree	14	70	9	45
4	agree	12	48	13	52
3	neutral	6	18	13	39
2	disagree	6	12	4	8
1	Strongly disagree	3	3	1	1
<b>Average</b>			<b>30.2</b>		<b>29</b>
<b>Standard Deviation</b>			<b>24.98319</b>		<b>20.54264</b>
<b>Pearson's Correlation Coefficients (Between X and Y)</b>				<b>0.805891</b>	<b>Positive Strong Relationship</b>

Figure.5: correlation of lab- training sessions and the complexity of query formulation



## Results and recommendations

This study observed how undergraduate students interact with the Scencedirect and Business Source complete information retrieval systems. It is found that faculty members and students in our case are utilizing the e-scholarly databases available through UOBL upon request whether personal or departmental and there were no programmed pre-scheduled training sessions available. It is recommended strongly to organize and arrange scheduled training sessions by the library with deferent levels according to the college's needs and majors, more advanced to science and information technology colleges as they already had previous knowledge translate original statements of user need into useful search formulation, to generate effective search requests, to find the exact information needed, and at least all should be aware of the facilities and how to use them. Kirkpatrick's Reaction represented clearly as the participants showed positive attitude and satisfaction. Behavior /performance showed participants capabilities to perform learned skills while searching the above mentioned e-scholarly databases.

Although they were familiar with web searching and Boolean operators, the targeted students found difficulties in formulating long phrase search, this supported the second hypotheses and is justifiable because two hours lab-training session was not enough to qualify them with all techniques and skills required, nevertheless, they showed high satisfaction and acceptance of having a course in Information Retrieval within the major requirements of IS department.

## References

1. Arampatzis, A., & Kamps, J. (2008). A study of query length. In *Proceedings of the 31<sup>st</sup> Annual International ACM SIGIR conference on Research and Development in Information Retrieval*, 811-812.
2. Aula, A. (2003). Query formulation in web information search. In *Proceedings of IADIS International Conference*, 403-410
3. Broder, A. (2002). A taxonomy of web search. The ACM Special Interest Group on Information Retrieval (SIGIR forum), 36(2), 3-10
4. Brusilovsky, P., Ahn, J., & Rasmussen, E. (2012). Teaching information retrieval with web-based interactive visualization. *Journal of Education in Library & Information Science (JELIS)*, 51(3), 187-200
5. Brusilovsky, P. (2002). Web-based interactive visualization in an information retrieval course. Paper presented at the ED-MEDIA'2002-World Conference on educational multimedia, hypermedia and telecommunications, Denver, CO.
6. Business Source Complete web site
7. Chu, H., & Rosenthal, M. (2003). Search engines for the World Wide Web: A comparative study and evaluation methodology. *American Society for Information Science (ASIS)*, 23(01). file:///C:/universite/annee4/algoWeb/20.html
8. Hamada M., et.al. (2010). Query Recommendation for Improving Search Engine Results. *Proceedings of the World Congress on Engineering and Computer Science, I, WCECS 2010, October 20-22, 2010, San Francisco, USA*
9. Jain, N. C. (2013). Open access ensures effective information retrieval of medical literature in e-databases. *Indian J Community Med*, [serial online] 2013 [cited 2013 Mar 14]; 38, 1-3. Available from: <http://www.ijcm.org.in/text.asp?2013/38/1/1/106615>
10. Jansen, B. J., Booth, D. L., & Spink, A. (2008). Determining the informational, navigational, and transactional intent of web queries. *Information Processing and Management*, 44, 1251-1266.
11. Johnson, M. S., Cohen W., & Tanker, B. W. (1999). Measuring appropriability in research and development with item response models. *Technical report*, Carnegie Mellon University.

12. Kirkpatrick, D. L., Kirkpatrick, J. D. (2009). *Evaluating Training Programs: The Four Levels*. (3<sup>rd</sup> ed). Berrel-Kochler.
13. Marchionini, G. (1992). Interfaces for end –user information seeking. *Journal for the American Society for Information Science*, 43(2), 156-163.
14. Marchionini, G. (April 2006). Exploratory search: From finding to understanding. *Communication of the ACM.*, 49(4), 41-46.
15. Martzoukou, K. (2008). Student’s attitude towards web search engines –increasing appreciation of sophisticated search strategies. *International Journal of Libraries and Information Services (Libri)*, 58, 182-201.
16. Morris, M. R. (2007). Interfaces for collaborative exploratory web search: Motivations and directions for multi-user design. *Proceedings of ACM SIGCHI 2007 workshop on exploratory search and HCI: designing and evaluating interfaces to support exploratory search interaction*, 9-12
17. Rose, D. E., & Levinson, D. (2004). Understanding user goals in web search. In *Proceedings of the 13<sup>th</sup> International Conference on World Wide Web*, 13-19
18. Selvaretnam, B., & belkhatir, M. (2012). Natural language technology and query expansion: Issues, state-of-the-art and perspectives. *Journal of Intelligent Information Systems*, 38, 709-740
19. Shah, C., & Marchionini, G. (2010). Awareness in collaborative information seeking. *Journal of the American Society for Information Science and Technology*, 61(10), 1970-86.
20. Tenoper, C., et.al. (2008). Academic users’ interactions with sciencedirect in search tasks: Affective and cognitive behaviors. *Information Processing and Management*, 44(1), 105-121
21. Wang, Q., & Jin, H. (2010). Exploring online social activities for adaptive search personalization. In *Proceedings of the 19<sup>th</sup> ACM International Conference on Information and Knowledge Management*. Toronto, On, Canada, 999-1008. 1871564: ACM. Doi:10.1145/1871437.187564



22. Weikum, G., Kasneci, G., Ramanath, M., & Suchaneket, F. (April 2009 ). Database and Information-Retrieval Methods for Knowledge Discovery. *Communications of the ACM*, 52(4), 56-64.
23. Xiangming Mu, Kun Lu, & Hohyon Ryu .( 2010). Search strategies on a new health information retrieval system. *Online Information Review*, 34(3), 440-456. [www.emeraldinsight.com/1468-4527.htm](http://www.emeraldinsight.com/1468-4527.htm)
24. Zhou, D., Lawless, S., & Wade, V. (2012). Improving search via personalized query expansion using social media. *Information Retrieval*, 15, 218-242

**Acknowledgments:** this research is supported and funded by the Deanship of scientific research (grant 2012/3) at University of Bahrain

---

**Follow us on:** [IRJLIS](#), [Facebook](#), [Twitter](#)