

# Factors Predicting Information Retrieval Skills among Undergraduates of Nigerian Universities

Janet O. Adekannbi

Africa Regional Centre for Information Science, University of Ibadan, Nigeria  
Email: janet.adekannbi@gmail.com

**Abstract** - A major problem identified among university students is lack of information retrieval skills for exploiting electronic resources, thus making the level of usage of resources by students very low. Hence, this study investigated factors predicting information retrieval skills among undergraduate students in Nigerian universities. The study examined information retrieval skills in terms of informational, operational and strategic retrieval skills. Multistage sampling technique was adopted. Six related departments/courses were purposively selected from private and public universities to ensure uniformity. Convenience sampling was used in selecting the total of 235 respondents. Questionnaire was used to collect data on respondents' socio-background characteristics, information literacy knowledge and information literacy skills, cognitive skills and information retrieval skills. Data were analyzed using frequencies and binary logistic regression. Cognitive abilities predicted informational, operational and strategic retrieval skills. Gender was also a significant predictor of both informational and operational retrieval skills. Information literacy knowledge and information literacy skills did not show any significant influence on any of informational, operational and strategic retrieval skills. The study recommends embedment of information retrieval skills training programmes in universities' curricula.

**Keywords:** Information literacy skills, information retrieval skills, cognitive abilities, undergraduates, Nigeria, gender

## I. INTRODUCTION

Information retrieval is concerned with retrieving documents that are likely to be relevant to a user's information need as expressed by his request (Fordjour, Badu and Adjei, 2010). A request is an imperfect expression of a user's information need which must have been defined (Omiunu, 2014) and only a user will be able to tell whether a document retrieved contains the information such user is seeking (Fordjour et al., 2010). This implies that documents retrieved may not be relevant to a request, and two users with identical request submitted can be satisfied in different ways. One document may be relevant to one user and not to the other. Hence, an information retrieval skill is defined as the ability to find information in such a way that non-relevant data (noise) are excluded while relevant information is found (Wien, 2000). Information retrieval skills are very crucial in this information age where many individuals, especially students rely on electronic sources to retrieve information to satisfy their research needs. However, students' efforts to successfully retrieve

information relevant to their needs may be limited due to lack of skills.

Ilogho and Nkiko (2014) stated that among University students which include freshmen, undergraduates and postgraduate students, there is often the experience of difficulty in searching and using information effectively. This is because a major problem identified among students is lack of information retrieval skills for exploiting electronic resources, thus making the level of usage of resources by students very low (Quadri, 2013). The study of Herring (2010) found that majority of students valued information retrieval skills but very small minority could understand the concepts of information retrieval which makes the process of information retrieval a herculean task. To surmount the problem of retrieving information, students may require a combination of skills which include informational retrieval, operational retrieval and strategic retrieval skills to make the process of retrieving information a simple task (Gui, 2007).

According to Gui (2007), informational skills include those needed to navigate, select the appropriate information, evaluate the information and re-use information. These skills involve being able to handle the changing contents of computer and information sources and knowing where and how to look for the resources. Undergraduates with informational retrieval skills should 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. Ahmed and Cooke (2008) indicated that utilisation of electronic resources and the improvement of information skills are important for end users. 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.

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. Okello-Obura and Magara (2008) investigated the use of electronic resources by students of Makerere University, Uganda and reported the need for the computer skills of students to be improved to facilitate accessibility and utilisation of e-resources.

Strategic retrieval skill is the capacity to use computer and network sources as the means of achieving particular and general goals of improving one's position in society (Gui, 2007). For strategic retrieval skills, students need the ability to plan, create appropriate queries and search terms which would enable the students to retrieve information. Undergraduates' ability to develop their strategic retrieval skills would aid in retrieving relevant information from electronic resources for academic purposes and self enhancement.

Various studies have shown the relevance of socio-background of users, information literacy skills and cognitive abilities in information retrieval skills of students. (Jegade and Owolabi, 2005; Fordjour *et.al*, 2010; Quadri, 2013; Schedl, Flexer and Urbano, 2013). According to Seneviratne and Wickramasinghe (2010), socio-background characteristics include age, gender, ethnicity, religion, if the mother is in a paid employment or housewife, and whether they had relatives living with them (such as grandparents), among others. Quadri (2013) investigated the influence of demographic factors on use of online library resources by undergraduate students in two private Nigerian University libraries. It was revealed from the study that there was a high significant level of correlation between the age of the students in both universities and the use of online library resources in the University libraries. However, according to Thirion and Pochet (2009) and Seneviratne and Wickramasinghe (2010) individual characteristics and family background of students do not show statistically significant effect on information retrieval skills.

The relevance of information literacy skills in research is still abstract to many students (Thompson and Blankinship, 2015), including the lifelong learning implications. Information literacy has drawn attention from librarians, researchers, conference organizers and educational institutions because of the successful impact it has on the effective retrieval and use of information (Al-Aufi and Al-Azri, 2013). Poor information literacy skills are at the root of students' search difficulties and poor performance in school (Ilogho and Nkiko, 2014). Sasikala and Dhanraju (2011) observed that students think they know more about accessing information and conducting of library research than they are able to demonstrate in practice. Some students do not know when information is needed, how to recognize good sources of information, how to locate relevant information, use and communicate it effectively (Ilogho and Nkiko, 2014).

Al-Maskari and Sanderson (2010) stated that in most cases, the relationship between some independent variables and information retrieval skills are being interfered with user's characteristics such as cognitive abilities and these could be the perceptual speed, logical reasoning, verbal comprehension, and spatial scanning. Cognitive tasks is one in which suitable processes of mental information is the major determinant of whether the task is successfully performed.

While most of these studies have investigated the influence of each of socio-background characteristics, cognitive abilities and information literacy on information retrieval, there is however a need to understand how the combination of students' information literacy knowledge, literacy skills, cognitive abilities and socio-background characteristics predict their retrieval skills. Information retrieval skills as a variable is investigated in terms of informational, operational and strategic retrieval skills.

## II. OBJECTIVE OF THE STUDY

The specific objective of the study is as follows:

- 1) To determine whether students' socio-background characteristics, information literacy knowledge, information literacy skill and cognitive ability jointly predict information retrieval skills in terms of:
  - a) Informational retrieval skills
  - b) Operational retrieval skills
  - c) Strategic retrieval skills

Based on this objective, the following hypothesis was tested:

H<sub>0</sub>: Socio-background, cognitive abilities, information literacy knowledge and information literacy skills jointly do not significantly predict information retrieval skills in terms of informational, operational and strategic retrieval skills of students.

H<sub>1</sub>: Socio-background, cognitive abilities, information literacy knowledge and information literacy skills jointly significantly predict information retrieval skills in terms of informational, operational and strategic retrieval skills of students.

## III. RESEARCH METHODOLOGY

A survey research design was adopted for this study. The location of this study is Ogun State, Nigeria. Ogun State was purposively selected for this study because it has the highest number of tertiary institutions in Nigeria as shown on the list of universities in Nigeria on the website of National Universities Commission (nuc.edu.ng). The study was carried out in two selected universities. These are Federal University of Agriculture, Abeokuta (public) and Babcock University (private). These universities were purposively selected for two reasons, namely, accessibility

to the students' population statistics and the fact that the two universities have some departments in common as shown in Table 1.

The target population of this study comprised the undergraduate students in both universities. The study purposively selected 300 level students from both universities because it is assumed that students at this level are already familiar with their academic activities. However, 400 level students were excluded from this study because of their preparation for the examinations.

A multi-stage sampling technique was used to select respondents for the study. Two colleges, Natural Sciences and Management Sciences were purposively selected from the Federal University of Agriculture, Abeokuta, while three schools, Basic and Applied Sciences, Computing and Engineering and Babcock Business School were selected from Babcock University. The colleges/schools were later stratified into six related departments/courses which were purposively selected from both institutions. This was done to ensure uniformity across the departments.

TABLE 1 SAMPLING DISTRIBUTION - FEDERAL UNIVERSITY OF AGRICULTURE, ABEOKUTA

Colleges	Departments	Population	Respondents Per Department
Natural Sciences	Biochemistry	93	19
	Computer Science	88	18
	Microbiology	91	18
Science	Accounting	22	4
	Business Enterprise (Business Administration)	200	40
	Economics	103	21
Total		597	120

Source: Administrative Unit, Federal University of Agriculture, Abeokuta, 2014

TABLE 2 SAMPLING DISTRIBUTION - BABCOCK UNIVERSITY

Schools	Courses	Population	Respondents Per Course
Basic and Applied Sciences	Microbiology	45	9
	Biochemistry	55	11
Computing and Engineering	Computer Science	140	28
Babcock Business School	Accounting	157	31
	Business Administration	92	18
	Economics	164	33
Total		653	130

Source: Data Services and Archival Unit, Babcock University, 2015

The total population for the six selected departments/courses in both universities is 1,250. Nwana (1981) proposed that if a population is a few hundreds, we need a sample of 20%. Hence, using a sample size of 20%, 120 and 130 respondents were selected from 300 level undergraduates in Federal University of Agriculture, Abeokuta and Babcock University, Ilishan-Remo, Ogun State respectively. Convenience sampling was however used to select the 300 level students in the selected departments/courses that participated in the study based on their accessibility, availability and readiness to participate in the study.

**IV. DATA COLLECTION AND ANALYSIS**

Data was collected using a structured questionnaire. The questionnaire was carefully designed to ensure that information and data obtained are relevant to the objective of the study. The questionnaire was divided into four major sections namely:

**Section A:** Consisted of demographic characteristics of the respondents which included gender, age group, faculty/college, course of study etc.

**Section B:** This section assessed the information literacy knowledge through an achievement test and information literacy level of the respondent.

**Section C:** This section assessed the cognitive abilities of the respondents.

**Section D:** This section assessed the students' information retrieval skills in terms of informational skills, operational skills and strategic skills.

The items in Section B of Information Literacy Knowledge Test were structured on four (4) options of multiple choice questions with only one correct answer. Each respondent was scored and the pass mark was set at 40%. Information Literacy skill Questions were structured on four (4) point rating scale of Highly Skilled (HS), Moderately Skilled (MS), Weakly Skilled (WS) and Not Skilled (NS). The items in section C of Cognitive Abilities

were structured on 4 point rating scale of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD) and the items in section D of Information Retrieval Skills were structured on 5 point rating scale of Very Good (VG), Good (G), Average (A) Poor (P) and Very Poor (VP). Respondents were instructed on how to respond to the questionnaire. Of the 250 questionnaire administered, 235 were returned, showing a return rate of 94%. Frequency and percentage distributions as well as binary logistic regression analysis were used to analyse data collected with the questionnaire. Binary logistic regression was used to determine the predictors of information retrieval skills.

## V.RESULTS

### *Socio-demographic characteristics of respondents*

Table 2 shows the socio-demographic characteristics of respondents. Majority of the respondents were males (52.3%) while 47.7% were females. More than 95% of the respondents were between 16-25 years. The table also shows that about 70% of the respondents had a family size of 2-5 persons per household. Over 70% of the respondents had their parents as self-employed and working with public organizations.

TABLE 3 SOCIO- DEMOGRAPHIC DATA OF THE RESPONDENTS

VARIABLE	MEASUREMENT	FREQUENCY	PERCENT (%)
GENDER	MALE	123	52.3
	FEMALE	112	47.7
AGE GROUP	16 – 20	122	51.9
	21 – 25	102	43.4
	26 -30	7	3.0
	31 – 35	2	0.9
	36 – 40	1	0.4
	41 – 45	1	0.4
RELIGION	Christianity	202	86.0
	Islam	33	14.0
MARITAL STATUS	Married	8	3.4
	Single	227	96.6
FAMILY SIZE	Only 1	16	6.8
	Between 2 – 5	163	69.4
	Between 6 – 10	55	23.4
	Above 10	1	0.4
PARENTS' MARITAL STATUS	Married	199	84.7
	Single	13	5.5
	Divorced	15	6.4
	Widow	7	3.0
	Missing value	1	0.4
FATHER'S OCCUPATION	Public / Civil Servant	88	37.4
	Private Sector	59	25.1
	Self-employed	85	36.2
	Missing	3	1.3
MOTHER'S OCCUPATION	Public / Civil Servant	76	32.3
	Private Sector	52	22.1
	Self-employed	107	45.5
	Public / Civil Servant	76	32.3

### *Test of Hypothesis*

This hypothesis was analyzed using Binary Logistic Regression analysis. For all the categorical independent

variables, the first category was used as the comparison group.

**Informational Retrieval Skills**

As shown in Table 4, a test of the full model against a constant only model was statistically significant (Chi square=76.379, p=0.000 with df=21) at a significance level

of 0.05. This indicates that at least one regression coefficient is not equal to zero. This shows that the independent variables as a set reliably predicted whether a student would possess high or low informational retrieval skills.

TABLE 4 OMNIBUS TESTS OF MODEL COEFFICIENTS

	Chi-square	Df	Sig.
Step	76.379	21	.000
Step 1 Block	76.379	21	.000
Model	76.379	21	.000

From Table 5, only the variables ‘gender’ (p=0.046, df=1) and ‘cognitive abilities’ (p=0.000, df=1) predicted informational retrieval skills.

TABLE 5 VARIABLES IN THE EQUATION

	B	S.E.	Wald	Df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
Step 1 <sup>a</sup> GENDER(Female)	-.716	.359	3.973	1	.046	.488	.241	.988
Cognitive.Abilities	.366	.062	34.722	1	.000	1.441	1.276	1.628
Constant	-7.706	2.688	8.217	1	.004	.000		

a. Variable(s) entered on step 1: Gender, Age group, family size, course of study, Knowledge, Information.Literacy, Cognitive.Abilities.

From Table 5, compared to the females, male students had a greater probability of having high level of informational retrieval skills. Also, the Exp(B) value of 1.441 for cognitive abilities shows that for each point increase in the cognitive abilities of a student, the odds of a student having a high level of informational retrieval skill increases by 1.441.

**Operational Retrieval skills**

From Table 6, only the variables ‘gender’ (p=0.005, df=1) and ‘cognitive abilities’ (p=0.000, df=1) predicted operational retrieval skills.

TABLE 6 VARIABLES IN THE EQUATION

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
Step 1 <sup>a</sup> GENDER(Female)	-1.071	.379	7.999	1	.005	.343	.163	.720
Cognitive.Abilities	.318	.061	27.590	1	.000	1.375	1.221	1.548
Constant	-8.155	2.713	9.034	1	.003	.000		

a. Variable(s) entered on step 1: Gender, Age group, family size, course of study, Knowledge, Information.Literacy, Cognitive.Abilities.

Compared to the females, male students have a greater probability of having high level of operational retrieval skills. Also, the Exp(B) value of 1.375 for cognitive abilities shows that for each point increase in the cognitive abilities of a student, the odds of a student having a high level of operational retrieval skills increases by 1.375.

**Strategic Retrieval Skills**

From Table 7, only ‘cognitive abilities’ (p=0.000, df=1) predicted strategic retrieval skills.

TABLE 7 VARIABLES IN THE EQUATION

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
Cognitive.Abilities	.256	.052	23.964	1	.000	1.291	1.166	1.431
Constant	-2.243	2.412	.864	1	.353	.106		

a. Variable(s) entered on step 1: Gender, Age group, family size, course of study, Knowledge, Information.Literacy, Cognitive.Abilities.

The Exp(B) value of 1.291 for cognitive abilities shows that for each point increase in the cognitive abilities of a student, the odds of a student having a high level of strategic retrieval skills increases by 1.291.

## VI. DISCUSSIONS

Findings from this study have shown that information literacy skills do not significantly predict information retrieval skills. However, the study has shown that compared to females, male students have a greater probability of having high level of informational and operational retrieval skills. The implication of this finding is that in terms of informational retrieval skills, male students are more skilled in knowing where and how to locate information as well as evaluation of the information. In terms of operational retrieval skills, male students also demonstrated greater competence in the use of computers and the network connections better than their female counterparts. This finding is not surprising as previous studies have suggested that male students tend to be very interested in how technology works while female students focus on how the technology is used (Tella and Mutula, 2008). The literature abounds with contrasting findings on the influence of gender on information retrieval. Tella and Mutula (2008) reported gender differences between female and male undergraduate students at the University of Botswana with regards to computer literacy. According to Bassi and Camble (2011), there exists a significant difference between male and female students in Adamawa state in the use of electronic resources, as females have more difficulty in finding information online than males. However, Ikolo and Okiy (2012) found that females use Internet more than males in their study on gender differences in computer literacy among medical students in selected Southern Nigerian universities. A more latter study by Oyeniyi (2013) reported that no gender differences exist between male and female information professionals on the basis of acquisition of information retrieval skills.

Cognitive ability was a significant predictor of informational, operational and strategic retrieval skills. Al-Maskari and Sanderson (2011) stated that cognitive abilities may potentially influence the user's information retrieval process. This study has clearly shown that students' success in knowing where and how to locate and evaluate information, as well as acquiring competence in the use of computers and the network connections is significantly a function of the level of their cognitive abilities. Previous studies have supported this result. Palmquist and Kim, (2000) studied the effects of cognitive style on user effectiveness and reported that cognitive style significantly influenced the search performance of novice searchers; however the influence was greatly reduced for those searchers who had substantial experience searching on-line databases. Novice searchers with low cognition tended to spend more time and visited more links for retrieving relevant information than those with higher cognition. In addition, Papaconomou et al. (2008) followed up the

Palmquist and Kim (2000) research with a small study on search and learning style. It was found that participants with online search experience, yet low cognition, tended to visit a lower number of links for retrieving relevant information than those with no online search experience.

## VII. CONCLUSION

The purpose of this study was to determine the factors predicting information retrieval skills among university undergraduates. This study has shown that students' gender and cognitive abilities significantly predict information retrieval skills. The findings from this study has clearly emphasised the need for Nigerian universities to embed information retrieval skills training programmes in their curriculum. This is especially important considering the problem of information overload arising from the application of information and communication technology (ICT) to information storage and access. These developments have increased the need for university undergraduates to have necessary information retrieval skills that will empower them to identify and retrieve quality information to satisfy their information needs. Librarians and other researchers also need to consider gender issues aimed at bridging the gender gap in acquisition of information retrieval skills of undergraduate students. A limitation of this study is that only two universities in Ogun State were used based on the fact that they offer related courses and information on students' population statistics was readily available. This may affect the generalization of the findings. The scope of the study can therefore be expanded geographically to cut across universities located in other states in Nigeria.

## REFERENCES

- [1] Al-Aufi A and Al-Azri H (2013) Information literacy in Oman's higher education: A descriptive-inferential approach. *Journal of Librarianship and Information Science* Epub ahead of print 15 May 2013 Doi: 10.1177/0961000613486824
- [2] Al-Maskari A and Sanderson M (2010) A review of factors influencing user satisfaction in information retrieval. Available at: [http://www.seg.rmit.edu.au/mark/publications/my\\_papers/2010\\_JASIST\\_Azzah.pdf](http://www.seg.rmit.edu.au/mark/publications/my_papers/2010_JASIST_Azzah.pdf) (accessed 15 May 2015)
- [3] Bassi MD and Camble E (2011) Gender differences in use of electronic resources in University Libraries in Adamawa State, Nigeria. Available at <http://digitalcommons.unl.edu/cgi/viewpoint>. (accessed 15 May 2015)
- [4] Fordjour R, Badu EE and Adjei E (2010) The prospects and challenges of information retrieval by university students: A case study of postgraduate students of the University of Ghana, Legon, In: *Joint 3rd African Association of Agricultural Economists (AAAE) and 48th Agricultural Economists Association of South Africa (AEASA) Conference*, Cape Town, South Africa, September 19-23, 2010. Available at: <http://ideas.repec.org/p/ags/aaae10/96831.html> (accessed 15 May 2015)
- [5] Gui M (2007) Formal and substantial internet information skills: The role of socio-demographic differences on the possession of different components of digital literacy. Available at: [http://www.firstmonday.org/issues/issue12\\_9/gui/index.html](http://www.firstmonday.org/issues/issue12_9/gui/index.html): 1-16 (accessed 10 March 2015)

- [6] Herring JE (2010) School students, information retrieval and transfer. *Library and Information Research*, 34 (107) Available at: <http://www.cilipjournals.org.uk/lir> (accessed 15 May 2015)
- [7] Ikolo VE and Okiy RB (2012) Gender differences in computer literacy among clinical medical students in selected Southern Nigerian Universities. <http://www.webpages.uidaho.edu/Ombolin/ikolo>. Ilogho JE and Nkiko C (2014) Information literacy search skills of students in five selected private universities in Ogun State, Nigeria: A Survey. *Library Philosophy and Practice (e-journal)*. Paper 1040. Available at: <http://digitalcommons.unl.edu/libphilprac/1040> (accessed 11 December 2015)
- [8] Jegede PO and Owolabi J (2005) Effects of professional status, subject discipline and computer attitudes among Teacher educators in Nigerian Colleges of Education. *Information Technology Journal* 4(2): 158-162
- [9] Khudair A and Cooke L (2008) Health care personnel's use of e-information resources in Riyadh governmental hospitals. *Journal of Librarianship and Information Science*, 40(3): 207-219.
- [10] Nwana OC (1981) *Introduction to education research for student teachers*. Ibadan: Heinemann Educational Books
- [11] Okello-Obura C and Magara E (2008) Electronic information access and utilisation by Makerere University students in Uganda. *Evidence based Library and Information Practice*, 3(3): 39-56 Available at: <http://ejournals.library.ualberta.ca/index.php/EBLIP/article/view/935> (accessed 15 December 2015)
- [12] Omiunu OG (2014) Conceptualizing information need: A phenomenological study. *Journal of Library and Information Sciences* 2(2): 29-54
- [13] Oyeniyi AS (2013) Gender differences in information retrieval skills and use of electronic resources among information professionals in South-western Nigeria. *International Journal of Library and Information Science* 5(7): 208-215
- [14] Palmquist RA and Kim KS (2000) Cognitive style and on-line database search experience as predictors of Web search performance. *Journal of the American Society for Information Science*, 51 (6): 558-566.
- [15] Papaconomou C, Zijlema AF and Ingwersen P (2008) Searchers' relevance judgments and criteria in evaluating web pages in a learning style perspective. In Proceedings of the second international symposium on Information interaction in context (pp. 123-132). ACM.
- [16] Quadri GO (2013) Influence of demographic factors on use of online library resources by undergraduate students in two private Nigerian university libraries. *Library Philosophy and Practice*. Available at: <http://digitalcommons.unl.edu/libphilprac/976> (accessed 16 February 2016)
- [17] Sasikala C and Dhanraju V (2011) Assessment of information literacy skills among science students of Andhra University. *Library Philosophy and Practice*. Available at: <http://unllib.unl.edu/LPP/> (accessed 16 February 2016)
- [18] Saunders L (2008) Exploring connections between information retrieval systems and information literacy standards. *Library and Information Science Research*. 30 (2): 86-93.
- [19] Schedl M Flexer A and Urbano J (2013) The neglected user in music information retrieval research. *Journal of Intelligent Information Systems*. Available at: [http://www.cp.jku.at/people/schedl/Research/Publications/pdf/schedl\\_jiis\\_2013.pdf](http://www.cp.jku.at/people/schedl/Research/Publications/pdf/schedl_jiis_2013.pdf) (accessed 11 December 2015)
- [20] Seneviratne TM and Wickramasinghe VM (2010) Information literacy skills of undergraduates of University of Moratuwa. *Journal of the University Librarians Association of Sri Lanka*. 14 (1): 15-30.
- [21] Tella A Mutula SM (2008) Gender Differences in computer literacy among undergraduate students at the University of Botswana: Implications for library use. *Malaysian Journal of Library and Information Science*, 13(1):59-76.
- [22] Thirion P and Pochet B (2009) Information literacy in students entering higher education in the French speaking community of Belgium: Lessons learned from an evaluation. *Official Journal of the International Federation of Library Associations and Institutions*, 35(2): 89–208.
- [23] Thompson L and Blankinship LA (2015) Teaching information literacy skills to Sophomore-Level Biology majors. *Journal of Microbiology and Biology Education* 16(1): 29–33.
- [24] Wien C (2000) Teaching online information retrieval to students of journalism. *ASLIB Proceedings*, 52(1): 39 – 47.