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A study of the challenges of information retrieval among university students in Ghana

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The poor performance of students in the various universities has been attributed to the inability of students to effectively retrieve information for academic work. The purpose of the study was to investigate the challenges of information retrieval among university students. The survey was used to investigate the awareness and use of information retrieval systems, document retrieved and its relevance to student's information needs and challenges of information retrieval among students. Three student faculties in the University of Ghana, Legon participated in the study. A questionnaire consisting of 29 items was used as an instrument for collecting data. The results revealed that students from all the faculties considered are highly aware of the information retrieval systems. The Faculty of Science students used periodical index and journal contents more than the Social Studies and Arts Students. Bibliographies were most commonly used by Faculty of Arts students. The study also shows that the use of information retrieval tools to retrieve relevant information depends on the information needs of the student and their level of study. The Science students used the Boolean Operators whilst most of the students from the Social Studies and Art Faculties did not find the Boolean Operators useful in retrieving relevant information as expressed in their request. Majority of the Arts Students used the Index Phrase more than the Science and Social Studies Students. Majority of M.Sc students sometimes get the information they need more than Students from M.A, M.PHIL and Ph.D. The study recommends that information retrieval skills training programme should be embedded in the curriculum and undertaken at an appropriate time and supported by academic staff of the university. In addition, the university administrators should ensure that students in the Art faculty receive sufficient information retrieval skills training so that they are not prejudiced against due to subject chosen. Also, ensure that information retrieval skills training are pitched at a level which is appropriate to the individual needs of the student.

Keywords: Information, retrieval systems, information needs, challenges, periodical index, journal contents, bibliographies, boolean operators, Index Phrase.

INTRODUCTION

Information is being created and it is becoming available in quantities as the access possibilities proliferate. There is a great deal of excitement about the Electronic Information Superhighway that enables information seekers to access the diverse and large information sources. Many information providers are developing on-line services to provide users with an interface to tap the rich universe of knowledge stored (Chowdhury, 2004).

However, the realization of making information available to users almost instantly, commonly referred to as the 'information explosion' is already becoming a mixed blessing without better methods to filter, retrieve and manage this potentially unlimited influx of information.

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Users face an 'information overload' problem and they require tools to explore the vast universe of information in a structured way (Ackermann and Hartman, 1997).

According to Alemna (2000)," in African countries, it appears there is so much information generated that can assist development process. The problems, however, arise out of difficulties inherent in accessing information within countries". The information seeking behaviour of a user depends on education, access to library and the length of time a user wishes to devote to information seeking (Aina, 2004). Naturally, most individuals seek information from their friends, neighbours and colleagues among others. But when the information required is complex, individuals resort to the libraries. With the advent of the internet, many professionals, researchers and highly placed individuals now seek information from the web (Aina, 2004). According to Rowley (1988), information retrieval (IR) is concerned with the exploitation of the information and other contents of documents. The establishment of various large databases, which are mounted on computers and made available to anyone who wishes to search them, has a significant impact on the effectiveness and efficiency of the retrieval of information (Rowley, 1988).

At the University of Ghana, students have with time recorded very low academic performance, which has been of great concern to the university authorities and students as well. The poor performance of students have been attributed to a number of reasons and highest among them are that, there are a lot of information retrieval systems designed by the university to help students, particularly at the post graduate levels to retrieve information for academic purposes and research work to enhance their performance. However, there have been complaints by most users that they cannot access the available resources and some of the students are not even aware of the existence of the information retrieval systems including the university databases. Students have problems of finding documents and deciding which ones to read, or selecting a database to search and devising a search strategy, or deciding which expert to believe. Moreover, students who are able to retrieve some information end up getting more information which is not relevant to what they want and at times they do not get the desired information. These problems have come about due to the fact that most students are attracted to the use of online retrieval rather than manual retrieval. And also, owing to the complexity and difficulty users have in presenting their information requests, which in the end results in frustration. It should be noted that, the above problems students face may result in time consuming in retrieving documents for research and this has great effect on academic work.

It should be noted that, information retrieval is to provide an avenue that changes the knowledge of a user so that this user is better able to perform a present task in order to solve a problem or make a decision. This makes him/her better prepared to perform future tasks and it also enables one to assimilate information needed for a present or future task. As Brophy (1993) argues, libraries must "reach a position where the acquisition of information skills is acknowledged as one of the key learning objectives for every student entering a university, so that no student leaves without being fully equipped to cope with the information intensive world - the information society - as an end-user".

The objectives of the study was to find out in three faculties, Social Studies, Science and Arts: the extent of awareness of information retrieval systems among students at the University of Ghana, assess the degree to which retrieved documents are relevant to the information needs of students comparatively as expressed by their request in their subject areas, ascertain the extent to which students from the faculties retrieve documents using index terms or keywords more than one another that satisfy the logical expression in their information request; and identify the difficulties experienced by each of the faculties in retrieving information among themselves.

Section 2 presents the methodology of the study by describing the conceptual framework of information retrieval concerned with retrieving documents that are likely to be relevant to a user's information need as expressed by his/her request. Also is a description of the data and how it was analysed. In Section 3 the results of the study are discussed. Section 4 presents the conclusion of the study with some recommendations to Universities and guide policy.

METHODOLOGY

Concept of Classical Information Retrieval:

The research was based on Classical Information Retrieval as analysed in Rijsbergen (1989) Theoretical Framework of a Non-Classical Logic for Information Retrieval which indicate that, implicit in many information retrieval models is logic. Documents which can be understood as a set of sentences are retrieved if they logically imply the request. However, as we all know, documents rarely imply requests; there is always a measure of uncertainty associated with such implication. So a notion of probable inference is made, and plausibility quantified through some measures. Modelling the information retrieval process in this way goes beyond the keyword approach, and specifies once and for all, the relationship between a document and a request and to compute probable relevance. It is very significant to realize that the above approach is similar to the one adopted in database querying and question-answering.

Information retrieval is concerned with retrieving documents that are likely to be relevant to a user's

information need as expressed by his request. A request is an imperfect expression of a user's information need; only a user will be able to tell whether a document contains the information he is seeking. This implies that documents are not relevant to a request, that is, 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. Relevance is connected firmly to 'aboutness'. A document is not relevant because of its colour or shape. It is relevant because it is about the information sought. The relationship between a document and a request will be formalised as a logical implication to which a measure is uncertainly attached. To motivate this 'implication', three examples shall be given to which standard information retrieval models are re-expressed in terms of uncertain implication (Sparck Jones and Willett, 1996).

Boolean Retrieval

It is assumed that documents are represented by index terms or keywords, and that requests are logical combinations (using AND, OR, NOT) of these terms. A document is deemed likely to be relevant, and hence retrieved, if the index terms in the document satisfy the logical expression in the request. The index terms are, in fact, the semantics, and the indexing is seen as mapping a piece of text into its formal semantics. Formally, an index term is true for a document if it occurs in the set representing the document. It is clear that the relation between document and request is one of logical implication. This is simply set-up and commonly used in practice. Unfortunately, it does not model the uncertainty of relevance.

Co-ordination Level Matching

Just as Boolean retrieval above, documents are assumed to consist of sets of index terms, but requests are now also sets of index terms. The relationship between a document and request is now computed in terms of the index terms they have in common. The likelihood of relevance is taken to be directly proportional to the number of index terms shared. This relationship can be described in terms of the probability of a logical implication.

Probability Retrieval

In this example, documents are represented by sets of index terms, and so are queries. However, this time the relationship between them is calculated by including estimates of the likelihood that a shared term indicates relevance. The emphasis is on somehow finding out how

index terms discriminate between relevant and non-relevant documents. For example, a user might indicate that an index term is a good discriminator. That is, it occurs far more frequently in relevant than a non-relevant documents. Such information for a number of terms is then pooled to estimate the probability of relevance of a particular document.

In conclusion, in re-expressing the three well known retrieval models, Boolean, Co-ordination and Probability, as examples of computation of logical implication, suggest that the fundamental retrieval operation is one of logical implication (Spark Jones and Willett, 1996).

Data and analysis

A survey was conducted among selected postgraduate students of the University of Ghana to generate the data for the study. The choice of post graduate students was due to the fact that they are a major component in all Universities all around the world. Indeed, for all the major universities, the quality of their academic work can be measured by the quality of their post-graduate programmes. The target population of the study was based on stratified sampling including three faculties. According to Microsoft Encarta (2007), when a population is divided into groups, or strata, stratified sampling gives a more representative sample and reduces bias. After the stratified random, the accidental sampling was used to select students to obtain the target population due to the fact that most of the post-graduate students had completed their course work and were busily undertaking their research work although the University was on vacation so locating the students was difficult. Most of the students were found in their hostels, libraries, computer outlets, Internet cafeterias and the graduate school of the University of Ghana.

The three faculties were purposively selected due to their student population strength. The sample size of the population for the study was one hundred and twenty two (122) students using stratified random sampling after which the accidental sampling was used to select students to obtain the target population. Sample for the study was based on Alreck and Settle(1985) proposed 10% sampling representation 10% of 627 of students from Social Studies Faculty which was equal to 63, 10% of 317 of students from Science Faculty which was equal to 32 and 10% of 267 of students from Arts Faculty which was equal to 27.The percentage from the Faculties totalling 122 of the population.

Cross tabulations were used to ascertain the percentages of respondents who chose each alternative for each question based on the objective of the study. The independence in the information retrieval by students and faculty and level were also ascertained by the Chi Square test at 0.05 level of significance (Fraenkel and

Table 1. Students Awareness of Information Retrieval Systems by Faculty

Awareness of information retrieval systems	Faculty of Respondents N = 112							
	SOCIAL STUDIES		SCIENCE		ARTS		TOTAL	
	No.	%	No.	%	No.	%	No.	%
YES	55	98.2%	29	100%	27	100%	111	99.1%
NO	1	1.8%	0	.0%	0	.0%	1	.9%
TOTAL	56	100%	29	100%	27	100%	112	100%
Chi-Square value= 1.009				Significant value = **0.604**				

Table 2. Students Use of Information Retrieval Systems by Faculty

Informationretrieval systems often used	Faculty of Respondents N = 112							
	SOCIAL STUDIES		SCIENCE		ARTS		TOTAL	
	No.	%	No.	%	No.	%	No.	%
CATALOGUE	45	84.4%	14	48.3%	15	55.6%	74	66.1%
PERIODICAL INDEX	3	5.4%	7	24.1%	1	3.7%	11	9.8%
BIBLIOGRAPHIES	8	14.3%	1	3.4%	8	29.6%	17	15.2%
JOURNAL CONTENTS	0	.0%	7	24.1%	3	11.1%	10	8.9%
TOTAL	56	100%	29	100%	27	100%	112	100%
Chi-Square = 30.819				Significant value = **0.000**				

Wallen, 1993). The Chi Square test at 0.05 level of significant was used because the research was a social write up which involves human beings and the need to create room for errors.

RESULTS AND DISCUSSION

Awareness of Information Retrieval Systems

Table 1 shows that, 99.1% of students were aware of information retrieval systems with Social Studies responding to 98.2%, Science and Arts students responding to 100% of students' awareness of information retrieval systems. This shows that post graduate students were aware of information retrieval systems. The Chi-Square value of 1.009 was not significant and showing that there is no difference in the observed rate of awareness across the faculties. This means that awareness of information retrieval systems is universal and does not depend on the faculty of respondents.

The finding on awareness was consistent with the statement of Jansen, B. J. (2000) who discovered that

many students do use some electronic resources and are aware of their benefits, but the majority still likes to use printed material to complement this technology. In addition, majority of students acknowledge an awareness of access to a networked computer by the University, although many stated computer availability deterred them from using the resources (Jansen, 2000).

Use of Information Retrieval Systems

There are various information retrieval systems available for students. Table 2 shows how students used information retrieval systems. Table 2 indicated that students from the Faculty of Social Studies with a percentage of 80.4 were the highest users of catalogue followed by students from Faculty of Arts with

55.6% and Science Faculty with 48.3% respectively. Considering the use of periodical index, 24.1% of respondents from the Science Faculty use it most as compared to only 5.4% of

respondents from the Social Studies Faculty and 3.7% from the Faculty of Arts.

On the other hand, the use of bibliographies was most common among respondents from the Faculty of Arts

Table 3. Students Use of Information Retrieval Tools to Get Relevant Information by Faculty

The use information retrieval tools to get relevant information	Faculty of Respondents						N = 112	
	SOCIAL STUDIES		SCIENCE		ARTS		TOTAL	
	No.	%	No.	%	No.	%	No.	%
I ALWAYS GET THE INFORMATION I NEED	7	12.5%	5	17.2%	2	7.4%	14	12.5%
I NEVER GET THE INFORMATION I NEED	1	1.8%	1	3.4%	7	25.9%	9	8.0%
I SOMETIMES GET THE INFORMATION I NEED	42	75.0%	22	75.9%	15	55.6%	79	70.5%
I GET INADEQUATE INFORMATION	6	10.7%	1	3.4%	3	11.1%	10	8.9%
TOTAL	56	100%	29	100%	27	100%	112	100%
Chi-Square = **17.771**[1]				Significant value = **0.007**				

Table 4. Students Use of Information Retrieval Tools to Get Relevant Information by Level

The use of information retrieval tools to get relevant information	Faculty of Respondents								N = 112	
	MA		M.PHIL		Ph.D		M.Sc.		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%
I ALWAYS GET THE INFORMATION I NEED	5	7.6%	4	22.2%	1	33.3%	4	16.0%	14	12.5%
I NEVER GET THE INFORMATION I NEED	7	10.6%	2	11.1%	0	.0%	1	4.0%	10	8.9%
I SOMETIMES GET THE INFORMATION I NEED	45	68.2%	12	66.7%	2	66.7%	19	76.0%	78	69.6%
I GET INADEQUATE INFORMATION	9	13.6%	0	.0%	0	.0%	1	4.0%	10	8.9%
TOTAL	66	100%	18	100%	3	100%	25	100%	112	100%
Chi-Square =		df = 9		Significant value = **0.387**					

(29.6%). None of the respondents from the Social Studies Faculty used information from journal contents. Seven (7) out of the twenty nine (29) representing 24.1% of respondents from the Faculty of Science used journal contents whilst only three respondents from the Arts Faculty used journal contents. From the above analysis, it can be deduced that the preference for a particular information retrieval system was dependent on the faculty of respondents. This was confirmed by the Chi-Square value of 30.819 as shown in the table 2.

Using Information Retrieval Tools to Obtain Relevant Information

The Internet/Database is an important system that holds a lot of relevant information. One needs to know the right techniques in order to retrieve the needed information. Respondents were asked whether or not they always get the information they need from the Internet/Database and the result is shown in table 3.

The responses as shown in the Table 3 above have 70.5% representing majority of students who sometimes get information they need, and only 12.5% students get the information they need. Also, 8.0% of respondents said they never get the information they need and 8.9% of respondents said the information they get was inadequate.

There was a vast difference between students who get information they need and those who sometimes get the needed information. Students from the Science Faculty representing 75.9% get information they need whilst Social Studies follows with 75% and Arts with 55.6% respectively.

The Chi-Square value of 17.771 with a significance value of 0.007 in Table 3 indicates that, there was a strong relationship between getting relevant information using information retrieval tools and faculty of students. This means that information retrieved using information retrieval tools depends strongly on the faculty of students. Table 4 shows the use of information retrieval tools to get relevant information by level of students. The result shows that 69.6% 'sometimes' get information they need.76.0 M.Sc students representing 76% sometimes

Table 5. Students Use of Two Search Strategies by Faculty

Search strategies used	Faculty of Respondents		SCIENCE		ARTS		TOTAL	
	SOCIAL STUDIES			N = 112				
	No.	%	No.	%	No.	%	No.	%
KEYWORDS (BOOLEAN POERATORS)	21	37.5%	11	37.9%	4	14.8%	36	32.1%
INDEX PHRASE	30	53.6%	10	34.5%	21	77.8%	61	54.5%
KEYWORDS AND INDEX PHRASE	5	8.9%	8	27.6%	2	7.4%	15	13.4%
TOTAL	56	100%	29	100%	27	100%	112	100%

get information needed, followed by 68.2% of M.A students with M.PHIL and Ph.D having an equal percentage of 66.7.

The Chi-Square value of 9.566 with no significance in table 4 shows that there was no relationship between getting relevant information using information retrieval tools and level of respondents.

The above analysis looked at the use of information retrieval tools to obtained relevant information by faculty and level of students. The findings revealed that relevance of information retrieved using information retrieval tools depends strongly on the faculty of the students but did not depend on the Level of Students. This may be due to the fact that some of the faculties give assignments which require the students to use information retrieval tools. In addition, majority of students from the Science Faculty "always" get the information they need and "sometimes" get the information they need. Majority of Arts students "never" get the information they need or get "inadequate" information. The findings also show that majority of M.Sc students 'sometimes' get the information they need more than Students from M.A, M.PHIL and Ph.D. The findings on relevant of information content to a user needs is consistent with Rijsbergen (1989), Frake & Baeza-Yates (1992) and Large et al. (1999).

Search Strategies Used by Faculties

The results from table 5 show that only 14.8% of the respondents from the Faculty of Arts used the Boolean Operators as a search strategy. Also, 37.5% of respondents from the Faculty of Social Studies used the Boolean Operators and 37.9% of the respondents in the Science Faculty used the Boolean Operators. Similarly, 34.5% of the respondents from the Faculty of Science used the Index Phrase as their search strategy with the remaining percentage of 27.9% used both search strategies.

As much as 77.8% of respondents from the faculty of

Arts used the Index Phrase. Less than 10% of respondents in the Faculties of Arts and Social Studies used both search strategies at parallel. The Index Phrase from the Table 5 was the more common of the two strategies mostly used by students from all the faculties. Respondents (54.5%) from all the faculties used the Index Phrase as compared to an average percentage of 32.1% for the use of Boolean Operators.

The use of the Boolean Operators and Index Phrase to retrieve relevant information as expressed in students request did not depend on the faculty of the students. This result concurs with the findings of Al-Kharashi and Evens (1994) which revealed that using roots and stem as index terms give better retrieval results than using words. The root performs as well as or better than the stems at low recall levels and definitely better at high recall levels.

Challenges of Information Retrieval among Students

Table 6 below shows that, more than half of respondents from the Science Faculty (55.2%) have difficulty with 'inadequate time' students have in retrieving information. Students from the Arts Faculty follow with 37% as compared to Social Studies Faculty with 35.7%. Respondents from the Arts (29.6%) Faculty has difficulty with 'frequently disruption' of Internet access service. Followed closely was the Social Studies Faculty with 28.6% as compared to respondents from the Science Faculty with only 24.1%. Also 18.5% of respondents from the Arts Faculty have difficulty in the Internet not being user friendly. Followed closely is Social Studies Faculty with 16.1% as compared to Science Faculty with only 6.9%. Respondents from the Social Studies Faculty representing 19% have difficulty in locating relevant information as compared to Arts Faculty with 14.8% and science Faculty with 13.8% respectively. The result shows that respondents from all the faculties have greater difficulty with 'inadequate time' students have in retrieving information with students from the Science

Table 6. Students Difficulty in Retrieving Information by Faculty

Difficulty in retrieving information	Faculty of Respondents		N = 112					
	SOCIAL STUDIES		SCIENCE		ARTS		TOTAL	
	No.	%	No.	%	No.	%	No.	%
INADEQUATE TIME BY STUDENTS	20	35.7%	16	55.2%	10	37.0%	46	41.1%
FREQUENTLY DISRUPTED INTERNET ACCESS SERVICE	16	28.6%	7	24.1%	8	29.6%	31	27.7%
INTERNET ISNOT USER FRIENDLY	9	16.1%	2	6.9%	5	18.5%	16	14.3%
DIFFICULTY IN LOCATING RELEVANT INFORMATION	11	19.6%	4	13.8%	4	14.8%	19	17.0%
TOTAL	56	100%	29	100%	27	100%	112	100%
Chi-Square = 4.141¹			Significant value = **0.658**					

faculty being the highest. Most of Students in the Art Faculty have difficulty with the frequently disruption of Internet access service. More students from the Social Studies Faculty have difficulty in locating relevant information than students in the Science and Arts Faculties.

The Chi-Square value of 4.141 was not significant suggesting that there is independence in the responses across the faculties. This means that respondents from the three faculties did not relate to the difficulty respondents have in retrieving information.

The difficulty with time students have may be due to the fact that students take other activities on campus important than concentrating on improving their information retrieval skills to obtain relevant information to enhance their academic work. In addition, it may be due to the fact that some lecturers do not encourage students who make extensive research outside what has been taught in the lecture room. This makes students reproduce lecture notes rather than being encouraged to use information retrieval tools to acquire extensive knowledge about the subject matter. The finding on inadequate time students have in retrieving information reaffirms Murphy (2003) claims that many participants have at least some difficulty in keeping up with research in their field(s) of study in regard to time. As a result, many participants do at least some of their information-gathering in their off-time or delegate certain research responsibilities to others.

Conclusion and Recommendations

This study presented the results of a survey of the challenges of information retrieval by post graduate students of the University of Ghana, Legon. Students from the Social Studies, Science and Arts Faculties were fully aware of information retrieval system and depending on the Faculty students belong used them. However, the use of the information retrieval systems to obtain relevant information was a problem with all the faculties. The main reasons for the difficulties in retrieval of information was attributed to frequently disruption of Internet, inadequate time by students on campus and non availability of training programmes to educate students on how to use information retrieval tools to obtain relevant information. The problems notwithstanding, there have been positive uses of the search strategies to retrieve relevant information by all the faculties. Students from the Social Studies, Science and Arts Faculties expect in the future to have access to Internet services in their hostels and also look forward to a well structured programme to train students to use information retrieval tools effectively to retrieve relevant information to improve academic work. The numbers of students entering higher education are increasing as the number of staff not rising accordingly, the possibility of ensuring that students have acquired the correct information retrieval skills is essentially very difficult to monitor.

Long experience of user education programmes has shown that teaching information retrieval skills to students should be embedded into the curriculum and done at a time when the user can understand its appropriateness. This training should also be adapted to the varying abilities of the users. If students are aware that the skills required for using electronic resources are not insular, and indeed provide them with valuable transferable lifelong skills, skills which employers will be looking for, they may be more likely to learn how to use them.

Majority of M.Sc students sometimes get the information they need more than Students from M.A, M.PHIL and Ph.D. The Social Studies Students used more catalogues than students from the two faculties. The Faculty of Science students used periodical index and journal contents more than the Social Studies and Arts Students. Bibliographies were most commonly used by Faculty of Arts students. The Science students used the Boolean Operators more than the Social Studies and Arts students. Majority of the Arts Students used the Index Phrase more than the Science and Social Studies Students. Most of the students from the Social Studies and Art Faculties did not find the Boolean Operators useful in retrieving relevant information as expressed in their request.

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