Abstract

Technological revolutions, centred on information, transform the traditional models of our society at an ever increasing pace generating a proliferation of information resources, and the emergence of new systems of communication founded on convergence with other technologies. As these technologies produce benefits for users, new ways to transmit knowledge have also created problems. In the research field, the scientific community has become aware that access to information is an integral part of research activity. Therefore, it is important to study the forms, processes and strategies in accessing information during research conducted by PhD students at the University of Hassan II Mohammedia - Casablanca, together with any difficulties encountered by these students.

1. Introduction

The activity of information research can be considered a secondary activity, through which the researcher is led to accomplish their primary activities, such as the conception of a research project, or the achievement of a scientific article (Pirolli & Card, 1999; Rouet & Tricot, 1998).

Several studies have shown the problematic character of the information research practices of graduate students, as well as their use of numerical information resources (Biaz & et al., 2006; Lardellier, 2006; Lima, 2007; Booth, 2007; Connaway & Dickey, 2010; Chu & Law, 2008). The majority of these studies were conducted in Europe (Foster, 2004; Steinerova & Susol, 2005). Other studies were conducted in the United States (George et al., 2006; Sadler & Given, 2007), as well as in Australia (Hughes & Bruce, 2006). Two streams of research have marked these studies (Tenopir, 2003; Rowlands, 2007; Connaway & Dickey, 2010): the user-focused research (Kuhlthau, 1991;
Limberg, 1999) and a second stream of research centred on the concept of information literacy in the documentary research perspective.

In an information environment, information retrieval consists of two main parts: first, interaction with information systems, second, the treatment and use of information. The exploration of these features will contribute to the efficient use of the Scientific and Technical Information (STI), and the development of new systems and tools to organise knowledge (Steinerova & Susol, 2005). The ultimate goal is to develop the information literacy skills of the students, particularly aspects related to information literacy where technological tools bring remarkable changes in practices (Bruce, 2004).

The present paper principally aims to gain some knowledge about the informational behaviour of doctoral students at the University of Hassan II Mohammedia - Casablanca. We will focus on the information tools used and their importance in research practices (Tenopir et al., 2009), analyse access techniques to information systems during the development of thesis, the contribution of free access to STI (Fry & Talja, 2007), and finally, aspects related to information literacy.

1.1. Scientific research in Morocco

Scientific research occupies an important role in Morocco; it is currently conducted in 70 university establishments and four research institutes. Most of these institutions are organised in research teams and centres of doctoral studies. The number of researchers in Morocco is nearly 13,500; 9,500 researchers operate within universities, 1,100 in staff training institutions, and 2,900 in public and private research institutions.

In Morocco the PhD students do not represent the target subject of any study. Considered a future teacher/researcher, eventual participant in higher education, or with a future intervening in scientific research, the doctoral student constitutes a cornerstone in the development of scientific research. Furthermore, the development of electronic resources has led to profound changes in the access practices and use of the (STI), and also in the techniques used by PhD students to carry out their research projects.

At the University of Hassan II Mohammedia - Casablanca, doctoral studies are undertaken within the following institutions; the Faculty of Law Studies in Mohammedia, the Faculty of Human Sciences Ben M'sik in Casablanca, the Faculty of Human Sciences in Mohammedia, the Faculty of Sciences Ben M'sik in Casablanca and finally the Faculty of Sciences and Techniques in Mohammedia. The total number of doctoral students registered at this university is 1,183 (all disciplines merged).

1.2. The doctoral research - expertise required for access to STI

Bibliographic research represents an essential step of the thesis project. The conducted research is usually large and requires different approaches. The PhD students are faced with the dispersion of resources of a multidisciplinary and specialised nature (Brown & Swan, 2007), they must evaluate and validate a considerable informational mass. Finally, they must communicate and disseminate the results of their research work (Sparks, 2005; Meadows, 2006; Heimeriks et al., 2008). (See Figure 1)
Online documentary research systems have experienced strong growth since the advent of micro computing (Marchionini, 1995). In these information systems, the task of the user consists of identifying sources of information, analysis, selection, treatment, and finally information communication (Boulogne, 2004). Katz and Lin (1993) studied the information behaviour of adults who performed information retrieval tasks on computers and concluded that information research activity is based on the twin expertise of domain and system (Colombi & Baccino, 2003).

2. Method

The approach adopted for this study is qualitative. Qualitative research consists of studying phenomena in their natural environment, and their interpretation based on meanings given to them by the participants (Denzin & Lincoln, 2003).

In order to reach a large number of individuals, we chose the questionnaire as a means of data collection (Javeau & Legros, 1977). The preliminary questionnaire was established thanks to a semi-structured interview (Blanchet & Gotman, 1992) conducted with six PhD students, chosen at random. An interview guide allowed us to focus the discussion to collect the maximum amount of data of interest to us.

Based on interviews administered, we established a first version of the questionnaire, which we administered experimentally to seven doctoral students, randomly selected in order to validate our questionnaire-test. Once the final questionnaire was ready, it began with identification of the PhD student, a second part focused on how frequently the tools were used, a third section concerned the use of information systems, and a last part discussed the importance of information literacy in the success of information research activity.

Finally, the questionnaire was administered to doctoral students in the research laboratories, in full coordination with the laboratory directors, between June and October 2012. The administration of the questionnaire took between 25 and 35 minutes. Out of a total of 1,183 doctoral students, 313 questionnaires were distributed, 258 received and the response rate was 82.43%. The questionnaire data were coded and analysed with SPSS Version 20.0.

3. Results

3.1. Participants’ characteristics

Our sample consisted of doctoral students from different disciplines: letters 7.8%, human and social sciences 24.4%, law 3.9%, education sciences 6.2%, economics and finance 15.1%, engineering sciences 1.9%, mathematics 3.5%, computer science 4.7%, physical sciences 12.8%, chemistry 10.9%, biology 7% and geology 1.9%.

The distribution of our survey sample was random, with a slight dominance towards men 51.2%, compared to 48.8% for women, of which 84% were students, 12% were teachers, while 2.7% were private sector employees.

3.2. Places and time allocated for research activity

Among the doctoral students surveyed, 45% prefer working from home, against 7.4% who reported they always conducted research within their laboratories. While a minority of them perform research in other areas, such as public spaces (Wi-Fi). Indeed, the place of research is a major factor in the quality and nature of the tools used, the social and pedagogical relationship (with colleagues and thesis directors), as well as the mobilisation of knowledge and expertise throughout the research process.

A good pedagogic relationship between student and tutor gradually leads to a change in the status of the student to a "future colleague", who learns to integrate a research career at the same level as other researchers in the laboratory of belonging. This promotes the skills of a researcher with a sense of community. This finding is a real questioning of the effective use of university libraries. In addition to the lack of specialised documents, other factors can be hidden behind reluctance towards using libraries, such as the noisy character of reading rooms, constraints related to geographic distance, or inadequate working hours.
3.3. Use of basic software related to research activities

Of the PhD students surveyed, 36.8% declared an expertise in the use of word processing software, whereas 51% are fluent in the use of the table’s management software. Regarding the use of bibliography management software, it should be noted that 47.7% declared they did not understand it. In addition, we also see a remarkable ignorance in using intelligent services. In fact, 22.9% of the doctoral students give no importance to news about their areas of specialty. Moreover, we see a low use of statistical processing software. This situation raises serious questions about training opportunities provided for the control of development tools in academic research projects. In addition, only 18.2% of students are in the process (results and writing) of their thesis.

3.4. Use of scientific journals

At the beginning of a research work, 37.6% of doctoral students begin their activity by reviewing the titles of journals; the use of subscribed journals remains low (10.9%), while free magazines are used daily by 17.1% of doctoral students. This shows that the use of the digital magazine is more rooted in the informational habits of the doctoral students. This is explained by the fact that the validation performed by scientific journals remains a major tool, not only of interest to the scientist as author, but also as a reader, especially when the expertise of domain is low (when starting a new project, for example), which explains the importance of this tool in practice.

3.5. Appreciation of the university’s library services and the importance of digital services

Regarding the assessment of services provided by the university library, 33.7% of doctoral students were not satisfied about the availability of documents in their special fields. Thirty two per cent had difficulty in locating documents, while 46.1% reported a lack of training in the tools of documentary research. These results are explained by the widespread use of the Internet by PhD students for academic research; 39.5% use the Internet daily for between two to four hours, without it affecting the importance of the primary document (paper). In fact, 45% of doctoral students appreciate the paper document; this percentage is slightly lower for electronic document amateurs who are mostly the scientists (54.3%).

The use of digital libraries is at an early stage. Indeed, only 35.7% use Google books, 10.1% use Gallica, 7% use Europeana, while 23.3% do not know understand digital libraries.

These results are clear and consistent. Users become increasingly familiar with numerical collections and very quickly adopt new media. Increasingly, they become seekers of an extended offer of special collections.

3.6. Collaboration and serendipity

The research found that 18.6% of students tended to abandon their current task when faced with problems related to access, 39.9% of respondents sought assistance from their supervisor, while the majority (51.2%) resorted to help from their colleagues. However, while using information systems, 82.6% of PhD students were confronted with the phenomenon of the serendipity; they came across relevant documents unplanned and by chance.

3.7. The use of search engines and databases

To meet their information needs, doctoral students rely more and more on general search engines; Google accounted for 76%. However, there was also a remarkable use of other search engines: Google Scholar 21.3%, Bing 14%, Scirus 14.3% and Yahoo 25.2%.

As we mentioned before, doctoral students have a preference for the most direct access to information. Although Google is considered the default search engine, recent studies show that despite the visible power of Google, it remains non-specialised and does not allow references to specific articles to be found (Niu & et al., 2010).
Therefore, this tool would be of little use in an effective research activity. Furthermore, a recent study (Herrera, 2011) shows the importance of Google Scholar in terms of academic research.

Regarding the use of databases, we found that 40% of doctoral students have never used databases established by the university, and 27% have never sought out foreign databases. Given this situation, the purpose of the university library could be strengthened by providing training to new PhD students in the use of databases for literature searches.

3.8. The use of information systems strategies for academic purposes

Regarding how a search engine is used, we found that only 32.6% use simple keywords, while 39.5% have never used Boolean operators (AND, OR, NOT), 48.4% have never used proximity operators (NEAR), and 44.6% have never searched similar results. These results explain the fact that 20% of the PhD students felt very little satisfaction with their search strategies, and 70.2% found difficulties in the use of information systems in general.

In this context, 50% of doctoral students claimed some useful research databases were password restricted, 21% found difficulties in the formulation of their query, 22.1% found difficulties in filtering relevant information, 23% claimed ignorance in foreign languages for academic research purposes, and finally 12% found serious difficulties in using interfaces.

3.9. Aspects related to information literacy

Although publication of scientific articles brings a scientific recognition to doctoral students, we found that 22.5% of students had never drafted a scientific paper, only 13.6% really knew the procedures of writing such a publication, only 32.9% could often identify relevant sources of information, only 26.4% could limit their search by date or language, only 14% could verify the credibility of the author, only 17.4% could identify the rules of intellectual property of a digital document, and finally only 30% could cite references.

In addition, 83.3% of the PhD students had never taken courses in literature search during their undergraduate studies, and 54.3% did not even know of the existence of such courses. This raises the question of current training and the real needs of PhD students in their research field: the monitoring and analysis of data, and publication of STIs.

We interviewed doctoral students in order to discover their opinions about the specifics of training in information literacy. The results revealed that 62% of students reported that training is related to research processes and annexes tools, and 38.8% are in favour of training in the process of producing and publishing information.

3.10. Training needs in information literacy

Given the importance of training in information literacy, doctoral students experience a remarkable need for training in how to carry out their research. Indeed, 52.3% of the students reported a need for training in information research strategies. These students are predominantly in the first or second year level of their thesis. Other PhD students declare the same need, even if they are at an advanced level in their thesis. 78.3% do not recognize the usefulness of the information monitoring for the success of their thesis project and only 21.7% showed the need for training in this area. In addition, 38.8% preferred training on analysis and how to use data; these students are mostly registered in the third year and beyond. Finally, 33.7% reported a need for training on the processes and procedures of scientific publication.

3.11. Which information system for doctoral students?

In general, the PhD students expected an information system to be user-friendly (easy to use interface), have a direct access without limitations, with integrated functionality adapted to their needs (assistance, selection of pertinent keywords according to formulated request, filtering features, history management and exploitation of
similar results.). Such a system must allow users to customise the tools to meet their research needs. Finally, it is important that all PhD students benefit from thorough training in the use of these new tools.

4. Discussion

The digital environments have remarkably reduced the use of libraries by PhD Students, and it is becoming increasingly important to adapt and upgrade university library services to meet the actual needs of this population. Indeed, declining library attendance, caused mainly by the large and easy use of search engines, could adversely affect the library's role in the cycle of scientific and technical research (Brown & Swan, 2007).

However, in spite of the lack of interest demonstrated towards the university library the doctoral students, as a whole, recognise the quality and importance of physical resources in their research work. This then imposes serious reflection on the platform available to the students. Indeed, libraries must work towards the improvement in the visibility of its documentary resources and provide training for this particular population. In addition, they must also develop quality databases that integrate information systems with interfaces, similar to the search engines with which PhD students are accustomed.

Concerning the new report on information and knowledge, the study confirmed the familiar character of information research tools for PhD students. In fact, most research tools present very intuitive simple search interfaces, but often with very limited functionality. The use of these tools in an advanced setting continues to require significant procedural knowledge. The difficulties encountered by doctoral students when operating these tools appear to be related primarily to the lack of training provided in these new techniques.

In addition to the lack of knowledge regarding techniques, there is some deficiency in skills related to information literacy. It seems that some users, who feel confident in their ability to use complex tools, confuse their own technical capabilities with their informational capabilities, which explains their low appreciation of aspects related to information literacy.

Although the mastery of tools increases with the mastery of the domain (Vezzosi, 2009), the study demonstrates the challenges faced by PhD students, whatever their thesis level. Indeed, research strategies are not always effective because of poor knowledge of research techniques, but also because of inappropriate disciplinary terms.

However, the maturation of the informational offer has changed the relationship between the PhD student and his documentary environment. Indeed, printed documents are rarely used, and the spaces for physical documentation are abandoned. Also, he attaches great importance to electronic information systems, despite all the difficulties.

In this landscape, in their search of scientific and technical information, doctoral students are becoming eager consumers of electronic information, made available thanks to a few clicks of a mouse. However, few PhD students use these tools very well, and if they know a few (e.g. Scirus and Google Scholar) they use them in a very empirical way and ignore many potential research possibilities.

Although the study has shown some reservations as for the offer of university libraries, notably in scientific disciplines, these areas offer other disciplines an important and inevitable informational bottom. We believe that the analysis of informational strategies will be very useful for libraries, as it allows them to discover the real needs of PhD students, in the context of the emergent electronic library. Therefore, the aim is to improve and adapt services for this specific population, whose needs are increasingly diverse.

It should also be noted that several studies have shown that failures of computerisation are due to misunderstanding the actual needs of users. Indeed, the development of such services should not be guided by technological advances but by the actual use of the system in question. It is from this perspective that it becomes necessary to be aware of the information needs of PhD students, to improve the access methods and query the efficiency of information systems, in order to thrive in the modern world.

The scientific research field in Morocco is thus at a crossroads. Certainly, it has in its ranks senior researchers, but with the increasing pace of scientific and technological change, it is increasingly important to make efforts in mobilising and using all potential skills to ensure the future development of the country.

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References