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# Searching for information sources: Students' behaviour in electronic environment

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**Abstract – ICT is an important catalyst in transition from traditional to 21st century education. In the centre of our interests are students and their search for reliable information sources. The paper presents results of an online survey of all the students of Faculty of Humanities and Social Sciences, University of Zagreb (FHSS). Analysis will show how they search for information in electronic environment while preparing exams and writing theses. Students' usage of library catalogue, commercial databases, open access repositories, open access journals, e-learning system, social networks, social bookmarking services, scientific blogs and forums will be analysed. Nine variables will be tested by chi-square test to show whether there are statistically significant differences in information searching behaviour between students of the Department of Information and Communication Sciences (DICS) and students of other departments at the faculty. All the results will show how important is formal education for using, evaluating and retrieving reliable information sources. The results will also accent some guidelines that will help educators and librarians at the faculty in planning education of their students/users.**

## I. INTRODUCTION

Learning paradigm has changed from a traditional one that was teacher-centred, to a new millennium learner-centred paradigm. Although teachers are still, and will always be, an important and irreplaceable link in the chain of education, learners' role has also become at least equally active and significant.

Electronic environment is a part of students' everyday lives, both private and professional. They are used to living in digital environment – they communicate and they search for all kinds of information. One important aspect of their lives is their education. Electronic information sources used by students for their education have to be of high-quality. Reliable and valuable scientific and professional information is not always easy to find – students have to know where to look for the information, how to search for it, how to evaluate it and, last but certainly not least, how to use it to produce new knowledge. Evaluation of information resources is especially important nowadays, in unstructured information environment, and with the emergence of Web 2.0 tools and applications together with the rise of “collaborative wisdom“ or “wisdom of the crowd“. Students, as well as younger users' population in general, rely more on the “easy to find“ resources that some search engines can provide for them and rarely choose to search through large amounts of professionally organized data stored in commercial databases.

What is to be done and how can libraries help their users to find appropriate path on their way to proper information resources? Before answering those questions, it is of great importance to test and examine retrieval habits of the specific group of users, to determine main features of their information seeking behaviour and, regarding that information, to develop services which could best accompany their needs. Enhanced users' information behaviour and urgent need of such a research was recognised at the Faculty of Humanities and Social Sciences, University of Zagreb (FHSS). The survey was taken as a first step towards development of new, enhanced library services which are to help new and enhanced library users on their way to find useful and appropriate information resources.

## II. LITERATURE REVIEW

Students' behaviour in electronic environment is still rather new and unexplored, especially in Croatian scientific community which, as a small community, challenged with many difficulties when it comes to traditional information environments, could benefit the most from new technologies.

According to a study of FHSS students [1], in 2011 students use personal computers daily – 94.11% use them for more than one hour a day. They also use personal computers in the FHSS library for educational purposes – 44.11% use them at least once a week. In a 2010 study [2] it was found out that there was an increase in the use of social networks among the students of FHSS during the year. The use of social networks has almost leveled with the use of e-mail (79% of the students use e-mails and 78% use social networks daily). According to the same study, reading wikis is another common online activity of the FHSS students (46% use them often). Social bookmarking services are not so commonly used (13.4% use them often), and the least popular online activity is editing wikis via user accounts (1% of the students do that).

The importance of Web 2.0 services in today's world is accented in various definitions by which authors from various scientific fields, sometimes gathered in cross-disciplinary projects, are trying to define this space of collaborative wisdom. One of the most influential definitions of Web 2.0 is the one from Joint Information System Committee (JISC) dating from 2007 claiming that Web 2.0 encompasses a variety of different meanings that include increased emphasis on user-generated content, data and content sharing and collaborative effect, together

with the use of various kinds of social software, new ways of interacting with web-based applications and the use of the web as a platform for generating, re-purposing and consuming content [3]. Described that way, many scholars have seen Web 2.0 and its tools as amateur, leisure-oriented structure and were not giving it as much attention as it deserved. Some others have recognized its potential and influence it could, if used appropriately, have on the knowledge society. As Virkus [4] points out, Web 2.0 is suitable for educational and lifelong learning purpose in our knowledge society, because our modern society is built to a large degree on digital environments of work and social communication, and educational practices must foster creative and collaborative engagement of learners with this digital environment in the learning process.

Discussing blogs, Pan, Bradbeer and Jurries [5] say that they are very useful for libraries to connect with their user community in various ways since they are Web 2.0 application in full sense of the world; opened, interactive and collaborative with main advantage in comments users can give on librarians' posts. Reichardt and Harder [6] went even a step further and characterized blogs as "great project management tools because of their centralized online location and for the functions of sharing, gathering and commenting they offer". This ideas and approaches to problematic of blogs and their usage for scientific communication are very valuable but findings from other authors show that scientific community is still not ready for such a change. As Ware [7] points out, in 2009 there was between 1000 and 1500 scientific blogs and two commercial blog publishers. The most popular scientific blogs were those offering mixture of different approaches to science, combining news and personal views, and only few of them made a shift towards scholarly communication by publishing the results of their researches or discussion on already published articles. A research undertaken at the Faculty of Humanities and Social Sciences in Zagreb in 2011 has shown that majority of educators support new ways of scholarly communication [8]. The research has shown that 74% of examinees were familiar with the scientific blogs but only 37% among them visits and reads their colleagues' blogs and none of them declared themselves as an active user, leaving comments, contributing in discussion or having their own blogs. This correlates with Ware's findings [7] from 2009 since he claims that only 15% of scientists read scientific blogs and none of them leave a comment or personal remark. Brown and Czerniewicz [9] have undertaken a research among students in South Africa and found that 75% of them have never used blogs for educational purposes. This implies that blogs are yet to be accepted as educational resource, not only among professors but among students as well.

Another important Web 2.0 tool are social bookmarking systems which are better accepted and sometimes even designed only for scientific purposes. Ware [7] claims that there are at least three social bookmarking systems created with scientific use in mind; CiteUlike, Connotea and 2collab. His findings also point out on certain advantages that use of social bookmarking systems could have on scholarly community. According to Ware, one obvious use is to allow research group to share

literature discoveries with each other and to maintain a single shared bibliography. It would also be possible to use combined metadata of the user community to identify the articles related to particular article in the ways that were not necessarily obvious from the content or keywords. One other valuable contribution to this topic comes from Hammond and Brown [10] who have proven that 25% of URL's indexed within Delicious social bookmarking system were brand new and un-indexed by the traditional search engines such as Google. Faculty staff at the Faculty of Humanities and Social Sciences in Zagreb declared support to social bookmarking systems in 65% but still only 9% of them were actually using some of those systems, with Delicious as the most popular one (25%) and CiteUlike, as a system designed for scholars, with only 10% of users [8]. Brown and Czerniewicz's [9] findings from South Africa showed that 67% of students have never used social bookmarking system to share content with each other.

The worlds' most popular form of wiki is Wikipedia. Croatian scientists claimed that they use Wikipedia for scholarly information but they do not find it reliable information resource [8]. Encouragement for scientists and students who hesitate to use Wikipedia can be a research that proves that Wikipedia Reference Desk is as accurate as digital library reference desk service and it provides more complete answers than libraries do [11].

Open Access journals and repositories have become very important way of communicating in science during the last decade. Literature about usage of Open Access resources shows us that Open Access scientific literature is more visible, thus have greater impact, than traditionally published literature [12]. The reason for Open Access advantage is not only Open Access itself, but also early access, quality advantage, usage advantage, quality bias and competitive advantage [13]. Open Access advantage is proved in numerous studies that are analysed in an annotated bibliography [14]. There are 51 articles listed in the bibliography, 5 of them are review articles, 7 of them are studies showing either no Open Access citation advantage or ascribing the advantage to factors unrelated to Open Access. But all of the other 39 articles are studies that prove Open Access citation advantage. A research on Open Access in Croatia [15] shows that Croatian scientists use information found in Open Access journals and repositories. Minority is afraid of publishing in Open Access and that proves that they still do not know enough about the new way of communicating in science.

### III. SURVEY OF STUDENTS' BEHAVIOUR IN ELECTRONIC ENVIRONMENT

#### A. Aims, methodology and sample

The aim of our survey was to find out which information sources students use, how they use them and how important the sources are. We also wanted to find out if there are differences between the two groups of students – students of the Department of Information and Communication Sciences (DICS) and students of other departments of the faculty. Another aim of our survey was to set up some guidelines for faculty library that will help

planning future education of their users, especially students.

Following information sources were in the centre of our interest – faculty library catalogue, commercial databases, open access repositories, open access journals, scientific forums, scientific blogs, social networks, wikis, social bookmarking services and e-learning system. Faculty library catalogue was chosen because it is a traditional database that has always been a reliable information source maintained by educated professionals. High reputation of the faculty and its library guarantees high quality of the catalogue. Commercial databases are paid for by the faculty or by the Ministry of Science, Education and Sports. The list of commercial databases is available on the faculty library web site; it is updated and is accessible to all the students. The investors' selection of databases is based on scientists', teachers' and students' needs, and that guarantees quality of the selected sources. Open access movement has become a new way of scientific communication during the last decade. Open access journals and repositories are proven to have high level of quality control. E-learning system at the Faculty had, in January 2012, 866 courses (146 at the Department of Information and Communication Sciences, 101 at the Department of Croatian language...) and the number of courses grows constantly [16]. Resources are added by teachers and quality of available information is guaranteed by teachers' careers. Web 2.0 services (social network sites, social bookmarking services, blogs and wikis) are unavoidable information sources in students' searches for information. Although they are user-centred, they could be important information sources if used properly.

In December 2011 an online questionnaire was sent to all the students of the FHSS. The total number of responses was 195.

### B. Results

Among the respondents, 73 (37.4%) were future information specialists (i.e. students of the DICS). The rest of respondents (122, or 62.6%) were from 19 other departments (26 respondents, or 13.3%, were from the Department of Psychology; 15 respondents, or 7.7%, from the Department of English Language; 12 respondents, or 6.2%, from the Department of Croatian Language; 11 respondents, or 5.6%, from the Department of Sociology etc.). As they were more willing to answer the questionnaire, we can say that future information specialists are more interested in problem of searching for information in electronic information sources than their colleagues from other departments are.

In the first question students were asked how often they use some of the information sources. The answers are shown descending in Table 1, beginning with the most used information source. The first column shows the results for all the respondents, the second column shows the results for the DICS students and the third column shows the results for students of other departments. The most important information source for all the students without any doubt is library catalogue. Open access journals are also very important, as well as commercial databases and wikis. We can immediately see the difference between the two groups of students in using e-

learning system as an information source. It is more important to future information specialists (2<sup>nd</sup> place) than to other students (5<sup>th</sup> place). Social media, blogs and forums are not very important information source for students while preparing exams and writing essays.

TABLE 1. LIST OF STUDENTS' PRIORITIES WHEN CHOOSING INFORMATION SOURCES (FROM THE MOST TO THE LEAST IMPORTANT)

	Information source		
	<i>All students</i>	<i>DICS students</i>	<i>Other students</i>
1	Library catalogue	Library catalogue	Library catalogue
2	Open access journals	E-learning system	Open access journals
3	Wikis	Open access journals	Commercial databases
4	Commercial databases	Wikis	Wikis
5	E-learning system	Commercial databases	Open access repositories
6	Open access repositories	Open access repositories	E-learning system
7	Social networks	Social networks	Social networks
8	Social bookmarking services	Social bookmarking services	Social bookmarking services
9	Scientific blogs and forums	Scientific blogs and forums	Scientific blogs and forums

Nine variables were tested by chi-square test to show whether differences between DICS and other students are statistically significant (with  $p < 0.05$  considered statistically significant). The difference in using information sources is not significant for library catalogue and open access journals. That means that frequency of usage of all the other seven information sources depends on students' formal education (i. e. whether they are DICS students or not). In Table 2 statistically significant variables are written in bold letters.

TABLE 2. DIFFERENCES IN USING INFORMATION SOURCES BY THE DICS AND OTHER STUDENTS

	<b>DICS students (N=73)</b>	<b>Other students (N=122)</b>	<b>P (chi-square test)</b>
Library catalogue	97.3%	97.5%	0.904
Open access journals	95.9%	87.7%	0.056
<b>Wikis</b>	<b>95.9%</b>	<b>82%</b>	<b>0.005</b>
<b>Commercial databases</b>	<b>95.9%</b>	<b>77.8%</b>	<b>0.005</b>
<b>E-learning system</b>	<b>93.2%</b>	<b>58.2%</b>	<b>0.000</b>
<b>Open access repositories</b>	<b>86.3%</b>	<b>52.5%</b>	<b>0.000</b>
<b>Social networks</b>	<b>54.8%</b>	<b>31.1%</b>	<b>0.001</b>
<b>Social bookmarking services</b>	<b>42.5%</b>	<b>22.1%</b>	<b>0.003</b>
<b>Scientific blogs and forums</b>	<b>56.2%</b>	<b>31.1%</b>	<b>0.001</b>

Asked about searching library catalogue, 185 respondents (94.9%) search the catalogue by themselves,

5 (2.6%) need librarians' help and 5 of them (2.6%) do not use library catalogue at all. The results are almost the same for the two groups – 94.5% of the DICS students and 95.1% of other students use the catalogue without librarians' or other help (Figure 1).

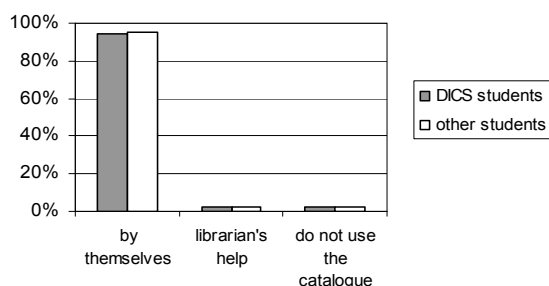


FIGURE 1. HOW DO STUDENTS USE FACULTY LIBRARY CATALOGUE?

The next question was – How did you learn to retrieve information in commercial databases? 20 respondents (3 of them DICS students) still do not know how to find information in commercial databases. Only 2 respondents asked librarians to help them. 48 respondents learn about commercial databases during their formal education – the percentage is higher for DICS students (47.9%) and not so high for other students (10.7%). The results are shown in Figure 2.

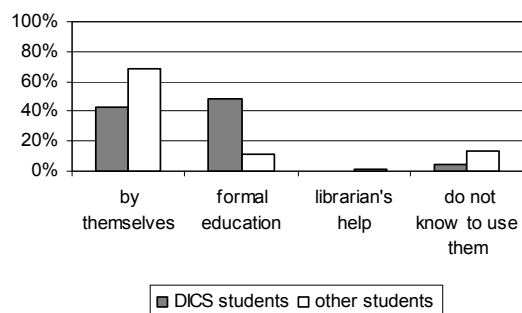


FIGURE 2. HOW DID STUDENTS LEARN TO USE COMMERCIAL DATABASES?

Asked about Open Access repositories, 51 DICS students (69.9%) and 28 (23%) other students learn about open access repositories as a part of their study programme. 68 students (34.9%) - 10 DICS students and 58 other students - have never heard of Open Access repositories (Figure 3). Another way, or golden route, to attain Open Access is through Open Access journals. 18 students (9.2%) do not use Open Access journals (3 DICS students and 15 others). 174 students (89.2%) support Open Access as a new way of scientific communication (93.2% of SICS students and 86.9% of other students). 35 students (17.9%) would not deposit their work in an Open Access repository. 17 students (2 DICS students and 15 others) never use Open Access journals.

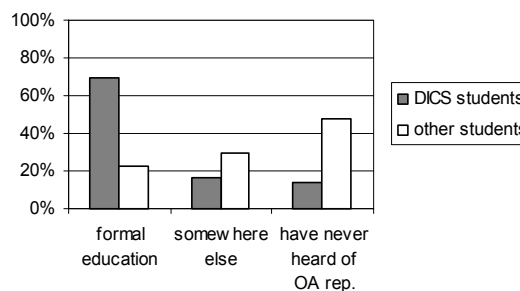


FIGURE 3. WHERE HAVE STUDENTS LEARNT ABOUT OPEN ACCESS REPOSITORIES?

Social bookmarking services are used by 31 DICS students (42.5%) and by only 5 students (4.1%) of other departments. The most commonly used social bookmarking service is Delicious.

Wikipedia and other wiki services are used by 185 students (94.9%) – only one student uses wikis as the most important source for his/hers research. Other students use wikis as a starting point for their research. 24 DICS students (32.9%) and 9 other students (7.4%) have edited at least one article in Wikipedia or other similar source.

E-learning system is especially popular among DICS students (that is the department with the most e-courses). Only 5 DICS students (6.8%) do not use e-learning system as an information source and 51 students of other departments (41.8%) do not use the system.

### C. Discussion

Results show that there are differences in using electronic information sources between the DICS students and students of other departments. The most popular information source for all the students is faculty library catalogue. The fact can be valuable for the library – librarians should continue to maintain their catalogue in the same way, it is well organized with a user-friendly interface. Open Access journals are also very popular among all students. They are promoted on library's web site as well as through formal education. The importance of Open Access repositories is recognized by majority of DICS students but by less than half of the other students. It is important to note that the number of Croatian Open Access journals is high (the number of scientific journals on Hrčak, portal of Croatian scientific journals [17], in January 2012 is 274). At the same time, number of Croatian Open Access repositories is extremely low (3), especially for social sciences and humanities (1) [18]. Of course, students can use international Open Access journals and repositories, but they have to be encouraged by their teachers and librarians. E-learning system as an information source is much more important to DICS students than to others. The system offers numerous possibilities for enhancement of e-learning and it becomes more popular every day.

Although promoted on faculty library web site, commercial databases are not popular enough between non-DICS students. They do not have appropriate training in retrieving techniques and that is the reason why they do not know how to use the databases. Both library and

teachers should be aware of the fact; they should educate students to make the best use of the acquired commercial databases. Another problem in using commercial databases is the fact that sometimes desired article cannot be accessed due to the access restrictions.

Wikis are the most popular Web 2.0 services among students when they search for information important for their education. Wikipedia is often used but students usually use it as a starting point for their research and they rarely cite its articles. Other Web 2.0 services, such as social networking sites, social bookmarking services and blogs are less popular for educational purposes.

#### IV. CONCLUSION

Using electronic information sources is part of students' everyday life. They often use them when preparing exams or writing their essays. Results indicate that information sources and the ways of retrieving information should be part of curriculum. Future information specialists (i.e. DICS students) have more opportunities to learn about information in electronic environment as a part of their formal education. Other students should have the same opportunity.

It is important to increase awareness about the importance of information literacy among educators and learners. Information literacy curriculum should be developed for all, not just DICS students, in collaboration with faculty library and other departments' professors and according to their fields of expertise and course curricula.

In order to develop trust towards digital resources, many preconditions are to be fulfilled. Libraries can help by promoting current services as well as by knowing the needs of its users and developing new services according to those needs. Nevertheless, there are many valuable, existing services, such as education for database retrieval, which could be enhanced to meet users' needs and, in this special case, may be combined with education for appropriate use of Web 2.0 tools and applications. Library should combine traditional services with more popular ones to help the users to achieve "ideal" information seeking behaviour; to combine traditional search through databases and search engines with searching and browsing within social software. It is of great importance to let Web 2.0 appear as a part of formal higher education courses curricula.

New students and new paradigms call for new learning objects and new learning environments. Even though e-learning and distance learning systems are highly accepted under the scope of higher education, there are others, user-friendlier tools hidden under the umbrella term „social web“ which students can find more attractive to use.

It would be wrong to claim that users are incapable of finding information by themselves as it would be wrong to claim users are completely independent in forming their information queries. Accepting the fact that we have moved from system-centred to user-centred information environment would make a good start. Developing courses curricula and library activities according to that

would mean a great step forward, a step everyone involved in education process have to take together, as an interdisciplinary activity.

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