The use and the attitude of scientists from the Rudjer Boskovic Institute about electronic journals - a user study

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Summary

The number of journals available in an electronic form is growing daily. In the past main role of libraries was ownership and storage but today this is replaced with accessibility and availibility of documents. Regarding this new library service, it is extremely important to have the feedback from the end users. During **December 2001 and January 2002** a user study was carried out to find out to what extent scientists at the Rudjer Boskovic Institute are accepting electronic journals. The results of this survey showed high acceptance of electronic journals at the Rudjer Boskovic Institute.

Key words: electronic journals, user study, questionnaire, survey

1. INTRODUCTION

User studies about electronic journals usage have a purpose to determine the attitude of users towards electronic journals, the degree of their acceptance and users' habits Librarians are interested what users consider as advantages and/or

disadvantages of electronic journals, to what extent they accept and use them, how do they use them, would they eventually be willing to give up print version.
These studies serve as an useful indicator at the creation of library's aquisition policy, as well as in education of users.
In the last few years the world experienced a large expansion of electronic journals therefore the Rudjer Boskovic Institute Library (further in the text RBI Library) is making an effort to adapt to modern trends and provide its users with access to a greater number of electronic journals.
We think that this user study will show current level of use and that it might encourage use of electronic journals.

1.1. Electronic journal

The first electronic journals appeared during 1970s. They were not available to a larger number of users; this is one of the reasons why they were not widespread. (Tenopir, C., 2000). With the appearance of Internet and PC computers the number of electronic journals rapidly grows. Until 1995 this number is rather low, but then it starts to rise (Hitchcock, S. et al, 1996). Today, most of the electronic journals appear as parallel version of its print counterparts. All the major publishers publish electronic journals and offer them as special services or databases (e.g. ScienceDirect (Elsevier), SpringerLINK (Springer). There is no unique definition for electronic journals. According to one of definitions "e-journals are serial publications available in digital format (Harrassowitz, 2002). Rich and Rabine define the electronic journal as a "periodical literature that is made available as an individual title via an electronic medium, typically the World Wide Web" (Rich, L.A.; Rabine, J. L., 2001). Electronic journals could be accessed through gopher, ftp, telnet, e-mail or discussion lists, but today they are mainly accessed through web. According to the latter definition, we consider "electronic journal" as a publication accessible exclusively on the web (regardless if it is electronic journal only or an electronic equivalent of the print version).

2. RELATED STUDIES

Appearance of electronic journals changes the role of publishers and libraries, as well as it changes information seeking behaviour. The first studies of users, librarians, publishers and authors come in to improve their offer of electronic journals, to justify the libraries' investments and to define the users' needs. These studies mostly explore several aspects:

1. library and librarians
2. authors
3. users.

Even though we are primarily interested into user studies we will take a look at the first two equally important aspects.

2.1. Library, librarian and author studies

Electronic journals today are becoming a part of the library collection, therefore different studies have been used to find out what are the reasons to subscribe to electronic journals. In the beginning of 1994 **Systems and Procedures Exchange Center (SPEC)**, a part of the Association of Research Libraries (ARL), conducted research among the members of the association about electronic journals. They wanted to determine to what extent American academic libraries accept electronic journals, why do they subscribe or do not subscribe to them. The most important reasons for electronic journals acceptance are: possibility of remote access, possibility of simultaneous use, the fact that the use does not depend on the library working hours. These are followed by great searching capabilities and links to other documents. As reasons for non-acceptance it was pointed out that the request of special equipment for a starting implementation creates a need for a large financial support of the library and requires promotion and training of library staff and users. Further more, librarians were concerned with copyrights (at the time they still had not been precisely defined with electronic journals). They pointed out a problem of archiving electronic journals and a problem of complex licensing agreements that is an important factor in acquisition of journals. At the time of this research, electronic journals were making a very small part of library collection but academic libraries showed a great enthusiasm for them (Chu, H., 2000).
In 1997 the **Department of Information Science of the University of Loughborough** carried out a research about tendency of British authors to publish their papers in electronic journals (McKnight, C.; Price, S., 1999). By the term of electronic journal were considered journals published exclusively in the electronic form. By that time only a 16% of authors had published their paper in an electronic journal. These are the top frequent reasons why papers were not published electronically: there are still no electronic journals within certain scientific fields and papers published electronically are not equally evaluated as print ones at obtaining the academic grade. On the other hand there are clear advantages: fast dissemination of results, shorter period of time required for publishing the paper (this period is fairly long with printed papers). At last, authors expressed their concern regarding the permanence of electronic journals due to often changes in the information technology.

2.2. User studies

The user and usage studies appear in literature in late 1990s when the larger number of electronic journals has become widely available (Diedrichs, C. P., 2001). These studies were mostly carried out among the academic staff of institutes and colleges who are the most frequent users of scholarly journals. According to the respondents' scientific field the most numerous among them are natural scientists. Studies that included respondents from social sciences and humanities showed that latter respondents use electronic journal to a smaller degree, which is partly caused by a lack of electronic journals in these fields (Rusch-Feja, D.; Siebeky, U., 1999).
In the usage studies different methods are used. One of them, mostly used by

publishers and libraries is the log file analysis. Some of the disadvantages of this method are the inability to include all the searches; journals can be found on different servers while the access is counted only on one of them; searches are saved in computer cache memory for several days and that kind of access is not measurable. Another problem is that it is not always clear what is being counted: the number of searches or the number of the full text downloads (Bauer, K., 2000). Survey (poll, questionnaire) is another method along with less represented methods as interview and focus groups (Sercar, T. et. al. 2001).

In 1995, The **University of Tilburg** introduced electronic journals in the library collection and started monitoring this service using the log file analysis. This study revealed a lack of information about the use of electronic journals and a lack of information about the use of print journals as well. Therefore in 1996, using diverse methods1, a research has been held about journals usage in general. The study showed that most of the respondents use journals daily and that print and electronic journals are used equally. Most of the requests are covered by a small core of journals while majority remains unused2. There are several reasons why researchers do not use electronic journals: technical problems when printing articles, a preference for actually handling the print journal, the lack of sufficient titles on their own research subject and the incompetence on the part of the researcher. Generally taken, researches do not have a negative attitude about electronic journals and they are aware of their advantages (The use of paper and electronic journals by researches, 1999).

During 1998 the consortium of **Ohio's college and university libraries and the State library of Ohio** (so-called OhioLINK3) carried out a two year research on accessing electronic journals using the log file analysis (Diedrichs, C. P., 2001). OhioLINK Electronic Journal Center stored locally on its server wide range of journals subscribed from different publishers. That way its users had a uniform interface and access itself became easier to analyze. A special attention was paid to use of titles that the library did not hold in print. It was revealed that 77% of downloads are from journals not held in print by libraries. It was concluded that users benefit from the offer and that print subscription not necessarily correspond to users' needs. Since the degree of utilization turned out to be high the decision to subscribe to electronic journals was correct. A lot of librarians use log file analysis as an indicator of the exploiting of offered electronic journals but further in the text we will focus on researches made through questionnaire since our decision was to follow that method.

During 1996 and 1997 a research was carried out among the **Great Britain academic staff** and it covered five faculties. The purpose was to determine a possible difference in use of electronic journals among academics belonging to different scientific fields, different academic status and different age groups. The results showed that 72% of respondents does not use electronic journals at all. According to the scientific field, researchers from Business, Science and Engineering use electronic journals more frequently than researchers from social science but one

of the reasons is certainly the fact that at the time of the research social sciences were not well represented. According to the age, electronic journals are used by 56% of respondents under the age of 40 and only 14% of those over 40. The use fairly varies according to the academic status: only 12% of professors use electronic journals.
Most of the respondents prefer to read the print copy instead of reading directly from the screen (57%). As the biggest advantage they point out the accessibility and possibility to read the article from their own desktop. At the same time the biggest disadvantage is considered to be the impression that the electronic publication is not a *real* one and that it would be easy to change its contents - which is actually a concern for the copyright.
Regarding the subscription to electronic version only the study revealed that respondents are still not prepared to give up the print version. As one of the reasons why they do not use electronic journals, respondents mention a lack of time to learn how to use them. They do not reject the new medium completely; as much as 80% of them responded that they could start using electronic journals in future. Indeed, most of them consider the development of the electronic publishing inevitable, it is only a question of how fast it will happen (Tomney, H.; Burton, P. F., 1998).

During 1996 within the **Café Jus**4 project (Woodward, H. et al, 1998) a survey was taken among the postgraduate students and the academic staff of the Loughborough University. Before the main research, a pilot research conducted on a smaller sample showed that the majority of respondents (60%) think that there are not enough relevant electronic journals. In the main research only 20% of respondents kept that opinion because in the meantime commercial publishers offered a larger quantity of journals available in electronic form.

The respondents listed several disadvantages: problems in accessing the material, slow download, necessity of foreknowledge (incompetence on the part of the user), required additional software (e.g. Acrobat Reader), inability to access back issues. However, excellent searching capabilities and availability at any time were listed as great advantages. Further more the research showed that users dislike reading the text from the screen, while 59% of respondents consider the print journal easier to handle. Also, the survey stressed the necessity of users education, finding out that diverse interfaces and seeking methods often create confusion.

Within the **Super Journal project** the study covered academic staff from thirteen universities in Great Britain. A research on use of electronic journals as well as print one was carried out during a two-year period (1997-1999). The respondents sorted out several advantages of electronic journals: easy to access, access from their own desktop, simultaneous use. As disadvantages, they pointed out scarce representation of certain scientific fields, insufficient number of available back issues and slow download. On the other side, disadvantages of print journals are that user has to pay the visit to the library, look for the journal and very often find out that journal has been already in use, lost or misfiled. Generally, respondents see electronic journals

as a new library service, as well as supplement to the print journals, not a replacement for it. (Baldwin, C.; Pullinger, D., 2000).

The research carried out among users of **Princeton University** (Holmquist, J. E., 1997) showed that 56% of respondents do not use electronic journals. The main reason given for not using electronic journals was that users prefer to read articles printed on paper. The second reason is the lack of time to study and learn about electronic journals.

The results of the survey carried out on **ETH in Zürich** during 1998 are curious because 52% of respondents were willing to renounce printed versions when the access to the electronic one is provided. A comparison to the research conducted in 1996 showed the decreased number of those who do not use electronic journals (from 59% down to 25%) (Keller, A.; Neubauer, W., 1999).

According to the type of the institute and the research sample, the **Max Planck Institute** is the closest to our sample in RBI, therefore we single out their survey. The results of this survey showed a significantly high acceptance of electronic journals and an unwillingness to return to print versions only. At the same time it displayed that scientist feel a lack of confidence for the new medium. They pointed out the lack of long term access and lack of electronic journal archives that would assure the access to these journals in the future. Nevertheless, the greatest advantage of electronic journals is the direct accessibility from the researcher's desktop (78%) and their prompt availability.(Rusch-Feja, D.; Siebeky, U., 1999).

In the survey carried out in the year 2000, the **Library and Learning Centre, University of Bath**, the respondents point out the importance of an existing electronic journal archive in the case the subscription is cancelled (53%). 19% of respondents absolutely do not want to cancel the print subscription. The other way round, more than a half of respondents (56%) want the library to provide even more electronic journals. (Electronic journals survey, 2000)

The librarians Clajus and Maier from the **University and State Library in Köln** carried out survey among the academic staff and found out that 16% of respondents do not want to renounce the print version of the journal under no circumstances. As the biggest advantages of the new service they pointed out the possibility of full-text access from their own desktop (49%), and the fact that the electronic journal is available before the print one. Besides the full text access, other facilities like the table of contents and the summary are also often consulted. As well as the researches of the University of Bath and the one of the Max Planck Institute this one also reveals that the respondents insist on the importance of electronic journal archives (Clajus, G.; Maier, C., 2001).

3. THE PURPOSE AND THE METHODOLOGY OF THE RESEARCH

By taking on this research, we wanted to find out to what extent the scientists at the RBI use and accept electronic journals and how much do they benefit from offered electronic journal sources. Further, what do they consider as advantages and disadvantages of electronic journals. Finally, we wanted to know what titles do they use and to which ones they would like to have access.
Using the questionnaire we carried out a user study on a sample of N=4785 scientists - employees of the Institute. The survey was anonymous and it has been taking place from **December 7th 2001 till February 8th 2002**.
Although the sample is quite homogeneous (it was sorted out from the scientists of related natural sciences), we supposed that nevertheless there are differences in use of electronic journals.

We posed following hypothesis:

1. Scientists use electronic journals but not to a sufficient degree. We supposed there would be about 40% of scientists who use electronic journals.
2. There is a difference in use regarding the academic status of the respondents which is closely connected to the age - scientists of the age up to 40 use electronic journals more than their older colleagues.
3. There is a difference in use regarding the field that scientists belong to - physicists set an example in using of electronic journals according to their tendency to publish in the preprint archives (Valauskas, E. J., 2001; Melinscak - Zlodi, I., 2002).

While creating a concept of the questionnaire we chose a multiple-choice (Fixed-alternative) 6 test type questionnaire for two reasons: respondents consider it easier and they answer to more questions, also, for us the answers are easier to analyze (Zelenika, R., 2000; Pavlinic, S.; Horvat, J., 1997).

We used open-ended questions in case we wanted respondents to express their opinions in their own words.
Along with the questionnaire we prepared a short introduction to motivate the users to fill it out, in order to use those answers as an indicator of further development and enhancement of the library services.

We tried to keep the questionnaire as short as possible, questions and offered answers clear and unambiguous. The first section contains questions about the respondent (questions 1 - 5: organizational unity, status, scientific field, sex and age). The second section (questions 6 - 20) contains questions about use of electronic journals and available electronic journal sources.
At most of the questions it was possible to give only one answer and only at 3 out of 20, the respondents could give several answers (questions 7, 14, 16). 17 questions were mandatory and 3 were optional (questions 9, 10 and 20). 7

Since all the departments at the Institute are networked for several years now, we did not explore the technical conditions required for use of electronic journals, or the computer skills. Also, users have at their disposal a number of computers in the library.

Before the actual survey we tested the questionnaire on a pilot sample. At two separate occasions e-mail notifications were sent to the scientists, also we tried to draw their attention with printed notices.

In the first phase of the research we put the questionnaire on the library web site and the questionnaire was accessible only from the RBI domain so the data were collected directly into the database[8]. This has made it easier to collect and process the data and it minimized the number of invalid questionnaires (respondents were not allowed to leave out questions or select few answers where only one was required).

The data collected were processed in SPSS software[9].

We supposed that the scientists not skilled in Internet use probably do not use electronic journals and would not fill out the online questionnaire. Fearing to miss their answers we gave out 350 print questionnaires in the second phase of the survey.

While the research was taking place users had on their disposal 92 full-text electronic journals accessible through the electronic journal list (http://knjiznica.irb.hr/pretplata/) and through the "Elektronische Zeitschriftenbibliothek" electronic journal database (EZB) (http://knjiznica.irb.hr/ezb/).

In 2001 the number of full-text electronic journals available to the Institute employees varied: on several occasions they could access electronic journals on the free-trial basis benefiting from services of ScienceDirect, Biomednet, PhysicsDirect, Engineering Village etc. At the beginning of 2002 the Ministry of Science and Technology subscribed to the electronic versions of journals published by major publishers "Elsevier" and "Springer"[10] in favor of the Croatian Academic Community (In Croatia academic libraries do not have their own budget, journals subscription is financed by Ministry of Science and Technology)
To inform the RBI scientists about new services we held a seminar on use of electronic journals. At the time, the number of journals available to the Institute employees increased to 1690, which is a lot more than at the time when the survey was carried out. After the seminar we asked the participants about the level of success of the seminar and the necessity of organizing similar ones[11] using the somewhat changed questionnaire containing three additional questions.
The question number 15 - What do you consider the main advantage of electronic journals? - supposed to have a single answer. Because many respondents selected several answers a lot of the questionnaires would have been invalid. We decided to

evaluate them as valid ones because the answers indicated the equal importance of all offered advantages and the problem of singling out only one of them - something that respondents additionally pointed out in their comments.

We included the five invalid slips in the analysis of the three additional questions:

1. Have you already had a chance to fill out the questionnaire about electronic journals brought by the Library during December of 2001 and January of 2002?
2. Has this seminar improved your knowledge on use of electronic journals?
3. Do you think that the Library should organize a presentation of its services from time to time?

The second survey was carried out on a very small sample therefore we did not analyze correlation of variables to avoid getting irrelevant information.

4. THE RESULTS OF THE RESEARCH

4.1. The results of the first survey

4.1.1. Description of frequencies

Out of the total of **478 resident scientist** at RBI, 155 respondents filled out the questionnaire: among those 150 were valid (31%) and 5 were invalid.

At the question number 6, respondents who do not use electronic journals at all, did not answer further questions so in the end we processed answers from 133 questionnaires.
The distribution of scientists and respondents at the RBI according to their academic status reveals that within the total of scientists at the Institute, the largest category is the one of junior researchers (assistents). For this reason it is not surprising that they form the largest category of respondents (35%) (table 1).

Table 1 - Distribution of scientists and respondents at the RBI according to their academic status

Academic Status	Total of scientists at the Institute	Number of respondents	The ratio of the respondents vs. the total in the respective status
research adviser	84 (18%)	25 (17%)	30%
senior research associate	68 (14%)	28 (19%)	41%
research associate	73(15%)	19 (13%)	26%
researcher	86 (18%)	24 (16%)	28%
junior researchers (assistents)	167(35%)	54 (35%)	32%

total	**478 (100%)**	**150 (100%)**	

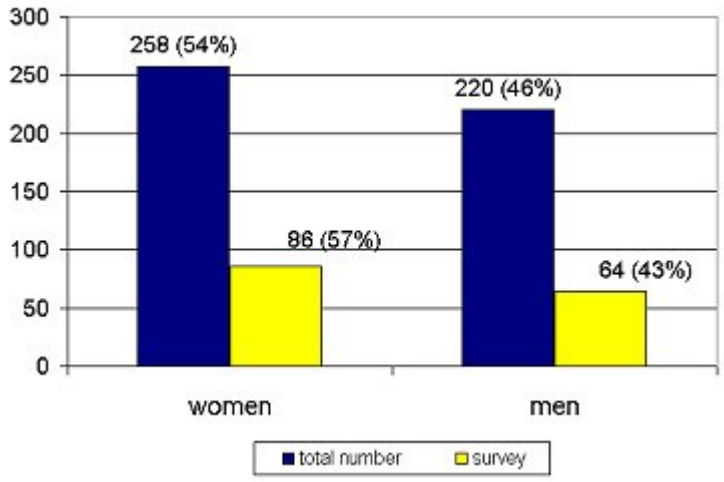
The distribution of scientists according to their scientific field (table 2) indicates that chemists are the most numerous; they are the most numerous in the total of the respondents as well. There are an equal number of physicists and biologists and there are only three respondents belonging to the category *other* that covers electronic engineering, mathematics and computer science. If we compare the number of respondents in relation to a total within the respective research field, the most represented are the scientists from the biomedical sciences (46%).

Table 2: Distribution of scientists and respondents at the RBI according to their scientific field:

Scientific field	Total of scientists at the Institute	Number of respondents	The ratio of the respondents vs. the total in the respective scientific field
Biology	69 (14%)	26 (17%)	38%
Biomedicine	48 (10%)	22 (15%)	46%
Physics	105 (22%)	26 (17%)	25%
Earth Sciences	71 (15%)	9 (6%),	13%
Chemistry	166 (35%)	64 (43%)	39%
other	19 (4%)	3 (2%)	16%
total	**478 (100%)**	**150 (100%)**	

Representation of respondents according to their sex is well balanced; female scientists are slightly more numerous which corresponds to the ratio within the total of scientists (figure 1).

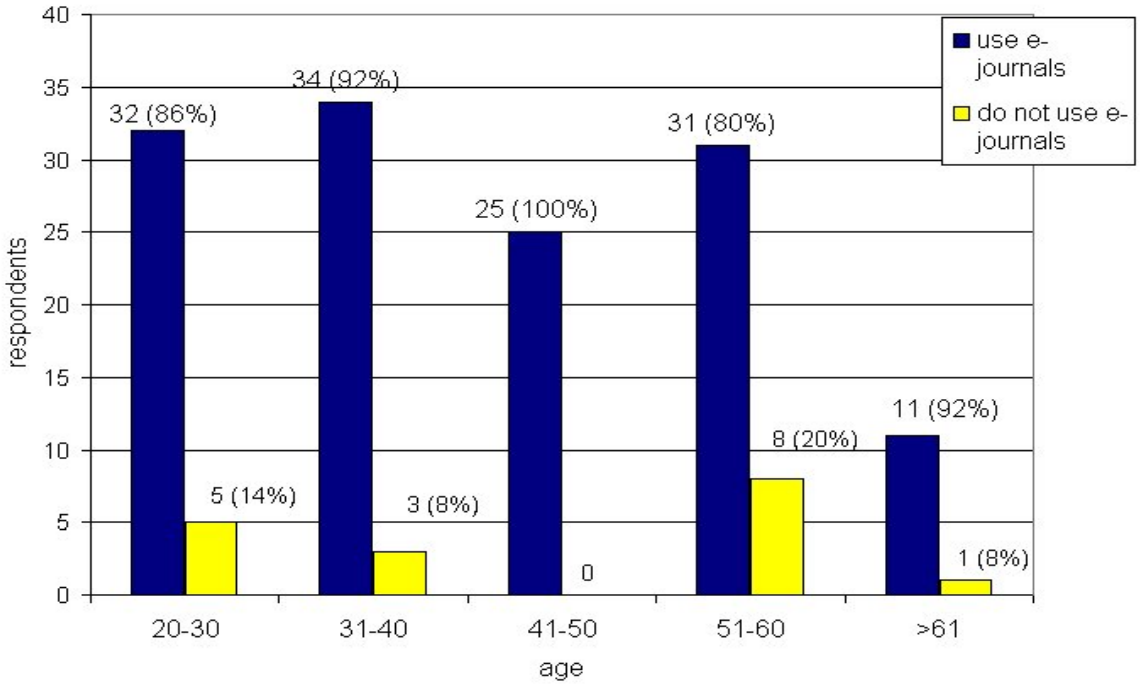
Figure 1- The number of scientists and respondents according to sex



In terms of age, the most represented group of scientists is the one aged 51 to 60, which is at the same time the largest group of respondents. The following ones are groups of scientists aged 31 to 40 and 20 to 30, and they are equally numerous. In the total of scientists and the total of respondents, the smallest group is the one of the scientists aged over 61.

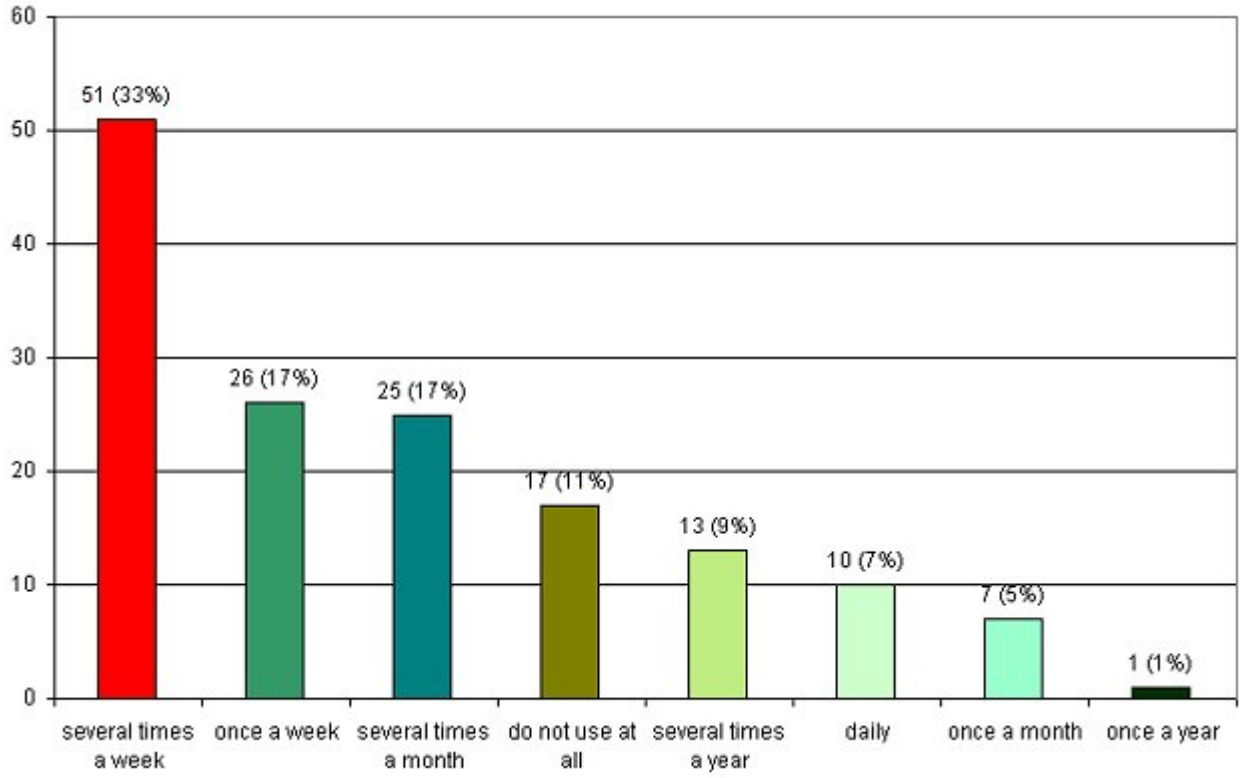
Comparing the number of scientists according to different categories (academic status, scientific field, age and sex) with the total number of scientists at the RBI we conclude that the relations in numbers are fairly balanced and that our sample is representative and corresponds to the real state of matters at the RBI.

Figure 2 - The number of scientists and respondents according to their age



At the question "how often do you use electronic journals" we received following answers: the journals are used *daily* by 10 respondents (7%), *several times a week* by 51 respondents (33%), *once a week* by 26 respondents (17%), *several times a month* by 25 respondents (17%), *once a month* by 7 respondents (5%), *several times a year* by 13 respondents (9%) and *once a year* by 1 respondent (1%). So, 133 respondents (89%) use electronic journals to some extent and only 17 of them (11%) do not use them at all. The most numerous are those who use them several times a week.

Figure 3 - How often do scientists use electronic journals



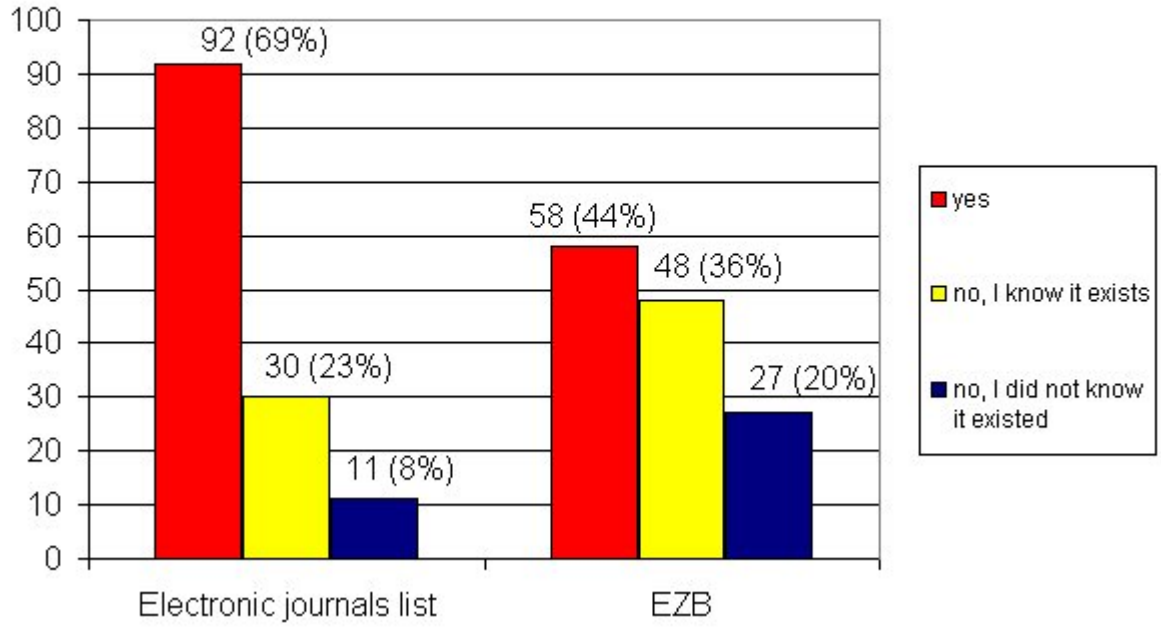
The respondents who do not use electronic journals at all had the opportunity to list in their own words the reasons for not using them. The most often reason is that scientists still have not developed the habit of using electronic journals because they are used to traditional print versions. Also, the journals they are interested in are not available electronically or the electronic version requires additional payment: "The journals that I find interesting are either unavailable or they are not free of charge". Some users express willingness to start using them: "I have not paid enough attention to it, although I would like to use them".

At the question considering the place respondents use to access electronic journals, it was possible to select more than one answer[12].
Most of the respondents, 132 of them, as we expected, use the computer at work, followed by 21 respondents who use the computer at home. The computers in the library are rarely used, 6 respondents use the computer in their own library, and 5 in other libraries.

We were interested whether the respondents use earlier mentioned sources of electronic journals (electronic journal list and EZB database), and whether they are aware of the existence of these sources.
At the question whether they use the list of electronic journals, 92 respondents (69%) confirmed, 30 respondents (23%) replied they did not use it although they knew it existed and 11 respondents (8%) answered they did not use it not being aware it existed.

Same questions were made about the EZB database: 58 respondents (44%) use it, 48 respondents (36%) do not use it although they know about it and 27 respondents (20%) do not know it exists and therefore do not use it.

Figure 4 - The use of electronic journal list and EZB database



Evidently, a large number of respondents use the electronic journal list while a lot of respondents did not know the EZB database even existed. So, we realized that additional information should be provided.

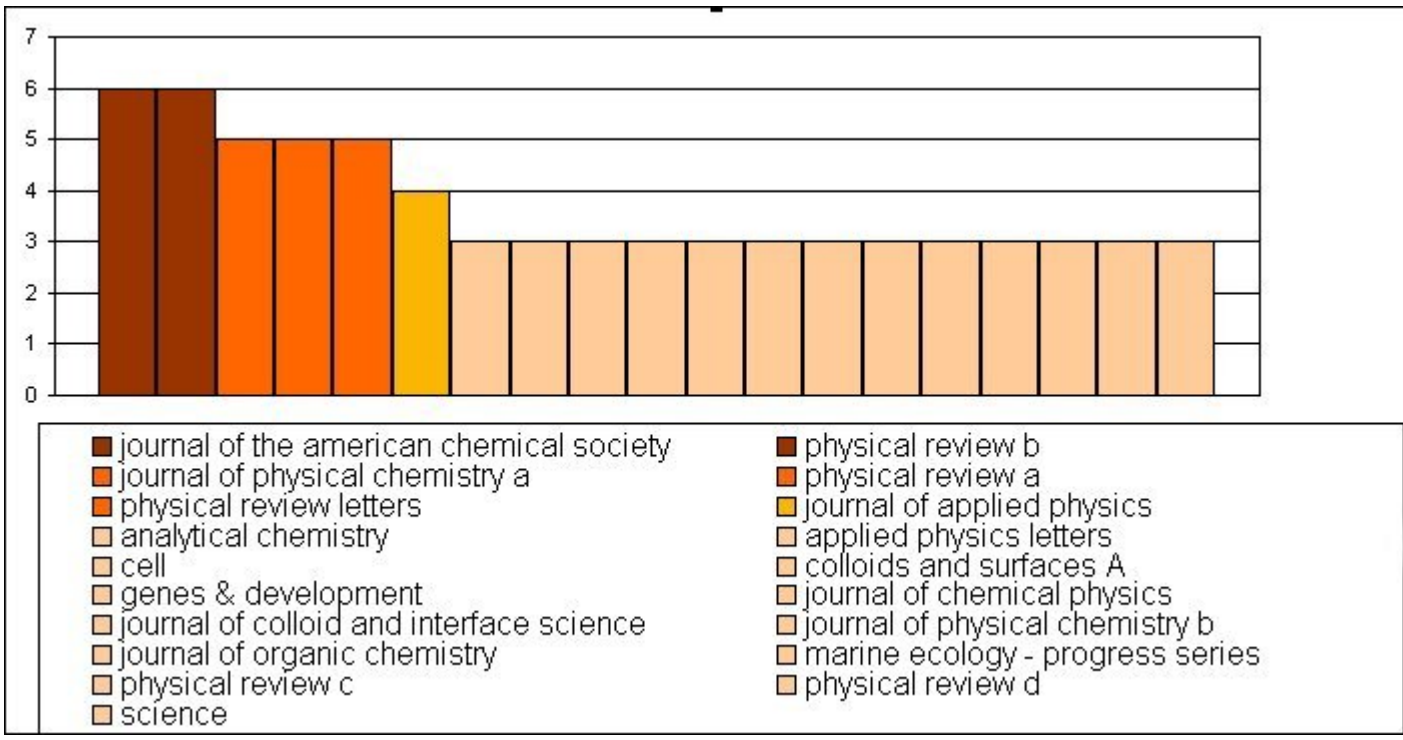
Another question was about the use of electronic journals that do not allow full-text access but only a browse through table of contents and summaries. 109 respondents (82%) answered affirmatively. This information indicates the importance of bibliographic information of the journal alongside with the importance of summaries which help scientists decide whether a particular article is important for their own research.

The number of electronic journals available to the employees of the Institute often increase with the opportunity to access diverse free-trial journals. As our library keeps users regularly informed about it, we wanted to define whether our users know about these possibilities and whether they used them. 79 respondents (59%) did use them, but 54 respondents (41%) - quite a fair number - did not benefit from this opportunity. Among the free trials library had access to, 52 respondents used ScienceDirect, 35 of them used BiomedNet and 9 respondents used PhysicsDirect[13]. The Engineering Village service that covers journals from the electrical engeeniring

was not used at all and the probable reason is that scientific fields covered by the database are not widely represented at the RBI. The respondents could list other electronic journal free-trials they used and these are: the journals accessible through ChemWeb, the journal published by the Institute of Physics and Nature.

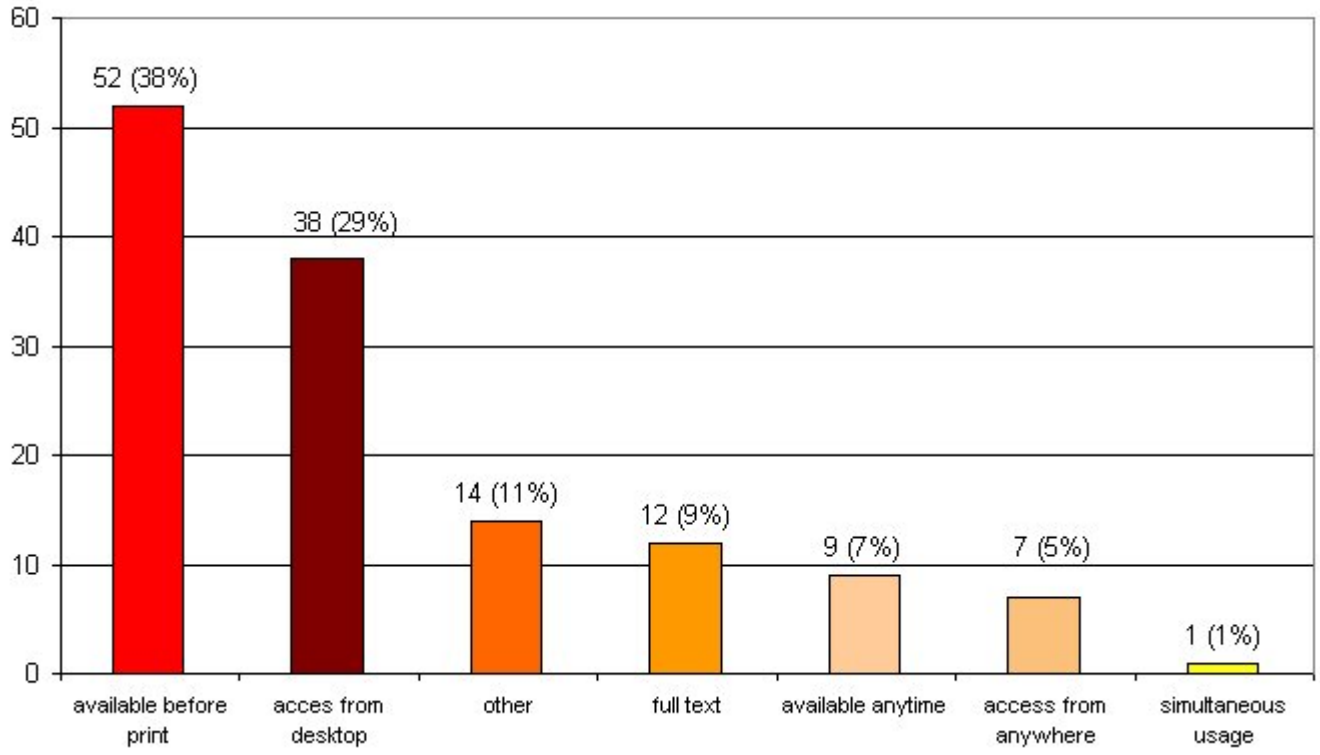
The respondents listed 230 titles they use and another 240 they would like to have access. We sorted out those that were listed by at least three respondents.

Figure 5 -Journals that users would like to use in electronic form



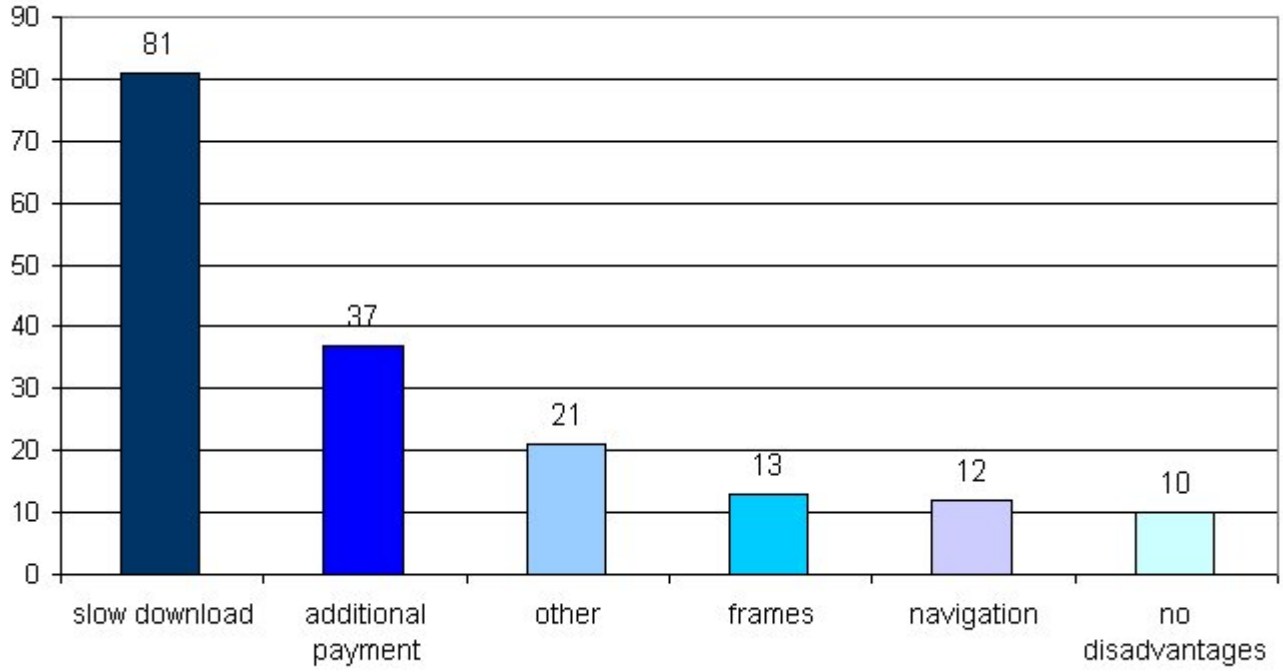
As the greatest advantage of electronic journals 52 respondents (38%) pointed out its availability before the print version, 38 respondents (29%) pointed out the accessibility from desktop. Only 12 respondents (9%) chose access to full-text, 9 respondents (7%) timeless availability, independence of the library working hours, 7 respondents (5%) mentioned the possibility of searching from different locations. The possibility to use the journal simultaneously by multiple users was chosen by only one respondent (1%). 14 respondents (11%) listed some other advantages: "some journals available electronically are not held by library", "I can print out instead of copying, if I get rid of the paper there is always a file, it is impossible that particular issue misses". Some of the respondents stated that all mentioned is equally important[14].

Figure 6 - The advantages of electronic journals



At the question about disadvantages of electronic journals it was possible to choose more than one answer and/or to add something else. 81 respondents chose slow download as the biggest disadvantage, 13 chose frames, 12 chose difficulties in navigation, 37 chose additional payment, 11 respondents stated some other disadvantage: low quality of printed pictures, problems in printing articles, "there are no advertisements and notices about conferences that can be found in the print journal", dependence on the computer equipment and the network, "necessity to have computer and access to the network", slow connection: " occasional difficulty in accessing the web ", as well as "storing for a longer period of time is uncertain". Only 10 respondents think that there are no disadvantages at all.

Figure 7 - Disadvantages of electronic journals

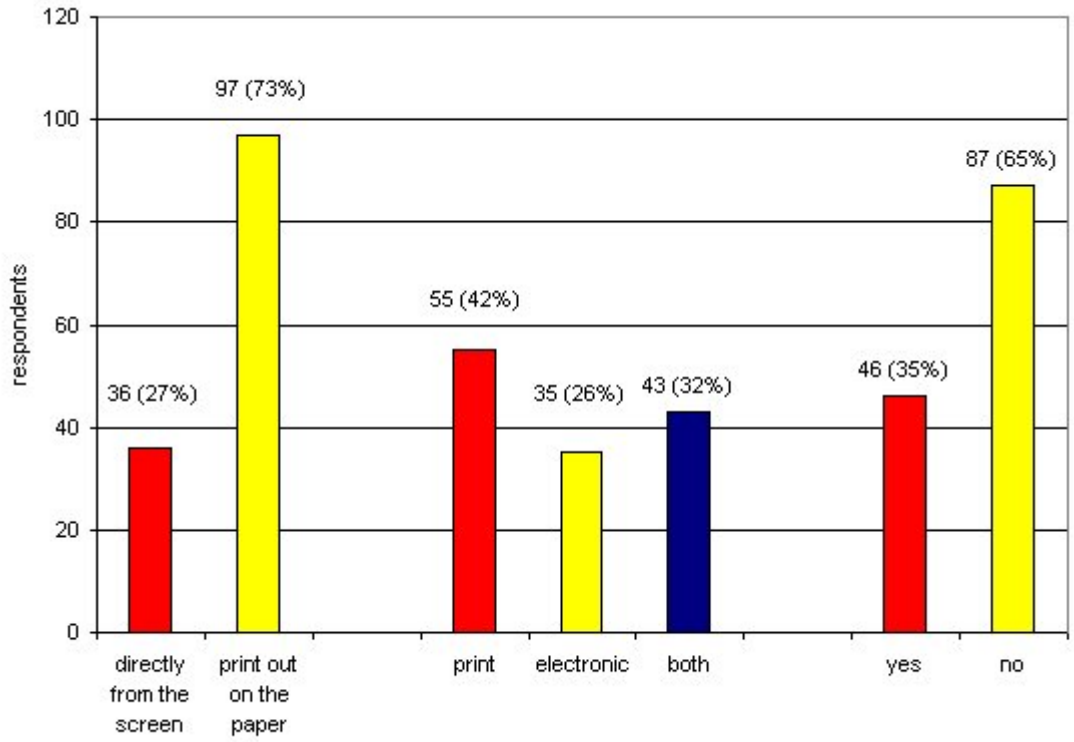


As expected, the results showed that according to the way of reading electronic journals, respondents prefer printing them out (97 respondents (73%)) instead of reading them directly from screen (36 respondents (27%). One respondent pointed it out as a disadvantage: "It is difficult to read articles from the screen". (Figure 8)

Regarding users' attachment to paper and the habit of use print journals the results showed that when both versions of the journal are available 55 respondents (42%) prefer to use the print one, 35 respondents (26%) prefer the electronic and 43 respondents (32%) have no preferences. (Figure 8)

In accordance with the previous, the following result shows that most of the respondents (87 of them (65%)) considers that electronic journals will not completely replace the print ones, although a considerable number of respondents (46 (35%)) think that it will happen. (Figure 8)

Figure 8 - Answers to the questions:
When using the electronic version of the journal do you read the full-text articles...?
When both versions of the journal are available what do you prefer?
Do you think that electronic journals will completely replace the print ones?



4.1.2. Correlation of variables

In regard to our hypothesis we carried out correlation of respective variables. (Chi-square test)

In cases where we offered multiple answers to questions we obtained great dispersion of results so we merged answers together.

At the question number 6: "How often do you use electronic journals?" we analyzed two categories: users and non-users of electronic journals and made the correlation with scientific field, academic status, sex and age.

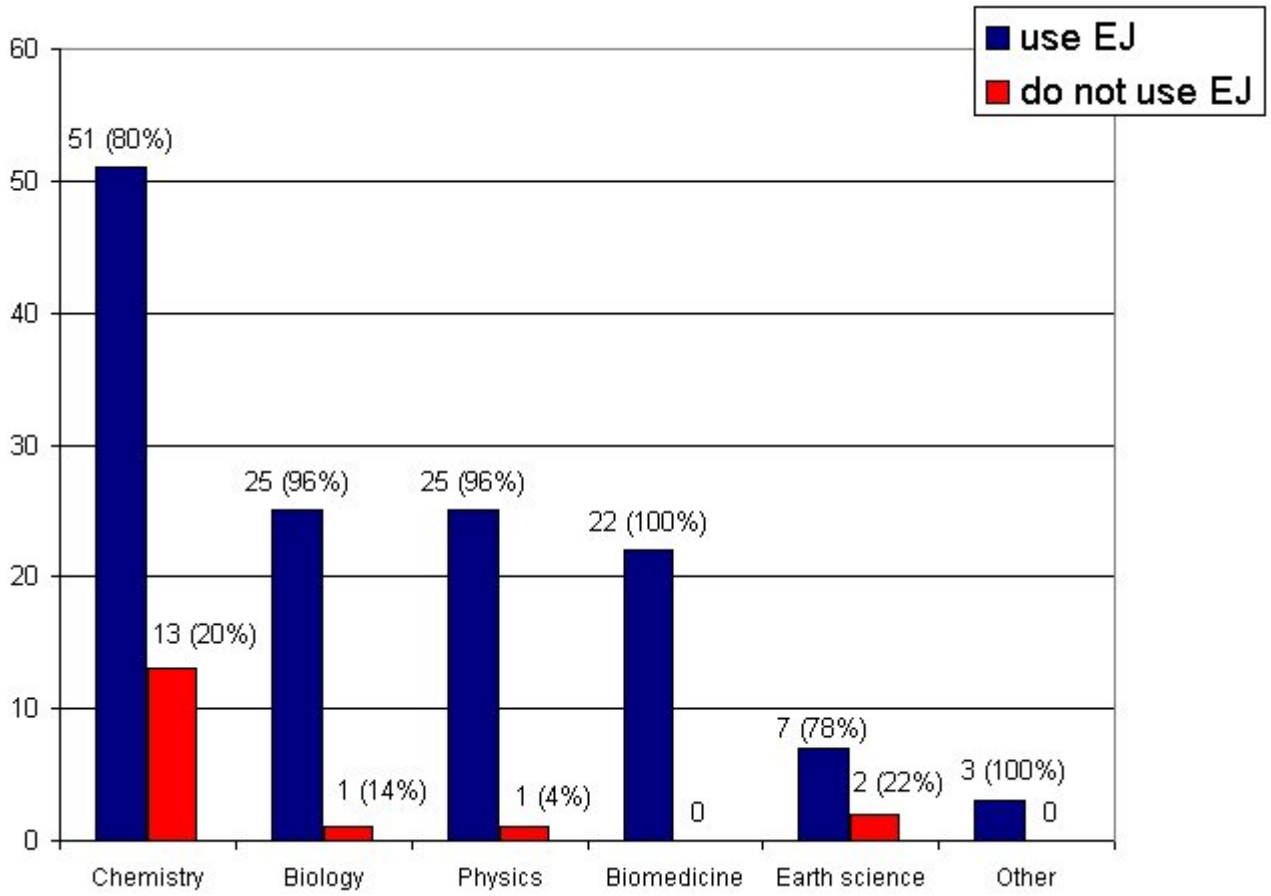
Correlation showed significant difference in terms of scientific fields. Most of the scientists who do not use electronic journals at all belong to the chemistry and Earth sciences (p=0,031)15. At the Institute there is a total of 71 scientist are from Earth sciences. Out of this total, only 9 scientists filled out the questionnaire, and two of them (22%) did not use electronic journals, but we could not draw general conclusions based on such a small number.

Out of the total of 166 chemists at the Institute, 64 answered the questionnaire. Among them 13 (20%) are non users of electronic journals. On the other side, comparing chemists with scientists from other fields, it is obvious that the number of users of electronic journals is the highest among chemists.

We received a very interesting result from biomedical respondents (48 scientists at the Institute). 22 respondents filled out the questionnaire (46%) and the result showed that all of them use electronic journals.

In spite of our hypothesis that physicists use electronic journals more than the scientists from other scientific fields, it turned out that there is no statistically significant difference.

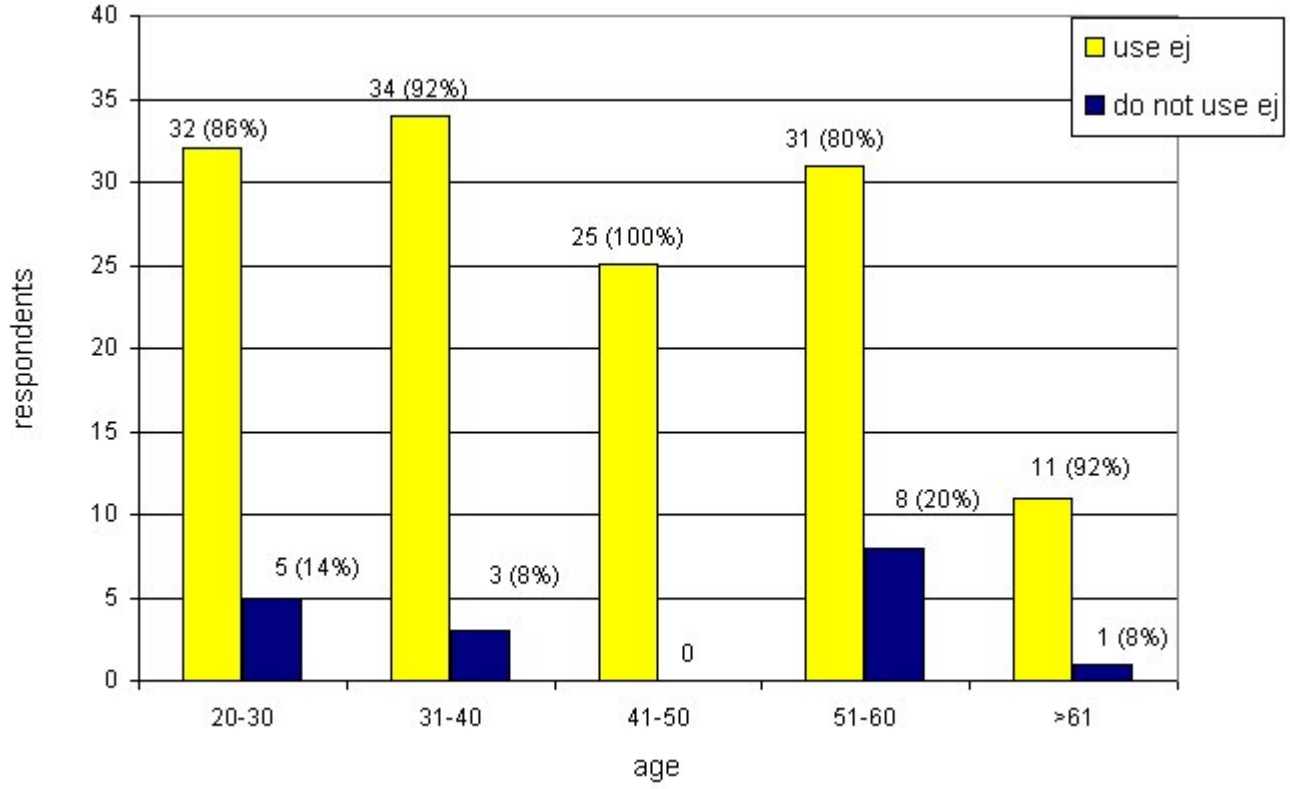
Figure 9 - Correlation of scientific field of respondents and the electronic journals usage



Correlation of variables in terms of age did not produce statistically significant difference. Since there are only 12 respondents (8%) aged over 61 we tried to do a correlation by merging this group with the group of respondents aged 51 to 60. However, this modified variable did not produce statistically significant difference. Correlation also proved wrong our hypothesis that scientists aged over 40 use electronic journals to a smaller extent. ($p>0,05$) Indeed, it showed that all the respondents aged 41 to 50 use electronic journals.

Remaining correlation of scientific field and sex also did not produce statistically significant difference in use of electronic journals.

Figure 10 - Correlation of age and electronic journals usage



Correlation of questions number 15: "What is the most important advantage of electronic journals?" and number 16: "What do you consider as disadvantage of electronic journals?" with academic status, scientific field, sex and age of respondents did not show statistically significant differences. (p>0,05)

4.2. The results of the survey carried out during the seminar on electronic journals usage

After the seminar 42 questionnaires were collected; 5 of them were invalid[16]. Respondents who do not use electronic journals (4 respondents) did not answer further questions so in the end we processed answers from 33 questionnaires.

Identically as in the first survey according to the academic status, the largest group is the one of junior researches (assistants) (15 respondents (40%), and according to the scientific field most of the respondents are chemists (22 respondents (59%).

The ratio of respondents according to their academic status and their scientific field approximately corresponds to the ratio of the respondents from the first survey.

Table 3 - Distribution of respondents according to their academic status and their scientific field

Academic status	**Number of respondents**		**Scientific field**	**Number of respondents**
research adviser	6 (16%)		Biology	2 (5%)
senior research associate	7 (19%)		Biomedicine	5 (14%)
research associate	5 (14%)		Physics	4 (11%)
researcher	4 (11%)		Earth Sciences	3 (8%)
junior researchers (assistents)	15 (40%)		Chemistry	22 (59%)
total	**37 (100 %)**		Other	1 (3%)
			total	**37 (100 %)**

Female are more represented than male scientists: 28 women (76%) vs. only 9 men (24%). This is disproportionate to the real ratio.

According to age groups, 12 respondents (33%) are in the group aged 20 to 30, 6 respondents (16%) belong to the groups aged 31 to 40 and 41 to 50, 10 respondents (27%) belong to group aged 51 to 60 and only 3 (8%) respondents make the group aged over 61.

At the question about frequency of use, 5 respondents (14%) use journals *daily*, 11 respondents (29%) use them *several times a week*, 5 respondents (14%) use them *once a week*, 8 (21%) respondents use them, *several times a month,* 1 (3%) respondent use them *once a month,* 3 respondents (8%) use them *several times a year*, and 4 respondents (11%) do not use them at all.

Based on the collected answers we came to the conclusion that most of the respondents (89%) use electronic journals, while those who do not use them at all make 11% out of total. This percentage is equal to the first survey. Two respondents listed as a reason for non-use lack of information about the available electronic journals.

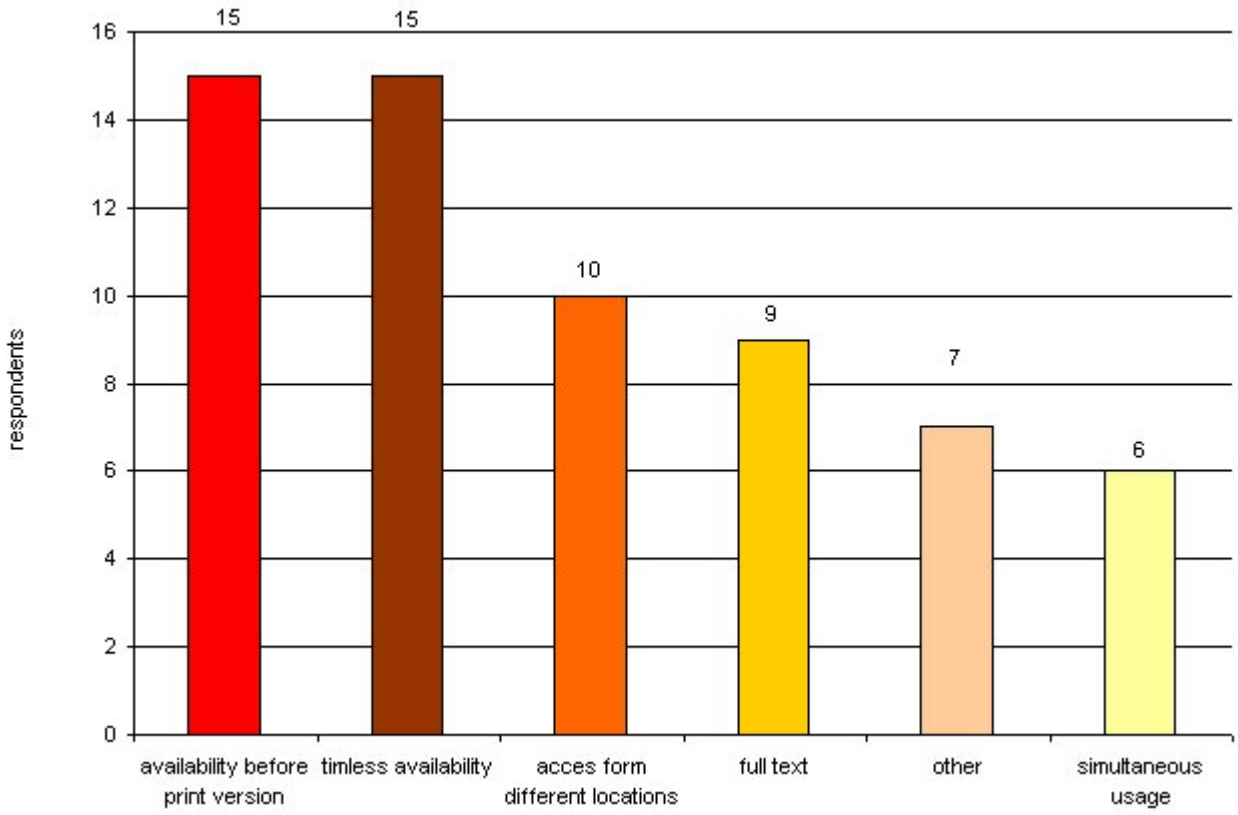
The respondents mostly access electronic journals from the computer at work (33 respondents) only 3 respondents access from home17. None of the respondents listed computers in the RBI library or in any other library as access place. Slightly less than in the first survey, 25 respondents (76%) use the journals that offer only contents and/or abstracts although they are informed about it, 8 respondents (24%) do not use these journals.

To the question whether they use the "Electronic journal list", 30 respondents (91%) answered affirmatively, 1 respondent (3%) answered he did not use it although he knew it existed and 2 respondents (6%) did not use it because they did not know it existed.

To the question whether they use the EZB electronic journal database, we offered three answers identical to ones to the previous question: every answer was chosen by the equal quantity of 11 respondents (33,3%).

As in the first survey we observe that a great part of respondents use the electronic journal list while the EZB database remains unexploited. We have already mentioned that the respondents consider all the advantages of electronic journals equally important[18]. Firstly the accessibility before the print version (15 respondents) and the independence regarding the library working hours (15 respondents). The next advantage is the possibility of searching from different locations (10 respondents), then the possibility of full text access (9 respondents) and the simultaneous use. (6 respondents)[19]. (Figure 11)

Figure 11 - The advantages of electronic journals



Beside the offered ones, respondents stated following advantages: "the possibility to link directly to the references in the article", "the possibility of zooming the text on

the screen", " it is not necessary to order articles from other libraries so it is time saving" and "the possibility of using the journals that the library does not subscribe in print.

The question "What do you consider as disadvantage of electronic journals?20" produced following results: most of the respondents, 21 of them, pointed out slow download of text and pictures, 2 of them pointed out the frames, 8 of them had problems in navigation and 16 of them chose the answer "other". As "other" most of the respondents consider problems in printing the article. Only 3 respondents thought that there were no disadvantages at all.

Identically to the results of the first survey questionnaire showed that most of the respondents, 26 of them (79%) reads the text printed out on paper and 7 of them (21%) reads it directly from screen.

When both versions of the journal are available 12 respondents (37%) prefer the print one, 10 respondents (30%) prefer the electronic one and 11 respondents (33%) use both versions. This actually shows that the use of electronic journals does not fall behind the use of paper one.

At the same time though, like in the first survey, 21 respondents (64%) think that electronic journals will not replace the print ones completely and 12 of them (36%) think this is going to happen.

Out of 33 respondents, added the answers from 5 invalid questionnaires, 24 of them (63%) had already taken part in the previous survey and 14 of them (37%) had not21.

At the question whether the seminar improved their knowledge about electronic journals use, 34 respondents (89%) confirmed, 3 respondents (8%) denied and 1 (3%) did not answer. All the respondents agree that the library should organize similar presentation of its services from time to time.

They also listed comments and suggestions about the seminar: "stand-by time for individual presentation directly on the computer", "more examples of searching capabilities from the beginning to the end", "instructions how to perform some key operations".

5. CONCLUSION

As in the earlier presented user studies, our research as well shows high acceptance and use of electronic journals, but clearly there is a consciousness of the lack of permanence of the electronic medium and users' concern regarding the archiving journals for future use.

Since their beginning library collections were designed with the idea of long-term use, and regarding electronic journals this is still quite uncertain. Publishers have different subscription conditions and canceling the current subscription always creates a possibility for a library and its users to lose all back issues. Although the users and libraries are still attached to print versions they accept electronic ones.

New electronic medium presented new possibilities as well as new demands for users. The users still have not changed their patterns of use and information seeking behaviour. It can take from sixteen months to three years for users to integrate changes in access patterns into their routine (Luther, J. 2000) There is a difference in age: students acquire new technologies faster but they often act as if resource do not exist if it is not available online (Luther, J., 2000).

Innovations affect people's earlier behavior. Hence, the innovations regarding searching have to be accepted in order to become a part of ordinary information seeking behavior. The pace of accepting the new varies from one individual to another, also the available infrastructure is an important pre-condition (Borghuis, M. G. M., 1997).

Until 1997, at the time of the first user studies about electronic journals usage, the commercial publishers only began to publish electronically. The offer was not that large as today and most of the time the back issues were not available which affect their usage in general. The size of the collection inevitably reflects its usage level. As amount of content increases, the collection usage increases as well (Luther, J. 2000).

The studies carried out at the RBI revealed that a part of Croatian Scientific Community (89% in both surveys) accepts electronic journals and uses them to a great extent, opposite to the 11% of non-users.

These results proved wrong our hypothesis that there is an insufficient quantity of scientists who use electronic journals. Although there is a possibility that we did not cover the real number of scientists who do not use electronic journals, we believe that the increased number of those respondents would have not changed the final results essentially. The similar results of the seminar and the first survey proved relevance of gained results.
Together with the unfounded hypothesis of insufficient number of electronic journals, another two turned out to be unfounded as well: scientists under 40 use electronic journals more and, physicists are predominant electronic journal users.

In the electronic journal use an important factor is being informed about the available sources and services. Some researches revealed quite devastating results about librarians as informers on relevant electronic publications.

The Keller and Neubauer survey showed that scientists (70% of them) consider e-mail recommendations from their colleagues the most important informal information channel. (Keller, A.; Neubauer, W., 1999).

The Tomney and Burton study showed that only 21 respondents out of 75 (28%) consider the University Library as a source of information about relevant electronic journals, and the main sources are recommendations from colleagues and searching on the Internet (Tomney, H.; Burton, P. F., 1998).

On the other side, the Baldwin and Pullinger study showed that scientists show great respect for library as institution, and that they consider electronic journals as a new library service and not a replacement for it. (Baldwin, C.; Pullinger, D., 2000).

Regarding these studies, the results on usage of the available sources on the Library site (electronic journal list, EZB, free-trial journals) showed that some of them are not used enough and users are not informed about existence of certain sources. The electronic journal list is used by 69% (or 91% in the second survey) of users and only 8% (in the second survey 6%) did not know it existed.

The number of respondents who do not use EZB electronic journal database even though they know about it combined with the number of respondents who do not know it exists comes to 56% according to the first survey and 67% according to the second one. This number is fairly higher then the number of its users (44% or 33,3%) and shows that the potential of this database is not exploited enough. One of the elements that made this source unavailable to many of those who knew about it is that up until May 2002 the interface was available only in German. The new interface now available in English as well will probably increase the number of its users.
There are also a lot of respondents who did not take advantage of the free-trial access (41%)22.

When asked about the use of these sources, the respondents were not given the opportunity of explanation, so we do not know the real reasons why they do not use them. Being librarians we have to ask ourselves whether we used all possibilities to inform our users.

Advantages and disadvantages of electronic journals listed in the earlier mentioned user studies are almost identical, with variations according to the importance that users attach to them.

The RBI respondents in both surveys stress the availability before the print version as the most important advantage of the electronic journals, and as the most important disadvantage slow download. Very few respondents think that electronic journals have no disadvantages at all (10 in the first and 3 in the second survey).

Although most of the respondents prefer print version in the situation where both versions are available, there are lots of those who use both versions equally (32% and 33%). Like other similar studies this one also proved the fact that respondents prefer reading the article printed out instead reading from screen. (73% and 79%).

This shows that the appearance of electronic journals will not save paper as it was thought originally (Woodward, H., 1997).

It is obvious that respondents are still quite attached to the paper version. In accordance, the opinion prevails that electronic journals will not replace print ones completely.
Comparing the opinion of our respondents with results from other researches it is evident that print and electronic journal will continue their co-existence for some time ahead.

Some authors think that the appearance of electronic journals represents the second communication revolution that changed the paradigm of scientific communication (Sercer, T. M. et al 1999). We agree with the opinion of Valauskas that electronic journals are different from its print equivalents but not as radically that it could be called revolution. Also, he thinks that the revolution is never going to happen and that in the future we will dispose of a large number of both print and electronic journals (Valauskas, E. J., 2001).

Preparing the seminar about the use of electronic journals we were suspicious whether we would meet the users' needs and expectations. We did not know whether our users think that seminars are necessary, so we were interested in answers about the success of the seminar and the need of organizing similar ones. A majority of respondents (89%) thinks that seminar improved their knowledge and all the participants agree that the Library should organize presentation of its services and practical workshops from time to time. A good response of users and the results we obtained showed that besides providing electronic journals there is a very important new task for librarians: education of users.

Promotion of electronic journals is a first step of animating users and it is not a one-time activity but ongoing process (Roes, H., 1999).
The libraries should spent more effort on promotion; printed promotional material like posters and guides still have the same importance as promotion on library web pages. (Ashcroft, L., 2000). We think and our respondents confirmed that information about the sources is not enough. Workshops where the practical use of electronic journals is taught are necessary, especially those about different ways of searching.

The change in medium i.e. the electronic version of journals did not fundamentally change the way of use - scientists still go directly to the desired article in the journal that they found either by searching through bibliography databases and/or they browse the latest issue (Clajus, G.; Maier, C., 2001).
That is the reason why the new searching capabilities, not applicable with print versions, mostly remain non-utilized. Many scientists emphasized lack of the time to study and manage the unfamiliar electronic journals.

The results of the user study among scientists at the RBI are very encouraging. They confirm that a part of Croatian scientists have already got quite ahead on the road of acquiring and intensifying the use of the electronic medium that provides more efficient and faster dissemination of scientific information. In spite of the favorable results of this study, which revealed high acceptance of electronic journals, it would be necessary to conduct a research that would include scientists from social sciences and humanities in order to get a better insight about the use of electronic journals within the Croatian Scientific Community.

The research among RBI scientists should be repeated after a year because a lot of journals from major publishers ("Springer", "Elsevier", "Wiley") became electronically available to users after our study was completed thus we think that a better offer will help increase the number of users. We hope that the intensive activities organized by the Library, directed to promote electronic journals and similar services as well as education of users will help increase this number, too.

One of the factors that will certainly help intensify the use of electronic journals is the increase of scientists willing to publish their paper through the electronic medium only. The academic libraries should certainly find their place in the promotion of new services and in user education In other words libraries have to accept the role of the intermediates between electronic journals and their end users. Otherwise, users will marginalize them and cut them off from the position of the relevant scientific information dissemination service.

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7. APPENDIX: The Questionnaire **(PDF File)**

Dear user,

With the purpose of offering you an ever better service, using this questionnaire the RBI Library is trying to find out to what extent the users/readers accept and use electronic journals.

We expect that the number of electronic journals is going to increase in the future as well as the number of scientists who will use them in their research work. That is why your answers are very precious to us.

The information you will provide is anonymous and its only purpose is helping our research.

Thank you for your time and effort.

1. Division, department

_____

2. Status

1. research adviser
2. senior research associate
3. research associate
4. researcher
5. junior researchers (assistents)

3. Scientific field (Ministry of Science and Technology Classification)

1. Biology
2. Biomedicine
3. Electronics
4. Physics
5. Earth sciences
6. Chemistry
7. Mathematics
8. Computer science
9. other_____

4. Sex

1. female
2. male

5. Age

1. 20-30
2. 31-40
3. 41-50
4. 51-60
5. 61-

6. Frequency of use (JUST ONE answer)

1. daily,
2. several times a week,
3. once a week
4. several times a month
5. once a month,
6. several times a year,
7. once a year

8. do not use them at all - please give us explanation for non usage

_____

If you do not use electronic journals at all you do not have to fulfill the rest of the questionnaire

7. Electronic journal access (several answers can be choosen)

1. from work place desktop
2. home deskop
3. computer in RBI library
4. computer in other library

8. Do you use list of current periodicals available at library web pages (one answer)?

1. yes
2. no, I know it exists
3. no, I didn't know it existed

9. Name at least 4 full text electronic journals that you use

_____

10. Name journal/journals that you would like to have access to

_____

11. Do you use electronic journals that offer only contents and/or abstracts?

1. yes
2. no

12. Do you use electronic journals database Electronische Zeitschriftenbibliothek (EZB)? (JUST ONE answer)

1. yes
2. no, I know it exists
3. no, I didn't know it existed

13. Did you use free trials that were accessible through library ?

1. yes
2. no

14. If your response to former question was positive, name free trials that you used (several answers can be choosen)

1. ScienceDirect
2. BiomedNet
3. PhysicsDirect
4. Engeeniring Village
5. Other_____

15. What do you consider the main advantage of electronic journals ? (JUST one answer !)

1. availability before print version
2. timeless availability
3. access from different locations
4. simultaneous usage
5. full text
6. access from desktop
7. other_____

16. What do you consider as disadvantage of electronic journals? (several answers can be choosen)

1. slow download
2. frames
3. navigation
4. additional payment
5. other,_____
6. there are no disadvantages

17. When using the electronic version of the journal do you read the full-text articles...?

1. from the screen
2. print out on the paper

18. When both versions are available which one do you prefer ?

1. print
2. electronic
3. both equally

19. Will print journals disappear ?

1. yes

2. no

20. Your comments and suggestions

_____

1 Survey slip method, monitoring use of photocopying facilities, questionnaire, interview, interlibrary slip analyses, log file, etc. The survey of the use of paper journals in collaboration with University in Maastricht.
2 With paper journals, 20% of journals covers 80% of the demand, with electronic journals 31% covers 80% of the demand
3 OhioLINK = The Ohio Library and Information Network
4 Café Jus = Commercial and Free Electronic Journals: User Study
5 The number of scientists at the time of the polling (December 1st 2001 - January 31st 2002)
6 There is a selection of answers offered to the respondents
7 The questionnaire is enclosed
8 The base for collecting data through the network questionnaire is programmed by a Mario Pranjić B. S. in Computer Sciences, IRB Library
9 The data was processed by Boris Badurina, B. A. in Sociology
10 Since May 2002 the access was possible to 100 journals from the publisher "Wiley"
11 The questions about use of free-trial journals, and the questions where the respondents list the electronic journals they use the most, as well as those they would like to use in the electronic version, are omitted.
12 It was possible to select as much as four offered answers.
13 It was possible to select several answers and to present your own answer

14 At this question the respondent could either select one answer of offer his own answer.
15 P-value of<0.05 was taken as statistically significant
16 See methodology
17 There were four answers offered with this question
18 The participants of the workshop could select multiple answers. See methodology
19 At this question the answer:" access from desktop" has been omitted because it is contained in the answer: "access from different locations"
20 The respondents could choose from multiple answers
21 four respondents who answered they did not use electronic journals, did not answer these questions, see methodology
22 see methodology