The Effectiveness of Providing Electronic Journals in JAERI

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Abstract
The Japan Atomic Energy Research Institute (JAERI), one of the government sponsored research institutes in the field of nuclear science and technology in Japan, has ten branch research sites scattered all over the Japanese Island. Because of the recent budget shrinkage of JAERI and increasing journal price, it has become more difficult to keep sufficient journal coverage at each branch library. Some users can read printed journals for their research work, while the rest are obliged to request a photocopy of journal articles from the central library of JAERI or affiliated libraries. It is necessary to improve this information gap among the sites. One of our attempts was to provide electronic journals through the intranet. We carried out a qualitative analysis on the trend of journals usage both in printed and in electronic form, from the viewpoint of the effectiveness of providing electronic journals. It was found out that the users having less printed journals more frequently accessed the electronic journals. This means that electronic journals are useful for the solution of information gap among the sites. The analysis also indicated that there exists a cost-effective compromise between providing printed journals and providing electronic journals.

Introduction
Nowadays electronic journals are widely used as useful library materials. While most electronic journals can still be used free of charge when we subscribe to printed journals, recently we have to pay for some of the electronic journals. Furthermore, some journals are published only in electronic form. At the same time journal prices are increasing, and many research institutes and universities are complaining of a shrinkage in the budget for journal subscription. Therefore, it is necessary to investigate the effectiveness of electronic journals from many viewpoints. Some Japanese university libraries have reported monitoring results of users’ access (Kurano, 2001) and others have tried to find out if the package contract of electronic journals was practical (Hirabuki, 2002). These studies indicate that it is still in the stage of trial and error to provide electronic journals in the libraries.

We carried out a quantitative analysis on the usage of journals both in a printed form and in an electronic form in order to clarify the effectiveness of providing electronic journals in the Japan Atomic Energy Research Institute (JAERI).

Case of JAERI
JAERI is one of the government sponsored research institutes in the field of nuclear science and technology in Japan. The largest site is in Tokai-mura where the central library is located. The headquarters is in Tokyo and other six branch sites are scattered all over the Japanese Islands. The central library collects about 50,000 books, 450 journal titles and two million technical reports. The branch libraries have limited collections closely related to the research fields at the sites.
Fig 1  Number of subscription titles

Fig 1 shows the number of journal subscriptions at the central library and six branch libraries. It is clear that it is not possible in 2002 to keep the previous number. This is caused by the budget shrinkage of JAERI and the increase in the journal price. Although the number of journals in the central library is less than half when compared with that of two years ago, researchers working near to the central library (Tokai, Naka and Oarai) can still use printed journals which are minimally required for their research work. On the other hand, researchers at other sites are obliged to get photocopies of journal articles from the central library or from the National Diet Library and some affiliated libraries. The information gap among the sites is clearly increasing.

One of our trials to minimise the gap is to provide electronic journals through the intranet. We have prepared a list of hyperlinks to available electronic journals on the home page of the central library since July 2000. Users can select and access journals of interest easily by clicking a title on the list. After the trial of providing electronic journals, we carried out a survey of usage at all sites. The results are shown as follows: About 60% of respondents accessed electronic journals, 20% did not try to use them and 20% did not know about this service. Regarding the frequency of access, 9% accessed once a day, 48% once a week, 32% once a month and the other 11% accessed several times a year. When they were asked if they wanted to use electronic journals, 49% answered that electronic journals should have a top priority, and 41% preferred that a suitable combination of printed journals and electronic journals should be provided. 4% claimed that only printed journals should be supplied. These results show that electronic journals are key to most of the researchers in JAERI.

Methodology

In order to clarify how effectively electronic journals are used in JAERI, we monitored the usage of both printed and electronic journals through our computer-based system located in the central library. Because there are few publishers providing statistics concerning the access to their web sites, we prepared a list of hyperlinks to available electronic journals on the home page. The access information to a certain electronic journal is automatically stored in the log file.
on the server. Concerning usage statistics of printed journals, these have been collected using our computerised library system. Registration numbers are given to all library materials, including printed journals. When users borrow journals, all the information including the registration number is accumulated in the library computer system.

Results and discussion

Number of journal uses
Fig 2 shows the use of both electronic and printed journals at the central library. The number of uses of printed journals includes the numbers for borrowing and photocopying.

It is clear that the number of accesses to electronic journals showed a rapid increase immediately after introducing them, and still keeps the same level. In spite of a sharp decrease in subscriptions to printed journals (as shown in Fig 1), the use of them keeps a certain level. We think this is caused by a synergistic effect with electronic journals. That is, some of the users who have accessed electronic journals might come to the library to search related journals and books in order to promote their research work. As a result, the total number of journal uses becomes about twice the number before introducing electronic journals.

Access curve of electronic journals
In our library some journals are more frequently used than others. Table 1 shows the frequency of users’ access to certain titles of electronic journals from July 2000 to March 2002. For the 357 electronic journals the total access was 74,322. The access to nature was 5.5% of the total access and that of Physical Review Letters was 2.9%. Therefore the accumulation to the total was 8.4% with these two journals. The following accumulation ratio was calculated. Fig 3 shows an asymptote pile graph (Kurano, 2001). The top five high-access titles account for 15% of all accesses. Similarly, 20 high-access titles account for 40%, 35 titles account for 50% and so on. It seems that the users’ accesses are concentrated on a limited number of titles.

Fig 2 Number of journal use/access

![Graph showing number of journal use/access from '98 to '02. The graph indicates a rapid increase immediately after introducing electronic journals, and still keeps the same level.](image-url)
Table 1 Frequency access ranking of electronic journals (July 2000–March 2002)

<table>
<thead>
<tr>
<th>Ranking</th>
<th>Journal title</th>
<th>Number of access</th>
<th>Cumulative ratio per total access</th>
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<tbody>
<tr>
<td>1</td>
<td>nature</td>
<td>4,112</td>
<td>5.5%</td>
</tr>
<tr>
<td>2</td>
<td>Physical Review Letters</td>
<td>2,140</td>
<td>8.4%</td>
</tr>
<tr>
<td>3</td>
<td>Journal of Nuclear Materials</td>
<td>1,852</td>
<td>10.9%</td>
</tr>
<tr>
<td>4</td>
<td>Review of Scientific Instruments</td>
<td>1,750</td>
<td>13.3%</td>
</tr>
<tr>
<td>5</td>
<td>Physical Review B</td>
<td>1,595</td>
<td>15.4%</td>
</tr>
<tr>
<td>6</td>
<td>Acta Materialia</td>
<td>1,587</td>
<td>17.5%</td>
</tr>
<tr>
<td>…</td>
<td>…</td>
<td>…</td>
<td>…</td>
</tr>
<tr>
<td>357</td>
<td>Journal of Membrane Science</td>
<td>2</td>
<td>100.0%</td>
</tr>
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</table>

Fig 3 Access curve of electronic journals

Access to the electronic journals by each site
Fundamentally, researchers at all sites can access most of the electronic journals. Table 2 shows the access at each site from July 2000 to March 2002. This table also includes distance from the central library, number of staff and number of available printed journals. Naka site and Oarai site are included in Ibaraki area since both of them are located within ten miles of the central library at Tokai site. The access from Ibaraki areas covers 52% while those from the other sites is 48%. It is especially interesting that the access from Mutsu site that is located farthest from Ibaraki area and has fewer printed journals, represents 14% of the total access.
Table 2  Access to the electronic journals by each site

<table>
<thead>
<tr>
<th>Area/Site</th>
<th>Ratio of access frequency</th>
<th>Distance from the Central Library</th>
<th>Number of staff</th>
<th>Printed journals (Title, FY2002)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ibaraki (Tokai+Naka+Oarai)</td>
<td>52%</td>
<td>Within 10 miles</td>
<td>1,642</td>
<td>341</td>
</tr>
<tr>
<td>Takasaki</td>
<td>23%</td>
<td>90 miles</td>
<td>140</td>
<td>46</td>
</tr>
<tr>
<td>Mutsu</td>
<td>14%</td>
<td>285 miles</td>
<td>35</td>
<td>5</td>
</tr>
<tr>
<td>Kansai</td>
<td>9%</td>
<td>338 miles</td>
<td>111</td>
<td>35</td>
</tr>
<tr>
<td>Tokyo</td>
<td>2%</td>
<td>75 miles</td>
<td>394</td>
<td>27</td>
</tr>
</tbody>
</table>

Next, we focused on the relation between the number of accesses to electronic journals from each site, the number of staff working at the site, and the distance from the central library (Fig 4). The circles show the number of accesses to electronic journals per one staff at each site. It was found that users working at Mutsu access electronic journals most frequently in JAERI. A similar tendency is seen at Takasaki and Kansai sites that are far from Ibaraki area and have less printed journals when compared with that of the central library. This indicates that electronic journals are useful for users who were obliged to make a request for a photocopy of journal article to the central library and some other libraries.

Fig 4  Number of accesses to electronic journals per one staff at each site
Cost effectiveness
As mentioned above, printed journals are borrowed for reading at the users’ laboratories, or for making photocopies. On the other hand, electronic journals are accessed through the home page on the intranet.

Fig 5 shows the change in total number of use and accesses per one title of journals and the cost per one use/access of these journals. It is obvious that the numbers of use/accesses per one title increased rapidly immediately after the introduction of electronic journal services. On the other hand, the cost per one use/access decreases steeply after this period. Considering the fact that the access to electronic journals is equivalently useful for users when compared with the traditional use of printed journals, it is concluded that electronic journal is an efficient library service from the viewpoint of cost effectiveness.

Conclusions
We carried out a quantitative analysis of journal usage, and found out that providing electronic journals is an efficient library service for users and is very useful from the viewpoint of cost effectiveness. Now we are planning to attempt analysing relationship among research fields, collection characteristics of printed journals, and concentration of access to certain electronic journals in every site.

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References