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Characteristics of reader account status as indicators for predicting the use of printed resources in academic libraries

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Abstract: A statistical analysis was made of the status of readers' accounts at the libraries of eight universities and colleges in Poznań, Poland. The following indices characterising the status of the accounts were considered: the ratio of the number of accounts with borrowed items to the number of accounts without; average, median, modal and maximum number of borrowed items per account; and average standard deviation. It was also determined what percentage of borrowed items corresponded to the most active 20% of all registered readers (to determine the validity of the 80/20 rule). The study was carried out for the accounts of academic and teaching staff and for those of students, in selected faculties. The results were interpreted with regard to the prediction of the level of use of printed resources in academic libraries.

Keywords: Circulation statistics, Collection development, Subject analysis, Academic libraries

1. Introduction

Characteristics of the status of readers' accounts can undoubtedly serve as a form of indicator of the use of information by a specific person. However, in such a case, the variety of possible events – including random ones – complicates the interpretation of that indicator immeasurably. A sufficiently large set of data referring to a population that is uniform in terms of certain features nonetheless clearly narrows down the field of interpretation. Hence analysis of the status of library accounts of the staff or students of a particular faculty may be used as a way to evaluate their information-related activity.

The researcher generally has access to several elements making up such a characterisation. These elements consist of data that are not especially difficult to obtain, since they are recorded by the library system. Unfortunately, however, the number of such elements is extremely limited. We may establish how many people in a given department have library accounts, how many accounts have

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current records of borrowed items, and how many items are borrowed by individual users. The systems also record the dates of borrowings and returns.
These indicators undoubtedly have something to tell us about reader activity. They cannot, however, serve as a basis to draw too far-reaching conclusions about information-related activity in general. It is possible, however, to predict the use of library resources in a specified time period, having access to data on the number of readers, their category (student, academic staff member) and the field in which they work.

2. Literature survey

There has been no research to date specifically on the subject of reader activity. The most relevant literature consists of reports on research projects relating to the use of library resources.
For example, in the paper *Are print books dead? An investigation of book circulation at a mid-sized academic library*, Lisa Rose-Wiles (Rose-Wiles 2013) analysed the circulation of printed books at Seton Hall University library. She used the WordCat Analysis tool and data from the Voyager system. The results showed that only 21.5% of available books were borrowed in the period from 2005 to 2009. The borrowing structure differed between fields, with a significantly higher rate of borrowing in fields in which new resources were available. In such cases more than one-third of resources were borrowed, while interest in older publications was much lower.
In turn, Steve Hiller (Hiller 2002) investigated library use patterns among students of various disciplines at Washington University Library. He noted a fall in the popularity of libraries among staff over a period of a few years, from 48% in 1998 to 40% in 2001. An even greater fall was recorded among students: from 78% in 1998 to 60% in 2001. There was a particularly noticeable drop in personal visits to the library by lecturers and doctoral students in the medical sciences, natural sciences and engineering. The reason for these changes is the greater use of remotely available resources and full-text electronic databases. The author also draws attention to the increase in the importance of electronic versions of journals. There are significant differences in the popularity of electronic journals among academic staff and students in the medical and engineering sciences, and much smaller differences in the humanities. Among the latter group, printed publications retained a high level of popularity.
The authors of the paper *Are first-circulation patterns for monographs in the humanities different from the sciences?* (Ladwig, Miller 2013) investigated the frequency of borrowings of monographs for the humanities and the sciences. The hypotheses which the authors put forward at the outset were confirmed: borrowing patterns did not differ between the disciplines, but there was a drop in the popularity of individual items with time – to approximately 5% after five years and just 1% after ten years.
The 80/20 rule was referred to in research by Blecic (Blecic 2000). That author investigated the circulation of monographs during the first three years after purchase at an academic library specialising in the medical sciences. Among 1674 titles, 81.48% were borrowed at least once. In total there were 7659

borrowings recorded; 38.69% occurred in the first year of a monograph's availability, 32.37% in the second year and 28.95% in the third. Approximately 38% of monographs accounted for 80% of borrowings. A small number of works, just 2.21% of the total, accounted for a significant percentage – 21.84%. – of borrowings. It was also reported that there was no significant change in the level of borrowing over the three years studied.

3. Methodology

3.1 Model of reader activity

The model describing reader activity assumes it to be the outcome of the interaction of several different factors, namely:

In – information needs (this refers here to specific sources of information which might be made available in physical form by libraries)

E – level of effectiveness of the information-related activity of an individual user (this denotes the number of books which the person is able to find in a given library and then borrow; it also refers to the speed of working with those books, namely the time after which they are returned and the next items borrowed)

R – the rules of a given library (these may limit the number of books that can be borrowed and the time for which they may be borrowed)

Po – the possibilities of satisfying information needs outside the library (there currently exist many other elements of library infrastructure providing access to information sources similar to those made available by libraries)

C – the resources of the library (books held by the library and available to the reader – this naturally concerns the collection which may interest the reader in question and the books which may be borrowed)

The model is consequently constructed as follows: Reader activity in a specified time is described as the intersection of the sets **In** and **C** reduced by **Po**. The set so obtained is further reduced by the limitations of **R** and **E**.

$$\mathbf{fE(fR(In \cap C) \setminus Po))}$$

3.2 The study sample

Research was carried out at state universities and colleges in Poznań, taking account of all users of the library system. This means that no sample was chosen, but that all data held in the Horizon integrated library system at the end of 2015 were used. That system supports nine academic libraries in the city of Poznań, including the libraries of Adam Mickiewicz University (39,300 students), Poznań University of Technology (20,600 students), Poznań University of Life Sciences (11,800 students) and Poznań University of Economics (10,800 students).

Some of the libraries are faculty libraries (this applies to Adam Mickiewicz University and the Medical University). The others are treated as main libraries for the academic institution as a whole. Data relating to certain libraries were ultimately rejected as these had specific features which caused them to differ significantly from the principal libraries being considered.

Only information on account status was available. An account is either empty or contains a certain number of items. These indicators produce a very sparse collection of data. Nonetheless, when analysed as a set, they may form a basis for certain interpretation to be made.
The first indicator obtained is the number of empty accounts as a proportion of the total number of accounts. This may reflect the level of reader activity in a particular group, or the possibility that their information needs are being satisfied outside the library.
The most active groups of readers were identified by multiplying the percentage of active accounts by the average number of books borrowed in each group. In the same way the group of least active readers was identified.

4. Statuses of library accounts of academic staff

4.1 Number of active accounts

Table 1. Ratio of number of active library accounts to number of all accounts – the most active readers (in the academic staff group)

Name of library	Number of accounts//Number of active accounts	Percentage of active accounts
AMU History Faculty	303//219	72.28%
AMU Mathematics Faculty	147//106	72.11%
AMU Geogr. and Geol. Faculty	229//158	69.00%
AMU Polish and Classic. Faculty	263//180	68.44%
AMU Polit. Sc. and Journ. Faculty	106//71	66.98%
AMU Biology Faculty	219//145	66.21%
College of Music	196//124	63.27%
AMU Social Sciences Faculty	235//148	62.98%
AMU English Language Faculty	135//84	62.22%
AMU Physics Faculty	184//111	60.33%

Table 2. Ratio of number of active library accounts to number of all accounts – the least active readers (in the academic staff group)

Name of library	Number of accounts//Number of active accounts	Percentage of active accounts
Medical Faculty I	291//93	31.96%

Medical Faculty II	269//104	28.18%
AMU Theology Faculty	31//8	25.81%
Pharmaceutics Faculty	119//23	19.33%
Health Sciences Faculty	175//33	18.86%
University of Fine Arts	191//20	10.47%

The first ten places in the table are occupied by groups of academics considered to be the most active in terms of library use, of whom between 60% and 70% make use of the library. It can be seen that these are mostly staff of university faculties, representing both the natural sciences, social sciences and humanities. They include mathematicians, physicists, biologists, geographers and geologists, followed by scholars of Polish and classical languages (Latin and Ancient Greek) and of English, and then historians, political scientists and journalism researchers. Also appearing in this group are staff of the College of Music, chiefly musicologists.

On the other hand, the least active users are medical scientists, theologians and staff of the University of Fine Arts. In these groups, between 10% and 30% of persons have active accounts.

4.2 Average number of borrowed items

Table 3. Average number of books borrowed per active account – the most active readers (in the academic staff group)

Social Sciences Faculty	**31.42**
Educational Studies Faculty	29.88
Polish and Classical Language Faculty	29.73
Mathematics Faculty	24.73
History Faculty	22.54
Political Sciences and Journalism Faculty	21.55
Physics Faculty	19.48
Poznań University of Life Sciences	10.18

Table 4. Average number of books borrowed per active account – the least active readers (in the academic staff group)

Poznań University of Technology	**8.77**
Medical Faculty I	8.75
Poznań University of Economics	8.36
Health Science Faculty	7.52
Pharmaceutics Faculty	5.52
Physical Education College (staff, doctoral students)	4.85
University of Fine Arts (teaching and library staff)	3.45

Taking into account the number of active accounts and the average number of borrowed items per active account, the highest index value was obtained for scholars of Polish and classical languages (20.35), followed by social scientists (19.79), mathematicians (17.83) and historians (16.23). The least active were the staff of the University of Fine Arts (0.36), the Pharmaceutics Faculty (1.07), the Health Sciences Faculty (1.42) and Physical Education College (1.86), the First Medical Faculty (2.8), the University of Economics (2.84), the Second Medical Faculty (3.03), the University of Technology (3.6) and the Theology Faculty (4.06). As was noted previously, these values were obtained by multiplying the percentage of active accounts by the average number of books borrowed per active account in each group.

5. 5.Statuses of students' library accounts

5.1 Number of active accounts

Table 5. Ratio of the number of active accounts to the number of all accounts. The most active readers (in the students group)

AMU Chemistry Faculty	**1318//652**	**49.47%**
Poznań University of Technology	11013//5145	46.72%
AMU Educational Studies Faculty	3981//1568	39.39%
AMU Polit. Sc. and Journalism Faculty	3060//1164	38.04%
AMU Biology Faculty	1462//530	36.25%

Table 6. Ratio of the number of active accounts to the number of all accounts. The least active readers (in the students group)

AMU Social Sciences Faculty	**5176//1013**	**19.57%**
AMU Theological Faculty	353//45	12.75%

These results may be somewhat distorted by the fact that a certain number of student accounts may be "dead", i.e. the student has completed or discontinued his or her studies, but the account has not yet been closed.

5.2 Average number of books borrowed

Table 7. Average number of books borrowed per active account – the most active readers (in the students group)

AMU Polish and Classical Languages Faculty	**8.41**
AMU Educational Studies Faculty	6.92
AMU History Faculty	6.56
AMU Social Sciences Faculty	6.27
AMU Chemistry Faculty	6.09
University of Life Sciences	5.99
University of Technology	5.71
Medical University	5.73

Table 8. Average number of books borrowed per active account – the least active readers (in the students group)

Political Sciences and Journalism Faculty	**5.61**
Theology Faculty	5.60
College of Music	5.41
Law Faculty	5.40
Physics Faculty	4.55
AMU Modern Languages Faculty	4.55
Mathematics Faculty	4.28
English Language Faculty	4.06
Geographical and Geological Sciences Faculty	3.81
Physical Education College	2.72

The most active students are those of chemistry, with an index value of 3.01, followed by those of Polish language (2.93), educational studies (2.72) and at the University of Technology (2.67). The least active are students of theology, with an index of 0.71, followed by those of the Physical Education College (0.82), geography (1.15) and mathematics (1.17). It should be borne in mind that in the case of students the number of books borrowed is smaller than in the case of academic staff due to the limitations contained in library rules. A student is not permitted to borrow practically unlimited numbers of books, as staff are. Moreover a student is required to return a book by a given date (or to pay a fine), while staff are subject to a more liberal approach.

6. Applicability of the 80/20 rule

Table 9. Groups of readers where the 80/20 rule is applicable (the most active 20% of accounts are responsible for approximately 80% of all borrowings)

Law Faculty students	**85.30%**
Chemistry Faculty staff	85.05%
Physical Education College students	84.86%
Physical Education College staff and doctoral students	84.85%
University of Economics readers	84.43%
Law Faculty staff	84.31%
Biology Faculty students	82.27%
Political Sciences and Journalism Faculty students	82.14%
Social Sciences Faculty staff	81.59%
Educational Studies students	79.42%
Educational Studies staff	78.80%
Modern Languages Faculty staff	76.83%
Political Sciences and Journalism Faculty staff	76.03%
Physics Faculty staff	75.53%

7. Conclusions

The analysis reported here does not make it possible to determine any explicit patterns. It is not possible to explain why certain groups of academic staff or students demonstrate a higher level of readership activity than others. Nonetheless, these differences are extremely marked.

The results of the analysis nonetheless indicate the possibility of predicting the size of the active resources of a library if we know the percentage of active accounts for a given category in a given field and the number of registered readers. The 80/20 rule can also be used for predictive purposes.

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