DEVELOPING INDICATORS FOR ACADEMIC LIBRARY PERFORMANCE: RATIOS FROM THE ARL STATISTICS 1993-94 AND 1994-95

INTRODUCTION

CURRENT CONTEXT FOR PERFORMANCE INDICATORS IN HIGHER EDUCATION

by Martha Kyrillidou Program Officer, ARL Statistics and Measurement

Higher education in North America is being pressed for greater accountability and improved attention to quality. Legislators in many regions are moving toward "performance incentive funding," as appropriations are based, at least in part, on whether universities and colleges are accomplishing stated goals. A public concerned with the balance between costs and benefits of higher education demands more information on institutional operations and outcomes. In particular, there is a great need to demonstrate the extent to which institutions are meeting their goals and objectives. A plethora of "useful" measures and other efforts has flooded the literature of higher education. Ultimately, it is the responsibility of each institution to define and describe its own goals, to place them in the context of peer group comparisons, and demonstrate to the public the position it holds in higher education.

The concepts of accountability and quality assessment in higher education constitute an international phenomenon. National education systems call upon universities to establish performance indicators to measure progress towards the establishment of national goals. Universities increasingly are called to describe in specific terms their contribution towards the national welfare and the relation between the welfare of a country and university teaching and research. In Europe and Australia, there is often direct involvement by the central government in establishing "indicators." In the United Kingdom, for example, quality control, quality audit, and quality assessment are being carried out by the Higher Education Quality Council and the three Higher Education Funding Councils. A new central agency to gather and analyze data, the Higher Education Statistics Agency (HESA), has been established. More specifically, library performance indicators have flourished in the United Kingdom as the restructuring of the British higher education system proceeds. Ian Winkworth discusses performance indicators in libraries in the UK and cites numerous examples. [1]

Although private higher education in the U.S. is less affected by such developments, there have been discussions about a greater federal role in institutional accreditation and questions about whether such a system might be based on "results" and "performance." Whether it is the federal government or some other entity that will undertake the responsibility to define "quality" for higher education in the U.S., critics of higher education have warned that if "the academy does not respond, the public appetite for results will expand and crystallize around the use of external performance indicators to measure results. And the jury is still out on the results desired." [2]

In the discussion regarding performance indicators in the U.S. the primary focus of attention has been cost efficiency and undergraduate education with less attention paid to graduate education and research. There is an apparent desire in some quarters that graduate education be more responsive to a free-market economy, that the production of Ph.D.s in certain subject areas somehow be

streamlined, and that private-public partnerships be encouraged. If this trend intensifies, research universities in the U.S. may become more like corporate entities whose performance is judged by direct observable connection to the economic welfare of the country. For example, contemporary indicators pointing toward this trend include stronger emphasis on scientific and technical education, efforts toward better management of intellectual property produced at universities, the move to privatize the National Information Infrastructure (NII), and sustaining the U.S. competitiveness in the international marketplace.

THE CONTEXT OF PERFORMANCE INDICATORS IN ACADEMIC LIBRARIES

Academic research libraries also feel the pressures of shifting from a management system accustomed to increased revenue and growth to systems that demand more evidence of efficiency and effectiveness. In 1992, ARL published a study prepared for The Andrew W. Mellon Foundation that analyzes the economic trends of research libraries in the context of the larger academic and publishing trends. This study identifies historical changes and technological challenges that affect and transform academic libraries. [3]

Also, libraries have recognized the need for output and performance measures. ARL responded to these calls by including in the supplementary portions of the ARL Statistics data on circulation, instructional sessions, and reference transactions, together with interlibrary loan and document delivery statistics, despite some concerns about the validity and reliability of such measures. As a next step, ARL decided to distribute this report on selected ratios drawn from ARL data. Efforts here are developing, in both senses of the word, i.e., still primitive and under development.

In addition to ARL's efforts, there have been a number of projects by other organizations that have tried to develop indicators or "benchmarks" for academic library operations, oftentimes within a larger institutional framework. It is important that as such library indicators are developed that they address the strengths and weaknesses of the different measures. An ambitious effort undertaken by the National Association of College and University Business Officers (NACUBO)[4] aims at developing benchmarks for 39 functional areas in universities. The library is one of 39 "functional areas" for which data were collected sandwiched between "legal affairs" and "mail room." ARL advised NACUBO on the development of the library portion of the survey, and as a result, the NACUBO library survey is almost a duplicate of the ARL survey. Unfortunately, some have taken the data collected by NACUBO as "indicators of efficiency," and "best practices," even as indicators of "quality," despite ARL's long-standing caution against such interpretations. Ratio analysis, which is the way most of the results were reported by NACUBO, is not benchmarking and does not answer questions; ratios of this sort provide a basis to ask questions.

Another organization conducting such initiatives is John Minter Associates. Their efforts to develop indicators in colleges and universities are built upon the Integrated Post-secondary Educational Data System (IPEDS) and thus published with the same delay that afflicts IPEDS surveys. Academic Library Statistical Norms 1992 is the latest of a series of publications issued by Minter since 1988 using the biennial IPEDS Academic Libraries datafile to report 101 "measures" on academic libraries. The publication reports ratios for different types of libraries in groups that are based on the Carnegie Classification System. The authors understand the limitations of ratio analyses and clearly point out in the introduction that

> "... each comparison takes on meaning only in light of management goals. Does the measure exceed, meet, or fall short of the desired goal? Why? In the absence of a stated goal the question then becomes, 'Is the position of this measure where we wish it to be? Why?' Operating

> measures are not of equal importance nor of the same importance to different institutions. It is unlikely that an institution will give equal consideration to all 101 measures. Institutional context and administrative vision are two reliable guides to the importance of particular measures. Over time, the focus on particular measures will shift as goals are achieved and institutional context changes." [5]

Both Minter and NACUBO report ratios for groups of institutions to protect the confidentiality of the institutions. Although ratios may be misinterpreted by those who are not familiar with each institution's goals and circumstances, there is a need for disclosure and openness. Non-disclosure of institutional data works against understanding of data anomalies and subsequent correction of reported errors. The challenge of a disclosure strategy involving individual institutional data entails investment of effort in educating the public, legislators, and university administrators about how to interpret numbers related to libraries and other higher education functions.

FACTORS AFFECTING THE RELIABILITY AND VALIDITY OF DATA

There are at least three major issues that need to be taken into account in assessing the reliability and validity of data generally and of academic library data in particular: consistency across institutions and through time; ease vs. utility in gathering data; and values, meaning, and measurements.

CONSISTENCY

Lack of consistency in the way data are collected from institution to institution and in the way data are collected over time within the same institution create problems in describing cross-sectional comparisons and time-series trends. There are no processes in place to guarantee compliance with standard definitions, with the result that comparability of data across institutions may legitimately be questioned. The existence of the extensive "Footnotes" section of the ARL Statistics publication testifies to the importance of recognizing the limitations of reported data.

One way to overcome inconsistencies from institution to institution is to develop standards for reporting data across common automated systems. (Such standards have been developed in higher education for transferring student records.) In order to develop parallel applications for libraries, at least to the level of sophistication of student records, concerns such as the confidentiality and privacy issues related to patron records and Internet transaction logs will have to be addressed.

EASE VS. UTILITY

Performance indicators are being developed from data that can be gathered easily. Of course, what is easy to measure is not necessarily what is desirable to measure. It is always tempting to set goals based on the data that are gathered rather than developing a data gathering system linked to assessing progress towards meeting established goals. For example, this report lists thirty ratios that are derived from existing data that ARL collects on an annual basis. Because the ARL data reflect the historical and traditional roles of academic libraries, the ratios calculated and printed in this report are primarily input indicators.

VALUES AND MEANING

There is a danger of blurring the distinction between the value system that is reflected in certain

indicators and the indicators themselves. For example, in developing a system of measures to track library performance regarding the cost of serial subscriptions or of monographs (see ratios on unit cost of serials, Table 12, and unit cost of monographs, Table 11) there are certain values behind the numbers which can be fundamentally different from library to library. These values and the interpretation of the measures therefore can have meaning only in the context of local circumstances. For example, a low unit cost for serial subscriptions may be extremely important for one institution, while another may assert that high quality service can be guaranteed only by acquiring the most costly scientific and technical journals, thus yielding a higher unit cost per serial subscription.

Another ratio that is often calculated is library expenditures per student or faculty: Does the library which spends more per student or per faculty offer better service? Or is this a sign of inefficiency? What is the relationship between library spending levels, usage, and educational achievement or user satisfaction? The data ARL collects cannot answer the latter questions. Therefore the meaning and value assigned to these ratios must be developed locally.

The movement for performance indicators, which appears to be a near-universal phenomenon, derives in part from the need to define a value system for higher education in an era of unprecedented change and technological innovation. As we explore further institutional value systems and establish measures that reflect these values, we will hope to be better able to define and measure quality in higher education and in academic and research libraries. As a first step, the ratios reported here can serve a dual purpose, although a limited one:

(a) to identify whether a relative position in the rankings for these ratios is that expected and desired for an institution, and

(b) to compare an institution against its peers, especially over time.

ARL has an electronic edition of the recent annual statistics which has been prepared by Spencer Graf at the University of Virginia <http://www.lib.virginia.edu/socsci/arl/test-arl>. Via this electronic publication a reader can calculate interactively any conceivable ratio among the data elements. This publication in some ways replicates part of what is available on the World Wide Web (WWW), but it also provides a comparison of the 1993-94 and the 1994-95 years for each of these ratio values for each ARL institution. An effort was made to include these ratios that are perceived as being of interest to ARL directors; a group discussion of directors was held and there was consensus that the 30 ratios presented in this report are useful and should be made publicly available.

TYPES OF RATIOS AND ORGANIZATION OF THE TABLES

There are three types of ratios included in this report: percentages, relational, and annual changes.

There are thirty ratios in this report, each ratio being reported in three tables (Table a, Table b, and Table c for each ratio). For each ratio, tables a and b provide the value of the ratio in 1993-94 and in 1994-95, with the difference in the ratio between the two years. Table a is sorted on the value of the ratio in 1994-95, while Table b is sorted on the difference between the values of the ratio in 1993-94 and in 1994-95. Table c lists the data used to calculate the ratios for both 1993-94 and 1994-95 and is sorted alphabetically by institution name.

Caution is necessary when one tries to interpret these ratios. What is the appropriate level of relation between items borrowed and items loaned in the local library context? Is the relation between library expenditures per faculty or per student relevant to the goals of the specific library?

Answers to these questions must be arrived at locally.

Percentages, i.e., part-whole relations, is one of the three types of ratios included in this report: a percentage describes the proportion of the whole represented by a specific category. For example, the number reported for total staff is the sum of three categories, professional staff, support staff, and student assistants. Ratios 1 through 3 report what percentage of total staff is represented by professionals, support staff, and student assistants, respectively, for each ARL library. Browsing through Table 1.a, which lists libraries based on the percentage of professional staff, one can see that Canadian libraries tend to have a smaller proportion of professional staff. Table 2.a, which reports percentage of support staff, indicates that many Canadian libraries have a larger proportion of support staff compared to most U.S. counterparts. The following ratios report percentages:

Ratio 1: Professional Staff as a Percentage of Total Staff
Ratio 2: Support Staff as a Percentage of Total Staff
Ratio 3: Student Assistants as a Percentage of Total Staff
Ratio 6: Serials Expenditures as a Percentage of Library Materials Expenditures
Ratio 7: Library Materials Expenditures as a Percentage of Total Library Expenditures
Ratio 8: Binding Expenditures as a Percentage of Total Library Expenditures
Ratio 9: Salary Expenditures as a Percentage of Total Library Expenditures
Ratio 10: Operating Expenditures as a Percentage of Total Library Expenditures

Relational change between two variables is the second type of ratio to be found here, i.e., how much of something for each unit of something else: If we are interested in the relation between two variables, we may want to describe the relation between them by dividing the two different quantities. For example, if we want to describe the relation in interlibrary lending/borrowing between items loaned and items borrowed by a library, we can divide items borrowed into items loaned and calculate Ratio 5. Here we have items loaned as the nominator and items borrowed as the denominator. Thus the ratio represents the number of items loaned for each item borrowed. If the number of items borrowed is larger than the number of items loaned, the resulting ratio will be less than one. As you can see in Table 5.a there are only fifteen ARL libraries that borrowed more items than they loaned in 1995. The majority of ARL libraries loaned slightly more items than they borrowed.

The relation between library expenditures and the size of the student/faculty body seems to be of interest to library and university administrators. Table 14.a reports total library expenditures per faculty, which range from $5,011 per faculty member to $40,057 per faculty member. Also, 80% of the values range between $473 to $1,842 for library expenditures per student (Table 23.a).

The ratios reporting relations between two variables in this report are:

Ratio 4: Ratio of Support Staff to Professional Staff
Ratio 5: Items Loaned over Items Borrowed
Ratio 13: Items Borrowed per Faculty
Ratio 14: Total Library Expenditures per Faculty
Ratio 15: Volumes Added (Gross) per Faculty
Ratio 16: Volumes Held per Faculty
Ratio 17: Paid Serial Subscriptions per Faculty
Ratio 18: Monographs Purchased per Faculty
Ratio 19: Faculty per Total Staff
Ratio 20: Library Materials Expenditures per Faculty
Ratio 21: Serials Expenditures per Faculty
Ratio 22: Items Borrowed per Student
Ratio 23: Total Library Expenditures per Student

Ratio 24: Volumes Added (Gross) per Student
Ratio 25: Volumes Held per Student
Ratio 26: Paid Serial Subscriptions per Student
Ratio 27: Monographs Purchased per Student
Ratio 28: Total Staff per Student
Ratio 29: Library Materials Expenditures per Student
Ratio 30: Serials Expenditures per Student

A special subcategory of relations between two variables is the case when one variable represents expenditures and the other variable represents units bought or served. For example, if we divide the expenditures for serial subscriptions by the number of paid subscriptions, we calculate the unit cost per subscription; Table 12.a reports the smallest institutional unit cost per subscription ($90.80) vs. the highest ($383.50). Unit costs in this report include:

Ratio 11: Unit Price of Monographs
Ratio 12: Unit Price of Serials

Last, annual changes in the ratio values is the third type of ratio calculated here, i.e., in what direction is a specific ratio moving (up or down) through time and is this a reflection of changes in local goals and objectives or unforeseen externalities and pressures? In this report, for each ratio we have calculated the difference between 1993-94 and 1994-95 and sorted Table b for each ratio based on the difference between the value of the ratio in these two consecutive years. For example, Table 12.b reports that the unit price per serial subscription has gone down in seventeen ARL libraries. Was this a reflection of any local goals to cancel serial subscriptions with high costs and to increase the number of serial subscriptions with low unit cost?

On the other hand, several other libraries paid more per serial subscription in 1994-95 than the year before, despite the fact that they canceled large numbers of serial subscriptions in the meantime. Is this an indication that serial subscription cancellations have taken place based on other criteria, such as the relative importance of some departments to the mission of the university, etc., and as a result of such a decision the unit costs have increased? In making comparisons across time for specific institutions, special care should be given to the fact that organizational data may vary for a multitude of reasons that are not obvious to an observer unfamiliar with the local scene. Following up with questions to specific institutions and identifying the specific circumstances that may have resulted in an apparent change in numbers before reaching any conclusions is essential.

ORGANIZATION OF THE REPORT

The ratios have been organized in three groups. The first group (Ratios 1 through 12) includes the first twelve ratios that report data on internal library operations. Summary statistics on this group of ratios have been reported in the ARL Statistics since 1977-78. There are distinct subgroups among these twelve ratios; for example, the first four ratios describe relations between staffing groups (professional, support, and student assistants); another subgroup consists of the ratios reporting percentages from total library expenditures (i.e., library materials, salaries, binding, and operating expenditures).

The second group of ratios (Ratios 13 through 21) report resources per faculty, and the third group of ratios (Ratios 22 through 30) resources per full-time student.

INTERPRETING RATIOS AND PERCENTAGES

For a more complete understanding of why a ratio value is trending up or down, it is essential to look at the third table for each ratio, where the actual data are reported. Ratio analysis can be useful in describing general trends but one should remember that a ratio can increase in two ways--a larger numerator or a smaller denominator-- thus examining the actual data is of paramount importance. Also, we are dealing with only two years of data; trend analysis typically requires several years of data. Gradually, through annual compilations of this report, ARL libraries will be able to build graphs depicting the development of key measures among these thirty ratios.

Caution also needs to be exercised when one is interpreting percentages. For example, a 100% increase may mean that a library has doubled its size in a variable, but this value can reflect quite different numbers. For example, it is one thing if the library bought 10,000 monographs in a given year instead of 5,000 the year before, and quite another if a library bought 60,000 monographs instead of 30,000 the year before. Both cases represent a 100% increase, but obviously quite different circumstances. A very interesting case exemplifying the above point is Harvard University. Table 7.a lists the expenditures for library materials as a percent of total library expenditures, where Harvard is listed as the library that spends 21.9% for library materials out of its total budget in 1995, the smallest percentage among all ARL libraries and getting smaller. However, Harvard spent by far the largest amount for library materials among all ARL libraries ($14,979,412 in 1994-95). Ratios are not the only indicators that can be used to describe the condition of research libraries. Techniques such as regression analysis and growth rates can be employed. Factor analysis is another method that ARL has used in developing what is known as the ARL membership index, a summary indicator of the investment made by a university in library resources.

CONCLUSION

Existing data on ARL libraries are limited to inputs and some gross measures of output. Collecting these data is a challenging task and the work that has been accomplished so far would not have been possible without the efforts of numerous professionals in the ARL libraries over many years.

At the same time, there is a great need to develop outcome and impact measures, i.e., to assess the extent to which the library and its programs improve the quality of research and teaching, enhance student achievement and satisfaction, so as to aid library and university leaders in better managing resources. The Statistics and Measurement Program is developing a research agenda that attempts to answer questions about the quality and costs of library services and has initiated meetings among leaders in ARL libraries to discuss local initiatives in user evaluation. The work goes on.

Martha Kyrillidou
ARL Program Officer for Statistics and Measurement
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FOOTNOTES

1 Ian Winkworth, "Performance Indicators" Librarianship and Information Work Worldwide, ed. Graham McKenzie and Ray Prychirch (London: Bower Saur, 1993), 171-191.

2 Gerald Gaither, Brian P. Nedwek, and John E. Neal, Measuring Up: the Promises and Pitfalls of Performance Indicators in Higher Education ASHE-ERIC Higher Education Report No. 5 (Washington, DC: George Washington University, Graduate School of Education and Human Development, 1994), v.

3 Cummings, Anthony M., et. al. University Libraries and Scholarly Communication (Washington, DC: ARL, 1992).

4 NACUBO, "Benchmarking for Process Improvement in Higher Education: a Prospectus" Coopers and Lybrand with the assistance of Barbara S. Shafer and Associates, FY 1994.

5 Academic Library Statistical Norms 1992 (Boulder, Colorado: John Minter Associates), 2.

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