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THE CHARACTERISTICS ASSOCIATED WITH PERCEIVED QUALITY IN SCHOOLS OF LIBRARY AND INFORMATION SCIENCE[1]

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The purpose of the present study is to determine, by building a model that predicts a judgment of perceived quality, what the profession means by "perceived quality of schools of library and information science." The study examines quantifiable characteristics of two groups of library schools: those ranked in both of Herbert S. White's perception studies and those not ranked in both. Multiple regression and discriminant analysis were used to build a model that showed clear differences between the two groups of schools. On the basis of several variables that define aspects of a program's size, finances, age, leadership, and rigor, the analysis showed that ranked and unranked schools form two mutually exclusive groups whose membership can be predicted with better than 98 percent accuracy. It also showed the perceived quality of a school's master's degree (M.L.S.) program is associated with the following variables, listed in decreasing order of importance: the half-life of the school's doctoral graduates, its budget and outside income, its age, its faculty's productivity, and the number of its students.

Introduction

The literature of library and information science education is noteworthy for its abiding sense of confusion and inertia when discussing the

1. This article is a condensation of my dissertation [1]. For their gracious and patient help in completing this study, I would like to thank the members of my committee: Margaret Kimmel, the chair; Blanche Woolls and Ellen Detlefsen of the University of Pittsburgh; and Daniel O'Connor of Rutgers University. Special thanks are also due to the editor of *The Library Quarterly*, Stephen Harter, the anonymous referees, and Daniel O'Connor for their help in the preparation of this manuscript.

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idea of quality because the library community, much less the library education community, has not agreed upon what constitutes a quality library and information science education program. On the contrary, there has been continuing debate within the profession over the nature of librarianship. This debate is at the heart of the theory versus practice, generalist versus specialist, education versus training, and librarian versus information scientist/specialist arguments that have engaged the profession for years.

Some might argue that the 1972 *Standards for Accreditation* [2] of the American Library Association Committee on Accreditation (COA) are an agreed-upon definition of quality. Given the large and persistent body of literature criticizing the standards and their application, this is hardly a realistic argument.

Richard W. Budd, taking his cue from Marshall McLuhan's aphorism, "We shape our tools, and thereafter our tools shape us," called for the library and information science education community to completely rethink not only the entire process of accreditation but also the very necessity for such a process [3]. Budd suggests that it is unclear whether the accreditation process is shaping library and information science education programs or whether the goals of library and information science education are determining the means used to ensure its quality. What is clear to him, though, is that the library and information science education community must first decide the reasons for which it is educating students. Then and only then can it take appropriate measures to ensure the quality of its programs and of their students and graduates. It is also clear to Budd that few schools of library and information science aspire to, much less achieve, any degree of excellence.

It is against this background that Mary Biggs and Abraham Bookstein report that there is little agreement among library and information science faculty on what constitutes a quality school. They state, "All that is clear is that very little is clear—in many individuals' minds and certainly in the 'group mind'—regarding the appropriate mission, scope, structure, content, and implementation of education in schools of library and information science at this critical period in their history" [4, p. 46].

Which are the quality schools of library and information science? There have been various attempts to answer this question. The first, according to Danton, was the Berkeley study conducted in 1956 [5]. This was followed in 1970 by Carpenter and Carpenter's study [6]; in 1973 by a similar study by Margulies and Blau [7]; in 1974–75 by another study by Blau and Margulies [8]; in 1979 by a study by Laurent-G. Denis [9]; in 1981 and 1987 by the two perception studies by White [10,

11]; and in 1985 by the third edition of the frivolous *Gourman Report* [12, 13]. There have been no attempts, however, to answer why certain schools—the same schools—are highly regarded and others are not.

White's two perception studies, conducted in 1980 and 1986, give the results of surveys of library and information science faculty and directors belonging to the Association of Research Libraries (ARL). He lists those schools mentioned most frequently by his respondents as having the highest-quality master's programs and the highest-quality doctoral programs and those schools whose faculty contribute most to the profession.

Bookstein and Biggs published their critique of the second White study in 1987 [14]. They surveyed by telephone forty-five randomly selected library and information science faculty—many of whom also were surveyed by White—in an attempt to study the perception study genre in general and the methodology of White's second study in particular. They found that although the same schools were ranked in both studies, the order of any such ranking was not reliable and that faculty make judgments based on little specific knowledge of the individual programs and based on little shared belief in any specific criteria for measuring quality.

In 1988, Biggs and Bookstein published their follow-up study of school quality [4]. Based on the same telephone survey, they reported more fully on their finding that there was little agreement on the nature of quality in library and information science education. The only characteristic of quality that more than half of their respondents (62 percent) listed was faculty productivity: at higher-quality schools faculty are more involved in research and publication. In all, they list twenty-four different criteria mentioned by more than 11 percent of their respondents. They point out that money and teaching quality were rarely mentioned as important and that only a few library school faculty seem to care about major issues in the profession today such as the impact of technology on the profession and the increasing insecurity of library and information science education programs.

In his second study, White suggested that the perceived top schools should be compared with the others to determine why they are so perceived and to shed light on whether the standards need to be changed or new guidelines established for COA to assure the quality of library and information science education programs [11, pp. 263–64]. The present study compared those schools that were ranked in both of White's perception studies with those that were not. Its ultimate purpose was to fashion a model that identifies the variables that are highly associated with "quality." To the extent that members of the profession con-

sciously or unconsciously apply criteria involving these variables, the present study has the goal of identifying how the profession defines quality.

In particular, the research questions addressed are: (1) How do ranked schools differ from unranked schools in relation to certain indicators of quality? (2) Can characteristics associated with perceived quality be developed from this evidence?

This study assumed that perception studies represent a consensus of professional opinion regarding the quality of library and information science education programs. It further assumed that the perception studies cited herein are the single major indicator to the profession and the general public of the quality of library and information science education programs today.

Methodology

Several different methodologies were used during the course of this study: content analysis, elementary descriptive statistics, multiple regression, and discriminant analysis. Content analysis and elementary descriptive statistics were used because of the intrinsic nature of the variables under study and the available sources of information. The multivariate statistical techniques of multiple regression and discriminant analysis were used because they enable a composite picture to be formed both of the relative importance of the different variables and their correlations and of the differences between the two groups of schools.

Variables

Several indicators have been suggested in the literature as hallmarks of quality. For purposes of measurement in this study, these variables have been divided into two groups, quantitative and qualitative; this article reports on the quantitative variables only.

Since White's two perception studies were conducted in 1980 and 1986, the statistics to be analyzed have been obtained, where possible, from those years. Most of the data come from readily available public sources. Other data sources needed were the catalogs for each school of library and information science and each school's dean's resume. To obtain the latter, a letter was sent to the deans of those programs under study. "Dean" is here defined as whoever is listed on the COA accredited list. The quantitative variables, given in parentheses below, were operationally defined and measured as follows:

1. *The faculty should be engaged in research and should obtain grant funding to support it.*—This is the most important of Biggs and Bookstein's criteria although they do not mention grant money. Varlejs and Dalrymple [15], Hayes [16], and White [17, p. 254] speak of the importance of this variable; Dyer and O'Connor [18] speak of the importance of the prestige that faculty research brings.

This variable was measured in two ways. (*a*) Faculty research output (CITED). This variable was treated dichotomously; a school was cited as having a productive faculty if that school was among the top twenty in publication output per faculty member in the study of Varlejs and Dalrymple [15] or was among the top twenty in citations per tenured faculty member in the study by Hayes [16]. If a school was listed in either study, it was scored 1; if it was not, it was scored 0. (*b*) External grant funding (OTHER86). External grant support was measured from figures reported by the Association for Library and Information Science Education (ALISE) [19, pp. 208–10; 20, pp. FIN-8–FIN-9]. The 1987 report lists six categories of income: parent institution, federal grants/contracts, continuing education activities, endowment/trust funds, state/provincial grants/contracts, and other; the 1981 report lists only three: parent institution, federal, and other. For each school, income from the "federal" categories was recorded, as was income from all sources other than the parent institution.

2. *The school should have a doctoral program.*—The fifth most important in Biggs and Bookstein's list, this variable is mentioned by 31.1 percent of their respondents. This variable was examined in several ways. (*a*) The presence of a doctoral program (PHD). This variable was treated dichotomously; the data were determined from the March 1987 accredited list published by the COA. A school with a Ph.D., D.A., or D.L.S. program was scored 1; one without such a program was scored 0. (*b*) Half-life of doctoral graduates (PHD12LF). This is a variation on the variable above. Half-life is defined as the difference between 1988 and the year in which the school graduated the first 50 percent of its total doctorates. This information was gathered from an online search of library and information science dissertations listed in the *Dissertation Abstracts* database, using DIALOG. The search protocol was: library (1w) information (w) science OR library (w) science OR information (w) science. (*c*) Number of doctoral graduates (PHDX). This information was gathered from the same online search of *Dissertation Abstracts*.

3. *The size of the faculty* (FTEF86X).—"Critical mass" proponents [21, 22] feel this variable is very important to the quality of a library school, but

only 17.8 percent of Biggs and Bookstein's faculty think it so. This variable was measured by counting the number of full-time, part-time, and full-time-equivalent (FTE) faculty as reported by ALISE [19, pp. 46 ff.; 20, pp. F42 ff.]. In all cases, data were reported for the fall semester.

4. *The size of the student body* (FTES86X).—This is important to Dyer and O'Connor, who state that to administrators quality is success and that success equals large enrollments. To "critical mass" proponents, quality is impossible without a certain number of students in the program. This criterion does not appear on Biggs and Bookstein's list. To measure this variable, the enrollment of full-time, part-time, and full-time-equivalent students was counted using data reported to ALISE [19, pp. 87–88; 20, pp. S12–S15].

5. *The size of the budget of the school* (TOTAL86).—The size of the budget is very important to the advocates of "critical mass," but only 20 percent of Biggs and Bookstein's faculty deem it so. It was ascertained using ALISE statistics [19, pp. 208–10; 20, pp. FIN-8–FIN-9].

6. *The program should be rigorous.*—The notion of rigor is mentioned by White [17, p. 254]; it is not mentioned—although several other aspects of the curriculum are—on Biggs and Bookstein's list. The rigor of a program does not readily lend itself to quantification. An attempt was made, however, to analyze several possible aspects of the concept of rigor. Program rigor was measured here in four different ways.

a) Contact hours (CONTACT). The number of contact hours was counted, based on the assumption that in a more rigorous program, students should have more potential classroom contact with their professors. Contact hours was defined here as the number of credit hours needed for the M.L.S. degree, taken from the current edition of the school's catalog, multiplied by the number of weeks in that school's term, taken from statistics reported to ALISE [23, pp. 147–48].

b) Rigor index (RIGOR). A rigor index, based on information obtained from each school's catalog, was constructed. Schools were scored from 0 to 6 based on the following points: (1) the presence of an end-of-program assessment; (2) the presence of prerequisites; (3) the presence of a core curriculum; (4) the presence of a required research methods course; (5) the presence of a required field experience; and (6) the presence in the catalog of any mention of library school faculty or student honors and awards.

It was assumed here that a rigorous program would require its students either to defend a thesis or pass a comprehensive examination

at the end of the program; would require for admission that they be knowledgeable in such subjects as foreign languages, computer languages and programming, and basic statistics; and would have core courses that would consist in part of an internship and a research methods course. It was also assumed that a rigorous program would have students and faculty who are honored for their teaching or who have had significant achievements and would, as far as is possible, mention these accomplishments in its catalog.

c) The percentage of listed courses actually taught (TAUGHT). The data were taken from statistics reported to ALISE [24, pp. 182–84]. It was assumed that a rigorous program would not have its catalog inflated with unoffered courses.

d) Size of the core curriculum (CORE)—that is, the percentage of the curriculum that is taken up by core courses. A "core" course was here defined as one every student is required to take. These data were gathered from the schools' catalogs. It was assumed here that a rigorous program would have a more substantial core.

7. *Teaching quality.*—This is thought very important by Hannigan [25] and by 33.3 percent of Biggs and Bookstein's respondents. It was investigated as part of the rigor index under the assumption that teaching excellence would be recognized and publicized in a school's catalog.

8. *Library resources.*—Library resources are important to White and to Biggs and Bookstein's survey respondents, who ranked this variable sixth. Under the assumption that one indicator of a university's commitment of library resources to its library and information science program is the presence of a separate departmental library, the *American Library Directory 1986–1987* [26] was examined to ascertain the following: (*a*) The number of separate school of library and information science libraries (LSLIB). This variable was treated dichotomously. (*b*) The average number of volumes in such a library.

9. *Equipment resources* (MCSS86).—That a school should have adequate and up-to-date equipment resources is important to White, but only 13.3 percent of Biggs and Bookstein's faculty think it is necessary, in order to maintain quality, that the curriculum incorporate new technology. The number of support staff (including students) in the schools' media services and computer laboratory was measured under the assumption that equipment resources need support staff to maintain them and to assist in their use, and that the more extensive the equipment resources are, the more support staff will be needed. The data were

obtained from statistics reported to ALISE [19, pp. 74–77, 79–82; 20, pp. F62–F66, F69–F73].

10. *The graduates of the school should fare well professionally* (GRAD85).—This criterion is very important to Hannigan, and under several different guises, appears in Biggs and Bookstein's list: 20 percent of their faculty respondents think it is a measure of quality that graduates achieve administrative positions; 17.8 percent think they should be of high intellectual quality; and 13.3 percent think they should become professional leaders.

The Bowker Annual [27, 28] each year contains a table entitled, "Placements and Salaries of Graduates." Under the assumption that higher starting salaries mean that graduates fare better professionally, the average starting salaries for graduates were compared for 1979 and 1985. Although the figures reported in *The Bowker Annual* have been criticized for being inaccurate and incomplete, they are being used here because they are the only figures readily available. It was assumed also that both ranked and unranked programs would be equally affected by geographic and cost-of-living factors that could influence the salaries their graduates receive.

11. *The leadership of the school* (LQ).—Paris [29] mentions an imaginative and diplomatic leader as being vital to the success of a school; only 17.8 percent of the faculty in Biggs and Bookstein's survey feel it necessary. To measure leadership, a leadership quotient was established based upon a content analysis of each dean's curriculum vitae. It was assumed for this part of the study that resumes would cite countable instances of recognizable leadership. The resumes were examined by a panel of three readers, all practicing academic librarians. They were requested to count instances of leadership in the following areas: (1) Professional library and information science association activities: Are instances (not including honors and awards) cited in the resume that lead you to conclude that this person is recognized as a state or national leader by the profession? (2) Activities influencing public policy: Are instances cited in the resume that lead you to believe that this person has spoken to various library and information science issues beyond the bounds of the profession—to the state, the nation, and the world? (3) University administration: Are instances (not including honors and awards) cited in the resume that lead you to believe that this person is recognized as a leader on his or her campus? (4) Productive scholarly output: Are significant publications (for example, those which have influenced the profession) listed on the resume? (5) Awards and honors: Has this person received any honors or awards in recognition of his or her leader-

ship? Occurrences were then totaled and one score recorded for each school.

As a result of lower correlations (.668 and .653) between the totals counted by one scorer and the other two, that scorer was dropped. The correlation between the totals counted by the two remaining scorers was .826.

In addition, several other variables were examined:

12. *The age of the master's program* (AGE).—The data were taken from the *Journal of Education for Library and Information Science Directory Issue 1987–1988* [30], which gives the date the library education program was founded.

13. *Student/faculty ratio* (STFAC86).—This was computed from FTEF86X and FTES86X above.

14. *Dollars per FTE student* (FTES86).—This was computed from FTES86X and TOTAL86 above.

15. *Dollars per FTE faculty member* (FTEF86).—This was computed from FTEF86X and TOTAL86 above.

16. *Number of times ranked* (NUMRANK).—The various perception studies mentioned above (Carpenter and Carpenter [6], Margulies and Blau [7], Blau and Margulies [8], Denis [9], and White 1981 [10] and 1987 [11]) were examined to determine how many times each M.L.S. program has been ranked. Schools were scored from 0 to 8, since each of White's studies reports separately the results of two surveys, one of library and information science faculty and one of ARL directors. This is one measure of school "quality" used in the present study and serves as the dependent variable in the multiple regression analysis, to be discussed later.

Population

The population of fifty-seven accredited schools was divided into four groups. Group 1 consists of those schools listed in both White's 1980 and 1986 studies as having the top quality masters' programs or as having faculty who contribute significantly to the advancement of the profession. This provides a core of schools viewed by the profession during the present decade as being of high quality. Group 1 consists of seventeen schools. Group 2 consists of those schools not listed in either of White's studies. This provides a core of schools viewed by the profession throughout the present decade as being of somewhat lesser quality.

Group 2 consists of thirty-six schools. Group 3 consists of those schools listed in White's 1986 study but not in his 1980 study. Group 3 consists of two schools. Group 4 consists of those schools listed in White's 1980 study but not in his 1986 one. Group 4 consists of two schools.

To be included, schools had to be in existence and fully, not conditionally, accredited at the time of both of White's studies. For the statistical analyses, group 3 and group 4 schools were, because of their small number and because they were not consistently ranked, included in group 2. See Appendix A for a list of schools by group.

Data treatment

These data were entered into a Lotus 1-2-3 spreadsheet, and basic descriptive statistics and frequency counts were computed. These statistics gave a good deal of information on the differences between the two groups of schools. They did not, however, by themselves enable a composite picture to be formed of the relationships among the different variables. Given the nature of the statistics to be analyzed—some nominal, mostly interval or ratio scale—two multivariate methods present themselves: multiple regression and discriminant analysis. Given the focus of this study on identifying characteristics of ranked and unranked schools, discriminant analysis was chosen as the primary methodology because, unlike multiple regression, it is meant to be used when the dependent variable is nominal and there are two or more groups. Here the dependent variable is dichotomous: Is the school ranked or unranked? Discriminant analysis enables the researcher to predict group membership based on the analysis of several independent variables [31, pp. 7 ff.].

A secondary means of analysis, multiple regression, was also used. In it, the dependent variable was not the school's ranked or unranked status but, rather, the number of times the school was ranked. The multiple regression results show the relative importance of the different independent variables in explaining variability in the dependent variable.

In the interests of simplicity and currency, the decision was made to run the multiple regression and discriminant analysis reports on 1985–86 data. Certain of the variables postdate this period (the percent of listed courses taught, the rigor index, the percent of the curriculum that is the core, the number of contact hours, the "leadership quotient," Ph.D. half-life, and the number of Ph.D. graduates), and one predates it (faculty productivity). Most of these variables deal with a school's leadership and curriculum; they all reflect the situation as close to the present as is possible. It is necessary here to assume, notwithstanding recent events at Columbia University and the University of Chicago, a certain

amount of consistency on the part of the school: that there had been no drastic change—change drastic enough to alter significantly the profession's opinion of the program—between 1985–86 and 1988–89 in either the school's leadership, its curriculum, or its finances.

Results

Impressionistically, the descriptive statistics for the independent variables clearly indicate that there are distinct differences between ranked and unranked schools for many variables and that the differences were just as sharp in 1979–80 as they were in 1985–86. These statistics are shown in tables 1 and 2.

Differences are especially apparent for the age of the master's pro-

TABLE 1
VARIABLE MEANS AND STANDARD DEVIATIONS, 1979

	RANKED SCHOOLS		UNRANKED SCHOOLS	
VARIABLES	Mean	Standard Deviation	Mean	Standard Deviation
Federal monies ($)	96,744	91,433	26,706	37,111
"Other" monies ($)	158,247	139,522	43,982	52,674
Total budget ($)	920,857	336,910	433,853	193,434
Full-time faculty	13.71	3.49	9.33	2.59
Part-time faculty	6.76	6.18	3.08	2.40
FTE faculty	15.19	4.36	10.21	2.68
Full-time students	80.35	33.51	48.81	32.01
Part-time students	89	80.1	79.76	50.05
FTE students	121.41	34.96	80.44	36.6
Dollars per FTE faculty	54,485	11,790	40,932	8,692
Dollars per FTE student	7,881	3,411	5,815	2,199
Graduates' salaries ($/year)	13,485	1,034	13,021	1,266
Media/computer center staff	.77	.80	.71	.97

TABLE 2

VARIABLE SCORES, MEANS, AND STANDARD DEVIATIONS, 1985

VARIABLES	RANKED SCHOOLS		UNRANKED SCHOOLS	
	Mean (Score)	Standard Deviation	Mean (Score)	Standard Deviation
Ph.D. half-life	9.1	5.5	1.4	2.7
Federal monies ($)	79,561	86,282	29,018	53,823
"Other monies" ($)	204,664	153,955	61,143	85,737
Total budget ($)	1,318,835	574,719	613,207	320,330
Full-time faculty	13	3.97	8.68	2.15
Part-time faculty	7.63	4.66	3.89	2.98
FTE faculty	15.26	4.64	9.85	2.16
Full-time students	82.53	39.85	50.63	35.52
Part-time students	135.07	101.5	91.32	65.73
FTE students	142.63	35.9	90.89	46.6
Dollars per FTE faculty	86,144	18,132	60,688	13,773
Dollars per FTE student	9,602	2,692	7,440	3,139
Student/faculty ratio	9.44	1.60	9.18	3.42
Graduates' salaries ($/year)	19,946	1,687	19,586	1,429
Media/computer center staff	3.01	4.1	1.15	1.4
Age of master's program (years)	65	25.1	37	22.2
Faculty research output	(13 of 17) [76%]		(9 of 40) [23%]	
Presence of doctoral program	(15 of 17) [88%]		(6 of 40) [15%]	
Presence of library school library	(10 of 17) [59]		(10 of 40) [25%]	
Volumes in library school library	102,640	113,427	28,047	14,220
Percent of listed courses taught	83.4	13.30	78.5	13.11
Percent of core curriculum	30.5	.12	40.1	.14
Rigor index	2.12	1.4	2.45	1.1
Contact hours	610.625	112.7	575.825	63.8
Leadership quotient	49.03	56.1	29.49	17.6

gram, faculty research output, presence of a doctoral program, presence of a library school library, numbers of media and computer center support staff, leadership quotient, and the different variables dealing with the program's size. Other variables, however, do not seem to differ greatly for the two groups, including percent of courses taught, contact hours, student faculty ratio, rigor index, and graduates' salaries.

Further analysis of the leadership quotient revealed the following: after two follow-up letters, fifty-one deans had returned their resumes; the six who did not were from unranked schools. The scorers counted a total of 3,523 items: 1,953 (55.4 percent) significant publications, 862 (24.5 percent) instances of professional leadership, 406 (11.5 percent) instances of public policy leadership, 188 (5.3 percent) honors, and only 114 (3.2 percent) instances of campus leadership. On twenty-six resumes, eight from deans of ranked programs and eighteen from deans of unranked programs, the scorers counted no instances of campus leadership.

Analysis of the rigor index revealed the following: (1) Unranked schools (twenty-three of forty versus six of seventeen) are far more likely to require a research methods course. (2) Unranked schools (twenty of forty versus four of seventeen) are far more likely to require an end-of-program assessment. (3) Few schools (two ranked and six unranked) had stated course prerequisites for entrance into the M.L.S. program. (4) Few schools (three ranked and three unranked) require field experience. (5) Only twelve schools (four ranked and eight unranked) used the catalog to highlight the successes of either their students or their faculty.

A multiple regression was run on SPSS-X 2.1 with the 1986 and present-day data. Its purpose was to determine which variables were most important in predicting the value (ranging from 0–8) of the dependent variable, the number of times the program has been ranked by the several perception studies [6–11]. The twenty variables were entered in a "stepwise" procedure, that is, the variable that explains most of the variance is entered first, followed by that one of the remaining variables which explains the most residual variance, and so on. In this manner, the unique contribution of each variable to the regression scores can be seen. Mean substitution was used for missing data. The results are reported in table 3 and presented graphically in figure 1. These results are statistically significant ($F = 48.743$, $P = .0001$). Five variables together account for 82.7 percent of the total variability in the number of times the program has been ranked.

The most important variable, by far, describes the median year for all the doctoral graduates of that school. It is a concept that takes into

TABLE 3
MULTIPLE REGRESSION RESULTS

Step	Variable	Zero-order Pearson's*	Cumulative R^2	Beta Weights
1	Ph.D. half-life	.7841	.6148	.5486
2	FTE faculty	.656	.7285	.3851
3	Age of master's program	.464	.7682	.2172
4	Contact hours	.100	.7967	.2343
5	Graduates' salaries	.108	.8270	.1862

NOTE.—Dependent variable = number of times the school has been ranked. $P = .0001$. $N = 57$.
*Correlation with the dependent variable.

consideration several different ideas—whether the school has a doctoral program, and the age and size of the doctoral program. Thus, the higher the half-life of the program's graduates, the longer the time those graduates have had to influence the profession and to increase the profession's recognition of that school. This one variable alone accounts for 61.48 percent of the variance; the number of FTE faculty accounts for an additional 11.37 percent, and the age of the program for an additional 3.97 percent.

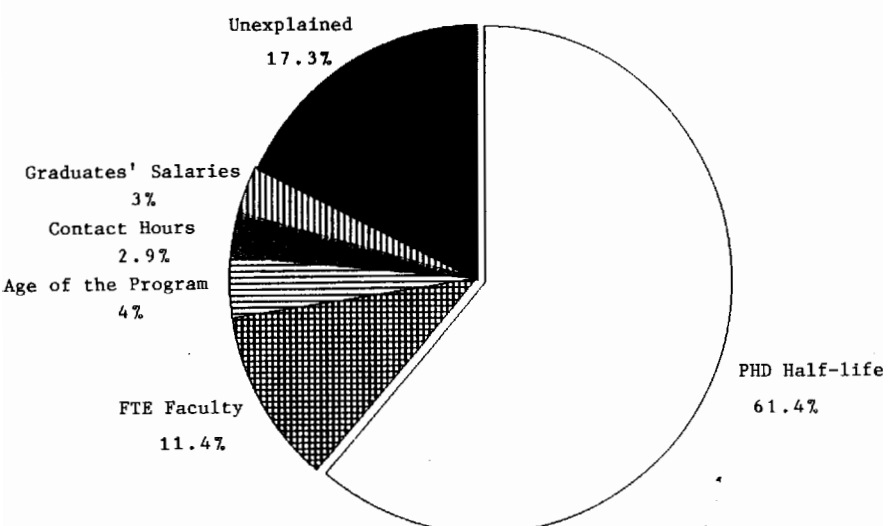

FIG. 1.—Multiple regression results depicting those variables that explain 82.7 percent of the variance when the dependent variable is the number of times the school has been ranked.

The discriminant analysis model, however, lies at the heart of this study. It is a statistical technique that allows distinctions to be drawn between two or more mutually exclusive groups. It is a goal of this study to determine why some schools are ranked and why others are not.

The dependent variable is dichotomous, based on whether the program is one of the seventeen consistently ranked programs or one of the forty unranked ones. Only thirteen independent variables were selected for this analysis. In discriminant analysis the independent variables should not be highly correlated with each other and the correlation matrix generated from the multiple regression report was used to select variables that were nonredundant. For example, doctoral half-life was included because it proved so important in the multiple regression. The number of doctoral graduates and whether the school has a doctoral program were not included because they correlate highly (.858 and .712, as shown in App. B) with doctoral half-life. Numbers of FTE faculty was not included because of its very high correlation (.891) with the school's total budget. Student/faculty ratio, dollars per FTE faculty, and dollars per FTE student were not included because they are linear combinations of other included variables. The percentage of courses taught was not included because it was so volatile. Mean substitution was used for missing values.

Discriminant analysis is interpreted from the structure coefficients [32, p. 701], which are listed in order of importance in table 4. They are presented graphically in figure 2. The canonical correlation is .8849; this model thus explains 78.3 percent of the variance. The square of the correlations listed in the structure matrix gives the approximate proportion of the variance explained by that variable.

The picture presented by the discriminant analysis is far more complex than the one shown above in the multiple regression results, where one variable, Ph.D. half-life, predominated. Here, none predominate; there are several variables that together predict quality rankings. The most significant one is, not surprisingly, Ph.D. half-life. Three of the next five variables measure in different ways the size of the program—the total budget of the school, the amount of support the school receives from other than its parent institution, and the number of FTE students. Other significant variables are the age of the program and faculty research output. Of lesser import are the variables dealing with the program's resources, its leadership, its curriculum, and the success of its graduates.

This model had exceedingly strong power in predicting group membership based on whether the school was ranked or not. It predicted the group correctly for fifty-six of the fifty-seven schools studied. The histogram reproduced in figure 2 clearly shows how accurately this

TABLE 4
DISCRIMINANT ANALYSIS STRUCTURE MATRIX

Variable	Correlation with Function	Proportion of Variance Explained
Ph.D. half-life	.50263	.2526
Total budget	.42671	.1821
"Other" monies	.33182	.1101
Age of master's program	.29434	.0866
Faculty research output	.28298	.0801
FTE students	.27128	.0736
Presence of library school library	.23538	.0554
Leadership quotient	.22206	.0493
Core curriculum	−.16836	.0283
Media/computer staff	.16451	.0271
Rigor index	−.08982	.0081
Contact hours	.04851	.0024
Graduates' salaries	.04425	.0020

NOTE.—Numbers are pooled within-group correlations between the discriminating variables and the canonical discriminant function. Variables ordered by size of correlation within function. df = 13, 43. Alpha = .05. Canonical correlation = .8849. Wilks's lambda = .2169. χ^2 = 51.196. F significant at .00001.

model distinguishes between ranked (group 1) and unranked (group 2) schools.

Only one school is incorrectly predicted; based on the numbers here, the University of British Columbia should not be ranked. The findings for one highly ranked school are an anomaly. This may be due to missing data for some of the variables and the mean substitution method employed in the discriminant analysis.[3]

An additional discriminant analysis was run to test the decision to remove from consideration the number of FTE faculty due to that variable's high correlation with the school's total budget. Thus the total budget was removed and the number of FTE faculty was added to the model. The resultant structure matrix is nearly identical with that reported in the original discriminant analysis model. This model predicts group membership with 100 percent accuracy.

3. Data were missing for one or more variables for fifteen of the fifty-seven schools studied (26.3 percent). Two schools were missing data for five of the thirteen variables (38.5 percent) included in the study; one school was missing data for four variables (30.8 percent); four schools were missing data for two variables (15.4 percent). With the one exception noted in the text, this missing data caused no problems.

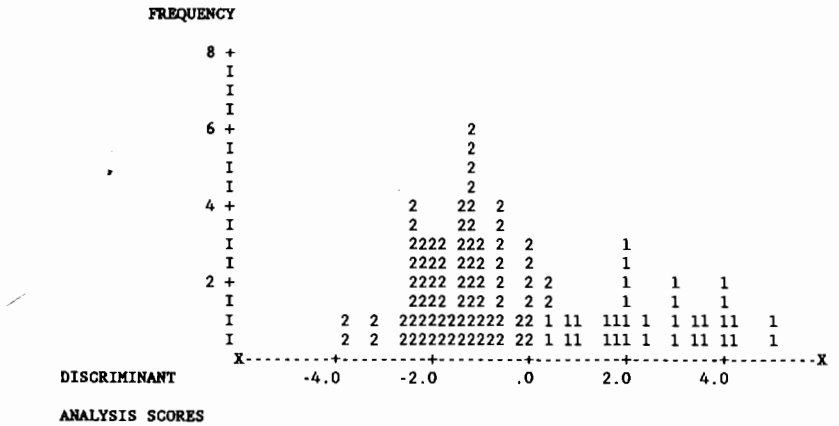

FIG. 2.—Histogram depicting the division of schools into ranked and unranked groups on the basis of discriminant analysis scores. Each school is represented by two vertical symbols: 1 = ranked schools; 2 = unranked schools.

Discussion

The discriminant analysis carried out in this study provides a model identifying quantitative variables strongly associated with perceived quality—that is, predicting how perception study rankings are achieved. The most important variables (those that explain more than 7 percent of the variance) identified by the model are the following, listed in decreasing order of importance—the half-life of the school's doctoral graduates, the size of the school's budget and the school's outside income, the school's age, the faculty's productivity, and the number of its students. Of lesser importance are the variables concerned with the program's leadership (leadership quotient), its resources (the presence of a library school library, media, and computer center staff, its rigor (the rigor index, the size of the core curriculum, and contact hours), and the graduates' salaries.

The most significant variables deal with the presence of a doctoral program, a program's size, and its age. Three variables—the presence of a doctoral program, the number of the program's doctoral graduates, and half-life of those doctoral graduates—deal with the presence of a doctoral program, a factor mentioned as important by 31.1 percent of Biggs and Bookstein's respondents. The half-life of a school's doctoral graduates—a measure of the median age of all the schools' doctoral graduates—is the single largest indicator of a program's ranking. These variables correlate significantly with a school's size. They also correlate

very highly with each other, suggesting that the most important indicator is the simple presence of a doctoral program. Findings indicate that ranked schools are far more likely to have a doctoral program associated with them—fifteen of seventeen ranked schools have doctoral programs while only six of forty unranked programs have them.

Several of the variables analyzed are indicators of a program's size—the program's total budget, the amount of monies it receives from sources other than its parent institution, and the number of its FTE students. White [21] and Holley [22] have suggested the importance of a "critical mass" of students, faculty, and money necessary for a high-quality library education program. Again, findings indicate that there are substantial differences between the two groups of schools on all indicators of size. Ranked schools are substantially larger. These variables are also highly significant in predicting group membership.

The age of the program is also important in predicting group membership, explaining just under 9 percent of the variance. It correlates with little and appears to mean nothing more than that the school has survived; the profession is more familiar with an older school than with a newer one. Indeed, the average age for a ranked program is sixty-five years; for an unranked program it is thirty-seven years. The profession is also more familiar with a school whose faculty members publish. One of the few meaningful correlations of the age of the program is with faculty productivity.

Faculty productivity is the only variable that a majority of Biggs and Bookstein's faculty respondents feel to be an indicator of quality. In spite of this, and in spite of the fact that there is a substantial difference between the two groups, this variable, as measured here, accounts for only 8 percent of the variance. It is also surprising that there is no significant correlation between this variable and the amount of money a program receives from sources other than its parent institution—a measure, in part, of grant income.

Analysis of the several variables measuring a program's resources, its leadership, and its rigor—the presence of a separate library and information science library and the numbers of media and computer center staff, the leadership quotient, the percent of courses taught, the rigor index, the percent of the curriculum that is a required core, and the number of potential contact hours—though of minimal importance in predicting ranking, reveals substantial differences between the two groups. It should be noted that two variables show a negative correlation with the discriminant analysis function. Unranked schools have a larger core curriculum and scored higher on the rigor index. That unranked programs have a larger core curriculum may relate to the fact that they

are smaller programs and that a core is relatively less expensive. This may also account in part for the requirement of a research methods course and the presence of an end-of-program assessment.

The variable measuring the professional success of a school's graduates—graduates' salaries—had no relation to the ranking of the school. The assertion that how graduates fare professionally is a measure of library school quality [4, 25], though, rests on several questionable assumptions. It suggests that job satisfaction and job performance are less important than ambition and that the profession pays attention to where people receive their M.L.S. degrees. Further questions quickly arise regarding how to differentiate a quality career path from a non-quality one, the amount of influence a school has over its students, and the relative role of the school or the students' work or internship experience in socializing students into the profession. However, this discussion is moot if students are as geographically immobile in choosing a library school as the recent research by William Moen [33, p. 105] indicates they are in choosing a job immediately after library school.

Knowledge of the variables reported here can be used to separate schools into two distinct, mutually exclusive groups to predict successfully whether a school is ranked or unranked in the White perception studies. These findings may appear to contradict Biggs and Bookstein's findings that there are no agreed upon indicators of quality in library education. In this sense, the present study provides a check of the external validity of White's two studies. The results obtained here, though, suffer from some of the same criticisms that White's results do—it is unsure whether they actually measure quality. White feels that his studies measure quality; Biggs and Bookstein feel that White's studies measure "something." This study finds that ranked schools are differentiated by their size and related correlates. The variables shown to be important have two factors in common. First, they are all variables with which members of the profession, especially ARL directors and library school faculty, can reasonably be expected to be familiar. Those variables that were shown in this study to have little or no bearing on a school's ranking—the rigor variables, the resource variables, the leadership quotient, and graduates' salaries—are all, with the obvious exception of the leadership quotient, far more difficult for evaluators to know. Second, with the exception of the program's age and the leadership quotient, they exhibit statistically significant high correlations with the size of the program.

In this regard the findings of the present study question the value of perception studies. The value of such studies is also called into question by the fact that the reasons for the perception study rankings as re-

ported by Biggs and Bookstein differ from those reported in this empirical study.

This is unfortunate because there are differences among schools of which members of the profession should be aware, especially since these differences fall in the areas of the school's curriculum and resources. Curricular issues are obviously related to quality library education, yet little research has been done analyzing them. It is reasonable to assume that members of the profession might judge programs differently if they knew that students at unranked programs were far more likely to have taken a research methods course, written a thesis, or taken a comprehensive examination before they received their degrees; if they knew that the core curriculum at unranked schools was one-third larger than at ranked schools; if they knew that most schools had neither prerequisites for entrance nor strict admission requirements; or if they knew that some schools had 50 percent more contact hours than others. Deans of unranked programs should at least realize that attempts to improve the rigor of their school's curriculum in terms of the "rigor variables" discussed in this study, while laudable, will not alone result in their schools' being more highly perceived.

The emphasis on size noted here would appear to suggest that members of the profession have accepted the "critical mass" theory. However, particular thresholds are not suggested here. To establish such thresholds, much additional research needs to be done.

Equating size, age, and having a doctoral program with quality means giving up the idea that a quality library school means quality teaching and accepting the obvious corollary that quality teaching is dependent on the size of the school. The nostalgic ideal that the best university is Mark Hopkins at one end of a log, and a student at the other, does not fit the model developed in this article. Educators, however, still hold to this idea. It is implied in the 1972 standards [2] in that any additional offerings of a school such as other masters' programs, Ph.D. programs, sixth-year programs, and so on are beyond the scope of the standards, in that the standards, in contrast to most present university practice, call for faculty members to be teachers first, researchers second and in that the standards make no mention of the size of the program.

The characteristics of excellence now used by the profession are the 1972 standards. They are purely qualitative and examine evidence in six areas—program goals and objectives; curriculum; faculty; students; governance, administration, and financial support; and physical resources and facilities. The findings of this study do not suggest any new areas for the standards to measure, with the possible exception of the presence of a doctoral program and its impact on the first professional

degree. Rather, they demonstrate the still lingering confusion over what the standards should measure and how.

Recommendations for Further Study

Chih Wang and Benjamin H. Layne [34] conclude that the perception study rankings are simply the result of a circular argument, namely, that the profession is more familiar with graduates of larger programs because there are more of them and not because there are any intrinsic differences in the programs themselves. This study has shown that while there is a significant difference between ranked and unranked schools in terms of size, there are also substantial intrinsic differences between programs on many of the other variables studied. While some of these variables shed little light on the ranking of the school, in all cases, these differences should be further examined.

The area of on-campus leadership calls for further study. According to the deans themselves, they and their faculty are becoming more and more visible and involved in the intellectual and political life of their universities. The profession forms its opinion about library school deans and their leadership abilities by listening to what they have to say, either by reading their publications or by having them as speakers and consultants. These two ways are well reflected in the deans' resumes.

Another, perhaps more important, way through which the profession forms its opinion of a program or its dean, curriculum, or resources is through publicity in the general literature of the profession. A hypothesis for a study would be that the names of ranked schools appear (excluding job advertisements) in general library publications such as *American Libraries, Library Journal,* and *Wilson Library Bulletin* more frequently than unranked schools. Since one of the most frequent criticisms of perception studies is that respondents have no basis upon which to judge programs, this "publicity" variable might be a better predictor of the school's ranking than the faculty research output variable used in this study. If in the eyes of the profession quality were to correlate with publicity, deans would know better what to do to improve the ranking of their programs.

This study has shown that the most important variables associated with perceived quality in library and information science education are the presence of a doctoral program, the size of the M.L.S. program, and the age of the M.L.S. program. Although school, public, and special librarians, and others, might not feel that library and information science faculty and ARL library directors are the only experts, the evidence

produced here suggests that those who have participated in perception study rankings have definite, albeit unspoken and perhaps unconscious, criteria to support their evaluations.

Appendix A

Group 1 Schools

University of British Columbia
University of California, Berkeley
University of California, Los Angeles
University of Chicago
Columbia University
Drexel University
University of Illinois at Urbana-Champaign
Indiana University
University of Michigan
University of North Carolina
University of Pittsburgh
Rutgers University
Simmons College
Syracuse University
University of Toronto
University of Washington
University of Wisconsin–Madison

Group 2 Schools

University of Alabama
University of Alberta
University of Arizona
Atlanta University
Brigham Young University
Catholic University of America
Clarion University of Pennsylvania
Dalhousie University
Emporia State University
University of Hawaii
University of Iowa
Kent State University
University of Kentucky
Long Island University
McGill University

University of Missouri, Columbia
Université de Montréal
State University of New York at Albany
State University of New York at Buffalo
North Carolina Central University
University of North Carolina at Greensboro
University of North Texas
Northern Illinois University
University of Oklahoma
Pratt Institute
Queens College, City University of New York
Rosary College
St. John's University
University of South Carolina
University of South Florida
Southern Connecticut State University
University of Southern Mississippi
University of Tennessee, Knoxville
Texas Woman's University
University of Western Ontario
University of Wisconsin–Milwaukee

Group 3 Schools

Florida State University
Louisiana State University

Group 4 Schools

University of Maryland
University of Texas

Appendix B

TABLE B1

CORRELATION COEFFICIENTS AMONG VARIABLES

Dependent Variables	CITED	PHD	OTHER86	TOTAL86	FTEF86X
AGE	.413**	.283	.267	.122	.117
CITED		.492**	.253	.320*	.369*
PHD			.485**	.602**	.573**
OTHER86				.709**	.570**
TOTAL86					.891*
	FTEF86	FTES86X	STFAC86	FTES86	GRAD85
AGE	.193	.121	.055	−.011	.033
CITED	.217	.334*	.089	.017	.063
PHD	.548**	.475**	.040	.238	.048
OTHER86	.685**	.378*	−.038	.464**	.110
TOTAL86	.807**	.656**	.035	.500**	−.068
FTEF86X	.519**	.706**	.011	.352*	−.081
FTEF86		.450**	.101	.553**	−.081
FTES86X			.680**	−.208	−.102
STFAC86				−.681**	−.080
FTES86					.015
	LSLIB	MCSS86	PHD12LF	TAUGHT	RIGOR
AGE	.166	.080	.384*	.114	−.107
CITED	.163	.325*	.474**	.190	−.211
PHD	.406**	.438**	.712**	.108	−.168
OTHER86	.295	.181	.414**	.174	−.061
TOTAL86	.492**	.476	.456**	.066	−.163
FTEF86X	.425**	.602**	.453**	.092	−.228
FTEF86	.455**	.256	.412**	.025	−.012
FTES86X	.426**	.574**	.374*	.099	−.225
STFAC86	.170	.155	.041	.057	−.063
FTES86	.091	.051	.186	−.053	.065
GRAD85	−.289	−.121	.050	−.035	.066
LSLIB		.321*	.373*	.032	−.336*
MCSS86			.334*	.033	−.307*
PHD12LF				.188	.224
TAUGHT					−.118

Appendix B

TABLE B1 (*Continued*)

	CORE	CONTACT	LQ	NUMRANK	PHDX
AGE	−.314*	−.068	.121	.464**	.262
CITED	−.314*	−.175	.203	.547**	.416**
PHD	−.245	.005	.296	.696**	.594**
OTHER86	−.184	−.023	.176	.519**	.508**
TOTAL86	−.139	.113	.264	.654**	.598**
FTEF86X	−.209	.050	.335*	.656**	.633**
FTEF86	−.033	.225	.115	.558**	.382*
FTES86X	−.078	.117	.300	.515**	.384*
STFAC86	.102	.146	.059	.043	−.057
FTES86	−.045	.073	−.013	.290	.282
GRAD85	−.163	−.347*	−.187	.108	.052
LSLIB	−.183	.081	.300	.401**	.387*
MCSS86	−.050	−.081	.601**	.400**	.411**
PHD12LF	−.285	−.135	.308*	.784**	.858**
TAUGHT	−.107	−.095	.095	.146	.200
RIGOR	.531**	.443**	−.183	−.178	−.315*
CORE		.236	−.080	−.329*	−.283
CONTACT			−.148	.100	−.161
LQ				.318*	.315*
NUMRANK					.740**

NOTE.—For $N = 42$ (df = 40), $r > .3044$ is significant at .95; $r > .3932$ is significant at .99. The dependent variable is the number of times the program has been ranked.

*Correlation significant at .95.

**Correlation significant at .99.

REFERENCES

1. Mulvaney, John Philip. "The Characteristics of a Quality Library School." Ph.D. dissertation, University of Pittsburgh, 1989.
2. *Standards for Accreditation 1972*. Chicago: American Library Association Committee on Accreditation, 1972.
3. Budd, Richard W. "Accreditation: The Way Ahead: Musings of a Provocateur." Paper presented at the Association for Library and Information Science Education, 1986 Annual Conference, Chicago, January 15–17, 1986.
4. Biggs, Mary, and Bookstein, Abraham. "What Constitutes a High-Quality M.L.S. Program? Forty-Five Faculty Members' Views." *Journal of Education for Library and Information Science* 29 (Summer 1988): 28–46.
5. Danton, J. Periam. "Notes on the Evaluation of Library Schools." *Journal of Education for Librarianship* 24 (Fall 1983): 106–16.
6. Carpenter, Ray L., and Carpenter, Patricia A. "The Doctorate in Librarianship and an Assessment of Graduate Library Education." *Journal of Education for Librarianship* 11 (Summer 1970): 44.

7. Margulies, Rebecca Zames, and Blau, Peter M. "America's Leading Professional Schools." *Change* 5 (November 1973): 21–27.
8. Blau, Peter M., and Margulies, Rebecca Zames. "The Reputations of American Professional Schools." *Change* 6 (Winter 1974–75): 42–47.
9. Denis, Laurent-G. "Full-time Faculty Survey Describes Educators." *Canadian Library Journal* 36 (June 1979): 107–21.
10. White, Herbert S. "Perceptions by Educators and Administrators of the Ranking of Library School Programs." *College & Research Libraries* 42 (May 1981): 191–202.
11. White, Herbert S. "Perceptions by Educators and Administrators of the Ranking of Library School Programs: An Update and Analysis." *Library Quarterly* 57 (July 1987): 252–68.
12. Gourman, Jack. *The Gourman Report: A Rating of Graduate and Professional Programs in American and International Universities*, 3d ed., rev. Los Angeles: National Education Standards, 1985.
13. Webster, David S. "Jack Gourman's Rankings of Colleges and Universities: A Guide for the Perplexed." *RQ* 25 (Spring 1986): 323–31.
14. Bookstein, Abraham, and Biggs, Mary. "Rating Higher Education Programs: The Case of the 1986 White Study." *Library Quarterly* 57 (October 1987): 351–99.
15. Varlejs, Jana, and Dalrymple, Prudence. "Publication Output of Library and Information Science Faculty." *Journal of Education for Library and Information Science* 27 (Fall 1986): 71–89.
16. Hayes, Robert M. "Citation Statistics as a Measure of Faculty Research Productivity." *Journal of Education for Librarianship* 23 (Winter 1983): 151–72.
17. White, Herbert S. "Accreditation and the Pursuit of Excellence." *Journal of Education for Librarianship* 25 (Spring 1983): 253–63.
18. Dyer, Esther, and O'Connor, Daniel. "Crisis in Library Education." *Wilson Library Bulletin* 57 (June 1983): 860–63.
19. Sineath, Timothy W., ed. *ALISE Library and Information Science Education Statistical Report 1987*. State College, Pa.: Association for Library and Information Science Education, 1987.
20. *Association of American Library Schools Library Education Statistical Report 1981*. State College, Pa.: Association of American Library Schools, 1981.
21. White, Herbert S. "Critical Mass for Library Education." *American Libraries* (September 1979), pp. 468 ff.
22. Holley, Edward G. Letter to the author, June 24, 1987.
23. Sineath, Timothy W., ed. *ALISE Library and Information Science Education Statistical Report 1988*. State College, Pa.: Association for Library and Information Science Education, 1988.
24. Sineath, Timothy W., ed. *ALISE Library and Information Science Education Statistical Report 1986*. State College, Pa.: Association for Library and Information Science Education, 1986.
25. Hannigan, Jane Anne. "Vision to Purpose to Power: A Quest for Excellence in the Education of Library and Information Science Professionals." Paper presented at the Association for Library and Information Science Education Conference, Washington, D.C., January 1984.
26. *American Library Directory, 1986–1987*. New York: Bowker, 1986.
27. *Bowker Annual of Library and Book Trade Information*, 26th ed. New York: Bowker, 1981.
28. *Bowker Annual of Library and Book Trade Information*, 32d ed. New York: Bowker, 1987.
29. Paris, Marion. *Library School Closings: Four Case Studies*. Metuchen, N.J.: Scarecrow, 1988.
30. DuMont, Rosemary R., ed. *Directory of the Association for Library and Information Science*

Education 1987–88. State College, Pa.: Association for Library and Information Science Education, 1987.

31. Klecka, William R. *Discriminant Analysis*. Sage University Paper Series on Quantitative Applications in the Social Sciences, no. 07-019. Beverly Hills, Calif., and London: Sage, 1980.
32. Pedhazur, Elazar J. *Multiple Regression in Behavioral Research: Explanation and Prediction*, 2d ed. New York: Holt, Rinehart & Winston, 1982.
33. Moen, William E. "Library and Information Science Student Attitudes, Demographics, and Aspirations Survey: Who We Are and Why We Are Here." In *Librarians for the New Millennium*, edited by William E. Moen and Kathleen M. Heim. Chicago: American Library Association, Office of Library Personnel Resources, 1988.
34. Wang, Chih, and Layne, Benjamin H. "Relationship between Perception Ranking and Number of Graduates: An Analysis of the White Survey." *Journal of Education for Library and Information Science* 28 (Fall 1987): 116–22.