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Abstract

We examined the relationships between the research originating at business schools, students' satisfaction with the schools, and the published ratings of the school's prestige. Research was positively correlated to prestige (where prestige was based on the perceptions of academics, firms, and student candidates). The satisfaction of recent graduates was not related to a school's prestige (based on the perceptions of academics and business firms). Research productivity of schools was not associated with lower satisfaction among their recent graduates. We conclude that schools should emphasize research instead of teaching if they desire high prestige.

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Business School Prestige – Research versus Teaching

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Editor's Note: Following the article by Scott Armstrong and Tad Sperry on business school prestige are comments by David Webster, Arnold Barnett, Frederic Murphy, Edwin Locke and Shelley Kirkpatrick, and Richard Franke. Scott and Tad then reply to the comments. The subject of this group of papers is the determinants of business school prestige and whether business schools should emphasize teaching over research. Each author has his or her own perspective. Important to the analyses presented here are the data developed by Shelley Kirkpatrick and Edwin Locke to formally measure research.

In compiling these papers, we first obtained peer reviews of the Armstrong and Sperry paper. Then we asked the other participants to contribute comments. We then provided all the participants with peer reviews of their own and each other's commentaries. In addition, we sent the package for review to William Ross at The Wharton School.

Although the subject of this collection does not directly relate to the practice of management science, it affects our ability to practice management science in the future. The current graduates of MBA programs are future customers for our models and analyses. Business schools have been reacting to beauty contests, such as *Business Week's* annual survey measuring student satisfaction. As a response, some business schools have reduced the amount of quantitative material, which students find difficult. This increases the ignorance of future managers and makes our jobs of communicating quantitative management models more difficult.

Through their surveys, the press has affected educational curricula without examining the educational issues in business schools. This collection of papers is a step towards articulating what the agenda should be.

Frederic H. Murphy

Abstract

We examined the relationships between the research originating at business schools, students' satisfaction with the schools, and the published ratings of the school's prestige. Research was positively correlated to prestige (where prestige was based on the perceptions of academics, firms, and student candidates). The satisfaction of recent graduates was not related to a school's prestige (based on the perceptions of academics and business firms). Research productivity of schools was not associated with lower satisfaction among their recent graduates. We conclude that schools should emphasize research instead of teaching if they desire high prestige.

If a business school wants high prestige, should it direct more of its limited resources toward research or toward teaching? To address this issue, we examined evidence on the research performed at business schools, the satisfaction of graduate students, and the schools' prestige. In recent years, the mass media have published the results of surveys designed to measure the relative prestige of business schools. The publication of these prestige rankings has apparently increased competition among business schools. *Business Week* discussed this competition in an article titled, "The battle of the B-schools is getting bloodier: Big-name schools 'compete like crazy' for top-flight faculty and students" [Byrne 1986]. Spurred by the popularity of these surveys, several prominent

business schools took actions to improve their rankings [Deutsche 1990]. Typically, they decided to emphasize teaching in an effort to improve the satisfaction of students. For example, in 1982, NYU's business school faculty lacked one vote to make research the sole criterion in its promotion and tenure decisions; in 1990, the NYU faculty voted to give teaching as much importance as research [Byrne 1990]. Presumably, this increased attention to teaching comes at the expense of research efforts. Hancock et al. [1992], for example, found that of those professors who published, those who spent more time with students published less.

What outcomes might be expected if resources are directed toward student satisfaction rather than toward research? Such a strategy might be effective if student satisfaction were positively related to the prestige of the MBA school and if research were not related to prestige. But the results do not support such a view. Increased emphasis on student satisfaction is likely to come at the expense of prestige.

Design of the Study

We expected to find a positive relationship between research impact and the perceptions of business schools' prestige among the academic community because academics read what academics at other schools publish. We also expected research to be positively related to the perceptions of business schools by firms that hire MBAs, because research should increase a school's exposure to business firms through the popular press and through consulting. Similarly, we believed that research would have a positive relationship to prestige in the opinions of MBA candidates, because some of the candidates' information about the schools would come from faculty members, and some would come from research findings discussed in the mass media.

We believed that research impact would have no significant relationship to MBA graduates' satisfaction, because learning about research findings is only a small part of their education. Prior studies suggest that research is not related to student satisfaction. Faculty who publish research do not receive higher or lower student ratings [Marsh 1984]. Perhaps this is because student evaluations of teachers are not related to lecture content [Abrami, Leventhal, and Perry 1982]. We examined the satisfaction of students because we know of no attempts to assess *learning* at business schools. A substantial amount of research in other disciplines has failed to identify a relationship between learning and student satisfaction. We expected, however, that research and learning would be related.

Research Impact

We used a measure of research that was developed by Kirkpatrick and Locke [1989]. Kirkpatrick and Locke (K&L) call their measure "faculty scholarship," but we refer to it in this paper as "research impact." K&L evaluated full-time, working (non-administrative), tenure-track faculty of 32 major business schools using three measures of research: productivity (measured by the number of articles published by the faculty associated with each school), influence (measured by number of citations of faculty members' publications), and reputation (measured by peer ratings of faculty in the same field). To determine productivity, K&L counted the number of articles published in top-rated journals from 1983 through 1987. They obtained citations from the *Social Science Citation Index* and the *Science Citation Index* for 1987. For peer ratings, K&L sent surveys to 2,410 full-time, tenure-track professors for the 1988-89 school year. They asked the faculty to rate each faculty member in his or her functional area (for example, marketing, finance) in the 32 schools. For a description of this study, see Kirkpatrick and Locke [1992].

K&L divided the ratings for each department by the number of its faculty. They then calculated Z-scores to show how each department differed from the average department on each of the three measures: publications, citations, and peer ratings. They added the three Z-scores to provide a research index for each department. K&L provided two indexes, one based on a summary of Z-scores across seven different departments, and one based on the faculty in the five core departments (accounting, finance, management science and statistics, management, and marketing). Because the core departments were common to all 32 participating schools, we used the latter index.

K&L examined the construct validity of their measure by comparing, for each of the seven departments, the school ranks by each component index: articles, citations, and peer ratings. The correlations ranged from 0.53 to 0.92, and the average of these 21 pairwise correlations was 0.72.

Graduate Students' Satisfaction

In 1988, *Business Week* surveyed corporate recruiters and recent graduates of business schools [Byrne 1988]. They asked questions related to teaching, curriculum, and environment. A total of 1,245 graduates responded to the 35-item questionnaire. *Business Week* used these responses to develop an index of graduate student satisfaction. In 1990, *Business Week* repeated the survey with 3,664 respondents [Byrne 1990, 1991b]. The 1988 rankings applied to 18 of the schools in our research set (K&L's 32 schools), and the 1990 rankings applied to 19 schools. These rankings allowed us to obtain combined rank estimates for the 18 schools common to the two surveys and to the Kirkpatrick and Locke study. We constructed graduate student satisfaction rankings (G) by averaging *Business Week's* graduate survey rankings for 1988 (B_{88_g}) and 1990 (B_{90_g}). That is:

$$G = (B_{88_g} + B_{90_g})/2.$$

The correlation for the two graduates' rankings was only 0.1. This is negligible; the adjusted t^2 was about zero. One possible explanation is that the schools that rated poorly on this measure decided to emphasize teaching, the faculty agreed, and the faculty were then successful in satisfying the students. At the same time, the more highly rated schools became lethargic, leading faculty to do a poorer job, which students noticed. While possible, this chain of events strikes us as unlikely. We believe that the critics were correct when they said that the procedures for assessing graduate satisfaction were unreliable.

In addition to being unreliable, the graduates' satisfaction is subject to bias because it is in their interest to rate their own school highly. One should expect the business schools to inform their graduates about the importance of good ratings. Of course, some schools may have been more effective than others in this effort.

Prestige Rankings

We examined the prestige of business schools according to three stakeholder groups: academics, firms, and prospective students. Schools should be concerned about each group, and we expected these three groups to have somewhat different opinions.

Academics: In 1985, a personnel consulting firm, Brecker and Merryman, surveyed business school deans to determine which business schools were best. They gave the deans a list of schools and asked them to rank the five best business schools. Brecker and Merryman listed the 21 most frequently mentioned schools. Their report was cited in the press and was published in *Barron's* guide to MBA programs [Miller 1988].

In 1987, *US News and World Report* asked the deans of 232 graduate business schools to name the top 10 schools [Solorzano et al. 1987]. They then ranked the schools according to their percentage of nominations. *US News and World Report* expanded its survey of graduate programs in 1990 and 1991 [Toch 1990; Gabor 1991] to include the two top deans at each school. Both the Brecker and Merryman ranking and the 1987 *US News and World Report* covered 18 of our 32 schools. The 1990 and 1991 *US News and World Reports* provided ranks for all 32 schools. Overall, these data allowed us to construct academic reputation indices for the 17 schools common to all four surveys and to the Kirkpatrick and Locke study. We computed the rankings by academics as follows:

$$A = (M + U_{87} + U_{90a} + U_{91a})/4$$

where

A = Academic reputation index,

M = Brecker and Merryman 1985 ranks,

U_{87} = *US News and World Report* 1987 ranks,

U_{90a} = *US News and World Report* 1990 academic ranks, and

U_{91a} = *US News and World Report* 1991 academic ranks.

The four component measures of rankings by academics were positively correlated with one another, ranging from about 0.5 to 0.9. The *US News and World Report* rankings were correlated about 0.9. Table 1 lists the correlations.

Table 1. Alternative prestige rankings of MBA programs by academics are correlated with one another.

	U_{87}	U_{90a}	U_{91a}
Brecker	0.47	0.61	0.62
U_{87}		0.91	0.87
U_{90a}			0.93

Firms: Business Week provided recruiters' rankings for 18 of the schools in our research sample for 1988 and for 19 schools in 1990. In 1990 and 1991, the *US News and World Report* also provided prestige rankings based on surveys of CEOs of large companies, and these covered all 32 schools. These data allowed us to construct prestige indices for the 18 schools common to the four surveys and to the Kirkpatrick and Locke study. We calculated ranking by firms as follows:

$$F = (B_{88fr} + B_{90fr} + U_{90ceo} + U_{91ceo})/4$$

where:

F = Reputation index among firms,

B_{88fr} = *Business Week* 1988 firms' ranks by recruiters,

B_{90fr} = *Business Week* 1990 firms' ranks by recruiters,

U_{90ceo} = *US News and World Report* 1990 ranks by CEOs, and

U_{91ceo} = *US News and World Report* 1991 ranks by CEOs.

The four component measures of firms' rankings correlated highly with each other, all of them reaching 0.75 or higher (Table 2).

Table 2. Alternative prestige rankings of MBA programs by firms are correlated with one another.

	B_{90fr}	U_{90ceo}	U_{91ceo}
B_{88fr}	0.78	0.75	0.75
B_{90fr}		0.89	0.85

$$\frac{U_{90ceo}}{0.96}$$

Student Candidates: US News and World Report also examined objective data in its 1990 and 1991 rankings. The objective data included measures of student selectivity: students' average undergraduate grade point average, students' average Graduate Management Admission Test score, the percentage of candidates rejected, and the percentage of accepted candidates who enrolled. We expressed each of these measures as a percentage of the highest score and then ranked them. We then weighted and combined the above scores to obtain an overall selectivity ranking. Thus, schools with the highest prestige among prospective students were those with the lowest acceptance rate and the highest enrollment yield. We combined the student selectivity rankings for two years as follows:

$$C = (U_{90s} + U_{91s})/2$$

where:

C = Student candidate index,

U_{90s} and U_{91s} are student selectivity rankings from the *US News and World Report* studies of 1990 and 1991.

These two component measures of the candidates' rankings were correlated 0.75 with each other, a reasonable level of reliability.

Summary of School Rankings

Table 3 lists the ratings for research impact, the satisfaction of the graduates, and the prestige ratings by three stakeholder groups. It lists the schools according to their research impact rankings.

Table 3. Average rankings of business schools, 1985-1991

School	Research Impact	Graduates' Satisfaction	Prestige as ranked by:		
			Academics	Firms	Candidates
Stanford	1.0	5.5	3.0	4.2	1.5
Pennsylvania (Wharton)	2.0	12.0	3.0	2.2	5.5
MIT (Sloan)	3.0	11.5	7.2	11.2	3.5
Columbia	4.0	24.0	6.2	6.2	33.0
Carnegie Mellon (GSIA)	5.0	6.5	10.5	12.0	34.0
Rochester (Simon)	6.0	17.0	25.5	33.5	50.0
Chicago	7.0	10.0	4.8	5.2	19.0
Cornell (Johnson)	8.0	9.0	16.4	13.5	10.5
Northwestern (Kellogg)	9.0	6.0	3.2	2.8	7.0
UCLA (Anderson)	10.0	9.0	11.8	16.2	5.0
Maryland	11.0	NA	31.0	39.2	31.0
Duke (Fuqua)	12.0	9.5	13.0	9.8	10.5
Pittsburgh (Katz)	13.0	NA	30.0	34.7	47.5
Dartmouth (Tuck)	14.0	3.0	10.2	11.2	5.5
Michigan	15.5	13.0	7.2	4.8	38.5
Purdue (Krannert)	15.5	NA	24.5	24.2	14.0
Harvard	17.5	7.5	2.2	2.2	2.0
NYU (Stern)	17.5	19.0	19.0	18.2	24.5
Texas (Austin)	19.0	NA	16.0	22.8	23.5

School	Research Impact	Graduates' Satisfaction	Prestige as ranked by:		
			Academics	Firms	Candidates
Wisconsin	20.0	NA	24.2	27.0	39.0
North Carolina	21.0	4.0	17.0	16.8	8.0
Minnesota (Carlson)	22.0	NA	25.2	30.5	53.5
Univ. of Washington	23.0	NA	27.2	28.2	64.5
Texas A&M	24.0	NA	33.7	41.5	56.5
Illinois, Urbana	25.0	NA	20.4	27.7	55.5
SUNY Buffalo	26.0	NA	35.2	45.0	51.0
Penn State (Smeal)	27.0	NA	27.5	27.0	40.5
Indiana	28.0	17.0	14.2	12.2	35.0
Ohio State	29.0	NA	26.5	26.0	40.5
Washington, St. Louis	30.0	NA	24.5	33.0	36.5
Syracuse	31.0	NA	41.2	34.2	67.0
Virginia (Darden)	32.0	10.0	11.5	11.5	18.5

Results

Research versus Academics' Opinions of School Prestige

The academics' perceptions of prestige (A) were significantly related to the research ranking (R) based on the 17 schools for which we had complete data:

$$A = 5.13 + 0.34R$$

The correlation was 0.58, and the t-statistic was 2.75 ($p < 0.01$, one-tailed test).

We then examined the relationship by controlling for the size of the school. A measure of the number of students in the MBA program was constructed using Byrne [1991a], Miller [1988], and Krasna [1990]. This variable was then included in the regression analysis. Larger schools had more prestigious rankings. The significance of the relationship between academic prestige and research did not change ($p < 0.01$).

Because high prestige business schools are often located at high prestige universities, our regression also included Webster's [1986] rankings of universities as a measure of host school prestige. The correlation between host school prestige and research was 0.4. As expected, including host school prestige in the regression reduced the level of statistical significance between academic prestige and research. Even so, the relationship between research and academic prestige remained positive and statistically significant ($p = 0.03$).

The 17 schools in the analyses are among the most prestigious of the approximately 650 graduate business school programs in the US [Byrne 1986]. Therefore, they provided a restricted range of data. Another problem was the small sample size (17) relative to the number of variables (three). To deal with these problems, we expanded the sample by assigning prestige rankings to the remaining 15 schools in the Kirkpatrick and Locke study (see the appendix for the procedure). As expected, the impact of the research variable was larger (the coefficient of 0.68 was twice that reported above), and the significance level was less than 0.001. These statistically significant results held up when controls were introduced into the regression for size and host school prestige. With both controls included, research was significantly related to prestige ($p = 0.004$). (In this last analysis, the sample size, was 24 because Webster's rankings were available for only 24 schools.)

Research versus Firms' Opinions of School Prestige

The gross relationship of research to prestige rankings by firms was weak. For the 18 schools for which we had complete data, the t-statistic was not statistically significant ($p = 0.31$). Controls for the program size and for

host school prestige showed a closer relationship between research and ranks by firms ($t = 1.14$, $p = 0.14$, one-tailed test), but the relationship was not strong.

We then expanded the sample size to the 32 schools for which we had research rankings. This produced a statistically significant relationship between research and firms' rankings for the simple regression ($p = 0.002$). The relationship remained strong and statistically significant when controls were included in the regression for both size and host school prestige ($p = 0.02$ and 0.01 , respectively). The coefficient of the research relationship to firms' prestige was 0.62, which is comparable to the 0.64 noted above for the relationship between research rankings and the prestige as assessed by academics.

Research versus Candidates' Implied Prestige

Student candidates' perceptions of school's prestige had a significant positive correlation (0.57) with research for the 32 schools for which we had full data ($t = 3.8$; $p = 0.0005$, one-tailed test). The coefficient was 1.21, almost twice that observed for academics. We obtained similar results when we controlled for the size of the program and for the host schools' prestige in the regression analysis ($p = 0.001$ and 0.01 , respectively).

Relationships of Graduates' Satisfaction to Prestige Rankings

We correlated the satisfaction of the graduates with the corresponding ratings by business recruiters of school's prestige as reported in each of the *Business Week* surveys. The results showed no significant correlation in either 1988 or 1990 or when the two years were combined. In 1988, the coefficient was negative, while in 1990 it was positive. Furthermore, graduate satisfaction was not significantly correlated with the academics' rankings of schools or with the firms' rankings. Given the low reliability of the ratings of student satisfaction, these results are not surprising.

Relationship of Graduates' Satisfaction to Research Impact

As expected, the satisfaction rankings by graduates had little relation to research for the 18 schools for which we had full data. The coefficient of 0.06 was not statistically significant ($t = 0.45$). Controls for size of program and host school prestige also failed to reveal any relationship. (We had no way to approximate graduates' ratings, so this was the maximum sample size that we could examine.) This result is consistent with the belief that an emphasis on research does not reduce student satisfaction.

Discussion

Our analysis can only reveal whether the results are consistent with our expectations; it cannot establish causal relationships. Given our expectations and the correlations reported here, we find it difficult to understand the rationale for increasing the emphasis on teaching at the more prestigious schools. Many observers believe that schools with lesser prestige put more emphasis on teaching. There is little reason to expect that the teachers at these lower prestige schools are any less talented at teaching than their counterparts at high prestige schools. By stressing teaching, the high prestige schools might be emphasizing their weakness and de-emphasizing their strength. We find it plausible that avowed teaching schools, such as Thunderbird, achieve higher student satisfaction. Do the high prestige schools really want to be judged on teaching?

High prestige schools typically have many more applicants per position than the low prestige schools. Given this ability to select students, high prestige schools could make known their preference for research. The fact that research findings can be applied to business problems should be of interest to some applicants. If research does produce knowledge, those schools that produce research should have a competitive advantage by virtue of their up-to-date and in-depth knowledge.

Conclusions

Our results showed that business school research is significantly correlated with prestige rankings by academics, firms, and candidates. Graduates' satisfaction had little relationship to schools' prestige (as perceived by academics or business firms).

For high prestige schools, the results support a strategy that emphasizes research rather than teaching. In other words, the traditional belief that research is the foundation of schools' prestige was supported by this study. The alternative strategy of emphasizing teaching received little support.

Acknowledgments

We thank Robert Morse for unpublished data. Fred Collopy, Richard H. Franke, Edwin A. Locke, Frederic H. Murphy, William Ross, and David S. Webster provided useful comments. This does not mean that they agreed with all of our conclusions. Jennifer L. Armstrong provided editorial assistance.

Appendix: Procedure for Dealing with Missing Data

Kirkpatrick and Locke ranked faculty scholarship (research impact) at 32 schools. (They failed to rank two perennial top 20 schools, Yale and Berkeley.) Filling in missing data points required some assumptions. First, we assumed that the firms' rankings did not overlook any more qualified (higher ranked) school. Second, we assumed the highest possible firms' ranking for the unranked schools, a conservative assumption. Then we gave the same rank to each of these unranked schools, also a conservative assumption. We assigned a rank to any unranked school for which we had a research ranking by making its rank in any particular survey equal to the average of the next highest unknown ranks. For instance, suppose we had a survey that ranked 30 schools, only 28 of which were in the research rankings. We would thus have research rankings for four schools (32 minus 28) that did not get ranked by this particular survey. We assumed that because these four unranked schools were not ranked in the top 30, they must have had poorer rankings. Then we assigned the best possible rank to each unranked school by making it equal to the average of the next four available missing ranks. In our example, the next four available ranks were 31, 32, 33, and 34, so the four missing schools would each be assigned a rank of 32.5. Using this procedure, we made the following adjustments:

	Missing Schools	Research Ranking
<i>Business Week</i> 1988 Recruiter Survey	13	29.1
<i>Business Week</i> 1990 Recruiter Survey	13	25.8
Brecker and Merryman Survey	14	27.4

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Virtues and Faults of Armstrong and Sperry's "Business School Prestige," a comment from David S. Webster, College of Education, Oklahoma State University.

Since 1910, when the Columbia University psychologist James McKeen Cattell published the first academic quality ranking, hundreds of such rankings have been published. In addition, hundreds of articles have been published in academic journals analyzing the results of these rankings. Despite the large number of articles that have been published discussing the results of academic quality rankings, Armstrong and Sperry, in their fine article "Business school prestige Research versus teaching," break new ground in three ways.

First, they compare how academics and nonacademics rank business schools as to their prestige. Others have compared the way different groups of professors have ranked academic departments and professional schools. For example, Cartter [1966] and Reese and Andersen [1970] compared how department chairpersons, senior

scholars, and junior scholars in various arts and sciences disciplines ranked departments in their discipline. Armstrong and Sperry, on the other hand, compare how people in three separate groups – academics (business school deans), executives (CEOs of large companies and recruiters), and applicants to MBA programs – rank business schools in prestige. Correlations among the prestige ratings conferred by department chairpersons, senior scholars, and junior scholars are usually very high. In the Reese and Andersen ranking, for example, the correlations among the rankings of these three groups for all 36 disciplines they studied were almost always 0.90 or higher (Table 30, p. 34).

For Armstrong and Sperry's three groups, however, the correlations are much lower. To cite some extreme disparities, deans ranked Carnegie Mellon University's business school 10.5 while applicants to MBA programs, as evidenced by the proportion of them who were rejected and the proportion of those accepted who ultimately enrolled, "ranked" it 34.0; deans ranked the University of Rochester 25.5 while applicants "ranked" it 50.0; and deans ranked the University of Chicago 4.8 while applicants "ranked" it 19.0. Executives, for their part, ranked the University of Michigan's business school 4.8 while applicants "ranked" it 38.5; executives ranked Indiana University 12.2 while applicants "ranked" it 35.0; and executives ranked Syracuse University 34.2 while applicants "ranked" it 67.0. (See, however, Richard H. Franke's comment on the Armstrong and Sperry article. In it [Table 1], he calculates the disparities in the rankings between deans and applicants and between executives and applicants at the schools listed above as much smaller than those shown by Armstrong and Sperry.)

Second, although scholars have frequently calculated the correlations of rankings based on prestige with those obtained by various measures of publication productivity, Armstrong and Sperry are among the first to show the correlation between a ranking based on prestige and one based on "graduates' satisfaction." This is a welcome step in the direction of scholars correlating prestige with other measures than those concerning scholars' publication productivity.

Third, the compilers of some of the major multi-disciplinary rankings based on academic prestige have reported a nearly perfect correlation between the reputation for scholarly competence of a department's faculty and the effectiveness of its doctoral programs. Roose and Andersen, for example, found that the correlation between the two was 0.99 for 24 of the disciplines they studied and 0.98 for the other 12 (Table 30, p. 34).

Armstrong and Sperry's results are very different. They do not use the measure, "effectiveness of MBA program." The measure they do use, however, "graduates' satisfaction," is probably not very different from "effectiveness of MBA program," since it is plausible that the more effective an MBA program is, the more satisfied its graduates will be with it. So it is striking that Armstrong and Sperry report that "graduate satisfaction was not significantly correlated with the academics' rankings of schools or with the firms' rankings." Assuming that what is true of graduates' satisfaction with MBA programs is also true of graduates' satisfaction with doctoral programs in the arts and sciences, this finding strongly suggests that some reputational rankings of doctoral programs' nearly perfect correlations between faculty research reputation and reputation for program effectiveness are far too high. Perhaps raters know little about the effectiveness of various programs, so they rank them the same for it as they do for faculty scholarly competence.

Faults

Armstrong and Sperry's article is not without faults; I will list three. First they assume that a common response of business schools to low rankings is to emphasize teaching to try to improve student satisfaction. They then argue that it is counterproductive for business schools to attempt to raise their rankings by improving teaching and that they should try to strengthen their research instead. The only evidence they present, however, for their assertion that business schools often try to raise their rankings by improving teaching is one newspaper article that mentioned three schools that had done so [Deutsch 1990]. Quite possibly, based on evidence from social science disciplines [Webster 1992], more schools try to elevate their rankings by improving their faculty's research productivity than by increasing their students' satisfaction, so that Armstrong and Sperry are knocking down a straw man.

Second, their measure of graduates' satisfaction, as they themselves admit, is flawed. They base it on two rankings of business schools published by *Business Week* in 1988 and 1990, based on their graduates' satisfaction

with the education they received; however, these two rankings correlated only 0.1, and Armstrong and Sperry write that they believe that *Business Week's* "procedures for assessing graduate satisfaction were unreliable."

Third, while Armstrong and Sperry's prestige rankings based on the opinions of deans and business executives are legitimate, they do not really have a prestige ranking based on the opinions of applicants to MBA programs. The problem is that their "prestige" ranking of business schools in the eyes of MBA applicants is not based on any survey of such candidates. Rather, it is based on the proportion of applicants to MBA programs who were accepted by each school and the proportion of those accepted by each school who chose to enroll. But these criteria measure what is usually called student selectivity, not prestige. The percentage of applicants a business school admits and the proportion of those admitted who choose to attend it are influenced by many other factors that may have little or nothing to do with prestige. These include a school's tuition, enrollment size, geographical location, the amount of financial aid it offers, and so on.

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Business Schools: Failing Fast? a comment from Arnold Barnett, Sloan School of Management, Massachusetts Institute of Technology.

Armstrong and Sperry have written a paper that is stimulating and even courageous. The *Business Week* rankings of leading business schools (which rely heavily upon the perceptions of each school's recent graduates) have created an odd spectacle: Many professors who formerly cared little about the views of MBA candidates now seem terrified of displeasing the newly empowered students. Professor Armstrong – who I'm sure was never guilty of the first of these vices – is certainly not guilty of the second.

The authors argue that business schools with strong research reputations should resist calls to place greater emphasis on high quality teaching (to the potential detriment of research activity). Armstrong and Sperry find a strong correlation between a school's "research impact" and its prestige among firms, business school deans, and prospective students. They also find that, while enrolled MBA students are not systematically happier at research-oriented schools, neither are they systematically unhappier. The research schools, in other words, would be well advised to keep on keeping on.

Armstrong and Sperry make a case that I find interesting but ultimately unconvincing. I see some technical problems in their work but, more fundamentally, think that their concept of "prestige" is dangerously narrow. Let me elaborate on these points.

Even at a cursory level, certain findings of the paper are incongruous. If research impact is so important to deans, firms, and prospective students, then how did Harvard – which ranked below the median on this dimension among 32 business schools -receive from these groups their very highest collective ranking? And if the authors'

interpretations of data are taken literally, students attracted to a school by its high-impact research become indifferent to that research once they get there.

Moreover, the paper relies on a tacit “steady-state” assumption, under which the extent to which a school’s key constituencies care about its research record will be the same in the future as in the past. But members of these constituencies could change their priorities as more diverse information about the schools becomes available. *Business Week’s* depictions of the satisfaction of current students, for example, have demonstrably affected the decisions of future ones. (Dartmouth’s Tuck School witnessed a surge in applications after *Business Week* portrayed it as highly congenial.)

One can easily imagine a time-dependent model of shifts in comparative prestige. If a student-oriented school with limited research activity starts attracting more talented students, business leaders could notice and accordingly adjust their rankings. Business school deans – the selection of whom could increasingly depend on the tastes of MBA students – may soon give far greater weight in their assessments of schools to the caliber of instruction. It is conceivable, therefore, that weaknesses in teaching could soon damage a school at least as much as weaknesses in research.

Yet all these considerations seem minor compared to another. When the authors speak of prestige, their focus is purely relative: Is Stanford more prestigious than Wharton? They ignore the issue of the absolute level of prestige of the overall business-school enterprise. Yet that absolute level appears to be dropping precipitously; indeed, the MBA degree may soon be perceived as the junk bond of educational credentials.

In the first two months of 1992, ominous articles appeared in several influential publications. *Forbes* reported that many companies, exasperated by dealing with high-salaried MBAs, were beginning to focus on “spunky Bas” who could be trained in-house [*Forbes* 1992]. *The Economist* contended that full-length MBA programs would decline as firms insisted on short, intense courses catering to their particular needs and restricted to their own executives [*The Economist* 1992].

The New York Times noted that corporate restructuring was eliminating many of the middle-management positions for which the MBA was once a prerequisite [*New York Times* 1992]. The *Times* suggested that perhaps 92 percent of the nation’s 900 business schools would close before the 21st century.

With our short memories, we forget that business schools only became a significant force in the 1970s and reached their heyday in the 1980s. But the 1980s is now viewed as a period of decadence, epitomized by Ivan Boesky and by the popular rock song that endlessly howled the line “I wanna be rich!” Someday, business schools may be perceived as a fad of the ‘80s akin to the bathtub gin of the Roaring ‘20s.

Under the circumstances, I cannot join Armstrong and Sperry in endorsing the business-school status quo. If today’s MBA students are disillusioned with their schools, an even deeper disenchantment may pervade the broader society. In the early 1960s, New York’s Rheingold Beer smugly advertised that “we must be doing something right.” Rheingold Beer is now gone. If business schools are to avoid its fate, they might do well to start with the working hypothesis that they must be doing something wrong.

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Don't Let Shallow Reporters Set the Agenda, a comment from Frederic H. Murphy, School of Business and Management, Temple University.

The teaching-versus-research debate as framed by the business press is more polemics than substance. For a given faculty member, there is a definite trade-off between teaching and research. Every hour devoted to research takes away from teaching and interacting with students, as long as the total hours worked remain the same. The debate focuses on this fact but fails to address the larger issue: what we really want is high quality research that produces something worth teaching and high quality learning.

Schools can get better teaching and research as a package in two ways. First, some people are more productive than others. One could interpret the Armstrong and Sperry conclusions to mean that prestige schools have been doing their jobs in selecting and retaining more productive faculty: they have an uncorrelated level of student satisfaction of the same level as less prestigious schools, and they have higher research productivity.

Second, one can improve productivity by eliminating time-wasting tasks that distract faculty from teaching and research. Universities are remarkably wasteful of faculty time. Too often meetings are held because administrators think "faculty aren't doing anything else and they ought to show up for something." However, to make the committee productive, they go to the same faculty who have been productive in teaching and research, taking them away from producing the university's products. In my department, we improved our situation by not holding any faculty meetings during the past academic year. This did not eliminate the entire burden on us, but it was a step forward.

What Armstrong and Sperry have done is determine the current measures of prestige. American universities were founded first to train ministers. By the end of the 19th century, private universities had become finishing schools for the new industrial elites, and prestige was defined by which scions of which rich families went where. After World War II, universities became research arms of the government, and prestige came to be measured in average SAT scores and the level of sponsored research.

Business Week, through its surveys, is trying to convert the measure of prestige for business schools to student satisfaction and corporate impressions. Corporate impressions are mostly halo effects and imprecise memories. Student satisfaction cannot be taken seriously as a measure of excellence. Since MBAs typically attend only one program, they cannot make comparisons. This makes their satisfaction assessments more a statement about themselves than about the school. A school probably could ace this dimension by admitting self-satisfied students lacking in introspection. The appropriate measure of the student experience is the extent to which graduates become better analysts, managers and leaders, something almost impossible to measure.

From a management perspective, one would like to determine the causes of excellence (not just prestige) and use this knowledge to improve one's school. In my mind, only two factors can affect the relative position of a university: changes in finances and better management of resources and of promotion and tenure. For example, Stanford and MIT used government grants and contracts to become important learning centers in the post World War II period.

We need to learn how to improve our management of the resources at every school, since focusing on a star system ignores the fact that very few managers come from prestige schools and the goal should be to improve the skills of all managers. We could begin this process by doing a data envelopment analysis with the data presented here to evaluate the productivity of the administrations at the different schools. We could then interview the successful deans on their secrets and send raspberries to the losers.

As long as the measure of success remains the same, university rankings are very stable because of several factors. First, students channel themselves to the same schools as schoolmates of equivalent ability from previous years. That is, the student perceptions of pecking order are stable. Second, faculty members self-select, and they rarely wish to disturb their own pecking orders. So, when left alone, they hire colleagues in their image rather than try to do better. Third, more prestigious schools get more donations to acquire more prestigious assets, whether faculty or facilities. Fourth, the attitudes alumni articulate are formed from experiences that took place many years ago.

Undoubtedly, the measures of prestige will change and the rankings will be up for grabs. The universities with good managers and strong financial resources will be able to adapt. Armstrong and Sperry are right to conclude that research should continue to be the focus of the schools with the resources. However, the leaders of these schools had better monitor any substantive change in the measure, ignore the frivolous efforts at agenda setting by shallow reporters, and reallocate those resources when the substantive change occurs.

Pitfalls in the Interpretation of Armstrong and Sperry's Data, comments from Edwin A. Locke, College of Business & Management, University of Maryland and Shelley A. Kirkpatrick, Kogod College of Business Administration, American University.

We appreciate the opportunity to comment on the paper by Armstrong and Sperry, but we cannot support their conclusions. We find two major problems with their analyses: (a) inadequate data, and (b) an incomplete causal analysis.

Data

There are two different though interrelated problems with Armstrong and Sperry's data. The first is the very small sample size. In their original data set, the sample sizes for each correlation range from 16 to 18. If we consider a moderate correlation of 0.50, the 95 percent confidence interval for a sample size of 16 is between 0.00 and 0.80. This large range indicates a high degree of sampling error when attempting to estimate the correlation for the population. In an attempt to remedy this problem, Armstrong and Sperry filled the missing data for the prestige measures by assuming that any omitted schools would have lower ranks on the missing measures than the schools for which there were measurements. This introduced a second problem – inconsistency in that they then reported selective results for both data sets, that is, for the sample size ranging from 16 to 18 using “unfilled” data and for the sample size of 32 using the “filled” data. One can see the instability of the results by comparing the correlations for the sample size of 16 to 18 to the correlation for the sample size of 32. For example, the research-satisfaction correlation for $n = 18$ is 0.00 and is not statistically significant. For $n = 32$, the correlation increases to 0.51 and is significant at $p < 0.01$. In fact, for $n = 16$ to 18, only three of the 10 correlations were significant, while all 10 were significant for $n = 32$. Thus, one's conclusions could easily be affected by the choice of sample size. In the interests of clarity and consistency, we present the original, unfilled correlations for the sample size of 16 to 18 and the full set of correlations for the sample size of 32, using filled data where needed (Table 1). To complete the data set for the larger sample size, we used filled data in all cases where there were no original data, including for satisfaction. We added public-private status to the table; this variable is discussed below.

Armstrong and Sperry calculated filled data for both the satisfaction and prestige measures but did not use the satisfaction data on the grounds that the assumptions made with respect to the filled data (that omitted schools would have lower satisfaction scores than those with data) did not apply in this case [Sperry 1992]. In other words, they believed that schools for which there were no satisfaction ratings might, in fact, have more satisfied students than some of those for whom there were satisfaction ratings. This could be true, but we believe that the original assumption made for the prestige data is at least as plausible for the satisfaction data as for the prestige data. That is, the schools that are good enough to be included in *Business Week's* satisfaction survey should also have the highest satisfaction rankings. Consider the following reasons why this should be so: (1) the students for whom there are satisfaction scores are from elite schools, and these students know that their schools are elite; (2) these same students know that they will be among the most highly recruited students and will receive higher salary offers than students at less elite schools; (3) they know that their schools have top-notch faculty and therefore they will be learning the most up-to-date ideas from some of the people who formulated the ideas; (4) they have met high standards of academic achievement by having been admitted to their schools; and (5) they are attending their schools with students who are as intelligent and as highly selected as they. Regardless of the teaching skills of the professors involved, these factors should tend to make students at the top schools more satisfied than those at the lesser schools where satisfaction was not measured.

Table 1. Correlations with sample sizes of 32 and 16 to 18.

	1	2	3	4	5	6
Research Impact	—	0.51** (32) 0.00 (18)	0.63** (32) 0.58* (17)	0.60** (32) 0.13 (18)	0.53** (32) 0.13 (18)	0.61** (32) 0.73** (18)
Satisfaction		—	0.79** (32) 0.26 (18)	0.81** (32) 0.24 (18)	0.75** (32) 0.65** (18)	^a 0.16 (18)
Prestige: Academics			—	0.96** (32) 0.93** (16)	0.64** (32) 0.34 (17)	0.47** (32) 0.35 (18)
Prestige: Firms				—	0.66** (32) 0.15 (16)	0.49** (32) 0.23 (18)
Student Selectivity					—	0.39** (32) 0.21 (18)
Private/Public^b						—

^a Armstrong & Sperry provided us with the filled ($n = 32$) and unfilled ($n = 16$ to 18) correlations among research impact, satisfaction, prestige (academics and firms) and student selectivity. They declined to provide us with the raw, filled satisfaction data; thus we could not correlate filled satisfaction with the private/public variable. Despite inconsistency and unclarity in the correlations for the unfilled data provided to us by Armstrong and Sperry (with sample sizes ranging between 16 and 18), we present what we best determined to be the correct unfilled correlations. The significance level was not affected by the difference in sample size (ranging from 16 to 18).

^b Scored as 0 = private, 1 = public. Note that due to use of ranked data, the positive correlations should be interpreted as private schools having higher rankings and public schools having lower rankings. The private/public correlations for $n = 18$ are based on omitting the 19 schools listed as “N/A” in Armstrong and Sperry’s Table 3.

* $p < 0.05$, ** $p < 0.01$.

One might argue that higher expectations could make students in top schools less satisfied than those in bottom schools, but this all depends on what students use as standards for assessing satisfaction. We suspect most students highly value graduating from a prestigious school, having classes from nationally known professors, and getting top jobs afterwards. We believe that these factors will have a major impact on satisfaction.

Thus, in the name of both sample size and consistency, we decided to reanalyze the Armstrong and Sperry data using only the filled data and all the filled data. These are the same data as are found in their Table 3 except that the filled satisfaction data were added. This means that the sample size in every case was 32. In Table 1 the first row for each variable shows the correlations for $n = 32$. For comparison purposes, the second rows show the corresponding correlations for $n = 16$ to 18. The correlations for the sample size of 32 may differ slightly between this matrix and the Armstrong and Sperry article because they entered rounded numbers into their computer program, whereas we did not.

The first thing to note about Table 1 is that every correlation based on a sample size of 32 is highly significant at $p < 0.01$ or less. Nor are the correlations, given the expected standard error with a sample size of 32, markedly different from one another.

We performed a principal components analysis (Table 2) on the matrix data and found that one factor emerged. (If two factors are forced, it is research, not satisfaction, that comes out as a separate factor, although it also loads highly on the first factor.) In sum, all of the variables are highly related and reflect the same underlying phenomenon, business school quality.

Table 2: Principal components analysis.

Variable	Factor 1
Research Impact	0.74
Satisfaction	0.90
Prestige: Academics	0.94
Prestige: Firms	0.94
Student Selectivity	0.82

Causal Analysis

It is one thing to calculate correlations; it is quite another to explain them. Armstrong and Sperry claim that research was the cause of business school prestige and imply that, therefore, teaching (the alleged cause of student satisfaction) can be safely ignored. Our conclusion is somewhat different. First, the data are only correlational, and a number of different causal models are plausible. One is that student selectivity (which was misnamed by Armstrong and Sperry as student prestige) may affect both academic prestige and prestige among recruiters, which in turn could affect student satisfaction. Prestige could, in turn, facilitate fund raising, which could be used for research. Alternatively, research and student selectivity could both affect academic and recruiter prestige, in turn affecting satisfaction. Student satisfaction, in turn, could have recursive effects by facilitating the schools' obtaining good applicants and enhancing the schools' reputation with recruiters. There are undoubtedly other causal models consistent with the data.

Second, there are important exogenous causal variables that must be considered. Armstrong and Sperry noted the possible significance of host school reputation, although these correlations were not very high compared to those in our Table 1 (data provided by Armstrong and Sperry). They also mentioned school size, but this can hardly be a causal variable by itself (as opposed to a proxy for wealth, breadth, and so forth). In our analysis, we entered public versus private status as a variable and found that being private was significantly associated ($p < 0.05$) with the research, satisfaction, selectivity, and prestige measures. Being private has several advantages that could facilitate the outcomes in Table 1. Private schools are less bureaucratic and thus are able to respond more rapidly and with more flexibility to customer (business) needs. Further, donors prefer giving money to private schools on the grounds that they are not also supported by state government subsidies. Such private monies can be used to promote teaching, research, and public relations, thus enhancing the schools' reputation.

Another exogenous variable is the very fact of being mentioned in business publications such as *Business Week*. This alone (as is widely reported by MBA program directors) enhances reputation and becomes a self-fulfilling prophecy. Firms, deans, and students who see that a business school is given a high rating by a national magazine (perhaps due to good public relations) automatically endow that school with a high reputation, whether the school objectively merits it or not. This increases the chances that it will be mentioned favorably in the next year's rankings, which in turn attracts capable and satisfied students, faculty, funding, and recruiters. Both this model and the private status model suggest that research and satisfaction may not be causally related, but are co-outcomes of a common cause or causes.

Finally, based on the results in Table 1, one does not have to choose between teaching and research. In our matrix, research and satisfaction were positively correlated. Even if one isolates the teaching quality component, as other studies have done (for example, Locke et al.), the correlation between teaching and research tends to approach 0.00, which means that the outcomes are independent rather than antagonistic. This implies that one can, in principle, successfully emphasize both outcomes. This point may seem counter-intuitive because of the fact that resources taken away from research and devoted to teaching should lower research productivity and vice versa. However, there is a way to maximize both outcomes. The best teachers could be given heavier teaching loads, thus raising the overall teaching quality, while the best researchers could be given more time to do research, thus raising their productivity. Even in publish-or-perish institutions, the best researchers do far more research than the less-than-best, therefore there should be a net gain in both research productivity and teaching quality when specialization is emphasized.

Devaluing teaching could have very negative consequences for a school. For example, students might be less likely to praise the school to their employer, to recommend the school to prospective students, and to donate money to the school in later years. The long-term result could be a lowering of the school's reputation. Of course, as implied above, we do not actually know what students are actually rating when they rate their satisfaction (Armstrong and Sperry admit these ratings were unreliable). The ratings could reflect just teaching but probably reflect teaching plus a number of other school characteristics. For example, the questions used by *Business Week* [Byrne 1988, 1990] included teaching, curriculum, and environment.

Conclusions

We realize that both the small sample and filled data matrices are far from reliable. Further, causal factors involved in determining a school's reputation are undoubtedly more numerous, complex, interrelated, and recursive than either we or Armstrong and Sperry report. Thus, we cannot safely make unequivocal causal recommendations from the present data. Even if we could, it does not solve the deeper problem of whether business school reputation rankings are actually objective. Business magazines typically utilize incomplete and often very superficial data to make their judgments.

We would like to suggest an objective approach to rating business school quality. This approach would rely on three classes of criteria: input (quality of students that the program attracts); process (what the students learn and gain from the program); and output (how well the students do in the job market and in their jobs once hired). Briefly, objective measures of input could include the following: (1) mean graduate management admission test (GMAT) scores of those accepted; (2) mean undergraduate grade point average of those accepted; (3) selectivity, or percentage of applicants accepted; (4) work experience of those accepted; (5) mean salary of those with previous work experience. The process measures could include the following: (1) quality of faculty scholarship (that is, Kirkpatrick and Locke's [1989] measure; see also Kirkpatrick and Locke [1992]); (2) quality of faculty teaching; (3) curriculum, such as course content, teaching methods, and application of knowledge; (4) facilities, such as modern classrooms, case rooms, computers, and library facilities; and (5) student support services, such as resume writing assistance and summer job placement. Output measures could include (1) student retention, or the percentage of students who complete the program; (2) mean percentage of students placed by or before graduation; (3) starting salary; (4) graduate ratings of the degree to which they feel the school prepared them for the business world; and (5) company ratings of graduates. The above list of measures is only suggestive and could no doubt be improved. Armed with objective (and comparative) data of this type, business schools could then take steps to modify their schools' scores on the three sets of variables and thus enhance their reputations without resorting to public relations and hype. These data would not only help them raise money but also show them how to spend it productively.

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Research and Teaching in Business School Prestige, a comment from Richard H. Franke, The Sellinger School, Loyola College.

Business schools frequently are ranked in terms of prestige, with possible repercussions upon resources and institutional success. As professional schools, they have both immediate educational aims and objectives for

eventual development of the fields of business, for which they strive in teaching and research activities. Armstrong and Sperry test whether teaching or research is the more important for business school prestige, as seen separately by academics and business recruiters and as indicated by schools' ability to be selective in admitting graduate students. Teaching emphasis is inferred from the satisfaction of recent graduates, while research emphasis is indicated by earlier research productivity, influence, and reputation.

Armstrong and Sperry indicate that research performance is the primary factor in establishing the prestige of business schools in the eyes of both academics and business professionals. This is the main thrust of their findings, which my analysis substantiates. Also, by showing the relationships of attitudinal and objective data, Armstrong and Sperry provide some support for the credibility of academic ratings [Gilley 1992].

Further Analysis

I further examined the group of 32 and the subgroup of 18 business schools used by Armstrong and Sperry. The latter includes 15 of the top 18 research institutions and can be thought of as comprising the super-elite. Only for this subgroup are measures of graduate student satisfaction with school teaching, curriculum, and environment available. Beyond (1) faculty research and (2) student satisfaction with teaching, the business school characteristics examined for possible effects on prestige are (3) location, with schools on the East or West Coast presumed to be more prestigious than those in the middle of the country, and (4) private as opposed to public schools, with private more focused on research [Jordan, Meador, and Walters 1988].

Most data are ordinal, but rank-order correlation using such data is nearly as efficient as ordinary correlation in rejecting false hypotheses [Siegel and Castellan 1988, p. 244], and ordinal data may be used in regression [Guilford and Fruchter 1973, p. 285] to test the effects of multiple variables upon prestige. While correlation and regression do not prove causation, it is possible to make inferences regarding causation from plausible and significant relationships in which explanatory variables occurred earlier than the variables explained [Kenny 1979, chapter 11. Relationships at a high level of aggregation are often strong because the aggregated data are of high quality and the differences among the aggregate entities (here, among business schools averaging about 70 faculty members each) are substantial. These relationships do not necessarily hold for individuals or for other groupings [Robinson 1950], so that it is necessary to test at several levels to infer generality [Blalock 1961]. At present we are interested in the business school level of aggregation, rather than in testing for individuals [Menzel 1950] and, if anything, would wish to test even more highly aggregated data. For example, we might want to evaluate the effects of business research and teaching on national productivity [Baily 1986; Thurow 1985, ch. 6]. In addition, the present research-unreplicated and with causal mechanisms not fully defined-requires verification using techniques such as cross-lagged panel analyses, experiments, and time-series regressions [Campbell and Fiske 1959; Franke 1980; Kenny 1979].

Data on Business Schools

Table I shows Armstrong and Sperry's Table 3 data further organized for the two groups of 32 and 18 business schools; I converted their composites from several sources to simple rankings for use in rank order correlations. To the rankings of average research impact per faculty member in columns one and two, I added Kirkpatrick and Locke's [1989] rankings of total research impact by all faculty members in each school. Schools may receive a better rank in total research for having a larger faculty or a few star researchers, as well as for having higher average faculty performance. Also in Table I are simple rankings of the school's graduate student satisfaction and of prestige values from Armstrong and Sperry, as well as categoric data regarding school location (coastal or interior) and status (private or public institution).

Table 1. Business school rankings from Armstrong and Sperry’s Table 3 and for total research impact from Kirpatrick and Lock (1989, Table 6) all ranked for the 30 and 18 schools and indications of location and institutional status. Excepting dummy variables of 1 or 0 for coastal versus interior location and for private versus public institutions, all data are rank orders ranging from 1 for the highest value to the number of the lowest ranking institution, measured, with “—” showing data not available.

School	Research Impact				School grads’ satisfaction n=18	Prestige as ranked by:						Coastal location/ private status	
	Per capita		Total			Academics		Firms		Candidates			
	n=32	n=18	n=32	n=18		n=32	n=18	n=32	n=18	n=32	n=18		
Stanford	1	1	4	4	3	4	4	4	4	1	1	1	1
Wharton	2	2	1	1	13	2	2	1.5	1.5	5.5	5.5	1	1
MIT	3	3	16	11	12	7.5	7.5	9.5	9.5	3	3	1	1
Columbia	4	4	5	5	18	6	6	7	7	17	14	1	1
Carnegie Mellon	5	5	20	14	5	10	10	12	12	18	15	0	1
Rochester	6	6	17	12	15.5	24	18	27	18	26	18	0	1
Chicago	7	7	7	7	10.5	5	5	6	6	13	12	0	1
Cornell	8	8	27	16	7.5	16	15	14	14	9.5	9.5	0	1
Northwestern	9	9	8	8	4	3	3	3	3	7	7	0	1
UCLA	10	10	10	9	7.5	12	12	15	15	4	4	1	0
Maryland	11	—	21	—	—	29	—	30	—	16	—	1	0
Duke	12	11	19	13	9	13	13	8	8	9.5	9.5	1	1
Pittsburgh	13	—	24	—	—	28	—	29	—	25	—	0	0
Dartmouth	14	12	28	17	1	9	9	9.5	9.5	5.5	5.5	1	1
Michigan	15.5	13	6	6	14	7.5	7.5	5	5	21	17	0	0
Purdue	15.5	—	23	—	—	22	—	19	—	11	—	0	0
Harvard	17.5	14.5	2	2	6	1	1	1.5	1.5	2	2	1	1
NYU	17.5	14.5	3	3	17	18	17	17	17	15	13	1	1
Texas	19	—	9	—	—	15	—	18	—	14	—	0	0
Wisconsin	20	—	25	—	—	20	—	21.5	—	22	—	0	0
North Carolina	21	16	26	15	2	17	16	16	16	8	8	1	0
Minnesota	22	—	15	—	—	23	—	25	—	28	—	0	0
U. Washington	23	—	13	—	—	21	—	26	—	20	—	1	0
Texas A&M	24	—	12	—	—	30	—	31	—	30	—	0	0
Illinois	25	—	18	—	—	19	—	23	—	29	—	0	0
SUNY Buffalo	26	—	29	—	—	31	—	32	—	27	—	0	0
Penn State	27	—	22	—	—	27	—	21.5	—	23.5	—	0	0
Indiana	28	17	14	10	15.5	14	14	13	13	19	16	0	0
Ohio State	29	—	11	—	—	25	—	20	—	23.5	—	0	0
Washington U.	30	—	30	—	—	26	—	24	—	31	—	0	1
Syracuse	31	—	31	—	—	32	—	28	—	32	—	0	1
Virginia	32	18	32	18	10.5	11	11	11	11	12	11	1	0

Simple Correlations

Table 2 shows the correlations of the variables in the study. Prestige rankings by academic deans correlate nearly perfectly with rankings by firms that recruit the schools’ graduates. Academics and business professionals are in close agreement as to which schools warrant more esteem, both in the generally more elite subgroup of 18 and in the broader group of 32 business schools. However, prestige as identified by student selectivity shows less correlation, about 0.8, with the prestige evaluations of academics and firm recruiters for the larger group of schools, and only correlations between 0.4 and 0.5 in the subgroup of 18. It appears, especially for schools of high quality, that students and professionals base their evaluations on somewhat different factors.

Table 2. Pearson correlation coefficients of variables in Table 1, for 18 (upper correlations) and 32 (lower correlations) business schools, where “—” = data not available. Results relating non-ranked data (coastal location and private status) to ranked data are reversed to provide the meanings suggested by the signs of the coefficients. Correlation significance levels are: (*) $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, and * $p < 0.001$, all two-tailed.**

Dependent Variables		Independent Variables						
Prestige as ranked by		Academics	Firms	Students	Research impact per capita	Research impact total	Student satisfaction	Coastal location
Firms		0.95***						
Students		0.96***						
		0.49*	0.41(*)					
		0.78***	0.77***					
Research impact per capita		0.40	0.31	0.21				
		0.59***	0.53**	0.60***				
Research impact total		0.55*	0.54*	0.17	0.30	-0.36		
		0.57***	0.52**	0.35*	0.45**	—		
Student satisfaction		0.20	0.16	0.60**	-0.03			
		—	—	—	0.32(*)			
Coastal location		0.13	0.10	0.62**	-0.03	0.14	0.12	
		0.44*	0.40*	0.66***	0.32(*)	0.24	—	
Private institution		0.31	0.30	0.20	0.63**	0.25	0.05	0.01
		0.48**	0.51**	0.36*	0.55***	0.20	—	0.24

The independent variables in Table 2 are generally unrelated. The main exception is a significant positive correlation between private institutions and research impact per faculty member. In both the subgroup and the full group of business schools, greater research per capita occurs in private institutions, a result similar to that obtained by Jordan, Meador, and Walters [1988] for economics departments.

Prestige correlations with independent variables (Table 2) are stronger, as might be expected, for the more diverse group of all 32 business schools. For these, according to academic and business professionals, prestige is associated with total and per capita research impact, while, for the more elite subgroup, only total research relates significantly to prestige. In the larger group, coastal location and private status add to prestige as seen by professionals.

Prestige as indicated by student selection of schools is associated first with coastal location and second (in the subgroup for which we have full data) with satisfaction about teaching, curriculum, and environment. For the broader group of schools with this variable not available, research impact (per capita and total) and private status are positive factors in student-indicated prestige.

The zero-order correlations of Table 2 support the research emphasis of Armstrong and Sperry but also suggest that teaching skills which affect student satisfaction are important – at least to students.

Beyond Simple Relationships

The stepwise multiple regression procedure chooses first the explanatory variable with the strongest correlation to the dependent variable (if significant) and then in order of decreasing strength any further variables that are significant after allowing for the influence of the first and other already-entered variables [Draper and Smith 1968, chapter 6; Franke 1980]. The resulting regression equations using the aggregate data that are available for 18 and 32 business schools with totals of 1,290 and 2,229 faculty members (Table 3) show that for academics, firms, and students, research accomplishment is a significant factor in subsequent prestige. In the subgroup of 18 schools for which student satisfaction data are available, satisfaction with teaching is a significant albeit secondary factor in

prestige, not just for students but also for academics and firms. Thus both teaching and research are indicated as determinants of prestige.

Table 3. Stepwise regression equations for prestige, where “—” = data not available and NS = nonsignificant in regression ($p > 0.10$). Stepwise multiple regression variance explanations are shown by order of independent variable entry, with constraints set at $p < 0.10$ and tolerance > 0.36 , as described by Franke [1980, pp. 1010-1011]. Nonranked data (coastal location and private status) are reversed to provide the meanings suggested by the signs of the regression slopes. Regression significance levels are: ($*p < 0.10$, $*p < 0.05$, $p < 0.01$, and $***p < 0.001$, all two-tailed.**

Prestige ranked by	Academics		Firms		Students	
	n = 18	n = 32	n = 18	n = 32	n = 18	n = 32
Intercept	-1.67	2.18	-0.78	5.30(*)	-1.97	3.56
Independent variables						
Research impact per capita	NS	+0.35* (Step 1: 34.56%)	NS	NS	NS	+0.43** (Step 2: 16.56%)
Research impact total	+0.72** (Step 1: 30.40%)	+0.35* (Step 2: 11.46%)	+0.68** (Step 1: 28.64%)	+0.43** (Step 1: 26.66%)	+0.34* (Step 3: 9.44%)	NS
Student satisfaction	+0.46* (Step 2: 18.40%)	—	+0.40(*) (Step 2: 14.16%)	—	+0.66*** (Step 2: 27.77%)	—
Coastal location		+4.61(*) (Step 3: 5.33%)	NS	NS	+5.19** (Step 1: 37.90%)	+0.85*** (Step 1: 43.79%)
Private institution	NS	NS	NS	+7.88** (Step 2: 17.41%)	NS	NS
R squared:	48.80%	51.35%	42.80%			
Adjusted R Square:	41.98%	46.13%	35.17%	40.22%	60.78%	57.62%

The question raised by Armstrong and Sperry, whether schools should direct resources more toward research or toward teaching if they seek higher prestige, can be answered tentatively based on the 18 schools for which we have all data: Upward movement of one rank in total research impact contributes upward movement of 7/10 of a rank in a school's prestige among academic and business professionals, but only about half that upward movement for prestige as indicated by student selectivity. On the other hand, an upward movement of one rank in student satisfaction with teaching is associated with 7/10 of a rank rise in prestige indicated by students but only a little over half that for prestige rating by academics and business persons. For prestige as determined by student selectivity, coastal location is the primary variable, contributing a rise of five rank units. In answer to Armstrong and Sperry's question, these results suggest that business schools might shift resources slightly toward teaching to achieve higher quality students, or toward research to achieve more prestige among professionals, but with the qualification that both ingredients of education need to be maintained at high levels.

Among the 18 business schools for which we have complete data, nearly half the variance in prestige rankings can be explained for academics and firms and about three quarters for students. Both research and teaching appear to be important determinants of prestige, research more for professionals and teaching more for students. High total research impact of a school (achieved through faculty size and star researchers, as well as high average performance) seems more important than is high per capita research.

For the full group of 32 business schools, including ones considerably less prominent than most in the subgroup of 18, academics seem to find both per capita and total research important but also to value coastal location, while business professionals seem to regard total research and private status as important ingredients of

prestige. Among this larger group of schools (lacking data on satisfaction with teaching), student selection appears to be influenced primarily by coastal location and secondarily by per capita faculty research.

Conclusion

Further analysis supports Armstrong and Sperry's finding that research by a business school's faculty is related to subsequent perceptions of its prestige by academics and business recruiters. Research also seems to affect which schools graduate students select, with schools whose faculties produce more research considered more desirable. In addition, student satisfaction with teaching is associated with prestige rankings by academics and firms and, even more than faculty research, appears to affect student selection of business schools.

While faculty research does not seem to affect student satisfaction with teaching, it is likely that research raises the credibility and standards of education. Research experiences should transfer to teaching, helping faculty to move beyond best commercial practice, traditional case, and textbook teaching toward classroom discovery, and the exposure of students to research should encourage the more exploratory and active learning that are needed for higher education [Armstrong 1983; Franke and Edlund 1992; Franke, Edlund, and Oster 1990; Reich 1991].

Multivariate appraisal explains 43 to 75 percent of differences in business school prestige rankings by academic deans, business recruiters, and graduate students. Prestige results from faculty research performance, from graduate student satisfaction with teaching, and from East or West Coast location and status as a private institution. To achieve high prestige, business schools should support important, influential, and useful research-work that might provide the technique and substance needed for good teaching.

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Learning versus Teaching: A Reply to the Comments

In replying to some issues raised by the four commentators, we assume that learning is a proper goal for business schools. We have seen little evidence to suggest that ratings of graduates' satisfaction are related to learning (see the reviews of the research by Dubin and Taveggia [1968] and Miller [1978], and the long-term study by McCord [1978]).

Webster

Webster may be correct in his claim that many schools have been increasing their emphasis on research at the expense of teaching. Our conclusions apply only to schools that are already regarded as prestigious (some of which are listed in our Table 1). Perhaps some schools not on this list have been emphasizing their relative weakness (research) at the expense of their relative strength (teaching).

We agree with Webster's listing of the limitations of our study. These are important limitations that might be resolved by further research. Besides doing further research on the current approaches, we urge researchers to examine outcomes more directly. In particular, they should conduct studies on the extent to which business schools produce useful research and transmit research findings to students and others.

Webster expressed skepticism about the impact of the mass media rankings on the prestigious MBA programs. He should visit the campus of an MBA program just as the latest poll results are released and witness the hysteria. Deans join actively in praising the polls (when they like the results) and denouncing them (when they do not like the results). Few deans take the position that the polls are irrelevant.

Barnett

Barnett raises an important question: should business schools' objectives change with their market (by which he means the students)? Consider the following: What if students decided that their objective was to

maximize their current enjoyment subject to spending the least amount of effort to receive certification (the MBA degree)? Should schools change to meet these demands? Some faculty members believe that MBA programs have done just that; they have made changes in recent years to reduce the effort students must expend to obtain degrees and to ensure that the students enjoy themselves. Some certification requirements have been reduced to the extent that it is rare for anyone who is admitted to an MBA program to be denied a degree. We cannot be sure that students graduated with MBA degrees have sufficient skills for such basic management tasks as structuring problems, analyzing problems, conducting meetings, writing management reports, or managing people.

One view of MBA programs is that students should have little responsibility for their learning. Under this assumption, students must be coerced by a grading system to do some distasteful tasks (study in courses) to become certified. This process might interfere with enjoyment.

The traditional view is that prestigious schools should focus on research because that is where their relative advantage lies. Interestingly, by focusing on research, prestigious schools have designed and implemented educational programs in which many students take responsibility for their learning. These students tend to be highly motivated, hard working, and effective at learning. We call these programs “PhD programs.”

In contrast to the emphasis placed on learner responsibility in a number of PhD programs, we are aware of only one school in the US (the University of Chicago) that has made changes in the MBA program to increase learner responsibility. Some European business schools, such as the Solstrand program in Norway, have also emphasized learner responsibility.

We appreciate Barnett’s kind words about courage. We identify with the protagonist in Ibsen’s *Enemy of the People*. Surely the people will want to know that the waters are becoming contaminated! In any event, this is the kind of research that tenure was designed to protect. Business schools will take pride that such issues are being discussed openly.

Murphy

We agree with Murphy that research time might also be gained by spending less time on service. Many faculty meetings end without useful action steps. We are not sure that additional funding for research will solve the problem, however. Brush [1977] reports on a large-scale attempt by the US government to develop “second tier schools” as centers for excellence. Between 1965 and 1972, the government awarded \$230 million to 31 universities. Follow-up studies showed that these faculties grew in numbers, but there were no gains in publication rates of faculty members, test scores of graduate students, or placement of PhD graduates.

Locke and Kirkpatrick

Kirkpatrick and Locke [1992] made a major contribution by providing a procedure to measure the impact of research. Hopefully, their approach will be extended so that business schools will measure this objective periodically.

We do not agree with Locke and Kirkpatrick’s current analysis based on “filling” the student satisfaction data. No effort had been made to select the schools that produced the happiest graduates. Therefore, we do not believe it is reasonable to assume that all the excluded schools have less satisfied graduates. (We suspect that faculty at most business schools would endorse our view.) Our hypothesis would be that graduate satisfaction at prestigious schools does not differ from that at less prestigious schools. (We are surprised that administrators at business schools outside the select circle have not yet organized to conduct large-scale surveys of graduate satisfaction. We expect that many little known MBA programs have highly satisfied graduates.) Although their assumptions differ from ours, Locke and Kirkpatrick provide full disclosure of their procedure, so readers can decide for themselves or even conduct further analyses.

Locke and Kirkpatrick suggest that more attention be given to assessing the outputs of the business school. We agree. We suggest, however, that schools assess progress on two other objectives: (1) discovering findings that

improve decision making, and (2) communicating these findings. The first is what we call the research goal, and the second relates to learning.

We need measures of the extent to which research discoveries from business schools lead to improved decision making. Although we are not aware of any business schools that have attempted to assess this, we believe that such measures could be obtained. For example, studies have been done that show that university research aids innovations in other areas, such as electronics and mechanical arts [Acs, Audretsch, and Feldman 1992].

Instead of attempting to measure learning, business schools measure “teacher performance.” They do so despite decades of research showing that teacher performance measures are invalid measures of students’ learning [Attiyeh and Lumsden 1972]. We believe that it is feasible to measure learning. Prestigious business schools might be particularly interested in assessing how their research affects learning when it is as communicated through journal publications and textbooks.

Locke and Kirkpatrick say that the data that we examined are consistent with a variety of causal interpretations. While we agree, our concern was with the way in which causality affected decision making. Given a budget for teaching and research, should the balance be altered? We asked whether the data are consistent with the historically accepted assumption that prestige schools should focus primarily upon research. We believe that they are.

Franke

Franke controlled for whether business schools were public or private (as did Locke and Kirkpatrick) but without the assumption that all excluded schools have less satisfied graduates. He also examined the schools’ locations.

Franke believes that research can improve course content and that better course content can lead to better learning. Empirical research has shown what none of us wants to believe . . . that course content has little relationship to teacher ratings [Marsh 1984; Abrami, Leventhal, and Perry 1982]. In other words, one can have satisfied students without content. But content (facts, techniques, and concepts) is crucial for learning. Without content there can be no learning. It is reassuring, then, that Abrami, Leventhal, and Perry’s [1982] review found that content was related to learning.

If certification replaces learning as the goal, then perhaps the ideal program in the view of many students should have no content. This would enable certification at the lowest cost. This is not a satisfactory viewpoint for society, however. If a body of content (techniques and principles) exists, is it proper to design a program for which the only explicit measure of a teacher’s success is whether the students are satisfied? Would we be willing to certify civil engineers and brain surgeons because they went through a program that produced very satisfied students?

Speculation

We expect that the mass media polls are here to stay. One possible improvement to the current situation would be to conduct more polls and to develop more measurements. We should develop explicit measures of research contributions. Then we should assess how people learn about research findings. (Perhaps the most prestigious schools contribute more effectively to learning through books, expert systems, and other programs than they do through direct contact with students.) Decisions should be made by focusing primarily on these measures rather than on the satisfaction of the students. We expect that these recommendations would improve research and that this would aid learning. Measures of progress in these areas should be heavily promoted so that it is widely known what schools do the most valuable research and what schools produce the most capable graduates. A simple first step would be to expand the Kirkpatrick and Locke research assessment to include more schools and to repeat it consistently every two years.

One way to implement these changes would be to separate the functions of learning and certification. Certification could be done at the end of the program, perhaps through a two-day assessment center test. Even better,

it could be done whenever the student wanted it. Students who already knew everything could become certified at the beginning of the program, thus saving time for them and for the faculty.

Here are some questions. Should prestigious business schools focus primarily on their relative advantage (research) and design their institutions to produce more useful research, or should they compete with nonprestigious schools to produce the happiest students? Do the high prestige schools have any relative advantage in making people happy? Should business schools focus on growth, or should they stick to their knitting?

Conclusions

In our opinion, the existing evidence does not justify the recommendation that prestigious schools should redirect faculty resources from research to teaching. One could easily argue that more resources should go into meaningful research. We believe that a reduced emphasis on research would harm the quality of research and the quality of learning. An emphasis on teaching might lead to a reduced level of prestige for some schools and this, in turn, might be detrimental to the school's graduates.

The market will respond to a demand to provide student certification at low cost, and some schools will make it their goal to produce happy graduates. But we hope that this will not be a primary goal at prestigious business schools.

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