Research as a Source of Differentiation in Academic Life

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This paper considers how differential commitment to research influences recruitment to academic work, the process of peer evaluation, and collegial communication among institutions and scholarly disciplines. Professors of engineering and chemistry affiliated with French and English medium Quebec universities were surveyed. The findings indicate that variations in the academic culture of institutions and scholarly disciplines are more likely to be the product of factors which shape their interactions with various constituencies than of differential commitment to research.

Dans cet article nous examinons en quoi les différences d'attitude à l'égard de la recherche influent sur le recrutement des professeurs, sur le processus d'évaluation par les pairs, et sur les échanges entre les établissements d'enseignement et à l'intérieur des diverses disciplines universitaires. Nous avons fait pour cela une enquête auprès de professeurs de génie et de chimie des universités françaises et anglaises du Québec. Selon les conclusions de notre enquête, il est probable que les différences de climat intellectuel entre les établissements et les disciplines sont attribuables davantage à des facteurs qui déterminent le type des interactions entre les différents regroupements qu'à des différences d'attitude à l'égard de la recherche.

This paper considers how differential commitment to research shapes recruitment, peer evaluation, and the social structure of collegial communication within disciplines and institutions. Findings are reported from a survey of professors of chemistry and civil, mechanical, electrical, and chemical engineering employed by McGill University, the University of Montreal, and the Ecole Polytechnique (which is affiliated to the University of Montreal). We will test the hypothesis that the primacy of research among chemists and staff affiliated with McGill University will be reflected in their motivations for entering academic life and in the evaluation of peers for purposes of promotion and tenure. The centrality of research, we further propose, has profound implications for networks of collegial communication. In science and engineering particularly, teamwork is the most prevalent form of research organization. It is anticipated, therefore, that where scholarly research occupies less importance, networks of professional communication within departments will be more individualistic.

METHOD OF DATA COLLECTION

During the spring term of the 1975-76 academic year, the data reported here were collected from interviews with staff attached to four engineering departments of McGill University and the Ecole Polytechnique. On the basis of the preliminary findings it was decided to study chemistry departments of these universities to ascertain whether institutional effects were peculiar to engineering. The chemistry departments were surveyed in the Spring of the 1976-77 academic year.

The four engineering fields selected for the initial phase of the study represent the principal branches of engineering at the two institutions. They are the largest engineering departments in terms of staffing and student enrolment. All are established engineering fields in the sense that instruction and research in these specialties at most engineering institutions necessitates supervision by an academic department. The study population was defined as staff in the four pairs of engineering departments who held full-time tenure track appointments at the assistant professor rank and above and did not occupy adminstrative positions, except as department chairmen. Structured interviews were used to collect data. A total of 124 engineering professors were interviewed (95% of the study population).

During the second phase of the field work, interviews were conducted with chemists at the two institutions. Chemistry was chosen in order to compare departments of similar size within the science faculties of McGill University and the University of Montreal. The study population was defined as above. But in the case of the chemistry department at McGill, professors affiliated with the Pulp and Paper Institute were not interviewed so that all applied chemists would be excluded from the study. Again, structured instruments were employed and 42 professors were interviewed (91% of the study population).

Initial analysis of the survey data relating to the research activities of staff at these institutions suggested differentiation with respect to commiment to research. The mean lifetime research productivity (i.e., number of publications appearing in refereed scientific journals) of McGill engineers was twice that of their colleagues at Ecole Polytechnique ($\bar{X}=17$ vs. 8) and professors of chemistry at McGill published more scientific papers in refereed journals than chemists at the University of Montreal ($\bar{X}=57$ vs. 39). Differences in level of research activity between chemists and engineers were roughly the same magnitude at either institution. Such differences could not be explained by relative opportunity to publish (Eisemon & Rabkin, forthcoming).

In this study, the centrality of research to chemists is presumed to differentiate them from engineers, for whom contributing scholarly research is simply one dimension of their professional role. Within the academic profession, chemistry would be, in Parsons' words, more "purely

oriented by cognitive rationality" (Parsons & Platt, 1973). Perhaps this is implicit in the designation of chemistry as a pure science.

The universities we studied may also be distinguished vis-à-vis their commitment to research. McGill University has long considered itself an internationally recognized centre of excellence. In public pronouncements, McGill describes itself as a research university, its prestige derived from the excellence of its graduate programs — especially in science — and the international visibility obtained through staff research (Eisemon & Rabkin, forthcoming). The University of Montreal is a very different institution. Although it is also a private university, the University of Montreal is a civic university in regard to its commitment to undergraduate teaching and to the social and economic improvement of the province generally. Research and graduate training are emphasized at the University of Montreal. But to the extent that graduate training and research compete with other conceptions of higher education, the University of Montreal approximates Parsons' notion of "cognitive rationality" less closely than McGill. The emphasis given at the University of Montreal to participation in Quebec society contrasts with McGill's preoccupation with its membership in the international community of English medium universities. It may be instructive in this connection to compare the development of their programs in science and technology.

THE DEVELOPMENT OF ENGINEERING AT MCGILL AND THE ECOLE POLYTECHNIQUE

While McGill University was founded in 1821 "for the advancement of sound learning and science," the humanistic orientation of the older French-Catholic universities prevailed until Montreal succeeded from Laval University and established the first Faculty of Science in 1920. Science and technology were still struggling for recognition within the ecclesiastical framework of Francophone higher education as recently as the 1950s. A comparison of histories of McGill's Faculty of Engineering and the Ecole Polytechnique will illustrate how religion, government, and language have shaped the evolution of these institutions into civic and research universities, respectively.

At McGill University, engineering studies were initiated in 1855 with a series of lectures given in the Faculty of Arts by Principal Dawson. A year later, these lectures were expanded and consolidated into a curriculum of two years' duration leading to a diploma in civil engineering. The first diploma was conferred in 1858, and by 1865 15 had been awarded. However, financial stringency caused McGill to suspend its courses until the early 1870s when, in anticipation of the University of Toronto's plan to offer an engineering program, a Department of Practical Science was founded and incorporated into the Faculty of Arts. A Faculty of Applied Science was not established until 1878, after Dawson failed to persuade

provincial authorities to sponsor a non-sectarian engineering school that would accelerate Quebec's industrialization. By the 1890s, five engineering specialties were taught: civil, mechanical, and electrical engineering, and mining and practical chemistry.

In French-speaking Quebec, serious interest in scientific and technical education was first expressed in 1870 when Premier Chauveau offered Laval University an annual grant to start courses in the applied sciences. Laval accepted but later returned the grant to the government. The university was reluctant to permit government interference in the affairs of a Catholic, humanistic institution. "This noble idea," as Laval's rector graciously put it, had to be developed elsewhere, namely, in Montreal (Harris, 1976). Chauveau's offer was taken up by the city's Catholic School Commission, at the urging of Archambault, the Principal of the Académie Commerciale de Montréal. In 1873, he recruited Charles Pfister to the Académie, a French émigré and former soap manufacturer in the United States. Pfister developed scientific and industrial courses at the Académie which in 1873 was renamed the Ecole Polytechnique. Two years later, aided by substantial government grants, the Ecole Polytechnique moved to a building of its own and was recognized by the Minister of Public Instruction as the equivalent of a university. In 1887, it was reluctantly affiliated to Laval University, which made engineering students eligible for a university degree. In 1919, the institution was associated with the University of Montreal.

However, the Ecole Polytechnique was slow to gain momentum. Many opposed in principle the idea of a publicly financed institution, situated uneasily within the ecclesiastical system of French medium higher education committed to the propagation of secular knowledge. The difficulties the government experienced in promoting science and technology within the Francophone sector did not foster an interest in engineering at McGill, though McGill's example provided an impetus to provincial authorities. When Premier Chauveau suggested establishing a program in the applied sciences to Laval, he sent the university a copy of Dawson's proposal to create a non-sectarian engineering institution — the proposal which the provincial government had considered earlier and rejected. Dawson's proposal threatened the efforts of Francophones to retain their autonomy in educational matters (which was affirmed in the confessional organization of the educational system that persists to the present day). About this, at least, the church and state were in agreement. While the state was helping the Ecole Polytechnique financially, the church discouraged French-Canadians from enrolling at McGill.

Scientific and technical training in French-medium universities did not fully develop until the 1960s, when the province experienced its "Quiet Revolution." Educationally, the Quiet Revolution led to a dramatic growth and secularization of secondary and higher education in French-speaking Quebec. The provincial government actively promoted indus-

trialization and, more significantly, through its language legislation sought to ensure that Francophones, now provided with the educational opportunities long enjoyed by the English, would be entitled to the resulting benefits. The Ecole Polytechnique was transformed by these developments. For most of its existence, the Ecole Polytechnique has trained engineers for administrative careers in the public service. Increasingly, its graduates are finding employment in the private sector, where the right to work in the official language of the province, French, is guaranteed. Largely in response to the bilingualization of employment (and the expansion of French-Canadian entrepreneurship), the Ecole Polytechnique has formalized its relationship with industrial concerns, establishing continuing education programs and an office to generate contract research and consulting work. And, since the late 1960s, provincial programs designed to foster advanced scientific training and research and to create an infrastructure for scientific work in French have been influential in stimulating research and graduate studies at this institution and at the University of Montreal.

The secularization of Francophone higher education and its transformation into an instrument of social, economic, and cultural policy has had profound implications for McGill. Initially rejected in its efforts to obtain provincial support, McGill (and other Anglophone universities) have become part of Quebec's system of higher education and subject to measures designed to equalize the resources of English and French medium universities. Partly in response, McGill has accentuated its unique status as a research university and window on the English-speaking scholarly world which is expressed in the primacy assigned to the research function.

Below we will consider how differences in the role of research at the two universities and among scholarly disciplines shape recruitment to academic work, peer evaluation, and collegial communication.

FACTORS INFLUENCING RECRUITMENT TO ACADEMIC WORK

The factors which influence an individual's decision to pursue an academic career are of interest here as an indication of how occupational choices are legitimized and how, in a broader sense, disciplines and institutions vary in their recruitment patterns. Scientists and engineers in our study were asked to rank the importance of several factors which may affect the decision to enter academic life. These factors were: the modelling influence of professors encountered during graduate studies; an interest in ideas and the extension of knowledge; the relative independence and freedom of the professorate; an interest in students and teaching; and the prestige and social status which professors enjoy. Clearly other factors are influential: familial pressures, for example. Such factors, how-

ever, are seldom acknowledged. Typically, academics identify what attracted them to academic life as influential rather than factors which may have pushed them into this vocation. Nevertheless, the attractions of academic life will be perceived differently. The prestige and social status of academic life, for instance, varies with the kind of academic work performed, the academic institution to which an individual belongs, and the opportunities for a more prestigious position in the discipline outside the system of higher education. We would anticipate that an interest in ideas in the extension of knowledge would be a greater attraction to chemists than to engineers, owing to the centrality of research in chemistry. Similarly, we would expect that staff at McGill would be more likely to emphasize an interest in ideas in the extension of knowledge as a factor influencing their decision to enter academic life given the explicit orientation to graduate training and research at that institution.

Table 1 compares engineers at the two institutions in regard to factors influencing their decision to pursue an academic career. The mean values given are derived from a relative ranking of the various factors. Each factor was ranked in order of importance. To simplify discussion, we will present data testing the significance of institutional effects across the same field and refer to the order of magnitude of differences between fields. Among engineers, an interest in teaching and in the extension of knowledge were given the highest ranking. An interest in students and teaching was ranked next highest. Surprisingly, independence and freedom do not figure more prominently in the case of engineers. Most of those we interviewed, however, described themselves as engineers working at a university, suggesting that the differences between academic and industrial engineering are perceived mainly in instruction and research rather than in the collegial character of academic life. The prestige of the academic profession and former mentors was considered relatively uninfluential. Only one significant difference was observed: Engineers at Ecole Polytechnique ranked the independence and freedom of professors less highly than colleagues at McGill.

Among chemists, an almost identical pattern emerges. The extension of knowledge and teaching are felt to be the most important factors, the independence and freedom of the professorate is next, and so on. No significant differences were noted between respondents at the two institutions. Comparing engineers and chemists at their respective institutions, an interest in the extension of knowledge is rated highly by both, though somewhat more so by engineers. Teaching seems to be slightly more important to engineers than to chemists at the University of Montreal. Generally, the differences between chemists and engineers are modest and of no interpretive value. In other words, there is little variation between engineers and chemists or between respondents at the two universities in terms of factors influencing recruitment to academic life.

TABLE 1

Factors Influencing Recruitment to Academic Life by Field and Institutional Affiliation

Factors	Engineers			Chemists		
	McGill University n=56 Means	*University of Montreal n=68 Means*	*Significance*	*McGill University n=20 Means*	*University of Montreal Means n=22*	*Significance*
1. Professors in graduate programs	4.2	3.9	N.S.	4.2	4.0	N.S.
2. Interest in ideas and extension of knowledge	2.2	2.2	N.S.	1.8	2.0	N.S.
3. Relative independence and freedom of professors	2.6	3.1	*	2.4	2.7	N.S.
4. Interest in students and teaching	2.3	2.0	N.S.	2.4	2.5	N.S.
5. Prestige and status professors enjoy	4.5	4.6	N.S.	4.5	4.8	N.S.

*$p<.05$

PEER EVALUATION

Presumably, differences in commitment to research would be most apparent in the process of peer evaluation, specifically in regard to the dimensions of academic work this process rewards. Decisions affecting tenure and promotion are the most critical feature of any system of peer evaluation. Promotability (or tenurability) at McGill and the University of Montreal is assessed in relation to an individual's contribution to teaching, research, and service activities including administration, committee work, and such consulting activities as may be appropriate to an individual's field of specialization. Excellence in two of these three areas of professional work is required for promotion and tenure, according to university policy. However, staffing policies are intended only as guidelines assuring a degree of equity across departments and faculties. While various levels of authority participate in promotion and tenure decisions, in most instances peer evaluation is carried out mainly within departments and the decisions made there are usually reaffirmed.

In our interviews, two related questions were put to respondents ascertaining what importance they perceived is and should be given to teaching, committee work, administration, consulting activities, and research in decisions regarding promotion and tenure. The respondent was asked to indicate whether much, some, little, or no importance is (or should be) assigned to these activities. Mean scores were calculated, with a low score implying more importance. Data comparing engineers and chemists at the two institutions appear in Table 2.

Insofar as engineers are concerned, performance in research and teaching are viewed as the two most important activities for promotion and tenure, with research, unexpectedly in the case of Ecole Polytechnique, being given a slightly, though not significantly, higher priority. Substantial differences exist in terms of the importance assigned other activities. Compared to their colleagues at Ecole Polytechnique, engineering professors at McGill say that more importance is given to administration and committee work in decisions having to do with promotion and tenure. Academic management seems to be valued highly as a professional activity at McGill, whereas at Ecole Polytechnique it is perhaps seen as interference with professional work. This may reflect the fact that in the syndicalized Francophone academic milieu academic work and academic management are frequently presented as dichotomous rather than complementary. On the other hand, at Ecole Polytechnique consulting activities are valued more highly. At McGill, which has a longer tradition of graduate training and research, consulting work was often viewed by our respondents as time taken away from teaching and research.

Not only do engineers at the two institutions differ in terms of their perception of which professional activties are rewarded in promotion and tenure at both institutions, but there are significant institutional differ-

TABLE 2

One-way Anova for Importance of Professional Activities in Peer Evaluation by Field and Institutional Affiliation

	Engineers			*Chemists*		
Institutional Priorities	*McGill University n=56 Means*	*Ecole Polytechnique n=68 Means*	*Significance*	*McGill University n=20 Means*	*Ecole Polytechnique n=22 Means*	*Significance*
In decisions regarding tenure and promotions, what importance *is* given to (low score implies more importance):						
teaching?	1.9	1.8	N.S.	1.3	2.0	**
committee work?	2.0	2.3	**	2.1	2.9	**
administration?	1.9	2.4	***	1.9	2.8	***
consulting?	2.9	2.4	**	3.8	2.8	***
research?	1.4	1.3	N.S.	1.1	1.3	N.S.
In decisions regarding tenure and promotions, what importance *should* be given to:						
teaching?	1.2	1.2	N.S.	1.2	1.2	N.S.
committee work?	2.3	2.7	**	2.5	2.8	N.S.
administration?	2.3	2.9	***	2.4	3.0	*
consulting?	2.8	2.3	***	3.6	2.4	***
research?	1.3	1.4	N.S.	1.0	1.2	*

*$p<.05$.
**$p<.01$.
***$p<.001$.

ences with respect to the importance of teaching. At the University of Montreal, teaching is felt to be less important than at McGill. As among the engineers, academic management is accorded more importance at McGill while consulting activities are regarded more highly at the University of Montreal. Similar findings emerge when we examine what professional activities should be considered important. McGill chemists give significantly more importance to administration and slightly more importance to committee work compared to their colleagues at the University of Montreal who, conversely, feel that more importance should be given to consulting activities.

Turning to the attitudes of respondents in different fields toward what importance various professional activities should be given in decisions regarding promotion and tenure, there are few differences between engineers and chemists at the two institutions vis-à-vis teaching and research. This is also the case in regard to their perception of the importance that should be placed on academic management. Only with respect to consulting, and then only in the case of McGill, is there a meaningful difference; chemists at this institution give consulting a much lower priority than engineers ($\bar{X}$ 3.6 vs. $\bar{X}$ 2.4). Institutional differences, therefore, are much more pronounced than the differences between chemists and engineers. However, these differences do not focus on the primacy of academic management and consulting activities that differentiates the two institutions.

NETWORKS OF PROFESSIONAL COMMUNICATION WITHIN DEPARTMENTS

In this section we will analyze networks of professional communication within academic departments. While professional communication occurs in various forms, for example in citations to the published work of other researchers, we have studied those peer relationships which are direct and long-term in nature involving a professor's most immediate reference group — departmental colleagues. Our analysis sets out to examine variations in patterns of professional communication that may be attributable to disciplinary and institutional influences. More specifically, we had hypothesized, the greater research activity among chemists, and at McGill generally, would be apt to foster greater collegial collaboration inasmuch as teamwork is the dominant mode of organization of scientific and technological research. Departments are viewed here as locus of several dimensions of academic work — teaching, service activities, and research. Departmental affiliation functions to integrate individual identification with the discipline with common membership in the academic profession.

Our data relates to networks of departmental communication in teaching, research, and, among engineers, industrial consulting. Respondents were asked to identify departmental colleagues whom they regularly con-

sulted about their courses, with whom they collaborated or contacted about their research (including co-publication as well as circulation of manuscripts prior to publication), and with whom they worked on projects initiated by various users of technology (for which they received compensation). This does not exhaust the range of possible activities that would involve collegial communication, but these are among the most important dimensions of academic work. Information obtained from questions concerning networks of communication was used to construct Table 3, which presents sociometric data for four pairs of engineering departments and one pair of chemistry departments. The number of departmental colleagues mentioned as contacted with respect to the respondent's teaching research and, among engineers, consulting work is recorded as is the ratio to the number of possible contacts for each activity by department and institution.

Comparing the sociometric data for engineers at the two institutions, it is evident that there is more communication among the departmental colleagues at the Ecole Polytechnique, despite the difference in the number of possible mentions. This holds true for two of the three dimensions of academic work studied. It is apparent in the area of communication with colleagues in research (1/114 vs. 1/51), even though there are fewer active researchers at Ecole Polytechnique. It is the case with consulting as well (1/280 vs. 1/62). The greater amount of collegial communication at Ecole Polytechnique in consulting work, however, may simply reflect the fact that consulting activity is more pronounced at this institution. Interestingly, the ratios for teaching are virtually identical (1/39 vs. 1/38). At both universities, teaching is the primary form of collegial collaboration. Among engineers, these data indicate that the department is the locus of communication mainly for teaching, and then mainly at an institution with a more recent emphasis on graduate training and research.

Insofar as individual departments are concerned, variations are slight. Possibly the most important variation is that between the Department of Mechanical Engineering at Ecole Polytechnique and all other departments. More communication takes place here than elsewhere on most dimensions of academic work. This finding, although it may indicate something of the interpersonal dynamics of the Department of Mechanical Engineering, is not explicable solely in terms of the number of staff, since it is a medium-sized department. However, the chemical engineering departments, the two smallest departments, exhibit a stronger pattern of communication in teaching and consulting compared to most other departments, suggesting an inverse relationship between size and amount of collegial communication.

For chemists, no differences were observed with regard to networks of communication in teaching (the ratio of contacts in teaching for both groups was 1/11). But in research, networks of communication were

TABLE 3

Departmental Communication in Teaching, Research, and Industrial Consulting: Engineers

	McGill University				
	Civil	*Electrical*	*Mechanical*	*Chemical*	*Total*
$n=56$	15	16	19	6	56
Teaching	30(1/7)	22(1/11)	21(1/16)	5(1/6)	78(1/39)
Research	10(1/21)	4(1/60)	12(1/29)	1(1/30)	27(1/114)
Consulting	1(1/210)	1(1/240)	7(1/49)	2(1/15	11(1/280)
m	210	240	342	30	3080

	Ecole Polytechnique				
	Civil	*Electrical*	*Mechanical*	*Chemical*	*Total*
$n=68$	20	21	15	12	68
Teaching	30(1/13)	40(1/11)	26(1/8)	23(1/6)	119(1/38)
Research	15(1/25)	26(1/16)	33(1/6)	15(1/9)	89(1/51)
Consulting	20(1/19)	25(1/17)	24(1/9)	5(1/26)	74(1/62)
m	380	420	210	132	4556

NOTE: n=number of departmental respondents.

$m=n(n-1)$=is the number of possible mentions.

Numbers in parentheses express the radio of number of mentions to number of possible mentions.

TABLE 4

Departmental Communication in Teaching and Research

	Chemistry Departments	
	McGill University	*University of Montreal*
n	20	22
Teaching	33(1/11)	44(1/11)
Research	13(1/29)	55(1/8)
m	380	462

NOTE: n=number of departmental respondents.
$m=n(n-1)$=number of possible mentions.
The numbers in parenthesis express the ratio of number of mentions to number of possible mentions.

stronger among chemists at the University of Montreal (as was the case among engineers) despite their lower scholarly productivity. Comparing chemists and engineers with respect to communication in teaching and research, greater collegial contact is indicated among chemists at both institutions, which is what we had predicted. Nevertheless, the greater incidence of collegial communication among chemists is difficult to attribute to the preoccupation with research in light of the findings of the two previous sections of this paper.

SUMMARY

Our findings lend very limited support to the belief that the centrality of research to a particular discipline or within a given institutional environment is a useful way of characterizing the division of labor in academia. In our study, an interest in ideas and the extension of knowledge was as important to engineers as to chemists at both institutions in their decision to pursue an academic career. The system of peer evaluation at the two institutions did not differ in terms of the importance placed on research. Our analysis of networks of professional communication, furthermore, did not indicate that the extent of collegiality was closely related to the level of research activity.

The most pronounced differences we have observed in what might be described as the culture of academic institutions and disciplines have little to do with the prevalence of research. In this study, commitment to research (as opposed to level of research activity) appears to be a commonality whether institutions (or disciplines) are compared. Orientation toward research is certainly a component of institutional and disciplinary differences. But there are other salient dimensions as well. The importance

of academic management in peer evaluation, for instance, is a source of differentiation among the institutions studied. This has, we think, little to do with the priority assigned research and graduate training. It is more likely to be the product of the assumption of governmental responsibility for higher education during the Quiet Revolution, which encouraged syndicalization in the once confessional and autonomous Francophone universities. The importance of linkages to practitioners outside academia is another dimension of institutional culture. Here again, variations in the importance attributed to such linkages are in all likelihood idiosyncratic, reflecting the way in which a university has evolved. The University of Montreal and the Ecole Polytechnique are depicted in statements of provincial science policy as axes of Francophone scientific and technological development. Successive provincial governments have, as we have pointed out earlier, prodded the Francophone universities to establish programs in science and technology, initially for purposes related to governmental manpower requirements and later to serve Francophone entrepreneurship. The reforms of the Quiet Revolution involved universities as participants in the province's transformation. In the case of science and technology in the Francophone sector, this has been made explicit in policies fostering training and research related to Quebec's needs (Gouvernement du Québec, 1978). At McGill, the relative indifference to consulting activities in the system of peer evaluation is more apt to reflect that institution's ambiguous status as an English-speaking university in a French-speaking province than to be the outcome of an orientation to graduate training and research. The greater degree of collegial contact at the University of Montreal in chemistry and engineering is to be explained at least in part by the heavy emphasis on teamwork, especially in research, that characterizes the Francophone approach to the organization of academic work and provision of research funding. By comparison, McGill faculty are more individualistic. Similar findings have been reported in studies of Francophone and Anglophone managers and clerical staff (Kunungo, 1976).

The variations between chemists and engineers in our study have less to do with the role of research than with the scope of professional activities embraced by these fields. Engineers must be in closer contact with the practice of engineering outside the university than chemists with the practice of chemistry. Still, our findings show that in many respects chemists are more like engineers within their institutions than they are like chemists at another institution, causing us to question whether disciplinary influences are as paramount as they are sometimes implied to be (Light, 1977). Universities are more than collectivities of disparate associations. Our study suggests that institutional cultures affect the work of various disciplines in important ways. In brief, the sources of differentiation in academic life are subtle. It is simplistic to speak of a system of higher education stratified by cognitive rationality without specifying the

historical, political, and economic context of particular academic institutions.

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