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Abstract

Departments are characterized according to the heterogeneity of the faculty's research interests. The study examines the extent to which department performance and satisfaction are related to the heterogeneity of the faculty. ACE rating, teaching effectiveness and faculty satisfaction with five facets of the department are employed as criteria. The results indicate that the heterogeneity measure is an index of situational favorableness which interacts with leadership style to determine teaching effectiveness. It was also found that heterogeneity is negatively related to department ACE rating and faculty satisfaction in hard areas, but that these variables are unrelated in soft areas.

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One of the more salient characteristics of a university department faculty is its division into subdisciplines or areas of special interest. In the present study, departments are characterized according to the heterogeneity of the faculty's research interests. Because patterns of control and influence are less pronounced and explicit, informal organizational relations are of particular importance in university departments. The present study examines the extent to which department performance and satisfaction are related to the heterogeneity of the faculty. The department rating by the American Council on Education (ACE), teaching effectiveness at both the undergraduate and graduate levels, and faculty satisfaction with five facets of the department are employed as criteria.

Campbell, Dunnette, Lawler, and Weick (1970) have reviewed the literature relevant to managerial effectiveness. Based upon their review, they propose a model of managerial behavior which accounts for the ability, motivation, and opportunity of the manager, mediated by situational variables. They observe that the potential effects of the organizational environment have long been recognized as potent determinants of managerial behavior, but the situational characteristics are not typically considered with manager attributes in studies of effectiveness.

The Contingency Model of leadership effectiveness (Fiedler, 1964, 1967, 1971) considers leadership style, as measured by the Least Preferred Coworker scale

(LPC), situational variables, and their interaction, in determining leadership effectiveness. Fiedler has dimensionalized the favorableness of a work group situation for the leader according to three components: leader-member relations, task structure, and leader position power. The Contingency Model considers a leader's situation to be more favorable as group acceptance, task structure, and formal position power increase. Dichotomizing on each dimension yields a classification of eight situations which may be ordered according to favorability. The Model predicts that task-motivated leaders perform better in high and low favorability situations and that relationship-motivated leaders perform better in situations of moderate favorableness.

However, Fiedler contends that the basic hypotheses of the Contingency Model are not tied to particular dimensions of favorableness, but that the problem of how best to order situations in terms of their favorableness remains open to further investigation. Fiedler and others have employed numerous alternative measures of situational favorableness: stress (Fiedler & Barron, 1967), group heterogeneity (Anderson, 1966), leader's cognitive complexity (Mitchell, 1970), cooperation requirements of the task (Ilgen & O'Brien, 1968), group cohesiveness (Fiedler & Meuwese, 1963), and experience of the leader (Csoka & Fiedler, 1971). For each of these methods of dimensionalizing situational favorableness, the results are consistent with Contingency Model predictions.

In general, increased heterogeneity is predicted to decrease the favorableness of the situation for the leader. This hypothesis has been borne out in a number of studies which have employed a wide range of variables in characterizing the degree of heterogeneity of a group. Fiedler (1966) and

Rombauts (1964) found that groups heterogeneous in terms of language and culture presented a more difficult situation for the leader than more homogeneous groups. Fiedler, Meuwese, and Oonk (1961) studied the creativity of groups differing in religious background. They found less effective communication and greater stress in heterogeneous groups. Anderson (1964) obtained similar results in a study involving graduate students from America and India.

Discrepancies in the scientific assumptions which underly research models in a field may be reasonably assumed to have an effect analogous to that of cultural heterogeneity. One conceptual framework useful in characterizing the heterogeneity of scientific fields was developed by Kuhn (1962). He demonstrated that research in the physical sciences is often structured around a generally accepted model. The scientific paradigm guides research in these fields not only in terms of the organization of the existing body of knowledge, but also with respect to the importance of new areas and appropriate methodology. Lodahl and Gordon (1972) have provided empirical support for the validity of Kuhn's thesis in a study which compared physics and chemistry with sociology and political science. They found that greater paradigm development facilitates teaching and research through improved communication. Allen and Biglan (1972) compared aspects of research in hard and soft areas in terms of the existing collaboration and influence structures, the use of facilities and equipment, and the standards for the conduct of scholarly activity. Their findings corroborated those of Lodahl and Gordon and further demonstrated the value of extending Kuhn's paradigmatic perspective to scholarly activity in the range of disciplines which comprise a university.

In the present study, comparisons of "hard" and "soft" areas (defined below) reflect a distinction between degrees of paradigm development and hence, in the ability of researchers to communicate and interact on the basis of commonly held assumptions.

Heterogeneity of group membership is a particularly important problem for the person who occupies the leadership position in an academic department and who must be able to understand and communicate effectively with faculty members who may have rather diverse and esoteric specialties and interests.

For purposes of this study departments will be characterized according to the heterogeneity in terms of research interests of faculty in relation to the interests of the chairman. This variable is introduced on the assumption that the opportunity for a chairman to exert some influence over the research depends, in part, upon the degree to which the chairman is informed about and sympathetic to the work of his departmental colleagues. This measure of heterogeneity will be employed as an index of situational favorableness in university departments. This seems especially important in light of recent discussions of the importance of academic area in characterizing university departments (Lodahl and Gordon, 1972; Allen and Biglan, 1972). These suggest that the effects of heterogeneity on faculty satisfaction should differ according to academic area. In "hard" areas, (e.g., physical and biological sciences) homogeneity is an index of a department's commitment to a particular paradigm. However, the degree of homogeneity in "soft" areas (e.g., social sciences and humanities) should be of less consequence as the presence of a common orientation is less crucial to the conduct of scholarly activity.

Hypothesis I. On the basis of the Contingency Model, it is predicted that the correlation between the chairman's LPC score and ratings of teaching effectiveness will be positive in departments with less heterogeneity of research interests and negative in departments with high heterogeneity.

Hypothesis II. The relationship between department heterogeneity and faculty satisfaction is predicted to be negative in hard areas. Heterogeneity and satisfaction will not be related in soft areas.

Hypothesis III. The relationship between department heterogeneity and the ACE rating is predicted to be negative in hard areas. Heterogeneity and ACE rating will not be related in soft areas.

Method

Sample.

Data were gathered by questionnaires administered to a random sample of the faculty of the University of Washington; 287 questionnaires (70%) were returned. The sample included faculty with rank of instructor and above from 38 departments.

Classification of academic areas.

Biglan (1971) has presented an analysis of academic task characteristics. He performed multidimensional scaling of scholars' ratings of the similarity of 36 different academic tasks. Three dimensions were defined: A "hard-soft" dimension distinguishing areas such as chemistry, engineering, and botany from areas such as psychology, English, and education; a "pure-applied" dimension distinguishing applied areas such as agriculture and education from areas such as English, physics, and psychology; and a life-nonlife dimension distinguishing areas such as education and agriculture from areas such as physics and economics.

Dichotomizing on each dimension yields a 2 x 2 x 2 classification of academic areas (see Table 1).

Insert Table 1 about here

Heterogeneity. A list of the research interests of faculty was compiled from a publication entitled Graduate Study and Research. Department chairmen were asked to rate each subdiscipline in terms of similarity and difference relative to the chairman's own on a seven-point scale. The product of this rating and the number of faculty who listed that subdiscipline as their research interest was summed across subdisciplines to obtain a heterogeneity score for each department in the sample.

Dependent measures. The ratings of the quality of graduate programs by the American Council on Education (Roose & Andersen, 1970) is included as a measure of the overall performance of the department. Faculty ratings of the quality of the undergraduate teaching and the graduate training in their department on a five-point scale were employed as measures of teaching effectiveness. Measures of faculty satisfaction with five job aspects were also obtained:

1. present position
2. hiring and promotion
3. progress toward own goals
4. opportunity to do own research
5. scholarly atmosphere of the department

TABLE 1

Classification of Departments by Areas

soft-applied-life	hard-applied-life
Education, administration	Fishery
Education, elementary	Forrestry
Curriculum and Instruction	
Education, higher	
Management and Organization	
Market, Transportation, Business	
soft-applied-nonlife	**hard-applied-nonlife**
Accountancy	Aeronautics
Economics	Civil Engineering
Finance	Computer Science
	Electrical Engineering
soft-pure-life	**hard-pure-life**
Anthropology	Botany
Education, history of	Genetics
Education, psychology of	Microbiology
Political Science	Pathology
Psychology	Physiology
Sociology	Zoology
soft-pure-nonlife	**hard-pure-nonlife**
English	Astronomy
German	Atmospheric Science
History	Chemistry
Philosophy	Geology
Slavic Languages	Mathematics
	Physics

Results

Hypothesis I predicted that the correlation between the chairman's LPC score and ratings of teaching effectiveness will be positive in departments with less heterogeneity of research interests and negative in departments with high heterogeneity. The correlations between the department chairman's LPC score and faculty ratings of teaching effectiveness are presented in Table 2. In relatively homogeneous departments, the correlation was $r = .32$ ($p < .20$) for the quality of undergraduate training and .64 ($p < .02$) for graduate training. The correlation between LPC and quality of undergraduate teaching was $r = -.63$ ($p < .02$) and for quality of graduate training, $r = -.33$ ($p < .15$) in high heterogeneity departments, thus supporting the hypothesis.

Hypothesis II stated that the relationship between department heterogeneity and faculty satisfaction will be negative in hard areas and not significantly different from zero in soft areas. Table 3 presents the correlations between heterogeneity and faculty satisfaction in soft and hard areas. For all five measures, the relationship with heterogeneity is significantly negative for hard areas and is not significant for soft areas.

Hypothesis III stated that the relationship between department heterogeneity and the ACE rating will be negative in hard areas and not significantly different from zero in soft areas. The correlations between heterogeneity and ACE rating for soft and hard areas are also presented in Table 3. In hard areas the correlation between heterogeneity and ACE rating was $r = -.71$ ($p < .05$). The relationship was not significant ($r = .28$) in soft areas.

Insert Tables 2 and 3 about here

TABLE 2

Correlations Between Chairman's LPC Score and Ratings of Teaching Effectiveness in Low- and High-Heterogeneity Departments[1]

	Low Heterogeneity (n = 10)	High Heterogeneity (n = 11)
undergraduate teaching	.32*	-.63***
graduate training	.64***	-.33**

* p < .20
** p < .15
*** p < .02

[1] Combined probability using Fisher's r to z transformation and Stoufer's Technique; z = 2.975, p < .0015

TABLE 3

Correlations Between Heterogeneity and Faculty Satisfaction

In Soft and Hard Areas

Satisfaction with:	Soft (n = 11)	Hard (n = 10)
present position	-.04	-.86***
hiring and promotion	-.22	-.74**
progress toward own goals	-.20	-.58*
research opportunity	.18	-.72**
scholarly atmosphere of department	-.14	-.60*
ACE rating	.28 (n = 6)	-.71* (n = 6)

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

Discussion

The results of this study indicate that heterogeneity of research interests in university departments is an important organizational variable. It has been shown to interact with the chairman's leadership style as a measure of his potential influence. This is consistent with the findings described above with respect to a number of different types of heterogeneity where the quality of communication between leader and group members is important to group effectiveness.

The interpretation that heterogeneity of research interests is of consequence for communication is also borne out in the findings with respect to faculty satisfaction with facets of university department. Communication concerning scholarly activity within a department, in soft areas, does not seem to require a common framework as specific as that suggested by committment to a paradigm. The latter involves many assumptions about research methods and a particular orientation, as is typical of scholarly activity in hard areas. Heterogeneity in soft areas reflects differences in substantive rather than methodological specialization. For example, content differs according to whether scholars pursue the literature of the ancients as opposed to modern literature, but their approach is likely to have much in common such that interaction would possibly be of mutual benefit. However, in hard areas a scholar is more likely to subscribe to a particular model for scholarly endeavor which provides him with a set of assumptions and specific orientations. This has been termed paradigmatic science by Kuhn. Where colleagues in a department differ with respect to the paradigm under which they conduct their scholarly activities, they would have little

in common and would not profit to a great extent from interaction. Differences would be manifest concretely perhaps in the nature of the specialized equipment hard area scholars require and would certainly be apparent at the level of differences in philosophy of science.

In summary, heterogeneity in research interests of faculty members appears to determine the favorableness of a department for the chairman in the framework of the Contingency Model. The degree of heterogeneity is of consequence in the communication between department chairman and faculty and the associated effects on faculty satisfaction can be interpreted in terms of the effects of heterogeneity on communication. These effects differ according to academic area in determining faculty satisfaction.

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