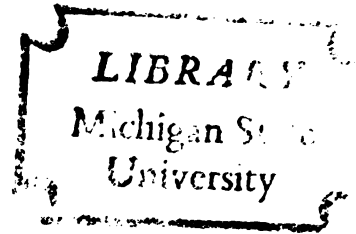


INSTRUCTIONAL SERVICE IN
ACADEMIC DEPARTMENTS:
AN EXPLORATORY STUDY

Dissertation for the Degree of Ph. D.
MICHIGAN STATE UNIVERSITY
LOU ANNA KIMSEY SIMON
1974



This is to certify that the
thesis entitled
INSTRUCTIONAL SERVICE IN
ACADEMIC DEPARTMENTS:
AN EXPLORATORY STUDY

presented by

Lou Anna Kimsey Simon

has been accepted towards fulfillment
of the requirements for

Ph.D. degree in Higher Education

Paul L. Drexel

Major professor

Date 5/9/74



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ABSTRACT

INSTRUCTIONAL SERVICE IN ACADEMIC DEPARTMENTS: AN EXPLORATORY STUDY

By

Lou Anna Kimsey Simon

This study was an investigation of the instructional service component of academic departments. This examination is part of a broader project funded by a grant from the Exxon Education Foundation and centered at the Office of Institutional Research at Michigan State University under the direction of Dr. Paul L. Dressel. One of the foci of this the third phase of the Exxon Departmental Study Project is the development of a budgeting model for academic departments based on clusters of departments with similar intrinsic characteristics and institutional roles. The selection of instructional service as a focus of study was predicated on the possibility of its inclusion as a dimension of the clustering framework. However, the concept of instructional service has been brought to the forefront at Michigan State University because the newly established medical schools subsidize certain departments for the service instruction given the medical students in "shared" departments. In lieu of a formalized pricing system for service instruction, this study identified the amount of service instruction in each academic department and sought to determine how the extent of instructional service was reflected in other data about the department (i.e., level of funding and staffing patterns).

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Purposes

This study was exploratory in nature and was designed to identify the relationships between measures of instructional service and the other available data about academic departments. Specifically, the purposes of this study were to 1) develop appropriate measures of the instructional service component of academic departments; 2) identify relationships among these measures and between these instructional service measures and other departmental characteristics; and 3) classify departments according to each undergraduate and graduate instructional service measure and determine which variables discriminate among the categories of the instructional service measures.

Instructional Service Measures

Two sets of instructional service measures were constructed to represent the instructional service component of academic departments. The department-based instructional service measures represented the relative amount of the total instructional load of each department who were service students (non-majors) while the university-based instructional service measures reflected the relative amount of the total instructional service load of the institution (instruction to non-majors) which was assumed by each department. Within each of these two set of measures, six measures representing various aggregates of courses within the departments were also constructed.

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Research Design

The research design developed for this study centered around ten questions about the relationships among the twelve instructional service measures and between each of these measures and departmental descriptor variables. In this study, two hundred fifty-two Spearman rank correlations and eight chi-square tests for independence were used to analyze the relationships among the twelve instructional service measures and between each of these measures and variables representing funding, faculty rank distributions, average salary, number of graduate assistants, prestige of graduate programs/faculty, and level of students served in undergraduate courses. In addition, the multiple discriminant analyses identified factors (generated from the principal axes factor analysis) which discriminated among the levels of eight of the instructional service measures.

Findings

The analyses of the data on instructional service revealed that significant relationships existed between 1) undergraduate and total instructional service measures, 2) department-based and university-based instructional service measures, and 3) unadjusted and adjusted instructional service measures. The results of the chi-square tests for independence indicated that 1) departments that service predominately lower division students tended to have high adjusted, and unadjusted, undergraduate university-based measures and 2) departments with prestige graduate programs/faculty tended to be classified as medium for the

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department-based graduate instructional service measures while the rated departments were primarily distributed between the medium and high categories for the university-based graduate measures. In addition, of the one hundred eighty Spearman rank correlations between the instructional service measures and the descriptor variables representing funding, faculty rank distributions, number of graduate assistants, and average salary, sixty-four (35.6%) were statistically significant, but only twenty-two of these correlations (12.2%) were strong (greater than .50) and, therefore, meaningful. Finally, the results of the principal axes factor analysis with a varimax rotation and the multiple discriminant analyses were unusually decisive. In the factor analysis six factors were defined which were good representations of the original data (explained 82% of the variance) and were highly internally consistent (alphas greater than .90). For seven of the eight instructional service measures used in the multiple discriminant analyses, only one of the two discriminant functions was significant. For the adjusted graduate department-based instructional service measure, no discriminant function was significant. Three factors emerged which discriminated among the categories of the seven instructional service measures. Factor 1 (undergraduate instructional load) was the dominant variable in the analyses of the unadjusted and adjusted undergraduate university-based instructional service measures. Factor 2 (graduate instructional load) was the dominant variable for the adjusted graduate department-based instructional service measure and the unadjusted and adjusted graduate university-based instructional service measures. Factor 3

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(undergraduate instructional output) was the dominant variable for the unadjusted and adjusted undergraduate department-based instructional service measures.

Conclusions

The findings indicated that overlap among the instructional service measures existed. The results of this study suggested that in any further analysis which included instructional service only the unadjusted undergraduate and graduate department-based are needed to represent the instructional service component of academic departments. Further, the lack of meaningful relationships between the department-based instructional service measures and the descriptor variables indicated that the funding and staffing of departments are not related to the level of instructional service in these departments. Instructional volume rather than the parameters of the instructional process in academic departments tended to be the primary determinant of departmental funding and staffing. Finally, though the results of the multiple discriminant analyses were unusually decisive, the use of factors instead of variables greatly complicated the interpretation of the results. Further research which clarifies the interactions of variables within these dominant factors is needed before a clear understanding of the relationships between the level of instructional service and variables representing instructional load and instructional output emerges. However, such further research must also be related to the realities of departmental organization and budgetary process.

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INSTRUCTIONAL SERVICE IN ACADEMIC DEPARTMENTS:

AN EXPLORATORY STUDY

By

Lou Anna Kimsey Simon

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Administration and Higher Education

1974

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1974

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To My Family

*This study is dedicated to my family.
Their encouragement, understanding, and
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This writer wishes to express her sincere appreciation to Dr. Paul L. Dressel for his guidance and support in preparing this dissertation and for the excellent experience derived while working in the Office of Institutional Research as a graduate assistant and as the Assistant Director of the Exxon Departmental Study Project.

This writer also wishes to thank the members of her committee-- Dr. Maryellen McSweeney, Dr. Philip Marcus, and Dr. Vandel Johnson. Their advice and criticism have greatly improved the quality of this work and the quality of the educational experience which surrounded this effort.

Grateful acknowledgment is extended to all members of the Institutional Research staff for their constant support and encouragement. A special word of appreciation is extended to Dr. Mary Thompson and Dr. William Faricy who assisted in the final preparation of this manuscript.

Finally, this writer wishes to thank Christina Traines who displayed outstanding competence and patience in typing manuscript drafts.

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LIST OF TABLES

LIST OF FIGURES

I. RATIONALE FOR

Introduction
Purpose of
Assumption
Limitation
Definition
Overview

II. CONCEPTUAL F

Summary

III. OTHER DEPART

Background
Departme
Empirica
Summary

IV. RESEARCH DE

Instruc
Data. .
Research
Methodo
Summary

V. THE RESULT

Instruc
Relatio
and
Discri
Summar

TABLE OF CONTENTS

Chapter	Page
LIST OF TABLES	vii
LIST OF FIGURES.	x
I. RATIONALE FOR THE STUDY.	1
Introduction.	1
Purpose of the Study.	5
Assumptions of the Study.	6
Limitations of the Study.	9
Definitions of Terms.	10
Overview of the Dissertation.	11
II. CONCEPTUAL FRAMEWORK FOR INSTRUCTIONAL SERVICE	12
Summary	20
III. OTHER DEPARTMENTAL LITERATURE.	21
Background.	21
Departmental Organization	24
Empirical Studies	27
Summary	33
IV. RESEARCH DESIGN.	35
Instructional Service Measures.	35
Data.	39
Research Questions.	41
Methodology	48
Summary	57
V. THE RESULTS.	58
Instructional Service Measures.	58
Relationships Between Instructional Service Measures and Descriptive Data	77
Discriminatory Variables.	88
Summary	105

1

II. SUMMARY, CONCL
STUDY . . .

Overview of
Summary of
Conclusions
Recommendations

INDEXES

A. DEPARTMENTS

B. LIST OF MSU D

C. TABLES OF DATA

BIBLIOGRAPHY. . . .

TABLE OF CONTENTS--Continued

CHAPTER	Page
VI. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER STUDY	106
Overview of the Study	106
Summary of Findings	114
Conclusions	116
Recommendations for Further Study	125
APPENDICES	
A. DEPARTMENTS IN STUDY	128
B. LIST OF MSU DEPARTMENT DESCRIPTOR VARIABLES.	131
C. TABLES OF DATA USED IN THIS STUDY.	135
BIBLIOGRAPHY.	170

24

1. Summary Measures
2. Instructional Se
3. Enrollment by C
4. Equations for I
5. Department-base
6. University-base
7. Extreme Departm
8. based Instructi
9. Descriptive Dat
10. Measures. . .
11. Descriptive Da
12. Measures. . .
13. Spearman Rank
14. Measures. . .
15. Departments wi
16. Service Studen
17. Chi-square Tes
18. Service Studen
19. Departments w
20. Chi-square Te
21. Faculty/Progr
22. Spearman Rank
23. Measures and
24. Descriptor Va
25. to Instructio

LIST OF TABLES

Table	Page
1. Summary Measures.	38
2. Instructional Service Students by Course Level, Fall 1971 .	60
3. Enrollment by Course Level, Fall 1971	62
4. Equations for Instructional Service Measures.	64
5. Department-based Instructional Service Measures, Fall 1971.	65
6. University-based Instructional Service Measures, Fall 1971.	67
7. Extreme Departments--Unadjusted and Adjusted Department- based Instructional Service Measures.	70
8. Descriptive Data--Department-based Instructional Service Measures.	72
9. Descriptive Data--University-based Instructional Service Measures.	73
10. Spearman Rank Correlations Among Instructional Service Measures.	75
11. Departments with Predominately Lower Division Instructional Service Students in Undergraduate Courses	79
12. Chi-square Tests of Independence--Level of Instructional Service Students in Undergraduate Courses	80
13. Departments with Prestige Graduate Faculty/Programs	82
14. Chi-square Tests of Independence--Prestige of Graduate Faculty/Programs.	83
15. Spearman Rank Correlations Between Instructional Service Measures and Descriptive Data	85
16. Descriptor Variables with Moderate and Strong Relationships to Instructional Service Measures	89

TABLE

1. Categories of Departments . . .

2. Categories of Departments . . .

3. Factors and The

4. Descriptive Data

5. Standardized Data

6. Group Means on

7. List of Department-Department-bas

8. Departmental Service Measur

9. Departmental Service Measu

10. Rank Ordering graduate Depa

11. Rank Ordering ate Departme

12. Rank Ordering Department-b

13. Rank Ordering graduate Dep

14. Rank Orderi Department-

15. Rank Orderi Department-

16. Rank Order graduate U

17. Rank Order ate Univer

LIST OF TABLES--Continued

Table	Page
17. Categories of Department-based Instructional Service Departments	91
18. Categories of University-based Instructional Service Departments	92
19. Factors and Their Loadings.	94
20. Descriptive Data--Factors and Their Loadings.	95
21. Standardized Discriminant Functions	100
22. Group Means on Standardized Functions	101
23. List of Departments with Disparate Unadjusted and Adjusted Department-based Instructional Service Measures	136
24. Departmental Rankings on Department-based Instructional Service Measures.	137
25. Departmental Rankings on University-based Instructional Service Measures.	139
26. Rank Ordering of Departments According to Unadjusted Under- graduate Department-based Instructional Service	141
27. Rank Ordering of Departments According to Unadjusted Gradu- ate Department-based Instructional Service.	142
28. Rank Ordering of Departments According to Unadjusted Total Department-based Instructional Service.	143
29. Rank Ordering of Departments According to Adjusted Under- graduate Department-based Instructional Service	144
30. Rank Ordering of Departments According to Adjusted Graduate Department-based Instructional Service.	145
31. Rank Ordering of Departments According to Adjusted Total Department-based Instructional Service.	146
32. Rank Ordering of Departments According to Unadjusted Under- graduate University-based Instructional Service	147
33. Rank Ordering of Departments According to Unadjusted Gradu- ate University-based Instructional Service.	148

194

1. Rank Ordering of University-based

2. Rank Ordering of Graduate Univers

3. Rank Ordering of State University-

4. Rank Ordering of University-base

5. Departmental Re 1971-72. . . .

6. Departmental R Expenditures,

7. Faculty Rank

8. Graduate Assi

9. Rank Ordering Equated Salar

10. Percentage D by Student L

11. Percentage D by Student L

12. Factor Scor

LIST OF TABLES--Continued

Table	Page
34. Rank Ordering of Departments According to Unadjusted Total University-based Instructional Service	149
35. Rank Ordering of Departments According to Adjusted Undergraduate University-based Instructional Service.	150
36. Rank Ordering of Departments According to Adjusted Graduate University-based Instructional Service	151
37. Rank Ordering of Departments According to Adjusted Total University-based Instructional Service	152
38. Departmental Rankings on General Fund Expenditures, 1971-72.	153
39. Departmental Rankings on Research Grant and Contract Expenditures, 1971-72.	155
40. Faculty Rank Distribution Indices.	157
41. Graduate Assistants, 1971-72	159
42. Rank Ordering of Departments According to Average 10-month Equated Salary, 1971-72.	161
43. Percentage Distribution of Instructional Service Students by Student Level--Unadjusted Data.	162
44. Percentage Distribution of Instructional Service Students by Student Level--Adjusted Data.	165
45. Factor Scores.	168

Page

1. Group Means--D

1. Group Means--D

1. Group Means--D

1. Group Means--D

LIST OF FIGURES

Figure	Page
1. Group Means--DBIS-UU and DBIS-UG	102
2. Group Means--DBIS-AU and DBIS-AG	102
3. Group Means--UBIS-UU and UBIS-UG	104
4. Group Means--UBIS-AU and UBIS-AG	104

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Chapter I

RATIONAL FOR THE STUDY

Introduction

As university operations have come under close scrutiny by legislative and fiscal agencies and the taxpaying public, growing disillusionment with higher education has amplified the cry for more managerial and financial accountability. In an article by Grassell, Whitter--speaking for the Council for the Advancement of Small Colleges--stated that

The crisis in which higher education finds itself today demands nothing less than our institutions being operated on the basis of sound management principles, keeping in mind, of course, that college and university purposes and characteristics are different from those of business and government.¹

In addition to being under public suspicion, higher education also finds itself in financial difficulty. The "dollar squeeze" has been intensified by declining revenues from tuition, increasing operating costs, and diminishing soft monies. As Cheit points out

In short, due to inflation and growing demands on schools for more service, for broader access, for academic innovation and for more quality, costs were rapidly rising. But income has not.²

¹E. M. Grassell, "The President Needs Training in Management," College Management, 6 (August, 1971), p. 29.

²E. F. Cheit, The New Depression in Higher Education (New York: McGraw-Hill, 1971), p. 1.

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Thus, less costly techniques must be found for meeting institutional responsibilities while retaining acceptable levels of quality. The development of efficient and effective methods of resource allocation compatible with institutional organization, goals, and needs has become of primary importance.

Many states have developed techniques of formula or program budgeting for appropriating funds to institutions. Yet, once institutions have these funds in their possession, they tend to divide these funds among operating units in traditional ways. This allocation procedure often takes the form of across-the-board percentage increases or decreases. Such uniform percentage changes across operating units reinforce the relative position of units and indirectly establish institutional priorities. The "fat" programs and departments remain, and some even grow fatter. But this type of system maintenance cannot respond to changes in societal goals and public needs and to alterations in assigned or implied institutional responsibilities. Simple maintenance or reinforcement of existing structures and priorities is no longer tenable for institutions of higher education.

Sound planning and management require that institutional priorities become operational through the budget. Within each institution, the key to sounder financial management lies at the level of the basic budget unit or cost center. In academic areas this basic unit is usually the department. In spite of debates about the appropriateness of the departmental structure for higher education, especially undergraduate education, departments remain the predominant organizational

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elements of colleges and universities around the world. Furthermore, alternatives to the departmental structure tend over time to regress to this basic pattern. At the departmental level inputs are translated into various outputs with contrasting degrees of efficiency. The aggregate of these departmental data reflects the overall level of institutional efficiency. A redefinition of efficiency at the institutional level does not imply greater effectiveness or efficiency for all departments. (This change could reflect a shift of mean which was accompanied by greater departmental variation.) Thus, departments represent viable units around which to develop a budget methodology.

Some would argue as McConnell does in the following passage that each department is unique and that separate criteria must be developed for the evaluation of each department.

The nature of departments varies so greatly, not only among institutions, but within particular institutions, that it is very difficult to make valid general statements about departmental organization and administration.³

On the other hand, a complete departmental self-study for each unit at a large institution is prohibitive, especially if such a self-study were to become necessary as an annual basis for resource allocation. Furthermore, the budgetary process for any single department always takes place in the context of the needs and aspirations of other departments. Departmental comparisons are inevitable. Procedures should be developed and tested by which departments could be grouped

³T. R. McConnell, Notes for a Table on Departmental Organization, Monograph 5 (Blouder, Colorado: Western Interstate Commission for Higher Education, 1969), p. 1.

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or clustered on variables or parameters which provide an equitable basis for departmental funding. These dimensions should recognize the inherent differences in disciplines and their concomitant instructional methodologies which affect input and output properties. This clustering strategy is predicated on the assumption that the budgetary procedure for departments with similar characteristics and missions should utilize the same funding principles and variables. When this strategy is applied, each department is compared only with other departments in its cluster and not with the entire university community. This approach permits variability among departmental clusters while stressing the development of uniform funding criteria within clusters.

The fundamental question is what dimensions or variables should be used as a basis for departmental clustering. By employing factor analytic techniques almost any set of variables could be used to group departments. Yet, implicit in the above discussion is the assumption that these clustering dimensions should have inherent implications for departmental resource allocation. This stipulation requires a clear understanding of each of the dimensions chosen as a basis for clustering departments. Simply manipulating the cost data on academic departments reflects only past budgeting practices about which little rationale is available. Thus, clustering dimensions must be identified in the context of a conceptual model of resource allocation, and these dimensions should be explored in light of present departmental data so that relationships in the data can be identified and redundancies

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eliminated. Only after intensive study should these dimensions be included in the departmental clustering methodology. This study undertook the analysis of one possible dimension--the instructional service component of academic departments.

Purpose of the Study

This study was exploratory in nature and designed to identify relationships and patterns between the aspects of instructional service and other available data on academic departments. This examination of instructional service in academic departments is part of a broader project funded by a grant from the Exxon Education Foundation and centered at the Office of Institutional Research at Michigan State University under the direction of Dr. Paul L. Dressel. One of the foci of this third phase of the Exxon Departmental Study Project⁴ is the development of the cluster-oriented budgetary schema alluded to in the introduction of this chapter. Using eighty-two academic departments at Michigan State University as the study population, the specific purposes of this study were to:

1. Develop appropriate measures of the instructional service component of academic departments. These measures represent both the amount of instructional service in a department and the

⁴The two previous projects are summarized in The Confidence Crisis (1970) by Dressel, Johnson, and Marcus and Return to Responsibility (1972) by Dressel and Faricy. Journal articles and dissertations have also been written from the data of these projects.

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2. Identify relationships among the instructional service measures, among these measures and other departmental characteristics. These departmental characteristics include funding level, faculty rank distribution, and levels of students served.
3. Classify departments on the basis of instructional service and determine which variables serve to discriminate among categories of service. Through various analyses, variable and variable sets emerge which are related to the amount of instructional service in academic departments.

Assumptions of the Study

Three basic assumptions are the premises for this study. First, departments are the basic organizational units in institutions of higher education and are, thus, an appropriate analysis unit. The development of departments can be traced to nineteenth century Harvard and the University of Virginia.⁵ While the rationale for the establishment of departments is unclear, the expansion of knowledge and the elective system fostered the development of departments as organizational

⁵J. S. Brubacher and W. Rudy, Higher Education in Transition (New York: Harper and Brothers Publishers, 1958), p. 354.

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entities.⁶ Regardless of the initial organizational intent of departments, departments have evolved as the professional and intellectual home of the faculty, providing peer social-psychological support for the faculty and also serving as a vehicle for academic governance. The present status of departments as the "heart of the multiversity"⁷ is reaffirmed in the following passage from the Michigan State University faculty bylaws:

The department or school is the basic administrative unit of education and research within the university.⁸

Second, departments can be described by dimensions that transcend traditional collegial structure and disciplinary lines. Further, these dimensions are identifiable, measurable, and can be explicated in objective terms. Thus, the teaching load of each department, regardless of affiliated college or subject matter, can be expressed in a countable unit such as teaching credits. The existence of such dimensions, not the homogeneity of departments on these dimensions, was postulated in this study.

The third assumption implicit in this research was that the instructional service aspect of academic departments is a viable

⁶J. A. Perkins (Ed.), The University as an Organization (New York: McGraw-Hill Book Company, 1973), p. 25.

⁷R. Hutchins, "The University and the Multiversity," The New Republic, April 1, 1967, p. 17.

⁸Michigan State University, Bylaws for Faculty Governance (East Lansing: Michigan State University, 1971), p. 7.

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dimension for study. In this study departmental activity was partitioned into two basic analysis units--a core unit and a service unit. The core unit consists of those inputs, resources, and outputs which are related to the education of students (graduate as well as undergraduate) who are majors in programs in a department. This departmental aspect includes the research and public service activities which are integrally related to the instructional programs within the department. The service aspect consists of those inputs, resources, and outputs which are related to the education of students who are not majors in programs offered by the department. This service component includes instruction to non-majors as well as research and public service activities that are tangential to the main thrust of the department and the disciplines within the department. Thus, using the core-service dichotomy, the service component of academic departments is defined as an extension of activity beyond that which is required for the education of students majoring in fields within the department.

Part of the utility of this dichotomy for resource allocation rests on cost differentials between service and non-service instruction. Service instruction tends, by nature, to be introductory, thus lending itself to large class size and reduced cost per unit. In addition, introductory courses are usually taught by junior faculty whose salaries are lower than senior faculty. Finally, the addition of service students to primarily major-oriented classes can be viewed as affecting marginal cost rather than fixed cost. Thus, while exact cost differentials are unknown, available evidence supports the proposition that these differentials exist.

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Recent organizational developments at Michigan State University have indicated the need for a better understanding of the service aspect of academic departments. The addition of two medical schools⁹ triggered the proliferation of multi-administered and multi-financed departments. These "shared" departments received operating funds from each medical school as well as from the university's general fund. This multiple funding occurred because the medical schools each received a line budget from the legislature. Through the funding of these "shared" departments, the medical schools were providing a subsidy for the service rendered to their students by the "shared" department. This type of subsidy was heretofore hidden in the general fund appropriations since each department provides some service to the university community. While neither the medical schools nor the "shared" departments were the focus for this research, these units did provide the impetus for studying the service aspect of academic departments within a conceptual framework based on economic theory.

Limitations of the Study

This study was limited to analyses related only to the instructional service aspect of academic departments. Thus, the service aspect was considered only in terms of course offerings. This view of service neglected such faculty activities as advising and sitting on graduate committees of non-majors. Hence, the qualifier "instructional" has been used throughout this study. In addition, the generalizability

⁹The College of Human Medicine was established in 1966, and the College of Osteopathic Medicine was established in 1970.

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of the results of the study was limited by the inclusion of only departments from Michigan State University. However, the exploratory and descriptive nature of the research lends itself to an institutional-based in-depth study with the economic model providing the conceptual framework for similar work in other institutions.

Definitions of Terms

As noted previously, one of the purposes of this study was to develop appropriate measures of the instructional service component of academic departments. Two constructs were created for this purpose. One set of measures was developed to reflect the relative amount of instructional service in each academic department. These department-based instructional service measures (DBIS) represented the proportion of the total number of students enrolled in a department during Fall term 1971 who were service students (non-majors). As the percentage of service students increased, the value of these department-based instructional service measures also increased, with higher values representing departments whose instruction was primarily service. The second set of measures was developed to reflect the relative amount of the total instructional service load of the university (instruction to non-majors) which was assumed by each academic department. These university-based instructional service measures (UBIS) represented the proportion of the total number of service students taught during Fall term 1971 who received instruction in each academic department. Similarly, high values on these university-based instructional service measures represented departments that processed many service students

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and, therefore, assumed a large share of the university's non-major instruction. Both constructs are discussed in greater detail in Chapter IV.

Overview of the Dissertation

Chapter I has presented a rationale for the study of instructional service. Chapter II presents ideas and literature related to a conceptual framework for resource allocations of which instructional service is a part. Chapter III presents other relevant literature about the department and its operations. Chapter IV describes the nature of the data, the specific research questions in this study, and the analysis methodologies. Chapter V presents the results of the various analyses. Chapter VI presents a summary and conclusions of the study along with suggestions of areas for further study.

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Chapter II

CONCEPTUAL FRAMEWORK FOR INSTRUCTIONAL SERVICE

As mentioned in Chapter I, the validity of instructional service as a dimension of a departmental budgeting schema and, hence, as a topic for study was predicated on the efficacy of this concept in resource allocation. The fiduciary relationships between the basic science departments and the medical schools at Michigan State University provided an example of the purchase of service by units within the same umbrella organization. This situation evolved because the medical programs were line-budgeted by the legislature and because the "shared" pattern which evolved helped facilitate the integration of the medical schools into the university community. Yet, no systematic method of exchange has evolved for determining what activities of the departments are actually being purchased and what relative value, "price," is associated with each of these activities. The amount of the departmental subsidy has been separately negotiated for each funding source. In turn, department chairmen have tried to allocate their departmental activities in a manner commensurate with the subsidy. However, with a growing cry for more accountability, this allocation by bargaining must give way to a more quantitative input-output model in which the commodities purchased from these basic science departments are identified and their rates of exchange are clearly established.

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While actual dollar subsidies occur between the medical schools and the basic sciences, a hypothetical service subsidy schema could be developed which provides part of the basis for the funding of all academic departments. In this study only the instructional service aspect of academic departments was analyzed. Yet, a service subsidy schema could extend to all the activities of the department which are not associated with the education of department majors. For example, academic advising, doctoral committee assignments and administrative assignments in other departments, i.e., curriculum committees, could also be included.

In a RAND publication, economist Martin Shubik proposed eight basic mechanisms for resource allocation: "(1) the economic model with a price system, (2) voting procedures, (3) bidding, (4) bargaining, (5) allocation by high authority, (6) allocation by force, (7) allocation by custom, and (8) allocation by chance."¹ The current trend in institutions of higher education is away from mechanisms 2-8 which have been historically dominant and towards a flexible system which provides not only incentives for adapting to changing educational needs and for improving the educational quality by reducing costs, but also a format for assessing the efficiency and effectiveness concerns of an accountability model. These types of incentives are present in an economic model with a price system. However, higher education when examined

¹M. Shubik, On Different Methods of Allocating Resources, as quoted in D. W. Breneman, Internal Pricing Within the University--A Conference Report (Berkeley, Calif.: University of California, 1971), pp. 3-4.

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from an economic perspective, is an extremely unique industry. Unlike other organizations whose operations are governed by a market model, in institutions of higher education, "(1) those who consume its product do not purchase it; (2) those who produce it do not sell it; and (3) those who finance it do not control it."² Thus, the selection of the type, quantity and quality of an educational output is governed by the producers (faculty within each department) and is not determined by the consumer (the student) since he has no buying power. Within this type of framework, no incentives for adapting to changing educational needs exist. Further, since the producers have no investments in the product (not the financiers), little incentive exists for improving quality and reducing costs.

The above assessment of the uniqueness of higher education indicates that organizational behavior in educational institutions is diametrically opposed to the price-driven tenets of a market model.

In its polar characteristics it represents a non-market economy in which (a) non-price variables, non-profit goods, and non-divisible resources (inputs and outputs) are prominently present; (b) non-tâtonnement exchanges and resource transfers are very important due to transaction and information costs; (c) price signals and output quotas may be replaced by other organizational procedures ...; and solutions may be attempted by central directives and informal organizational procedures.³

Thus, the interaction of departments for scarce resources within the umbrella organization of the institution simulates a non-market model

²J. M. Buchanan and N. E. Develletoglou, Academia in Anarchy (New York: Basic Books, Inc. Publishers, 1970), p. 8.

³K. A. Fox (Ed.), Economic Analysis for Educational Planning (Baltimore: The Johns Hopkins University Press, 1972), p. 20.

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since this interaction represents an internal market which is governed by non-price (quality and prestige) variables. Techniques for resource allocation within a non-market model require the optimization or sub-optimization of a policy function which reflects the objectives of the organization and the set of activities which relate inputs to outputs. In addition, the relative price of each must be known before optimization can occur. Plessnar, Fox and Sanyal have developed a policy-based non-market model for the allocation of resources in a department of economics. The economic part of the model was represented by a

programming objective function which consists of the capitalization of expected lifetime income earned by students who graduate from the department in all its programs less departmental expenses on new faculty and other expenditures associated with the teaching program.⁴

Fox has also described problems and approaches for comparing work loads and performance among departments within a university, developing work load, cost, and quality measures for a given department, and comparing departments in the same discipline across institutions.⁵ However, all these techniques which apply the postulates of non-market models to higher education are theoretical manipulation rather than practical realities upon which resource allocation can be based.

If departments are viewed using the core-service dichotomy described in Chapter I, a more practical application of an economic

⁴Y. Plessnar, K. A. Fox, and B. C. Sanyal, "On the Allocation of Resources in a University Department," Metroeconomica, 20 (September, 1968), p. 259.

⁵K. A. Fox (Ed.), Economic Analysis for Educational Planning (Baltimore: The Johns Hopkins University Press, 1972), pp. 258-295.

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theory for resource allocation emerges. The decentralized market model advocated by Hoenack and Norman⁶ in a recent journal article could be applied to only the service aspect of each department, and more subjective allocation techniques like bargaining or bidding could be used as a basis for the subsidy of the core area--teaching, research, and public related to the education of majors. This procedure theoretically divides the department into a major coalition and a service unit in a manner which parallels Hirschleifer's model of a divisionalized firm.⁷ Under this allocation procedure, departments would first be funded in terms of their major coalition--core--activities. Thus, funding from external agencies for research or instruction would become part of the pool for the core activities. Funding for the service aspect would be generated from fees paid by non-majors in exchange for instruction or other activities provided by the department. "Theoretically, under this system, each department has an incentive to reduce costs while maximizing output since it naturally wishes to maintain or increase its operating budget."⁸ In addition, the separation of funding for service and non-service students would provide non-service students with buying power which theoretically should make the department more responsive to the needs

⁶S. A. Hoenack and A. L. Norman, "Incentives and Resource Allocation in Universities," Journal of Higher Education, 45 (January, 1974), pp. 21-37.

⁷J. Hirschleifer, "Economics of the Divisionalized Firm," Journal of Business, 30 (April, 1957).

⁸J. F. Minahan, "Administrative Cost Accounting: Whose Cost and Whose Accounting," Journal of Higher Education, 45 (January, 1974), p. 25.

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of these students and should increase the quality of service instruction. This is especially true if the students purchased elective rather than required instruction. Similarly, the department could also be reimbursed for activities such as advising, doctoral committee assignments, and committee assignments outside the department. This type of model is presently approximated by the "shared" department arrangement between the medical schools and the basic science department.

Hoenack and Norman advocated the position that instructional service fees should be set by each department and that these fees could differ substantially by department and by teaching methodology. Thus,

The service unit sets the prices of all its services, including instruction. The expansion or contraction of a service unit depends solely on its market performance because service units receive payment directly from their clients and budgets are not granted automatically by the institution.... In establishing a schedule of prices for alternative types of services, it is assumed that academics will seek to maximize a utility function of which prestige is an important component.⁹

In a market model with such an internal pricing schema, each department accrues part of its operating budget on the basis of the value of its output (measured by a schedule of internal prices) and uses this portion of its budget to purchase resources, internally priced at opportunity cost. Thus, "the central administration can influence departmental behavior by altering the values placed on outputs, while maintaining the advantages of decentralization in resource use through the system

⁹S. A. Hoenack and A. L. Norman, "Incentives and Resource Allocation in Universities," Journal of Higher Education, 45 (January, 1974), p. 25.

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of internal resource prices."¹⁰ Yet, several problems prohibit the current implementation of a complete pricing system:

1. The absence of a complete, well-defined and measurable set of college and university outputs;
2. The lack of systematic methods for evaluating university outputs;
3. The prevalence of single year budgets;
4. Lack of knowledge regarding the educational production function; and
5. Inflexibility in staffing created by tenure positions.¹¹

Therefore, until research which identifies and measures adequately the outputs of higher education and research which characterizes the decision-making processes within institutions have been completed, internal pricing--like the non-market approach--will remain theoretical exercises. Until these methodological problems are solved, the inclusion of the instructional service measures as a dimension of the departmental clustering and budgeting schema serves to identify departments whose funding base would be contingent largely on money acquired from service instruction.

A review of the annotated bibliographies of the Association for Institutional Research for the last four years revealed no reference to service instruction. Thus, measures of instructional service have not become part of the regular reporting schema for academic departments.

¹⁰D. W. Breneman, Internal Pricing Within the University--A Conference Report (Berkeley, Calif.: University of California, 1971), p. 30.

¹¹Ibid.

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However, probably the most prominent examples of the use of the concept of instructional service in a management system are the induced course load and the induced work load matrices which are an integral part of the Resource Requirements Prediction Model (RRPM) developed by the National Center for Higher Education Management Systems at the Western Interstate Commission for Higher Education. From the data in these matrices, the number of credits taken in each discipline by the average student enrolled in each program and the total number of credits each discipline must generate in order to satisfy the demand placed on it by all students enrolled in each program for a given period can be determined.¹² Since the dimensions of these matrices are in terms of programs and disciplines, further aggregation is necessary to generate work load information for each department. On the basis of this information the effect of a decrease or increase in enrollment in any other sector of the institution can be calculated in terms of the resource needs of each department. Unfortunately, the construction of induced course load and work load matrices is a difficult task which requires large manpower and hardware commitments. However, the measures of instructional service developed in this study do identify departments whose resource requirements are very sensitive to change in the enrollments within the institution. For example, the department-based instructional service measures reflected the relative proportion of the department's instructional load which are service students. Thus,

¹²National Center for Higher Education Management Systems, A Blueprint for RRPM, 1.6 Application (Boulder, Colo.: Western Interstate Commission for Higher Education, 1973), p. 19.

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departments with high department-based instructional service measures have instructional loads and, thus, resource requirements which are sensitive to changes in student enrollments or enrollment patterns.

Summary

The preceding discussion provided evidence that the concept of instructional service can be incorporated in resource allocation and projective techniques, and within these frameworks this concept can produce greater clarity and refinement in management models. Yet, the operation of this concept in the framework presented above is practically impossible. The instructional service measures developed for this study and the eventual use of these measures in a departmental clustering and budgetary schema are important because they provide a method of incorporating instructional service into a management model before all the methodological problems mentioned above have been solved.

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Chapter III

OTHER DEPARTMENTAL LITERATURE

While the instructional service component of academic departments was of primary interest in the study, a brief review of the literature about the establishment and organization of the department provides a general framework from which to view academic departments and their management. It was evident from the review of available literature that most articles about academic departments were based on speculation rather than empirical data. However, in this chapter some of the empirical works on academic departments are presented. Again, their relevance is in terms of a general understanding of academic departments, and these works had little direct bearing on the analyses in this study.

Background

The evolution of the department to its present position as the basic organizational unit in institutions of higher education closely paralleled the growth and specialization of knowledge. Yet, the establishment of the elective system in the early nineteenth century provided the catalyst for the reorganization of college faculties on the basis of subject matter rather than individual chairs of instruction.¹

¹J. Brubacher and W. Rudy, Higher Education in Transition (New York: Harper and Brothers, Publishers, 1958), p. 114.

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The emergence of the department pattern as an organizational reality occurred in the "second quarter of the nineteenth century at both Harvard and the University of Virginia."² While forces such as specialization and the elective system have been identified as contributors to the development of the departmental structure, the exact rationale used by men such as Eliot at Harvard for this reorganization is only speculation. Veysey states the problem thus:

Indeed one may find the date on which such and such a department was established at such and such a university; one may even uncover a spirited debate over the details of certain of the new arrangements. But exceedingly little direct evidence may be found on decisions involving the basic shape of the rapidly emerging academic structures.³

As the complexity of American life continued to change from a rural, agricultural society to highly industrialized, urban society as a result of the Industrial Revolution, new specializations were introduced as viable areas of advanced study. These specializations grew into departments such as engineering, management, and architecture.

In the new technological society educational institutions are expanded not only to exercise research functions but also to play a central role in the economy and the system of stratification as agencies of selection, training, and occupational placement of individuals.⁴

²Ibid., p. 354.

³L. R. Veysey, The Emergence of the American University (Chicago: The University of Chicago Press, 1965), p. 267.

⁴A. H. Halsey, "The Changing Functions of Universities," in A. H. Halsey, J. Floud, and C. A. Anderson (Eds.), Education, Economy, and Society (Glencoe, Ill.: The Free Press, 1961), pp. 456-465.

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With the space age also came widening commitments on the part of institutions of higher education to the study of societal issues. Departments of resource development, racial and ethnic studies, and urban development began to appear on university campuses in addition to departments representing new specializations such as biophysics and packaging.

Through its evolution the department "has become the potent force both in determining the stature of the university and in hampering the attempts of the university to improve its effectiveness and adapt to changing social and economic requirements."⁵ This increase in departmental autonomy was a function of the rapid growth and increased specialization of academic departments and the decentralization of authority which resulted because the central administrative personnel could not deal with all the complexities of an evolving multiversity. Yet, this autonomy which has allowed departments to grow and prosper poses a threat to departments today because of growing pressures for accountability at all institutional levels. Indeed, Freeman in a recent article calls departments "a fallacy of misplaced abstraction."⁶ Freeman further contends that "like credit hours, departments seem useful only in documenting where one has been and not at all useful in imagining where he might go."⁷ While perpetuation of the organizational

⁵P. L. Dressel and D. Reichard, "The University Department: Retrospect and Prospect," Journal of Higher Education, 41 (May, 1970), p. 387.

⁶L. D. Freeman, "The Management of Knowledge," Journal of Higher Education, 45 (February, 1974), p. 86.

⁷Ibid., p. 92.

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integrity of the department, rather than the development and transmission of knowledge, may have become the primary thrust of departments in today's institutions, departments are still the basic organizational unit and the "heart" of the institution.

Departmental Organization

Though McConnell has indicated that the great diversity among departments makes generalizations about departmental organization and administration very difficult, the recent studies by Hobbs and Anderson and by Dressel et al. provide some insight into the organization of academic departments. Though faculty members were described by Millett as "individual practitioners of scholarship,"⁸ they do have responsibility for some administrative matters. These activities generally fall under the major heading of governance. The primary foci of faculty efforts in governance at the department level are curriculum review and control and personnel concerns. Hobbs and Anderson indicated that the organizational modes for dealing with these two areas were different. Curriculum review and control decisions were handled in a democratic manner while personnel decisions were relegated to a group of senior faculty.

The most widely applicable model of academic departmental organization is a composite of (1) a division of labor among peers for administrative activities, (2) an oligarchy of the senior professional ranks for decision-making with respect to professional concerns, and (3) a collegium, i.e., a democracy, for decision-making with respect to curricular affairs. But given (a) departments with varying degrees of activities requiring coordination, and, hence, varying extents of the divisions of administrative

⁸J. D. Millett, The Academic Community (New York: McGraw-Hill Book Company, 1962), p. 102.

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labor, (b) several possible structures for governance, whether in professional or curricular concerns, (c) numerous departmental matters which fall in the areas of intersect between administration and governance, and (d) the inclination of many, if not most, individuals to exploit whatever power they may enjoy in one context when participating in another--the combinatorial possibilities of organizational models with which to describe any given academic department are legion.⁹

The organization of academic departments is further complicated by the role of the department chairman or head in the decision-making within the department. There is some debate in the literature as to whether an elected chairman or an appointed head should be the chief administrative officer of the department. Porter indicated that if prompt and confident administration is important then a head is indicated. On the other hand, a chairman is indicated if faculty participation in determining departmental policy is of paramount concern.¹⁰ It, thus, appears that the appointed department head occupies a more authoritative position than does an elected chairman. Further complexities are introduced into the organization of departments by past inadequacies of definition because "for the most part ... the chairman's role was so poorly defined that there wasn't anything they could do which could make much difference."¹¹ Euwema indicated that the head should be personally responsible for recruiting, faculty evaluation,

⁹W. C. Hobbs and L. G. Anderson, "The Operation of Academic Departments," Management Science, 15 (December, 1971), pp. B-142-143.

¹⁰K. Porter, "Department Head or Chairman?" AAUP Bulletin, 47 (December, 1961), p. 339.

¹¹W. Key, The Department Chairman: One Man's Viewpoint (Boulder, Colo.: Western Interstate Commission for Higher Education, 1970), p. 2.

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curriculum, and ceremonial functions and that he should delegate everything else.¹²

The department chairman's position is similar to that of a first-line supervisor. He represents the administration to the faculty and the faculty to the administration. However, the first-line supervisor in industry has two advantages over the department chairman. First, while the chairman's decisions are primarily in policy execution, the supervisor makes many decisions of policy formulation as well as execution. Second, the supervisor's relationship to his subordinates is usually hierarchical while the chairman is both a leader and a professional colleague and, thus, has shared power with his colleagues.¹³

McKeachie summarizes the organizational problems of the chairmanship thus:

Although the department chairmen in most colleges and universities are the key individuals in determining the educational process of the institution, they are generally ill-prepared, inadequately supported, and more to be pitied than censored.¹⁴

The chairman's role as well as the formal and informal aspects of the departmental organization need to be more closely studied so that an effective management model for academic departments can be developed.

¹²B. Euwema, "The Organization of the Department," Educational Record, 23 (January, 1953), p. 42.

¹³J. J. Corson, Governance of Colleges and Universities (New York: McGraw-Hill Book Company, 1960), p. 89.

¹⁴W. J. McKeachie, "Memo to a New Department Chairman," Educational Record, 42 (Spring, 1968), p. 221.

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Empirical Studies

Beginning in 1918, Committee T, on Academic Freedom and Tenure, of the American Association of University Professors has studied the various procedures in departmental and institutional administration. At periodic intervals questionnaires were mailed to several hundred AAUP chapter offices throughout the United States. The 1948 survey was summarized in Doyle,¹⁵ and this survey showed that the major functions of the department chairman included budgeting and curriculum control and review. However, Doyle's own study of 107 departments in 33 liberal arts colleges for the academic year 1950-51 is one of the most intensive works done on the role and functions of the department chairman. In this study Doyle conducted interviews about the actual practice in each department and also studied faculty handbooks, regulations, resolutions, and minutes. In addition to delineating the functions of these chairmen, Doyle indicated that these chairmen spent most of their time in educationally rather than administratively related activities. Doyle also reported that previous teaching experience, teaching ability, and administrative ability were the three criteria used in the selection of a chairman.

Gunter surveyed the department chairmen in ten state universities during the 1963-64 academic year. He found that the size of the institution (large or small) did not affect the principal functions of

¹⁵E. A. Doyle, The Status and Functions of the Department Chairman (Washington, D.C.: Catholic University of America Press, 1953) pp. 115-125.

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the department chairman.¹⁶ Hemphill in 1955 studied the relationship between departmental reputation and the leadership behavior of the chairman. On the basis of the data from 22 departments of a liberal arts college, Hemphill concluded that, "It appears that reputation may provide a criterion of excellence."¹⁷ In an effort to study the power of the department chairman, Hill and French sampled 375 professors in 5 state-supported four year colleges. Their findings indicated a positive correlation between the faculty's perception of the power of the department chairman and the level of the professor's satisfaction and the productivity in terms of organizational goals. However, a slight negative correlation existed between perceived power and the professional output of the professors. In addition, department chairmen were perceived to have less authority than other administrative groups.¹⁸ Finally, Patterson has reported that in a study of 338 professors in 90 departments at 10 universities faculty members tended to regard the ideal department chairman as a facilitator of their own self-determined goals, an intermediary between themselves and the dean,

¹⁶C. W. Gunter, "The Role of Department Chairmen in the Governance of State Universities" (Unpublished Ed.D. dissertation, Washington State University, 1964).

¹⁷J. K. Hemphill, "Leadership Behavior Associated with the Administrative Reputation of College Departments," in W. W. Charters, Jr. and N. L. Gage (Eds.), Readings in the Social Psychology of Education (Boston: Allyn and Bacon, 1963), p. 326.

¹⁸W. W. Hill and W. L. French, "Perceptions of Power of the Department Chairman by Professors," Administrative Science Quarterly, 11 (March, 1967), pp. 548-574.

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Other research has focused on the faculty and students associated with academic departments. Vreeland and Bidwell classified departments on the basis of departmental goals and means available for achieving them. The findings of this research suggested that

the particular definition of undergraduate education by a department faculty conditions teachers' affective responses to students and the way in which they define and relate to the student role. If so, it may be a faculty's conception of the instructional task more than the content of the subject matter itself, that determines the social organization of the department's work with undergraduates.²⁰

Currie et al. studied the relationship between the images of college professors which are held by undergraduates and these students' interest in becoming college professors. The results of this survey of freshmen at the University of California indicated that the prevailing image of the college professor (an occupational stereotype) is an important factor in identifying students who are interested in certain occupations. Also, the number of students "realistically considering" becoming college professors varied from one area to another.²¹

¹⁹L. M. Patterson, "Preferences in Administrative Style Based on an Inquiry Into the Perceptions of the Ideal Role of the Department Chairman" (Unpublished Ph.D. dissertation, University of Texas, 1966).

²⁰R. S. Vreeland and C. E. Bidwell, "Classifying University Departments: An Approach to the Analysis of Their Effects," Sociology of Education, 39 (Spring, 1966), p. 254.

²¹I. D. Currie et al., "Images of the Professors and Interest in the Academic Profession," Sociology of Education, 39 (Fall, 1966), pp. 301-323.

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The theme of variability among departments and their students was further documented by Gaff and Wilson whose research suggested that areas of specialization--humanities, social sciences, natural sciences and professional studies--represented four different faculty cultures with different attitudes toward certain relevant educational topics.²²

The concepts of local and cosmopolitan academic faculty were described by Gouldner on the basis of his work at a small midwestern college. While locals were characterized by their involvement on their own campus and their general concern for the institution, cosmopolitans were more discipline-oriented and had few ties to the institution at which they were employed.²³ Utilizing these concepts developed by Gouldner, Hamblin and Smith surveyed graduate students about the behavior and attitude patterns of professors in their department. On the basis of their results, these researchers suggested that the primary distinctions between those faculty members with local status and those with professional status were their research publications and the fact that these faculty members remained aloof (socially distant).²⁴

Finally, the research on departments as organizational units which has been reported in the first two phases of the Exxon Departmental

²²J. C. Gaff and R. C. Wilson, "Faculty Cultures and Interdisciplinary Studies," Journal of Higher Education, 43 (March, 1971), pp. 186-201.

²³A. W. Gouldner, "Cosmopolitans and Locals: Toward an Analysis of Latent Social Roles," Administrative Science Quarterly, 2 (June, 1958), pp. 444-480.

²⁴R. L. Hamblin and C. R. Smith, "Values, Status, and Professors," Sociometry, 29 (September, 1966), pp. 183-196.

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Study Project merits attention. The Confidence Crisis represented a study of selected university departments in fourteen universities. Featherstone called this book a "basic text" and an excellent review of the literature on departments as well as a report of research findings.²⁵ The basic question in this research was what roles do the operation and function of departments in large universities play in the achievement of the institution's goals? The results reported in The Confidence Crisis indicated that departments with high national standing, based on productivity research and doctoral degrees, were characterized by more informal administrative organization and practices than departments of less stature. In addition, departments of high national standing were found to be less involved in local institutional matters and tended to shun institutional priorities. Further, three of the tentative conclusions reached in this study were thus:

Autonomy is essential to effective departmental operation, but autonomy is meaningless without adequate resources, which, in turn, are dependent upon the existence of both departmental self-confidence and confidence reciprocated among the department, the dean, and the university.... The confidence game is a central element in university relations.... The outcomes of the confidence game are not always in best interest of higher education.²⁶

The authors concluded by stating that the "university and the departments within them are out of control."²⁷ Reorganization of departments

²⁵R. L. Featherstone, The Development of Management Systems for the Academic Department (Boulder, Colo.: Western Interstate Commission for Higher Education, 1972), p. 15.

²⁶P. L. Dressel, F. C. Johnson, and P. M. Marcus, The Confidence Crisis (San Francisco: Jossey-Bass, Inc., Publishers, 1970), p. 145.

²⁷Ibid., p. 232.

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and the development of appropriate management informational systems are needed to ensure that "resources are allocated and used in accord with the priorities set for the university by the university in co-operation with those who support it."²⁸

In Return to Responsibility, a sequel to The Confidence Crisis, Dressel and Faricy focus "on developments, self-generated or imposed, designed to bring increased control over the uses of resources in the university. The appropriate degree of autonomy of the university and its units is a central issue ... through all the discussion."²⁹ On the basis of the responses to questionnaires sent to faculty, administration, board members and legislators, the authors suggested that while most people accept the need for departmental review, most respondents felt that this review should be conducted by faculty or administrators.

Efficiency, uniformity, a better "product"--these appear to be major concerns in universities. But human concerns--personal and intellectual welfare--are not neglected, especially on particular issues.³⁰

On new patterns of organization, the authors stated that

Departmental autonomy is generally decreased by innovative structures, but problems of autonomy--excessive or deficient--are merely shifted to other points in the structure. Furthermore, no structure observed has been able to curb or satisfy the faculty's

²⁸Ibid., p. 232.

²⁹P. L. Dressel and W. H. Faricy, Return to Responsibility (San Francisco: Jossey-Bass, Inc., Publishers, 1972) p. xii.

³⁰Ibid., p. 47.

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desire for a disciplinary-based structure corresponding to their graduate school preparation and their research interest.³¹

The authors also stressed the need for planning and coordination at the state and national level so that some measure of congruence between resource allocation, social needs and institutional roles can be achieved.

Indeed, most faculty members and departments seem to have operated on the principle that what is good for them is good for the university; and in turn, the university seems to have operated on the principle that what is good for the university is good for society. But, in fact, what they perceive as good for the university is not necessarily needed by, wanted by, or good for society.³²

Finally, on the subject of constraints, the authors listed four types of constraints that are reasonable and justifiable:

- Generally, constraints are justifiable when they
- (a) tend to make the students' educational experience more interesting, challenging, and relevant to social needs;
 - (b) provide policies that are both necessary and fair as judged by students and the general public;
 - (c) encourage or ensure more efficient use of resources;
 - (d) permit effectiveness and success to be judged by results and costs, rather than by faculty or student preferences for particular educational processes.³³

Summary

Fundamental organizational questions about the department and its operations still remain even though the department structure has been in existence for over 100 years. Much has been written about the department

³¹Ibid., p. 87.

³²Ibid., p. 184.

³³Ibid., p. 188.

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and its members, but few facts have emerged. Systematic research on all facets of departmental operations including the formal and informal social systems is needed. In addition, the results of these research efforts need to be coalesced into a theory of academic departments so that departments on the same or different campuses can be adequately evaluated and compared. Each effort to describe, measure, or report departmental operations, like this study of the instructional service aspect of academic departments, makes such a theory of departments more possible.

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Chapter IV

RESEARCH DESIGN

The aforesaid purposes of this study were to 1) develop appropriate measures of the instructional service component of academic departments; 2) identify relationships among the instructional service measures and among these measures and other departmental characteristics, and 3) classify departments on the basis of instructional service and determine which variables serve to discriminate among categories of instructional service. The research design developed to meet these aims is fully described in this chapter.

Instructional Service Measures

Departmental instructional service measures could have been based on either the number of students majoring in other departments who were enrolled in courses in a department or the number of student credit hours (SCH) generated by these students. Since the number of student credit hours generated by a department is a function of the enrollment of that department, the use of both measures would have been redundant. Thus, one set of measures was a sufficient representation of instructional service. Student-based measures were used as instructional service indicators in this study because service-oriented, sub-program courses existed which had enrollments but generated no student credit hours.

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One caveat should be given about the nature of enrollment data. The enrollment data for each department are an aggregate of the number of students enrolled in each course offered by the department. These data do not represent the number of unique students enrolled in the department. For example, if a student were enrolled in two courses in a department during a term, this person would be reflected as two students in the enrollment data for the department for that term. However, this attribute of enrollment data did not adversely affect the data structure of this study since the instructional service concept was based on instructional activity or effort on the part of academic departments. Though only one student was involved, this student participated in two instructional activities provided by the department, and both of these activities were reflected in the enrollment data for the department.

In this study, the instructional service component of academic departments was represented by two sets of measures--department-based instructional service measures (DBIS) and university-based instructional service measures (UBIS). The department-based instructional service measures (DBIS) described the relative amount of instructional service (instruction to non-majors) in each academic department. These department-based measures were defined as the percentage of the total number of students enrolled in a department during Fall term 1971 who were service students (non-majors). Thus, $DBIS = \text{number of service students in a department} / \text{total number of students in the department}$. This equation was applicable for all course levels. On the other hand,

university-based instructional service measures (UBIS) represented the relative amount of the total instructional service load of the university (an aggregate over all departments) which was assumed by each academic department. Thus, $UBIS = \text{number of service students in a department} / \text{total number of service students over all departments}$. This equation was also applicable for all course levels. Since the level of a course affects its cost, with more advanced level courses tending to cost more,¹ both department-based and university-based instructional service measures were computed for each course level. Undergraduate courses were initially subdivided into subprogram, lower level, and upper level, while graduate courses were subdivided into graduate-professional, masters level, and doctoral level. The six summary measures constructed for each department for both categories of instructional service measures are displayed in Table 1.

The three unadjusted measures (undergraduate, graduate, and total) were based on all course levels applicable to each category. The adjusted measures, as constructed, did not include subprogram and short courses (undergraduate and total measures) and graduate-professional courses (graduate and total measures). Subprogram courses are those courses which are remedial in nature and whose credits do not count toward a degree. Short courses are those courses that are associated with the Agricultural Technology programs (usually granting two-year certificates) and are taught by various departments in the institution.

¹R. L. Williams, "The Cost of Educating One College Student," Educational Record, 42 (October, 1961), p. 233.

Table 1. Summary of Measurements

INDICES BASED ON NUMBER OF STUDENTS	LEVEL OF COURSES INCLUDED	COURSE NUMBERS
1. Unadjusted undergraduate	subprogram & short courses lower level upper level	000-099 100-299 300-499

Table 1. Summary Measures

INDICES BASED ON NUMBER OF STUDENTS		LEVEL OF COURSES INCLUDED	COURSE NUMBERS
1. Unadjusted undergraduate		subprogram & short courses lower level upper level	000-099 100-299 300-499
2. Unadjusted graduate		graduate-professional master's level doctoral level	500-699 800-899 900-999
3. Unadjusted total		subprogram & short courses lower level upper level graduate-professional master's level doctoral level	000-099 100-299 300-499 500-699 800-899 900-999
4. Adjusted undergraduate		lower level upper level	100-299 300-499
5. Adjusted graduate		master's level doctoral level	800-999 900-999
6. Adjusted total		lower level upper level master's level doctoral level	100-299 300-499 800-899 900-999

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²Ibid., p

Finally, graduate-professional courses are those courses associated with the three professional programs at Michigan State University-- Human Medicine, Osteopathic Medicine, and Veterinary Medicine. The adjusted indicators reflect a concept of instructional service which is more applicable to other institutions that do not have similarly organized professional programs or an equivalent Agricultural Technology program.

One other piece of information was collected about instructional service in academic departments. A percentage distribution of service students (non-majors) by class level was generated for each aggregate course level (undergraduate, graduate, and total) from both adjusted and unadjusted data. These data were further aggregated, and departments serving primarily lower level students were identified. This distinction by student level was prompted by research which found that "costs increase with the advance in class level of the student."² In addition, one of the questions of interest in this study was whether high undergraduate instructional service-oriented departments taught primarily lower division or upper division undergraduate students. Thus, when department-based and university-based instructional service measures were coupled with data about the level of student served, a picture of the department's instructional service role began to emerge.

Data

Information gathered on eighty-two (82) academic departments at Michigan State University formed the data base used in this study.

²Ibid., p. 232.

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A review of the list of these departments found in Appendix A reveals that no department in the College of Education was included in this study. This was a practical and not a conceptual omission. The data for the College of Education are not reported nor aggregated by department. Thus, no departmental data summaries exist for the departments within the College of Education. In addition, one other subtlety present in the data should be noted. Data for multi-administered and/or -financed departments were aggregated and reported as representing a single department. For example, the Colleges of Human Medicine, Osteopathic Medicine, and Veterinary Medicine each contributed to the funding of the Department of Anatomy. However, the data for Anatomy used in this study reflected the total dollars for Anatomy from all funding sources.

The service measures described above were computed for each department in the study from enrollment data in the Analysis of Student Enrollment in Courses by Student's Curriculum and Class (R7705) and from tenth day class lists for Fall 1971, both of which were prepared by the Registrar's Office. Class lists were used because they are the only available source of enrollments by major for departments with non-unique curriculum codes. For example, all departments in the College of Agriculture and Natural Resources have the same curriculum code and are aggregated in the R7705 report; hence, separation of majors in each department in this college from other Agriculture students would have been impossible using this report. Since the service loads of departments, not the instructional service load of colleges, were of interest in this study, the major codes appearing on class lists for departments

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like those in the College of Agriculture and Natural Resources with non-unique curriculum codes were used to discriminate between department majors and service students.

Numerous departmental descriptor variables were also used in various phases of the analyses conducted in this study. These variables are listed in Appendix B. These data for the 1971-72 academic year represent objective data (empirical and externally observable) routinely compiled by various offices at Michigan State University.³ In addition, data representing the prestige of graduate education in departments at Michigan State was gleaned from reports published by the American Council on Education.⁴ Thus, the twelve department-based and university-based instructional service measures and these eighty-six descriptor variables comprised the data base for this study.

Research Questions

This research was exploratory in nature and was designed to identify relationships among the instructional service measures and among these measures and other available data on academic departments. The areas of inquiry central to this study and their attendant statistical analysis are delineated in the following passages.

³These offices include the Registrar's Office, the Office of Institutional Research, the Provost's Office, and the Office of the Vice-President for Business and Finance.

⁴The American Council on Education published reports on graduate education prestige compiled by Cartter in 1966 and by Roose and Andersen in 1970.

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1. Relationships between undergraduate and graduate department-based instructional service measures.

Do departments with highly instructional service-oriented undergraduate programs tend to have highly instructional service-oriented graduate programs? The null hypothesis associated with this question was that department-based undergraduate instructional service and department-based graduate instructional service are mutually independent. Spearman rank correlation coefficients were used to assess this relationship for both unadjusted and adjusted data.

2. Relationships between department-based instructional service measures and university-based instructional service measures.

The department-based instructional service measures for each department were defined in terms of the service students processed by the department. On the other hand, the university-based instructional service measures reflected the department's contribution to the processing of students at the institutional level. For each course level (undergraduate, graduate and total), are the department-based and university-based instructional service measures independent? Spearman rank correlation coefficients for both unadjusted and adjusted data were used to test the null hypothesis that for each course level department-based instructional service and university-based instructional service are mutually independent.

3. Relationships between adjusted instructional service measures and unadjusted instructional service measures.

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As noted previously, the difference between unadjusted and adjusted instructional service measures reflected the effect of subprogram and short courses and graduate-professional courses on the instructional service level of a department. A review of the data on course offerings revealed that thirty-three (33) of the eighty-two (82) departments had courses falling into at least one of the above categories (see Appendix C, Table 23). The extent of the relationships between unadjusted and adjusted measures for both department-based and university-based instructional service was determined using Spearman rank correlation coefficients. The null hypotheses were that the unadjusted and adjusted department-based instructional service measures for each course level are mutually independent and that the unadjusted and adjusted university-based instructional service measures for each course level are mutually independent.

4. Relationships between the level of students served in undergraduate courses and the undergraduate instructional service measures.

Do high undergraduate instructional service-oriented departments serve primarily lower division or upper division students? Similarly, do departments which assume a large part of the institutional service load serve predominately lower division or upper division undergraduate students? A chi-square test for independence was used to test the hypothesis that the level of department-based undergraduate instructional service and the level of students served in undergraduate courses are statistically independent and the

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5. Relationships between the department-based and university-based instructional service measures and the faculty rank distribution of departments.

Do departments with similar department-based or university-based instructional service measures have similar faculty rank distributions? Are the department-based or the university-based instructional service measures reflective of the faculty rank distributions within departments? These relationships were of interest since, theoretically, the type of instructional load in academic departments should affect staffing. Three faculty rank indices--one based on faculty headcount, one based on full-time equivalent faculty (FTE), and one based on the percentage distribution of faculty and ranks--were constructed by weighting each rank. Spearman rank correlation coefficients were used to assess the relationships between these faculty rank distribution indices and undergraduate and graduate, adjusted and unadjusted department-based and university-based instructional service measures. The general form of the null hypothesis was that the faculty rank distribution index and the instructional service measure are mutually independent.

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6. Relationships between department-based and university-based instructional service measures and the number of graduate assistants employed in academic departments.

Do departments with similar department-based or university-based instructional service measures employ a similar number of graduate assistants? Two measures of the number of graduate assistants in a department--headcount and FTE's--were developed for each department. Spearman rank correlation coefficients were used to assess the relationships between these measures and the undergraduate and graduate, department-based and university-based instructional service measures. These relationships were calculated for both adjusted and unadjusted instructional service measures. The general form of the null hypothesis was that the measure of the number of graduate assistants and the instructional service measure are mutually independent.

7. Relationships between department-based and university-based instructional service measures and the funding level and average salary in academic departments.

The two major sources of departmental funding are the general fund and research grants and contracts. Is the level of funding from these two sources independent of the level of department-based and university-based instructional service in the department? Is the average salary of faculty in a department related to the level of department-based or university-based instructional service? The extent of these relationships among funding, average salary, and instructional service measures was assessed using Spearman rank

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8. Relationships between the prestige of graduate education in departments and the department-based or university-based graduate instructional service measures.

Do departments with prestigious graduate programs have relatively high or low department-based and university-based instructional service measures? A chi-square test for independence was used to test the hypothesis that the level of department-based graduate instructional service and level of prestige of the department's graduate program are statistically independent and the hypothesis that the level of university-based graduate instructional service and the level of prestige are statistically independent. The correlation coefficient ϕ (Φ) was used to describe the strength of the relationships between these qualitative variables.

9. Classification of departments on the basis of instructional service.

Using the rankings of departments on undergraduate and graduate instructional service data, four two-dimensional arrays of the following form were constructed.

		<u>Graduate</u>		
		Low	Medium	High
<u>Undergraduate</u>	Low			
	Medium			
	High			

These four arrays represented the rankings on unadjusted department-based, adjusted department-based, unadjusted university-based, and

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adjusted university-based instructional service measures. Each category was constructed on the basis of rankings and represented approximately one-third of the departments. This stratification was based on ranking to ensure approximately equal cell sizes for the multiple discriminant analysis discussed in the next passage. In addition, since departments tended to cluster around the extremes of the instructional service measures, especially the department-based measures, the ranks provided the best representation of the data.

10. Identification of descriptor variables reflective of the classification schema.

For each dimension, undergraduate and graduate, of the four instructional service arrays, what descriptor variables discriminate among the categories of undergraduate and graduate instructional service? That is, what linear combination of variables will maximize the differences among groups? Multiple discriminant analysis was the technique used to study the relationships among the categories of undergraduate and graduate instructional service in terms of the many descriptor variables available for each department. The selection of the input variables for the multiple discriminant analyses was facilitated by the use of principal axes factor analysis. In principal axes factor analysis, redundancies in the data are eliminated by the generation of n statistically independent linear combinations called factors. These factors were, in turn, used as the input variables for the discriminant analysis.

Methodology

A review of the statistical techniques—rank correlations—factor analysis in the following pages.

Spearman Rank

Basic questions: What is the extent to which it was used as a descriptor variable? Values of rho vary from perfect positive to perfect negative (statistical independence). Extremes of the distribution based on ranks rather than study. In order to use the ranks in the instructional series, a program which computes the ranks was generated in this study. This type of man-

Methodology

A review of the preceding section reveals that four types of statistical techniques were used in this study. Each of these techniques--rank correlation, chi-square test for independence, principal axes factor analysis, and multiple discriminant analysis--are described in the following paragraphs.

Spearman Rank Correlations--Correlation analysis deals with two basic questions: does a relationship exist between two variables and what is the extent of this relationship? In this study, Spearman's rho was used as a measure of the relationships among the ranks of the instructional service measures and the ranks of the other departmental descriptor variables. As with other measures of relationships, the values of rho vary from -1, a perfect negative correlation, to +1, a perfect positive correlation, with a value of zero indicating statistical independence. Since departments tended to cluster around the extremes of the instructional service measures, correlation coefficients based on ranks rather than raw data were most appropriate in this study. In order to correct for the many ties which were present in the instructional service data, correlation coefficients were calculated using the ranks on these service data as the input into a computer program which computed Pearson's r .⁵ The correlation coefficients generated in this manner were then interpreted as Spearman's rho's. This type of manipulation was possible since "Pearson's r reduces to

⁵W. J. Conover, Practical Nonparametric Statistics (New York: John Wiley & Sons Inc., 1971), p. 246.

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Spearman's rho if the data are replaced by their ranks."⁶ The null hypotheses of mutual independence ($E(r_s) = 0$) were tested using a t-statistic, $t = r_s \sqrt{N-2} / \sqrt{1-r_s^2}$, with N-2 degrees of freedom.⁷

Chi-square Test for Independence--The chi-square test for independence tests statistical independence within the framework of an $r \times c$ contingency table. Eight chi-square tests were conducted on this study--four based on level of student served in undergraduate courses and four based on the prestige of graduate programs. The 2×3 contingency tables which provided the basis for the analyses are diagramed as

		<u>Undergraduate Instructional Service</u>		
		Low	Medium	High
<u>Student Level</u>	Predominately Lower Division			
	Predominately Upper Division			
		<u>Graduate Instruction Service</u>		
		Low	Medium	High
Prestige	Ranked			
	Unranked			

In order to test the hypothesis of the general form, the level of qualitative variable A is independent of the level of qualitative variable B,

⁶Ibid., p. 247.

⁷L. A. Marascuilo, Statistical Methods for Behavioral Science Research (New York: McGraw-Hill Book Company, 1971), p. 457.

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the statistic $T = \sum_{i=1}^r \sum_{j=1}^c \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$ was computed.⁸ The rejection region for the null hypothesis correspond to values of T greater than 5.991, the .95 percentile of the chi-square random variable with $(r-1)(c-1) = 2$ degrees of freedom.⁹ The strength of the association between the dimension of the contingency table was computed using the phi coefficient. The range of $\hat{\phi}$ is from 0 to 1, where zero is uncorrelated while one represents a perfect relationship. The relationship between the phi coefficient and Karl Pearson's chi-square is expressed for a $r \times c$ contingency tables by the formula: $\hat{\phi} = \sqrt{X^2/NM}$ where N is the sample size and M is the minimum of $(r-1)$ and $(c-1)$.¹⁰

Principal Axes Factor Analysis--Factor analysis was described by Overall and Klett as

a powerful method of statistical analysis that has as its aim the explanation of relationships among numerous correlated variables in terms of a relatively few underlying factor variables.¹¹

In this study one of the main analysis problems was the selection of variables for use in the multiple discriminant analyses. Since the number of departmental descriptor variables exceeds the number of departments in each instructional service category, criteria for variable selection were needed. Yet, no a priori variable selection strategy which accounted for possible correlations within the descriptor

⁸W. J. Conover, Practical Nonparametric Statistics (New York: John Wiley & Sons Inc., 1971), p. 155.

⁹Ibid., p. 156.

¹⁰L. A. Marasciulo, Statistical Methods for Behavioral Science Research (New York: McGraw-Hill Book Company, 1971), p. 406.

¹¹J. E. Overall and C. J. Klett, Applied Multivariate Analysis (New York: McGraw-Hill Book Company, 1972), p. 89.

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variables and which weighted the variables accordingly existed.

Principal axes factor analysis with a varimax rotation provided a tool for reducing the data into smaller set of orthogonal (statistically independent) factors which account for a maximum amount of the total variability among departments on all the descriptor variables.

Principal axes factor analysis is one of the multifactor techniques described by Rummel and characterized by the following attributes:

1. The approach is one of reducing the data to the minimum number of common factors or factor-dimensions necessary to reproduce the original data.
2. The complexity of the variables may be one (as in the multiple-group technique), two, or greater.
3. The complexity of the factors may consist of general, group, or specific factors.
4. Communalities must be estimated if the common factor model is involved.¹²

The general steps of most factor analytic techniques as delineated by Comrey are "(a) selecting the variables; (b) computing the matrix of correlations among the variables; (c) extracting the unrotated factors; (d) rotating the factors; and (e) interpreting the rotated factors."¹³

In this study thirty-five (35) departmental descriptor variables were used in the factor analysis conducted in this study. The remaining descriptor variables listed in Appendix B were used in other analyses conducted in this study. Steps b, c, and d were accomplished through the use of two computer programs, PACKAGE and FACTRB, which were

¹²R. J. Rummel, Applied Factor Analysis (Evanston, Ill.: Northwestern University Press, 1970), p. 333.

¹³A. L. Comrey, A First Course in Factor Analysis (New York: Academic Press, 1973), p. 4.

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available at the Michigan State University Computer Center. First, a product-moment correlation matrix was computed with estimates of the communalities substituted in the diagonal of this matrix. This necessary substitution causes an inherent weakness in the common factor analytic model--a basic indeterminacy or circularity in calculation.

Rummel describes the problem thus:

The communalities¹⁴, h_2 , cannot be known until the common factors are defined. The delineation of these factors, however, depends on the correlation matrix.... The traditional procedure for dealing with this indeterminacy--this communality problem--is to insert in the principal diagonal of the correlation matrix some estimates of the communality values.¹⁵

Two types of estimates of the communalities are commonly used; the upper bound which is unity or the lower bound which is the squared multiple correlation (SMC) of a variable with all the other variables in the data set. In the absence of other relevant studies that could serve as a guide for the choice of communality estimates for this study, the squared multiple correlations were used since Rummel described them as "the best estimate on theoretical and empirical grounds."¹⁶

As previously noted, the unrotated factors were extracted using principal axes factor analysis. The principal axes technique was

¹⁴Communalities are defined as the "sum of the squares of the factor loadings over all the factors," and they give the proportion of the variance of the variables that can be accounted for by scores in the factor." (Comrey, 1973, p. 12)

¹⁵R. J. Rummel, Applied Factor Analysis (Evanston, Ill.: Northwestern University Press, 1970), p. 312.

¹⁶Ibid., p. 320.

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described by Cattell as the preferred technique "notably for its mathematical properties and for practical reasons such as yielding a test of the number of factors...."¹⁷ The principal axes were defined by Rummel as the "minimum orthogonal dimensions required to linearly reproduce (define, generate, explain) the original data."¹⁸

Computationally, principal axes factor analysis is an iterative method which operates on the correlation matrix and successive residual matrices to generate principal axes factor loadings based on principal components. These coefficients (factor loadings) represent the "extent to which variables are related to the hypothetical factor."¹⁹ FACTRB extracts successive principal components and factors until the eigenvalue of a factor is less than or equal to one or until a default limit of twenty factors is reached. However, this program constraint did not affect the analysis in this study. Some of the characteristics of the factors which are derived using principal axes factor analysis include

1. Both factor loadings and factor scores are orthogonal.
2. The variance contributions of the factors are decreasing.
The first factor measures the most variance and successive factors will account for decreasing proportions of variance.
3. Sensitivity to random error or communality estimates appears low relative to other techniques.
4. The geometrical fit of all factors is ellipsoidal.²⁰

¹⁷R. B. Cattell, Handbook of Multivariate Experimental Psychology (Chicago: Rand McNally & Company, 1966), p. 176.

¹⁸R. J. Rummel, Applied Factor Analysis (Evanston, Ill.: Northwestern University Press, 1970), p. 338.

¹⁹A. L. Comrey, A First Course in Factor Analysis (New York: Academic Press, 1973), p. 7.

²⁰R. J. Rummel, Applied Factor Analysis (Evanston, Ill.: Northwestern University Press, 1970), pp. 344-45.

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As previously mentioned, factor analytic methods are characterized by a basic indeterminacy. That is, some data when factor analyzed by different methods produces different factor loading matrices. In addition, "although principal axes factors are statistically orthogonal and account for maximum possible variance, they tend to be complex and difficult to interpret."²¹ Rotational transformations of the factors around the origin of an n-dimensional space have been used by factor analysts "to obtain meaningful factors that are consistent (invariant) as possible from analysis to analysis."²² In the factor loading matrix that results from a principal axes factor analysis, the first factor accounts for the largest amount of variance and subsequent factors account for decreasing amounts of variance. In the matrix of rotated factors, the variance is distributed more evenly across all the factors; thus, the first rotated factors which are extracted do not have loadings on almost all of the variables. In addition, in the rotated factor matrix the variables are usually highly loaded on a few factors instead of these variables being highly loaded on many factors as occurs in the unrotated matrix. Thus, the rotation process can produce a matrix improved in both parsimony and clarity.

Kaiser's varimax rotation procedure was used in this study to generate the rotated factor matrix. The varimax method is an orthogonal rotation technique which maximizes the variance of the squared factor

²¹J. E. Overall and C. J. Klett, Applied Multivariate Analysis (New York: McGraw-Hill Book Company, 1972), p. 114.

²²B. Fruchter, Introduction to Factor Analyses (New York: Van Nostrand, 1954), p. 106.

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²³R. J. R.
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²⁴Ibid.,

²⁵F. N. I.
Behavioral Research
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loadings by column. "A strong feature of varimax is its ability to discern the same cluster of variables regardless of the number or combination of other variables in the process."²³ An orthogonal rather than an oblique rotation method was chosen because the factors remain statistically independent. In addition, "the chief grounds for orthogonal rotation are simplicity, a mathematical elegance of the result, conceptual clarity, and amenability to subsequent manipulation and analysis."²⁴ In summary, a principal axes factor analysis with a varimax rotation was used to generate n weighted linear combinations of variables called factors which are statistically independent. Factor scores based on these linear combinations were computed for each department, and these scores were used as variables in the multiple discriminant analyses.

Multiple Discriminant Analysis--Multiple discriminant analysis is a generalized form of regression in which the dependent variable represents group membership.²⁵ In the case of two groups the dependent variable assumes the values of 0 and 1. Since the number of discriminant functions (linear combinations of variables which serve to maximally discriminate among groups) is equal to one less than the number of groups,²⁶ only one discriminant function, similar in form to a

²³R. J. Rummel, Applied Factor Analysis (Evanston, Ill.: Northwestern University Press, 1970), p. 392.

²⁴Ibid., p. 388.

²⁵F. N. Kerlinger and E. J. Pedhazur, Multiple Regression in Behavioral Research (New York: Holt, Rinehart and Winston, Inc., 1973), p. 337.

²⁶J. E. Overall and C. J. Klett, Applied Multivariate Analysis (New York: McGraw-Hill Book Company, 1972), p. 281.

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regression equation, emerges. With the three group classification schema used in this study, two discriminant functions which "maximize the difference between groups relative to the differences within the groups"²⁷ were generated. These discriminant functions were linear combinations of the composite variables and not the original descriptor variables--a fact which complicated the interpretation of the discriminant functions. As was the case in principal axes factor analysis, the two discriminant functions are orthogonal (statistically independent) to each other.

The first discriminant function is that single weighted combination of measurements which has maximum variance between groups relative to the variance within groups.²⁸

The second discriminant function is that weighted combination of the p variables which of all possible weighted combinations independent of the first discriminant function accounts for a maximum of the remaining group differences.²⁹

The computer program DISCRIM2 available at the Michigan State University Computer Center was used to generate the two discriminant functions. Since only three groups were used, the constraints of the program did not affect the analysis. Eight separate discriminant analyses of the instructional service measures were conducted in this study: department-based unadjusted undergraduate, department-based unadjusted graduate,

²⁷F. N. Kerlinger and E. J. Pedhazur, Multiple Regression in Behavioral Research (New York: Holt, Rinehart and Winston, Inc., 1973), p. 340.

²⁸J. E. Overall and C. J. Klett, Applied Multivariate Analysis (New York: McGraw-Hill Book Company, 1972), p. 281.

²⁹Ibid., p. 282.

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Summary

In this chapter the research design of the study was presented. The instructional service measures were defined, and the procedure for calculating these measures identified. Also, the parameters of the entire data base for the study were described. While the purposes of the study have been mentioned in previous chapters, the focus in this chapter was on the specific areas of inquiry and their attendant statistical techniques. The discussion of these techniques--rank correlation, chi-square test for independence, principal axes factor analysis, and multiple discriminant analysis--completed the chapter.

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Chapter V

THE RESULTS

This study was exploratory in nature and was designed to identify relationships among the aspects of instructional service and other available data on academic departments. The purposes of this study were to 1) develop appropriate measures of the instructional service component of academic departments; 2) identify relationships among the instructional service measures and other departmental characteristics; and 3) classify departments on the basis of instructional service and determine which variables serve to discriminate among categories of instructional service. In the preceding chapter the ten areas of inquiry related to these research objectives were identified, and their attendant statistical strategies and techniques were described. The results of these statistical procedures are discussed in this chapter.

Instructional Service Measures

As noted above, one of the tasks in this study was the development of appropriate measures of the instructional service component of academic departments. Two constructs were developed which reflected aspects of instructional service. Department-based instructional service measures represented the relative amount of the total enrollment in each department who were service students (non-majors). Therefore, these

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measures reflected the role of instructional service in the internal functioning of each department. On the other hand, university-based instructional service measures represented the relative amount of the total institutional instructional service load for which each department was responsible. Thus, these university-based measures reflected the department's contribution to the total service instruction within the institution.

For each category of instructional service measures--department-based and university-based--six summary measures were calculated based on the number of instructional service students for Fall 1971, which are displayed in Table 2 and the total enrollments in each department for Fall 1971 which are displayed in Table 3. These six summary measures were described in Table 1 in the preceding chapter. The three unadjusted measures (undergraduate, graduate and total) were based on service and total enrollments in all courses applicable to each category. The adjusted measures, as constructed, did not include subprogram and short courses (undergraduate and total measures) and graduate-professional courses (graduate and total measures). The equations used to calculate these twelve measures of instructional service are reported in Table 4. The six department-based instructional service measures and the six university-based instructional service measures which were computed for Fall 1971 are displayed in Tables 5 and 6 respectively.

Extreme Departments--In this study, extreme departments were defined as those departments with instructional service measures of 0.0 (no instructional service students; a non-service department) or 100.0 (all students were service students; a total service department).

Table 2. Instructional Service Students by Course Level, Fall 1971

Department	Sub-program	UNDERGRADUATE				GRADUATE				TOTALS	
		Lower Level	Upper Level	Adjusted Total	Total	G-P	Masters	Doctoral	Adjusted Total	Total	Total
Ag. Economics	179	00	00	00	179	00	4	00	4	4	183
Ag. Engineering	441	33	58	91	532	00	43	00	43	43	575
Animal Husbandry	50	196	5	201	251	00	1	00	1	1	252
Crop & Soil Sci.	349	251	48	299	648	00	19	00	19	19	667
Dairy	47	248	73	321	368	00	00	1	1	1	369
Fish. & Wildlife	00	00	147	147	147	00	3	00	3	3	150
Food Sci. & H.N.	18	150	42	192	210	00	3	10	13	13	223
Forestry	61	138	101	239	300	00	17	1	18	18	318
Horticulture	235	118	116	234	469	00	7	00	7	7	476
Packaging	00	52	11	63	63	00	2	00	2	2	65
Park & Rec. Res.	00	00	202	202	202	00	34	00	34	34	236
Poultry Science	7	00	4	4	11	00	00	00	00	00	11
Resource Devel.	38	00	328	328	366	00	66	00	66	66	432
Art	00	753	153	906	906	00	7	00	7	7	913
English	630	1,462	1,417	2,879	3,509	00	65	6	71	71	3,580
German & Russian	00	739	186	925	925	00	3	00	3	3	928
History	00	1,555	2,099	3,654	3,654	00	35	1	36	36	3,690
Linguistics	00	96	102	198	198	00	8	2	10	10	208
Music	00	1,453	74	1,527	1,527	00	1	00	1	1	1,528
Philosophy	00	716	933	1,649	1,649	00	25	00	25	25	1,674
Religion	00	543	259	802	802	00	4	00	4	4	806
Romance Lang.	00	1,512	541	2,053	2,053	00	7	00	7	7	2,060
Acct. & Finance	153	754	557	1,311	1,464	00	271	2	273	273	1,737
Bus. Law & Off. Adm.	71	184	709	893	964	00	15	00	15	15	979
Economics	00	1,616	1,161	2,777	2,777	00	394	2	396	396	3,173
H. R. I.	00	100	8	108	108	00	3	00	3	3	111
Management	00	149	888	1,037	1,037	00	489	4	493	493	1,530
Marketing & Trans.	33	00	970	970	1,003	00	184	8	192	192	1,195
Advertising	10	408	128	536	546	00	11	00	11	11	557
Audiology & Spch.	4	155	86	241	245	00	1	00	1	1	246
Communications	00	1,190	92	1,282	1,282	00	115	5	120	120	1,402
Journalism	00	155	132	287	287	00	9	1	10	10	297
TV & Radio	00	177	47	224	224	00	6	1	7	7	231
Theatre	00	115	80	195	195	00	1	00	1	1	196
Chemical Eng.	00	4	5	9	9	00	4	5	9	9	18
Civil & San. Eng.	00	74	53	127	127	00	7	1	8	8	135
Computer Sci.	00	819	264	1,083	1,083	00	8	3	11	11	1,094
Electrical Eng.	00	00	157	157	157	00	72	13	85	85	242
Mechanical Eng.	00	27	42	69	69	00	3	2	5	5	74
M. M. M.	00	432	160	592	592	00	35	00	35	35	627

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Department	Sub-program	UNDERGRADUATE				GRADUATE				TOTALS		
		Lower Level	Upper Level	Adjusted Total	Total	G-P	Masters	Doctoral	Adjusted Total	Total	Adjusted Total	Total
Family Ecology	00	59	270	329	329	00	28	4	32	32	361	361
Fam. & Child Sci.	00	330	497	827	827	00	20	1	21	21	848	848
Hum. Nutr. & Foods	00	380	28	408	408	00	3	00	3	3	411	411
Hum. Envir. & Des.	00	304	121	425	425	00	4	00	4	4	429	429
Human Development	00	00	00	00	00	1	00	00	00	1	1	1
Medicine (NM)	00	00	00	00	00	7	00	00	00	7	00	7
Psychiatry	00	00	00	00	00	18	00	00	00	18	00	18
Astronomy	00	345	17	362	362	00	00	00	00	00	362	362
Biochemistry	114	00	356	356	470	00	73	9	82	82	438	552
Biophysics	00	00	00	00	00	00	8	00	8	8	8	8
Bot. & Plant Path.	113	00	249	249	362	00	17	26	43	43	292	405
Chemistry	00	4,242	458	4,700	4,700	00	40	18	58	58	4,758	4,758
Entomology	15	00	446	446	461	00	20	20	40	20	466	481
Geology	00	460	181	641	641	00	14	4	18	18	659	659
Mathematics	594	4,898	525	5,423	6,017	00	43	2	45	45	5,468	6,062
Nursing	00	6	1	7	7	00	00	00	00	00	7	7
Physics	00	2,581	135	2,716	2,716	00	20	1	21	21	2,737	2,737
Statistics	00	510	765	1,275	1,275	00	77	1	78	78	1,353	1,353
Zoology	00	00	1,082	1,082	1,082	00	22	00	22	22	1,104	1,104
Anthropology	00	1,694	323	2,017	2,017	00	20	00	20	20	2,037	2,037
Criminal Justice	00	478	105	583	583	00	18	00	18	18	601	601
Geography	00	697	456	1,153	1,153	00	12	00	12	12	1,165	1,165
Labor & Ind. Rel.	00	00	00	00	00	00	52	2	54	54	54	54
Political Science	00	863	1,273	2,136	2,136	00	11	15	26	26	2,162	2,162
Psychology	00	4,152	2,250	6,402	6,402	00	127	44	171	171	6,573	6,573
Social Work	00	339	161	500	500	00	45	3	48	48	548	548
Sociology	00	1,176	1,422	2,598	2,598	00	69	65	134	134	2,732	2,732
U. P. L. A.	19	113	106	219	238	00	14	00	14	14	233	252
Amer. Tht. & Lang.	227	6,718	26	6,744	6,971	00	00	00	00	00	6,744	6,971
Humanities	00	5,681	11	5,692	5,692	00	00	00	00	00	5,692	5,692
Natural Science	00	5,167	35	5,202	5,202	00	00	00	00	00	5,202	5,202
Social Science	00	4,542	51	4,593	4,593	00	00	00	00	00	4,593	4,593
Anatomy	00	00	589	589	589	285	35	00	35	320	624	909
Lg. Anim. Sur. & Med.	00	00	00	00	00	226	00	00	00	226	00	226
Medical Tech.	00	32	6	38	38	00	00	00	00	00	38	38
Microbiology	44	287	330	617	661	105	13	1	14	119	631	780
Pathology	00	00	82	82	82	95	81	8	89	184	171	266
Pharmacology	00	00	97	97	97	113	00	00	00	113	97	210
Physiology	00	321	296	617	617	189	7	7	14	203	631	820
Sm. Anim. Sur. & Med.	00	00	00	00	00	427	4	00	4	431	4	431
Fam. & Comm. Med.	00	00	00	00	00	36	00	00	00	36	00	36
Medicine (OM)	00	00	00	00	00	74	00	00	00	74	00	74
Service Totals	3,452	62,749	25,188	87,937	91,389	1,576	2,859	299	3,158	4,734	91,095	96,123

Table 3. Enrollment by Course Level, Fall 1971

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Table 3. Enrollment by Course Level, Fall 1971

Department	Sub- program	U N D E R G R A D U A T E				G R A D U A T E				T O T A L S	
		Lower Level	Upper Level	Adjusted Total	Total	G-P	Masters	Doctoral	Adjusted Total	Total	Adjusted Total
Ag. Economics	179	00	00	00	179	00	54	30	84	84	84
Ag. Engineering	441	43	77	120	561	00	68	14	82	82	202
Animal Husbandry	50	234	15	249	299	00	8	5	13	13	262
Crop & Soil Sci.	349	272	64	336	685	00	36	23	59	59	395
Dairy	47	256	95	351	398	00	9	16	25	25	376
Fish. & Wildlife	00	00	227	227	227	00	46	15	61	61	288
Food Sci. & H.N.	18	156	135	291	309	00	25	51	76	76	385
Forestry	61	249	340	589	650	00	38	8	46	46	635
Horticulture	235	129	197	326	561	00	42	17	59	59	385
Packaging	00	79	206	285	285	00	19	00	19	19	304
Park & Rec. Res.	00	00	408	408	408	00	71	00	71	71	479
Poultry Science	7	00	15	15	22	00	4	8	12	12	34
Resource Devel.	38	00	399	399	437	00	174	8	182	182	581
Art	00	1,265	792	2,057	2,057	00	148	00	148	148	2,205
English	630	1,692	2,285	3,977	4,607	00	191	119	310	310	4,287
German & Russian	00	861	221	1,082	1,082	00	47	22	69	69	1,151
History	00	1,665	2,580	4,245	4,245	00	180	56	236	236	4,481
Linguistics	00	106	115	221	221	00	41	9	50	50	271
Music	00	3,351	911	4,262	4,262	00	170	33	203	203	4,465
Philosophy	00	729	1,041	1,770	1,770	00	57	12	69	69	1,839
Religion	00	555	275	830	830	00	4	00	4	4	834
Romance Lang.	00	1,610	928	2,538	2,538	00	83	23	106	106	2,644
Acct. & Finance	153	894	1,035	1,929	2,082	00	408	58	466	466	2,395
Bus. Law & Off. Adm.	71	251	983	1,234	1,305	00	15	00	15	15	1,320
Economics	00	1,634	1,577	3,211	3,211	00	518	51	569	569	3,780
H. R. I.	00	335	248	583	583	00	29	00	29	29	612
Management	00	149	1,024	1,173	1,173	00	650	28	678	678	1,851
Marketing & Trans.	33	00	1,163	1,163	1,196	00	362	58	420	420	1,583
Advertising	10	446	412	858	868	00	16	00	16	16	884
Audiology & Spch.	4	203	252	455	459	00	45	53	98	98	553
Communications	00	1,382	361	1,743	1,743	00	201	37	238	238	1,981
Journalism	00	335	365	700	700	00	44	1	45	45	745
TV & Radio	00	407	276	683	683	00	69	12	81	81	764
Theatre	00	219	220	439	439	00	28	17	45	45	484
Chemical Eng.	00	31	133	164	164	00	42	16	58	58	222
Civil & San. Eng.	00	117	242	359	359	00	56	23	79	79	438
Computer Sci.	00	831	619	1,450	1,450	00	40	25	65	65	1,515
Electrical Eng.	00	00	1,267	1,267	1,267	00	197	54	251	251	1,518
Mechanical Eng.	00	47	420	467	467	00	23	20	43	43	510
M. M. M.	00	447	207	654	654	00	84	19	103	103	757

Department	Sub-Program	U. S. R. A. U. S. A. U. S. A. U. S. A. U. S. A.		Total	G. P.	U. S. R. A. U. S. A. U. S. A. U. S. A. U. S. A.		Total	Adjusted Total	Total	Adjusted Total
		Lower Level	Upper Level			Lower Level	Upper Level				
Family Ecology	00	74	509	583	00	61	13	76	76	76	659
Fam. & Child Scl.	00	372	776	1,148	00	69	5	74	74	74	1,222
Hum. Nutr. & Foods	00	476	127	553	00	16	3	19	19	19	572
Hum. Envir. & Des.	00	1,146	711	1,857	00	54	00	54	54	54	1,911
Human Development	00	00	00	00	01	00	00	00	01	01	00
Medicine (HM)	00	00	00	00	7	00	00	00	7	7	00
				00	18	00	00	00	18	18	00

Table 3--Continued

Department	Sub-program	UNDERGRADUATE			GRADUATE			TOTALS	
		Lower Level	Upper Level	Adjusted Total	G-P	Masters	Doctoral	Adjusted Total	Total
Family Ecology	00	74	509	583	00	63	13	76	659
Fam. & Child Sci.	00	372	776	1,148	00	69	5	74	1,222
Hum. Nutr. & Foods	00	426	127	553	00	16	3	19	572
Hum. Envir. & Des.	00	1,146	711	1,857	00	54	00	54	1,911
Human Development	00	00	00	00	01	00	00	01	01
Medicine (HM)	00	00	00	00	7	00	00	7	07
Psychiatry	00	00	00	00	18	00	00	18	18
Astronomy	00	348	36	384	00	00	00	00	384
Biochemistry	114	00	450	564	00	162	120	282	732
Biophysics	00	00	00	00	00	25	8	33	33
Bot. & Plant Path.	113	00	282	282	00	61	83	144	426
Chemistry	00	4,316	615	4,931	00	144	243	387	5,318
Entomology	15	00	479	479	00	7	46	53	532
Geology	00	483	295	778	00	67	16	83	861
Mathematics	595	5,173	1,168	6,341	00	322	112	434	6,775
Nursing	00	89	187	276	00	00	00	00	276
Physics	00	2,600	265	2,865	00	125	77	202	3,067
Statistics	00	510	767	1,277	00	124	25	149	1,426
Zoology	00	00	1,483	1,483	00	89	40	129	1,612
Anthropology	00	1,788	429	2,217	00	69	25	94	2,311
Criminal Justice	00	766	1,118	1,884	00	135	00	135	2,019
Geography	00	757	603	1,360	00	100	37	137	1,497
Labor & Ind. Rel.	00	00	00	00	00	154	4	158	158
Political Science	00	1,020	1,604	2,624	00	31	54	85	2,709
Psychology	00	4,677	3,265	7,942	00	422	318	740	8,682
Social Work	00	434	729	1,163	00	453	4	457	1,620
Sociology	00	1,198	1,657	2,855	00	158	154	312	3,167
U. P. L. A.	19	383	430	813	00	136	00	136	949
Amer. Tht. & Lang.	227	6,718	26	6,744	00	00	00	00	6,744
Humanities	00	5,681	11	5,692	00	00	00	00	5,692
Natural Science	00	5,167	35	5,202	00	00	00	00	5,202
Social Science	00	4,542	51	4,593	00	00	00	00	4,593
Anatomy	00	00	590	590	287	45	3	335	925
Lg. Anim. Sur. & Med.	00	00	00	00	226	2	00	228	228
Medical Tech.	00	124	72	196	00	00	00	00	196
Microbiology	44	288	400	688	106	59	31	196	778
Pathology	00	00	82	82	96	103	15	118	200
Pharmacology	00	00	97	97	116	4	50	170	151
Physiology	00	322	320	642	197	23	53	76	718
Sm. Anim. Sur. & Med.	00	00	00	00	427	15	00	15	442
Fam. & Comm. Med.	00	00	00	00	36	00	00	00	36
Medicine (OM)	00	00	00	00	74	00	00	74	74
Enrollment Totals	3,453	70,382	41,799	112,181	1,591	7,579	2,480	10,059	122,240
				115,634				11,650	127,284

Table 4. Equations for Instructional Service Measures

Summary Measures	Department-Based Instructional Service Measures	University-Based Instructional Service Measures
unadjusted undergraduate	$DBIS_{UU} = \frac{100(\text{num. of service students in unadj. undergrad. courses})}{\text{dept. enroll. in unadj. undergrad. courses}}$	$UBIS_{UU} = \frac{100(\text{num. of service students in unadj. undergrad. courses})}{\text{total service enroll. in unadj. undergrad. courses (91,389)}}$
unadjusted graduate	$DBIS_{UG} = \frac{100(\text{num. of service students in unadj. grad. courses})}{\text{dept. enroll. in unadj. grad. courses}}$	$UBIS_{UG} = \frac{100(\text{num. of service students in unadj. grad. courses})}{\text{total service enroll. in unadj. grad. courses (4,734)}}$
unadjusted total	$DBIS_{UT} = \frac{100(\text{num. of service students in unadj. total courses})}{\text{dept. enroll. in unadj. total courses}}$	$UBIS_{UT} = \frac{100(\text{num. of service students in unadj. total courses})}{\text{total service enroll. in unadj. total courses (96,123)}}$
adjusted undergraduate	$DBIS_{AU} = \frac{100(\text{num. of service students in adj. undergrad. courses})}{\text{dept. enroll. in adj. undergrad. courses}}$	$UBIS_{AU} = \frac{100(\text{num. of service students in adj. undergrad. courses})}{\text{total service enroll. in adj. undergrad. courses (87,937)}}$
adjusted graduate	$DBIS_{AG} = \frac{100(\text{num. of service students in adj. grad. courses})}{\text{dept. enroll. in adj. grad. courses}}$	$UBIS_{AG} = \frac{100(\text{num. of service students in adj. grad. courses})}{\text{total service enroll. in adj. grad. courses (3,158)}}$
adjusted total	$DBIS_{AT} = \frac{100(\text{num. of service students in adj. total courses})}{\text{dept. enroll. in adj. total courses}}$	$UBIS_{AT} = \frac{100(\text{num. of service students in adj. total courses})}{\text{total service enroll. in adj. total courses (91,005)}}$

Table 5. Department

Department

Agricultural Econ.
 Agricultural Engin.
 Animal Husbandry
 Crop & Soil Scienc
 Dairy
 Fisheries & Wildl
 Food Sci. & Hum.
 Forestry
 Horticulture
 Packaging
 Park & Rec. Resou
 Poultry Science
 Resource Developm
 Art
 English
 German & Russian
 History
 Linguistics
 Music
 Philosophy
 Religion
 Romance Language
 Acct. & Finance
 Bus. Law & Offic
 Economics
 Hotel, Res. & Inst
 Management
 Marketing & Tran
 Advertising
 Audiology & Spee
 Communications
 Journalism
 TV & Radio
 Theatre
 Chemical Engineer
 Civil & Sanitary
 Computer Science
 Electrical Engin
 Mechanical Engin
 Metal., Mech. &
 Family Ecology
 Family & Child
 Human Nutr. & F
 Human Envir. &
 Human Developm
 Medicine
 Psychiatry

Table 5. Department-based Instructional Service Measures, Fall 1971

Department	Unadjusted			Adjusted		
	Undergraduate	Graduate	Total	Undergraduate	Graduate	Total
Agricultural Economics	100.0	4.8	69.6	0.0	4.8	4.8
Agricultural Engineering	94.8	52.4	89.4	75.8	52.4	66.3
Animal Husbandry	83.9	7.7	80.8	80.7	7.7	77.1
Crop & Soil Science	94.6	32.2	89.7	89.0	32.2	80.5
Dairy	92.5	4.0	87.2	91.5	4.0	85.6
Fisheries & Wildlife	64.8	4.9	52.1	64.8	4.9	52.1
Food Sci. & Hum. Nutr.	68.0	17.1	57.9	66.0	17.1	55.9
Forestry	46.2	39.1	45.7	40.6	39.1	40.5
Horticulture	83.6	11.9	76.8	71.8	11.9	62.6
Packaging	22.1	10.5	21.4	22.1	10.5	21.4
Park & Rec. Resources	49.5	47.9	49.3	49.5	47.9	49.3
Poultry Science	50.0	0.0	32.4	26.7	0.0	14.8
Resource Development	83.8	36.3	69.8	82.2	36.3	67.8
Art	44.0	4.7	41.4	44.0	4.7	41.4
English	76.2	22.9	72.8	72.4	22.9	68.8
German & Russian	85.5	4.3	80.6	85.5	4.3	80.6
History	86.1	15.3	82.3	86.1	15.3	82.3
Linguistics	89.6	20.0	76.8	89.6	20.0	76.8
Music	35.8	0.5	34.2	35.8	0.5	34.2
Philosophy	93.2	36.2	91.0	93.2	36.2	91.0
Religion	96.6	100.0	96.6	96.6	100.0	96.6
Romance Languages	80.9	6.6	77.9	80.9	6.6	77.9
Acct. & Finance Adm.	70.3	58.6	68.2	68.0	58.6	66.1
Bus. Law & Office Adm.	73.9	100.0	74.2	72.4	100.0	72.7
Economics	86.5	69.6	83.9	86.5	69.6	83.9
Hotel, Res. & Inst. Mgt.	18.5	10.3	18.1	18.5	10.3	18.1
Management	88.4	72.7	82.7	88.4	72.7	82.7
Marketing & Trans. Adm.	83.9	45.7	73.9	83.4	45.7	73.4
Advertising	62.9	68.8	63.0	62.5	68.8	62.5
Audiology & Speech Sci.	53.4	1.0	44.2	53.0	1.0	43.8
Communications	73.6	50.4	70.8	73.6	50.4	70.8
Journalism	41.0	22.2	39.9	41.0	22.2	39.9
TV & Radio	32.8	8.6	30.2	32.8	8.6	30.2
Theatre	44.4	2.2	40.5	44.4	2.2	40.5
Chemical Engineering	5.5	15.5	8.1	5.5	15.5	8.1
Civil & Sanitary Eng.	35.4	10.1	30.8	35.4	10.1	30.8
Computer Science	74.7	16.9	72.2	74.7	16.9	72.2
Electrical Engineering	12.4	33.9	15.9	12.4	33.9	15.9
Mechanical Engineering	14.8	11.6	14.5	14.8	11.6	14.5
Metal., Mech. & Mat.Sci.	90.5	34.0	82.8	90.5	34.0	82.8
Family Ecology	56.4	42.1	54.8	56.4	42.1	54.8
Family & Child Science	72.0	28.4	69.4	72.0	28.4	69.4
Human Nutr. & Foods	73.8	15.8	71.9	73.8	15.8	71.9
Human Envir. & Design	22.9	7.4	22.4	22.9	7.4	22.4
Human Development	0.0	100.0	100.0	0.0	0.0	0.0
Medicine	0.0	100.0	100.0	0.0	0.0	0.0
Psychiatry	0.0	100.0	100.0	0.0	0.0	0.0

Table 5--Continued

Department

Astronomy
 Biochemistry
 Biophysics
 Botany & Plant Path.
 Chemistry
 Entomology
 Geology
 Mathematics
 Nursing
 Physics
 Statistics
 Zoology
 Anthropology
 Criminal Justice
 Geography
 Labor & Indust. Rel.
 Political Science
 Psychology
 Social Work
 Sociology
 Urban Plan. & Land.
 Amer. Thought & Lang.
 Humanities
 Natural Science
 Social Science
 Anatomy
 Eq. Anim. Surg. & M.
 Medical Technology
 Microbiology
 Pathology
 Pharmacology
 Physiology
 Sm. Anim. Surg. & M.
 Family & Community
 Medicine (OM)

Table 5--Continued

Department	Unadjusted			Adjusted		
	Undergraduate	Graduate	Total	Undergraduate	Graduate	Total
Astronomy	94.3	0.0	94.3	94.3	0.0	94.3
Biochemistry	83.3	29.1	65.2	79.1	29.1	59.8
Biophysics	0.0	24.2	24.2	0.0	24.2	24.2
Botany & Plant Path.	91.6	29.9	75.1	88.3	29.9	68.5
Chemistry	95.3	15.0	89.5	95.3	15.0	89.5
Entomology	93.3	37.7	87.9	93.1	37.7	87.6
Geology	82.4	21.7	76.5	82.4	21.7	76.5
Mathematics	86.8	10.4	82.3	85.5	10.4	80.7
Nursing	2.5	0.0	2.5	2.5	0.0	2.5
Physics	94.8	10.4	89.2	94.8	10.4	89.2
Statistics	99.8	52.3	94.9	99.8	52.3	94.9
Zoology	73.0	17.1	68.5	73.0	17.1	68.5
Anthropology	91.0	21.3	88.1	91.0	21.3	88.1
Criminal Justice	30.9	13.3	29.8	30.9	13.3	29.8
Geography	84.8	8.8	77.8	84.8	8.8	77.8
Labor & Indust. Rel.	0.0	34.2	34.2	0.0	34.2	34.2
Political Science	81.4	30.6	79.8	81.4	30.6	79.8
Psychology	80.6	23.1	75.7	80.6	23.1	75.7
Social Work	43.0	10.5	33.8	43.0	10.5	33.8
Sociology	91.0	42.9	86.3	91.0	42.9	86.3
Urban Plan. & Land. Arch.	28.6	10.3	26.0	26.9	10.3	24.6
Amer. Thought & Lang.	100.0	0.0	100.0	100.0	0.0	100.0
Humanities	100.0	0.0	100.0	100.0	0.0	100.0
Natural Science	100.0	0.0	100.0	100.0	0.0	100.0
Social Science	100.0	0.0	100.0	100.0	0.0	100.0
Anatomy	99.8	95.5	98.3	99.8	72.9	97.8
Lg. Anim. Surg. & Med.	0.0	99.1	99.1	0.0	0.0	0.0
Medical Technology	19.4	0.0	19.4	19.4	0.0	19.4
Microbiology	90.3	60.7	84.1	89.7	15.6	81.1
Pathology	100.0	86.0	89.9	100.0	75.4	85.5
Pharmacology	100.0	66.5	78.7	100.0	0.0	64.2
Physiology	96.1	74.4	89.6	96.1	18.4	87.9
Sm. Anim. Surg. & Med.	0.0	97.5	97.5	0.0	26.7	26.7
Family & Community Med.	0.0	100.0	100.0	0.0	0.0	0.0
Medicine (OM)	0.0	100.0	100.0	0.0	0.0	0.0

Table 6. University-based Instructional Service Measures, Fall 1971

Department	Unadjusted			Adjusted		
	Undergraduate	Graduate	Total	Undergraduate	Graduate	Total
Agricultural Economics	.196	.084	.190	.000	.127	.004
Agricultural Engineering	.582	.908	.598	.103	1.362	.147
Animal Husbandry	.275	.021	.262	.229	.032	.222
Crop & Soil Science	.709	.401	.694	.340	.602	.349
Dairy	.403	.021	.384	.365	.032	.353
Fisheries & Wildlife	.161	.063	.156	.167	.095	.165
Food Sci. & Hum. Nutr.	.230	.275	.232	.218	.412	.225
Forestry	.328	.380	.331	.272	.570	.282
Horticulture	.513	.148	.495	.266	.222	.265
Packaging	.069	.042	.068	.072	.063	.071
Park & Rec. Resources	.221	.718	.246	.230	1.077	.259
Poultry Science	.012	.000	.011	.005	.000	.004
Resource Development	.400	1.394	.449	.373	2.090	.433
Art	.991	.148	.950	1.030	.222	1.002
English	3.840	1.500	3.724	3.274	2.248	3.238
German & Russian	1.012	.063	.965	1.052	.095	1.019
History	3.998	.760	3.839	4.155	1.140	4.051
Linguistics	.217	.211	.216	.225	.317	.228
Music	1.671	.021	1.590	1.736	.032	1.677
Philosophy	1.804	.528	1.742	1.875	.792	1.838
Religion	.878	.085	.839	.912	.127	.885
Romance Languages	2.246	.148	2.143	2.335	.222	2.261
Acct. & Finance Adm.	1.602	5.767	1.807	1.491	8.645	1.739
Bus. Law & Office Adm.	1.055	.317	1.018	1.015	.475	.997
Economics	3.039	8.365	3.301	3.158	12.540	3.483
Hotel, Res. & Inst. Mgt.	.118	.063	.115	.123	.095	.122
Management	1.135	10.414	1.592	1.179	15.611	1.680
Marketing & Trans. Adm.	1.098	4.056	1.243	1.103	6.080	1.276
Advertising	.597	.232	.579	.610	.348	.600
Audiology & Speech Sci.	.268	.021	.256	.274	.032	.266
Communications	1.403	2.535	1.459	1.458	3.800	1.539
Journalism	.314	.211	.309	.326	.317	.326
TV & Radio	.245	.148	.240	.255	.222	.254
Theatre	.213	.021	.204	.222	.032	.215
Chemical Engineering	.010	.190	.019	.010	.285	.020
Civil & Sanitary Eng.	.139	.169	.140	.144	.253	.148
Computer Science	1.185	.232	1.138	1.232	.348	1.201
Electrical Engineering	.172	1.796	.252	.179	2.692	.266
Mechanical Engineering	.076	.106	.077	.078	.158	.081
Metal., Mech. & Mat.Sci.	.648	.739	.652	.673	1.108	.688
Family Ecology	.360	.676	.376	.374	1.013	.396
Family & Child Science	.905	.444	.882	.940	.665	.931
Human Nutr. & Foods	.446	.063	.428	.464	.095	.451
Human Envir. & Design	.465	.084	.446	.483	.127	.471
Human Development	.000	.021	.001	.000	.000	.000
Medicine (HM)	.000	.148	.007	.000	.000	.000
Psychiatry	.000	.380	.019	.000	.000	.000

Table 6--Continued

Department	Unadjusted			Adjusted		
	Undergraduate	Graduate	Total	Undergraduate	Graduate	Total
Astronomy	.396	.000	.377	.412	.000	.397
Biochemistry	.514	1.732	.574	.405	2.597	.481
Biophysics	.000	.169	.008	.000	.253	.009
Botany & Plant Path.	.396	.908	.421	.283	1.362	.321
Chemistry	5.143	1.225	4.950	5.345	1.834	5.223
Entomology	.504	.422	.500	.507	.633	.512
Geology	.701	.380	.686	.729	.570	.723
Mathematics	6.584	.951	6.307	6.167	1.425	6.003
Nursing	.008	.000	.007	.008	.000	.008
Physics	2.972	.444	2.847	3.089	.665	3.005
Statistics	1.395	1.648	1.408	1.450	2.470	1.485
Zoology	1.184	.465	1.149	1.230	.697	1.212
Anthropology	2.207	.422	2.119	2.294	.633	2.236
Criminal Justice	.638	.380	.625	.663	.570	.660
Geography	1.262	.253	1.212	1.311	.380	1.279
Labor & Indust. Rel.	.000	1.141	.056	.000	1.710	.059
Political Science	2.337	.549	2.249	2.429	.823	2.373
Psychology	7.005	3.612	6.838	7.280	5.415	7.216
Social Work	.547	1.104	.570	.569	1.520	.602
Sociology	2.843	2.831	2.842	2.954	4.243	2.999
Urban Plan. & Land. Arch.	.260	.296	.262	.249	.443	.256
Amer. Thought & Lang.	7.628	.000	7.252	7.669	.000	7.403
Humanities	6.228	.000	5.922	6.473	.000	6.248
Natural Science	5.692	.000	5.412	5.916	.000	5.711
Social Science	5.026	.000	4.778	5.223	.000	5.042
Anatomy	.644	6.760	.946	.670	1.108	.685
Lg. Anim. Surg. & Med.	.000	4.774	.235	.000	.000	.000
Medical Technology	.042	.000	.040	.043	.000	.042
Microbiology	.723	2.514	.811	.702	.443	.693
Pathology	.090	3.887	.277	.093	2.818	.188
Pharmacology	.106	2.387	.218	.110	.000	.106
Physiology	.675	4.288	.853	.702	.443	.693
Sm. Anim. Surg. & Med.	.000	9.104	.448	.000	.127	.004
Family & Community Med.	.000	.760	.037	.000	.000	.000
Medicine (OM)	.000	1.563	.077	.000	.000	.000

1

A review of the data in Tables 5 and 6 revealed that departments at both extremes appeared on the department-based instructional service measures while only non-service departments were identified on the university-based instructional service measures. In addition, the non-service departments were identical on both sets of measures.¹ These extreme departments (non-service and total service) are listed in Table 7.

In general, these departments are classified as extreme because they did not have any undergraduate or graduate courses. However, there were two exceptions to the above for both the department-based and the university-based instructional service measures. For both the unadjusted and adjusted data, Poultry Science was classified as a graduate, non-service department; Pharmacology was classified as a graduate, non-service department on only the adjusted measure. Yet, both these departments offered graduate courses and had graduate-level majors. Thus, these deviations were engendered by student course selection for Fall 1971 and could not have been predicted from such departmental characteristics as number of majors and course offerings.

Two additional points should be made about the data in Table 7. When the total instructional efforts of the department was considered (unadjusted total instructional service measures), every department in the study provided instruction to service students (non-majors) in either

¹The definition of the university-based measures required that the sum of the departmental values for each measure equal 100. Thus, no total service departments existed on the university-based measures.

Table 7. Extreme Departments--Unadjusted and Adjusted Department-based Instructional Service Measures

No Undergraduate Service Load	No Graduate Service Load	No Total Service Load	Total Service Undergraduate	Total Service Graduate	Total Service All Courses
<u>Unadjusted Department-Based Instructional Service Measures</u>					
Human Development Medicine (HM) Psychiatry Biophysics Lab. & Ind. Rel. Lg. Anim. Surg. Sm. Anim. Surg. Fam. & Comm. Med. Medicine (OM)	Poultry Science Astronomy Nursing Amer. Tht. & Lang. Humanities Natural Science Social Science Medical Tech.	N=0 (0.0%)	Ag. Economics Amer. Tht. & Lang. Humanities Natural Science Social Science Pathology Pharmacology	Religion Bus. Law & Off. Ad. Human Development Medicine (HM) Psychiatry Fam. & Comm. Med. Medicine (OM)	Medicine (HM) Psychiatry Human Development Amer. Tht. & Lang. Natural Science Humanities Social Science Fam. & Comm. Med. Medicine (OM)
N=9 (11.0%)	N=8 (9.8%)	N=0 (0.0%)	N=7 (8.5%)	N=7 (8.5%)	N=9 (11.0%)
<u>Adjusted Department-Based Instructional Service Measures</u>					
Ag. Economics Human Development Medicine (HM) Psychiatry Biophysics Lab. & Ind. Rel. Lg. Anim. Surg. Sm. Anim. Surg. Fam. & Comm. Med. Medicine (OM)	Poultry Science Human Development Medicine (HM) Psychiatry Astronomy Nursing Amer. Tht. & Lang. Humanities Natural Science Social Science Lg. Anim. Surg. Medical Tech. Pharmacology Fam. & Comm. Med. Medicine (OM)	* Human Development Medicine (HM) Psychiatry Lg. Anim. Surg. Fam. & Comm. Med. Medicine (OM)	Amer. Tht. & Lang. Humanities Natural Science Social Science Pathology Pharmacology	Religion Bus. Law & Off. Ad.	Amer. Tht. & Lang. Humanities Natural Science Social Science
N=10 (12.2%)	N=15 (18.3%)	N=6 (7.3%)	N=6 (7.3%)	N=2 (2.4%)	N=4 (4.8%)

undergraduate or graduate courses. Thus, the degree of both undergraduate and graduate instructional service, not the presence or absence of instructional service, should be used to differentiate the role of instructional service in academic departments. Second, a comparison of the list of unadjusted and adjusted extreme departments revealed that some departments (Psychiatry, Human Development, etc.) shifted from graduate, total service departments (unadjusted) to graduate, non-service departments (adjusted). This exchange occurred because all of the courses offered in these departments were graduate-professional courses, and enrollments in these courses were not part of the adjusted data base. Similarly, Agricultural Economics was classified as an undergraduate, total service department (unadjusted) and an undergraduate, non-service department. In this case, the deletion of enrollments of sub-program and short courses to form the adjusted data base eliminated all undergraduate enrollment in Agricultural Economics. This, in turn, changed the value of the undergraduate instructional service measure from 100.0 to 0.0.

Descriptive Data--The department-based instructional service measures ranged from 0.0 (non-service) to 100.0 (total service) for all measures except the unadjusted total which ranged from 2.50 to 100.0. The range, mean, median, and standard deviations of these six measures are presented in Table 8. These data in Table 8 indicated that means and medians for the undergraduate and total instructional service measures were substantially higher than the means and medians for the graduate service measures. Thus, generally, the level of graduate service instruction is less than the level of undergraduate service

Table 8. Descriptive Data--Department-based Instructional Service Measures

Summary Measures	Range	Median	Mean	Standard Deviation
unadjusted undergraduate	0.0 - 100.0	75.45	62.73	34.47
unadjusted graduate	0.0 - 100.0	21.95	33.26	32.12
unadjusted total	2.5 - 100.0	76.10	67.64	27.46
adjusted undergraduate	0.0 - 100.0	73.30	60.37	34.68
adjusted graduate	0.0 - 100.0	15.55	22.65	23.57
adjusted total	0.0 - 100.0	68.15	57.13	31.11

instruction in academic departments. However, the obvious exceptions were those departments which had no undergraduate service or instructional load (i.e., Labor and Industrial Relations and Psychiatry). The distributions of the undergraduate and total department-based instructional service measures were negatively skewed (median > mean) for both unadjusted and adjusted data while the distributions of the graduate measures were positively skewed (median < mean). Finally, when the unadjusted and adjusted department-based measures for each instructional level were compared, the difference scores indicated that the means of the unadjusted and adjusted, graduate and total measures were meaningfully different (10.61 and 10.51 respectively).

Parallel data for the university-based instructional service measures are presented in Table 9. While both the upper and lower limits of the ranges of the department-based measures with relatively constant (0.0 and 100.0), only the lower limits of the ranges of the university-based measures exhibited this stability. All measures except the

Table 9. Descriptive Data--University-based Instructional Service Measures

Summary Measures	Range	Medium	Mean	Standard Deviation
unadjusted undergraduate	0 - 7.628	.514	1.220	1.774
unadjusted graduate	0 - 10.414	.380	1.221	2.103
unadjusted total	.001 - 7.252	.535	1.219	1.694
adjusted undergraduate	0 - 7.669	.438	1.220	1.808
adjusted graduate	0 - 15.611	.364	1.220	2.527
adjusted total	0 - 7.403	.461	1.220	1.763

unadjusted total (.001) had lower limits of 0.0. The upper bounds of the range varied from 7.403 (adjusted total) to 15.611 (adjusted graduate). Also, the upper limits of the graduate measures were larger than their undergraduate and total counterparts. The data in Table 9 indicated that the means of the six university-based instructional service measures were identical when rounded to the nearest hundredth. Further, the medians, though exhibiting more variance than the means across measures, were less than the means which indicated that the distributions of all of the university-based instructional service measures were positively skewed.

Correlational Data²--Three of the ten sets of research questions outlined in Chapter IV focused on the relationships among the twelve

²Throughout the discussions in Chapter V and VI "relationship" implies the relationship of the rank order of the variables as computed by Spearman's rho.

instructional service measures defined in this study. Spearman rank correlation coefficients were computed based on the ranking of the departments on each instructional service measure. A composite of the rankings for each department and the rankings for each measure are shown in Appendix C, Tables 24-37. The correlation coefficients relevant to all three questions are presented in Table 10.

The first set of research questions dealt with the relationships among the undergraduate, graduate, and total instructional service measures. For the unadjusted department-based instructional service measures, the relationship between the undergraduate and graduate instructional service measures was extremely weak³ (-.07) while the relationships between the undergraduate and total (.53) and the graduate and total measures were statistically significant but moderate and weak respectively. A similar pattern emerged for the adjusted department-based measures for which the relationship between the undergraduate and graduate measures was very weak (.26) while the relationships between the undergraduate and total (.96) and the graduate and total (.32) measures were statistically significant and very strong and weak respectively. Thus, for the adjusted department-based instructional service measures, the null hypothesis of mutual independence was not rejected for the relationship between undergraduate and graduate measures and

³Qualitative descriptions of the correlation coefficients (weak, moderate, strong) were based on guidelines presented by Marascuilo. (L. Marascuilo, Statistical Methods for Behavioral Science Research (New York: McGraw-Hill Book Company, 1971), p. 433.)

Table 10. Spearman Rank Correlations Among Instructional Service Measures

	DBIS-UU	DBIS-UG	DBIS-UT	DBIS-AU	DBIS-AG	DBIS-AT	UBIS-UU	UBIS-UG	UBIS-UT	UBIS-AU	UBIS-AG	UBIS-AT
DBIS-UU	1.00											
DBIS-UG	-.07	1.00										
DBIS-UT	.53*	.37*	1.00									
DBIS-AU	.93*	-.03	.54*	1.00								
DBIS-AG	.23	.57*	-.05	.26	1.00							
DBIS-AT	.88*	-.05	.55*	.96*	.32*	1.00						
UBIS-UU	.64*	-.16	.30*	.70*	.25	.77*	1.00					
UBIS-UG	.11	.72*	.21	.15	.63*	.14	.16	1.00				
UBIS-UT	.63*	-.06	.38*	.69*	.30*	.78*	.98*	.28*	1.00			
UBIS-AU	.59*	-.18	.26	.69*	.23	.77*	.98*	.14	.96*	1.00		
UBIS-AG	.25	.38*	-.10	.28	.82*	.32*	.43*	.75*	.46*	.41*	1.00	
UBIS-AT	.59*	-.16	.25	.69*	.27	.79*	.98*	.18	.97*	1.00*	.46*	1.00

* $p < .01$

was rejected for the relationship between undergraduate and total and graduate and total measures. Parallel results were found for the unadjusted university-based instructional service measures. However, for the adjusted university-based instructional service measures, the relationship between the undergraduate and the graduate measures (.41) was weak but statistically significant.

The second set of research questions focused on the relationships between department-based and university-based instructional service measures. The Spearman rank correlation coefficients for these relationships are also found in Table 10. In this analysis, the relationships between each department-based summary measure and its university-based counterpart were of interest. The null hypothesis of mutual independence was rejected for all six summary measures. However, the strength of the relationships varied from .38 (unadjusted total) to .82 (adjusted graduate).

Finally, the third set of research questions were developed to assess the relationship between the unadjusted and adjusted instructional service measures at each level (undergraduate, graduate and total). An analysis of these six correlation coefficients revealed that on the basis of these Spearman rho's the null hypothesis of mutual independence for each pair of unadjusted and adjusted measures was rejected. In addition, the strengths of the relationships for the university-based measures (.98, undergraduate; .75, graduate; .97, total) were greater than those for the department-based measures (.93, .57, and .55 respectively).

Summary--The analyses of the data on instructional service revealed that significant relationships existed between 1) undergraduate and total instructional service measures, 2) undergraduate and graduate adjusted, university-based measures, 3) department-based and university-based instructional service measures, and 4) adjusted and unadjusted instructional service measures. Only the relationships between the undergraduate and graduate unadjusted department-based, adjusted department-based, and unadjusted university-based instructional service measures were not significant.

Relationships Between Instructional Service Measures and Descriptive Data

Five of the areas of inquiry delineated in Chapter IV focused on the relationships of the twelve instructional service measures with other descriptive data about the academic departments. These descriptive data included funding, faculty rank distributions, graduate assistants, prestige of graduate programs and level of instructional service students. The relationships with funding, faculty rank distributions, graduate assistants and average salary, were assessed by Spearman rank correlations based on the rankings on the instructional service measures, Appendix B, Tables 24-37 and the rankings on the descriptor variables, Appendix C, Tables 38-42. The relationships with prestige and level of instructional service were measured through a chi-square test for independence. A discussion of the results of each type of analysis is presented in this section of Chapter V.

Chi-square Tests of Independence--Four chi-square tests were used to assess the relationship between the level of instructional service students in undergraduate courses and the level of undergraduate instructional service based on unadjusted and adjusted, department-based and university-based instructional service measures. Departments were first classified into predominately lower division or predominately upper division instruction service on the basis of the percentage distributions of students by level presented in Appendix C, Tables 43-44. The departments which provided instructional service in undergraduate courses to primarily lower division undergraduate students are listed in Table 11. The departments were then classified into low, medium, and high instructional service departments. The classification procedure and its results are discussed fully in a subsequent section of this chapter. The observed and expected cell frequencies and the results of the analyses of the contingency tables for each test are presented in Table 12. A review of the results of these four chi-square tests for independence revealed that the level of department-based instructional service in undergraduate courses was independent of the predominate level of instructional service students in undergraduate courses. The values of chi-square and phi were 4.29 and .24 for the unadjusted data and 2.69 and .18 for the adjusted data. Conversely, the computed values of chi-square for the university-based measures were significant at the .05 level. Therefore, the null hypotheses were rejected and significant relationships existed between the unadjusted and adjusted university-based instructional service measures and the level of instructional service students in undergraduate courses.

Table 11. Departments with Predominately Lower Division Instructional Service Students in Undergraduate Courses

<u>Based on Unadjusted Data</u>	<u>Based on Adjusted Data</u>
1. Agricultural Economics	1. Animal Husbandry
2. Agricultural Engineering	2. Dairy
3. Animal Husbandry	3. Poultry Science
4. Crop and Soil Science	4. German and Russian
5. Dairy	5. Music
6. Horticulture	6. Romance Languages
7. Poultry Science	7. Communications
8. German and Russian	8. Human Environment and Design
9. Music	9. Chemistry
10. Romance Languages	10. Mathematics
11. Communications	11. Physics
12. Human Environment and Design	12. Criminal Justice
13. Chemistry	13. Psychology
14. Mathematics	14. American Thought and Language
15. Physics	15. Humanities
16. Criminal Justice	16. Natural Science
17. Psychology	17. Social Science
18. American Thought and Language	18. Medical Technology
19. Humanities	
20. Natural Science	
21. Social Science	
22. Medical Technology	

Table 12. Chi-square Tests of Independence--Level of Instructional Service Students in Undergraduate Courses

Department-Based--Unadjusted Undergraduate			
	Low	Medium	High
Lower Division	4 (7.24)	7 (7.51)	11 (7.24)
Upper Division	23 (19.76)	21 (20.49)	16 (19.76)
$\chi^2 = 4.69$ $\hat{\phi} = .24$			
Department-Based--Adjusted Undergraduate			
	Low	Medium	High
Lower Division	5 (5.93)	4 (5.93)	9 (6.15)
Upper Division	22 (21.07)	23 (21.07)	19 (21.85)
$\chi^2 = 2.69$ $\hat{\phi} = .18$			
University-Based--Unadjusted Undergraduate			
	Low	Medium	High
Lower Division	3 (7.24)	7 (7.51)	12 (7.24)
Upper Division	24 (19.76)	21 (20.49)	15 (19.76)
$\chi^2 = 7.71^*$ $\hat{\phi} = .31$			
University-Based--Adjusted Undergraduate			
	Low	Medium	High
Lower Division	3 (5.93)	3 (6.14)	12 (5.93)
Upper Division	24 (21.07)	25 (21.85)	15 (21.07)
$\chi^2 = 11.89^*$ $\hat{\phi} = .38$			

*Significant; alpha = .05

The strengths of these relationships were .31 for the unadjusted data and .38 for the adjusted data. Finally, an inspection of the contingency tables indicated that departments that served predominately lower division students in undergraduate courses tended to have high university-based instructional measures.

A second set of four chi-square tests for independence was used to assess the relationship between the prestige of graduate programs and the level of instructional service in graduate courses. The reports on the prestige of graduate education by Cartter (1966) and Roose and Andersen (1970) published by the American Council on Education were used to identify departments with prestige graduate programs. Both reports rated departments on the quality of their faculty and the quality of their graduate program. A composite of those two ratings was used to identify the "ranked" departments listed in Table 13. Six departments appeared in the Roose-Andersen report which were not rated in the Cartter report. These departments which are designated with asterisks in Table 13 were included in the analyses as rated departments. The categories of graduate instructional service were based on the rankings of departments on each measure and are discussed in a subsequent section. The observed and expected frequencies and the results of the chi-square tests on each contingency table are presented in Table 14. The null hypothesis that the level of graduate instructional service and the prestige rating of graduate education are statistically independent was rejected for all four measures of graduate instructional service. The strengths of these relationships as described by the phi

Table 13. Departments with Prestige Graduate Faculty/Programs

*Anthropology	History
*Biochemistry ^	Mathematics
Botany	Mechanical Engineering
*Chemical Engineering ^	Microbiology
Chemistry	*Music ^
Civil and Sanitary Engineering	Philosophy
Economics	Physics
Electrical Engineering ^	Physiology
English	Political Science
Entomology	Psychology
Geography x	*Romance Languages ^
Geology	Sociology
*German and Russian x	Zoology

*Rated by Roose and Andersen (1970) but not by Cartter (1966).
 N = 26 (31.7%)

coefficient were .31, unadjusted department-based; .38, adjusted department-based; .27, unadjusted university-based, and .35 adjusted university-based. A comparison of the observed and expected values in each contingency table disclosed that for the department-based graduate instructional service measures the ranked departments tended to have medium unadjusted and adjusted measures. However, for the university-based graduate instructional service measures, the rank departments were primarily distributed in the medium and high categories for the unadjusted and adjusted measures.

Correlational Data--As previously noted, Spearman rank correlation coefficients were used to measure the strengths of the relationships between the twelve instructional service measures and descriptive data such as funding, faculty rank distributions, graduate assistants and

Table 14. Chi-square Tests of Independence Prestige of Graduate Faculty/Programs

Department-Based--Unadjusted Graduate				
	Low	Medium	High	
Ranked	7 (8.88)	14 (8.56)	5 (8.56)	
Unranked	21 (19.12)	13 (18.44)	22 (18.44)	
$\chi^2 = 7.81^*$ $\phi = .31$				
Department-Based--Adjusted Graduate				
	Low	Medium	High	
Ranked	3 (8.56)	15 (8.88)	8 (8.56)	
Unranked	24 (18.44)	13 (19.12)	19 (18.44)	
$\chi^2 = 11.53^*$ $\phi = .38$				
University-Based--Unadjusted Graduate				
	Low	Medium	High	
Ranked	4 (8.88)	10 (8.24)	12 (8.88)	
Unranked	24 (19.12)	16 (17.76)	16 (19.12)	
$\chi^2 = 6.09^*$ $\phi = .27$				
University-Based--Adjusted Graduate				
	Low	Medium	High	
Ranked	2 (7.93)	11 (9.51)	13 (8.56)	
Unranked	23 (17.07)	19 (20.49)	14 (18.44)	
$\chi^2 = 10.20$ $\phi = .35$				

*Significant; alpha = .05

average salary. The correlation coefficients are presented in Table 15. This array is a table of correlations, not a correlation matrix, because only the correlations of the descriptor variables with the twelve instructional service measures are displayed.

One of the sets of relationships under study was the relationships between the instructional service measures and funding. Ten variables were identified which represented three aspects of funding in each department. Five variables (total, salary, labor, supplies and services and equipment) described the general fund expenditures for the 1971-72 academic year; four variables (total, salary, equipment, and other) described the research grant and contract expenditures for 1971-72, and one variable (average salary) described the 10-month equated average salary for each department. The data in Table 15 indicated that significant but weak relationships existed between general fund total and salary expenditures and the unadjusted and adjusted, undergraduate and total department-based instructional service measures. However, the relationships between these general fund variables and the comparable university-based instructional service measures were strong and statistically significant. Three other significant relationships were found in the general fund data: general fund labor and unadjusted total department-based measure, general fund supplies and services and unadjusted total department-based measure, and general fund supplies and services and unadjusted university-based measure. While no significant relationships occurred between the department-based instructional service measures and the four research grant and contract variables,

Table 15. Spearman Rank Correlations Between Instructional Service Measures and Descriptive Data

	DBIS-UU	DBIS-UG	DBIS-UT	DBIS-AU	DBIS-AG	DBIS-AT	UBIS-UU	UBIS-UG	UBIS-UT	UBIS-AJ	UBIS-AG	UBIS-UT
GF-TOTAL	.36*	-.04	.31*	.40*	.06	.44*	.66*	.35*	.70*	.64*	.38*	.65*
GF-SALARY	.32*	-.03	.29*	.37*	.07	.43*	.66*	.35*	.71*	.64*	.38*	.66*
GF-LABOR	.27	.01	.28*	.25	-.08	.21	.11	.15	.14	.07	.03	.07
GF-SUP. & SERV.	.23	.09	.30*	.21	-.08	.17	.20	.29*	.22	.15	.18	.16
GF-EQUIP.	-.03	.11	.04	.01	-.11	-.07	-.12	.11	-.14	-.10	-.01	-.12
RG-TOTAL	.15	.16	.09	.06	.07	.01	-.05	.29*	-.05	-.10	.23	-.09
RG-SALARY	.14	.20	.10	.04	.11	-.00	-.06	.31*	-.06	-.11	.25	-.10
RG-EQUIP.	.06	.25	.19	-.00	-.00	-.06	-.25	.21	-.20	-.30*	.00	-.28
RG-OTHER	.17	.16	.10	.08	.08	.04	-.05	.29*	-.05	-.10	.23	-.09
FI-NUM.	.47*	-.14	.28*	.39*	.03	.41*	.59*	.19	.60*	.52*	.30*	.54*
FI-FTE	.37*	-.14	.19	.43*	.10	.48*	.72*	.28*	.75*	.71*	.39*	.73*
FI-% DIST.	.13	.11	-.03	.06	.24	.05	.05	.24	.03	-.00	.34*	.02
GA-NUM.	.27	-.04	-.10	.21	.31*	.25	.47*	.35*	.43*	.41*	.60*	.43*
GA-FTE	.16	.03	-.12	.26	.36*	.30*	.56*	.44*	.55*	.57*	.66*	.59*
AVG. SAL.	-.13	.42*	.09	-.11	.16	-.13	-.09	.39*	-.08	-.09	.30*	-.08

*Significant; alpha < .01

four significant, but weak, relationships were evidenced between the university-based instructional service measures and these four funding variables. These relationships were between the following pairs of variables: unadjusted graduate and total; unadjusted graduate and salary; unadjusted graduate and other; and adjusted undergraduate and equipment. Finally, only three significant relationships--unadjusted and adjusted graduate university-based instructional service measures and unadjusted graduate department-based measure--with average salary were present in the data. Interestingly, most of the non-significant relationships with average salary were negative.

The second set of relationships which was analyzed in this study included the twelve instructional service measures and indicators of the faculty distribution by ranks in each department. These relationships were of interest because, theoretically, the type of instructional load in academic departments should affect staffing. Three faculty rank indices--one based on faculty headcount, one based on full-time equivalent faculty (FTE), and one based on the percentage distribution of faculty over ranks--were constructed by weighting each rank (4-professor, 3-associate professor, 2-assistant professor, and 1-instructor) and summing across ranks. These indices and ranking of the departments on each are displayed in Appendix C, Table 40. The evidence in Table 15 suggested that both the headcount and FTE faculty indices were significantly related to eight of the twelve instructional service measures--department-based unadjusted and adjusted undergraduate and adjusted total; university-based unadjusted and adjusted

undergraduate and total and adjusted graduate. In addition, the headcount index is significantly related to the unadjusted total department-based measure while the FTE index is significantly related to the unadjusted graduate university-based measure. On the other hand, the faculty rank index based on the percentage distribution of faculty over ranks was significantly, but weakly, related to only one instructional service measure--the adjusted graduate university-based measure.

The last set of relationships between the twelve instructional service measures and the descriptor variables focused on the number (headcount and FTE) of graduate assistants employed in academic departments. Both measures of graduate assistant employment were significantly related to all six university-based instructional service measures and to the adjusted graduate department-based measure. In addition, the FTE measure had a weak, but significant relationship with the adjusted total department-based measure.

Summary--From the results of the chi-square tests for independence, three points can be made. First, departments that served predominately lower division students tended to have high adjusted and unadjusted undergraduate university-based instructional service measures. Second, departments with rated graduate programs/faculty tended to be classified as medium unadjusted and adjusted graduate department-based instructional service measures. Third, for the university-based graduate instructional service measures, the rated departments were primarily distributed in the medium and high categories for the unadjusted and adjusted measures.

Of the one hundred and eighty correlations under consideration in this part of the analysis, sixty-four (35.6%) were statistically

significant. These significant relationships were identified in the preceding discussion. However, of these sixty-four significant relationships, only twenty-two (12.2%) were moderate or strong (greater than .50). Thus, approximately thirty-six percent of the relationships studied were significant and only twelve percent were moderate or strong. These twenty-two moderate to strong relationships are summarized in Table 16. Interestingly, no department-based instructional service measures were strongly related to any of the descriptor variables, and no variables representing research grant and contract expenditures were strongly related to any of the instructional service measures. In addition, the strong correlations between the unadjusted undergraduate and unadjusted total and between the adjusted undergraduate and adjusted total university-based instructional service measures were reflected in Table 16 since these pairs of measures had similar relationships with the descriptor variables. Finally, the adjusted graduate university-based instructional service measure appeared only twice (graduate assistant-numbers and FTE) in Table 16, while the unadjusted graduate measure was not represented.

Discriminatory Variables

The final purpose of this study was to classify departments on the basis of the instructional service measures and to determine which descriptor variables discriminated among the categories of instructional service. A multiple discriminant analysis was conducted on the four undergraduate measures and the four graduate instructional service

Table 16. Descriptor Variables with Moderate and Strong Relationships to Instructional Service Measures

<u>Variable</u>		<u>Instructional Service Measure</u>	<u>Rho</u>
1	General Fund Total	UBIS - unadjusted undergraduate	.66
2	"	UBIS - unadjusted total	.70
3	"	UBIS - adjusted undergraduate	.64
4	"	UBIS - adjusted total	.65
5	General Fund Salary	UBIS - unadjusted undergraduate	.66
6	"	UBIS - unadjusted total	.71
7	"	UBIS - adjusted undergraduate	.64
8	"	UBIS - adjusted total	.66
9	Faculty Index - Number	UBIS - unadjusted undergraduate	.59
10	"	UBIS - unadjusted total	.60
11	"	UBIS - adjusted undergraduate	.52
12	"	UBIS - adjusted total	.54
13	Faculty Index - FTE	UBIS - unadjusted undergraduate	.72
14	"	UBIS - unadjusted total	.75
15	"	UBIS - adjusted undergraduate	.71
16	"	UBIS - adjusted total	.73
17	Graduate Asst. - Number	UBIS - adjusted graduate	.60
18	Graduate Asst. - FTE	UBIS - unadjusted undergraduate	.56
19	"	UBIS - unadjusted total	.55
20	"	UBIS - adjusted undergraduate	.57
21	"	UBIS - adjusted graduate	.66
22	"	UBIS - adjusted total	.59

measures defined in this study. The input variables for these analyses were factor scores derived by using a principal-axes factor analysis with a varimax rotation. The results of the classification, factor analytic, and discriminatory techniques are discussed in this part of Chapter V.

Classification Schema--Using the rankings of departments on all undergraduate and graduate instructional service measures which are displayed in Appendix C, Tables 26-27, 29-30, 32-33, and 35-36, departments with ranks of 1-27 were classified as low, 28-55 as medium, and 56-82 as high. Thus, each category represented approximately one-third of the departments in the study. The stratification was based on ranking because the numerous tied ranks and the skewness of the distributions rendered the standard deviation approach inutile. In addition, approximately equal cell sizes were advantageous in the multiple discriminant analyses conducted on each undergraduate and graduate instructional service measure. The largest deviations from the one-third approximations occurred for the adjusted graduate university-based measure which had cell frequencies of twenty-five for the low category and thirty for the medium category. While each instructional service measure was analyzed separately, the departments in each category are presented as two-dimensional (undergraduate-graduate) arrays. The two arrays representing the unadjusted and adjusted department-based instructional measures are displayed in Table 17, and the two arrays representing the unadjusted and adjusted university-based instructional service measures are displayed in Table 18. Each dimension of these four arrays was used

Table 17. Categories of Department-based Instructional Service Departments

	U N D E R G R A D			A D V A N C E D			
	GRAD LOW	GRAD MED	GRAD HIGH	GRAD LOW	GRAD MED	GRAD HIGH	
UNDERGRAD	Art Civil & Sanitary Eng. ² Hotel, Res. & Inst. Mgt. Hum. Envir. & Design ¹ Medical Technology ¹ Music ¹ ² Nursing Packaging Social Work Theatre TV and Radio Urban Plan. & Land Arch.	Biophysics Chemical Engineering ² Criminal Justice ¹ Electrical Engineering ² Journalism Labor & Indust. Rel. ² Mechanical Engineering ²	Family & Comm. Med. Forestry Human Development Large Animal Surgery Medicine (RM) Medicine (OM) Psychiatry Small Animal Surgery	Agr. Economics Family & Comm. Med. Human Development Hum. Envir. & Design ¹ Large Animal Surgery Medical Technology ¹ Medicine (RM) Medicine (OM) Music ¹ ² Nursing Poultry Science ¹ Psychiatry TV and Radio	Biophysics Chemical Engineering ² Civil & Sanitary Eng. ² Criminal Justice ¹ Hotel, Res. & Inst. Mgt. Journalism Mechanical Engineering ² Packaging Small Animal Surgery Social Work Urban Plan. & Land Arch.	Electrical Engineering ² Forestry Labor & Indust. Rel.	
LOW							
UNDERGRAD	Animal Husbandry ¹ Audiology Fisheries & Wildlife German & Russian ¹ ² Geography ² Poultry Science ¹ Romance Languages ¹ ²	Biochemistry ² Computer Science English ² Family & Child Sci. Food Sci. & Hum. Nutr. Geology ² History ² Horticulture ¹ Human Nutr. & Foods ² Political Science ² Psychology ¹ ² Resource Development Zoology ²	Accounting & Finance Advertising Business & Office Adm. Communications ¹ Economics ² Family Ecology Marketing Parks & Recreation	Animal Husbandry ¹ Art Audiology Fisheries & Wildlife Romance Languages ¹ ² Theatre	Computer Science English ² Food Sci. & Hum. Nutr. Geography ² Geology ² Horticulture Human Nutr. & Foods Psychology ¹ ² Zoology ²	Accounting & Finance Advertising Ag. Engineering Biochemistry ² Business Law & Off. Ad. Communications ¹ Family & Child Sci. Family Ecology Marketing Parks & Recreation Political Science ² Resource Development	
MED							
UNDERGRAD	Ag. Economics ¹ Amer. Thought & Lang. ¹ Astronomy Dairy ¹ Humanities ¹ Mathematics ¹ ² Natural Science ¹ Physics ¹ ² Social Science ¹	Anthropology ² Botany ² Chemistry ¹ ² Crop & Soil Sci. ¹ Linguistics Metal., Mech. & Mat. Sci. Philosophy ²	Ag. Engineering ¹ Anatomy Entomology ² Management Microbiology ² Pathology Pharmacology Physiology ² Religion Sociology ² Statistics	Amer. Thought & Lang. ¹ Astronomy Dairy ¹ German & Russian ¹ ² Humanities ¹ Natural Science ¹ Pharmacology Social Science ¹	Anthropology ² Chemistry ¹ ² History ² Linguistics ¹ Mathematics ¹ ² Microbiology ² Physics ¹ ² Physiology ²	Anatomy ² Botany ² Crop & Soil Sci. Economics ² Entomology ² Management Metal., Mech. & Mat. Sci. Pathology ² Philosophy ² Religion Sociology ² Statistics	
HIGH							

¹Primarily lower division undergraduate service²Rated graduate program/faculty

Table 18. Categories of University-based Instructional Service Departments

	U N A D J U S T E D				A D J U S T E D			
	GRAD LOW	GRAD MED	GRAD HIGH		GRAD LOW	GRAD MED	GRAD HIGH	
UNDERGRAD	Ag. Economics ¹ Fisheries & Wildlife Hotel, Res. & Inst. Mgt. Human Development Mechanical Engineering ¹ Medicine (RM) Nursing Packaging Poultry Science ¹ Theatre TV and Radio	Biophysics Chemical Engineering ² Civil & Sanitary Eng. ² Food Sci. & Hum. Nutr. Linguistics Parks & Recreation Psychiatry	Electrical Engineering ² Family & Comm. Med. Labor & Indust. Rel. Large Animal Surgery Medicine (OM) Pathology Pharmacology Small Animal Surgery		Animal Husbandry ¹ Family & Comm. Med. Fisheries & Wildlife Hotel, Res. & Inst. Mgt. Human Development Large Animal Surgery Medical Technology ¹ Medicine (RM) Medicine (OM) Nursing Packaging Pharmacology Poultry Science ¹ Psychiatry Theatre	Ag. Economics Biophysics Chemical Engineering ² Civil & Sanitary Eng. ² Food Sci. & Hum. Nutr. Linguistics Mechanical Engineering ² Small Animal Surgery	Ag. Engineering Electrical Engineering ² Labor & Indust. Rel. Pathology	
LOW								
UNDERGRAD	Animal Husbandry ¹ Art Astronomy Aud. & Speech Sci. Dairy ¹ Horticulture ¹ Human Envir. & Design ¹ Human Nutr. & Foods Religion	Advertising Criminal Justice ¹ Crop & Soil Science ¹ Entomology ² Family & Child Sci. Family Ecology Forestry Geology ² Journalism Metal., Mech. & Mat. Sci. Urban Plan. & Land. Arch.	Ag. Engineering ¹ Anatomy Biochemistry ² Botany & Plant Path. ² Microbiology ² Physiology ² Resource Development Social Work		Aud. & Speech Sci. Astronomy Dairy ¹ Human Nutr. & Foods	Advertising Bus. Law & Office Adm. Criminal Justice ¹ Crop & Soil Science Entomology ² Family & Child Sci. Forestry Geology ² Horticulture Human Envir. & Design ¹ Journalism Microbiology ² Physiology ² Religion TV and Radio Urban Plan. & Land. Arch.	Anatomy Biochemistry ² Botany & Plant Path. ² Family Ecology Metal., Mech. & Mat. Sci. Parks & Recreation Resource Development Social Work	
MED								
UNDERGRAD	Amer. Thought & Lang. ¹ German & Russian ^{1, 2} Humanities ¹ Music ^{1, 2} Natural Science ¹ Social Science ¹ Romance Languages ^{1, 2}	Anthropology ² Bus. Law & Office Adm. Computer Science Geography ^{1, 2} Philosophy ^{1, 2} Physics ^{1, 2} Political Science ² Zoology ²	Accounting & Finance Chemistry ^{1, 2} Communications ¹ Economics ² English ² History ² Management Marketing Mathematics ^{1, 2} Psychology ^{1, 2} Sociology ² Statistics		German & Russian ^{1, 2} Amer. Thought & Lang. Humanities ¹ Music ^{1, 2} Natural Science ¹ Social Science ¹	Anthropology ² Art Computer Science Geography ² Physics ^{1, 2} Romance Languages ^{1, 2}	Accounting & Finance Chemistry ^{1, 2} Communications ¹ Economics ² English ² History ² Management Marketing Mathematics ^{1, 2} Philosophy ² Political Science ² Psychology ^{1, 2} Sociology ² Statistics Zoology ²	
HIGH								

¹Primarily lower division undergraduate service²Rated graduate program/faculty

in the multiple discriminant analyses.

Factor Scores--As previously explained, the factor scores which were generated by a principal axes factor analysis with a varimax rotation were the input variables for the multiple discriminant analyses. This factor analytic technique was performed on thirty-five descriptor variables which represented various characteristics of the instructional load and output of academic departments (i.e., teaching credits, student credit hours (SCH), enrollment, degrees, and majors). Six orthogonal factors (statistically independent, linear combinations of the original variables) were created through the factor analytic techniques used in this study. The variables which comprised these six factors and their loadings are reported in Table 19. The loadings in Table 19 are the correlation coefficients which indicate the extent to which each variable is related to the hypothetical factor. The square of the loading multiplied by one hundred equals the percent of a variable's variance accounted for by the factor. Thus, strong correlations (high loadings) were used to identify dominant variables in each factor. The percentages of the total variance (the average squared loadings for each factor) accounted for by each factor are reported in Table 20. These values ranged from 24% for the first factor to 4% for Factor 6. The sum of these average squared loadings (.82) multiplied by one hundred is the percentage of variance of the original data explained by the factors. Thus, these six factors accounted for 82% of the variance in the original data. Therefore, these six factors are a good representation of the original data. The standard score alpha coefficients for each

Table 19. Factors and Their Loadings

<u>Factor 1</u>	<u>Loading</u>
1. Teaching Credits - Undergraduate Total	.91
2. Teaching Credits - Undergraduate Recitation	.91
3. SCH - Undergraduate	.91
4. Enrollment - Undergraduate Lower Division	.90
5. Teaching Credits - Total	.90
6. SCH - Undergraduate Recitation	.90
7. SCH - Total	.89
8. Enrollment - Undergraduate Total	.88
9. Enrollment - Total	.88
 <u>Factor 2</u>	 <u>Loading</u>
1. SCH - Graduate Classes	.96
2. SCH - Graduate Total	.91
3. Enrollment - Graduate Total	.88
4. Teaching Credits - Graduate	.83
5. Enrollment - Master's Level	.81
6. Majors - Master's Level	.68
7. Degrees - Master's Level	.65
8. Majors - Graduate Total	.64
 <u>Factor 3</u>	 <u>Loading</u>
1. Majors - Undergraduate Total	.93
2. Majors - Undergraduate Upper Division	.92
3. Degrees - Bachelor's	.87
4. Majors - Undergraduate Lower Division	.86
5. Majors - Total	.80
6. Degrees - Total	.72
7. Enrollment - Undergraduate Upper Division	.56
8. SCH - Undergraduate Independent Study	.55
9. Enrollment - Graduate-Professional	-.30
 <u>Factor 4</u>	 <u>Loading</u>
1. Enrollment - Doctoral Level	.81
2. Majors - Doctoral Level	.73
3. Degrees - Doctoral Level	.70
4. SCH - Graduate Independent Study	.66
 <u>Factor 5</u>	 <u>Loading</u>
1. SCH - Undergraduate Laboratory	.92
2. Teaching Credits - Undergraduate Laboratory	.91
3. Teaching Credits - Undergraduate Lecture	.78
4. SCH - Undergraduate Lecture	.68
 <u>Factor 6</u>	 <u>Loading</u>
1. Enrollment - Sub College	.54

Table 20. Descriptive Data--Factors and Their Loadings

Factor	Number of Variables	Proportion of Variance	Coefficient Alpha
1	9	.24	.99
2	8	.18	.96
3	9	.17	.93
4	4	.10	.91
5	4	.09	.90
6	1	.04	1.00
		<u>.82</u>	

INTER-FACTOR CORRELATIONS

FACTOR	1	2	3	4	5	6
1	1.00					
2	.37	1.00				
3	.46	.52	1.00			
4	.52	.66	.54	1.00		
5	.38	.07	.23	.33	1.00	
6	.40	.20	.21	.29	.06	1.00
	1	2	3	4	5	6

factor are also displayed on Table 20. These alphas are the measure of internal consistency of each factor.⁴ These extremely high alpha values indicated that the factors are highly internally consistent and, thus, are very reliable factors. Finally, the correlations among these six factors are also reported in Table 20. These correlations ranged from .66 for Factors 2 and 4 to .06 for Factors 5 and 6.

The interpretation of these factors was based on the dominant variables in each factor. Variables with loading of at least .80 were considered dominant variables for the purposes of this analysis.⁵ In Factor 1, all the variables in this factor were dominant. This factor basically represented instructional load characteristics associated with undergraduate education in academic departments. Similarly, the dominant variables in Factor 2 represented the instructional load characteristics of graduate education in academic departments. However, the other variables in Factor 2 had strong correlations (greater than .60) and emphasized the master's level of graduate education. Undergraduate instructional output characteristics (majors and degrees) were the dominant variables in Factor 3. In addition, the variable representing total degrees had a strong (.72) factor loading while undergraduate upper division enrollment (.56) and undergraduate independent study student credit hours (.55) had moderate loadings. Factor 3 was the only factor

⁴J. C. Nunnally, Psychometric Theory (New York: McGraw-Hill Book Company, 1967), pp. 196-98.

⁵This was an arbitrary decision based on the distributions of factor loadings, and the definition by Marascuilo of a very strong correlation referred to in footnote 3.

which had a variable with a negative loading (graduate-professional enrollment, $-.30$). While the loading represented a weak correlation between this variable and factor, this relationship indicated a tendency for departments with high graduate-professional enrollments to have a relatively small number of undergraduate majors and low undergraduate degree output. This type of relationship is exemplified by departments associated with the health programs such as Human Development and Psychiatry. Factor 4 has only one dominant variable, doctoral enrollment, but the other three variables in the factor had strong factor loadings. This factor was interpreted as representing graduate education at the doctoral level. On the basis of its two dominant variables, Factor 5 represented undergraduate laboratory instructional load. Yet, variables representing undergraduate lecture instructional load were also strongly related to this factor. Finally, Factor 6 represented undergraduate instruction in sub-college courses. Though only one variable was included in this factor, its loading is not unity because of the orthogonality criteria of the varimax rotation.

The factor scores which were used as the variables in the multiple discriminant analyses were calculated using the loadings as weighting coefficients. The six scores for each department were computed using the following equations⁶:

$$F_1 = .91X_{13} + .91X_{11} + .91X_5 + .90X_{17} + .90X_{15} + .90X_2 + .89X_9 \\ + .88X_{19} + .88X_{24}$$

⁶The subscripts for each variable in these equations are the number assigned the variable prior to analysis.

$$F_2 = .96X_6 + .91X_8 + .88X_{23} + .83X_{14} + .81X_{21} + .68X_{28} + .65X_{33} \\ + .64X_{30}$$

$$F_3 = .93X_{27} + .92X_{26} + .87X_{32} + .86X_{25} + .80X_{31} + .72X_{35} + .56X_{18} \\ + .55S_4 - .30X_{20}$$

$$F_4 = .81X_{22} + .73X_{29} + .70X_{34} + .66X_7$$

$$F_5 = .92X_3 + .91X_{12} + .78X_{10} + .68X_1$$

$$F_6 = .54X_{16}$$

The scores for each department which were used in the multiple discriminant analyses are present in Appendix C, Table 45.

Multiple Discriminant Analyses--As explained in Chapter IV, multiple discriminant analysis is a regression-like technique for reducing the six factor scores for each department to two orthogonal linear combinations of these variables which have the maximum potential for distinguishing among members of the three categories of instructional service. Rao's chi-square test was used to test the hypothesis of no significant difference between the groups on the discriminant functions.⁷ Standardized function weights were used to compare the discriminant functions after the effects units of measurement had been largely removed.

⁷"Rather than testing the significance of each root separately, the strategy is to test the total discrimination as a chi-square with $p(k-1)$ degrees of freedom. If significant, it is accepted that at least one discriminant function is significant, and if any is significant, it should be the one with the largest associate variance λ_1 . Next the first root λ_1 is subtracted from the total of all roots..., and the residual is tested as a chi-square with $p(k-1)-(p+k-2)$ degrees of freedom. If this test is significant, it is concluded that at least one discriminant function in addition to the first is significant." (J. E. Overall and C. J. Klett, Applied Multivariate Analysis (New York: McGraw-Hill Book Company, 1972), p. 289.)

1

As in the factor analytic results reported above, the weighting coefficients of each variable in the discriminant functions represented the extent to which each variable is related (contributed) to the discriminant functions. The two standardized discriminant functions for each undergraduate and graduate instructional service measure are displayed in Table 21, and the group means⁸ on each of these discriminant functions are reported in Table 22.

For seven of the eight multiple discriminant analyses, only one of the two discriminant functions was significant, and for the adjusted graduate department-based instructional service measure, no discriminant function was significant.⁹ In the analyses of the instructional service categories for the unadjusted and adjusted undergraduate department-based measures, the highest weighting coefficients in the significant functions occurred for Factor 3 (undergraduate instructional output). These factors had weighting coefficients of .84 and .77 respectively. The configurations of the group means presented in Figures 1 and 2¹⁰ indicated that for these two measures, group 3 (high) differed substantially from the other two and occupied an extreme position in the

⁸Group means for each discriminant function are computed by applying the discriminant function weights to the group means on the original data.

⁹The significance of the total function, not the significance of individual weighting coefficients, was tested by chi-square. Thus, significant and non-significant functions could both have significant (dominant) weighting coefficients.

¹⁰The figures were constructed using the group means for the two discriminant functions (y_1 and y_2) which are reported in Table 22.

Table 21. Standardized Discriminant Functions

Instructional Service Measure	2 X	Percent of Trace	Standardized Function Weight					
			Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
DBIS-UU	SIG.	87.97	-.31	-.09	.84	-.27	-.18	-.25
	NOT SIG.	12.02	-.38	-.02	-.17	-.56	.69	-.18
DBIS-UG	SIG.	78.77	.42	-.72	.47	-.12	.22	-.04
	NOT SIG.	21.23	.33	.34	-.09	-.83	.18	-.20
DBIS-AU	SIG.	85.84	-.55	-.23	.77	-.15	-.18	.03
	NOT SIG.	14.15	.01	.23	-.20	-.76	.28	-.50
DBIS-AG	NOT SIG.	69.73	.50	-.71	.03	-.34	.14	-.32
	NOT SIG.	30.27	-.20	-.25	.49	.37	.71	.05
UBIS-UU	SIG.	96.58	.97	.19	.05	-.02	.07	-.15
	NOT SIG.	3.42	.53	.15	-.23	-.36	-.36	-.63
UBIS-UG	SIG.	97.10	.21	-.92	.22	-.12	-.01	-.22
	NOT SIG.	2.90	.64	.19	.14	-.70	.21	.00
UBIS-AU	SIG.	99.43	.94	.18	.13	.01	.14	-.20
	NOT SIG.	.57	.50	.11	-.75	-.06	-.24	-.32
UBIS-AG	SIG.	91.17	.13	-.87	-.08	-.34	.07	-.30
	NOT SIG.	8.83	.77	.18	-.45	-.25	-.21	-.21

Table 22. Group Means on Standardized Functions

Instructional Service Measure	Group 1	Group 2	Group 3
DBIS-UU	173 -84	80 -245	-147 -124
DBIS-UG	644 10	316 -89	-382 -10
DBIS-AU	521 -37	236 -112	-779 -61
DBIS-AG	10 340	-113 579	-161 257
UBIS-UU	114 -22	231 -61	889 -38
UBIS-UG	17 148	-57 54	-423 116
UBIS-AU	89 -101	198 -137	710 -114
UBIS-AG	-64 26	-148 -92	-398 -12

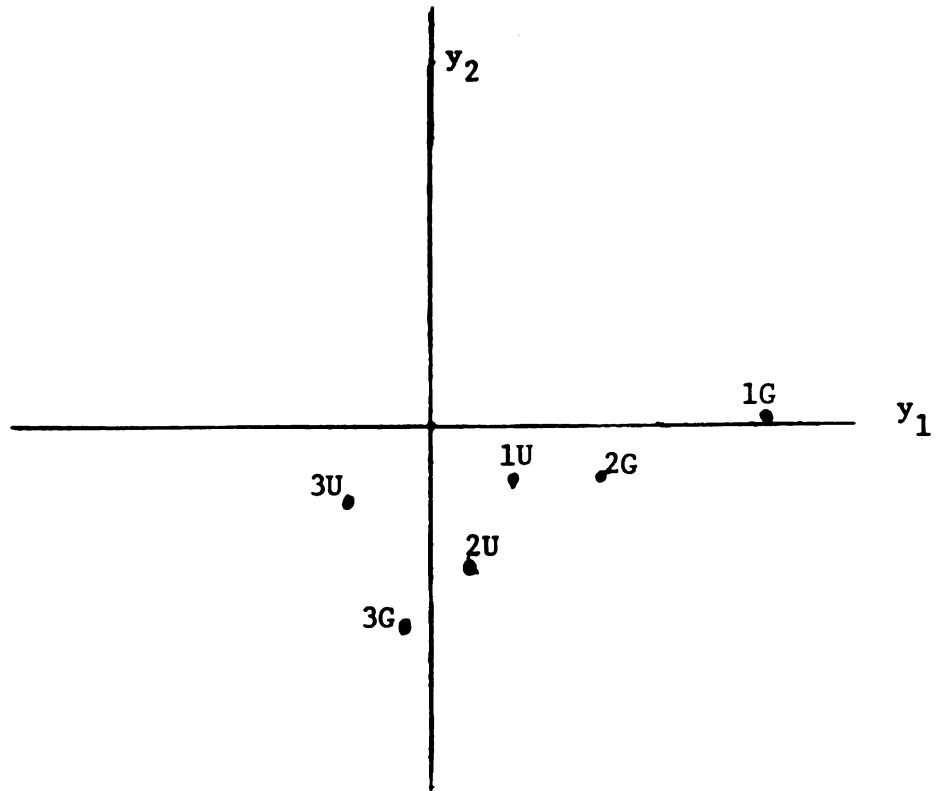


Figure 1. Group Means--DBIS-UU and DBIS-UG.

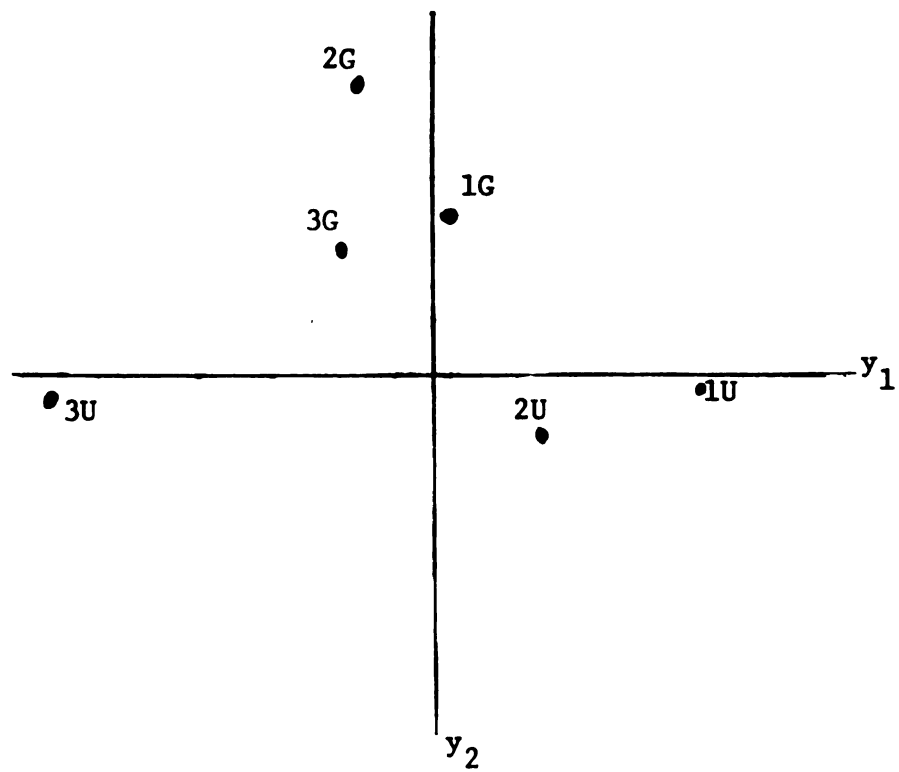


Figure 2. Group Means--DBIS-AU and DBIS-AG.

measurement domain. Three of the four discriminant analyses on graduate instructional service measures yielded one significant discriminant function. For each of these discriminant functions representing the unadjusted graduate department-based measures and the unadjusted and adjusted graduate university-based measures, the most dominant variable in the function was Factor 2 (graduate instructional load). The coefficients for this factor were $-.72$ for unadjusted department-based, $-.92$ for unadjusted university-based, and $-.87$ for adjusted university-based. The information in Table 22 and in Figures 1, 3 and 4 suggested that for these three measures, group 3 (high) differed substantially from the other two and occupied an extreme position in the measurement domain. Similarly, for the significant discriminant functions for the unadjusted and adjusted undergraduate university-based instructional service measures, one factor--Factor 1, undergraduate instructional load--was the dominant factor with weighting coefficients of $.97$ and $.94$ respectively. Finally, the configurations of the group means presented in Figures 3 and 4 depicted group 3 (high) as substantially different from other two groups on both of these instructional service measures.

Summary--These multiple discriminant analyses were conducted to identify the descriptor variables which discriminated among the categories of each instructional service measures. Factor scores instead of the original descriptor variables were used in the discriminant analyses because of the interdependence among these original variables. The results of these discriminant analyses are summarized by three statements. First, no factor used in these analyses discriminated significantly

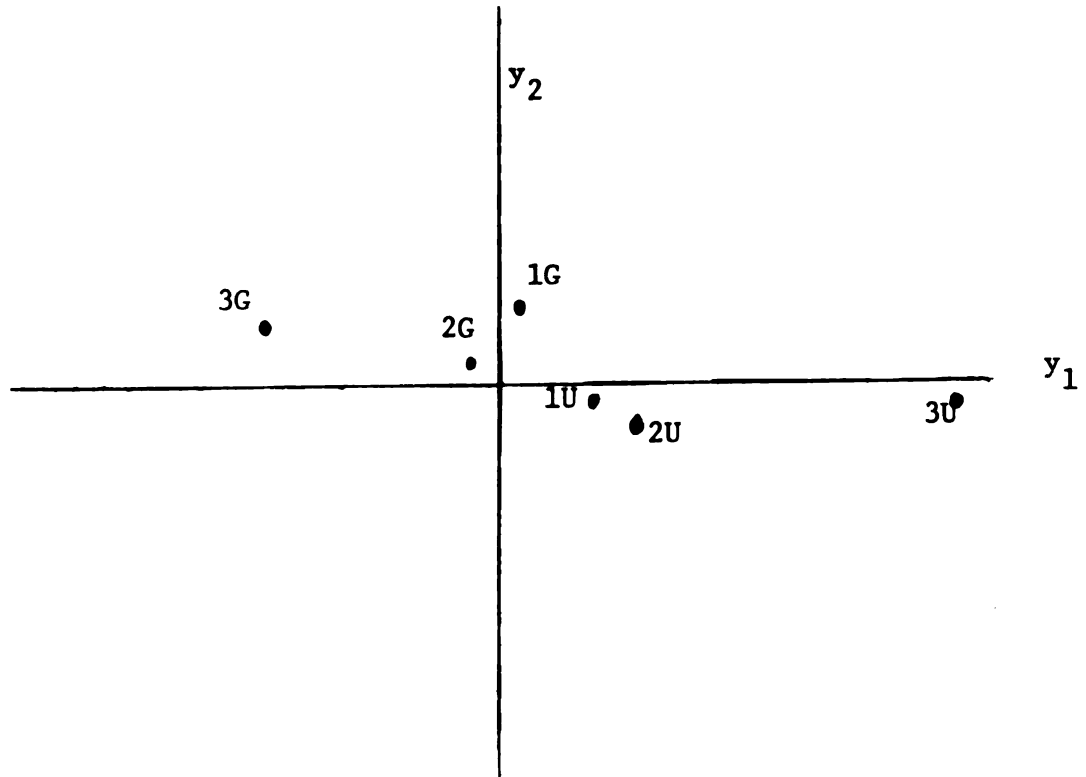


Figure 3. Group Means--UBIS-UU and UBIS-UG.

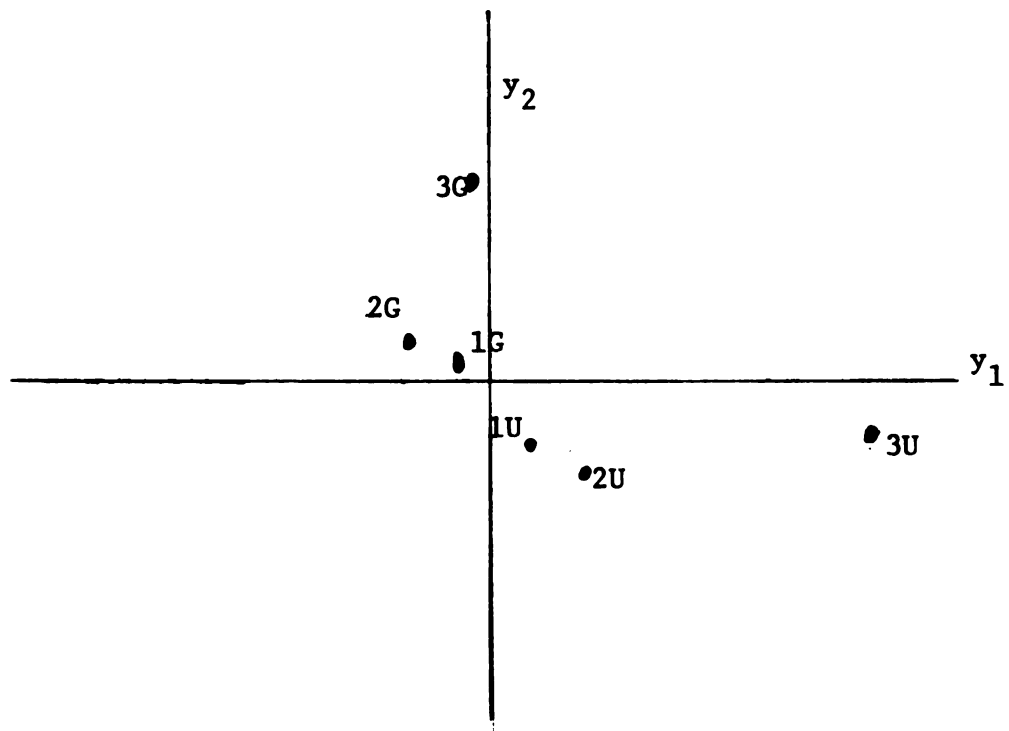


Figure 4. Group Means--UBIS-AU and UBIS-AG.

among the three categories of the adjusted graduate department-based instructional service measures. Second, three factors emerged which discriminated among the categories of the instructional service measures. Factor 1 (undergraduate instructional load) was the dominant variable in the analyses of the unadjusted and adjusted undergraduate university-based measures. Factor 2 (graduate instructional load) was the dominant variable for the unadjusted graduate department-based measure and the unadjusted and adjusted graduate university-based measures. Factor 3 (undergraduate instructional output) was the dominant variable for the unadjusted and adjusted undergraduate department-based instructional service measures. Finally, in all the analyses, group 3 (high) substantially differed from the other two groups and occupied an extreme position in the measurement domain.

Summary

The results of the numerous analyses conducted in this study were presented and summarized in this chapter. Two hundred fifty-two Spearman rank correlations were studied along with the results of eight chi-square tests of independence. In addition, the results of the preparatory analyses (classification and factor analysis) and the eight multiple discriminant analyses were also reported. The implications of these results and the conclusions drawn from them are discussed in Chapter VI.

Chapter VI

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER STUDY

Overview of the Study

One of the more pressing problems facing institutions of higher education today is the development of effective and efficient methods of resource allocation within each institution. While many states have developed techniques of formula or program budgeting for appropriating funds to institutions, once institutions have these funds in their possession, they tend to divide these funds among operating units in traditional ways. This allocation procedure often takes the form of uniform percentages changes across these units which reinforce the relative position of units and indirectly establishes institutional priorities. Thus, a more dynamic resource allocation system is needed which can respond to changes in societal goals and public needs and to alterations in assigned or implied institutional responsibilities while satisfying the demands for accountability. This study of the instructional service component of academic departments is only part of a broader study funded by a grant from the Exxon Education Foundation and centered at the Office of Institutional Research at Michigan State University under the direction of Dr. Paul L. Dressel. One of the foci of this third phase of the Exxon Departmental Study

Project is the development of a model of the dynamic budgeting schema alluded to in Chapter I which accounts for the inherent differences in disciplines, the concomitant instructional methodologies which affect input and output properties of departments, and the operational differences imposed by the role of each department in the university community.

Since the present study is a portion of this larger project, a brief discussion of the current Departmental Study Project is necessary to bring this study into proper perspective. The dynamic budgeting schema which is the goal of the current Departmental Study Project will be based on a series of departmental clusters. These clusters represent groups of departments with similar intrinsic characteristics and similar institutional roles. This clustering strategy was predicated on the assumption that budgetary procedures for departments with similar characteristics and missions should utilize the same funding principles and variables. When this strategy is applied, each department is compared only with other departments in its cluster and not with every department in the university. This approach permits variability among departmental clusters while stressing the development of uniform funding criteria within clusters.

"Process" variables are associated with the disciplines that make up a department and describe the intrinsic characteristic of a discipline and its instructional modes. These variables reflect

questions such as:

1. What is unique about the discipline?
2. Are certain modes of instruction required by the discipline?
3. Is there a minimum number of specializations that must be represented to have a "legitimate" university department?
4. Are the skills that are acquired by students of a discipline predictive of success and in that discipline reflective of the internal processes of a department?

The identification of "process" variables is an effort to partition out the institutional effects on departments. For example, when studying departmental data, one cannot account for a chairman's political activities in acquiring funds or for the historically determined status of a department. Add-on budgeting methods only further complicate an analysis. Institutional politics and idiosyncracies cannot be ignored, but a department-oriented budgeting schema should also include elements that transcend institutional bounds. "Process" variables have been used in this model to represent these supra-institutional dimensions.

The identification of fundamental "process" variables is hindered by the inadequacy of curricular theory and pedagogy in higher education. The common elements of curricular and pedagogical theory across institutions or disciplines are not adequately addressed in the literature. However, two dimensions have been identified in this project through theoretical analysis which do reflect intrinsic characteristics of a discipline. These are

laboratory modes and specializations. In addition to reflecting the intrinsic characteristics of a discipline, these variables also have budgetary and planning implications. Laboratory modes refers to those disciplines whose operations involve non-classroom experience as well as those whose operations require specially equipped work spaces. It should be noted that curricular innovations may alter the assignment of departments along this dimension, but such reassignment of a discipline would not invalidate the model. The second dimension, specializations, refers to the number of faculty members necessary to staff a department. A university department cannot usually include a member to represent each possible specialization within a discipline. For example, the National Register of Scientific and Technical Personnel lists over 150 specialities for physics alone and nearly 1000 distinct specializations in natural sciences. The issue can be stated: regardless of student enrollment, how many specializations must be represented in order to have a "legitimate" university department. When a department includes all possible specializations, enrollments would determine the number of faculty needed in each specialization. In the absence of criteria for selecting the number of specializations to be included, the size of the departmental faculty would be determined by enrollment, by the desired educational thrust of the department, and by a department's role within the university.

"Role" variables reflect those characteristics that can be

ascribed to a department by the institution or by a state-wide system. These variables might fluctuate with changing student body interests or with the whims of the department chairmen. However, they can also be key decision points for administrators with the consequences of these decisions having many budgetary and educational ramifications. The inclusion of these variables in a model does not presuppose a given decision-making process. Decisions about these variables may be made by an individual or by a committee at several levels of review. The model does, however, make these variables overt and points out the consequences of changes in these variables. Dimensions considered for the model include the following:

1. service (major vs nonmajor)
2. undergraduate vs graduate enrollment
3. size
4. quality (prestige)
5. public service
6. research
7. societal needs

Each dimension will be explored in depth and correlated with other available information about departments. Then the dimensions will be multivariately combined and their effects on cost and faculty time and rank distribution will be determined.

Finally, "cost" variables need to be identified which include both direct and indirect costs that stem from "process" or "role"

designations. For example, a laboratory department would have equipment costs, repair costs, and replacement costs, as well as salary dollars for technical personnel (glassblowers, electronic personnel and store room managers). These expenses must be accounted for in departmental budgets. The cost variables translate the department typology into a budgeting schema.

In this study, the instructional service component of academic departments was examined in light of the other available data about the characteristics of academic departments. The selection of this aspect of departmental operations as a focus of study was predicated on the possibility of its inclusion as a dimension of the clustering framework. The concept of instructional service has received attention at Michigan State University; in the organization of this university, the three medical colleges (veterinarian, osteopathic, and allopathic) subsidize certain departments for the service instruction that these shared departments give to the medical students enrolled in departmental courses. With the need for more accountability, the university has begun to study more closely the parameters of these exchanges of financial support and instructional service. No solution to this problem of rates of exchange has yet been found. At present, department chairmen bargain directly with each dean for the funds each department receives.

This type of exchange could extend to all service instruction within the institution. Each department could receive part of its

funding from the service instruction it provides to various colleges, at different rates of exchange. In lieu of a formalized pricing system for service instruction, this study identified the amount of service instruction in each academic department and sought to determine how the extent of instructional service was reflected in other data about the department (i.e., level of funding and staffing patterns).

Purposes--This study was exploratory in nature and was designed to identify the relationships between measures of instructional service and the other available data about academic departments. Specifically, the purposes of this study were to 1) develop appropriate measures of the instructional service component of academic departments; 2) identify relationships among these measures and between these instructional service measures and other departmental characteristics, and 3) classify departments according to each undergraduate and graduate instructional service measure and determine which variables discriminate among the categories of the instructional service measures.

Instructional Service Measures--Two sets of instructional service measures were constructed to represent the instructional service component of academic departments. The department-based instructional service measures represented the relative amount of the total instructional load of each department directed to service students (non-majors) while the university-based instructional service measures reflected the relative amount of the total instructional service load of the

institution (instruction to non-majors) which was assumed by each department. Within each of these two sets of measures, six measures representing various aggregates of courses within the departments were also constructed. The unadjusted measures (undergraduate, graduate, and total) represented instructional service in all courses in each of these categories. On the other hand, the three adjusted measures (undergraduate, graduate and total) did not include sub-program and short courses (undergraduate and total) and graduate-professional courses (graduate and total). The difference between the corresponding unadjusted and adjusted instructional service measures reflected the effects of these predominantly non-major types of instruction on the level of instructional service in academic departments.

Research Design--The research design developed for this study centered around ten questions about the relationships among the twelve instructional service measures and between each of these measures and departmental descriptor variables. A variety of statistical techniques was used to assess these relationships. Among these were Spearman rank correlations, chi-square tests for independence, principal axes factor analysis, and multiple discriminant analyses. In this study, two hundred fifty-two Spearman rank correlations and eight chi-square tests for independence were used to analyze the relationships among the twelve instructional service measures and between each of these measures and variables representing funding, faculty rank distributions, average salary, number of graduate

assistants, prestige of graduate programs/faculty, and level of students served in undergraduate courses. In addition, the multiple discriminant analyses identified factors (generated from the principal axes factor analysis) which discriminated among the levels of eight of the instructional service measures. The findings of this study based on the results of the analyses of the twelve instructional service measures and the eighty-six descriptor variables which were reported in Chapter V and the implications of these results are discussed in the following passages.

Summary of Findings

The following statements summarize the major findings of this study of the instructional service component of academic departments at Michigan State University. A discussion of the implications of these findings is presented in the next section of this chapter.

1. When all course offerings of departments were considered, every department provided instruction to service students (non-majors) during Fall 1971.
2. Generally, for departments that offered both undergraduate and graduate courses, the level of the instructional service in undergraduate courses as measured by the department-based measures was greater than the level of instructional service in graduate courses.
3. The undergraduate and graduate instructional service measures were mutually independent.
4. The department-based and university-based instructional service measures are not mutually independent.
5. The unadjusted and adjusted instructional service measures are not mutually independent.



6. Departments that serve predominantly lower division undergraduate students tended to have relatively high undergraduate university-based instructional service measures.
7. Departments with prestigious graduate programs/faculty as indicated in the ACE reports tended to have medium graduate department-based instructional service measures and medium to high graduate university-based instructional service measures.
8. Of the one hundred eighty Spearman rank correlations between the instructional service measures and the descriptor variables representing funding, faculty rank distributions, number of graduate assistants, and average salary, sixty-four (35.6%) were statistically significant, but only twenty-two of these correlations (12.2%) were strong (greater than .50) and, therefore, meaningful.
9. No department-based instructional service measure was strongly related to any of the descriptor variables representing funding, faculty rank distributions, average salary, and number of graduate assistants.
10. No variable representing research grant and contract expenditures was strongly related to any of the instructional service measures.
11. The undergraduate and total university-based instructional service measures were strongly related to the following variables: 1) general fund total, 2) general fund salary, 3) faculty index based on headcount, 4) faculty index based on FTE's, and 5) number of graduate assistants based on headcount.
12. The adjusted graduate university-based instructional service measure was strongly related to the descriptor variables representing the number of graduate assistants based on FTE's.
13. Six factors were defined within the descriptor variables through the principal axes factor analysis with a varimax rotation. These factors were good representations of the original data (explained 82% of the variance) and were highly internally consistent (alphas greater than .90).
14. For each of the eight multiple discriminant analyses, two discriminant functions (groups-1) were computed. These linear combinations of variables were orthogonal and have

potential for discriminating among the groups of each instructional service measure. For the adjusted graduate department-based instructional service measure, neither one of the discriminant functions were significant. In addition, the interpretation of the results of these analyses was greatly enhanced because in the remaining seven analyses, only the first discriminant function was significant. Thus, the categories of each of these instructional service measures differed significantly in multivariate mean profiles, and the contribution of each factor to this overall difference is expressed by the weighting coefficients of the first discriminant function.

15. Three factors emerged which were dominant in these significant discriminant functions. In addition, the emergence of a single dominant factor in each discriminant function greatly aided the interpretation of the results of the multiple discriminant analyses. Factor 1 (undergraduate instructional load) was the dominant variable in the significant discriminant functions for the unadjusted and adjusted university-based instructional service measures. Factor 2 (graduate instructional load) was the dominant variable for the unadjusted graduate department-based instructional service measure and the unadjusted and adjusted graduate university-based instructional service measure. Similarly, Factor 3 (undergraduate instructional output) was the dominant variable for the unadjusted and adjusted undergraduate department-based instructional service measures.
16. In all the significant multiple discriminant analyses, group 3 (high) substantially differed from the other two groups and occupied an extreme position in the measurement domain.

Conclusions

Since this study is part of the more extensive Departmental Study Project, the conclusions and implications of these findings extend beyond the scope and purposes of this study. In the following paragraphs the more statistically-based conclusions which flow directly from the findings of this study are first discussed, and

then the more general implications of these findings for the clustering and budgeting schema being developed in the Departmental Study Project and for similar studies of academic departments are discussed.

One of the purposes of this study was the development of appropriate measures of the instructional service component of academic departments. The summary measures used in this study represented possible course aggregates upon which instructional service could be described. Since no a priori criteria existed for choosing among these measures, all twelve measures were included in the study and the relationships among these twelve measures were examined. However, the inclusion of all twelve instructional service measures as part of one dimension of the departmental clustering schema may be a meaningful representation of this dimension, but a linear combination of these variables would be very difficult to interpret (low utility) and may not be the most parsimonious way of expressing this dimension. Parsimony and utility along with meaningfulness and efficiency are important criteria for any model and for the selection of variables which are included in the model. Through the study of the relationships among the instructional service measures, overlap and redundancy within the measures can be identified and a subset of these measures chosen to represent the dimension of instructional service in the cluster-oriented budgeting model.

The findings of this study reported in the preceding section indicated that overlap among the measures did exist. However, the

mutual independence between the undergraduate and graduate instructional service measures indicated that measures representing aggregates of both these course bases should be included in any further analysis of instructional service in academic departments. On the other hand, since both of these measures were strongly related to the total measure for the department, the use of the total measure in conjunction with both the undergraduate and graduate measure is unnecessary for an adequate representation of the instructional service component of academic departments.

However, decisions about the selection between unadjusted and adjusted measures and the selection between department-based and university-based measures involved certain pragmatic considerations and a post hoc analysis and were not directly discernible from the data. With the exception of the relationship between the unadjusted total measures for the department-based and the university-based measures (significant but weak), the relationships between the corresponding department-based and university-based measures were strong and significant. Thus, the use of both measures of each of these pairs would result in redundancy within the instructional service dimension of the clustering schema. However, the analyses provided no indication of which measure of each set should be chosen. Since the unadjusted measures represented instructional service in all courses in each department and, thus, are a better representation of the workload within each department, the unadjusted measures rather than the adjusted measures will be used in any further analysis

of instructional service. The effect of sub-program and graduate-professional courses on the instructional service load of each department can be expressed through an internal pricing system in which different types of instruction have different rates of exchange.

The selection of the department-based measures over the university-based measures was aided by a post hoc examination of the relationships between these measures and the enrollments in each department. This analysis indicated that the relationships between the unadjusted department-based measures and the corresponding enrollments were .43, .31, and .13 for the undergraduate, graduate and total measures respectively. For the university-based measures these relationships were .94, .83, and .93 for the undergraduate, graduate, and total respectively. Thus, the university-based instructional service measures were much more a function of the size of the department than were the department-based measures. For example, Agricultural Economics and American Thought and Language have the same unadjusted undergraduate department-based instructional service measure--100.0--while the enrollment for each is 179 and 6971 respectively. Therefore, the department-based measures were chosen because they best reflect the role of instructional service in departmental operations and these measures are less sensitive to departmental size. In summary, the set of twelve instructional service measures was reduced to two measures--unadjusted undergraduate and graduate department-based--which will represent instructional service in further analyses.

A second facet of the results of this study is that no department-based instructional service measure was strongly related to any of the descriptor variables representing funding, faculty, rank distributions, number of graduate assistants, or average salary. Thus, the staffing and funding of the departments do not appear to be meaningfully related to the "role" of instructional service in these departments. These findings also indicate that the size-related university-based measures (undergraduate and total) were strongly related to these descriptor variables. Thus, instructional volume rather than the parameters of the instructional processes appears to be the primary determinant of departmental funding and staffing. This point is further evidenced by the finding that the faculty index based on the percentage distribution over ranks (which standardizes the size of the faculty in each department) was not related to any of the university-based instructional service measures.

Finally, the results of the multiple discriminant analyses of the undergraduate and graduate instructional service measures suggest that relationships existed between these measures of instructional service and the six factors derived from the descriptor variables. These multiple discriminant analyses were important because they clarify the role of instructional service in academic departments by identifying linear combinations of variables which reflect differences along the instructional service dimension. However, even though the results of these analyses were unusually decisive (only one significant discriminant function which was dominated by one of the factors),

the use of factors instead of variables greatly complicated the interpretation of these results. In this study the most appropriate statistical techniques did not yield the most interpretable and meaningful results. Further research which clarifies the interactions of variables within these dominant factors is needed before a clear understanding of the relationships between the level of instructional service and variables representing instructional load (enrollment, student credit hours, and teaching credits) and instructional output (degrees and majors) emerges. However, such further research must also be related to the realities of departmental organization and the budgetary process. Procedures which deviate too far from practical and traditional patterns of organization and budgeting are unlikely to seriously affect existing patterns of university operations.

At this point, the discussion focuses on the more general implications of these results for the Departmental Study Project and for other research on academic departments. These implications center on two basic issues--a "costing" or "pricing" schema and staffing standards. In Chapter II there was presented an economic framework for instructional service in which the instructional service provided by academic departments was "traded" to other academic units at a yet to be determined rate of exchange. Two basic questions associated with this "pricing" schema are: (1) At what level of course offering should these prices be set? and (2) Should these prices reflect marginal or average costs?

In relation to the first question, the analyses in this study compared measures based on different quantities across the same aggregate level of instruction. These analyses produced two measures (unadjusted undergraduate and graduate department-based) which could be used in future analyses to represent the "role" of instructional service in academic departments. While these two measures seem to represent the best measurement base, they do not necessarily represent the best costing base. Indeed, a further differentiation of undergraduate and graduate unadjusted department-based measures into their components (subprogram, lower level, upper level, graduate-professional, master's, and doctoral) may offer a more viable framework for a "pricing" schema. A "pricing" schema based on course aggregates within these six broader levels of instruction rather than on individual courses may result in a more easily managed system of exchange. Further research using the unadjusted department-oriented measurement base identified through this study with different levels of aggregation must be conducted to identify the most appropriate level of specification for a pricing system.

For the second cost question--whether to use marginal or average costs in the "pricing" schema--consideration of the level of instructional service provides some insight. Assuming similar instructional modes in several departments, a department with a low instructional service "role" will have its instructional load primarily generated by majors. In such a case, the relatively low proportion of service students taught by the department might best be reflected by a mar-

ginal cost (increment of one student to a base cost). On the other hand, if a department's instructional service "role" is relatively high, an average cost (total cost/number of students) might be the most appropriate foundation for a "pricing" schema. Again, this concept needs to be explored through a study which compares the two costing principle in selected departments which have relatively low or relatively high instructional service "roles." In addition, the impact of the instructional mode on the cost of adding a student to a particular course needs to be examined. It may be that equipment and space restrictions of laboratory versus non-laboratory courses are greater determinants in the choice of an appropriate cost base than the level of instructional service.

Finally, the implications of the role of instructional service for the staffing pattern of academic departments should be explored. The department-based measures reflected the relative amount of a department's total instructional load related to service (non-major) students. Thus, these measures of instructional service indicate the thrust of the educational process in each department. One of the basic questions in an accountability model is whether or not a department staffing pattern is congruent with its objectives and "roles." This question is especially important since a large proportion of the budget of each department is salary money. In a rigorous accountability model the requirement that the number of faculty members be commensurate with the enrollment of the department could be coupled with the requirement that these faculty members be assigned

to tasks which are congruent with the instructional load and missions of the department. For example, if a department is a low service, graduate-oriented department, this department could possibly justify a faculty rank distribution which was skewed toward the ranks of associate and full professors and a workload model which included low teaching load and a high research commitment. However, this same staffing and workload pattern might be very hard to justify for a high service, undergraduate-oriented department. Since the results of this study indicated that the funding and staffing of academic departments were not related to the instructional service "role," present departmental data can not be used to identify staffing patterns which are congruent with the "role" of the department. In the continuing work of the Departmental Study Project, this problem of staffing and workload will be approached through a more theoretical orientation. Appropriate staffing and workload patterns must be hypothesized for each configuration of departmental "roles," and the effects of these patterns of departmental funding closely analyzed. If these postulated patterns prove workable, these patterns can be used as targets for future departmental staffing.

One final point should be made about the available institutional data on academic departments. The results of the study suggested that most of the data collected about academic departments is size-related. While the concept of volume of instruction has some merit when the magnitude of the departmental efforts is discussed, size should not be the sole criterion for funding or staffing departments. The core-

service dichotomy (reflecting the distinction between instruction of majors and non-majors) utilized in this study may provide a vehicle for partially overcoming this problem. If the core department is considered first as the basic unit necessary to maintain the integrity of the departments in the eyes of the discipline and the academic community, then the resource requirements necessary for the first n majors could be identified. The addition of more majors to this basic department would result in further resource requirements. The service dimension could then be treated as instructional overhead which requires certain resource requirements which are reflected through the "pricing" schema. The main point in this discussion is that in any funding and staffing model the basic integrity of the department must be maintained, thus fostering departmental contributions to the discipline and society. The core-service framework helps protect this departmental integrity by highlighting the needs of the core department, especially in high instructional service departments.

Recommendations for Further Study

The results of this study indicated that instructional service is a viable dimension for a departmental clustering and budgeting schema. In addition, this dimension can be represented by two measures of instructional service: the unadjusted undergraduate and graduate department-based instructional service measures. Four areas of study need to be further explored in order to make the concept of instructional service usable in a department-oriented management schema.

First, the concept of instructional service needs to be expanded to include the other aspects of service which are provided by departments (i.e., academic advising to non-majors, graduate committee work, and committee assignment in other units). The basic science departments "shared" by the medical colleges provide an excellent arena for this study for two reasons. Presently, these units are involved in a faculty activity analysis which can provide information about the time expenditures of faculty in various research and instructional activities. This form could be modified to include a division between time spent with majors and time spent with non-majors. Further, members of these "shared" departments have formalized responsibilities for committee and instructional responsibility within the medical schools. Thus, the "shared" department-medical program interactions provide a good microcosm for the study of non-instructional service aspects.

The second area of needed research is the assignment of "prices" to the services provided by academic departments. Here again, the present fiduciary arrangements between the "shared" departments and the medical colleges provide an appropriate subject for study. Techniques of cost accounting coupled with the information from the faculty activity analysis can be used to define the parameters of these exchanges. Hypothetical exchanges based on the "prices" derived from these techniques can then be compared to the amount of existing financial subsidy to gain further insight into the pricing problem.

A third area of needed research implied in this study is the identification of other possible dimensions of departmental activity

which can be used in the departmental clustering and budgeting schema which is the primary thrust of the current Exxon Departmental Study Project. However, this study has identified a methodology by which each of these proposed dimensions can be studied and has pointed to the need for better understanding of the relationships among the variables within each factor prior to such an analysis. Techniques such as multi-dimensional scaling or hierarchical clustering need to be explored as alternatives to the principal axes factor analysis used in this study.

Finally, the effect of size on the costs and instructional processes within the departments must be understood before a sound budgetary schema can be developed which considers the intrinsic characteristics of the departments as well as its volume. This understanding of size is also important in developing sound staffing standards for academic departments.

APPENDICES

APPENDIX A
DEPARTMENTS IN STUDY

APPENDIX A

DEPARTMENTS IN STUDY

Department	College Affiliation
Agricultural Economics	Agriculture & Nat. Res.
Agricultural Engineering	"
Animal Husbandry	"
Crop & Soil Science	"
Dairy	"
Fisheries & Wildlife	"
Food Science & Human Nutrition	"
Forestry	"
Horticulture	"
Packaging	"
Park & Recreation Resources	"
Poultry Science	"
Resource Development	"
Art	Arts and Letters
English	"
German and Russian	"
History	"
Linguistics--Oriental & African Languages	"
Music	"
Philosophy	"
Religion	"
Romance Languages	"
Accounting & Financial Administration	Business
Business Law and Office Administration	"
Economics	"
Hotel, Restaurant, & Inst. Management	"
Management	"
Marketing & Transportation Administration	"
Advertising	Communication Arts
Audiology & Speech Science	"
Communication	"
Journalism, School of	"
TV & Radio	"
Theatre	"
Chemical Engineering	Engineering
Civil & Sanitary Engineering	"
Computer Science	"
Electrical Engineering & Systems Science	"
Mechanical Engineering	"
Metallurgy, Mechanics, & Materials Sci.	"
Family Ecology	Human Ecology
Family and Child Science	"
Human Nutrition & Foods	"
Human Environment & Design	"
Human Development	Human Medicine
Medicine	"
Psychiatry	"

continued

APPENDIX A--Continued

Department	College Affiliation
Astronomy	Natural Science
Biochemistry	Natural Science
	Human Medicine
Biophysics	Natural Science
	Human Medicine
Botany & Plant Pathology	Natural Science
Chemistry	"
Entomology	"
Geology	"
Mathematics	"
Nursing	"
Physics	"
Statistics	"
Zoology	Natural Science
	Human Medicine
Anthropology	Social Science
Criminal Justice	"
Geography	"
Labor & Industrial Relations	"
Political Science	"
Psychology	Social Science
	Human Medicine
Social Work	Social Science
Sociology	Social Science
	Human Medicine
Urban Planning & Landscape Architecture	Social Science
American Thought & Language	University College
Humanities	"
Natural Science	"
Social Science	"
Anatomy	Veterinary Medicine
	Human Medicine
Large Animal Surgery & Medicine	Veterinary Medicine
Medical Technology	Veterinary Medicine
	Human Medicine
Microbiology & Public Health	Veterinary Medicine
	Human Medicine
	Natural Science
Pathology	Veterinary Medicine
	Human Medicine
Pharmacology	Veterinary Medicine
	Human Medicine
Physiology	Veterinary Medicine
	Human Medicine
Small Animal Surgery & Medicine	Veterinary Medicine
Family & Community Medicine	Osteopathic Medicine
Medicine	Osteopathic Medicine

APPENDIX B

LIST OF MSU DEPARTMENT DESCRIPTOR VARIABLES

APPENDIX B

LIST OF MSU DEPARTMENT DESCRIPTOR VARIABLES

General Fund Expenditures

1. Total, 1971-72
2. Salary, 1971-72
3. Labor, 1971-72
4. Supplies & Services, 1971-72
5. Equipment, 1971-72

Research Grant & Contract Expenditures

6. Salary, 1971-72
7. Equipment, 1971-72
8. Other, 1971-72
9. Total

Student Credit Hours

10. Undergraduate Lecture, Fall 1971
11. Undergraduate Recitation, Fall 1971
12. Undergraduate Laboratory, Fall 1971
13. Undergraduate Independent Study-Variable Credit, Fall 1971
14. Undergraduate Total, Fall 1971
15. Percent, Undergraduate Laboratory SCH
16. Graduate Classes, Fall 1971
17. Graduate Independent Study-Variable Credit, Fall 1971
18. Total Graduate SCH, Fall 1971
19. Total SCH, Fall 1971

Teaching Credits

20. Undergraduate Lecture, Fall 1971
21. Undergraduate Recitation, Fall 1971
22. Undergraduate Laboratory, Fall 1971
23. Undergraduate Total, Fall 1971
24. Percent, Undergraduate Lab/Undergraduate Total, Fall 1971
25. Graduate, Fall 1971
26. Total, Fall 1971

Total Head Count

27. Full-time Faculty, Fall 1971
28. Part-time Faculty, Fall 1971
29. Graduate Assistants, Fall 1971
30. Total, Fall 1971
31. Total, Full and Part-time Faculty, Fall 1971

FTE

32. Full-time Faculty, Fall 1971
33. Part-time Faculty, Fall 1971

continued

APPENDIX B--Continued

FTE Cont'd.

- 34. Graduate Assistants, Fall 1971
- 35. Total, Fall 1971
- 36. Total Full and Part-time Faculty, Fall 1971

FTE - General Fund

- 37. A-Faculty, 1971-72
- 38. B-Faculty, 1971-72

Faculty Headcount - By Rank

- 39. Professors, 1971-72
- 40. Associate Professors, 1971-72
- 41. Assistant Professors, 1971-72
- 42. Instructors, 1971-72
- 43. Other, 1971-72
- 44. Total, 1971-72

FTE - By Rank

- 45. Professor, 1971-72
- 46. Associate Professor, 1971-72
- 47. Assistant Professor, 1971-72
- 48. Instructor, 1971-72
- 49. Total, 1971-72

Faculty Rank Percentages

- 50. Percent Professors, 1971-72
- 51. Percent Associate Professors, 1971-72
- 52. Percent Assistant Professors, 1971-72
- 53. Percent Instructors, 1971-72
- 54. Percent Other, 1971-72

Course Enrollments

- 55. Sub-College, Fall 1971
- 56. Lower Division, Fall 1971
- 57. Upper Division, Fall 1971
- 58. Undergraduate (Lower & Upper), Fall 1971
- 59. Graduate-Professional, Fall 1971
- 60. Masters, Fall 1971
- 61. Doctors, Fall 1971
- 62. Graduate Total, Fall 1971
- 63. Total, Fall 1971

continued

APPENDIX B--Continued**Majors**

- 64. Lower Division, Fall 1971
- 65. Upper Division, Fall 1971
- 66. Undergraduate Total
- 67. Masters, Fall 1971
- 68. Doctoral, Fall 1971
- 69. Graduate Total
- 70. Departmental Total

Degrees

- 71. No. of Bachelor Degrees, 1971
- 72. No. of Masters Degrees, 1971
- 73. No. of Doctor Degrees, 1971
- 74. Total, 1971

Average Salary

- 75. Professor, 1971-72
- 76. Associate Professor, 1971-72
- 77. Assistant Professor, 1971-72
- 78. Instructor, 1971-72
- 79. Ten Month Salary - All Ranks
- 80. Twelve Month Salary - All Ranks

Quality Measures

- 81. Cartter Report, Quality of Faculty
- 82. Cartter Report, Quality of Program
- 83. Roose-Andersen Report, Quality of Faculty
- 84. Roose-Andersen Report, Quality of Program
- 85. Composite of Cartter Report
- 86. Composite of Roose-Andersen Report

APPENDIX C

TABLES OF DATA USED IN THIS STUDY

Table 23. List of Departments with Disparate Unadjusted and Adjusted Department-Based Instructional Service Measures

<u>Departments with Sub Program and Short Courses</u>	<u>Departments with Graduate- Professional Courses</u>
1. Agricultural Economics	1. Human Development
2. Agricultural Engineering	2. Psychiatry
3. Animal Husbandry	3. Medicine (HM)
4. Crop and Soil Science	4. Anatomy
5. Dairy	5. Large Animal Surgery
6. Food Sci. and Human Nutr.	6. Microbiology*
7. Forestry	7. Pathology
8. Horticulture	8. Pharmacology
9. Poultry Science	9. Physiology
10. Resource Development	10. Small Animal Surgery
11. English	11. Fam. and Comm. Med.
12. Accounting and Finance	12. Medicine (OM)
13. Business Law and Office Ad.	
14. Marketing and Transportation	
15. Advertising	
16. Audiology and Speech Sci.	
17. Biochemistry	
18. Botany and Plant Path.	
19. Entomology	
20. Mathematics	
21. Urban Planning and Land. Arch.	
22. ATL	
23. Microbiology*	

Table 24. Departmental Rankings on Department-based Instructional Service Measures

Department	U N A D J U S T E D			A D J U S T E D		
	Undergraduate	Graduate	Total	Undergraduate	Graduate	Total
Ag. Economics	T79.0	15	32	T 5.5	22	8
Ag. Engineering	T69.5	64	62	45	74	40
Animal Husbandry	T50.5	19	50	48	26	54
Crop & Soil Sci.	68	50	65	61	60	58
Dairy	64	12	58	67	19	67
Fisheries & Wildlife	33	16	24	34	23	32
Food Sci. & Hum. Nutr.	34	T37.5	26	35	T45.5	34
Forestry	27	57	22	25	67	T27.5
Horticulture	48	30	T43.5	37	37	37
Packaging	16	T27.5	7	17	T34.5	15
Park & Rec. Resources	28	61	23	30	71	31
Poultry Science	29	T 4.5	14	19	T 8.0	11
Resource Development	49	55	33	51	65	41
Art	25	14	20	28	21	29
English	42	43	37	T39.5	52	44
German & Russian	53	13	49	T55.5	20	59
History	54	33	T51.5	57	40	62
Linguistics	58	39	T43.5	62	48	53
Music	22	9	T16.5	24	16	T24.5
Philosophy	65	54	67	69	64	74
Religion	73	T79.0	70	74	T81.5	77
Romance Languages	44	17	46	49	24	56
Acct. & Finance Adm.	35	65	29	36	75	39
Bus. Law & Office Adm.	40	T79.0	39	T39.5	T81.5	49
Economics	55	69	55	58	77	65
Hotel, Rest. & Inst.Mgt.	14	T23.5	5	15	T30.5	13
Management	57	70	53	60	78	63
Marketing & Transp. Adm.	T50.5	60	38	53	70	50
Advertising	32	68	27	33	76	36
Audiology & Speech Sci.	30	10	21	31	17	30
Communications	38	62	34	42	72	46
Journalism	23	42	18	26	51	26
TV & Radio	20	20	12	22	27	21
Theatre	26	11	19	29	18	T27.5
Chemical Engineering	11	34	2	12	41	9
Civil & Sanitary Eng.	21	22	13	23	29	22
Computer Science	41	36	36	44	44	48
Electrical Engineering	12	51	4	13	61	12
Mechanical Engineering	13	29	3	14	36	10
Metal, Mech, & Mat.Sci.	60	52	54	64	62	64
Family Ecology	31	58	25	32	68	33
Family & Child Sci.	36	46	31	38	56	45
Human Nutr. & Foods	39	35	35	43	43	47
Human Envir. & Design	17	18	8	18	25	16
Human Development	T 5.0	T79.0	T78.0	T 5.5	T 8.0	T 3.5
Medicine (HM)	T 5.0	T79.0	T78.0	T 5.5	T 8.0	T 3.5
Psychiatry	T 5.0	T79.0	T78.0	T 5.5	T 8.0	T 3.5

Table 24--Continued

Department	U N A D J U S T E D			A D J U S T E D		
	Undergraduate	Graduate	Total	Undergraduate	Graduate	Total
Astronomy	67	T 4.5	68	70	T 8.0	75
Biochemistry	47	47	28	46	57	35
Biophysics	T 5.0	45	9	T 5.5	54	17
Botany & Plant Path.	63	48	40	59	58	T42.5
Chemistry	71	32	63	72	39	73
Entomology	66	56	59	68	66	69
Geology	46	41	42	52	50	52
Mathematics	56	T25.5	T51.5	T55.5	T32.5	60
Nursing	10	T 4.5	1	11	T 8.0	7
Physics	T69.5	T25.5	61	71	T32.5	72
Statistics	T74.5	63	69	T75.5	73	76
Zoology	37	T37.5	30	41	T45.5	T42.5
Anthropology	61	40	60	T65.5	49	71
Criminal Justice	19	31	11	21	38	20
Geography	52	21	45	54	28	55
Labor & Indust. Rel.	T 5.0	53	T16.5	T 5.5	63	T24.5
Political Science	45	49	48	50	59	57
Psychology	43	44	41	47	53	51
Social Work	24	T27.5	15	27	T34.5	23
Sociology	62	59	57	T65.5	69	68
Urban Plan. & Land.Arch.	18	T23.5	10	20	T30.5	18
Amer. Thought & Lang.	T79.0	T 4.5	T78.0	T79.5	T 8.0	T80.5
Humanities	T79.0	T 4.5	T78.0	T79.5	T 8.0	T80.5
Natural Science	T79.0	T 4.5	T78.0	T79.5	T 8.0	T80.5
Social Science	T79.0	T 4.5	T78.0	T79.5	T 8.0	T80.5
Anatomy	T74.5	73	72	T75.5	79	78
Lg. Anim. Surg. & Med.	T 5.0	75	73	T 5.5	T 8.0	T 3.5
Medical Technology	15	T 4.5	6	16	T 8.0	14
Microbiology	59	66	56	63	42	61
Pathology	T79.0	72	66	T79.5	80	66
Pharmacology	T79.0	67	47	T79.5	T 8.0	38
Physiology	72	71	64	73	47	70
Sm. Anim. Surg. & Med.	T 5.0	74	71	T 5.5	55	19
Family & Comm. Med.	T 5.0	T79.0	T78.0	T 5.5	T 8.0	T 3.5
Medicine (OM)	T 5.0	T79.0	T78.0	T 5.5	T 8.0	T 3.5

Table 25. Departmental Rankings on University-based Instructional Service Measures

Department	U N A D J U S T E D			A D J U S T E D		
	Undergraduate	Graduate	Total	Undergraduate	Graduate	Total
Ag. Economics	22	T20.5	17	T 5.5	T27.5	T 8.0
Ag. Engineering	44	T57.5	45	18	T64.5	19
Animal Husbandry	30	T11.5	T27.5	27	T18.0	24
Crop & Soil Sci.	51	44	49	36	52	36
Dairy	37	T11.5	34	37	T18.0	37
Fisheries & Wildlife	20	T17.5	16	22	T23.5	21
Food Sci. & Hum. Nutr.	26	37	21	24	43	25
Forestry	32	T41.5	31	32	T50.0	33
Horticulture	41	T26.0	40	31	T32.5	30
Packaging	14	15	11	15	21	15
Park & Rec. Resources	25	53	24	28	60	29
Poultry Science	12	T 4.5	5	11	T 8.0	T 8.0
Resource Development	36	63	39	38	70	40
Art	55	T26.0	55	56	T32.5	56
English	74	64	74	74	71	73
German & Russian	56	T17.5	56	57	T23.5	57
History	75	T55.5	75	75	63	75
Linguistics	24	T32.5	19	26	T38.5	26
Music	66	T11.5	64	66	T18.0	64
Philosophy	67	50	66	67	57	67
Religion	53	22	51	53	T27.5	53
Romance Languages	69	T26.0	69	69	T32.5	69
Acct. & Finance Adm.	65	78	67	65	80	66
Bus. Law & Office Adm.	57	39	57	55	47	55
Economics	73	80	73	73	81	74
Hotel, Rest. & Inst. Mgt.	18	T17.5	14	20	T23.5	18
Management	59	82	65	59	82	65
Marketing & Transp. Adm.	58	75	61	58	79	60
Advertising	45	T34.5	44	46	T40.5	45
Audiology & Speech Sci.	29	T11.5	26	33	T18.0	T31.5
Communications	64	71	63	64	76	63
Journalism	31	T32.5	30	35	T38.5	35
TV & Radio	27	T26.0	23	30	T32.5	27
Theatre	23	T11.5	18	25	T18.0	23
Chemical Engineering	11	31	T 6.5	13	37	12
Civil & Sanitary Eng.	19	T29.5	15	21	T35.5	20
Computer Science	61	T34.5	58	61	T40.5	58
Electrical Engineering	21	68	25	23	74	T31.5
Mechanical Engineering	15	23	T12.5	16	30	16
Metal, Mech. & Mat.Sci.	48	54	47	49	62	49
Family Ecology	33	52	32	39	59	38
Family & Child Sci.	54	T47.5	53	54	T54.5	54
Human Nutr. & Foods	38	T17.5	36	42	T23.5	41
Human Envir. & Design	39	T20.5	37	43	T27.5	42
Human Development	T 5.0	T11.5	1	T 5.5	T 8.0	T 3.5
Medicine (HM)	T 5.0	T26.0	T 2.5	T 5.5	T 8.0	T 3.5
Psychiatry	T 5.0	T41.5	T 6.5	T 5.5	T 8.0	T 3.5

Table 25--Continued

Department	U N A D J U S T E D			A D J U S T E D		
	Undergraduate	Graduate	Total	Undergraduate	Graduate	Total
Astronomy	T34.5	T 4.5	33	41	T 8.0	39
Biochemistry	42	67	43	40	73	43
Biophysics	T 5.0	T29.5	4	T 5.5	T35.5	11
Botany & Plant Path.	T34.5	T57.5	35	34	T64.5	34
Chemistry	77	62	77	77	69	77
Entomology	40	T45.5	41	44	48	44
Geology	50	T41.5	48	52	T50.0	52
Mathematics	80	59	80	79	66	79
Nursing	10	T 4.5	T 2.5	12	T 8.0	10
Physics	72	T47.5	72	72	T54.5	72
Statistics	63	66	62	63	72	62
Zoology	60	49	59	60	56	59
Anthropology	68	T45.5	68	68	53	68
Criminal Justice	46	T41.5	46	47	T50.0	47
Geography	62	36	60	62	42	61
Labor & Indust. Rel.	T 5.0	61	10	T 5.5	68	14
Political Science	70	51	70	70	58	70
Psychology	81	73	81	81	78	81
Social Work	43	60	42	45	67	46
Sociology	71	72	71	71	77	71
Urban Plan. & Land.Arch.	28	38	T27.5	29	T45.0	28
Amer. Thought & Lang.	82	T 4.5	82	82	T 8.0	82
Humanities	78	T 4.5	79	80	T 8.0	80
Natural Science	79	T 4.5	78	78	T 8.0	78
Social Science	76	T 4.5	76	76	T 8.0	76
Anatomy	47	79	54	48	61	48
Lg. Anim. Surg. & Med.	T 5.0	77	22	T 5.5	T 8.0	T 3.5
Medical Technology	13	T 4.5	9	14	T 8.0	13
Microbiology	52	70	50	T50.5	T45.0	T50.5
Pathology	16	74	29	17	75	22
Pharmacology	17	69	20	19	T 8.0	17
Physiology	49	76	52	T50.5	T45.0	T50.5
Sm. Anim. Surg. & Med.	T 5.0	81	38	T 5.5	T27.5	T 8.0
Family & Comm. Med.	T 5.0	T55.5	8	T 5.5	T 8.0	T 3.5
Medicine (OM)	T 5.0	65	T12.5	T 5.5	T 8.0	T 3.5

Table 26. Rank Ordering of Departments According to Unadjusted Undergraduate Department-based Instructional Service

T 5.0	Human Development	(0.0)	42	English	(76.2)
	Medicine (HM)	(0.0)	43	Psychology	(80.6)
	Psychiatry	(0.0)	44	Romance Languages	(80.9)
	Biophysics	(0.0)	45	Political Science	(81.4)
	Labor & Industrial Rel.	(0.0)	46	Geology	(82.4)
	Large Animal Surg. & Med.	(0.0)	47	Biochemistry	(83.3)
	Small Animal Surg. & Med.	(0.0)	48	Horticulture	(83.6)
	Family & Community Med.	(0.0)	49	Resource Development	(83.8)
	Medicine (OM)	(0.0)	T50.5	Animal Husbandry	(83.9)
10	Nursing	(2.5)		Marketing & Transp. Adm.	(83.9)
11	Chemical Engineering	(5.5)	52	Geography	(84.8)
12	Electrical Engineering	(12.4)	53	German & Russian	(85.5)
13	Mechanical Engineering	(14.8)	54	History	(86.1)
14	Hotel, Rest. & Inst. Mgt.	(18.5)	55	Economics	(86.5)
15	Medical Technology	(19.4)	56	Mathematics	(86.8)
16	Packaging	(22.1)	57	Management	(88.4)
17	Human Environment & Design	(22.9)	58	Linguistics	(89.6)
18	Urban Plan. & Land. Arch.	(28.6)	59	Microbiology	(90.3)
19	Criminal Justice	(30.9)	60	Metal., Mech. & Mat. Sci.	(90.5)
20	TV & Radio	(32.8)	T61.5	Anthropology	(91.0)
21	Civil & Sanitary Eng.	(35.4)		Sociology	(91.0)
22	Music	(35.8)	63	Botany & Plant Pathology	(91.6)
23	Journalism	(41.0)	64	Dairy	(92.5)
24	Social Work	(43.0)	65	Philosophy	(93.2)
25	Art	(44.0)	66	Entomology	(93.3)
26	Theatre	(44.4)	67	Astronomy	(94.3)
27	Forestry	(46.2)	68	Crop & Soil Science	(94.6)
28	Park & Recreation Res.	(49.5)	T69.5	Agricultural Engineering	(94.8)
29	Poultry Science	(50.0)		Physics	(94.8)
30	Audiology & Speech Sci.	(53.4)	71	Chemistry	(95.3)
31	Family Ecology	(56.4)	72	Physiology	(96.1)
32	Advertising	(62.9)	73	Religion	(96.6)
33	Fisheries & Wildlife	(64.8)	T74.5	Statistics	(99.8)
34	Food Sci. & Human Nutr.	(68.0)		Anatomy	(99.8)
35	Acct. & Finance Adm.	(70.3)	T79.0	Agricultural Economics	(100.0)
36	Family & Child Science	(72.0)		American Thought & Lang.	(100.0)
37	Zoology	(73.0)		Humanities	(100.0)
38	Communications	(73.6)		Natural Science	(100.0)
39	Human Nutrition & Foods	(73.8)		Social Science	(100.0)
40	Business Law & Office Adm.	(73.9)		Pathology	(100.0)
41	Computer Science	(74.7)		Pharmacology	(100.0)

Table 27. Rank Ordering of Departments According to Unadjusted Graduate Department-based Instructional Service

T 4.5	Poultry Science	(0.0)	42	Journalism	(22.2)
	Astronomy	(0.0)	43	English	(22.9)
	Nursing	(0.0)	44	Psychology	(23.1)
	American Thought & Lang.	(0.0)	45	Biophysics	(24.2)
	Humanities	(0.0)	46	Family & Child Science	(28.4)
	Natural Science	(0.0)	47	Biochemistry	(29.1)
	Social Science	(0.0)	48	Botany & Plant Pathology	(29.9)
	Medical Technology	(0.0)	49	Political Science	(30.6)
9	Music	(0.5)	50	Crop & Soil Science	(32.2)
10	Audiology & Speech Sci.	(1.0)	51	Electrical Engineering	(33.9)
11	Theatre	(2.2)	52	Metal., Mech., & Mat. Sci.	(34.0)
12	Dairy	(4.0)	53	Labor & Industrial Rel.	(34.2)
13	German & Russian	(4.3)	54	Philosophy	(36.2)
14	Art	(4.7)	55	Resource Development	(36.3)
15	Agricultural Economics	(4.8)	56	Entomology	(37.7)
16	Fisheries & Wildlife	(4.9)	57	Forestry	(39.1)
17	Romance Languages	(6.6)	58	Family Ecology	(42.1)
18	Human Environment & Design	(7.4)	59	Sociology	(42.9)
19	Animal Husbandry	(7.7)	60	Marketing & Transp. Adm.	(45.7)
20	TV & Radio	(8.6)	61	Park & Recreation Res.	(47.9)
21	Geography	(8.8)	62	Communications	(50.4)
22	Civil & Sanitary Eng.	(10.1)	63	Statistics	(52.3)
T23.5	Hotel, Rest. & Inst. Mgt.	(10.3)	64	Agricultural Engineering	(52.4)
	Urban Plan. & Land. Arch.	(10.3)	65	Acct. & Finance Adm.	(58.6)
T25.5	Mathematics	(10.4)	66	Microbiology	(60.7)
	Physics	(10.4)	67	Pharmacology	(66.5)
T27.5	Packaging	(10.5)	68	Advertising	(68.8)
	Social Work	(10.5)	69	Economics	(69.6)
29	Mechanical Engineering	(11.6)	70	Management	(72.7)
30	Horticulture	(11.9)	71	Physiology	(74.4)
31	Criminal Justice	(13.3)	72	Pathology	(86.0)
32	Chemistry	(15.0)	73	Anatomy	(95.5)
33	History	(15.3)	74	Small Animal Surg. & Med.	(97.5)
34	Chemical Engineering	(15.5)	75	Large Animal Surg. & Med.	(99.1)
35	Human Nutrition & Foods	(15.8)	T79.0	Religion	(100.0)
36	Computer Science	(16.9)		Business Law & Office Adm.	(100.0)
T37.5	Food Sci. & Human Nutr.	(17.1)		Human Development	(100.0)
	Zoology	(17.1)		Medicine (HM)	(100.0)
39	Linguistics	(20.0)		Psychiatry	(100.0)
40	Anthropology	(21.3)		Family & Community Med.	(100.0)
41	Geology	(21.7)		Medicine (OM)	(100.0)

Table 28. Rank Ordering of Departments According to Unadjusted Total Department-based Instructional Service

1	Nursing	(2.5)	42	Geology	(76.5)
2	Chemical Engineering	(8.1)	T43.5	Horticulture	(76.8)
3	Mechanical Engineering	(14.5)		Linguistics	(76.8)
4	Electrical Engineering	(15.9)	45	Geography	(77.8)
5	Hotel, Rest. & Inst. Mgt.	(18.1)	46	Romance Languages	(77.9)
6	Medical Technology	(19.4)	47	Pharmacology	(78.7)
7	Packaging	(21.4)	48	Political Science	(79.8)
8	Human Environment & Design	(22.4)	49	German & Russian	(80.6)
9	Biophysics	(24.2)	50	Animal Husbandry	(80.8)
10	Urban Plan. & Land. Arch.	(26.0)	T51.5	History	(82.3)
11	Criminal Justice	(29.8)		Mathematics	(82.3)
12	TV & Radio	(30.2)	53	Management	(82.7)
13	Civil & Sanitary Eng.	(30.8)	54	Metal., Mech., & Mat. Sci.	(82.8)
14	Poultry Science	(32.4)	55	Economics	(83.9)
15	Social Work	(33.8)	56	Microbiology	(84.1)
T16.5	Music	(34.2)	57	Sociology	(86.3)
	Labor & Industrial Rel.	(34.2)	58	Dairy	(87.2)
18	Journalism	(39.9)	59	Entomology	(87.9)
19	Theatre	(40.5)	60	Anthropology	(88.1)
20	Art	(41.4)	61	Physics	(89.2)
21	Audiology & Speech Sci.	(44.2)	62	Agricultural Engineering	(89.4)
22	Forestry	(45.7)	63	Chemistry	(89.5)
23	Park & Recreation Res.	(49.3)	64	Physiology	(89.6)
24	Fisheries & Wildlife	(52.1)	65	Crop & Soil Science	(89.7)
25	Family Ecology	(54.8)	66	Pathology	(89.9)
26	Food Sci. & Human Nutr.	(57.9)	67	Philosophy	(91.0)
27	Advertising	(63.0)	68	Astronomy	(94.3)
28	Biochemistry	(65.2)	69	Statistics	(94.9)
29	Acct. & Finance Adm.	(68.2)	70	Religion	(96.6)
30	Zoology	(68.5)	71	Small Animal Surg. & Med.	(97.5)
31	Family & Child Science	(69.4)	72	Anatomy	(98.3)
32	Agricultural Economics	(69.6)	73	Large Animal Surg. & Med.	(99.1)
33	Resource Development	(69.8)	T78.0	Human Development	(100.0)
34	Communications	(70.8)		Medicine (HM)	(100.0)
35	Human Nutrition & Foods	(71.9)		Psychiatry	(100.0)
36	Computer Science	(72.2)		American Thought & Lang.	(100.0)
37	English	(72.8)		Humanities	(100.0)
38	Marketing & Transp. Adm.	(73.9)		Natural Science	(100.0)
39	Business Law & Office Adm.	(74.2)		Social Science	(100.0)
40	Botany & Plant Pathology	(75.1)		Family & Community Med.	(100.0)
41	Psychology	(75.7)		Medicine (OM)	(100.0)

Table 29. Rank Ordering of Departments According to Adjusted Undergraduate Department-based Instructional Service

T 5.5	Agricultural Economics	(0.0)	42	Communications	(73.6)
	Human Development	(0.0)	43	Human Nutrition & Foods	(73.8)
	Medicine (HM)	(0.0)	44	Computer Science	(74.7)
	Psychiatry	(0.0)	45	Agricultural Engineering	(75.8)
	Biophysics	(0.0)	46	Biochemistry	(79.1)
	Labor & Industrial Rel.	(0.0)	47	Psychology	(80.6)
	Large Animal Surg. & Med.	(0.0)	48	Animal Husbandry	(80.7)
	Small Animal Surg. & Med.	(0.0)	49	Romance Languages	(80.9)
	Family & Community Med.	(0.0)	50	Political Science	(81.4)
	Medicine (OM)	(0.0)	51	Resource Development	(82.2)
11	Nursing	(2.5)	52	Geology	(82.4)
12	Chemical Engineering	(5.5)	53	Marketing & Transp. Adm.	(83.4)
13	Electrical Engineering	(12.4)	54	Geography	(84.8)
14	Mechanical Engineering	(14.8)	T55.5	German & Russian	(85.5)
15	Hotel, Rest. & Inst. Mgt.	(18.5)		Mathematics	(85.5)
16	Medical Technology	(19.4)	57	History	(86.1)
17	Packaging	(22.1)	58	Economics	(86.5)
18	Human Environment & Design	(22.9)	59	Botany & Plant Pathology	(88.3)
19	Poultry Science	(26.7)	60	Management	(88.4)
20	Urban Plan. & Land. Arch.	(26.9)	61	Crop & Soil Science	(89.0)
21	Criminal Justice	(30.9)	62	Linguistics	(89.6)
22	TV & Radio	(32.8)	63	Microbiology	(89.7)
23	Civil & Sanitary Eng.	(35.4)	64	Metal., Mech., & Mat. Sci.	(90.5)
24	Music	(35.8)	T65.5	Anthropology	(91.0)
25	Forestry	(40.6)		Sociology	(91.0)
26	Journalism	(41.0)	67	Dairy	(91.5)
27	Social Work	(43.0)	68	Entomology	(93.1)
28	Art	(44.0)	69	Philosophy	(93.2)
29	Theatre	(44.4)	70	Astronomy	(94.3)
30	Park & Recreation Res.	(49.5)	71	Physics	(94.8)
31	Audiology & Speech Sci.	(53.0)	72	Chemistry	(95.3)
32	Family Ecology	(56.4)	73	Physiology	(96.1)
33	Advertising	(62.5)	74	Religion	(96.6)
34	Fisheries & Wildlife	(64.8)	T75.5	Statistics	(99.8)
35	Food Sci. & Human Nutr.	(66.0)		Anatomy	(99.8)
36	Acct. & Finance Adm.	(68.0)	T79.5	American Thought & Lang.	(100.0)
37	Horticulture	(71.8)		Humanities	(100.0)
38	Family & Child Science	(72.0)		Natural Science	(100.0)
T39.5	English	(72.4)		Social Science	(100.0)
	Business Law & Office Adm.	(72.4)		Pathology	(100.0)
41	Zoology	(73.0)		Pharmacology	(100.0)

Table 30. Rank Ordering of Departments According to Adjusted Graduate Department-based Instructional Service

T 8.0	Poultry Science	(0.0)	42	Microbiology	(15.6)
	Human Development	(0.0)	43	Human Nutrition & Foods	(15.8)
	Medicine (HM)	(0.0)	44	Computer Science	(16.9)
	Psychiatry	(0.0)	T45.5	Food Sci. & Human Nutr.	(17.1)
	Astronomy	(0.0)		Zoology	(17.1)
	Nursing	(0.0)	47	Physiology	(18.4)
	American Thought & Lang.	(0.0)	48	Linguistics	(20.0)
	Humanities	(0.0)	49	Anthropology	(21.3)
	Natural Science	(0.0)	50	Geology	(21.7)
	Social Science	(0.0)	51	Journalism	(22.2)
	Large Animal Surg. & Med.	(0.0)	52	English	(22.9)
	Medical Technology	(0.0)	53	Psychology	(23.1)
	Pharmacology	(0.0)	54	Biophysics	(24.2)
	Family & Community Med.	(0.0)	55	Small Animal Surg. & Med.	(26.7)
	Medicine (OM)	(0.0)	56	Family & Child Science	(28.4)
16	Music	(0.5)	57	Biochemistry	(29.1)
17	Audiology & Speech Sci.	(1.0)	58	Botany & Plant Pathology	(29.9)
18	Theatre	(2.2)	59	Political Science	(30.6)
19	Dairy	(4.0)	60	Crop & Soil Science	(32.2)
20	German & Russian	(4.3)	61	Electrical Engineering	(33.9)
21	Art	(4.7)	62	Metal., Mech., & Mat. Sci.	(34.0)
22	Agricultural Economics	(4.8)	63	Labor & Industrial Rel.	(34.2)
23	Fisheries & Wildlife	(4.9)	64	Philosophy	(36.2)
24	Romance Languages	(6.6)	65	Resource Development	(36.3)
25	Human Environment & Design	(7.4)	66	Entomology	(37.7)
26	Animal Husbandry	(7.7)	67	Forestry	(39.1)
27	TV & Radio	(8.6)	68	Family Ecology	(42.1)
28	Geography	(8.8)	69	Sociology	(42.9)
29	Civil & Sanitary Eng.	(10.1)	70	Marketing & Transp. Adm.	(45.7)
T30.5	Hotel, Rest. & Inst. Mgt.	(10.3)	71	Park & Recreation Res.	(47.9)
	Urban Plan. & Land. Arch.	(10.3)	72	Communications	(50.4)
T32.5	Mathematics	(10.4)	73	Statistics	(52.3)
	Physics	(10.4)	74	Agricultural Engineering	(52.4)
T34.5	Packaging	(10.5)	75	Acct. & Finance Adm.	(58.6)
	Social Work	(10.5)	76	Advertising	(68.8)
36	Mechanical Engineering	(11.6)	77	Economics	(69.6)
37	Horticulture	(11.9)	78	Management	(72.7)
38	Criminal Justice	(13.3)	79	Anatomy	(72.9)
39	Chemistry	(15.0)	80	Pathology	(75.4)
40	History	(15.3)	T81.5	Religion	(100.0)
41	Chemical Engineering	(15.5)		Business Law & Office Adm.	(100.0)

Table 31. Rank Ordering of Departments According to Adjusted Total Department-based Instructional Service

T 3.5	Human Development	(0.0)	T42.5	Botany & Plant Pathology	(68.5)
	Medicine	(0.0)		Zoology	(68.5)
	Psychiatry	(0.0)	44	English	(68.8)
	Large Animal Surg. & Med.	(0.0)	45	Family & Child Science	(69.4)
	Family & Community Med.	(0.0)	46	Communications	(70.8)
	Medicine (OM)	(0.0)	47	Human Nutrition & Foods	(71.9)
7	Nursing	(2.5)	48	Computer Science	(72.2)
8	Agricultural Economics	(4.8)	49	Business Law & Office Adm.	(72.7)
9	Chemical Engineering	(8.1)	50	Marketing & Transp. Adm.	(73.4)
10	Mechanical Engineering	(14.5)	51	Psychology	(75.7)
11	Poultry Science	(14.8)	52	Geology	(76.5)
12	Electrical Engineering	(15.9)	53	Linguistics	(76.8)
13	Hotel, Rest. & Inst. Mgt.	(18.1)	54	Animal Husbandry	(77.1)
14	Medical Technology	(19.4)	55	Geography	(77.8)
15	Packaging	(21.4)	56	Romance Languages	(77.9)
16	Human Environment & Design	(22.4)	57	Political Science	(79.8)
17	Biophysics	(24.2)	58	Crop & Soil Science	(80.5)
18	Urban Plan. & Land. Arch.	(24.6)	59	German & Russian	(80.6)
19	Small Animal Surg. & Med.	(26.7)	60	Mathematics	(80.7)
20	Criminal Justice	(29.8)	61	Microbiology	(81.1)
21	TV & Radio	(30.2)	62	History	(82.3)
22	Civil & Sanitary Eng.	(30.8)	63	Management	(82.7)
23	Social Work	(33.8)	64	Metal., Mech., & Mat. Sci.	(82.8)
T24.5	Music	(34.2)	65	Economics	(83.9)
	Labor & Industrial Rel.	(34.2)	66	Pathology	(85.5)
26	Journalism	(39.9)	67	Dairy	(85.6)
T27.5	Forestry	(40.5)	68	Sociology	(86.3)
	Theatre	(40.5)	69	Entomology	(87.6)
29	Art	(41.4)	70	Physiology	(87.9)
30	Audiology & Speech Sci.	(43.8)	71	Anthropology	(88.1)
31	Park & Recreation Res.	(49.3)	72	Physics	(89.2)
32	Fisheries & Wildlife	(52.1)	73	Chemistry	(89.5)
33	Family Ecology	(54.8)	74	Philosophy	(91.0)
34	Food Sci. & Human Nutr.	(55.9)	75	Astronomy	(94.3)
35	Biochemistry	(59.8)	76	Statistics	(94.9)
36	Advertising	(62.5)	77	Religion	(96.6)
37	Horticulture	(62.6)	78	Anatomy	(97.8)
38	Pharmacology	(64.2)	T80.5	American Thought & Lang.	(100.0)
39	Acct. & Finance Adm.	(66.1)		Humanities	(100.0)
40	Agricultural Engineering	(66.3)		Natural Science	(100.0)
41	Resource Development	(67.8)		Social Science	(100.0)

Table 32. Rank Ordering of Departments According to Unadjusted Undergraduate University-based Instructional Service

T 5.0	Human Development	(0.000)	42	Biochemistry	(0.514)
	Medicine (IM)	(0.000)	43	Social Work	(0.547)
	Psychiatry	(0.000)	44	Agricultural Engineering	(0.582)
	Biophysics	(0.000)	45	Advertising	(0.597)
	Labor & Industrial Rel.	(0.000)	46	Criminal Justice	(0.638)
	Large Animal Surg. & Med.	(0.000)	47	Anatomy	(0.644)
	Small Animal Surg. & Med.	(0.000)	48	Metal., Mech. & Mat. Sci.	(0.648)
	Family & Community Med.	(0.000)	49	Physiology	(0.675)
	Medicine (OM)	(0.000)	50	Geology	(0.701)
10	Nursing	(0.008)	51	Crop & Soil Science	(0.709)
11	Chemical Engineering	(0.010)	52	Microbiology	(0.723)
12	Poultry Science	(0.012)	53	Religion	(0.878)
13	Medical Technology	(0.042)	54	Family & Child Science	(0.905)
14	Packaging	(0.069)	55	Art	(0.991)
15	Mechanical Engineering	(0.076)	56	German & Russian	(1.012)
16	Pathology	(0.090)	57	Bus. Law & Office Adm.	(1.055)
17	Pharmacology	(0.106)	58	Marketing & Transp. Adm.	(1.098)
18	Hotel, Rest. & Inst. Mgt.	(0.112)	59	Management	(1.135)
19	Civil & Sanitary Eng.	(0.139)	60	Zoology	(1.184)
20	Fisheries & Wildlife	(0.161)	61	Computer Science	(1.185)
21	Electrical Engineering	(0.172)	62	Geography	(1.262)
22	Agricultural Economics	(0.196)	63	Statistics	(1.395)
23	Theatre	(0.213)	64	Communications	(1.403)
24	Linguistics	(0.217)	65	Acct. & Finance Adm.	(1.602)
25	Park & Recreation Res.	(0.221)	66	Music	(1.671)
26	Food Sci. & Human Nutr.	(0.230)	67	Philosophy	(1.804)
27	TV & Radio	(0.245)	68	Anthropology	(2.207)
28	Urban Plan. & Land. Arch.	(0.260)	69	Romance Languages	(2.246)
29	Audiology & Speech Sci.	(0.268)	70	Political Science	(2.337)
30	Animal Husbandry	(0.275)	71	Sociology	(2.843)
31	Journalism	(0.314)	72	Physics	(2.972)
32	Forestry	(0.328)	73	Economics	(3.039)
33	Family Ecology	(0.360)	74	English	(3.840)
T34.5	Astronomy	(0.396)	75	History	(3.998)
	Botany & Plant Pathology	(0.396)	76	Social Science	(5.026)
36	Resource Development	(0.400)	77	Chemistry	(5.143)
37	Dairy	(0.403)	78	Natural Science	(5.692)
38	Human Nutrition & Foods	(0.446)	79	Humanities	(6.228)
39	Human Environment & Design	(0.465)	80	Mathematics	(6.584)
40	Entomology	(0.504)	81	Psychology	(7.005)
41	Horticulture	(0.513)	82	American Thought & Lang.	(7.628)

Table 33. Rank Ordering of Departments According to Unadjusted Graduate University-based Instructional Service

T 4.5	Poultry Science	(0.000)	T41.5	Geology	(0.380)
	Astronomy	(0.000)		Criminal Justice	(0.380)
	Nursing	(0.000)	44	Crop and Soil Science	(0.401)
	American Thought & Lang.	(0.000)	T45.5	Entomology	(0.422)
	Humanities	(0.000)		Anthropology	(0.422)
	Natural Science	(0.000)	T47.5	Family & Child Science	(0.444)
	Social Science	(0.000)		Physics	(0.444)
	Medical Technology	(0.000)	49	Zoology	(0.465)
T11.5	Animal Husbandry	(0.021)	50	Philosophy	(0.528)
	Dairy	(0.021)	51	Political Science	(0.549)
	Music	(0.021)	52	Family Ecology	(0.676)
	Audiology & Speech Sci.	(0.021)	53	Park & Recreation Res.	(0.718)
	Theatre	(0.021)	54	Metal., Mech. & Mat. Sci.	(0.739)
	Human Development	(0.021)	T55.5	History	(0.760)
15	Packaging	(0.042)		Family & Community Med.	(0.760)
T17.5	Fisheries & Wildlife	(0.063)	T57.5	Agricultural Engineering	(0.908)
	German & Russian	(0.063)		Botany & Plant Pathology	(0.908)
	Hotel, Rest. & Inst. Mgt.	(0.063)	59	Mathematics	(0.951)
	Human Nutrition & Foods	(0.063)	60	Social Work	(1.104)
T20.5	Agricultural Economics	(0.084)	61	Labor & Industrial Rel.	(1.141)
	Human Environment & Design	(0.084)	62	Chemistry	(1.225)
22	Religion	(0.085)	63	Resource Development	(1.394)
23	Mechanical Engineering	(0.106)	64	English	(1.500)
T26.0	Horticulture	(0.148)	65	Medicine (OM)	(1.563)
	Art	(0.148)	66	Statistics	(1.648)
	Romance Languages	(0.148)	67	Biochemistry	(1.732)
	TV & Radio	(0.148)	68	Electrical Engineering	(1.796)
	Medicine (HM)	(0.148)	69	Pharmacology	(2.387)
T29.5	Civil & Sanitary Eng.	(0.169)	70	Microbiology	(2.514)
	Biophysics	(0.169)	71	Communications	(2.535)
31	Chemical Engineering	(0.190)	72	Sociology	(2.831)
T32.5	Linguistics	(0.211)	73	Psychology	(3.612)
	Journalism	(0.211)	74	Pathology	(3.887)
T34.5	Advertising	(0.232)	75	Marketing & Transp. Adm.	(4.056)
	Computer Science	(0.232)	76	Physiology	(4.288)
36	Geography	(0.253)	77	Large Animal Surg. & Med.	(4.774)
37	Food Sci. & Human Nutr.	(0.275)	78	Acct. & Finance Adm.	(5.767)
38	Urban Plan. & Land. Arch.	(0.296)	79	Anatomy	(6.760)
39	Bus. Law & Office Adm.	(0.317)	80	Economics	(8.365)
T41.5	Forestry	(0.380)	81	Small Animal Surg. & Med.	(9.104)
	Psychiatry	(0.380)	82	Management	(10.414)

Table 34. Rank Ordering of Departments According to Unadjusted Total University-based Instructional Service

1	Human Development	(0.001)	42	Social Work	(0.570)
T 2.5	Medicine (HM)	(0.007)	43	Biochemistry	(0.574)
	Nursing	(0.007)	44	Advertising	(0.579)
4	Biophysics	(0.008)	45	Agricultural Engineering	(0.598)
5	Poultry Science	(0.011)	46	Criminal Justice	(0.625)
T 6.5	Chemical Engineering	(0.019)	47	Metal., Mech. & Mat. Sci.	(0.652)
	Psychiatry	(0.019)	48	Geology	(0.686)
8	Family & Community Med.	(0.037)	49	Crop & Soil Science	(0.694)
9	Medical Technology	(0.040)	50	Microbiology	(0.811)
10	Labor & Industrial Rel.	(0.056)	51	Religion	(0.839)
11	Packaging	(0.068)	52	Physiology	(0.853)
T12.5	Mechanical Engineering	(0.077)	53	Family & Child Science	(0.882)
	Medicine (OM)	(0.077)	54	Anatomy	(0.946)
14	Hotel, Rest. & Inst. Mgt.	(0.115)	55	Art	(0.950)
15	Civil & Sanitary Eng.	(0.140)	56	German & Russian	(0.965)
16	Fisheries & Wildlife	(0.156)	57	Bus. Law & Office Adm.	(1.018)
17	Agricultural Economics	(0.190)	58	Computer Science	(1.138)
18	Theatre	(0.204)	59	Zoology	(1.149)
19	Linguistics	(0.216)	60	Geography	(1.212)
20	Pharmacology	(0.218)	61	Marketing & Transp. Adm.	(1.243)
21	Food Sci. & Human Nutr.	(0.232)	62	Statistics	(1.408)
22	Large Animal Surg. & Med.	(0.235)	63	Communications	(1.459)
23	TV & Radio	(0.240)	64	Music	(1.590)
24	Park & Recreation Res.	(0.246)	65	Management	(1.592)
25	Electrical Engineering	(0.252)	66	Philosophy	(1.742)
26	Audiology & Speech Sci.	(0.256)	67	Acct. & Finance Adm.	(1.807)
T27.5	Animal Husbandry	(0.262)	68	Anthropology	(2.119)
	Urban Plan. & Land. Arch.	(0.262)	69	Romance Languages	(2.143)
29	Pathology	(0.277)	70	Political Science	(2.249)
30	Journalism	(0.309)	71	Sociology	(2.842)
31	Forestry	(0.331)	72	Physics	(2.847)
32	Family Ecology	(0.376)	73	Economics	(3.301)
33	Astronomy	(0.377)	74	English	(3.724)
34	Dairy	(0.384)	75	History	(3.839)
35	Botany & Plant Pathology	(0.421)	76	Social Science	(4.778)
36	Human Nutrition & Foods	(0.428)	77	Chemistry	(4.950)
37	Human Environment & Design	(0.446)	78	Natural Science	(5.412)
38	Small Animal Surg. & Med.	(0.448)	79	Humanities	(5.922)
39	Resource Development	(0.449)	80	Mathematics	(6.307)
40	Horticulture	(0.495)	81	Psychology	(6.838)
41	Entomology	(0.500)	82	American Thought & Lang.	(7.252)

Table 35. Rank Ordering of Departments According to Adjusted Undergraduate University-based Instructional Service

T 5.5	Agricultural Economics	(0.000)	42	Human Nutrition & Foods	(0.464)
	Human Development	(0.000)	43	Human Environment & Design	(0.483)
	Medicine (HM)	(0.000)	44	Entomology	(0.507)
	Psychiatry	(0.000)	45	Social Work	(0.569)
	Biophysics	(0.000)	46	Advertising	(0.610)
	Labor & Industrial Rel.	(0.000)	47	Criminal Justice	(0.663)
	Large Animal Surg. & Med.	(0.000)	48	Anatomy	(0.670)
	Small Animal Surg. & Med.	(0.000)	49	Metal., Mech. & Mat. Sci.	(0.673)
	Family & Community Med.	(0.000)	T50.5	Microbiology	(0.702)
	Medicine (OM)	(0.000)		Physiology	(0.702)
11	Poultry Science	(0.005)	52	Geology	(0.729)
12	Nursing	(0.008)	53	Religion	(0.912)
13	Chemical Engineering	(0.010)	54	Family & Child Science	(0.940)
14	Medical Technology	(0.043)	55	Bus. Law & Office Adm.	(1.015)
15	Packaging	(0.072)	56	Art	(1.030)
16	Mechanical Engineering	(0.078)	57	German & Russian	(1.052)
17	Pathology	(0.093)	58	Marketing & Transp. Adm.	(1.103)
18	Agricultural Engineering	(0.103)	59	Management	(1.179)
19	Pharmacology	(0.110)	60	Zoology	(1.230)
20	Hotel, Rest. & Inst. Mgt.	(0.123)	61	Computer Science	(1.232)
21	Civil & Sanitary Eng.	(0.144)	62	Geography	(1.311)
22	Fisheries & Wildlife	(0.167)	63	Statistics	(1.450)
23	Electrical Engineering	(0.179)	64	Communications	(1.458)
24	Food Sci. & Human Nutr.	(0.218)	65	Acct. & Finance Adm.	(1.491)
25	Theatre	(0.222)	66	Music	(1.736)
26	Linguistics	(0.225)	67	Philosophy	(1.875)
27	Animal Husbandry	(0.229)	68	Anthropology	(2.294)
28	Park & Recreation Res.	(0.230)	69	Romance Languages	(2.335)
29	Urban Plan. & Land. Arch.	(0.249)	70	Political Science	(2.429)
30	TV & Radio	(0.255)	71	Sociology	(2.954)
31	Horticulture	(0.266)	72	Physics	(3.089)
32	Forestry	(0.272)	73	Economics	(3.158)
33	Audiology & Speech Sci.	(0.274)	74	English	(3.274)
34	Botany & Plant Pathology	(0.283)	75	History	(4.155)
35	Journalism	(0.326)	76	Social Science	(5.223)
36	Crop & Soil Science	(0.340)	77	Chemistry	(5.345)
37	Dairy	(0.365)	78	Natural Science	(5.916)
38	Resource Development	(0.373)	79	Mathematics	(6.167)
39	Family Ecology	(0.374)	80	Humanities	(6.473)
40	Biochemistry	(0.405)	81	Psychology	(7.280)
41	Astronomy	(0.412)	82	American Thought & Lang.	(7.669)

Table 36. Rank Ordering of Departments According to Adjusted Graduate University-based Instructional Service

T 8.0	Poultry Science	(0.000)	42	Geography	(0.380)
	Human Development	(0.000)	43	Food Sci. & Human Nutr.	(0.412)
	Medicine (HM)	(0.000)	T45.0	Urban Plan. & Land. Arch.	(0.443)
	Psychiatry	(0.000)		Microbiology	(0.443)
	Astronomy	(0.000)		Physiology	(0.443)
	Nursing	(0.000)	47	Bus. Law & Office Adm.	(0.475)
	American Thought & Lang.	(0.000)	T49.0	Forestry	(0.570)
	Humanities	(0.000)		Geology	(0.570)
	Natural Science	(0.000)		Criminal Justice	(0.570)
	Social Science	(0.000)	51	Crop & Soil Science	(0.602)
	Large Animal Surg. & Med.	(0.000)	T52.5	Entomology	(0.633)
	Medical Technology	(0.000)		Anthropology	(0.633)
	Pharmacology	(0.000)	T54.5	Family & Child Science	(0.665)
	Family & Community Med.	(0.000)		Physics	(0.665)
	Medicine (OM)	(0.000)	56	Zoology	(0.697)
T18.0	Animal Husbandry	(0.032)	57	Philosophy	(0.792)
	Dairy	(0.032)	58	Political Science	(0.823)
	Music	(0.032)	59	Family Ecology	(1.013)
	Audiology & Speech Sci.	(0.032)	60	Park & Recreation Res.	(1.077)
	Theatre	(0.032)	T61.5	Metal., Mech. & Mat. Sci.	(1.108)
21	Packaging	(0.063)		Anatomy	(1.108)
T23.5	Fisheries & Wildlife	(0.095)	63	History	(1.140)
	German & Russian	(0.095)	T64.5	Agricultural Engineering	(1.362)
	Hotel, Rest. & Inst. Mgt.	(0.095)		Botany & Plant Pathology	(1.362)
	Human Nutrition & Foods	(0.095)	66	Mathematics	(1.425)
T27.5	Agricultural Economics	(0.127)	67	Social Work	(1.520)
	Religion	(0.127)	68	Labor & Industrial Rel.	(1.710)
	Human Environment & Design	(0.127)	69	Chemistry	(1.834)
	Small Animal Surg. & Med.	(0.127)	70	Resource Development	(2.090)
30	Mechanical Engineering	(0.158)	71	English	(2.248)
T32.5	Horticulture	(0.222)	72	Statistics	(2.470)
	Art	(0.222)	73	Biochemistry	(2.597)
	Romance Languages	(0.222)	74	Electrical Engineering	(2.692)
	TV & Radio	(0.222)	75	Pathology	(2.818)
T35.5	Civil & Sanitary Eng.	(0.253)	76	Communications	(3.800)
	Biophysics	(0.253)	77	Sociology	(4.243)
37	Chemical Engineering	(0.285)	78	Psychology	(5.415)
T38.5	Linguistics	(0.317)	79	Marketing & Transp. Adm.	(6.080)
	Journalism	(0.317)	80	Acct. & Finance Adm.	(8.645)
T40.5	Advertising	(0.348)	81	Economics	(12.540)
	Computer Science	(0.348)	82	Management	(15.611)

Table 37. Rank Ordering of Departments According to Adjusted Total University-based Instructional Service

T 3.5	Human Development	(0.000)	42	Human Environment & Design	(0.471)
	Medicine (HM)	(0.000)	43	Biochemistry	(0.481)
	Psychiatry	(0.000)	44	Entomology	(0.512)
	Large Animal Surg. & Med.	(0.000)	45	Advertising	(0.600)
	Family & Community Med.	(0.000)	46	Social Work	(0.602)
	Medicine (OM)	(0.000)	47	Criminal Justice	(0.660)
T 8.0	Agricultural Economics	(0.004)	48	Anatomy	(0.685)
	Poultry Science	(0.004)	49	Metal., Mech. & Mat. Sci.	(0.688)
	Small Animal Surg. & Med.	(0.004)	T50.5	Microbiology	(0.693)
10	Nursing	(0.008)		Physiology	(0.693)
11	Biophysics	(0.009)	52	Geology	(0.723)
12	Chemical Engineering	(0.020)	53	Religion	(0.885)
13	Medical Technology	(0.042)	54	Family & Child Science	(0.931)
14	Labor & Industrial Rel.	(0.059)	55	Bus. Law & Office Adm.	(0.997)
15	Packaging	(0.071)	56	Art	(1.002)
16	Mechanical Engineering	(0.081)	57	German & Russian	(1.019)
17	Pharmacology	(0.106)	58	Statistics	(1.201)
18	Hotel, Rest. & Inst. Mgt.	(0.122)	59	Zoology	(1.212)
19	Agricultural Engineering	(0.147)	60	Marketing & Transp. Adm.	(1.276)
20	Civil & Sanitary Eng.	(0.148)	61	Geography	(1.279)
21	Fisheries & Wildlife	(0.165)	62	Statistics	(1.485)
22	Pathology	(0.188)	63	Communications	(1.539)
23	Theatre	(0.215)	64	Music	(1.677)
24	Animal Husbandry	(0.222)	65	Management	(1.680)
25	Food Sci. & Human Nutr.	(0.225)	66	Acct. & Finance Adm.	(1.739)
26	Linguistics	(0.228)	67	Philosophy	(1.838)
27	TV & Radio	(0.254)	68	Anthropology	(2.236)
28	Urban Plan. & Land. Arch.	(0.256)	69	Romance Languages	(2.261)
29	Park & Recreation Res.	(0.259)	70	Political Science	(2.373)
30	Horticulture	(0.265)	71	Sociology	(2.999)
T31.5	Audiology & Speech Sci.	(0.266)	72	Physics	(3.005)
	Electrical Engineering	(0.266)	73	English	(3.238)
33	Forestry	(0.282)	74	Economics	(3.483)
34	Botany & Plant Pathology	(0.321)	75	History	(4.051)
35	Journalism	(0.326)	76	Social Science	(5.042)
36	Crop & Soil Science	(0.349)	77	Chemistry	(5.223)
37	Dairy	(0.353)	78	Natural Science	(5.711)
38	Family Ecology	(0.396)	79	Mathematics	(6.003)
39	Astronomy	(0.397)	80	Humanities	(6.248)
40	Resource Development	(0.433)	81	Psychology	(7.216)
41	Human Nutrition & Foods	(0.451)	82	American Thought & Lang.	(7.403)

Table 38. Departmental Rankings on General Fund Expenditures, 1971-72

Department	Total	Salary	Labor	Supplies & Services	Equip.
Ag. Economics	23	25	28	49	T11.5
Ag. Engineering	32	32	62	48	36
Animal Husbandry	33	22	74	72	56
Crop & Soil Sci.	50	47	67	61	42
Dairy	19	6	80	35	46
Fisheries & Wildlife	17	20	37	19	38
Food Sci. & Human Nutr.	28	24	70	54	2
Forestry	20	19	27	30	60
Horticulture	45	36	78	50	40
Packaging	7	9	22	16	58
Park & Rec. Resources	2	2	1	6	1
Poultry Science	12	3	77	58	59
Resource Development	5	7	30	17	3
Art	73	73	51	71	72
English	78	79	17	37	20
German & Russian	54	57	11	15	T11.5
History	68	69	6	22	27
Linguistics	11	15	9	3	21
Music	75	75	54	60	73
Philosophy	53	58	14	2	22
Religion	3	5	4	1	24
Romance Languages	72	74	19	32	23
Acct. & Finance Adm.	67	67	56	40	T11.5
Bus. Law and Office Adm.	27	34	24	12	T11.5
Economics	71	72	31	52	T11.5
Hotel, Rest. & Inst. Mgt.	13	17	T 2.5	13	T11.5
Management	52	52	12	27	T11.5
Marketing & Transp. Adm.	60	62	21	10	T11.5
Advertising	8	13	15	8	28
Audiology & Speech Sci.	25	29	16	38	39
Communications	56	55	53	53	54
Journalism	22	23	20	18	35
TV & Radio	9	12	34	7	48
Theatre	24	31	23	24	25
Chemical Engineering	10	10	10	23	67
Civil & Sanitary Eng.	31	35	42	9	47
Computer Science	34	28	72	56	50
Electrical Engineering	59	59	71	63	53
Mechanical Engineering	41	43	35	34	33
Metal, Mech., & Mat. Sci.	47	49	25	51	45
Family Ecology	15	18	29	5	51
Family & Child Science	21	21	48	11	31
Human Nutr. & Foods	16	14	64	33	44
Human Envir. & Design	36	39	36	28	49
Human Development	37	37	59	68	63
Medicine (HM)	39	38	45	62	74
Psychiatry	18	16	32	59	55

Table 38--Continued

Department	Total	Salary	Labor	Supplies & Services	Equip.
Astronomy	4	4	47	55	64
Biochemistry	51	42	58	66	79
Biophysics	6	8	T 2.5	14	34
Botany & Plant Path.	58	56	61	70	68
Chemistry	82	81	82	82	82
Entomology	14	11	65	43	65
Geology	44	44	52	46	57
Mathematics	81	82	55	79	T11.5
Nursing	48	50	5	20	29
Physics	79	78	81	78	78
Statistics	49	51	8	21	26
Zoology	57	54	57	69	71
Anthropology	38	41	41	44	52
Criminal Justice	43	46	13	41	30
Geography	55	53	43	45	37
Labor & Indust. Rel.	64	64	60	65	T11.5
Political Science	66	66	33	74	43
Psychology	80	80	76	80	80
Social Work	40	40	7	57	66
Sociology	69	68	50	77	61
Urban Plan. & Land. Arch.	42	45	38	36	32
Amer. Thought & Lang.	77	77	39	39	T11.5
Humanities	70	71	46	29	T11.5
Natural Science	76	76	68	64	T11.5
Social Science	636	65	44	25	T11.5
Anatomy	62	60	66	75	81
Lg. Anim. Surg. & Med.	26	27	63	26	T11.5
Medical Technology	1	1	26	4	41
Microbiology	74	70	79	81	77
Pathology	65	63	75	73	76
Pharmacology	35	26	69	67	75
Physiology	61	61	73	76	62
Sm. Anim. Surg. & Med.	46	48	49	31	T11.5
Family & Comm. Med.	30	30	40	47	70
Medicine (OM)	29	33	18	42	69

Table 39. Departmental Rankings on Research Grant and Contract Expenditures, 1971-72

Department	Total	Salary	Equip.	Other
Ag. Economics	80	81	58	81
Ag. Engineering	55	58	62	54
Animal Husbandry	64	63	64	66
Crop & Soil Sci.	72	73	65	68
Dairy	60	57	49	65
Fisheries & Wildlife	57	55	75	59
Food Sci. & Human Nutr.	65	60	74	71
Forestry	40	44	46	40
Horticulture	63	64	70	60
Packaging	48	50	61	43
Park & Rec. Resources	31	35	T22.5	31
Poultry Science	44	46	T22.5	46
Resource Development	49	48	T22.5	49
Art	33	T12.5	68	T 9.0
English	26	27	T22.5	30
German & Russian	T 8.5	T12.5	T22.5	T 9.0
History	T 8.5	T12.5	T22.5	T 9.0
Linguistics	25	T12.5	T22.5	28
Music	21	T12.5	T22.5	23
Philosophy	29	25	T22.5	34
Religion	T 8.5	T12.5	T22.5	T 9.0
Romance Languages	23	T12.5	T22.5	25
Acct. & Finance Adm.	27	31	T22.5	29
Bus. Law & Office Adm.	T 8.5	T12.5	T22.5	T 9.0
Economics	52	54	T22.5	20
Hotel, Rest. & Inst. Mgt.	22	30	T22.5	20
Management	T 8.5	T12.5	T22.5	T 9.0
Marketing & Transp. Adm.	35	38	T22.5	36
Advertising	20	28	T22.5	21
Audiology & Speech Sci.	53	45	44	55
Communications	61	61	48	63
Journalism	T 8.5	T12.5	T22.5	T 9.0
TV & Radio	39	T12.5	T22.5	50
Theatre	T 8.5	T12.5	T22.5	T 9.0
Chemical Engineering	T 8.5	T12.5	T22.5	T 9.0
Civil & Sanitary Eng.	T 8.5	T12.5	T22.5	T 9.0
Computer Science	T 8.5	T12.5	T22.5	T 9.0
Electrical Engineering	43	47	57	39
Mechanical Engineering	T 8.5	T12.5	T22.5	T 9.0
Metal, Mech., & Mat. Sci.	19	T12.5	T22.5	22
Family Ecology	24	26	T22.5	24
Family & Child Science	70	69	50	72
Human Nutr. & Foods	34	40	56	26
Human Envir. & Design	T 8.5	T12.5	T22.5	T 9.0
Human Development	59	62	71	57
Medicine (HM)	47	43	60	51
Psychiatry	66	71	53	64

Table 39--Continued

Department	Total	Salary	Equip.	Other
Astronomy	28	29	T22.5	32
Biochemistry	79	79	79	80
Biophysics	75	75	76	75
Botany & Plant Path.	68	68	63	70
Chemistry	81	80	82	78
Entomology	74	76	72	73
Geology	46	41	1	52
Mathematics	69	74	T22.5	58
Nursing	62	65	53	56
Physics	82	82	80	82
Statistics	45	51	T22.5	41
Zoology	67	66	54	67
Anthropology	38	37	45	38
Criminal Justice	50	49	T22.5	48
Geography	17	T12.5	T22.5	18
Labor & Indust. Rel.	58	59	47	62
Political Science	41	42	T22.5	45
Psychology	78	78	59	79
Social Work	71	72	T22.5	69
Sociology	56	52	52	61
Urban Plan. & Land.Arch	30	34	T22.5	27
Amer. Thought & Lang.	T 8.5	T12.5	T22.5	T 9.0
Humanities	T 8.5	T12.5	T22.5	T 9.0
Natural Science	37	36	T22.5	37
Social Science	18	T12.5	T22.5	19
Anatomy	54	56	69	53
Lg. Anim. Surg. & Med.	32	33	51	33
Medical Technology	T 8.5	T12.5	T22.5	T 9.0
Microbiology	76	70	81	76
Apthology	42	39	73	42
Pharmacology	73	67	77	74
Physiology	77	77	787	77
Sm. Anim. Surg. & Med.	36	32	67	35
Family & Comm. Med.	51	53	66	44
Medicine (OM)	T 8.5	T12.5	T22.5	T 9.0

Table 40. Faculty Rank Distribution Indices

Department	FACULTY RANK INDICES			RANKINGS		
	Headcount	FTE	% Dist.	Num.	FTE	% Dist.
Ag. Economics	145	22.60	333	76.0	20.0	T59.5
Ag. Engineering	68	25.65	337	T57.5	30.0	T63.5
Animal Husbandry	54	20.00	360	48.0	17.0	T74.5
Crop & Soil Sci.	148	43.08	343	78.0	50.0	67.0
Dairy	57	12.40	317	T49.5	4.0	47.0
Fisheries & Wildlife	36	25.20	324	T28.5	27.0	T52.5
Food Sci. & Hum. Nutr.	71	24.55	360	60.0	26.0	T74.5
Forestry	62	25.35	326	53.0	28.0	57.0
Horticulture	104	30.60	320	71.0	38.0	T49.5
Packaging	19	15.30	220	T 8.0	11.0	4.0
Park & Rec. Resources	12	3.50	240	T 3.5	2.0	8.0
Poultry Science	34	9.35	340	T24.5	3.0	66.0
Resource Development	33	17.20	346	T21.5	13.0	70.0
Art	117	105.00	308	72.0	74.0	T41.0
English	146	132.77	359	77.0	78.0	73.0
German & Russian	47	53.00	250	T38.5	62.0	10.0
History	96	85.00	304	68.0	71.0	36.0
Linguistics	21	21.16	245	10.0	18.0	9.0
Music	137	139.50	299	74.0	79.0	T31.0
Philosophy	67	59.67	302	56.0	65.0	35.0
Religion	14	15.20	350	5.0	10.0	71.0
Romance Languages	88	86.34	276	66.0	72.0	21.0
Acct. & Finance Adm.	68	73.00	283	T57.5	68.0	25.0
Bus. Law & Office Adm.	30	32.00	299	17.0	39.0	T31.0
Economics	91	84.91	323	67.0	70.0	51.0
Hotel, Rest. & Inst. Mgt.	23	25.75	380	T12.5	32.0	T79.5
Management	48	39.00	333	T41.0	46.0	T59.5
Marketing & Transp. Adm.	27	58.85	389	T14.5	64.0	81.0
Advertising	19	19.00	266	T 8.0	16.0	T17.5
Audiology & Speech Sci.	33	29.50	275	T21.5	36.0	20.0
Communications	53	36.50	314	T46.5	43.0	44.0
Journalism	31	26.00	230	T18.5	33.0	5.0
TV & Radio	17	13.25	325	6.0	5.0	T55.0
Theatre	11	23.00	233	2.0	T22.5	6.0
Chemical Engineering	23	21.50	329	T12.5	19.0	58.0
Civil & Sanitary Eng.	34	36.70	324	T24.5	45.0	T52.5
Computer Science	33	27.20	260	T21.5	35.0	14.0
Electrical Engineering	59	47.40	305	51.0	56.0	T37.5
Mechanical Engineering	60	45.50	339	52.0	53.0	65.0
Mat., Mech. & Mat. Sci.	63	45.75	337	54.0	54.0	T63.5
Family Ecology	36	24.05	274	T28.5	25.0	19.0
Family & Child Sci.	33	22.90	266	T21.5	21.0	T17.5
Human Nutr. & Foods	38	18.50	306	T30.5	15.0	39.0
Human Envir. & Design	29	25.70	203	16.0	31.0	3.0
Human Development	31	13.51	257	T18.5	7.0	13.0
Medicine (HM)	57	23.00	320	T49.5	T22.5	T49.5
Psychiatry	35	13.50	264	T26.5	6.0	16.0

Table 40--Continued

Department	FACULTY RANK INDICES			RANKINGS		
	Headcount	FTE	% Dist.	Num.	FTE	% Dist.
Astronomy	12	14.00	280	T 3.5	8.0	24.0
Biochemistry	75	30.55	371	T61.5	37.0	78.0
Biophysics	19	15.00	380	T 8.0	9.0	T79.5
Botany & Plant Pathology	101	48.50	335	69.0	58.0	62.0
Chemistry	102	91.40	316	70.0	73.0	T45.5
Entomology	50	17.45	300	T44.5	14.0	T33.5
Geology	43	46.00	367	35.0	55.0	77.0
Mathematics	221	182.04	345	82.0	82.0	T68.5
Nursing	47	40.25	174	T38.5	49.0	2.0
Physics	156	118.18	345	80.0	75.0	T68.5
Statistics	48	49.22	316	T41.0	59.0	T45.5
Zoology	64	49.25	351	55.0	60.0	72.0
Anthropology	44	36.55	297	T36.5	44.0	T28.5
Criminal Justice	44	34.00	310	T36.5	41.0	43.0
Geography	39	44.40	308	T32.5	51.0	T41.0
Labor & Indust. Rel.	50	48.00	325	T44.5	57.0	T55.0
Political Science	70	65.11	305	59.0	66.0	T37.5
Psychology	168	130.33	334	81.0	77.0	61.0
Social Work	53	39.50	308	T46.5	47.0	T41.0
Sociology	75	53.78	297	T61.5	63.0	T28.5
Urban Plan. & Land. Arch.	48	39.55	319	T41.0	48.0	48.0
Amer. Thought & Language	140	175.35	252	75.0	81.0	11.0
Humanities	133	121.17	286	73.0	76.0	26.0
Natural Science	153	163.55	279	79.0	80.0	23.0
Social Science	84	75.00	299	65.0	69.0	T31.0
Anatomy	42	35.60	262	34.0	42.0	15.0
Lg. Anim. Surg. & Med.	35	23.65	254	T26.5	24.0	12.0
Medical Technology	1	3.00	150	1.0	1.0	1.0
Microbiology	80	68.03	292	63.0	67.0	27.0
Pathology	49	44.50	325	43.0	52.0	T55.0
Pharmacology	38	25.50	278	T30.5	29.0	22.0
Physiology	81	51.15	361	64.0	61.0	76.0
Sm. Anim. Surg. & Med.	39	32.85	234	T32.5	40.0	7.0
Family & Comm. Med.	22	16.47	300	11.0	12.0	T33.5
Medicine (OM)	27	26.69	400	T14.5	34.0	82.0

Table 41. Graduate Assistants, 1971-72

Department	Headcount	FTE	R A N K I N G S	
			Headcount	FTE
Ag. Economics	50	0	76	T 7.0
Ag. Engineering	16	1.00	43	T23.5
Animal Husbandry	13	1.00	39	T23.5
Crop & Soil Sci.	39	2.45	T72.0	39
Dairy	25	0.50	T55.5	T17.0
Fisheries & Wildlife	38	0.50	T70.0	T17.0
Food Sci. & Hum. Nutr.	37	0	T67.5	T 7.0
Forestry	22	0	52	T 7.0
Horticulture	37	3.00	T67.5	42
Packaging	4	1.50	T19.0	T30.5
Park & Rec. Resources	4	0.50	T19.0	T17.0
Poultry Science	11	1.50	T33.5	T30.5
Resource Development	14	1.00	T40.5	T23.5
Art	28	10.25	60	T65.5
English	51	25.50	77	79
German & Russian	21	10.25	T50.0	T65.5
History	43	16.00	T73.0	76
Linguistics	14	4.81	T40.5	51
Music	36	11.50	T65.5	T69.5
Philosophy	15	6.70	42	56
Religion	1	0.50	T12.0	T17.0
Romance Languages	44	22.75	74	78
Acct. & Finance Adm.	38	13.25	T70.0	74
Bus. Law & Office Adm.	3	1.25	T16.5	T27.5
Economics	25	11.50	T55.5	T69.5
Hotel, Rest. & Inst. Mgt.	11	3.50	T33.5	T43.5
Management	26	11.15	T58.0	67
Marketing & Transp. Adm.	20	8.75	48	T62.5
Advertising	5	1.75	T22.0	33
Audiology & Speech Sci.	1	0.50	T12.0	T17.0
Communications	35	9.25	64	64
Journalism	8	2.25	T27.0	T36.5
TV & Radio	6	2.50	T24.5	T40.5
Theatre	23	11.25	T53.5	68
Chemical Engineering	3	1.00	T16.5	T23.5
Civil & Sanitary Eng.	9	3.50	29	T43.5
Computer Science	5	2.25	T22.0	T36.5
Electrical Engineering	19	8.50	47	61
Mechanical Engineering	4	1.25	T19.0	T27.5
Metl, Mech., & Mat.Sci.	10	4.25	30	T48.0
Family Ecology	12	3.75	T37.5	45
Family & Child Sci.	29	4.25	61	T48.0
Human Nutr. & Foods	11	2.25	T33.5	T36.5
Human Envir. & Design	11	4.00	T33.5	46
Human Development	8	1.00	T27.0	T23.5
Medicine	2	0.50	T14.5	T17.0
Psychiatry	6	1.00	T24.5	T23.5

Table 41--Continued

Department	Headcount	FTE	R A N K I N G S	
			Headcount	FTE
Astronomy	0	0	T 5.5	T 7.0
Biochemistry	46	8.75	75	T62.5
Biophysics	12	2.25	T37.5	T36.5
Botany & Plant Path.	38	6.00	T70.0	T54.0
Chemistry	163	58.28	82	81
Entomology	23	1.50	T53.5	T30.5
Geology	17	7.25	T44.5	58
Mathematics	133	63.75	81	82
Nursing	0	0	T 5.5	T 7.0
Physics	78	15.75	79	75
Statistics	17	6.75	T44.5	57
Zoology	36	11.55	T65.5	71
Anthropology	18	7.50	46	59
Criminal Justice	11	5.50	T33.5	52
Geography	30	12.75	62.5	72
Labor & Indust. Rel.	21	8.25	T50.0	60
Political Science	26	13.00	T58.0	73
Psychology	85	34.75	80	80
Social Work	21	4.25	T50.0	T48.0
Sociology	60	21.25	78	77
Urban Plan. & Land. Arch.	8	2.50	T27.0	T40.5
Amer. Thought & Lang.	0	0	T 5.5	T 7.0
Humanities	0	0	T 5.5	T 7.0
Natural Science	1	0.50	T12.0	T17.0
Social Science	0	0	T 5.5	T 7.0
Anatomy	11	4.50	T33.5	50
Lg. Anim. Surg. & Med.	0	0	T 5.5	T 7.0
Medical Technology	0	0	T 5.5	T 7.0
Microbiology	30	6.00	T62.5	T54.0
Pathology	2	1.50	T14.5	T30.5
Pharmacology	5	2.00	T22.0	34
Physiology	26	6.00	T58.0	T54.0
Sm. Animal Surg. & Med.	0	0	T 5.5	T 7.0
Family & Comm. Med.	0	0	T 5.5	T 7.0
Medicine (OM)	0	0	T 5.5	T 7.0

Table 42. Rank Ordering of Departments According to Average 10-month Equated Salary, 1971-72

1	Medical Technology	(10,866)	42	Mathematics	(16,103)
2	Nursing	(11,538)	43	Dairy	(16,108)
3	Theatre	(11,737)	44	Poultry Science	(16,110)
4	Family & Child Science	(12,001)	45	Geography	(16,131)
5	Human Envir. & Design	(12,546)	46	Bus. Law & Office Adm.	(16,144)
6	Packaging	(13,200)	47	Animal Husbandry	(16,216)
7	Park and Rec.Resources	(13,224)	48	English	(16,222)
8	Linguistics	(13,361)	49	Electrical Engineering	(16,355)
9	Amer. Thought & Lang.	(13,484)	50	Urban Plan. & Land. Arch.	(16,400)
10	Sm. Anim. Surg. & Med.	(13,518)	51	Pharmacology	(16,484)
11	Hum. Nutr. & Foods	(13,783)	52	Geology	(16,496)
12	Humanities	(13,851)	53	Computer Science	(16,503)
13	German & Russian	(13,932)	54	Sociology	(16,665)
14	Natural Science	(14,117)	55	Chemistry	(16,775)
15	Family Ecology	(14,183)	56	Labor & Indust. Rel.	(16,807)
16	Anatomy	(14,209)	57	Biochemistry	(16,815)
17	Romance Languages	(14,384)	58	Physiology	(16,826)
18	Entomology	(14,555)	59	Communications	(16,915)
19	Audiology	(14,589)	60	Psychology	(16,966)
20	Music	(14,661)	61	Food Sci. & Human Nutr.	(17,024)
21	Ag. Engineering	(14,664)	62	Resource Development	(17,036)
22	Art	(14,792)	63	Criminal Justice	(17,135)
23	Journalism	(14,987)	64	Mechanical Engineering	(17,384)
24	Philosophy	(15,062)	65	Zoology	(17,404)
25	Astronomy	(15,138)	66	Physics	(17,514)
26	Lg. Anim. Surg. & Med.	(15,317)	67	Statistics	(17,565)
27	TV and Radio	(15,329)	68	Pathology	(17,689)
28	Horticulture	(15,352)	69	Civil & Sanitary Eng.	(17,920)
29	Microbiology	(15,466)	70	Metall. Mech. & Mat. Sci.	(18,110)
30	Botany	(15,476)	71	Acct. & Finance Adm.	(18,263)
31	Advertising	(15,498)	72	Chemical Engineering	(18,612)
32	Religion	(15,697)	73	Human Development	(18,623)
33	Anthropology	(15,700)	74	Family & Comm. Med.	(18,896)
34	History	(15,711)	75	Biophysics	(19,037)
35	Fisheries & Wildlife	(15,776)	76	Management	(19,320)
36	Ag. Economics	(15,850)	77	Hotel, Rest., & Inst. Mgt.	(19,800)
37	Political Science	(15,988)	78	Economics	(19,806)
38	Social Science	(15,993)	79	Psychiatry	(21,119)
39	Social Work	(16,060)	80	Marketing & Transp. Adm.	(21,337)
40	Forestry	(16,079)	81	Medicine (HM)	(22,271)
41	Crop and Soil Science	(16,091)	82	Medicine (OM)	(25,105)

Table 43. Percentage Distribution of Instructional Service Students by Student Level--Unadjusted Data

Department	UNDERGRADUATE COURSES					GRAD. COURSES			ALL COURSES							
	Fr	Soph	Jr	Sr	Grad	Total	Jr	Sr	Grad	Total	Fr	Soph	Jr	Sr	Grad	Total
Agricultural Economics	84	15	01	00	00	179	00	00	100	04	82	15	01	00	02	183
Agricultural Engineering	75	10	06	08	02	532	00	05	95	43	70	09	05	07	09	575
Animal Husbandry	78	07	05	09	01	251	00	00	100	01	77	06	06	09	02	252
Crop & Soil Science	55	13	17	13	02	648	00	00	100	19	54	13	16	12	05	667
Dairy	53	08	11	18	11	368	00	00	100	01	53	08	11	18	11	369
Fisheries & Wildlife	01	02	19	48	30	147	00	00	100	03	01	02	19	47	31	150
Food Sci. & Human Nutr.	09	17	35	36	03	210	00	00	100	13	08	16	33	34	09	223
Forestry	36	12	19	25	08	300	00	00	100	18	34	11	18	24	13	318
Horticulture	49	16	21	14	00	469	00	00	100	07	48	15	21	13	02	476
Packaging	08	22	29	35	07	063	00	00	100	02	08	22	28	34	09	065
Park & Rec. Resources	03	13	21	52	10	202	00	07	94	34	03	11	18	45	22	236
Poultry Science	45	36	00	00	18	11	00	00	00	00	45	36	00	00	18	11
Resource Development	13	09	25	39	14	366	03	08	89	66	11	08	22	34	25	432
Art	16	17	34	30	03	906	14	43	43	07	16	17	33	31	03	913
English	10	14	34	35	06	3509	00	32	68	71	10	14	34	35	07	3580
German & Russian	31	25	28	14	02	925	33	33	33	03	31	25	28	15	01	928
History	14	18	40	27	01	3654	11	03	86	36	14	17	40	27	02	3690
Linguistics	12	16	29	23	21	198	10	30	60	10	11	15	28	23	23	208
Music	34	25	26	14	01	1527	00	00	100	01	34	25	26	14	01	1528
Philosophy	19	23	33	23	02	1649	12	08	80	25	19	22	33	23	03	1674
Religion	19	22	34	24	01	802	00	00	100	04	19	22	34	24	01	806
Romance Languages	31	22	27	18	01	2053	00	00	100	07	31	22	27	18	02	2060
Accounting & Fin. Ad.	12	24	38	25	01	1464	00	04	96	273	11	20	32	21	16	1737
Business Law	10	09	28	52	01	964	00	13	87	15	10	08	28	52	02	979
Economics	08	28	38	23	03	2777	00	03	97	396	07	24	33	21	15	3173
Hotel, Res. & Inst. Mgt.	21	22	33	23	01	106	00	00	100	03	21	22	32	22	03	111
Management	06	08	36	49	01	1037	00	04	96	493	04	05	25	34	32	1530
Marketing	03	10	49	37	01	1003	01	05	94	192	02	08	42	32	16	1195
Advertising	13	30	36	19	02	546	00	00	100	11	12	30	35	19	04	557
Audiology & Speech Sci.	10	22	40	26	02	245	00	100	00	01	10	22	40	26	02	246
Communications	45	18	23	14	00	1282	02	03	95	120	42	16	21	13	08	1402
Journalism	18	14	29	37	02	287	00	30	70	10	18	13	28	36	05	297
TV and Radio	17	26	21	29	07	224	00	00	100	07	17	25	20	28	10	231
Theatre	10	20	38	29	03	195	00	00	100	01	10	19	38	29	03	196

Table 43--Continued

Department	UNDERGRADUATE COURSES						GRAD. COURSES						ALL COURSES					
	Fr	Soph	Jr	Sr	Grad	Total	Jr	Sr	Grad	Total	Fr	Soph	Jr	Sr	Grad	Total	Fr	Soph
Chemical Engineering	00	22	00	67	11	09	00	00	100	09	00	11	00	33	56	18	00	11
Civil & Sanitary Eng.	03	17	39	35	06	127	00	12	88	08	03	16	36	34	11	135	03	16
Computer Science	24	21	33	14	08	1083	46	27	27	11	24	21	33	15	08	1094	24	21
Electrical Engineering	00	06	53	37	04	157	04	14	82	85	00	04	35	29	32	242	00	04
Mechanical Engineering	04	10	26	44	16	69	00	00	100	05	04	09	24	41	22	74	04	09
Metal., Mech. & Mat. Sci.	01	22	57	20	00	592	00	17	83	35	01	21	54	19	05	627	01	21
Family Ecology	18	06	39	36	01	329	00	12	88	32	16	06	35	34	09	361	16	06
Family & Child Sci.	07	21	40	28	04	827	00	00	100	21	07	20	39	27	06	848	07	20
Human Nutr. & Foods	17	22	38	18	04	408	33	00	67	03	17	21	38	18	05	411	17	21
Human Envir. & Design	26	25	27	21	01	425	00	00	100	04	26	24	27	20	02	429	26	24
Human Development	00	00	00	00	00	00	00	00	100	01	00	00	00	00	100	01	00	00
Medicine (EM)	00	00	00	00	00	00	00	00	100	07	00	00	00	00	100	07	00	00
Psychiatry	00	00	00	00	00	00	00	00	100	18	00	00	00	00	100	18	00	00
Astronomy	10	21	37	32	01	362	00	00	00	00	10	21	37	32	01	362	10	21
Biochemistry	24	03	28	14	30	470	04	04	91	82	21	03	25	12	39	552	21	03
Biophysics	00	00	00	00	00	00	12	38	50	08	00	00	12	38	50	08	00	00
Botany & Plant Path.	32	10	27	20	10	362	00	00	100	43	29	09	24	18	20	405	29	09
Chemistry	56	19	15	08	01	4700	05	21	74	58	55	19	15	08	02	4758	55	19
Entomology	05	10	48	31	05	461	00	00	100	20	05	10	46	31	09	481	05	10
Geology	11	19	38	30	01	641	00	33	66	18	11	19	37	30	03	659	11	19
Mathematics	55	18	15	08	03	6017	11	13	76	45	55	18	15	08	04	6062	55	18
Nursing	00	29	43	14	14	07	00	00	00	00	00	00	29	43	14	07	00	00
Physics	06	47	34	12	01	2716	00	48	52	21	06	46	34	12	01	2737	06	46
Statistics	03	19	36	23	19	1275	10	17	73	78	03	18	35	22	22	1353	03	18
Zoology	03	09	43	39	06	1082	00	14	86	22	03	09	42	39	07	1104	03	09
Anthropology	27	22	30	20	01	2017	05	00	95	20	26	22	30	20	02	2037	27	22
Criminal Justice	31	26	20	22	01	583	00	11	89	18	30	26	20	21	03	601	31	26
Geography	13	18	34	33	02	1153	00	25	75	12	13	18	33	33	03	1165	13	18
Labor & Industrial Rel.	00	00	00	00	00	00	00	09	91	54	00	00	00	09	91	54	00	00
Political Science	15	18	40	26	01	2136	03	12	85	26	15	17	40	26	02	2162	15	17
Psychology	34	17	27	20	02	6402	02	08	90	171	34	17	26	19	04	6573	34	17
Social Work	21	20	31	25	03	500	00	21	79	48	19	19	28	24	10	548	21	20
Sociology	14	20	36	26	05	2598	00	04	96	134	13	19	34	25	09	2732	14	20
Urban Planning	17	16	25	30	11	238	00	14	86	14	16	15	24	29	16	252	17	16
Amer. Thought & Lang.	89	04	02	05	00	6971	00	00	00	00	89	04	02	05	00	6971	89	04
Humanities	13	63	19	06	00	5692	00	00	00	00	13	63	19	06	00	5692	13	63
Natural Science	79	07	07	07	00	5202	00	00	00	00	79	07	07	07	00	5202	79	07
Social Science	18	64	13	05	00	4593	00	00	00	00	18	64	13	05	00	4593	18	64

Table 43--Continued

Department	UNDERGRADUATE COURSES					GRAD COURSES				ALL COURSES						
	Fr	Soph	Jr	Sr	Grad	Total	Jr	Sr	Grad	Total	Fr	Soph	Jr	Sr	Grad	Total
Anatomy	04	34	46	15	01	589	01	03	96	320	02	22	30	11	35	909
Large Animal Surg & Med	00	00	00	00	00	0	00	00	100	226	00	00	00	00	100	226
Medical Technology	03	50	32	11	05	38	00	00	00	0	03	50	32	11	05	38
Microbiology	07	19	24	46	04	661	02	02	96	119	06	16	21	39	18	780
Pathology	00	00	11	79	10	82	00	02	98	184	00	00	03	26	71	266
Pharmacology	00	01	33	53	13	97	00	03	97	113	00	00	15	24	59	210
Physiology	05	17	34	35	09	617	00	02	98	203	03	13	25	27	31	820
Small Animal Surg & Med	00	00	00	00	00	0	00	00	99	431	00	00	00	00	99	431
Family & Community Med	00	00	00	00	00	0	00	00	100	36	00	00	00	00	100	36
Medicine (OH)	00	00	00	00	00	0	00	00	100	74	00	00	00	00	100	74

Table 44. Percentage Distribution of Instructional Service Students by Student Level--Adjusted Data

Department	UNDERGRADUATE COURSES					Total	GRAD. COURSES					Total	ALL COURSES					Total
	Fr	Soph	Jr	Sr	Grad		Jr	Sr	Grad	Total	Fr		Soph	Jr	Sr	Grad		
Agricultural Economics	00	00	00	00	00	0	00	00	100	4	00	00	00	100	4			
Agricultural Engineering	11	05	31	44	09	91	00	05	95	43	07	04	21	31	37	134		
Animal Husbandry	76	05	06	11	01	201	00	00	100	1	76	05	06	11	02	202		
Crop and Soil Science	11	21	36	27	05	299	00	00	100	19	10	19	34	26	11	318		
Dairy	50	06	12	21	12	321	00	00	100	1	49	06	12	20	12	322		
Fisheries & Wildlife	01	02	19	48	30	147	00	00	100	3	01	02	19	47	31	150		
Food Sci. & Human Nutr.	03	16	38	40	04	192	00	00	100	13	03	15	35	37	10	205		
Forestry	21	13	24	32	10	239	00	00	100	18	19	12	23	30	16	257		
Horticulture	07	24	41	27	01	234	00	00	100	7	07	23	39	27	04	241		
Packaging	08	22	29	35	07	63	00	00	100	2	08	22	28	34	09	65		
Parks & Rec. Resources	03	13	21	52	10	202	00	07	94	34	03	11	18	45	22	236		
Poultry Science	00	50	00	00	50	4	00	00	00	0	00	50	00	00	50	4		
Resource Development	03	10	28	43	16	328	03	08	89	66	02	08	24	37	28	394		
Art	16	17	34	30	03	906	14	43	43	7	16	17	33	31	03	913		
English	13	17	42	27	01	2879	00	32	68	71	12	16	41	27	03	2950		
German & Russian	31	25	28	14	02	925	33	33	33	3	31	25	28	15	01	928		
History	14	18	40	27	01	3654	11	03	86	36	14	17	40	27	02	3690		
Linguistics	12	16	29	23	21	198	10	30	60	10	11	15	28	23	23	208		
Music	34	25	26	14	01	1527	00	00	100	1	34	25	26	14	01	1528		
Philosophy	19	23	33	23	02	1649	12	08	80	25	19	22	33	23	03	1674		
Religion	19	22	34	24	01	802	00	00	100	4	19	22	34	24	01	806		
Romance Languages	31	22	27	18	01	2053	00	00	100	7	31	22	27	18	02	2060		
Accounting & Fin. Ad.	03	26	43	27	01	1311	00	04	96	273	03	21	35	24	17	1584		
Bus. Law & Office Ad.	05	08	30	56	01	893	00	13	87	15	05	07	30	56	02	908		
Economics	08	28	38	23	03	2777	00	03	97	396	07	24	33	21	15	3173		
Hotel, Res. & Inst. Mgt.	21	22	33	23	01	108	00	00	100	3	21	22	32	22	03	111		
Management	06	08	36	49	01	1037	00	04	96	493	04	05	25	34	32	1530		
Marketing	01	09	51	38	01	970	01	05	94	192	01	08	43	33	16	1162		
Advertising	11	31	36	20	02	536	00	00	100	11	11	30	35	19	04	547		
Audiology & Speech Sci.	10	23	41	25	02	241	00	100	00	1	10	23	40	25	02	242		
Communications	45	18	23	14	00	1282	02	03	95	120	42	16	21	13	08	1402		
Journalism	18	14	29	37	02	287	00	30	70	10	18	13	28	36	05	297		
TV and Radio	17	26	21	29	07	224	00	00	100	7	17	25	20	28	10	231		
Theatre	10	20	38	29	03	195	00	00	100	1	10	19	38	29	03	196		

Table 44--Continued

Department	UNDERGRADUATE COURSES						GRAD. COURSES				ALL COURSES					
	Fr	Soph	Jr	Sr	Grad	Total	Jr	Sr	Grad	Total	Fr	Soph	Jr	Sr	Grad	Total
Chemical Engineering	00	22	00	67	11	9	00	00	100	9	00	11	00	33	56	18
Civil & Sanitary Eng.	03	17	39	35	06	127	00	12	88	8	03	16	36	34	11	135
Computer Science	24	21	33	14	08	1083	46	27	27	11	24	21	33	15	08	1094
Electrical Engineering	00	06	53	37	04	157	04	14	82	85	00	04	35	29	32	242
Mechanical Engineering	04	10	26	44	16	69	00	00	100	5	04	09	24	41	22	74
Metal., Mech. & Mat.Sci.	01	22	57	20	00	592	00	17	83	35	01	21	54	19	05	627
Family Ecology	18	06	39	36	01	329	00	12	88	32	16	06	35	34	09	361
Family & Child Science	07	21	40	23	04	827	00	00	100	21	07	20	39	27	06	848
Human Nutrition & Foods	17	22	38	18	04	408	33	00	67	3	17	21	38	18	05	411
Human Envir. & Design	26	25	27	21	01	425	00	00	100	4	26	24	27	20	02	429
Human Development	00	00	00	00	00	0	00	00	00	0	00	00	00	00	00	0
Medicine (HM)	00	00	00	00	00	0	00	00	00	0	00	00	00	00	00	0
Psychiatry	00	00	00	00	00	0	00	00	00	0	00	00	00	00	00	0
Astronomy	10	21	37	32	01	362	00	00	00	0	10	21	37	32	01	362
Biochemistry	01	04	37	18	40	356	04	04	91	82	00	03	31	16	50	438
Biophysics	00	00	00	00	00	0	12	38	50	8	00	00	12	38	50	8
Botany & Plant Path.	01	16	39	29	15	249	00	00	100	43	01	13	33	25	27	292
Chemistry	56	19	15	08	01	4700	05	21	74	58	55	19	15	08	02	4758
Entomology	02	11	49	33	05	446	00	00	100	20	02	10	47	32	09	466
Geology	11	19	38	30	01	641	00	33	66	18	11	19	37	30	03	659
Mathematics	54	19	15	08	03	5423	11	13	76	45	54	19	15	08	04	5468
Nursing	00	29	43	14	14	7	00	00	00	0	00	29	43	14	14	7
Physics	06	47	34	12	01	2716	00	48	52	21	06	46	34	12	01	2737
Statistics	03	19	36	23	19	1275	10	17	73	78	03	18	35	22	22	1353
Zoology	02	09	43	39	06	1082	00	14	86	22	03	09	42	39	07	1104
Anthropology	27	22	30	20	01	2017	05	00	95	20	26	22	30	20	02	2037
Criminal Justice	31	26	20	22	01	583	00	11	89	18	30	26	20	21	03	601
Geography	13	18	34	33	02	1153	00	25	75	12	13	18	33	33	03	1165
Labor & Industrial Rel.	00	00	00	00	00	0	00	09	91	54	00	00	00	09	91	54
Political Science	15	18	40	26	01	2136	03	12	85	26	15	17	40	26	02	2162
Psychology	34	17	27	20	02	6402	02	08	90	171	34	17	26	19	04	6573
Social Work	21	20	31	25	03	500	00	21	79	48	19	19	28	24	10	548
Sociology	14	20	36	26	05	2598	00	04	96	134	13	19	34	25	09	2732
Urban Plan. & Land.Arch.	11	16	27	33	12	219	00	14	86	14	10	15	26	32	17	233
Amer. Thought & Language	88	04	02	06	00	6744	00	00	00	0	88	04	02	06	00	6744
Humanities	13	63	19	06	00	5692	00	00	00	0	13	63	19	06	00	5692
Natural Science	79	07	07	07	00	5202	00	00	00	0	79	07	07	07	00	5202
Social Science	18	64	13	05	00	4593	00	00	00	0	18	64	13	05	00	4593

Table 44--Continued

Department	UNDERGRADUATE COURSES						GRAD COURSES				ALL COURSES					
	Fr	Soph	Jr	Sr	Grad	Total	Jr	Sr	Grad	Total	Fr	Soph	Jr	Sr	Grad	Total
Anatomy	04	34	46	15	01	589	00	09	91	35	03	32	44	15	06	624
Large Animal Surg & Med	00	00	00	00	00	0	00	00	00	0	00	00	00	00	00	0 0
Medical Technology	03	50	32	11	05	38	00	00	00	0	03	50	32	11	05	38
Microbiology	02	18	26	49	04	617	07	07	86	14	02	18	26	48	06	631
Pathology	00	00	11	79	10	82	00	02	98	89	00	00	05	39	56	171
Pharmacology	00	01	33	53	13	97	00	00	00	0	00	01	33	53	13	97
Physiology	05	17	34	35	09	617	00	07	93	14	04	17	33	34	11	631
Small Animal Surg & Med	00	00	00	00	00	0	00	00	100	4	00	00	00	00	100	4
Family & Community Med	00	00	00	00	00	0	00	00	00	0	00	00	00	00	00	0
Medicine (OM)	00	00	00	00	00	0	00	00	00	0	00	00	00	00	00	0

Table 45. Factor Scores

Department	1	2	3	4	5	6
Ag. Economics	341	238	1,338	76	18	98
Ag. Engineering	3,926	579	952	105	1,241	245
Animal Husbandry	2,067	88	1,567	45	789	28
Crop & Soil Sci.	5,152	476	1,066	108	769	191
Dairy	3,113	140	868	83	926	26
Fisheries & Wildlife	1,311	476	4,900	216	435	0
Food Sci. & Human Nutr.	2,306	484	974	152	720	10
Forestry	5,156	344	2,698	81	979	33
Horticulture	4,164	431	1,565	105	1,301	127
Packaging	3,590	190	3,620	20	619	0
Park & Rec. Resources	3,345	560	1,980	13	83	0
Poultry Science	204	113	333	75	0	4
Resource Development	4,403	1,562	1,871	94	0	21
Art	18,629	947	8,643	391	4,717	0
English	38,626	2,001	11,025	393	657	327
German & Russian	11,454	507	1,467	87	291	0
History	35,908	2,266	7,672	309	2,265	0
Linguistics	2,927	380	367	32	269	0
Music	23,773	1,089	7,196	263	4,341	0
Philosophy	14,994	565	1,586	127	216	0
Religion	6,741	18	305	8	0	0
Romance Languages	26,178	797	4,071	83	449	0
Acct. & Finance Adm.	24,229	4,288	8,832	200	632	82
Bus. Law & Office Adm.	10,564	103	3,001	21	371	38
Economics	34,223	4,949	4,430	263	0	0
Hotel, Rest., & Inst. Mgt.	5,097	344	5,456	0	754	0
Management	12,523	6,035	3,960	293	732	0
Marketing & Transp. Adm.	10,838	4,314	4,764	204	1,794	17
Advertising	6,855	176	3,810	14	693	5
Audiology & Speech Sci.	3,731	742	2,497	209	279	3
Communications	15,288	1,983	4,089	160	0	0
Journalism	6,233	417	4,909	46	1,006	0
TV & Radio	6,458	723	4,406	59	510	0
Theatre	4,036	370	2,126	63	863	0
Chemical Engineering	1,433	365	1,595	64	0	0
Civil & Sanitary Eng.	2,926	618	3,093	75	866	0
Computer Science	12,934	1,476	3,490	68	506	0
Electrical Engineering	8,893	933	5,459	116	402	0
Mechanical Engineering	3,515	347	3,573	61	655	0
Metal, Mech. & Mat. Sci.	6,046	649	780	94	515	0
Family Ecology	4,243	438	604	106	365	0
Family & Child Sci.	7,997	564	2,917	110	248	0
Human Nutr. & Foods	4,713	111	1,522	39	931	0
Human Envir. & Design	13,603	408	8,632	34	2,526	0
Human Development	3	3	0	1	0	0
Medicine (HM)	1,085	1,274	1,522	281	119	0
Psychiatry	55	56	-5	29	0	0

1

Table 45--Continued

Department	1	2	3	4	5	6
Astronomy	3,745	1	507	0	36	0
Biochemistry	5,611	1,342	2,613	263	350	63
Biophysics	169	311	227	57	0	0
Botany & Plant Path.	3,286	983	1,048	263	1,096	62
Chemistry	34,940	2,142	3,990	684	11,159	0
Entomology	3,478	376	813	139	624	8
Geology	5,727	470	1,463	135	1,310	0
Mathematics	71,718	3,897	2,822	370	7,173	329
Nursing	3,694	0	6,012	0	1,396	0
Physics	19,392	1,392	2,385	312	3,125	0
Statistics	11,138	1,284	898	85	1,541	0
Zoology	12,334	803	5,411	273	2,252	0
Anthropology	18,997	567	2,264	302	3,234	0
Criminal Justice	19,734	895	9,854	375	604	0
Geography	9,828	873	1,909	297	2,506	0
Labor & Indust. Rel.	741	1,556	560	30	0	0
Political Science	25,768	778	5,360	125	0	0
Psychology	68,087	4,997	7,533	1,231	1,447	0
Social Work	9,554	4,003	6,420	26	756	0
Sociology	26,344	1,958	4,199	753	172	0
Urban Plan. & Land. Arch.	7,272	1,144	3,668	22	1,251	11
Amer. Thought & Lang.	57,048	0	66	0	0	124
Humanities	56,461	0	23	0	992	0
Natural Science	43,059	0	53	0	12,006	0
Social Science	44,943	0	130	0	918	0
Anatomy	7,944	3,132	361	322	446	0
Lg. Anim. Surg. & Med.	1,440	2,764	-34	7	0	0
Medical Technology	810	0	3,310	0	0	0
Microbiology	6,110	1,812	1,604	113	2,362	24
Pathology	1,728	1,971	179	73	332	0
Pharmacology	1,371	1,247	217	89	0	0
Physiology	5,926	2,660	802	141	1,645	0
Sm. Anim. Surg. & Med.	1,388	2,412	-72	43	0	0
Family & Comm. Med.	98	168	-11	0	0	0
Medicine (OM)	234	415	-22	0	0	0

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