A STUDY OF THE ROLE OF RESEARCH IN THE NATURAL SCIENCES AT UNDERGRADUATE INSTITUTIONS

ACADEMIC EXCELLENCE

THE SOURCEBOOK

SPONSORED BY: THE CAMILLE AND HENRY DREYFUS FOUNDATION
THE ROBERT A. WELCH FOUNDATION • W. M. KECK FOUNDATION
M. J. MURDOCK CHARITABLE TRUST • RESEARCH CORPORATION

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INTRODUCTION

This Study was undertaken to provide a basic understanding of the environment for research in the natural sciences at predominantly undergraduate colleges and universities. These institutions have served as a national resource for a significant proportion of students who undertake professional careers in the sciences,[1] and a primary reason cited for their output has been the research experiences of undergraduate students with faculty mentors.[2] However, prior to the Study there was a growing perception that the number and quality of proposals from their science faculty was declining and that external funding opportunities for research were shrinking. Furthermore, several sources were reporting that faculty time was being stretched beyond its limits, and there was evidence from selected institutions of moderation in their number of science baccalaureates and a decline in the number of peer-reviewed publications from science faculty.

Concern over these perceived trends, expressed at a meeting in May of 1999 with representatives of private foundations having programmatic interests in the sciences, was the origin of this Study. Since the sampling of schools and programs that suggested these trends was limited, there was agreement that collection of relevant information would be required and that presentation of these data to an assembly of college presidents would be desirable. A conference at Oberlin College in 1985 of presidents from 48 selected private colleges and universities had previously received information that included self-reported data about research activity and the baccalaureate origins of Ph.D.s in science and mathematics.[1] That conference and subsequent developments had impact on a number of programmatic and attitudinal changes that subsequently benefited the sciences at liberal arts colleges.

The five private foundations listed on the cover page of this Study, and in all of its correspondence, have funded this project. Representatives of these foundations provided the intellectual guidance and oversight for the design and evolution of the Study into its present form. This evolution resulted from two subsequent meetings in 1999, during which three consultants were actively involved in assisting the foundation representatives to focus the Study. A meeting in March of 2000 with the presidents of ten private and public undergraduate institutions advised the foundation representatives that the direction being taken in the Study would be of benefit to their institutions and that they were supportive. The Study was operated from Research Corporation because of space and personnel considerations, the latter relating to the availability of two talented scientists who have managed the Study, the data acquisition, and the presentation of Study results.

OVERVIEW OF THE STUDY FORMS, SURVEYS AND INSTITUTION SELECTIONS

Two Survey forms were created to access information not readily available in order to assess the environment for research at predominantly undergraduate institutions. The Institutional Survey (Appendix A) would provide critical information about the flow of funding into the natural sciences, information on internal budgets, faculty and staff sizes, library budgets and holdings, student involvement in research, and perceived changes in time allocations and institutional trends. The Faculty Survey (Appendix B) would provide critical activity on individual faculty activities in obtaining external grants, publishing peer-reviewed papers, student involvement in research as evidenced by coauthorship of these papers, invited talks by faculty, and perceived changes in time allocations and institutional trends. Both surveys invited essay responses to a broad range of considerations. Separately the surveys were intended to provide different vantage points with which to assess the environments for research in the natural sciences at the surveyed institutions. Together, we anticipated that the surveys could provide a multidimensional assessment that would assist foundations, government, and especially the institutions, both administration and faculty, to understand the complex environments that exist in the natural sciences as well as their singular impact and placement relative to other institutions.

From the start we recognized that there was an abundance of information relating to the Study that was publicly available. This included enrollment and degree demographics, baccalaureate origins of Ph.D.s in the sciences, grant awards from several private foundations and government agencies, and institutional endowments. Some of this data was readily accessible, but most was not. One of the great challenges of this endeavor was to obtain this information for the surveyed institutions and, whenever possible and appropriate, for the entire community of predominantly undergraduate institutions.

The Study was restricted to the natural sciences, and the primary reasons for this were the similarities of the natural sciences in requirements (facilities, laboratories, research performance, for example) combined with the interests of the sponsoring foundations. For the vast majority of the surveyed institutions, the departments of biology, chemistry, earth science or geology, and physics constitute the natural sciences. At other institutions natural sciences also include agricultural sciences, astronomy, biochemistry, environmental sciences, or neuroscience or a combination of these. The Study did not include mathematics, computer or information science, engineering, or any other departments or departmental units that could not be identified with the natural sciences. However, interdisciplinary natural science units such as neurobiology that existed in a department outside of the survey were included.

Following the March 2000 meeting with representative college presidents and receipt of their advice, the sponsoring foundations set out to identify those institutions, public and private, that would be included in the Survey. The only significant criteria were that there would be perceived research activity and that there be representation from a broad array of private and public, bachelors degree-granting and advanced degree-granting institutions. A few doctoral institutions were included, but no Research I (Carnegie Classification) institution was selected. Geographical considerations were also relevant. Foundation representatives added and removed institutions known to them and to their organizations. In the end the presidents of 191 institutions were invited to participate in the Study and the attendant Conference, and 159 responded affirmatively. When deadlines for submission of survey information could no longer be extended, 136 institutions had completed the institutional survey (see pages 45–47 for an alphabetical listing); and 132 institutions had submitted faculty surveys.

The institutions that were not able to participate rarely gave reasons, but those that did informed us that there was an absence of requested information at their institution or that they did not have sufficient time or personnel with which to conduct the surveys. One of the institutions informed us that "Much of the data requested are not on file . . . . In some instances, we only keep records for a period of one or two years . . . ."

However, there was no obvious pattern from the schools that declined to participate, and the reasons for their declination must be considered to be because of individual circumstances and interests.

THE INSTITUTIONAL SURVEY AND ITS RELIABILITY

Invitations to presidents of 191 institutions were sent at the end of May in 2000, with follow-up correspondence in July and August, and the surveys were sent to them following their agreement to take part in the Study. Return of the completed Institutional Survey was requested for mid-September, and many were received by this time, but the bulk arrived during the ensuing month. There is no doubt that this was a laborious process for each participating institution. Unfortunately, institutional size and activity increased the workload, but as highly productive faculty who provide annual reports also understand, this is the price paid for prominence.

Various interpretations were used by institutions in completing the data requested in the Institutional Surveys, and not all information requested was available to the institution. Extensive cross checks were used to determine the completeness of contributed data. In some cases, for example, the narrative mentioned a renovation or construction that was not included in the section on grants and awards. In such instances contact was made with the institution to clarify this matter. In addition, a letter was sent to all participating institutions requesting additional information that might not have been included in the original submission. The additional information received (about 5% of the total entered) added to our sense of confidence in the completeness of the data. However, we observed that "General Institutional Support for Physical and Life Sciences" was not available to several institutions prior to 1994.

How reliable are these data? We are certain that some institutions have not included all of the appropriate funding made available to the natural sciences and their faculty, and that there were other institutions that included funding more appropriate to other instructional units. Overall, however, we are confident that we have accessed the vast majority of available resources. As cross checks on reporting, reported institutional data for faculty research grants obtained from the Petroleum Research Fund of the American Chemical Society as well as from Research Corporation was compared with public records from these funding sources; there was greater than 90% correspondence. Reporting for awards received from the Camille and Henry Dreyfus Foundation and from the Howard Hughes Medical Institute offered similar levels of confidence.

All of the data was checked and rechecked by those managing the Study as well as through computational assessments that could identify "outliers." When there was such a discrepancy, the institution was contacted to ascertain the validity of the information. Still, we remain skeptical about the uniform validity of some categories of information. This is especially true for categories 3–7 of General Institutional Support for Physical and Life Sciences (page 6 of the Institutional Survey, Appendix A) and for the number of junior and senior majors and the number of research students (academic year) from Instructional Effort (page 7 of the Institutional Survey). In cases where the data requested are not routinely accessed or for which there are multiple interpretations, there is decreased reliability.

The vast majority of respondents provided one-to-three page narratives that addressed issues related to the Study. As a primary goal, the Study sought the institution's perspective on "recent trends and evident needs in the physical and life sciences." In some cases we were informed that the narratives represented consensus impressions of several persons or groups; in most they are the views of the institutional respondent. The narratives were abstracted for the SourceBook according to the primary focus of the comment with any reference that could identify the source expunged to ensure confidentiality. The number of times a trend or need was listed is taken as a reflection of the intensity of the concern expressed, and this is captured in Section 7 by noting the volume of comments in the selected categories. Most institutions provided advice to answer the question of "How could external public and private funding sources best structure their programs to adjust to recent trends and evident needs?"

FACULTY PERSPECTIVES AND THEIR RELIABILITY

Faculty surveys were due one month following the Institutional Survey, and considerable flexibility was provided to institutions to assist them in the reporting process. Overall, nearly 70% of natural science faculty at the surveyed institutions responded—nearly 3,000—and their efforts are greatly appreciated. Percent response varied from institution to institution, from 20% to more than 90% with four of the 136 surveyed institutions having either no or an unusable faculty response. We are aware of heroic efforts made by several institutions to insure a high response. We are also aware of institutions at which faculty were concerned about unintended uses of the surveys, at which faculty resented this encroachment on their limited time, and at which there was little incentive or instruction given to faculty to prepare their survey forms.

Here the labor of the Study increased by at least an order of magnitude. Few institutions provided faculty responses using the recommended formats, and often the faculty included their information in a form associated with them individually or that was peculiar to their institution. Consequently, there was a significantly higher degree of interpretation required for the faculty survey than for its institutional counterpart. In many instances, the appropriate category for grant awards was not provided, and institutional or departmental awards were listed by faculty as individual grants. This was particularly true of large awards from foundations such as HHMI and in listing grants received for major instrumentation. In some cases, faculty included publications that could not be judged as having been peer-reviewed; if this judgement could be confirmed, these publications were not included in the survey results. Finally, our intent to designate invited presentations was missed by most faculty who generally listed every place and time that they gave a talk, poster, or workshop.

Institutions with a high percentage of faculty response provide a good indication of faculty activity and attitudes. The institutional data drawn from their faculty have a validity that is high. For institutions that had low faculty response there is a corresponding uncertainty with their composite data. We do not have a rigorous measure of which faculty, if any, are underrepresented in providing their Faculty Perspectives. There were very few faculty surveys submitted from departments that did not fit the Study criteria for natural sciences.

Because of time pressures, the SourceBook does not contain excerpts of Narrative Perspectives on Resource Allocation Trends and Needs from the faculty. These will be provided in the future. However, from a preliminary reading we can say that faculty narrative responses do not necessarily reflect "institutional" responses and that less than half of the surveyed faculty wrote any response.

DATA ENTRY

The principal task confronting those directly involved with the Study surveys was the correct coding of the data and their entry into the database that was prepared for future access. Early in the period of data collection from Institutional Surveys we recognized that the information being provided could be categorized and subcategorized to optimize search characteristics. An extensive coding system was developed for the Institutional Survey to designate the source and purpose of grants and funding. The coding system was consistent with the initial categories on the survey forms but extended beyond them to specify the nature of the activity (for example, the specific funding source, whether the award was for basic research or education, if the purpose was the acquisition of instrumentation, curriculum development, or basic/applied research). Another coding system was devised for the Faculty Perspectives to allow entry of such items as faculty rank, number and dollar amount of grants received, total publications and research publications, and invited talks. Overall, more than 110,000 individual items were separately coded. Each was checked and rechecked for accuracy and consistency by persons other than the one making the entry, and we would estimate that there is a high uniformity in these designations.

Certain categories could not be used effectively because of different meanings that they have in different disciplines. One of these was the "on campus/off campus" designation. Originally intended to allow differentiation between research at the home institution and research carried out at another academic institution, a company, or a national facility, we were rapidly made aware that field research was generally considered to be "off campus." Consequently, although the on campus/off campus differentiation may have disciplinary relevance, overall significance related to research performed on campus or off campus cannot be judged.

In addition to the categories that required specific coding, there were extensive efforts to ensure that all of the data provided could be entered into accessible tables.

Innumerable items were entered, and these entries were checked and then searched computationally for "outliers" and inconsistencies. Following entry into individual institutional tables in Excel, the composite was then entered into the FoxPro database management system. The resulting database was the source from which the outcomes of composite institutional and faculty information have been taken.

The overall intent of this Study was to learn more about the natural sciences at predominantly undergraduate institutions. As the Study was proceding, we were asked what we anticipated to be the outcome. What did we expect to change? Our answer was that we had no hidden intent, that we expected as many surprises as confirmations of our original views, but with the accumulated data we could make informed decisions. The information in the SourceBook serves as a resource for decision-making in predominantly undergraduate institutions, private foundations or government agencies, and professional associations. If there is sufficient interest, a more complete report will be published in the future.

Michael P. Doyle, Vice President
Research Corporation

Tucson, Arizona
June 1, 2001

SECTION 1:
THE INSTITUTIONS AND VALIDITY OF THE DATA

George Rubottom, Coordinator, Academic Excellence Study

The selection of the Study group and the collection of data through self-reporting are two aspects of the Study that should be addressed. The following comparisons attempt to place the Study group in perspective and to give some level of confidence in the institutional data obtained from the Study.

THE INSTITUTIONS

With a total of 136 institutions taking part in the Study, the question arose as to whether the group was representative of the broader community of predominantly undergraduate institutions (PUIs). Two comparisons were made that indicate that this is the case. The first was a comparison of trends in natural science baccalaureate production and the second was a comparison of funding profiles based on the frequency of receiving individual research awards.

SCIENCE BACCALAUREATE PRODUCTION

The Study group was compared to a group of 1,115 PUIs that included the Study group to see if trends in production of natural science baccalaureate degrees were similar in the two groups. The comparisons show striking similarities in the trends of production of baccalaureates in astronomy, chemistry, physics, geosciences and the biological sciences.

The source for all baccalaureate production data was the National Science Foundation WebCASPAR database and counts were derived from the Integrated Postsecondary Education System (IPEDS) Completions Report contained therein. Dr. Richard S. Myers, Associate Provost for Budget and Institutional Research at Williams College provided this data for the Study. Science baccalaureates from 1984–1985 to 1996–1997 were included. The comparisons are shown in Table 1.1 and Table 1.2 and in Figures 1.1–1.12.

FREQUENCY OF INDIVIDUAL RESEARCH AWARDS

The frequency with which the Study group received individual research awards from a combination of funding agencies (Figure 1.13) was compared to the frequency for all awardees (Figure 1.14). The funding programs chosen were the Research Corporation Cottrell College Science Awards Program, the American Chemical Society-Petroleum Research Fund Type B Program, the National Science Foundation Research in Undergraduate Institutions (RUI-Research) Program (Natural Sciences only) and the National Institutes of Health Academic Research Enhancement Award (AREA) Program. As seen in the chart showing “Total Frequency of Research Corporation (CCSA), PRF (Type B), NSF (RUI Research) and NIH (AREA) Awards 1986–2000,” approximately 50% of the institutions received three or fewer awards over the period 1986–2000. With the Study group, the grant activity is greater than with the total group but enough of the low frequency grant recipients were included so that selection of an “elite” group was avoided. The reader is encouraged to consult the Global Data section of the SourceBook for full citing of data sources and restrictions on the frequency data presented.

VALIDITY OF THE DATA

The data in the Study was generated by self-reporting from the Study group. Therefore it was felt to be important to give an example of the validity of the data when compared to known values. To this end, a comparison was made between the actual funding awarded to the Study group by the Research Corporation Cottrell College Science Award (CCSA) Program, the American Chemical Society-Petroleum Research Fund (ACS-PRF) Type B Program, the Howard Hughes Medical Institute (HHMI) (awards from 1990 until June, 2000 only) and the Camille and Henry Dreyfus Foundation and the numbers reported by the group. As noted, the correspondence between actual and reported values is high.

Funding Source	**Actual $**	**Reported $**	**% Correspondence**
ACS-PRF Type B	$10,177,739	$9,966,930	97.7%
Research Corp. (CCSA)	$13,024,762	$12,049,085	92.5%
HHMI (1990 – 6/2000)	$63,550,000	$58,228,215	91.6%
Dreyfus Foundation (1990–2000)	$7,381,661	$6,419,942	87.0%

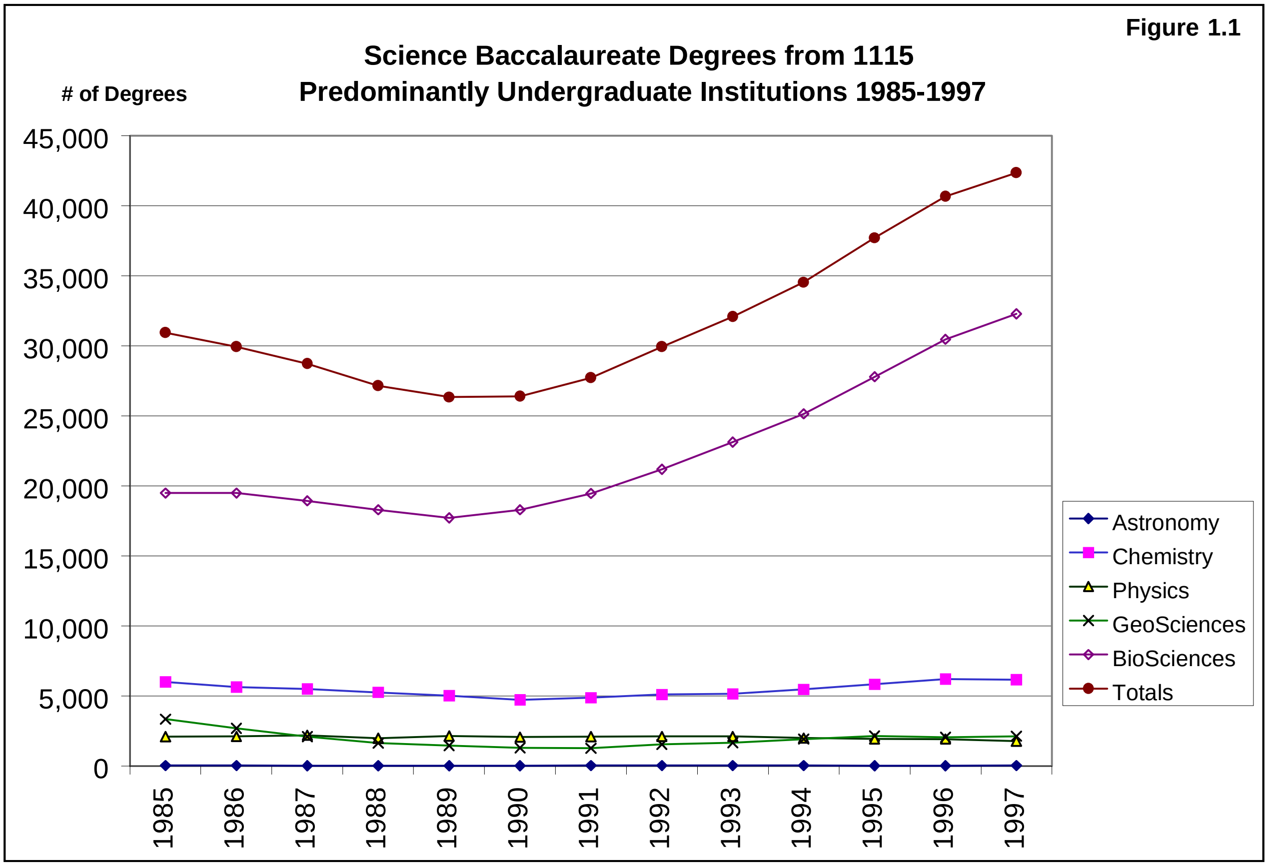


Table 1.1. Science Baccalaureate Degrees from 1115 Predominantly Undergraduate Institutions 1985–1997

Year	Astronomy	Chemistry	Physics	GeoSciences	BioSciences	Totals
1985	25	6,004	2,087	3,344	19,482	30,942
1986	24	5,632	2,107	2,685	19,490	29,938
1987	16	5,499	2,191	2,088	18,931	28,725
1988	14	5,262	1,973	1,630	18,283	27,162
1989	21	5,018	2,142	1,447	17,720	26,348
1990	21	4,727	2,063	1,290	18,288	26,389
1991	29	4,876	2,092	1,262	19,455	27,714
1992	28	5,088	2,111	1,531	21,185	29,943
1993	30	5,146	2,114	1,662	23,130	32,082
1994	33	5,459	1,992	1,910	25,137	34,531
1995	18	5,828	1,934	2,144	27,797	37,721
1996	23	6,215	1,911	2,048	30,471	40,668
1997	25	6,162	1,781	2,120	32,284	42,372
Totals	307	70,916	26,498	25,161	291,653	414,535

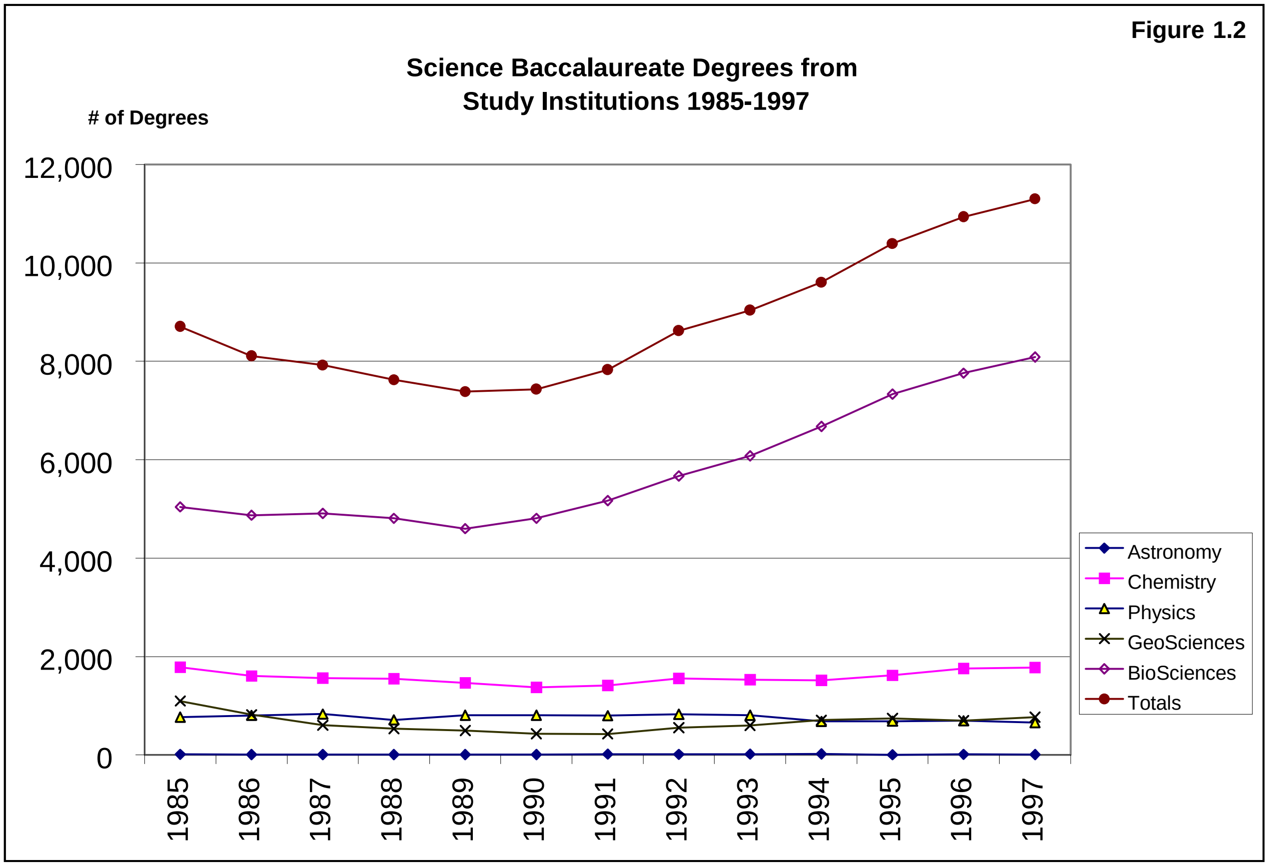


Table 1.2. Science Baccalaureate Degrees from Study Institutions 1985–1997

Year	Astronomy	Chemistry	Physics	GeoSciences	BioSciences	Totals
1985	15	1,781	770	1,097	5,040	8,703
1986	9	1,604	805	820	4,871	8,109
1987	10	1,565	834	605	4,910	7,924
1988	10	1,548	714	538	4,811	7,621
1989	11	1,465	809	494	4,602	7,381
1990	9	1,371	810	431	4,809	7,430
1991	19	1,414	798	426	5,170	7,827
1992	14	1,553	828	554	5,668	8,617
1993	16	1,533	809	602	6,076	9,036
1994	23	1,516	681	709	6,677	9,606
1995	6	1,619	686	745	7,333	10,389
1996	13	1,759	697	702	7,759	10,930
1997	10	1,778	657	767	8,088	11,300
Totals	165	20,506	9,898	8,490	75,814	114,873

Figure 1.3

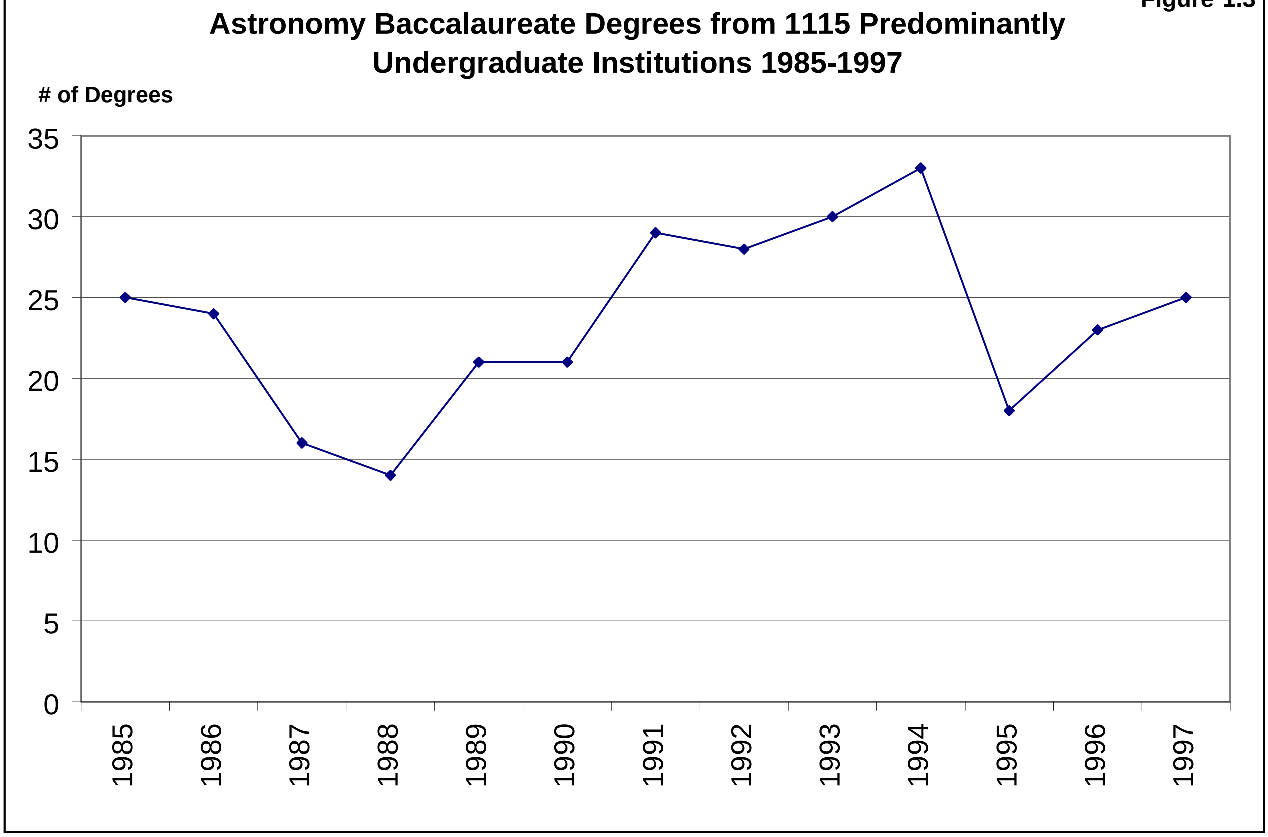
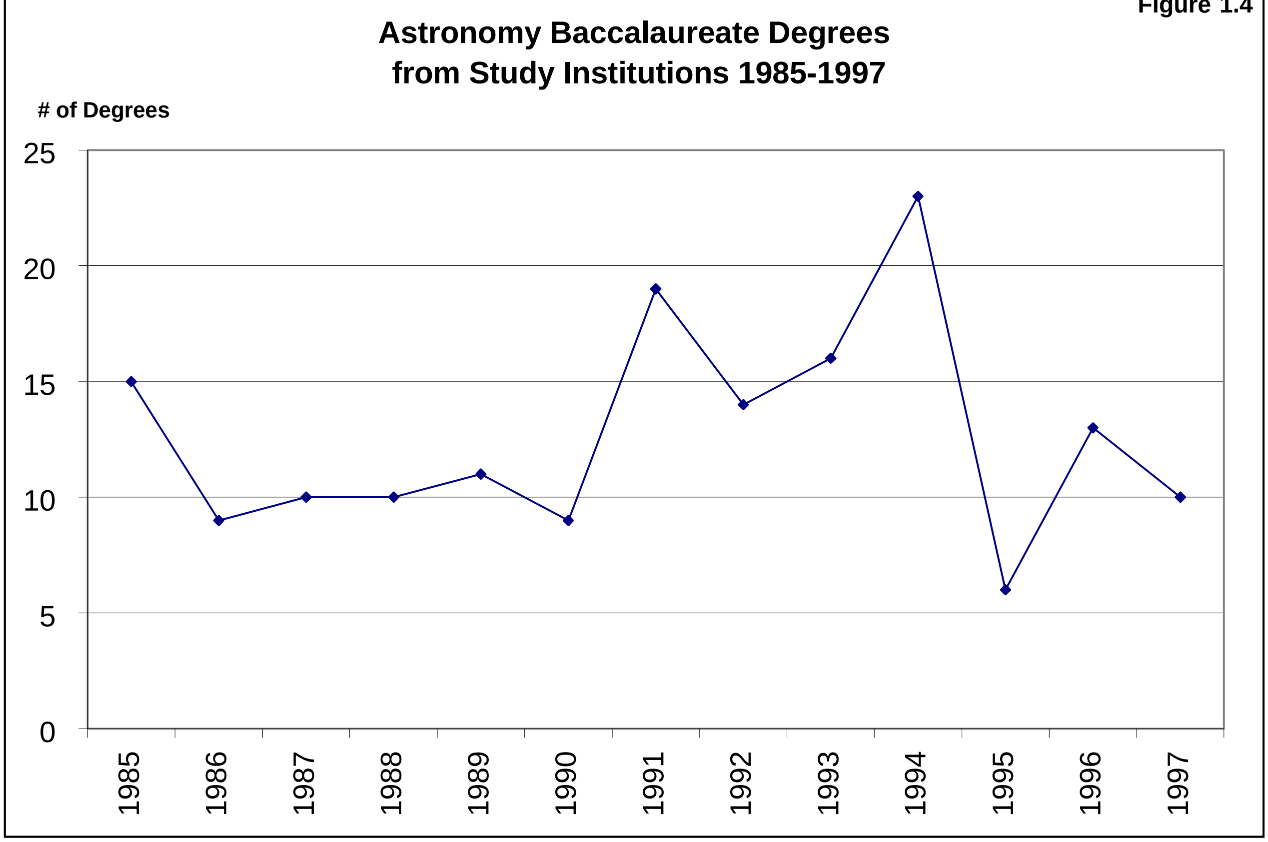


Figure 1.4



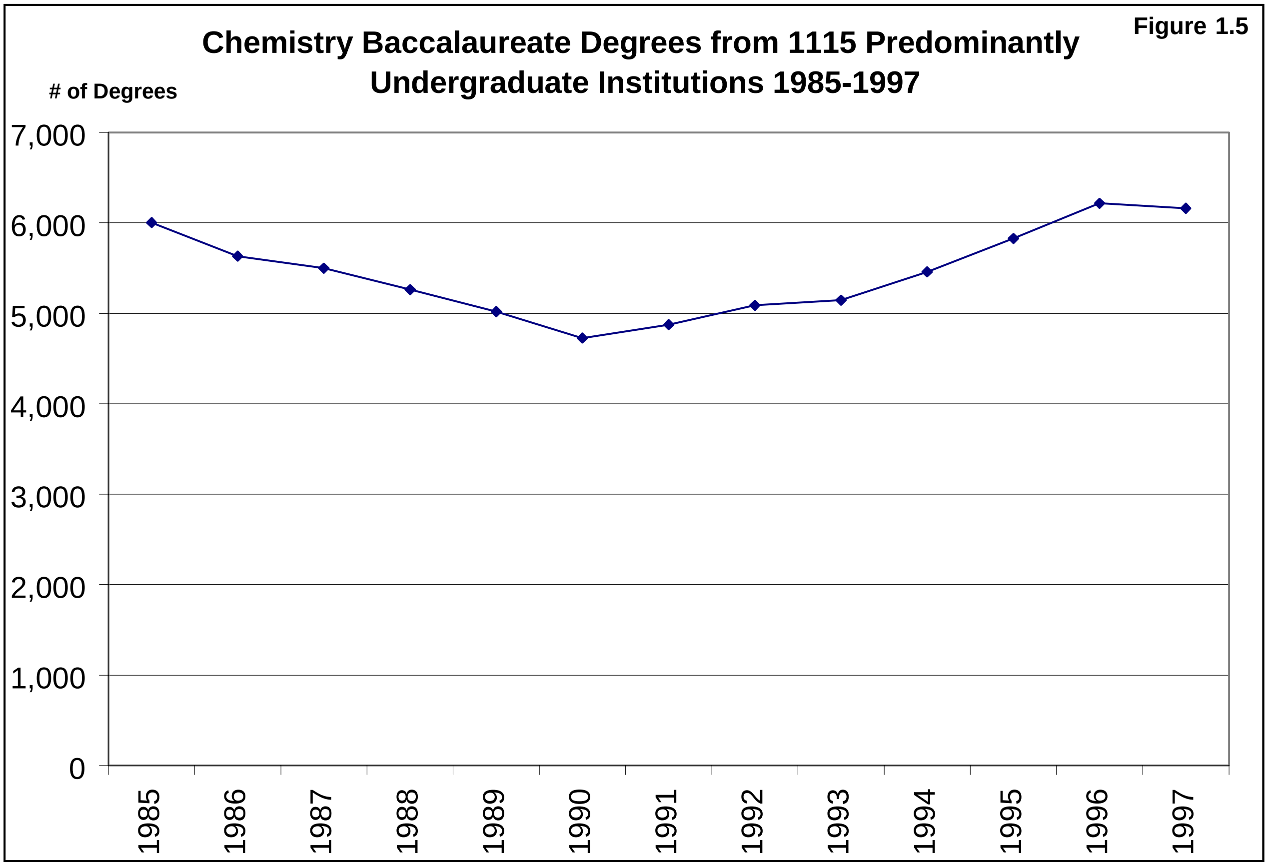


Figure 1.5
Chemistry Baccalaureate Degrees from 1115 Predominantly Undergraduate Institutions 1985-1997
# of Degrees
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997

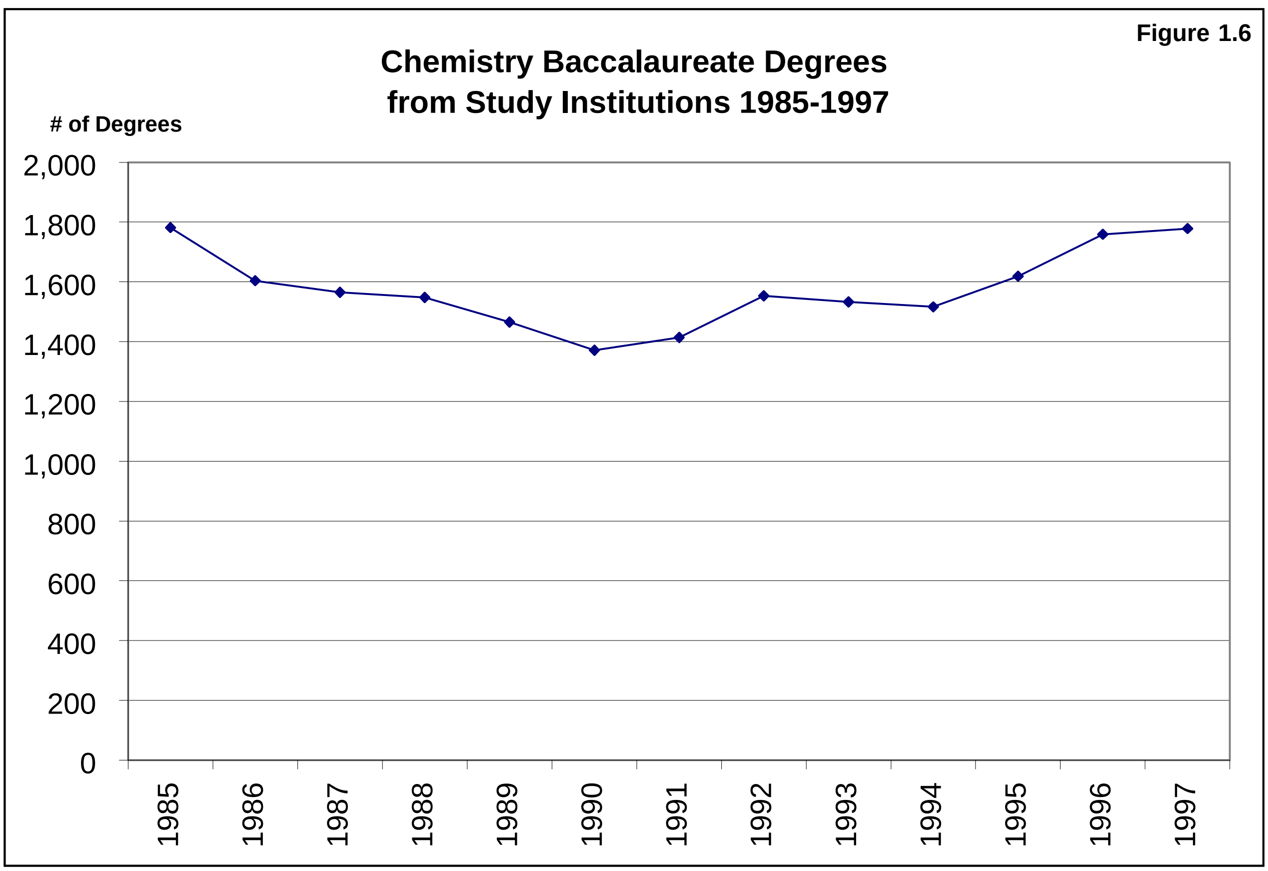
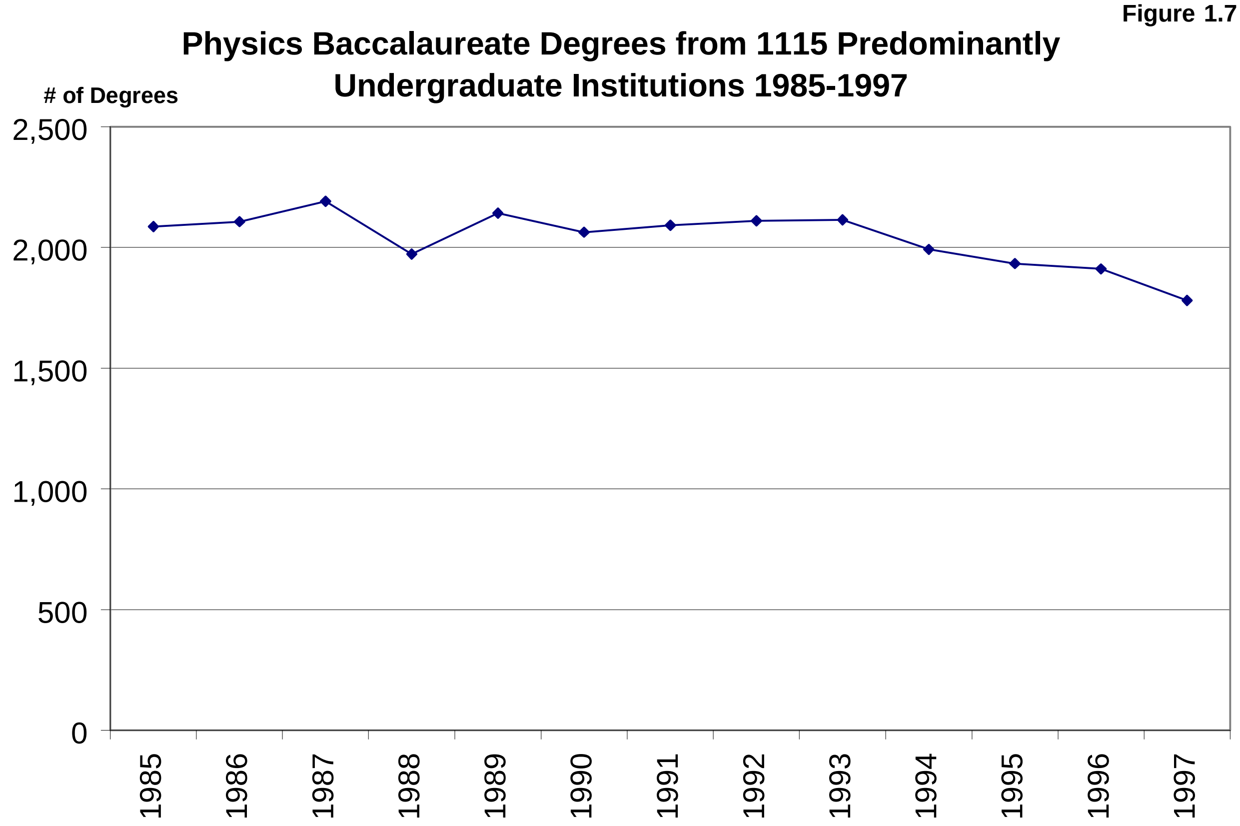


Figure 1.6
Chemistry Baccalaureate Degrees from Study Institutions 1985-1997
# of Degrees
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997

Figure 1.7



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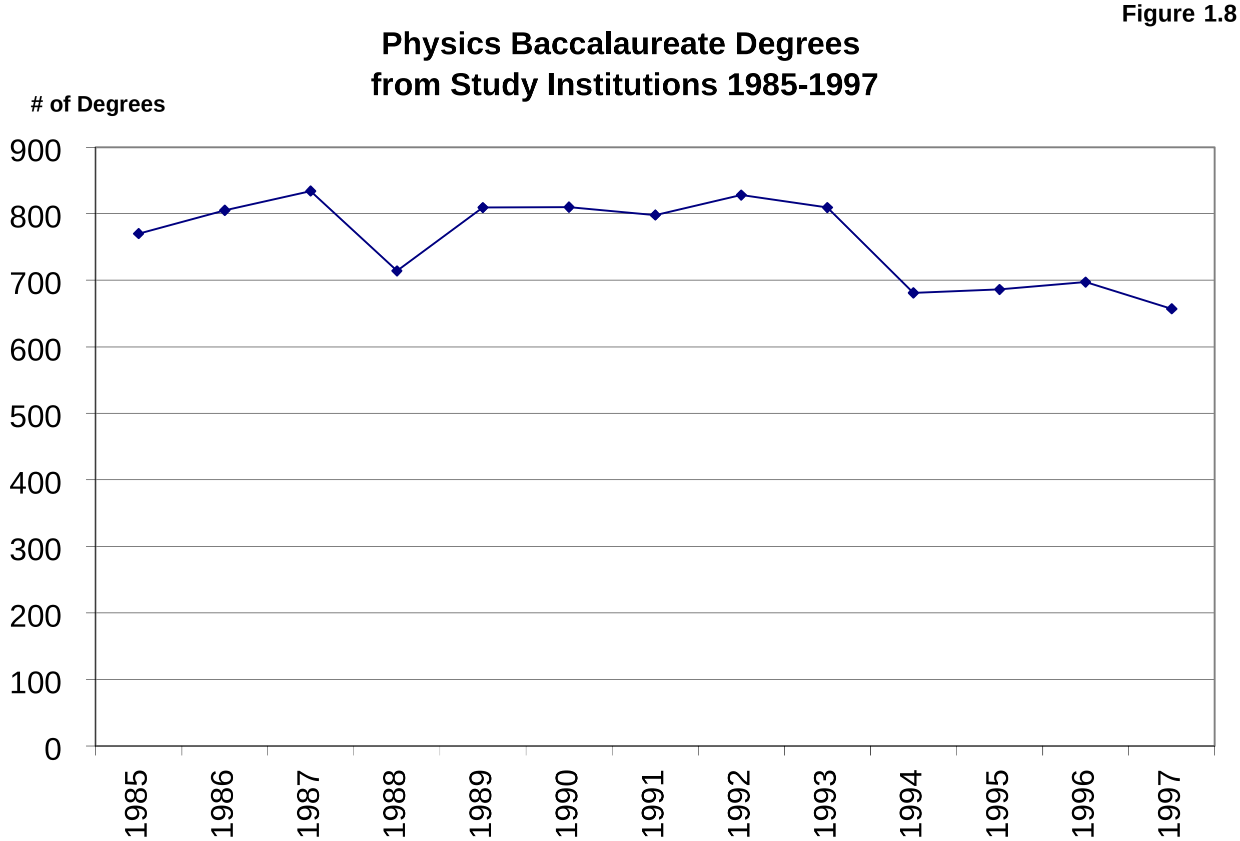


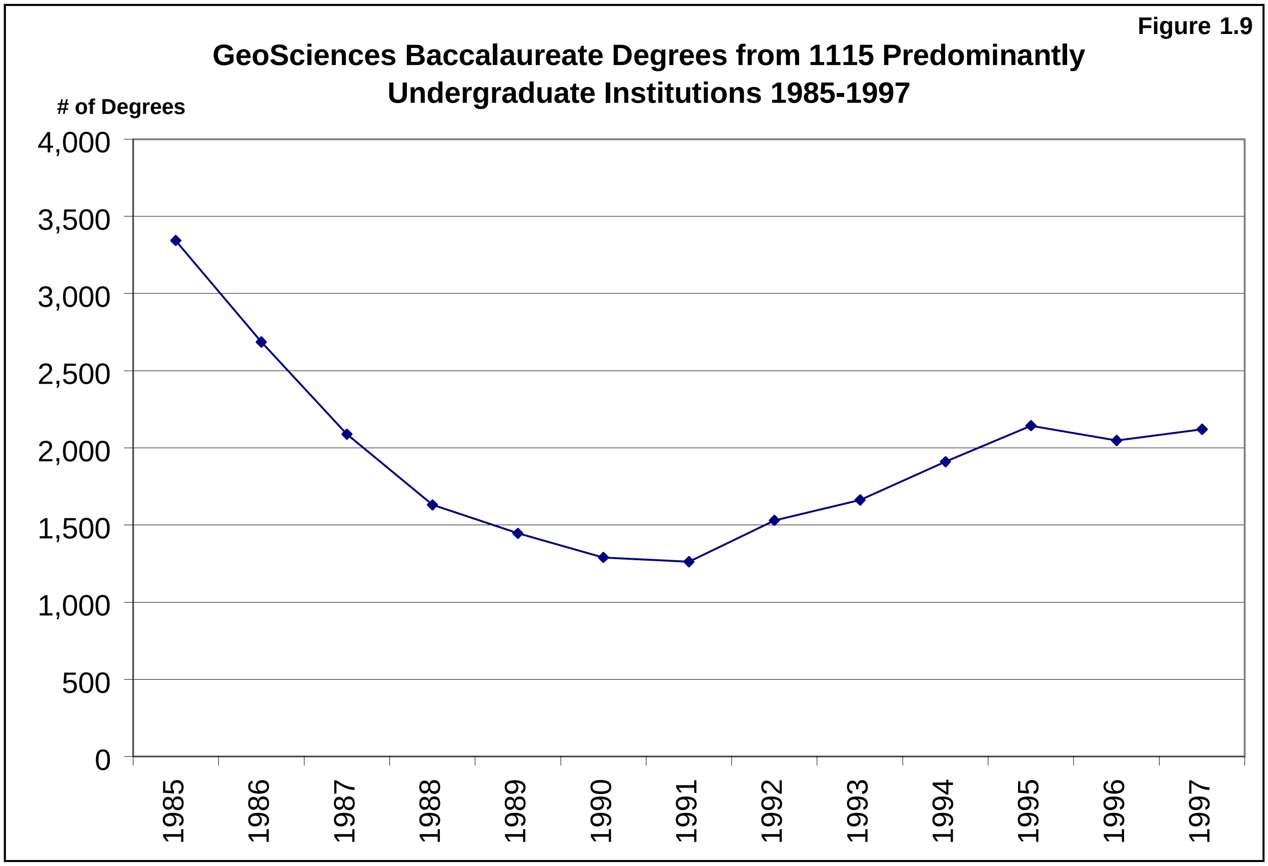


Figure 1.9
GeoSciences Baccalaureate Degrees from 1115 Predominantly Undergraduate Institutions 1985-1997
# of Degrees
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997

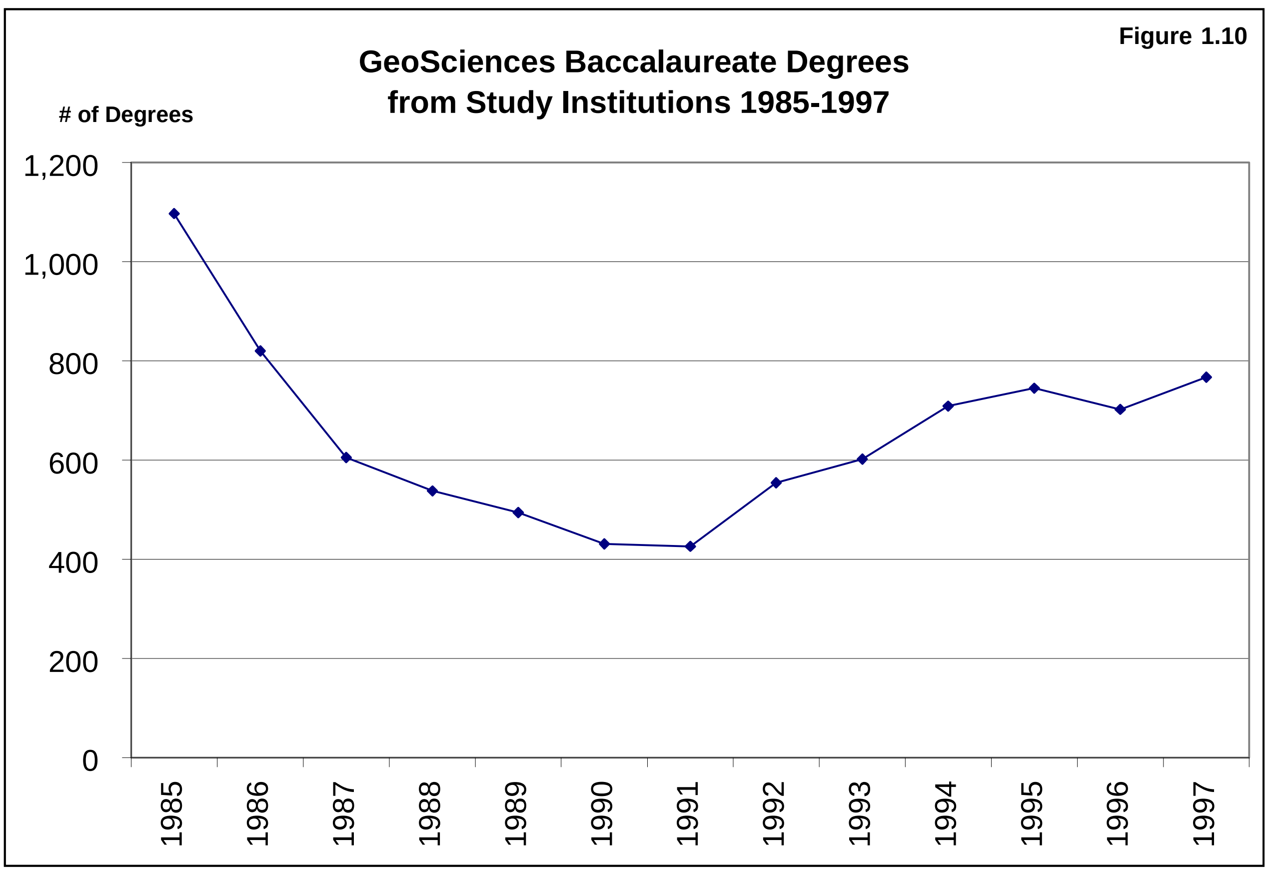


Figure 1.10
GeoSciences Baccalaureate Degrees from Study Institutions 1985-1997
# of Degrees
1,200
1,000
800
600
400
200
0
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997

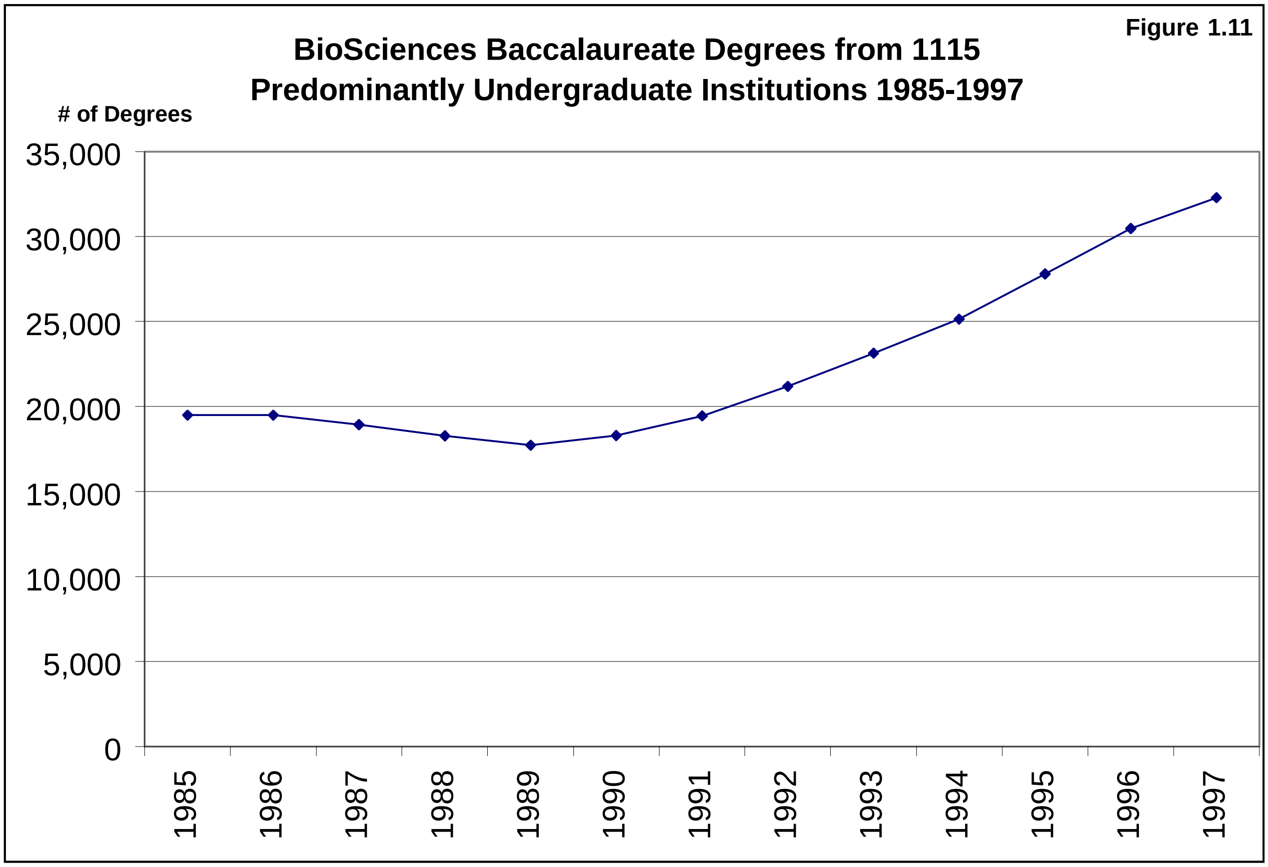


Figure 1.11
BioSciences Baccalaureate Degrees from 1115
Predominantly Undergraduate Institutions 1985-1997
# of Degrees
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997

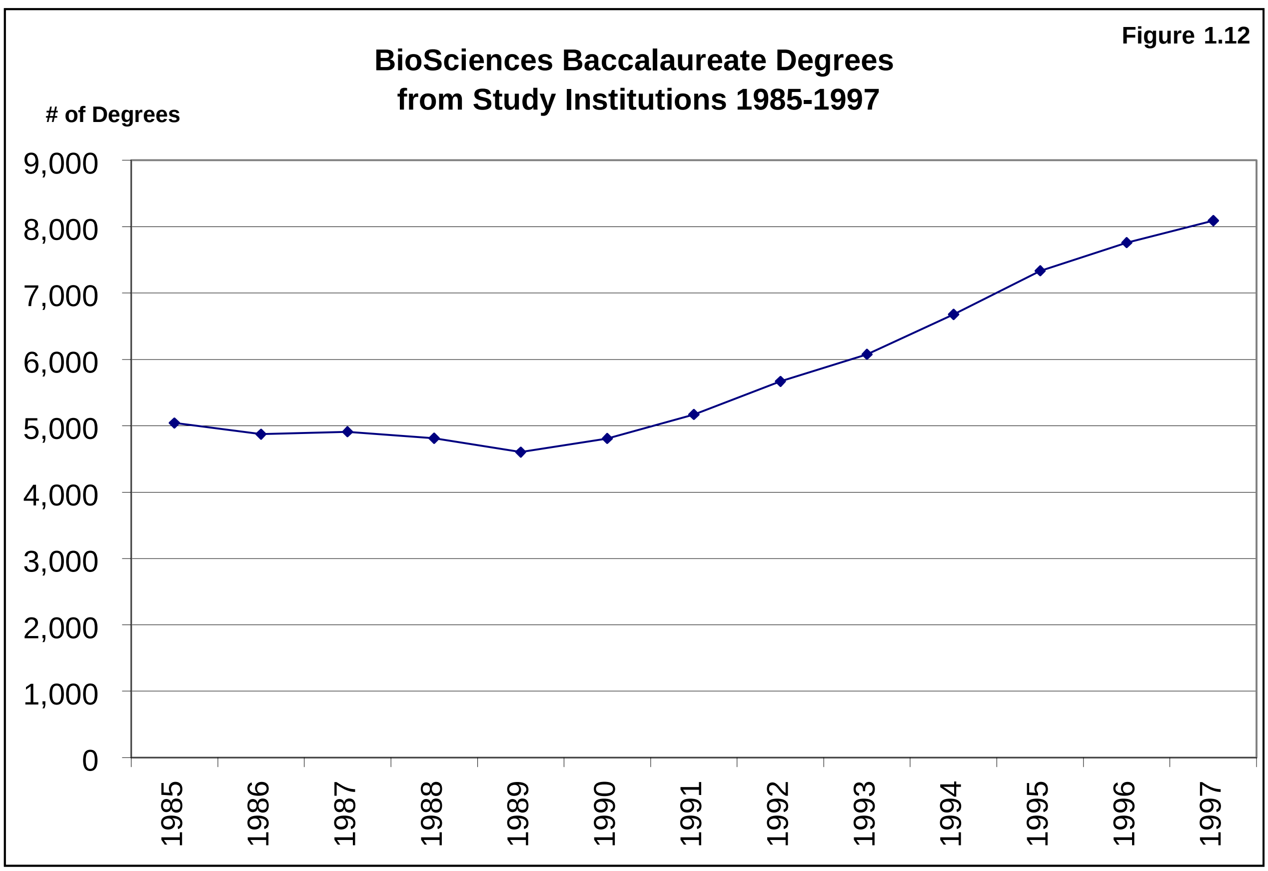
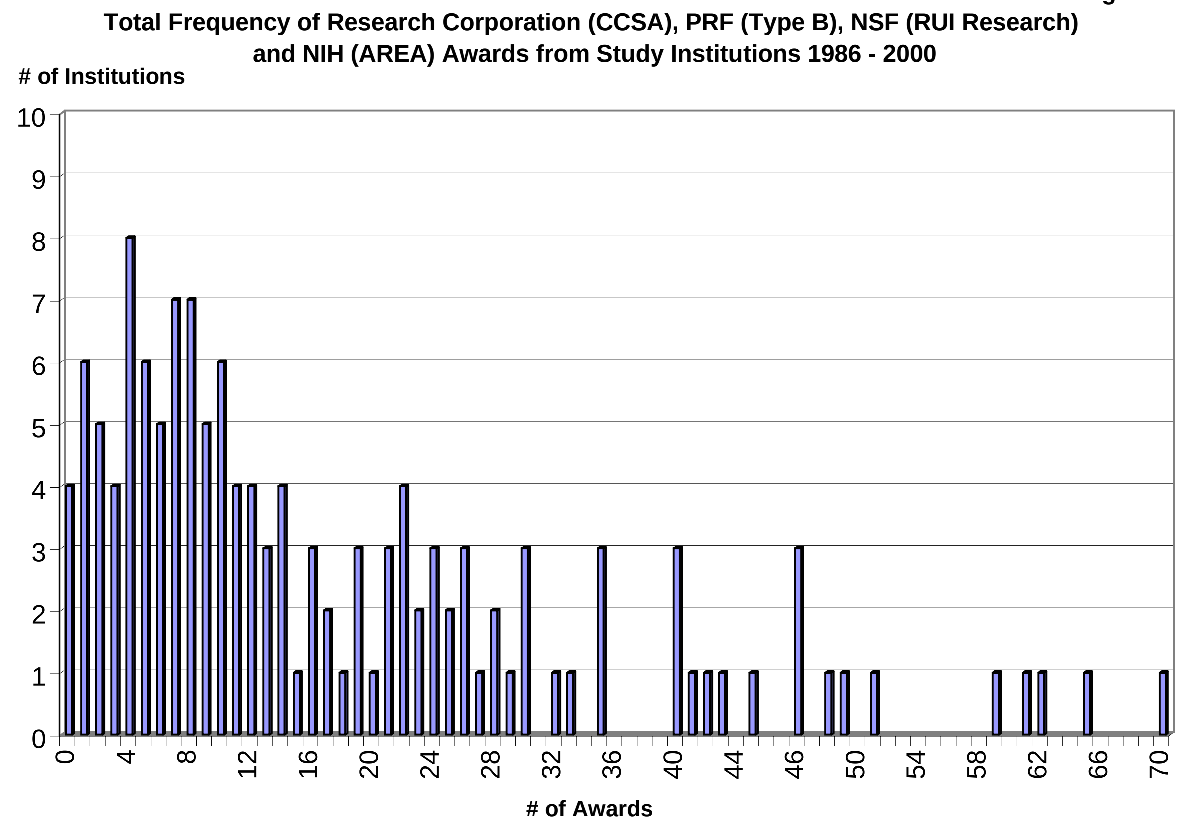


Figure 1.12
BioSciences Baccalaureate Degrees
from Study Institutions 1985-1997
# of Degrees
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997

Figure 1.13



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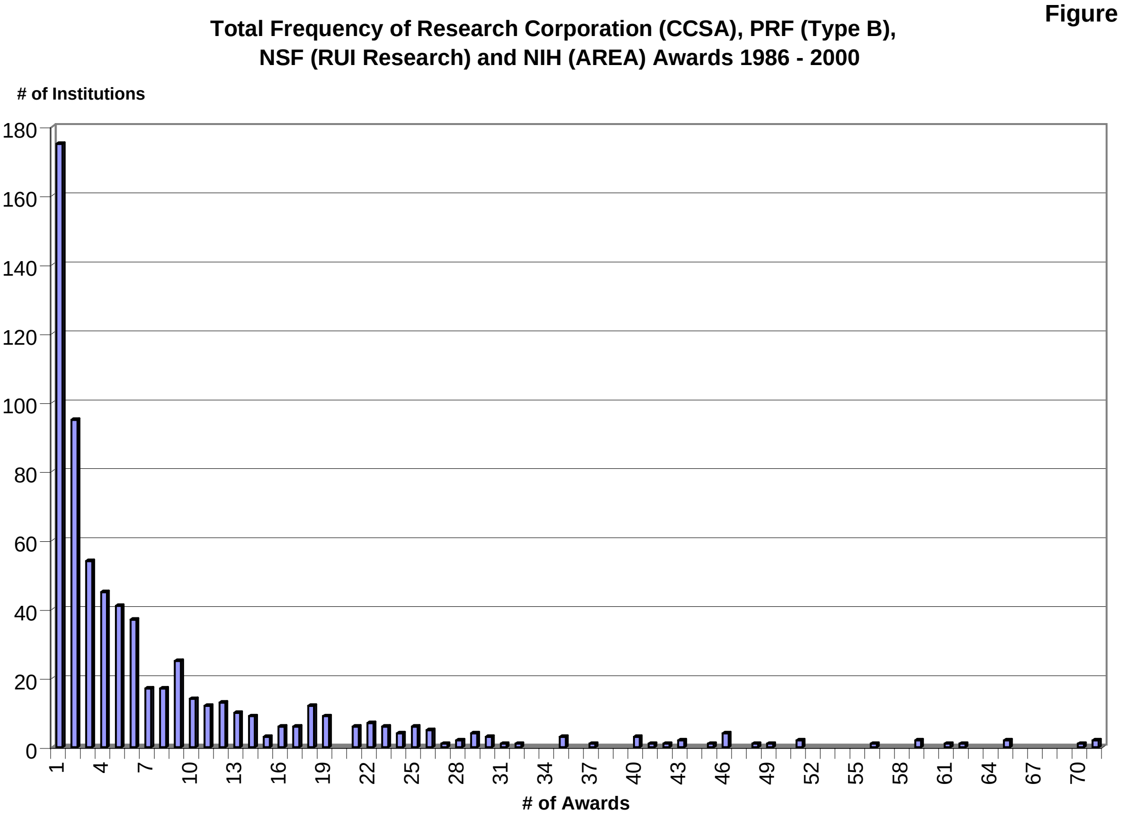

SECTION 2:
INSTITUTIONAL DATA FROM EXTERNAL SOURCES

George Rubottom, Coordinator, Academic Excellence Study

All of the data presented in this section were assembled from public sources with the intention of giving a more comprehensive picture of the Study institutions. The institutions were designated as to class and type with the former roughly paralleling the Carnegie Classification and the latter differentiating between public and private institutions. Data describing enrollment, degree and graduation statistics, are given along with listings of SAT median scores, estimated costs for the school year 1999–2000 and institutional endowments as of June 30, 1999. Numbers of awards from major funding sources were also assembled. The sources of the data, along with pertinent restrictions to the data are noted as follows:

CLASS AND TYPE OF INSTITUTION

Institutions were assigned the designation "Class B" if the highest degree granted in the natural sciences was the Baccalaureate. Institutions awarding an advanced degree in at least one of the natural sciences were assigned the designation "Class A." Institutional catalogs were used as the source for checking these assignments. Public institutions were described as "Type S" and private institutions were described as "Type P."

ENROLLMENT, DEGREE AND GRADUATION DATA

The source for all enrollment, degree, graduation and baccalaureate origin of Ph.D.s data used in Tables 2.1–2.8 and Table 2.10 was the National Science Foundation WebCASPAR database and counts were derived from the Integrated Postsecondary Education System (IPEDS) Completions Report contained therein. WebCASPAR can be accessed through the NSF home page at http://www. nsf.gov by clicking on "Science Statistics." Dr. Richard S. Myers, Associate Provost for Budget and Institutional Research at Williams College provided these data for the Study.

Full Time Undergraduate Enrollments, from 1985–1986 to 1997–1998, based on opening Fall enrollment were used. Science baccalaureates from 1984–1985 to 1996–1997 were included. Double majors were assigned one major in all these counts due to the form of the Completions Report. Counts of Science degrees were limited to a selected group of fields that included *astronomy, chemistry, physics, geosciences and biological sciences.* It is important to note that *mathematics, engineering, computer related areas, agricultural areas and fields related directly to medicine were not included.*

SAT I VERBAL AND SAT I MATHEMATICS DATA

The SAT I verbal and SAT I mathematics median scores for the Study institutions found in Table 2.9 were those listed in *Profiles of American Colleges, 2001*, 24th Edition, Barron's Educational Series, Inc.

COST FOR SCHOOL YEAR 1999–2000

Estimated costs for the 1999–2000 school year, when available, were those listed in the *College Facts Chart, 1999–*

2000, 44th Edition, Lori Guthrie, Editor, The National Beta Club, Spartanburg, S.C. When the data were not available, institutional catalogs or queries to institutional representatives afforded the information. These data are presented in Table 2.9.

FISCAL YEAR 1999 ENDOWMENTS

Values for endowments, as of June 30, 1999, were taken from the Facts and Figures Section of the February 18, 2000 issue of *The Chronicle of Higher Education.* For those institutions not listed in the article, the data were obtained by contacting the appropriate institutional representative. Table 2.9 contains these values

AWARDS TO THE STUDY GROUP FROM RESEARCH CORPORATION, THE PETROLEUM RESEARCH FUND, THE NATIONAL SCIENCE FOUNDATION, AND THE NATIONAL INSTITUTES OF HEALTH

The awards listed in Table 2.11 include totals from the Research Corporation Cottrell College Science Award (CCSA) Program (1986–2000), the American Chemical Society Petroleum Research Fund (ACS-PRF) Type B Program (1986–2000), the National Sciences Foundation (NSF) Research in Undergraduate Institutions (RUI)-Research Program (1986–2000) and the National Institutes of Health (NIH) Academic Research Enhancement Award (AREA) Program (1985–1999).

NSF RUI-Research awards are those from the natural sciences only and NIH-AREA awards include only those to departments related to the natural sciences. Data for NSF "mainstream" awards and NIH R01 awards are not included. The reader is encouraged to consult the Global Data section of the Source Book for full citing of data sources and restrictions on the data presented.

AWARDS TO THE STUDY GROUP FROM THE CAMILLE AND HENRY DREYFUS FOUNDATION AND HOWARD HUGHES MEDICAL INSTITUTE (HHMI)

Data for Dreyfus Foundation awards for the period 1990–2000 (Table 2.12) and Howard Hughes Medical Institute (HHMI) Undergraduate Biological Sciences Education, Colleges awards for the period 1988–2000 (Table 2.13) were included in this section.

Table 2.1. Science Baccalaureate Degrees from Study Institutions 1985–1997*

Study (*)	Academic Institution	Class	Type	Astr	Chem	Phys	GeoSci	BioSci	Total
*	College of William and Mary	A	S	0	585	220	175	1,403	2,383
*	California State Poly U-San Luis Obispo	A	S	0	164	145	0	1,968	2,277
*	University of PR Mayaguez Campus	A	S	0	361	87	66	1,558	2,072
*	California State University-Long Beach	A	S	0	292	101	90	1,481	1,964
*	San Jose State University	A	S	0	374	251	213	1,126	1,964
*	College of Charleston	A	S	0	209	95	131	1,389	1,824
*	Central Michigan University	A	S	2	221	27	458	1,094	1,802
*	Humboldt State University	A	S	0	76	66	414	1,181	1,737
*	University of Wisconsin-Stevens Point	B	S	0	199	30	0	1,401	1,630
*	Eastern Michigan University	A	S	0	212	101	333	957	1,603
*	Northern Arizona University	A	S	1	264	55	275	977	1,572
*	Eastern Illinois University	A	S	0	137	75	176	1,182	1,570
*	University of Scranton	A	P	0	270	47	0	1,245	1,562
*	Bucknell University	A	P	0	225	56	78	1,086	1,445
*	James Madison University	A	S	0	204	80	164	981	1,429
*	University of Wisconsin-Eau Claire	A	S	0	297	126	109	884	1,416
*	University of Minnesota - Duluth	A	S	0	269	41	220	877	1,407
*	Wake Forest University	A	P	0	271	108	0	1,013	1,392
*	Creighton University	B	P	0	303	65	80	936	1,384
*	Oberlin College	B	P	0	183	111	81	965	1,340
*	SUNY College at Geneseo	B	S	0	118	204	106	895	1,323
*	Carleton College	B	P	0	334	227	252	505	1,318
*	Southwest Missouri State University	A	S	0	218	60	139	857	1,274
*	Western Washington University	A	S	1	165	115	256	718	1,255
*	University of Northern Iowa	A	S	0	258	83	130	766	1,237
*	Colgate University	B	P	4	163	89	305	655	1,216
*	Augustana College (Rock Island, IL)	B	P	0	107	90	57	903	1,157
*	Western Kentucky University	A	S	0	186	108	125	728	1,147
*	Gustavus Adolphus College	B	P	0	198	153	71	719	1,141
*	Colorado College	B	P	0	140	115	166	715	1,136
*	Towson State University	A	S	0	102	104	0	910	1,116
*	Middle Tennessee State University	A	S	0	247	36	115	694	1,092
*	Southwest Texas State University	A	S	0	163	113	0	804	1,080
*	Rochester Institute of Technology	A	P	0	329	97	0	646	1,072
*	Hope College	B	P	0	360	75	62	573	1,070
*	St Lawrence University	B	P	0	116	44	129	777	1,066
*	Smith College	B	P	7	99	58	129	765	1,058
*	Mount Holyoke College	B	P	7	114	72	62	793	1,048
*	Williams College	B	P	26	325	97	123	474	1,045
*	Furman University	A	P	0	263	76	83	601	1,023
*	Southern Illinois University at Edwardsville	A	S	0	248	59	59	656	1,022
*	College of the Holy Cross	B	P	0	318	152	0	531	1,001
*	Franklin and Marshall College	B	P	0	208	118	163	483	972
*	Occidental College	B	P	0	111	143	60	638	952
*	Bowdoin College	B	P	0	150	101	35	663	949

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Table 2.1. Science Baccalaureate Degrees from Study Institutions 1985–1997

Study (*)	Academic Institution	Class	Type	Astr	Chem	Phys	GeoSci	BioSci	Total
*	Luther College	B	P	0	83	77	0	780	940
*	John Carroll University	A	P	0	239	97	0	567	903
*	Allegheny College	B	P	0	196	99	54	551	900
*	Wellesley College	B	P	25	159	58	54	604	900
*	Fairfield University	B	P	0	89	55	0	749	893
*	Colby College	B	P	0	112	56	89	631	888
*	Central Washington University	A	S	0	75	54	76	677	882
*	Middlebury College	B	P	0	147	109	100	523	879
*	University of Tennessee at Chattanooga	B	S	0	348	81	42	398	869
*	University of Richmond	A	P	0	215	31	0	611	857
*	Union College (Schenectady, NY)	B	P	0	131	49	33	641	854
*	Pacific Lutheran University	B	P	0	117	51	54	630	852
*	Bates College	B	P	0	117	128	66	537	848
*	College of St Benedict / St John's U.	B	P	0	189	83	0	567	839
*	Lafayette College	B	P	0	136	36	55	602	829
*	Reed College	B	P	0	172	204	0	433	809
*	Wesleyan University	B	P	30	122	126	0	518	796
*	Fort Lewis College	B	S	0	173	47	161	413	794
*	Trinity University	B	P	0	97	50	78	554	779
*	Grinnell College	B	P	0	225	135	0	413	773
*	Fordham University	A	P	0	128	67	0	570	765
*	Calvin College	B	P	0	138	29	69	526	762
*	DePauw University	B	P	0	164	61	49	474	748
*	Juniata College	B	P	0	155	29	94	463	741
*	College of Wooster	B	P	0	270	76	121	272	739
*	Haverford College	B	P	23	158	107	23	419	730
*	University of Puget Sound	B	P	0	106	136	53	427	722
*	University of Dayton	A	P	0	186	55	50	421	712
*	Swarthmore College	B	P	18	91	98	0	497	704
*	Santa Clara University	B	P	0	111	50	0	531	692
*	Pomona College	B	P	0	135	120	50	376	681
*	Denison University	B	P	0	96	63	98	421	678
*	Wheaton College (Wheaton, IL)	B	P	0	183	63	47	379	672
*	Whitman College	B	P	2	89	141	146	279	657
*	Kalamazoo College	B	P	0	187	106	0	353	646
*	Illinois Wesleyan University	B	P	0	88	91	0	466	645
*	Barnard College	B	P	5	71	19	7	539	641
*	Davidson College	B	P	0	121	68	0	450	639
*	University of San Diego	A	P	0	141	23	0	470	634
*	Lawrence University	B	P	0	96	95	65	371	627
*	Canisius College	B	P	0	144	22	0	459	625
*	Earlham College	B	P	0	88	55	55	423	621
*	Hendrix College	B	P	0	129	80	17	395	621
*	Northern Kentucky University	B	S	0	102	95	25	391	613
*	Spelman College	B	P	0	191	34	0	387	612

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Table 2.1. Science Baccalaureate Degrees from Study Institutions 1985–1997

Study (*)	Academic Institution	Class	Type	Astr	Chem	Phys	GeoSci	BioSci	Total
*	Washington and Lee University	B	P	0	156	21	93	340	610
*	Dickinson College	B	P	0	131	93	67	316	607
*	Harvey Mudd College	B	P	0	208	319	2	77	606
*	Bryn Mawr College	A	P	11	184	91	51	264	601
*	Trinity College (Hartford, CT)	B	P	0	91	21	0	470	582
*	Gettysburg College	B	P	0	91	54	9	420	574
*	Connecticut College	B	P	2	36	29	0	498	565
*	University of St Thomas (Saint Paul, MN)	A	P	0	122	28	27	379	556
*	Macalester College	B	P	0	89	57	92	308	546
*	Austin College	B	P	0	88	16	0	438	542
*	Knox College	B	P	0	180	40	9	305	534
*	Ohio Wesleyan University	B	P	1	75	55	35	341	507
*	Centre College	B	P	0	75	66	0	358	499
*	Lewis and Clark College	B	P	0	76	56	0	367	499
*	Hamilton College	B	P	0	51	68	123	251	493
*	Skidmore College	B	P	0	25	10	52	406	493
*	University of the Pacific	A	P	0	55	14	45	367	481
*	Wabash College	B	P	0	148	60	0	271	479
*	Willamette University	B	P	0	113	45	0	321	479
*	Ithaca College	B	P	0	102	74	0	295	471
*	University of Central Arkansas	A	S	0	81	40	0	350	471
*	University of North Carolina at Asheville	B	S	0	59	36	113	258	466
*	Butler University	B	P	0	163	52	0	250	465
*	Drury University	B	P	0	63	14	0	382	459
*	Beloit College	B	P	0	67	48	67	273	455
*	Coastal Carolina University	B	S	0	2	0	0	448	450
*	Southwestern University	B	P	0	123	8	0	278	409
*	Hartwick College	B	P	0	42	26	74	241	383
*	Centenary College of Louisiana	B	P	0	28	38	110	201	377
*	Mississippi College	B	P	0	105	7	0	249	361
*	University of Portland	B	P	0	39	28	0	293	360
*	Gonzaga University	B	P	0	49	20	0	284	353
*	University of North Florida	B	S	0	95	0	0	246	341
*	Dillard University	B	P	0	84	51	0	177	312
*	Lake Forest College	B	P	0	92	39	0	178	309
*	Ripon College	B	P	0	82	29	0	193	304
*	Coe College	B	P	0	49	35	0	218	302
*	Linfield College	B	P	0	51	65	0	166	282
*	Morehouse College	B	P	0	79	89	0	108	276
*	Randolph-Macon College	B	P	0	40	20	0	209	269
*	Texas Lutheran University	B	P	0	106	3	0	144	253
*	Rose-Hulman Institute of Technology	A	P	0	83	148	0	0	231
*	Goucher College	B	P	0	62	0	0	168	230
*	Texas Wesleyan University	B	P	0	51	0	0	128	179
*	Mount St Mary's College	B	P	0	4	0	0	151	155
*	Chatham College	B	P	0	45	0	0	98	143

*table sorted on total

Table 2.2. Astronomy Baccalaureate Degrees from Study Institutions 1985–1997

Academic Institution	Class	Type	Astronomy Degrees
Wesleyan University	B	P	30
Williams College	B	P	26
Wellesley College	B	P	25
Haverford College	B	P	23
Swarthmore College	B	P	18
Bryn Mawr College	A	P	11
Mount Holyoke College	B	P	7
Smith College	B	P	7
Barnard College	B	P	5
Colgate University	B	P	4
Central Michigan University	A	S	2
Connecticut College	B	P	2
Whitman College	B	P	2
Northern Arizona University	A	S	1
Ohio Wesleyan University	B	P	1
Western Washington University	A	S	1

Table 2.3. Chemistry Baccalaureate Degrees from Study Institutions 1985–1997

Academic Institution	Class	Type	Chemistry Degrees
College of William and Mary	A	S	585
San Jose State University	A	S	374
University of PR Mayaguez Campus	A	S	361
Hope College	B	P	360
University of Tennessee at Chattanooga	B	S	348
Carleton College	B	P	334
Rochester Institute of Technology	A	P	329
Williams College	B	P	325
College of the Holy Cross	B	P	318
Creighton University	B	P	303
University of Wisconsin-Eau Claire	A	S	297
California State University-Long Beach	A	S	292
Wake Forest University	A	P	271
College of Wooster	B	P	270
University of Scranton	A	P	270
University of Minnesota - Duluth	A	S	269
Northern Arizona University	A	S	264
Furman University	A	P	263
University of Northern Iowa	A	S	258
Southern Illinois University at Edwardsville	A	S	248
Middle Tennessee State University	A	S	247
John Carroll University	A	P	239
Bucknell University	A	P	225
Grinnell College	B	P	225
Central Michigan University	A	S	221
Southwest Missouri State University	A	S	218
University of Richmond	A	P	215
Eastern Michigan University	A	S	212
College of Charleston	A	S	209
Franklin and Marshall College	B	P	208
Harvey Mudd College	B	P	208
James Madison University	A	S	204
University of Wisconsin-Stevens Point	B	S	199
Gustavus Adolphus College	B	P	198
Allegheny College	B	P	196
Spelman College	B	P	191
College of St Benedict / St John's U.	B	P	189
Kalamazoo College	B	P	187
University of Dayton	A	P	186
Western Kentucky University	A	S	186
Bryn Mawr College	A	P	184
Oberlin College	B	P	183
Wheaton College (Wheaton, IL)	B	P	183
Knox College	B	P	180
Fort Lewis College	B	S	173

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Table 2.3. Chemistry Baccalaureate Degrees from Study Institutions 1985-1997

Academic Institution	Class	Type	Chemistry Degrees
Reed College	B	P	172
Western Washington University	A	S	165
California State Poly U-San Luis Obispo	A	S	164
DePauw University	B	P	164
Butler University	B	P	163
Colgate University	B	P	163
Southwest Texas State University	A	S	163
Wellesley College	B	P	159
Haverford College	B	P	158
Washington and Lee University	B	P	156
Juniata College	B	P	155
Bowdoin College	B	P	150
Wabash College	B	P	148
Middlebury College	B	P	147
Canisius College	B	P	144
University of San Diego	A	P	141
Colorado College	B	P	140
Calvin College	B	P	138
Eastern Illinois University	A	S	137
Lafayette College	B	P	136
Pomona College	B	P	135
Dickinson College	B	P	131
Union College (Schenectady, NY)	B	P	131
Hendrix College	B	P	129
Fordham University	A	P	128
Southwestern University	B	P	123
University of St Thomas (Saint Paul, MN)	A	P	122
Wesleyan University	B	P	122
Davidson College	B	P	121
SUNY College at Geneseo	B	S	118
Bates College	B	P	117
Pacific Lutheran University	B	P	117
St Lawrence University	B	P	116
Mount Holyoke College	B	P	114
Willamette University	B	P	113
Colby College	B	P	112
Occidental College	B	P	111
Santa Clara University	B	P	111
Augustana College (Rock Island, IL)	B	P	107
Texas Lutheran University	B	P	106
University of Puget Sound	B	P	106
Mississippi College	B	P	105
Ithaca College	B	P	102
Northern Kentucky University	B	S	102
Towson State University	A	S	102
Smith College	B	P	99

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Table 2.3. Chemistry Baccalaureate Degrees from Study Institutions 1985–1997

Academic Institution	Class	Type	Chemistry Degrees
Trinity University	B	P	97
Denison University	B	P	96
Lawrence University	B	P	96
University of North Florida	B	S	95
Lake Forest College	B	P	92
Gettysburg College	B	P	91
Swarthmore College	B	P	91
Trinity College (Hartford, CT)	B	P	91
Fairfield University	B	P	89
Macalester College	B	P	89
Whitman College	B	P	89
Austin College	B	P	88
Earlham College	B	P	88
Illinois Wesleyan University	B	P	88
Dillard University	B	P	84
Luther College	B	P	83
Rose-Hulman Institute of Technology	A	P	83
Ripon College	B	P	82
University of Central Arkansas	A	S	81
Morehouse College	B	P	79
Humboldt State University	A	S	76
Lewis and Clark College	B	P	76
Central Washington University	A	S	75
Centre College	B	P	75
Ohio Wesleyan University	B	P	75
Barnard College	B	P	71
Beloit College	B	P	67
Drury University	B	P	63
Goucher College	B	P	62
University of North Carolina at Asheville	B	S	59
University of the Pacific	A	P	55
Hamilton College	B	P	51
Linfield College	B	P	51
Texas Wesleyan University	B	P	51
Coe College	B	P	49
Gonzaga University	B	P	49
Chatham College	B	P	45
Hartwick College	B	P	42
Randolph-Macon College	B	P	40
University of Portland	B	P	39
Connecticut College	B	P	36
Centenary College of Louisiana	B	P	28
Skidmore College	B	P	25
Mount St Mary's College	B	P	4
Coastal Carolina University	B	S	2

Table 2.4. Physics Baccalaureate Degrees from Study Institutions 1985–1997

Academic Institution	Class	Type	Physics Degrees
Harvey Mudd College	B	P	319
San Jose State University	A	S	251
Carleton College	B	P	227
College of William and Mary	A	S	220
Reed College	B	P	204
SUNY College at Geneseo	B	S	204
Gustavus Adolphus College	B	P	153
College of the Holy Cross	B	P	152
Rose-Hulman Institute of Technology	A	P	148
California State Poly U-San Luis Obispo	A	S	145
Occidental College	B	P	143
Whitman College	B	P	141
University of Puget Sound	B	P	136
Grinnell College	B	P	135
Bates College	B	P	128
University of Wisconsin-Eau Claire	A	S	126
Wesleyan University	B	P	126
Pomona College	B	P	120
Franklin and Marshall College	B	P	118
Colorado College	B	P	115
Western Washington University	A	S	115
Southwest Texas State University	A	S	113
Oberlin College	B	P	111
Middlebury College	B	P	109
Wake Forest University	A	P	108
Western Kentucky University	A	S	108
Haverford College	B	P	107
Kalamazoo College	B	P	106
Towson State University	A	S	104
Bowdoin College	B	P	101
California State University-Long Beach	A	S	101
Eastern Michigan University	A	S	101
Allegheny College	B	P	99
Swarthmore College	B	P	98
John Carroll University	A	P	97
Rochester Institute of Technology	A	P	97
Williams College	B	P	97
College of Charleston	A	S	95
Lawrence University	B	P	95
Northern Kentucky University	B	S	95
Dickinson College	B	P	93
Bryn Mawr College	A	P	91
Illinois Wesleyan University	B	P	91
Augustana College (Rock Island, IL)	B	P	90

Table 2.4. Physics Baccalaureate Degrees from Study Institutions 1985–1997

Academic Institution	Class	Type	Physics Degrees
Colgate University	B	P	89
Morehouse College	B	P	89
University of PR Mayaguez Campus	A	S	87
College of St Benedict / St John's U.	B	P	83
University of Northern Iowa	A	S	83
University of Tennessee at Chattanooga	B	S	81
Hendrix College	B	P	80
James Madison University	A	S	80
Luther College	B	P	77
College of Wooster	B	P	76
Furman University	A	P	76
Eastern Illinois University	A	S	75
Hope College	B	P	75
Ithaca College	B	P	74
Mount Holyoke College	B	P	72
Davidson College	B	P	68
Hamilton College	B	P	68
Fordham University	A	P	67
Centre College	B	P	66
Humboldt State University	A	S	66
Creighton University	B	P	65
Linfield College	B	P	65
Denison University	B	P	63
Wheaton College (Wheaton, IL)	B	P	63
DePauw University	B	P	61
Southwest Missouri State University	A	S	60
Wabash College	B	P	60
Southern Illinois University at Edwardsville	A	S	59
Smith College	B	P	58
Wellesley College	B	P	58
Macalester College	B	P	57
Bucknell University	A	P	56
Colby College	B	P	56
Lewis and Clark College	B	P	56
Earlham College	B	P	55
Fairfield University	B	P	55
Northern Arizona University	A	S	55
Ohio Wesleyan University	B	P	55
University of Dayton	A	P	55
Central Washington University	A	S	54
Gettysburg College	B	P	54
Butler University	B	P	52
Dillard University	B	P	51

Table 2.4. Physics Baccalaureate Degrees from Study Institutions 1985-1997

Academic Institution	Class	Type	Physics Degrees
Pacific Lutheran University	B	P	51
Santa Clara University	B	P	50
Trinity University	B	P	50
Union College (Schenectady, NY)	B	P	49
Beloit College	B	P	48
Fort Lewis College	B	S	47
University of Scranton	A	P	47
Willamette University	B	P	45
St Lawrence University	B	P	44
University of Minnesota - Duluth	A	S	41
Knox College	B	P	40
University of Central Arkansas	A	S	40
Lake Forest College	B	P	39
Centenary College of Louisiana	B	P	38
Lafayette College	B	P	36
Middle Tennessee State University	A	S	36
University of North Carolina at Asheville	B	S	36
Coe College	B	P	35
Spelman College	B	P	34
University of Richmond	A	P	31
University of Wisconsin-Stevens Point	B	S	30
Calvin College	B	P	29
Connecticut College	B	P	29
Juniata College	B	P	29
Ripon College	B	P	29
University of Portland	B	P	28
University of St Thomas (Saint Paul, MN)	A	P	28
Central Michigan University	A	S	27
Hartwick College	B	P	26
University of San Diego	A	P	23
Canisius College	B	P	22
Trinity College (Hartford, CT)	B	P	21
Washington and Lee University	B	P	21
Gonzaga University	B	P	20
Randolph-Macon College	B	P	20
Barnard College	B	P	19
Austin College	B	P	16
Drury University	B	P	14
University of the Pacific	A	P	14
Skidmore College	B	P	10
Southwestern University	B	P	8
Mississippi College	B	P	7
Texas Lutheran University	B	P	3

Table 2.5. GeoSciences Baccalaureate Degrees from Study Institutions 1985-1997

Academic Institution	Class	Type	GeoSciences Degrees
Central Michigan University	A	S	458
Humboldt State University	A	S	414
Eastern Michigan University	A	S	333
Colgate University	B	P	305
Northern Arizona University	A	S	275
Western Washington University	A	S	256
Carleton College	B	P	252
University of Minnesota - Duluth	A	S	220
San Jose State University	A	S	213
Eastern Illinois University	A	S	176
College of William and Mary	A	S	175
Colorado College	B	P	166
James Madison University	A	S	164
Franklin and Marshall College	B	P	163
Fort Lewis College	B	S	161
Whitman College	B	P	146
Southwest Missouri State University	A	S	139
College of Charleston	A	S	131
University of Northern Iowa	A	S	130
Smith College	B	P	129
St Lawrence University	B	P	129
Western Kentucky University	A	S	125
Hamilton College	B	P	123
Williams College	B	P	123
College of Wooster	B	P	121
Middle Tennessee State University	A	S	115
University of North Carolina at Asheville	B	S	113
Centenary College of Louisiana	B	P	110
University of Wisconsin-Eau Claire	A	S	109
SUNY College at Geneseo	B	S	106
Middlebury College	B	P	100
Denison University	B	P	98
Juniata College	B	P	94
Washington and Lee University	B	P	93
Macalester College	B	P	92
California State University-Long Beach	A	S	90
Colby College	B	P	89
Furman University	A	P	83
Oberlin College	B	P	81
Creighton University	B	P	80
Bucknell University	A	P	78

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Table 2.5. GeoSciences Baccalaureate Degrees from Study Institutions 1985–1997

Academic Institution	Class	Type	GeoSciences Degrees
Trinity University	B	P	78
Central Washington University	A	S	76
Hartwick College	B	P	74
Gustavus Adolphus College	B	P	71
Calvin College	B	P	69
Beloit College	B	P	67
Dickinson College	B	P	67
Bates College	B	P	66
University of PR Mayaguez Campus	A	S	66
Lawrence University	B	P	65
Hope College	B	P	62
Mount Holyoke College	B	P	62
Occidental College	B	P	60
Southern Illinois University at Edwardsville	A	S	59
Augustana College (Rock Island, IL)	B	P	57
Earlham College	B	P	55
Lafayette College	B	P	55
Allegheny College	B	P	54
Pacific Lutheran University	B	P	54
Wellesley College	B	P	54
University of Puget Sound	B	P	53
Skidmore College	B	P	52
Bryn Mawr College	A	P	51
Pomona College	B	P	50
University of Dayton	A	P	50
DePauw University	B	P	49
Wheaton College (Wheaton, IL)	B	P	47
University of the Pacific	A	P	45
University of Tennessee at Chattanooga	B	S	42
Bowdoin College	B	P	35
Ohio Wesleyan University	B	P	35
Union College (Schenectady, NY)	B	P	33
University of St Thomas (Saint Paul, MN)	A	P	27
Northern Kentucky University	B	S	25
Haverford College	B	P	23
Hendrix College	B	P	17
Gettysburg College	B	P	9
Knox College	B	P	9
Barnard College	B	P	7
Harvey Mudd College	B	P	2

Table 2.6. BioSciences Baccalaureate Degrees from Study Institutions 1985–1997

Academic Institution	Class	Type	BioSciences Degrees
California State Poly U-San Luis Obispo	A	S	1,968
University of PR Mayaguez Campus	A	S	1,558
California State University-Long Beach	A	S	1,481
College of William and Mary	A	S	1,403
University of Wisconsin-Stevens Point	B	S	1,401
College of Charleston	A	S	1,389
University of Scranton	A	P	1,245
Eastern Illinois University	A	S	1,182
Humboldt State University	A	S	1,181
San Jose State University	A	S	1,126
Central Michigan University	A	S	1,094
Bucknell University	A	P	1,086
Wake Forest University	A	P	1,013
James Madison University	A	S	981
Northern Arizona University	A	S	977
Oberlin College	B	P	965
Eastern Michigan University	A	S	957
Creighton University	B	P	936
Towson State University	A	S	910
Augustana College (Rock Island, IL)	B	P	903
SUNY College at Geneseo	B	S	895
University of Wisconsin-Eau Claire	A	S	884
University of Minnesota - Duluth	A	S	877
Southwest Missouri State University	A	S	857
Southwest Texas State University	A	S	804
Mount Holyoke College	B	P	793
Luther College	B	P	780
St Lawrence University	B	P	777
University of Northern Iowa	A	S	766
Smith College	B	P	765
Fairfield University	B	P	749
Western Kentucky University	A	S	728
Gustavus Adolphus College	B	P	719
Western Washington University	A	S	718
Colorado College	B	P	715
Middle Tennessee State University	A	S	694
Central Washington University	A	S	677
Bowdoin College	B	P	663
Southern Illinois University at Edwardsville	A	S	656
Colgate University	B	P	655
Rochester Institute of Technology	A	P	646
Union College (Schenectady, NY)	B	P	641
Occidental College	B	P	638
Colby College	B	P	631
Pacific Lutheran University	B	P	630

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Table 2.6. BioSciences Baccalaureate Degrees from Study Institutions 1985–1997

Academic Institution	Class	Type	BioSciences Degrees
University of Richmond	A	P	611
Wellesley College	B	P	604
Lafayette College	B	P	602
Furman University	A	P	601
Hope College	B	P	573
Fordham University	A	P	570
College of St Benedict / St John's U.	B	P	567
John Carroll University	A	P	567
Trinity University	B	P	554
Allegheny College	B	P	551
Barnard College	B	P	539
Bates College	B	P	537
College of the Holy Cross	B	P	531
Santa Clara University	B	P	531
Calvin College	B	P	526
Middlebury College	B	P	523
Wesleyan University	B	P	518
Carleton College	B	P	505
Connecticut College	B	P	498
Swarthmore College	B	P	497
Franklin and Marshall College	B	P	483
DePauw University	B	P	474
Williams College	B	P	474
Trinity College (Hartford, CT)	B	P	470
University of San Diego	A	P	470
Illinois Wesleyan University	B	P	466
Juniata College	B	P	463
Canisius College	B	P	459
Davidson College	B	P	450
Coastal Carolina University	B	S	448
Austin College	B	P	438
Reed College	B	P	433
University of Puget Sound	B	P	427
Earlham College	B	P	423
Denison University	B	P	421
University of Dayton	A	P	421
Gettysburg College	B	P	420
Haverford College	B	P	419
Fort Lewis College	B	S	413
Grinnell College	B	P	413
Skidmore College	B	P	406
University of Tennessee at Chattanooga	B	S	398
Hendrix College	B	P	395
Northern Kentucky University	B	S	391
Spelman College	B	P	387

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Table 2.6. BioSciences Baccalaureate Degrees from Study Institutions 1985-1997

Academic Institution	Class	Type	BioSciences Degrees
Drury University	B	P	382
University of St Thomas (Saint Paul, MN)	A	P	379
Wheaton College (Wheaton, IL)	B	P	379
Pomona College	B	P	376
Lawrence University	B	P	371
Lewis and Clark College	B	P	367
University of the Pacific	A	P	367
Centre College	B	P	358
Kalamazoo College	B	P	353
University of Central Arkansas	A	S	350
Ohio Wesleyan University	B	P	341
Washington and Lee University	B	P	340
Willamette University	B	P	321
Dickinson College	B	P	316
Macalester College	B	P	308
Knox College	B	P	305
Ithaca College	B	P	295
University of Portland	B	P	293
Gonzaga University	B	P	284
Whitman College	B	P	279
Southwestern University	B	P	278
Beloit College	B	P	273
College of Wooster	B	P	272
Wabash College	B	P	271
Bryn Mawr College	A	P	264
University of North Carolina at Asheville	B	S	258
Hamilton College	B	P	251
Butler University	B	P	250
Mississippi College	B	P	249
University of North Florida	B	S	246
Hartwick College	B	P	241
Coe College	B	P	218
Randolph-Macon College	B	P	209
Centenary College of Louisiana	B	P	201
Ripon College	B	P	193
Lake Forest College	B	P	178
Dillard University	B	P	177
Goucher College	B	P	168
Linfield College	B	P	166
Mount St Mary's College	B	P	151
Texas Lutheran University	B	P	144
Texas Wesleyan University	B	P	128
Morehouse College	B	P	108
Chatham College	B	P	98
Harvey Mudd College	B	P	77

**Table 2.7. Science Baccalaureate Degrees from Study Institutions
Based on the Percentage of Science Degrees to Total Degrees 1985–1997**

Study (*)	Academic Institution	Class	Type	Total Degrees	Science Degrees	% Science Degrees
*	Harvey Mudd College	B	P	1,684	606	36.0%
*	Reed College	B	P	3,145	809	25.7%
*	Hendrix College	B	P	2,656	621	23.4%
*	Juniata College	B	P	3,216	741	23.0%
*	Carleton College	B	P	5,759	1,318	22.9%
*	Wabash College	B	P	2,252	479	21.3%
*	Earlham College	B	P	2,998	621	20.7%
*	Centre College	B	P	2,430	499	20.5%
*	Haverford College	B	P	3,556	730	20.5%
*	Kalamazoo College	B	P	3,225	646	20.0%
*	Bowdoin College	B	P	4,797	949	19.8%
*	Occidental College	B	P	4,840	952	19.7%
*	Knox College	B	P	2,778	534	19.2%
*	Augustana College (Rock Island, IL)	B	P	6,026	1,157	19.2%
*	Lawrence University	B	P	3,270	627	19.2%
*	Grinnell College	B	P	4,096	773	18.9%
*	Colorado College	B	P	6,259	1,136	18.1%
*	Whitman College	B	P	3,646	657	18.0%
*	Centenary College of Louisiana	B	P	2,096	377	18.0%
*	Allegheny College	B	P	5,318	900	16.9%
*	Franklin and Marshall College	B	P	5,780	972	16.8%
*	St Lawrence University	B	P	6,434	1,066	16.6%
*	Bryn Mawr College	A	P	3,658	601	16.4%
*	Bates College	B	P	5,197	848	16.3%
*	Beloit College	B	P	2,834	455	16.1%
*	Austin College	B	P	3,398	542	16.0%
*	Mount Holyoke College	B	P	6,573	1,048	15.9%
*	Hope College	B	P	6,743	1,070	15.9%
*	Williams College	B	P	6,611	1,045	15.8%
*	Luther College	B	P	6,239	940	15.1%
*	Oberlin College	B	P	8,929	1,340	15.0%
*	Ripon College	B	P	2,027	304	15.0%
*	College of Wooster	B	P	4,935	739	15.0%
*	Pomona College	B	P	4,562	681	14.9%
*	Swarthmore College	B	P	4,720	704	14.9%
*	Colby College	B	P	5,961	888	14.9%
*	College of William and Mary	A	S	16,074	2,383	14.8%
*	Colgate University	B	P	8,572	1,216	14.2%
*	Gustavus Adolphus College	B	P	8,175	1,141	14.0%
*	College of Charleston	A	S	13,136	1,824	13.9%
*	Bucknell University	A	P	10,412	1,445	13.9%
*	Furman University	A	P	7,394	1,023	13.8%
*	Davidson College	B	P	4,650	639	13.7%
*	Creighton University	B	P	10,110	1,384	13.7%
*	University of Scranton	A	P	11,439	1,562	13.7%

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Table 2.7. Science Baccalaureate Degrees from Study Institutions
Based on the Percentage of Science Degrees to Total Degrees 1985–1997

Study (*)	Academic Institution	Class	Type	Total Degrees	Science Degrees	% Science Degrees
*	Spelman College	B	P	4,543	612	13.5%
*	Wake Forest University	A	P	10,377	1,392	13.4%
*	Illinois Wesleyan University	B	P	4,861	645	13.3%
*	Southwestern University	B	P	3,093	409	13.2%
*	Washington and Lee University	B	P	4,633	610	13.2%
*	Union College (Schenectady, NY)	B	P	6,766	854	12.6%
*	Middlebury College	B	P	7,012	879	12.5%
*	Lafayette College	B	P	6,678	829	12.4%
*	University of PR Mayaguez Campus	A	S	16,877	2,072	12.3%
*	Dillard University	B	P	2,567	312	12.2%
*	Trinity University	B	P	6,450	779	12.1%
*	Humboldt State University	A	S	14,406	1,737	12.1%
*	College of the Holy Cross	B	P	8,315	1,001	12.0%
*	Wellesley College	B	P	7,529	900	12.0%
*	Fort Lewis College	B	S	6,675	794	11.9%
*	Smith College	B	P	9,215	1,058	11.5%
*	DePauw University	B	P	6,554	748	11.4%
*	Macalester College	B	P	4,828	546	11.3%
*	Willamette University	B	P	4,295	479	11.2%
*	Denison University	B	P	6,222	678	10.9%
*	Chatham College	B	P	1,327	143	10.8%
*	Drury University	B	P	4,280	459	10.7%
*	John Carroll University	A	P	8,503	903	10.6%
*	Ohio Wesleyan University	B	P	4,971	507	10.2%
*	Texas Lutheran University	B	P	2,484	253	10.2%
*	Goucher College	B	P	2,302	230	10.0%
*	University of Minnesota - Duluth	A	S	14,102	1,407	10.0%
*	University of North Carolina at Asheville	B	S	4,771	466	9.8%
*	Dickinson College	B	P	6,230	607	9.7%
*	Wheaton College (Wheaton, IL)	B	P	6,925	672	9.7%
*	Gettysburg College	B	P	5,918	574	9.7%
*	Trinity College (Hartford, CT)	B	P	6,017	582	9.7%
*	Lake Forest College	B	P	3,233	309	9.6%
*	University of Richmond	A	P	9,093	857	9.4%
*	Lewis and Clark College	B	P	5,315	499	9.4%
*	Connecticut College	B	P	6,048	565	9.3%
*	Hartwick College	B	P	4,113	383	9.3%
*	University of Wisconsin-Stevens Point	B	S	17,564	1,630	9.3%
*	Coe College	B	P	3,315	302	9.1%
*	SUNY College at Geneseo	B	S	14,576	1,323	9.1%
*	Randolph-Macon College	B	P	2,964	269	9.1%
*	Barnard College	B	P	7,087	641	9.0%
*	Hamilton College	B	P	5,487	493	9.0%
*	Wesleyan University	B	P	8,976	796	8.9%
*	Pacific Lutheran University	B	P	9,785	852	8.7%

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Table 2.7. Science Baccalaureate Degrees from Study Institutions Based on the Percentage of Science Degrees to Total Degrees 1985–1997

Study (*)	Academic Institution	Class	Type	Total Degrees	Science Degrees	% Science Degrees
*	University of Puget Sound	B	P	8,464	722	8.5%
*	Fairfield University	B	P	10,740	893	8.3%
*	College of St Benedict/St. Johns' University	B	P	10,226	839	8.2%
*	Coastal Carolina University	B	S	5,526	450	8.1%
*	Butler University	B	P	6,025	465	7.7%
*	Canisius College	B	P	8,314	625	7.5%
*	Calvin College	B	P	10,158	762	7.5%
*	Skidmore College	B	P	7,094	493	6.9%
*	Rose-Hulman Institute of Technology	A	P	3,416	231	6.8%
*	University of Tennessee at Chattanooga	B	S	12,924	869	6.7%
*	University of Wisconsin-Eau Claire	A	S	21,111	1,416	6.7%
*	Mount St Mary's College	B	P	2,575	155	6.0%
*	University of San Diego	A	P	10,598	634	6.0%
*	California State Polytechnic U-San Luis Obispo	A	S	38,120	2,277	6.0%
*	Mississippi College	B	P	6,105	361	5.9%
*	University of Portland	B	P	6,143	360	5.9%
*	Southern Illinois University at Edwardsville	A	S	17,472	1,022	5.8%
*	Western Kentucky University	A	S	19,753	1,147	5.8%
*	Northern Kentucky University	B	S	10,604	613	5.8%
*	University of the Pacific	A	P	8,376	481	5.7%
*	Morehouse College	B	P	4,851	276	5.7%
*	Northern Arizona University	A	S	27,708	1,572	5.7%
*	Eastern Illinois University	A	S	27,846	1,570	5.6%
*	Santa Clara University	B	P	12,421	692	5.6%
*	Texas Wesleyan University	B	P	3,254	179	5.5%
*	Gonzaga University	B	P	6,483	353	5.4%
*	James Madison University	A	S	27,447	1,429	5.2%
*	Western Washington University	A	S	25,947	1,255	4.8%
*	Middle Tennessee State University	A	S	22,745	1,092	4.8%
*	University of Northern Iowa	A	S	25,975	1,237	4.8%
*	Central Michigan University	A	S	38,163	1,802	4.7%
*	Rochester Institute of Technology	A	P	22,946	1,072	4.7%
*	Southwest Missouri State University	A	S	27,640	1,274	4.6%
*	Fordham University	A	P	16,770	765	4.6%
*	Linfield College	B	P	6,204	282	4.5%
*	Eastern Michigan University	A	S	35,476	1,603	4.5%
*	University of St Thomas (Saint Paul, MN)	A	P	12,500	556	4.4%
*	University of Central Arkansas	A	S	11,216	471	4.2%
*	San Jose State University	A	S	48,707	1,964	4.0%
*	Central Washington University	A	S	21,989	882	4.0%
*	University of Dayton	A	P	19,008	712	3.7%
*	Towson State University	A	S	30,663	1,116	3.6%
*	California State University-Long Beach	A	S	55,654	1,964	3.5%
*	Southwest Texas State University	A	S	37,067	1,080	2.9%
*	Ithaca College	B	P	16,197	471	2.9%
*	University of North Florida	B	S	14,041	341	2.4%

Table 2.8. Science Baccalaureate Degrees from Study Institutions Based on the Percentage of Science Degrees to Full-Time Undergraduate Enrollment 1985–1997

Study (*)	Academic Institution	Class	Type	Full-Time Undergraduates	Science Degrees	% Science Degrees
*	Harvey Mudd College	B	P	7,744	606	7.8%
*	Carleton College	B	P	24,281	1,318	5.4%
*	Juniata College	B	P	13,932	741	5.3%
*	Reed College	B	P	15,575	809	5.2%
*	Bowdoin College	B	P	18,887	949	5.0%
*	Haverford College	B	P	14,591	730	5.0%
*	Hendrix College	B	P	12,802	621	4.9%
*	Grinnell College	B	P	16,628	773	4.6%
*	Occidental College	B	P	20,751	952	4.6%
*	Colorado College	B	P	25,102	1,136	4.5%
*	Wabash College	B	P	10,618	479	4.5%
*	Earlham College	B	P	13,784	621	4.5%
*	Centre College	B	P	11,446	499	4.4%
*	Lawrence University	B	P	14,455	627	4.3%
*	Mount Holyoke College	B	P	24,395	1,048	4.3%
*	St Lawrence University	B	P	25,262	1,066	4.2%
*	Augustana College (Rock Island, IL)	B	P	27,478	1,157	4.2%
*	Bates College	B	P	20,392	848	4.2%
*	Franklin and Marshall College	B	P	23,641	972	4.1%
*	Knox College	B	P	13,020	534	4.1%
*	Whitman College	B	P	16,197	657	4.1%
*	Williams College	B	P	25,790	1,045	4.1%
*	Kalamazoo College	B	P	15,994	646	4.0%
*	Swarthmore College	B	P	17,689	704	4.0%
*	Colby College	B	P	22,443	888	4.0%
*	Centenary College of Louisiana	B	P	9,663	377	3.9%
*	Bryn Mawr College	A	P	15,715	601	3.8%
*	Gustavus Adolphus College	B	P	29,847	1,141	3.8%
*	Allegheny College	B	P	23,782	900	3.8%
*	Oberlin College	B	P	35,731	1,340	3.8%
*	Austin College	B	P	14,744	542	3.7%
*	Pomona College	B	P	18,876	681	3.6%
*	College of William and Mary	A	S	67,491	2,383	3.5%
*	Colgate University	B	P	35,335	1,216	3.4%
*	Furman University	A	P	29,982	1,023	3.4%
*	Bucknell University	A	P	42,637	1,445	3.4%
*	Luther College	B	P	28,379	940	3.3%
*	Middlebury College	B	P	26,560	879	3.3%
*	Hope College	B	P	32,384	1,070	3.3%
*	Davidson College	B	P	19,618	639	3.3%
*	Union College (Schenectady, NY)	B	P	26,346	854	3.2%
*	Wellesley College	B	P	27,833	900	3.2%
*	University of Scranton	A	P	48,337	1,562	3.2%
*	College of Wooster	B	P	22,968	739	3.2%
*	Beloit College	B	P	14,165	455	3.2%

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Table 2.8. Science Baccalaureate Degrees from Study Institutions Based on the Percentage of Science Degrees to Full-Time Undergraduate Enrollment 1985–1997

Study (*)	Academic Institution	Class	Type	Full-Time Undergraduates	Science Degrees	% Science Degrees
*	Smith College	B	P	33,035	1,058	3.2%
*	Lafayette College	B	P	26,173	829	3.2%
*	Creighton University	B	P	44,443	1,384	3.1%
*	Ripon College	B	P	10,080	304	3.0%
*	Wake Forest University	A	P	46,158	1,392	3.0%
*	Washington and Lee University	B	P	20,524	610	3.0%
*	College of the Holy Cross	B	P	34,881	1,001	2.9%
*	Illinois Wesleyan University	B	P	23,133	645	2.8%
*	Trinity University	B	P	28,161	779	2.8%
*	Southwestern University	B	P	14,966	409	2.7%
*	Spelman College	B	P	22,600	612	2.7%
*	Denison University	B	P	25,567	678	2.7%
*	DePauw University	B	P	28,664	748	2.6%
*	Connecticut College	B	P	21,698	565	2.6%
*	Trinity College (Hartford, CT)	B	P	22,941	582	2.5%
*	Chatham College	B	P	5,704	143	2.5%
*	Macalester College	B	P	22,114	546	2.5%
*	Dickinson College	B	P	24,643	607	2.5%
*	Humboldt State University	A	S	70,573	1,737	2.5%
*	College of Charleston	A	S	76,533	1,824	2.4%
*	Willamette University	B	P	20,310	479	2.4%
*	Wheaton College (Wheaton, IL)	B	P	28,749	672	2.3%
*	Drury University	B	P	19,644	459	2.3%
*	Pacific Lutheran University	B	P	36,639	852	2.3%
*	University of Richmond	A	P	37,013	857	2.3%
*	John Carroll University	A	P	39,068	903	2.3%
*	Coe College	B	P	13,098	302	2.3%
*	Barnard College	B	P	27,828	641	2.3%
*	Hamilton College	B	P	21,541	493	2.3%
*	Lake Forest College	B	P	13,584	309	2.3%
*	Fairfield University	B	P	39,467	893	2.3%
*	Ohio Wesleyan University	B	P	22,514	507	2.3%
*	Lewis and Clark College	B	P	22,191	499	2.2%
*	Wesleyan University	B	P	35,440	796	2.2%
*	Gettysburg College	B	P	25,891	574	2.2%
*	Texas Lutheran University	B	P	11,738	253	2.2%
*	Goucher College	B	P	10,847	230	2.1%
*	University of Puget Sound	B	P	34,890	722	2.1%
*	SUNY College at Geneseo	B	S	64,917	1,323	2.0%
*	Hartwick College	B	P	18,904	383	2.0%
*	Randolph-Macon College	B	P	13,787	269	2.0%
*	University of Minnesota - Duluth	A	S	76,759	1,407	1.8%
*	College of St Benedict/St. Johns' University	B	P	45,928	839	1.8%
*	University of North Carolina at Asheville	B	S	25,884	466	1.8%
*	University of PR Mayaguez Campus	A	S	120,858	2,072	1.7%

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Table 2.8. Science Baccalaureate Degrees from Study Institutions Based on the Percentage of Science Degrees to Full-Time Undergraduate Enrollment 1985–1997

Study (*)	Academic Institution	Class	Type	Full-Time Undergraduates	Science Degrees	% Science Degrees
*	Mississippi College	B	P	21,126	361	1.7%
*	University of Wisconsin-Stevens Point	B	S	96,933	1,630	1.7%
*	Fort Lewis College	B	S	47,358	794	1.7%
*	Dillard University	B	P	18,955	312	1.6%
*	Skidmore College	B	P	30,008	493	1.6%
*	Canisius College	B	P	38,949	625	1.6%
*	Calvin College	B	P	48,596	762	1.6%
*	University of Portland	B	P	24,935	360	1.4%
*	Butler University	B	P	32,349	465	1.4%
*	Santa Clara University	B	P	49,477	692	1.4%
*	University of the Pacific	A	P	35,192	481	1.4%
*	Eastern Illinois University	A	S	117,120	1,570	1.3%
*	Rose-Hulman Institute of Technology	A	P	17,240	231	1.3%
*	University of San Diego	A	P	47,363	634	1.3%
*	University of Tennessee at Chattanooga	B	S	65,509	869	1.3%
*	Linfield College	B	P	21,358	282	1.3%
*	Texas Wesleyan University	B	P	13,787	179	1.3%
*	California State Polytechnic U-San Luis Obispo	A	S	176,836	2,277	1.3%
*	Mount St Mary's College	B	P	12,137	155	1.3%
*	Southern Illinois University at Edwardsville	A	S	81,289	1,022	1.3%
*	Fordham University	A	P	62,918	765	1.2%
*	Coastal Carolina University	B	S	37,232	450	1.2%
*	University of Wisconsin-Eau Claire	A	S	117,212	1,416	1.2%
*	James Madison University	A	S	125,565	1,429	1.1%
*	Gonzaga University	B	P	31,129	353	1.1%
*	Northern Arizona University	A	S	140,472	1,572	1.1%
*	Western Washington University	A	S	114,403	1,255	1.1%
*	Rochester Institute of Technology	A	P	100,326	1,072	1.1%
*	Central Washington University	A	S	83,144	882	1.1%
*	University of St Thomas (Saint Paul, MN)	A	P	53,277	556	1.0%
*	San Jose State University	A	S	191,383	1,964	1.0%
*	Eastern Michigan University	A	S	157,319	1,603	1.0%
*	Central Michigan University	A	S	177,532	1,802	1.0%
*	University of Northern Iowa	A	S	124,899	1,237	1.0%
*	Western Kentucky University	A	S	126,355	1,147	0.9%
*	California State University-Long Beach	A	S	218,008	1,964	0.9%
*	Towson State University	A	S	126,234	1,116	0.9%
*	University of Dayton	A	P	80,627	712	0.9%
*	Morehouse College	B	P	33,193	276	0.8%
*	Southwest Missouri State University	A	S	160,296	1,274	0.8%
*	Northern Kentucky University	B	S	78,555	613	0.8%
*	University of North Florida	B	S	44,836	341	0.8%
*	Middle Tennessee State University	A	S	144,406	1,092	0.8%
*	Ithaca College	B	P	73,490	471	0.6%
*	Southwest Texas State University	A	S	176,295	1,080	0.6%
*	University of Central Arkansas	A	S	83,084	471	0.6%

Table 2.9 Infrastructure Data for the Study Institutions

Institution	Class	Type	SAT I Verbal Median Score	SAT I Math. Median Score	Cost for School Year (Est. 1999-2000)	FY 1999 Endowment
Allegheny College	B	P	600	600	25,380	121,265,000
Augustana College	B	P	NA	NA	21,165	75,650,000
Austin College	B	P	600	600	20,522	107,444,000
Barnard College	B	P	670	660	31,400	153,662,000
Bates College	B	P	660	660	30,070	162,418,000
Beloit College	B	P	640	610	25,068	96,946,000
Bowdoin College	B	P	680	680	30,955	406,853,000
Bryn Mawr College	A	P	670	640	31,240	426,499,000
Bucknell University	A	P	NA	NA	26,410	392,372,000
Butler University	B	P	560	510	21,850	113,579,000
Cal. Poly. State U, San Luis Obispo	A	S	NA	NA	4,952	54,857,000
California State U, Long Beach	A	S	470	490	7,318	21,296,000
Calvin College	B	P	600	600	18,095	48,533,000
Canisius College	B	P	550	554	20,622	60,068,000
Carleton College	B	P	NA	NA	27,195	551,019,000
Centenary College of Louisiana	B	P	550	550	17,760	111,917,000
Central Michigan University	A	S	520	520	8,080	36,083,000
Central Washington University	A	S	485	490	8,190	8,263,000
Centre College	B	P	620	630	21,350	153,849,000
Chatham College	B	P	559	515	22,190	52,786,000
Coastal Carolina University	B	S	505	510	8,020	6,305,000
Coe College	B	P	580	560	21,710	43,066,000
Colby College	B	P	660	660	31,580	290,420,000
Colgate University	B	P	644	651	31,080	383,018,000
College of Charleston	A	S	NA	NA	7,590	26,000,000
College of St. Benedict / St. John's U	B	P	580	575	21,419	26,971,000
College of the Holy Cross	B	P	630	630	30,230	338,310,000
College of William and Mary	A	S	660	660	9,851	354,616,000
College of Wooster	B	P	NA	NA	26,238	192,845,000
Colorado College	B	P	NA	NA	26,208	367,090,000
Connecticut College	B	P	640	630	30,595	142,867,000
Creighton University	B	P	576	586	18,584	210,332,000
Davidson College	B	P	670	670	28,568	274,579,000
Denison University	B	P	602	609	26,650	355,116,000
DePauw University	B	P	NA	NA	22,770	418,314,000
Dickinson College	B	P	NA	NA	27,440	151,890,000
Dillard University	B	P	NA	NA	13,500	52,294,000
Drury University	B	P	NA	NA	14,730	113,174,000
Earlham College	B	P	620	580	25,066	302,856,000
Eastern Illinois University	A	S	NA	NA	6,512	18,721,000
Eastern Michigan University	A	S	500	490	8,057	31,494,000
Fairfield University	B	P	575	584	27,815	75,859,000
Fordham University	A	P	590	570	26,285	222,896,000
Fort Lewis College	B	S	490	490	6,320	2,383,000
Franklin and Marshall College	B	P	631	638	29,450	258,180,000
Furman University	A	P	620	622	23,114	216,137,000

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Table 2.9 Infrastructure Data for the Study Institutions

Institution	Class	Type	SAT I Verbal Median Score	SAT I Math. Median Score	Cost for School Year (Est. 1999-2000)	FY 1999 Endowment
Gettysburg College	B	P	NA	NA	29,676	147,316,000
Gonzaga University	B	P	576	577	21,330	96,828,000
Goucher College	B	P	610	570	27,730	145,382,000
Grinnell College	B	P	680	660	25,060	1,020,372,000
Gustavus Adolphus College	B	P	600	620	21,520	74,773,000
Hamilton College	B	P	NA	NA	31,200	355,726,000
Hartwick College	B	P	558	554	30,410	82,161,000
Harvey Mudd College	B	P	720	760	28,736	163,592,000
Haverford College	B	P	NA	NA	31,400	269,290,000
Hendrix College	B	P	641	617	15,855	123,540,000
Hope College	B	P	582	592	21,054	105,201,000
Humboldt State University	A	S	540	520	7,604	11,145,000
Illinois Wesleyan University	B	P	610	630	23,200	185,431,000
Ithaca College	B	P	NA	NA	25,314	169,987,000
James Madison University	A	S	580	590	9,114	23,285,000
John Carroll University	A	P	560	580	21,424	131,513,000
Juniata College	B	P	570	573	22,780	77,704,000
Kalamazoo College	B	P	640	622	24,975	104,430,000
Knox College	B	P	620	620	25,116	47,224,000
Lafayette College	B	P	605	645	27,762	468,003,000
Lake Forest College	B	P	570	560	24,800	61,015,000
Lawrence University	B	P	NA	NA	25,863	147,426,000
Lewis and Clark College	B	P	NA	NA	26,534	136,775,000
Linfield College	B	P	544	548	23,020	41,544,000
Luther College	B	P	595	599	36,800	45,771,000
Macalester College	B	P	670	650	26,320	517,180,000
Middle Tennessee State University	A	S	536	531	4,657	15,525,000
Middlebury College	B	P	670	650	30,475	604,841,000
Mississippi College	B	P	NA	NA	12,998	32,000,000
Morehouse College	B	P	520	530	16,878	118,111,000
Mount Holyoke College	B	P	630	610	30,162	355,473,000
Mount Saint Mary’s College	B	P	530	510	22,858	48,955,000
Northern Arizona University	A	S	520	520	6,228	28,037,000
Northern Kentucky University	B	S	NA	NA	5,820	18,625,000
Oberlin College	B	P	690	650	30,442	508,490,000
Occidental College	B	P	610	610	29,338	255,434,000
Ohio Wesleyan University	B	P	NA	NA	27,500	105,352,000
Pacific Lutheran University	B	P	556	549	20,570	37,334,000
Pomona College	B	P	720	710	30,920	759,519,000
Randolph-Macon College	B	P	551	547	21,930	62,682,000
Reed College	B	P	690	660	30,700	267,827,000
Ripon College	B	P	616	603	22,640	30,527,000
Rochester Institute of Technology	A	P	590	610	24,489	437,111,000
Rose-Hulman Institute of Technology	A	P	650	700	24,780	153,614,000
San Jose State University	A	S	480	510	8,187	26,527,000

Table 2.9 Infrastructure Data for the Study Institutions

Institution	Class	Type	SAT I Verbal Median Score	SAT I Math. Median Score	Cost for School Year (Est. 1999-2000)	FY 1999 Endowment
Santa Clara University	B	P	590	610	24,765	373,580,000
Skidmore College	B	P	610	610	31,200	127,618,000
Smith College	B	P	660	630	30,402	884,782,000
Southern Illinois U at Edwardsville	A	S	NA	NA	6,730	39,486,000
Southwest Missouri State University	A	S	NA	NA	6,532	27,414,000
Southwest Texas State University	A	S	539	537	6,668	40,198,000
Southwestern University	B	P	622	622	20,312	336,013,000
Spelman College	B	P	NA	NA	16,295	181,022,000
St. Lawrence University	B	P	560	560	30,110	226,839,000
SUNY College at Geneseo	B	S	597	602	8,886	6,350,000
Swarthmore College	B	P	770	705	30,740	905,680,000
Texas Lutheran University	B	P	500	510	14,042	28,863,000
Texas Wesleyan University	B	P	483	491	12,350	44,700,000
Towson University	A	S	530	540	9,736	7,941,000
Trinity College	B	P	630	640	30,620	341,930,000
Trinity University	B	P	630	640	21,444	584,445,000
Union College	B	P	600	630	30,366	266,727,000
University of Central Arkansas	A	S	NA	NA	5,612	9,430,000
University of Dayton	A	P	560	580	20,400	247,463,000
University of Minnesota - Duluth	A	S	NA	NA	8,540	52,492,000
University of North Carolina, Asheville	B	S	580	560	5,950	13,310,000
University of North Florida	B	S	560	570	6,424	32,688,000
University of Northern Iowa	A	S	NA	NA	6,496	60,540,000
University of Portland	B	P	571	570	23,358	55,315,000
University of Puerto Rico, Mayaguez	A	S	576	634	5,980	NA
University of Puget Sound	B	P	560	560	25,875	190,425,000
University of Richmond	A	P	NA	NA	23,910	803,252,000
University of San Diego	A	P	570	580	19,265	95,289,000
University of Scranton	A	P	560	561	22,231	82,796,000
University of St.Thomas	A	P	560	580	21,533	218,769,000
University of Tennessee, Chattanooga	B	S	NA	NA	7,240	74,733,000
University of the Pacific	A	P	540	560	25,135	111,400,000
University of Wisconsin-Eau Claire	A	S	540	550	6,142	16,284,000
University of Wisconsin-Stevens Point	B	S	NA	NA	6,654	5,484,000
Wabash College	B	P	576	598	22,410	320,868,000
Wake Forest University	A	P	NA	NA	27,320	857,938,000
Washington and Lee University	B	P	NA	NA	21,858	683,123,000
Wellesley College	B	P	678	671	29,520	887,489,000
Wesleyan University	B	P	690	680	21,190	530,323,000
Western Kentucky University	A	S	NA	NA	5,442	31,600,000
Western Washington University	A	S	550	550	7,350	13,705,000
Wheaton College	B	P	NA	NA	19,270	268,208,000
Whitman College	B	P	660	650	25,870	253,063,000
Willamette University	B	P	600	610	27,400	193,186,000
Williams College	B	P	710	710	29,350	923,243,000

Table 2.10. Number of Doctorate Alumni in Astronomy, Chemistry, GeoSciences, Physics, and Biological Sciences by Baccalaureates Produced Six Years Earlier in Same Disciplines**

Academic Institution	Class	Type	Doctorates 1991-1993	Science Baccalaureates 1985-1987	Ratio A *	Doctorates 1994-1996	Science Baccalaureates 1988-1990	Ratio B *	Doctorates 1997-1999	Science Baccalaureates 1991-1993	Ratio C *
Harvey Mudd College	B	P	47	105	**2.2**	48	125	**2.6**	68	142	**2.1**
Swarthmore College	B	P	62	155	**2.5**	71	137	**1.9**	65	158	**2.4**
University of San Diego	A	P	6	99	**16.5**	6	104	**17.3**	53	143	**2.7**
Carleton College	B	P	108	318	**2.9**	93	269	**2.9**	82	268	**3.3**
Reed College	B	P	71	195	**2.7**	51	156	**3.1**	61	207	**3.4**
Wesleyan University	B	P	43	198	**4.6**	43	143	**3.3**	45	174	**3.9**
Bates College	B	P	31	176	**5.7**	33	183	**5.5**	39	152	**3.9**
Kalamazoo College	B	P	39	163	**4.2**	32	150	**4.7**	37	145	**3.9**
Pomona College	B	P	42	154	**3.7**	27	125	**4.6**	33	133	**4.0**
Morehouse College	B	P	5	98	**19.6**	1	40	**40.0**	10	41	**4.1**
Oberlin College	B	P	68	270	**4.0**	75	272	**3.6**	83	354	**4.3**
Wabash College	B	P	22	135	**6.1**	23	111	**4.8**	25	110	**4.4**
Williams College	B	P	51	223	**4.4**	34	202	**5.9**	52	233	**4.5**
Bryn Mawr College	A	P	23	138	**6.0**	27	126	**4.7**	29	133	**4.6**
Trinity College	B	P	18	132	**7.3**	20	112	**5.6**	24	111	**4.6**
Haverford College	B	P	36	155	**4.3**	38	156	**4.1**	40	186	**4.7**
Beloit College	B	P	26	113	**4.3**	25	106	**4.2**	18	86	**4.8**
Mount Holyoke College	B	P	41	253	**6.2**	38	204	**5.4**	49	235	**4.8**
Macalester College	B	P	22	121	**5.5**	22	98	**4.5**	25	122	**4.9**
Trinity University	B	P	13	159	**12.2**	29	144	**5.0**	39	192	**4.9**
Ithaca College	B	P	5	105	**21.0**	13	94	**7.2**	22	109	**5.0**
Franklin and Marshall College	B	P	28	262	**9.4**	35	187	**5.3**	37	185	**5.0**
College of William and Mary	A	S	73	479	**6.6**	90	418	**4.6**	111	561	**5.1**
Texas Lutheran University	B	P	6	58	**9.7**	15	45	**3.0**	14	71	**5.1**
College of Wooster	B	P	42	166	**4.0**	33	138	**4.2**	32	164	**5.1**
Juniata College	B	P	25	185	**7.4**	22	155	**7.0**	27	139	**5.1**
Grinnell College	B	P	44	169	**3.8**	44	174	**4.0**	33	174	**5.3**
Wellesley College	B	P	28	180	**6.4**	33	181	**5.5**	42	223	**5.3**
Whitman College	B	P	20	164	**8.2**	26	126	**4.8**	25	138	**5.5**
Allegheny College	B	P	41	244	**6.0**	32	202	**6.3**	33	186	**5.6**
University of Dayton	A	P	21	181	**8.6**	39	135	**3.5**	23	130	**5.7**
Calvin College	B	P	25	177	**7.1**	29	181	**6.2**	29	167	**5.8**
Smith College	B	P	38	245	**6.4**	38	191	**5.0**	38	219	**5.8**
Earlham College	B	P	33	152	**4.6**	19	123	**6.5**	25	146	**5.8**
Rochester Institute of Technology	A	P	25	170	**6.8**	46	255	**5.5**	45	264	**5.9**
Barnard College	B	P	16	180	**11.3**	16	141	**8.8**	17	101	**5.9**
Chatham College	B	P	4	37	**9.3**	6	25	**4.2**	4	24	**6.0**
Lake Forest College	B	P	4	84	**21.0**	7	73	**10.4**	8	48	**6.0**
Bowdoin College	B	P	27	212	**7.9**	38	197	**5.2**	32	194	**6.1**
College of the Holy Cross	B	P	14	277	**19.8**	24	198	**8.3**	31	189	**6.1**
Middlebury College	B	P	25	225	**9.0**	29	187	**6.4**	30	185	**6.2**
Rose-Hulman Institute of Technology	A	P	5	43	**8.6**	12	44	**3.7**	13	82	**6.3**
Illinois Wesleyan University	B	P	15	139	**9.3**	9	130	**14.4**	25	166	**6.6**
Bucknell University	A	P	36	283	**7.9**	48	292	**6.1**	47	313	**6.7**
Lawrence University	B	P	15	121	**8.1**	26	118	**4.5**	26	178	**6.8**
Ripon College	B	P	15	74	**4.9**	15	64	**4.3**	11	76	**6.9**
Furman University	A	P	23	177	**7.7**	23	192	**8.3**	36	249	**6.9**

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Table 2.10. Number of Doctorate Alumni in Astronomy, Chemistry, GeoSciences, Physics, and Biological Sciences by Baccalaureates Produced Six Years Earlier in Same Disciplines

Academic Institution	Class	Type	Doctorates 1991-1993	Science Baccalaureates 1985-1987	Ratio A *	Doctorates 1994-1996	Science Baccalaureates 1988-1990	Ratio B *	Doctorates 1997-1999	Science Baccalaureates 1991-1993	Ratio C *
Hope College	B	P	41	237	**5.8**	34	226	**6.6**	33	233	**7.1**
Dickinson College	B	P	20	150	**7.5**	10	111	**11.1**	19	135	**7.1**
Knox College	B	P	14	126	**9.0**	22	125	**5.7**	16	114	**7.1**
Occidental College	B	P	31	181	**5.8**	32	192	**6.0**	31	223	**7.2**
Hendrix College	B	P	16	167	**10.4**	22	135	**6.1**	19	142	**7.5**
Ohio Wesleyan University	B	P	13	86	**6.6**	13	80	**6.2**	15	113	**7.5**
Connecticut College	B	P	14	139	**9.9**	16	111	**6.9**	14	107	**7.6**
Willamette University	B	P	9	79	**8.8**	13	129	**9.9**	15	115	**7.7**
Colorado College	B	P	19	233	**12.3**	36	235	**6.5**	32	253	**7.9**
Gustavus Adolphus College	B	P	22	244	**11.1**	20	234	**11.7**	32	255	**8.0**
Skidmore College	B	P	11	150	**13.6**	12	96	**8.0**	13	104	**8.0**
Wheaton College	B	P	16	180	**11.3**	18	151	**8.4**	17	136	**8.0**
Davidson College	B	P	19	108	**5.7**	19	120	**6.3**	19	155	**8.2**
Santa Clara University	B	P	21	113	**5.4**	15	127	**8.5**	18	147	**8.2**
Lafayette College	B	P	25	183	**7.3**	27	174	**6.4**	23	189	**8.2**
Colby College	B	P	23	187	**8.1**	20	168	**8.4**	23	192	**8.3**
Fort Lewis College	B	S	15	192	**12.8**	16	154	**9.6**	19	159	**8.4**
Lewis and Clark College	B	P	17	123	**7.2**	11	87	**7.9**	13	112	**8.6**
University of Puget Sound	B	P	22	125	**5.7**	15	161	**10.7**	19	169	**8.9**
Hamilton College	B	P	22	85	**3.9**	17	80	**4.7**	13	116	**8.9**
Centre College	B	P	10	82	**8.2**	14	109	**7.8**	13	117	**9.0**
Goucher College	B	P	8	68	**8.5**	8	28	**3.5**	7	63	**9.0**
Washington and Lee University	B	P	8	91	**11.4**	8	123	**15.4**	16	144	**9.0**
Colgate University	B	P	41	318	**7.8**	37	218	**5.9**	29	263	**9.1**
Western Kentucky University	A	S	16	233	**14.6**	14	207	**14.8**	31	286	**9.2**
Canisius College	B	P	18	144	**8.0**	20	131	**6.6**	15	140	**9.3**
John Carroll University	A	P	15	183	**12.2**	17	187	**11.0**	21	197	**9.4**
Humboldt State University	A	S	43	476	**11.1**	39	268	**6.9**	37	348	**9.4**
DePauw University	B	P	15	194	**12.9**	17	178	**10.5**	16	152	**9.5**
University of Wisconsin - Stevens Point	B	S	26	283	**10.9**	24	307	**12.8**	39	376	**9.6**
James Madison University	A	S	17	252	**14.8**	25	249	**10.0**	32	312	**9.8**
Cal. Poly. State U - San Luis Obispo	A	S	36	412	**11.4**	35	423	**12.1**	57	558	**9.8**
University of Northern Iowa	A	S	18	236	**13.1**	14	233	**16.6**	26	257	**9.9**
University of St.Thomas	A	P	8	131	**16.4**	9	96	**10.7**	11	109	**9.9**
Northern Arizona University	A	S	20	340	**17.0**	24	305	**12.7**	28	290	**10.4**
Union College	B	P	22	209	**9.5**	23	180	**7.8**	19	197	**10.4**
Western Washington University	A	S	20	245	**12.3**	29	198	**6.8**	24	249	**10.4**
University of Richmond	A	P	13	163	**12.5**	15	171	**11.4**	17	180	**10.6**
Wake Forest University	A	P	33	327	**9.9**	42	281	**6.7**	30	326	**10.9**
University of Wisconsin-Eau Claire	A	S	29	266	**9.2**	23	293	**12.7**	28	306	**10.9**
Gettysburg College	B	P	18	130	**7.2**	11	109	**9.9**	13	145	**11.2**
Luther College	B	P	13	175	**13.5**	14	190	**13.6**	19	213	**11.2**
Hartwick College	B	P	12	88	**7.3**	11	76	**6.9**	8	90	**11.3**
Southwest Missouri State University	A	S	20	224	**11.2**	31	210	**6.8**	24	270	**11.3**
Gonzaga University	B	P	6	81	**13.5**	8	68	**8.5**	7	79	**11.3**
Pacific Lutheran University	B	P	9	155	**17.2**	17	181	**10.6**	19	218	**11.5**
University of Minnesota - Duluth	A	S	13	326	**25.1**	19	247	**13.0**	24	276	**11.5**

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Table 2.10. Number of Doctorate Alumni in Astronomy, Chemistry, GeoSciences, Physics, and Biological Sciences by Baccalaureates Produced Six Years Earlier in Same Disciplines

Academic Institution	Class	Type	Doctorates 1991-1993	Science Baccalaureates 1985-1987	Ratio A *	Doctorates 1994-1996	Science Baccalaureates 1988-1990	Ratio B *	Doctorates 1997-1999	Science Baccalaureates 1991-1993	Ratio C *
SUNY College at Geneseo	B	S	15	277	**18.5**	24	259	**10.8**	24	277	**11.5**
University of North Florida	B	S	3	25	**8.3**	0	52	**NA**	6	70	**11.7**
Spelman College	B	P	1	106	**106.0**	9	112	**12.4**	13	153	**11.8**
Southwestern University	B	P	5	64	**12.8**	6	79	**13.2**	9	108	**12.0**
University of Central Arkansas	A	S	5	86	**17.2**	8	70	**8.8**	7	85	**12.1**
San Jose State University	A	S	22	501	**22.8**	34	414	**12.2**	35	447	**12.8**
California State University, Long Beach	A	S	23	489	**21.3**	33	470	**14.2**	31	404	**13.0**
University of Puerto Rico, Mayaguez	A	S	19	401	**21.1**	22	344	**15.6**	34	447	**13.1**
Fairfield University	B	P	11	189	**17.2**	15	186	**12.4**	15	198	**13.2**
Mississippi College	B	P	6	70	**11.7**	4	58	**14.5**	6	85	**14.2**
Centenary College of Louisiana	B	P	2	99	**49.5**	3	73	**24.3**	6	88	**14.7**
Towson University	A	S	9	176	**19.6**	14	207	**14.8**	18	266	**14.8**
Drury University	B	P	3	62	**20.7**	2	94	**47.0**	7	109	**15.6**
Texas Wesleyan University	B	P	1	43	**43.0**	4	38	**9.5**	2	32	**16.0**
Southwest Texas State University	A	S	9	164	**18.2**	13	193	**14.8**	14	231	**16.5**
Creighton University	B	P	18	294	**16.3**	20	270	**13.5**	19	314	**16.5**
Southern Illinois U. at Edwardsville	A	S	16	219	**13.7**	12	199	**16.6**	15	252	**16.8**
Eastern Michigan University	A	S	17	359	**21.1**	21	360	**17.1**	21	356	**17.0**
Mount Saint Mary's College	B	P	1	18	**18.0**	0	23	**NA**	2	34	**17.0**
Denison University	B	P	10	174	**17.4**	11	150	**13.6**	9	154	**17.1**
University of Scranton	A	P	23	373	**16.2**	20	379	**19.0**	19	330	**17.4**
Central Michigan University	A	S	14	410	**29.3**	28	400	**14.3**	23	402	**17.5**
University of Tennessee, Chattanooga	B	S	9	188	**20.9**	10	159	**15.9**	10	177	**17.7**
University of North Carolina, Asheville	B	S	3	54	**18.0**	7	73	**10.4**	6	110	**18.3**
Augustana College	B	P	17	211	**12.4**	21	228	**10.9**	16	297	**18.6**
St. Lawrence University	B	P	32	237	**7.4**	21	196	**9.3**	13	247	**19.0**
Eastern Illinois University	A	S	15	374	**24.9**	27	325	**12.0**	18	346	**19.2**
Austin College	B	P	8	112	**14.0**	7	121	**17.3**	7	137	**19.6**
College of St. Benedict / St. John's U.**see note**	B	P	31	192	**12.0**	20	144	**13.7**	32	191	**19.9**
College of Charleston	A	S	20	275	**13.8**	15	234	**15.6**	21	422	**20.1**
Coe College	B	P	8	65	**8.1**	5	58	**11.6**	3	62	**20.7**
Central Washington University	A	S	4	199	**49.8**	5	167	**33.4**	9	188	**20.9**
Fordham University	A	P	22	252	**11.5**	19	183	**9.6**	7	149	**21.3**
Linfield College	B	P	8	69	**8.6**	4	38	**9.5**	3	64	**21.3**
Northern Kentucky University	B	S	9	146	**16.2**	6	103	**17.2**	6	133	**22.2**
Randolph-Macon College	B	P	8	62	**7.8**	4	53	**13.3**	3	70	**23.3**
Dillard University	B	P	0	85	**NA**	1	57	**57.0**	3	71	**23.7**
Butler University	B	P	14	111	**7.9**	13	76	**5.8**	4	106	**26.5**
University of the Pacific	A	P	8	106	**13.3**	6	81	**13.5**	3	81	**27.0**
Middle Tennessee State University	A	S	9	244	**27.1**	10	199	**19.9**	3	253	**84.3**
University of Portland	B	P	5	44	**8.8**	4	51	**12.8**	1	95	**95.0**
Coastal Carolina University	B	S	0	42	**NA**	0	65	**NA**	0	103	**NA**

* Ratios A, B and C represent number of baccalaureates awarded per doctorate awarded to an alumni six years later.

**Data sorted on Ratio C.

****Ratios for the College of St. Benedict/St. John's University should read as follows:
A-6.2, B-7.2, C-6.0**

Table 2.11. Research Corporation (CCSA), PRF (Type B), NSF (RUI Research) and NIH (AREA) Awards from Study Institutions 1986–2000

Academic Institution	Class	Type	Research Corporation (CCSA) 1986-2000	Petroleum Research Fund (PRF-B) Awards 1986-2000	NSF-RUI Research Awards (Physical and GeoSciences) 1986-2000	NSF-RUI Research Awards (Biological Sciences) 1986-2000	NIH (AREA) Awards 1985-1999	Totals (RC + PRF + NSF-RUI + NIH-AREA)
Williams College	B	P	19	12	18	16	5	**70**
Franklin and Marshall College	B	P	8	18	30	7	2	**65**
Haverford College	B	P	12	2	21	21	6	**62**
San Jose State University	A	S	12	13	36			**61**
Occidental College	B	P	10	13	19	8	9	**59**
University of Wisconsin - Eau Claire	A	S	16	12	12	7	4	**51**
Colgate University	B	P	13	5	16	11	4	**49**
Wellesley College	B	P	14	3	8	16	7	**48**
California State University - Long Beach	A	S	7	2	10	11	16	**46**
College of William and Mary	A	S	7	15	13	4	7	**46**
Northern Arizona University	A	S	10	9	19	2	6	**46**
Swarthmore College	B	P	12	4	13	10	6	**45**
Carleton College	B	P	12	9	8	4	10	**43**
Hope College	B	P	11	9	15	1	6	**42**
Middlebury College	B	P	11	5	9	2	14	**41**
Harvey Mudd College	B	P	11	16	9	1	3	**40**
Mount Holyoke College	B	P	10	4	5	9	12	**40**
Oberlin College	B	P	5	9	10	11	5	**40**
Calvin College	B	P	10	6	16		3	**35**
Hamilton College	B	P	9	4	7	6	9	**35**
Trinity University	B	P	7	7	11	6	4	**35**
Santa Clara University	B	P	9	1	8	5	10	**33**
Barnard College	B	P	6	2	5	11	8	**32**
Bucknell University	A	P	7	12	4	4	3	**30**
Davidson College	B	P	9	9	2	6	4	**30**
Reed College	B	P	11	4	1	11	3	**30**
Grinnell College	B	P	11	8	5	2	3	**29**
Southern Illinois University at Edwardsville	A	S	5	5	6	3	9	**28**
Western Washington University	A	S	7	5	10	2	4	**28**
University of Minnesota - Duluth	A	S	5	13	4	3	2	**27**
Bates College	B	P	9	2	8	3	4	**26**
College of Charleston	A	S	5	7	9	2	3	**26**
Lafayette College	B	P	7	3	11	4	1	**26**
Pomona College	B	P	5	5	2	10	3	**25**
Union College	B	P	8	2	7	8		**25**
Furman University	A	P	11	7	3		3	**24**
Ithaca College	B	P	7	3	2	10	2	**24**
James Madison University	A	S	3	3	8	8	2	**24**
College of Wooster	B	P	6	7	7	2	1	**23**
SUNY College at Geneseo	B	S	4	6	7	2	4	**23**
Allegheny College	B	P	5	2	2	9	4	**22**
Connecticut College	B	P	9	3	1	5	4	**22**
Lewis and Clark College	B	P	11	2	7		2	**22**
Southwest Missouri State University	A	S	6	1	4	5	6	**22**
Bowdoin College	B	P	3	9	1	5	3	**21**
College of the Holy Cross	B	P	8	2	3	4	4	**21**

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Table 2.11. Research Corporation (CCSA), PRF (Type B), NSF (RUI Research) and NIH (AREA) Awards from Study Institutions 1986–2000

Academic Institution	Class	Type	Research Corporation (CCSA) 1986-2000	Petroleum Research Fund (PRF-B) Awards 1986-2000	NSF-RUI Research Awards (Physical and GeoSciences) 1986-2000	NSF-RUI Research Awards (Biological Sciences) 1986-2000	NIH (AREA) Awards 1985-1999	Totals (RC + PRF + NSF-RUI + NIH-AREA)
University of Richmond	A	P	7	1	2	7	4	**21**
University of San Diego	A	P	8	4	2	3	3	**20**
Eastern Illinois University	A	S	6	7	3		3	**19**
Gonzaga University	B	P	4	2	5	5	3	**19**
Hendrix College	B	P	11	3	3	1	1	**19**
Wake Forest University	A	P			8	3	7	**18**
Knox College	B	P	5	1	3	4	4	**17**
Southwest Texas State University	A	S	7	4	1	3	2	**17**
Colby College	B	P	7		2	2	5	**16**
Kalamazoo College	B	P	2	9	1	2	2	**16**
Macalester College	B	P	5	1	6	3	1	**16**
Gustavus Adolphus College	B	P	9		4	1	1	**15**
Cal. Poly. State University - San Luis Obispo	A	S	4		9	1		**14**
Dickinson College	B	P	7		1	3	3	**14**
Lawrence University	B	P	6	1	2	2	3	**14**
Smith College	B	P	4	2	5	1	2	**14**
Eastern Michigan University	A	S	3	1	3	4	2	**13**
Northern Kentucky University	B	S	3	1	3	1	5	**13**
Trinity College	B	P	4	1	3		5	**13**
Central Michigan University	A	S	5	1	5		1	**12**
Colorado College	B	P	6	1	5			**12**
Denison University	B	P	8		1		3	**12**
Lake Forest College	B	P	7			4	1	**12**
Augustana College	B	P			9		2	**11**
Drury University	B	P		7	1		3	**11**
Gettysburg College	B	P	4	4		2	1	**11**
University of North Carolina - Asheville	B	S	2	2	4	2	1	**11**
Bryn Mawr College	A	P			1		9	**10**
Coe College	B	P	3	1	6			**10**
Fort Lewis College	B	S	5	4	1			**10**
John Carroll University	A	P	4	1	5			**10**
University of Dayton	A	P	4	3		1	2	**10**
University of Puerto Rico - Mayaguez	A	S	7		2	1		**10**
Goucher College	B	P	4			4	1	**9**
University of Northern Iowa	A	S	5			1	3	**9**
University of Tennessee - Chattanooga	B	S	4	3	1		1	**9**
Western Kentucky University	A	S	3	1	3		2	**9**
Whitman College	B	P	5	1	2	1		**9**
Canisius College	B	P	2	1	1	1	3	**8**
Central Washington University	A	S	1	1	2	1	3	**8**
Creighton University	B	P	4	1	1	2		**8**
Fordham University	A	P	5	1			2	**8**
University of Central Arkansas	A	S	3	2	1		2	**8**
University of St.Thomas	A	P	5				3	**8**
Washington and Lee University	B	P	2	1	1	3	1	**8**
Juniata College	B	P		1	3		3	**7**

Table 2.11. Research Corporation (CCSA), PRF (Type B), NSF (RUI Research) and NIH (AREA) Awards from Study Institutions 1986–2000

Academic Institution	Class	Type	Research Corporation (CCSA) 1986-2000	Petroleum Research Fund (PRF-B) Awards 1986-2000	NSF-RUI Research Awards (Physical and GeoSciences) 1986-2000	NSF-RUI Research Awards (Biological Sciences) 1986-2000	NIH (AREA) Awards 1985-1999	Totals (RC + PRF + NSF-RUI + NIH-AREA)
Ripon College	B	P	2	1	1	3		**7**
Skidmore College	B	P	5	2				**7**
Southwestern University	B	P			3		4	**7**
University of Wisconsin - Stevens Point	B	S	2		1	2	2	**7**
University of Puget Sound	B	P	4			2	1	**7**
Wesleyan University	B	P	1		1	1	4	**7**
Luther College	B	P	3	1		1	1	**6**
Middle Tennessee State University	A	S	5	1				**6**
Pacific Lutheran University	B	P	2		2	1	1	**6**
University of North Florida	B	S	2	1	2		1	**6**
University of the Pacific	A	P	2			3	1	**6**
College of St. Benedict / St. John's University	B	P	3				2	**5**
Fairfield University	B	P	3		2			**5**
Rochester Institute of Technology	A	P	1	1			3	**5**
Towson University	A	S	4			1		**5**
Wabash College	B	P		3		1	1	**5**
Wheaton College	B	P	1	1		1	2	**5**
Beloit College	B	P	1			3		**4**
Butler University	B	P	3				1	**4**
Centenary College of Louisiana	B	P	2		2			**4**
Hartwick College	B	P	1		1	1	1	**4**
Mississippi College	B	P	1			2	1	**4**
Mount Saint Mary’s College	B	P	1			3		**4**
St. Lawrence University	B	P	1	1		1	1	**4**
University of Scranton	A	P	1	1		2		**4**
Centre College	B	P	2			1		**3**
DePauw University	B	P	2		1			**3**
Humboldt State University	A	S	1		1		1	**3**
Illinois Wesleyan University	B	P	1	1	1			**3**
Austin College	B	P			2			**2**
Linfield College	B	P	1		1			**2**
Morehouse College	B	P			1	1		**2**
Ohio Wesleyan University	B	P	1				1	**2**
Willamette University	B	P				2		**2**
Coastal Carolina University	B	S				1		**1**
Earlham College	B	P		1				**1**
Rose-Hulman Institute of Technology	A	P	1					**1**
Spelman College	B	P			1			**1**
Texas Lutheran University	B	P				1		**1**
Texas Wesleyan University	B	P		1				**1**
Dillard University	B	P						**0**
Chatham College	B	P						**0**
Randolph-Macon College	B	P						**0**
University of Portland	B	P						**0**

Table 2.12. Camille and Henry Dreyfus Foundation Awards to Study Institutions 1990–2000

Class	Type	Institution	Total Awards	Dollars
A	P	Furman University	11	496,500
A	S	San Jose State University	9	303,000
B	P	Trinity University	9	283,000
B	P	Harvey Mudd College	8	267,500
A	P	Bucknell University	8	228,000
B	P	Hope College	8	225,500
B	P	Mount Holyoke College	10	218,856
A	S	Eastern Illinois University	6	210,985
A	S	College of William and Mary	4	205,000
B	P	Occidental College	7	180,500
B	P	Swarthmore College	6	178,000
B	P	Wellesley College	5	150,500
A	S	Northern Arizona University	3	150,199
B	P	Calvin College	3	145,000
A	S	University of Puerto Rico-Mayaguez Campus	4	140,500
B	S	Fort Lewis College	3	125,500
A	S	University of Minnesota, Duluth	2	125,000
A	S	Western Washington University	6	120,500
A	S	Southwest Texas State University	2	120,000
B	P	Franklin and Marshall College	5	118,950
B	P	College of Wooster	4	110,000
B	P	College of the Holy Cross	5	106,050
B	P	Smith College	3	105,000
A	S	University of Wisconsin-Eau Claire	4	98,000
B	P	Haverford College	3	97,500
B	P	Middlebury College	3	95,610
B	S	Northern Kentucky University	4	95,400
B	P	Carleton College	3	95,500
B	P	Grinnell College	3	92,500
B	P	Ithaca College	2	85,000
B	P	Davidson College	3	83,000
A	P	University of Richmond	2	80,000
B	P	Santa Clara University	4	79,445
B	P	Gustavus Adolphus College	4	77,500
B	P	Hamilton College	2	76,900
B	P	Bates College	2	75,000
B	P	Drury University	2	75,000
B	P	Hendrix College	4	74,138
B	P	Connecticut College	2	73,600
B	P	Williams College	4	73,000
B	P	Macalester College	2	72,500
B	P	Pomona College	2	72,500
B	P	Texas Wesleyan University	3	71,000
A	P	Rochester Institute of Technology	3	70,688
B	P	Barnard College	2	70,000
B	P	Colby College	2	70,000
B	P	Gonzaga University	2	70,000
B	P	Juniata College	1	65,000

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Table 2.12. Camille and Henry Dreyfus Foundation Awards to Study Institutions 1990–2000

Class	Type	Institution	Total Awards	Dollars
A	S	California State University - Long Beach	1	60,000
A	S	Central Washington University	1	60,000
B	P	Skidmore College	1	60,000
B	P	Trinity College	3	51,000
B	P	Denison University	4	50,500
B	P	Union College	5	47,455
B	P	Knox College	1	39,000
B	P	Bowdoin College	3	35,000
B	P	Goucher College	3	35,000
B	P	Luther College	2	35,000
B	P	Wheaton College	2	35,000
B	P	College of St. Benedict / St. John's University	1	30,000
B	P	Ohio Wesleyan University	2	30,000
B	P	Oberlin College	2	29,000
B	P	Randolph-Macon College	3	28,000
B	S	SUNY at Geneseo	2	25,175
B	P	Austin College	2	25,000
B	P	Hartwick College	1	25,000
B	P	Morehouse College	1	25,000
A	S	Towson University	1	25,000
A	P	Fordham University	2	21,000
A	S	California Polytechnic State University,San Luis	1	20,000
A	S	College of Charleston	1	20,000
A	S	Eastern Michigan University	1	20,000
B	P	Kalamazoo College	1	20,000
B	P	Southwestern University	1	20,000
A	P	University of Scranton	1	20,000
B	P	Whitworth College	1	20,000
B	P	Willamette University	1	20,000
B	P	Earlham College	1	18,200
A	S	Central Michigan University	1	18,000
B	P	Centenary College of Louisiana	1	15,000
B	P	Centre College	1	15,000
B	P	Chatham College	1	15,000
A	P	Rose-Hulman Institute of Technology	1	15,000
B	P	Ripon College	2	13,750
B	P	Dickinson College	1	12,500
B	P	Lake Forest College	1	12,500
B	P	Lawrence University	1	12,500
B	P	Coe College	1	10,000
B	P	DePauw University	1	10,000
B	P	Fairfield University	1	10,000
B	P	Lewis and Clark College	1	10,000
B	P	Reed College	1	10,000
B	P	St. Lawrence University	1	10,000
A	P	University of San Diego	1	10,000
B	P	Wabash College	1	10,000
A	S	Southern Illinois University at Edwardsville	1	9,660
B	P	Lafayette College	1	5,500
B	P	Washington and Lee University	1	5,500

Table 2.13. Howard Hughes Medical Institute Awards to Study Institutions 1988–2000

Class	Type	Academic Institution	Awards	Dollars
B	P	Haverford College	4	4,250,000
B	P	Wellesley College	4	4,000,000
B	P	Swarthmore College	4	3,450,000
B	P	Smith College	4	3,400,000
B	P	Wesleyan University	4	3,350,000
B	P	Bates College	4	3,300,000
B	P	Carleton College	4	3,200,000
B	P	Colorado College	4	3,200,000
B	P	Barnard College	3	3,100,000
B	P	Williams College	4	3,100,000
B	P	Beloit College	3	2,850,000
B	P	Colby College	3	2,800,000
B	P	Reed College	3	2,700,000
B	P	Spelman College	3	2,700,000
A	S	College of William and Mary	2	2,600,000
B	P	Macalester College	3	2,600,000
B	P	Earlham College	3	2,450,000
A	P	Bryn Mawr College	3	2,400,000
A	S	California State University, Long Beach	2	2,350,000
B	P	Mount Holyoke College	3	2,300,000
B	P	Canisius College	3	2,250,000
B	P	Colgate University	3	2,250,000
B	P	College of the Holy Cross	3	2,250,000
B	P	Occidental College	3	2,200,000
A	S	Humboldt State University	3	2,150,000
B	P	Morehouse College	3	2,100,000
B	P	Harvey Mudd College	2	2,000,000
B	P	Oberlin College	3	2,000,000
A	S	University of Puerto Rico, Mayaguez	3	1,900,000
B	P	Ohio Wesleyan University	3	1,850,000
B	P	Allegheny College	2	1,500,000
B	P	Lawrence University	2	1,500,000
B	P	Hope College	2	1,450,000

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Table 2.13. Howard Hughes Medical Institute Awards to Study Institutions 1988–2000

Class	Type	Academic Institution	Awards	Dollars
B	P	Pomona College	2	1,400,000
B	P	Union College	2	1,400,000
B	P	Bowdoin College	2	1,350,000
B	P	Davidson College	2	1,350,000
B	P	Gettysburg College	2	1,350,000
B	S	Fort Lewis College	2	1,300,000
B	P	Grinnell College	2	1,300,000
B	P	Calvin College	2	1,200,000
A	S	Northern Arizona University	1	1,200,000
B	P	Connecticut College	1	1,100,000
B	P	Franklin and Marshall College	2	1,100,000
B	P	Middlebury College	2	1,050,000
B	P	College of Wooster	1	1,000,000
B	P	Knox College	2	1,000,000
B	P	Mississippi College	1	1,000,000
B	P	Whitman College	2	1,000,000
B	P	Dickinson College	1	900,000
B	P	Juniata College	1	900,000
B	P	Wabash College	1	900,000
B	P	Kalamazoo College	1	800,000
B	P	Santa Clara University	1	800,000
A	P	Wake Forest University	1	800,000
A	P	Bucknell University	1	700,000
B	P	Denison University	1	700,000
B	P	Hamilton College	1	700,000
A	P	University of Scranton	1	700,000
B	P	Centenary College of Louisiana	1	600,000
B	P	DePauw University	1	600,000
B	P	Lafayette College	1	600,000
B	P	Wheaton College	1	550,000
B	P	Centre College	1	500,000
B	P	Goucher College	1	500,000
B	P	Dillard University	1	400,000

SECTION 3:
INTRODUCTION TO THE STUDY OF INSTITUTIONAL CHARACTERISTICS

When this Study was about to begin, the five sponsoring foundations sought the advice of scientist-educators who could bring to the endeavor understanding of the environment of undergraduate institutions and their faculty. Three persons were immediately identified as having a breadth of perspectives and valued insights. Two, Stuart Crampton and James Gentile, came through the ranks at undergraduate institutions and have been or are administrators. Both have distinguished careers in science, and both have been instrumental in the formation and development of organizations that promote research in undergraduate institutions. Dudley Herschbach came to his view of predominantly undergraduate institutions by a different pathway, and his diverse activities have for many years directly and indirectly enriched the faculty and students of these colleges and universities.

Hearing their unique insights during the course of the several meetings at which they were in attendance prompted us to invite them to comment through essays their views and advice, and the result is the three essays in this section. They bring perspectives that raw data do not. They aid in interpretation of the vast array of information that follows. They offer insights that allow a thoughtful progression of ideas into programs.

Michael P. Doyle

QUESTIONS FROM THE PAST FOR THE FUTURE

Stuart B. Crampton, Barclay Jermain Professor of Natural Philosophy, Williams College

Presidents of undergraduate colleges and universities are well aware that their science programs present special challenges. In addition to the usual faculty office with a computer wired to the network, a science faculty member may expect several hundred square feet of high technology laboratory space, equipped with expensive equipment likely to be obsolete long before it wears out. Science students expect teaching labs equipped with advanced technology previously found only in upper level course labs or research labs. Despite the increase of information available on the Internet, the cost of science periodicals continues to rise at double-digit rates. Science facilities must be as modern and as attractive as the student centers, the libraries and the athletic facilities. Mentoring small groups of science students in research or research-based courses requires low student-faculty teaching ratios, which must somehow be balanced with higher ratios elsewhere. There are institutional costs associated with year-round research by students with their faculty mentors. Faculty welcome the extra summer activity for the sake of the companionship and the assistance, as well as the pleasure of introducing students to what is, after all, the core activity of science. Faculty also expect this activity to be recognized and somehow rewarded.

Strong science programs offer many advantages to institutions. The relatively rapid pace of change in the sciences can produce new modes of learning able to serve as models for other disciplines. Excellent science programs attract bright and highly motivated students. Excellent science programs attract faculty able to continue to grow in professional stature and knowledge of their fields while at the same time translating advances in the field into an effective curriculum effectively taught to undergraduates. Professionally active faculty bolster institutional reputations, helping to build cases for funding from alumni, other private individuals, foundations, corporations and the government. Professionally active faculty can themselves generate outside funding, reducing and also to some extent legitimizing, the internal funding needed to build and maintain their programs.

How expensive is it to develop science programs that successfully compete for students, faculty and external funding from private foundations, corporations and federal agencies? How important are external funding sources relative to internal sources of funds for facilities, equipment and programs? What factors correlate with institutional performance factors such as faculty grant and publication activity, the numbers of science majors, and the numbers of science students who go on to earn Ph.D. degrees? What factors other than funding have influenced the development of science programs and the way faculty work?

Stuart Crampton has taught physics and done research in atomic physics at Williams College since 1965, and served a term as Provost. He is a Fellow of the American Physical Society and a recipient of its award for research at an undergraduate institution. He has served on the American Physical Society Council and has been president of the Council on Undergraduate Research.

The five foundations sponsoring the Academic Excellence study and conference believe the answers to these questions may help individual presidents make future programmatic and resource allocation decisions. The answers may also be useful to foundations, corporations and government agencies asked to support science programs at undergraduate institutions. The task of this essay is to seek clues to the appropriate questions and answers from the history of undergraduate college science as experienced over the past thirty-five years by a science faculty member.

EXPANSION DURING THE 1960s

The success of science during World War II, the new peacetime technology that grew out of it, and newly available federal support for science research led to an explosion of opportunities for scientists and numbers of science students. Science faculty were busy teaching what they already knew or could pick up from the literature. Faculty research at undergraduate colleges and universities was a secondary consideration. But the frenetic advance of science and technology soon made it clear to science faculty that they would need to stay active in research in order to keep up with their fields. To do that, they sought modern research facilities and equipment. They sought research-active colleagues with whom to discuss their ideas, goals, problems and successes. They sought incentives, encouragement and recognition.

Led by alliances between science faculty and far-sighted administrators, many undergraduate institutions sought and found the necessary funding. Presidents raised money privately. The National Science Foundation (NSF) College Science Improvement Program and new foundation and corporate programs supported a mid-1960s boom in facilities and research support initiatives. The NSF also offered an Undergraduate Research Participation program that made it relatively easy for colleges as well as for research universities to support students working summers with faculty. Increasing numbers of college science faculty developed research programs competitive with those of their university peers for publication in peer reviewed journals. Some were able to do so using only institutional funds, but many found that in order be competitive they needed equipment, supplies and technical assistance beyond what their institutions could provide. Fortunately, several private foundations and government agencies were receptive to research grant proposals from faculty at undergraduate institutions. However, reviewers of those grant proposals had to be convinced of the feasibility of the research in a college setting, as well as the intrinsic value of the research. It was important for a college scientist seeking a grant to have a track record indicating success relevant to the proposed work. It was important to be able to demonstrate institutional commitment to the importance of research, as evidenced by institutionally provided facilities, equipment, supplies, technical support, speakers programs, and matching funds. It was important to know and be known by others in the appropriate peer community doing similar research by visiting major research centers, by attending national and international meetings, and by exchanging preprints of results. Above all, it was important to write good proposals and to write enough of them. Even unsuccessful proposals were useful in producing reviews that offered advice and information for crafting a more successful proposal. Targeting a number of agencies having different guidelines and reviewing procedures improved the chances of success. The more proposals submitted by a particular research community as a whole, the greater the likelihood of increased funding for that community. So in a real sense, greater numbers of proposals performed a service for the whole community, including the individual submitting it.

All this activity in support of research took significant amounts of institutional and personal resources. It also led to institutional and personal benefits beyond the intrinsic value of the research and dynamic faculty development. Faculty in touch with the latest developments and modes of thinking in their disciplines incorporated them into their classroom and laboratory teaching. Individual research grants and departmental or institutional research equipment grants provided sophisticated modern instrumentation also useful in course laboratories and demonstrations. Students were introduced to the value and the satisfaction of science research before deciding on career options and often even before deciding on a major. The environment shifted from talking about science to doing it.

WANING STUDENT INTEREST AND RISING COSTS

Ironically, as undergraduate colleges and universities became better equipped to attract and educate students for careers in science, there was a decline of the college-age population and among that population a relative decline of interest in science. The country became preoccupied with other issues. Nationally the absolute numbers of all first year students who were indicating intention to major in the basic sciences fell by 38% from 1975 to 1984.[1] Meanwhile, the national need for scientists to maintain our economic and military competitive edge continued to grow.

THE OBERLIN CONFERENCES 1985–1986

In the middle 1980s several presidents of private college noted that, while their own and similar colleges had been relatively prolific baccalaureate sources of professional scientists, they had received relatively little external funding for their science programs. Considering that a significant investment of funds was soon to be needed to replace aging facilities and retiring faculty, that situation had to change. President Frederick Starr of Oberlin College and six other presidents decided to convene a group of private liberal arts college presidents to address that issue. The intent was to make the case that as important sources of science graduates and science professionals, private liberal arts colleges deserved far more attention and support from federal agencies and private sources and also more attention from secondary school guidance counselors. About four dozen private colleges were chosen on the basis of criteria designed to support that case. The presidents of most of them met in June 1985 to discuss the supporting data and how they might use it to advantage.

I attended that conference as one of a panel of scientists drawn from among the 48 colleges. Our role was to give the presidents a sense of the issues being faced by their science faculty. The presidents had been prepared for the panel discussion by a booklet of seven position papers written by faculty on subjects ranging from the increasing importance of discrete mathematics to examples of effective local support of science to information about national faculty science initiatives such as the Council on Undergraduate Research. Jeanne Powell, a biologist from Smith, and Neal Abraham, a physicist then at Bryn Mawr, gave brief opening talks, followed by a panel discussion moderated by President David Fraser of Swarthmore. The presidents were attentive, sympathetic and supportive. While the position papers and discussion may have increased the presidents' anxiety about funding, they also may have provided some material for the case they hoped to make.

The panel was followed by an address by Douglas Walgren from the House of Representatives. He warned that budget deficits would make new initiatives problematic, but he also recommended taking the case personally to Washington. At lunch, an NSF representative described the various ways NSF was supporting science at colleges, including the research directorates and the recently revived undergraduate education unit. He emphasized the need for increased numbers of research and other science proposals, as a means of demonstrating the need for increased science funding. He also exhorted the presidents to lobby for increased support for science at all levels.

The presidents got the message. In the final session they decided to develop more data, to lobby and to meet again in a year. They agreed to be taxed to support additional data collection, and they formed four volunteer groups to begin to get the case out to potential sources of funding and secondary school sources of science students. They also agreed to meet again in June of 1986 at Oberlin to receive reports on the progress of the lobbying and to review the new data.

Additional data and reports on the evolution of the case for support of science at liberal arts colleges were presented at the second Oberlin meeting in June 1986.[2] There was also considerable discussion of two new topics, networking and library automation, that were important to science at liberal arts colleges but had a scope well beyond science. Out of that second, and final, meeting came renewed commitments to lobbying efforts and two new consortial groups, the Consortium of Liberal Arts Colleges (CLAC), to coordinate efforts in information technology, and the Oberlin Group, to coordinate and share information on library automation efforts.

The Oberlin presidents lobbied for increased financial support for science at undergraduate colleges and for increased attention to them as destinations for secondary school students interested in science. Financial support has improved. Numbers of secondary school students electing to pursue science at undergraduate colleges and universities has increased, in many cases dramatically. Of course, efforts of the Oberlin presidents were not the only causes of those effects, or even the initial causes. The Council on Undergraduate Research (CUR) had been started by a group of chemists in 1978 specifically to promote support for research at undergraduate institutions. With prodding by CUR and others, the NSF had already initiated its Research at Undergraduate Institutions (RUI) program to support undergraduate college research through the research directorates. With the re-establishment of the NSF education directorate had come a new scientific equipment program. Several private foundations had developed or were developing programs to stimulate curricular innovation in science and networking among scientists at undergraduate colleges and universities. Nevertheless, the Oberlin presidents' activities did significantly contribute to increased attention to science at undergraduate colleges and universities. The library and information technology consortia they initiated have continued to be valuable. In addition, I believe that the presidents themselves gained a new sense of how to improve their science programs and fund those improvements.

UNDERGRADUATE COLLEGE SCIENCE TODAY

However significant the contributions of the Oberlin efforts, the climate for science at undergraduate institutions is far different than it was in the early 1980s. Federal funding programs involve more undergraduate college scientists in planning and reviewing, and their programs are more sensitive to the undergraduate college environment. Private foundations and corporations have increased their support of undergraduate college science. They have supported networking and the spread of best practices among undergraduate college science faculty and students directly with their own programs and indirectly by supporting faculty initiatives such as Project

Kaleidoscope, the National Conferences on Undergraduate Research, and CUR. They have provided direct support to individual undergraduate institutions for equipment, programs and facilities. At most undergraduate institutions the numbers of science students and science majors have increased substantially. Spurred by the rapid exchange of information about best practices, faculty are busily engaged in developing and teaching research-based science courses at all levels and involving more students in a wide variety of independent projects and research.

Science itself continues to advance at an incredible pace. Many of the most exciting developments of the past decade could not have been predicted ten years ago. Much of the new science relies on expertise in more than one traditional field. To the general questions raised earlier about resource allocations, we can add some new ones. How have colleges been coping with the explosion of knowledge, the increasingly interdisciplinary character of science, the development of new research-based teaching techniques, and the increased emphasis on one-on-one mentoring? How do the numbers of science faculty and support staff compare to the numbers of science students? Have new demands on faculty time outstripped their ability to cover all bases? If so, are they covering the right bases? Are faculty finding time to keep up their research, so as to stay current and to translate advances in their fields into an effective curriculum? Are they finding time to write proposals so as to get money that may actually relieve some time pressure while enabling them to work more effectively? Do government and foundation programs provide the right incentives to help that happen? Are these the right questions? What are the right questions?

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[1] David Davis-Van Atta, Sam C. Carrier, and Frank Frankfort, *Educating America's Scientists: The Role of the Research Colleges,* Oberlin College, May 1985, p. 8.

[2] Sam C. Carrier and David Davis-Van Atta, *Maintaining America's Scientific Productivity: The Necessity of the Liberal Arts Colleges,* Oberlin College, March 1987.

FACULTY: OUR GREATEST INVESTMENT

James Gentile, Dean of the Natural Sciences Hope College

Sustaining a strong and vital science and mathematics faculty is the key ingredient of a successful science and mathematics program. The curriculum is established and owned by the faculty as a whole. Overall, faculty who provide excellence in teaching and scholarship also serve as role models for students, provide intellectual stimulation for their colleagues, and catalyze all aspects of the academic process. Faculty members who have career satisfaction, who are enthusiastic about teaching, and committed to, and excited about, scholarship serve as catalysts for programmatic excellence and provide the fundamental framework for institutions to meet their mission and goals in science education and for the training of future scholars.

To establish and sustain a strong faculty there must be an institutional commitment to:

- **identifying faculty members who best meet the mission of the institution and programs;**
- **providing a salary structure that will be seen as attractive and rewarding for long-term career development;**
- **investing the resources necessary to help each faculty member establish and sustain herself as a teacher/ scholar over a career.**

Therefore, in my opinion, an institution can best achieve success if, from the very beginnings of any search process, they have:

- **a clear articulation of goals and purposes for the position(s) to be filled;**
- **an understanding of how the introduction of new faculty will provide leverage and drive to move programs forward (in both the short and long term);**
- **a clear set of professional (teaching and research) expectations for each faculty member as to what defines success;**
- **a willingness to make the fiscal investment, at all career stages, to allow each faculty member to develop to her fullest potential as a teacher, scholar and institutional leader.**

AN INVESTMENT IN PEOPLE

Relative to the cost for most academic programs science education is expensive. Academic institutions with the intention to develop strong programs in science and mathematics must quickly recognize the need for costly scientific instrumentation, for precious expendable commodities, and for science building space that meets the demands of new pedagogical approaches to science education. These are elements that provide the critical framework upon which dynamic teaching, scholarship, and student learning can be sustained in a dynamic fashion. Each of these expenditures must be seen

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(albeit grudgingly at times) as "the cost of doing business" and recognized as essential to the infrastructure of a curriculum and a campus.

Such investments, however, pale when compared with the costs associated with the human resources necessary to bring a program to life and to give vitality and purpose to an institutional mission. A vibrant and vital faculty community of scholars represents the singular most important financial investment that an institution can make. The most obvious cost is, of course, salary. However, institutional resources must be continuously provided to each faculty member over a lifetime of work to help individuals achieve continued intellectual growth, be a sustaining contributor to the intellectual community of learners on the campus, remain engaged as quality educators, and ultimately be the role model mentors for new faculty recruits as they are brought into the community. It is only logical to do so, for one would not build a new science facility without also providing a strategy and fiscal commitment for upkeep, refreshment and incremental modernization for that building. The same forms of continuing investment must be envisioned for faculty.

When faculty spend an academic lifetime at a single institution, the expectation can be for about 30 years or more of active service. Careers can be generally divided into thirds:

- the early years—hiring through tenure;
- the middle years—new visions, new directions, burnout possibilities;
- the later years—senior status, mature mentoring, leaving a legacy.

Resources need to be provided on a continual basis throughout the career cycle of faculty members so as to sustain vitality, and the amounts and types of funds necessary for success will vary. While it is important to recruit the best individuals possible to join the faculty ranks at an institution, it is perhaps even more important to implement and develop programs targeted towards retraining these faculty and sustaining the professional energies and expertise that caused them to be identified as key individuals to bring into our institutional communities.

The types of funds and programs which they support are unique to the phase of development as well as to institutional make-up and expectation, but all of the costs are real and must be considered as mandatory investments if an institution is to sustain an excellence in faculty and programmatic growth. Most institutions have reasonably well-developed programs through which new faculty are brought into the culture of an institution and provided with the tools necessary to succeed as a teacher-scholar. Institutions also have devised mechanisms to assist faculty in late stages of their careers to assume leadership responsibilities within the institutional structure and also to phase out of an institution with grace and honor through retirement incentives. Many institutions must yet focus on how to keep mid-career faculty from becoming disillusioned and stale in their work. To combat the natural "midlife fatigue" that often enters the life of a faculty member somewhere between years 7 and 20 of service, institutions should invest in programs that will encourage mid-career faculty to continue to grow. Such initiatives might include efforts such as:

- supplemental travel support to help faculty learn about pedagogical and scholarly changes;
- ways to connect faculty at the national level, to move them out of the local climate so that new thinking is encouraged;

- mechanisms to encourage collaborations both on and off campus, particularly collaborations that involve new colleagues on campus (reverse mentoring?);
- incentives to apply for mid-career "re-start up funding" to move a career forward;
- promoting interdisciplinary collaborations and helping faculty to be comfortable in the new technologies of science.

WHAT INVESTMENTS IN FACULTY CAN BE MADE?

To achieve sustained excellence in faculty two factors must integrate with one another. The first, not surprisingly, is to attract exceptional faculty members to fill vacancies as they become available. These faculty must be recruited from among the very best in the world and must be individuals who are committed to the educational, intellectual, and core values of the institution. The second factor is to provide a strong support structure to sustain all facets of faculty development and growth.

An institutional base of internal support for faculty development is critical even if the initial investment is small. For example, a competitive internal grant competition can signal to faculty an institutional commitment of support for intellectual endeavors while also setting the expectation for excellence in programs that are ultimately supported. Funds should be generously provided but should not be merely "given" to faculty. They must be earned.

Such funds, however, only form the foundation for this effort. In science, important supplemental faculty development funds must also be infused into the program through a continued series of external grants from private and public foundations. Thus a well-defined articulation between mission, goals and purposes must be agreed upon by faculty and administrators alike, and the faculty and development office must then work in a coordinative fashion to generate proposals that are owned by the campus community in its entirety. Added to this should be a growing budgetary line-item base for regular funds invested for faculty travel, the funding of a pedagogical- and research-centered workshops, and regular informal opportunities (lunch or dinner meetings) to encourage freedom of idea exchange on topics chosen by the faculty.

One of the other key investments that is mandatory for the recruitment and development of successful science faculty is start-up funding for incoming tenure-track positions. All faculty (independent of discipline) should receive a minimum start-up package that includes all necessary computer hardware and software (common and unique) needs, and reduced teaching expectations in the first year (to allow for institutional acculturation, course development and the establishment of research on site). Salary funding for the first summer on campus should also be considered if summer scholarly expectations (particularly involving students) are part of the institutional culture. The funding for this summer should be tied to an expectation of a proposal submission sometime during the first year (hence another reason for a reduced teaching load) but should be guaranteed for the faculty member if the proposal is submitted whether it is funded or not.

At a predominantly undergraduate institution dedicated to a quality curriculum that is built upon the integration of teaching and research, start-up funding for some areas of science (i.e., molecular biology, physical chemistry) can extend upwards of $100,000. The norm for science faculty (excluding mathematics)

may be closer to $25,000. When hiring multiple faculty members in any given year the start-up investment can indeed be considerable. However, while these numbers may be a stretch in some cases, when one considers the total investment in faculty over a long period of work and the need to maintain the drive towards excellence, such start-up costs are small investments indeed. With these funds should come an explicit expectation that faculty must use the resources to generate an extramural grant proposal that will further enhance their teaching and scholarship. It should be realized however, that with many of these grants comes also an expectation from the institution to provide matching resources of some nature (and thus another institutional investment in the faculty).

In general, through the judicious use of institutional funds, grants, discretionary resources and gifts, it would not be unheard of for a predominantly undergraduate institution to expend (*excluding* investments in sabbatical leaves) about $400,000–$500,000 annually in faculty development in science.

CALCULATING YOUR COST

The worksheet on page 69 provides a basic working template in which institution-specific calculations can be generated to gauge the resource investment involved to recruit, retain and sustain a quality faculty member over her lifetime of institutional work. While the information here is merely a gauge of investment, it does, nevertheless, provide an interesting perspective on the value we currently, or can elect to, place on the investment in the human resource investments that are currently being made to achieve and sustain a successful program. The calculations here should reflect your own anticipated salary and budgetary increases projected over the historical lifetime of faculty at your institution.

CONCLUSION

Faculty are the greatest resource, and the greatest investment, for any institution. Indeed, upon the compilation of institution costs, it is likely that one will quickly observe that the *vast* majority of institutional investment in a faculty member will accrue during the post-tenure years. At Hope College, for example, the projected investment for a faculty member over a thirty-year academic lifetime is about $4 million, but the investment for that faculty member in the pretenure period, even with substantial start-up funding, may be not much greater than ten percent of this total. This underscores the critical importance of making the right hires, and making sound decisions on tenure at the critical review juncture for the institution. *A wrong tenure decision (when judged against institutional expectations and needs) can cost millions of dollars.* Therefore, it is in the best interest of the institution and each faculty member for an institution to invest the human resources and time necessary for well-defined and thoughtful annual evaluations for faculty as well as an intensive and thorough mid-tenure (three year), and post-tenure (every three or five years) review so that the targeted goals and expectations for success can be well understood and kept in focus for all involved in the process. Rewards, based upon institutional culture and history, should also then be tied to those expectations.

One way to do this is to put a premium on faculty scholarship in the form of proposal writing (with a strong belief that ideas challenged through a peer-review evaluation are ultimately those that are best honed for creative activity). In concert with this there should be a reward mechanism for faculty who, in good

faith, write and submit proposals for funding consideration. The reward may reflect the institutional premium that is used to recognize faculty for publication of ideas through any peer-review publication mechanism (journal manuscripts or books). The emphasis and reward is therefore put on *proposal writing* rather than on grant receipt, with the effect being a cohort of faculty excited about pursing this challenge because they are recognized for their efforts.

In closing, administrators at all academic institutions must all remember that while costing of faculty careers is important, faculty must be not regarded as merely "tools of the trade" or infrastructure. The costs for sustained excellence in faculty must be embraced within the overall institutional framework for human resource development and with the understanding that, indeed, the investment is large and important. Thus, the allocation of resources for faculty growth and development must take on the deservedly important recognition that, without such an investment, all institutional resources targeted towards infrastructure and programs will not be resources that will have been well spent.

COST WORKSHEET FOR LONG TERM FACULTY DEVELOPMENT

Hiring and Pre-tenure Period

1. Miscellaneous Hiring Expenses ____________
2. Initial Salary including fringe ____________
3. Salary Escalation for 6 Years (? %) ____________
4. Start-up Costs paid in initial years ____________
5. Travel Costs over 6 years ____________
6. Mentoring/Special Program Costs ____________
7. Institutional Fac. Dev. Funds (if any) ____________
8. Matching Costs on Grants ____________
9. Other Expenses as appropriate (list) ____________

Total Pre-Tenure Years ____________

Post-Tenure Years

Mid-Career (Years 7–20)

1. Salary Projected with Escalation ____________
2. Sabbatical Leave Costs (4 leaves) ____________
3. Travel Costs ____________
4. Faculty Development Costs ____________
5. Matching Costs on Grants ____________
6. Retraining/Special Program Costs ____________
7. Other Expenses as appropriate (list) ____________

Total Mid-Career Years ____________

Latter Career Stage (Years 21–30)

1. Salary Projected with Escalation ____________
2. Sabbatical Leave Costs (1–2 leaves) ____________
3. Travel Costs ____________
4. Faculty Development Costs ____________
5. Matching Costs on Grants ____________
6. Retraining/Special Program Costs ____________
7. Early Retirement/Buyout ____________
8. Other Expenses as appropriate (list) ____________

Total Latter Career Years ____________

GRAND TOTAL ____________

UNDERSTANDING THE OUTSTANDING: ZIPF'S LAW AND POSITIVE DEVIANTS

Dudley Herschbach, Frank B. Baird, Jr. Professor of Science, Harvard University

When I entered college as a freshman 50 years ago, I did not imagine that even undergraduates could engage in scientific research. The opportunity to do so, which came in the summer after my sophomore year, was a transforming experience. Focusing on a project made much more meaningful the courses I'd had. Discovering that the frontiers of science were actually nearby was surprising and exhilarating. Reading research papers, and tracing back via footnotes the genealogy of ideas and techniques, greatly broadened my perspective. From that I began to appreciate what was outstanding work (as well as what was not so good). Also, it helped me to realize that first-rate scientific research does not stem so much from technical expertise as from architectural vision. Conversations with my faculty mentor and more senior student researchers taught me much, including important aspects of the culture and ethics of science. Discussions of concepts entirely new to me, particularly quantum physics, led me to see the pervasive power of mathematics. Consequently, I enrolled that Fall in a course in probability theory which led to many other unanticipated academic adventures that shaped my career. From this personal history, and what I have witnessed with many of my own students, I am convinced that undergraduate research often contributes a vital impetus to the making of a scientist.

The Academic Excellence study[1] of the role of research in science education at undergraduate institutions has compiled a large body of striking data. This reveals a wide range in quality of performance, even for institutions similar in function, organization, and resources. As with laboratory explorations, unorthodox means of analysis may prove useful in interpreting the data or devising new initiatives. In this essay, I call attention to two approaches that have emerged from empirical studies of complex phenomena and deserve to be better known. Although exemplified in distant contexts, these offer compelling perspectives on generic aspects of exceptional performance.

First is Zipf's Law, originally discovered in the form of an inverse correlation between word rank and word frequency in languages but found applicable as well to many other things, including population patterns, income distributions, and the severity of storms. These correlations appear akin to "pink noise," also termed "1/f noise," an inverse relation between spectral intensity and frequency. It is widely observed in acoustic science and invoked in the aesthetics of music. This

Dudley Herschbach has pursued research and the teaching of chemistry for nearly 50 years, chiefly at Harvard, where he received his Ph.D in Chemical Physics in 1958. His research on molecular reaction dynamics was awarded the Nobel Prize in 1986. Currently, he is much engaged in efforts to improve K–16 science education and public understanding of science.

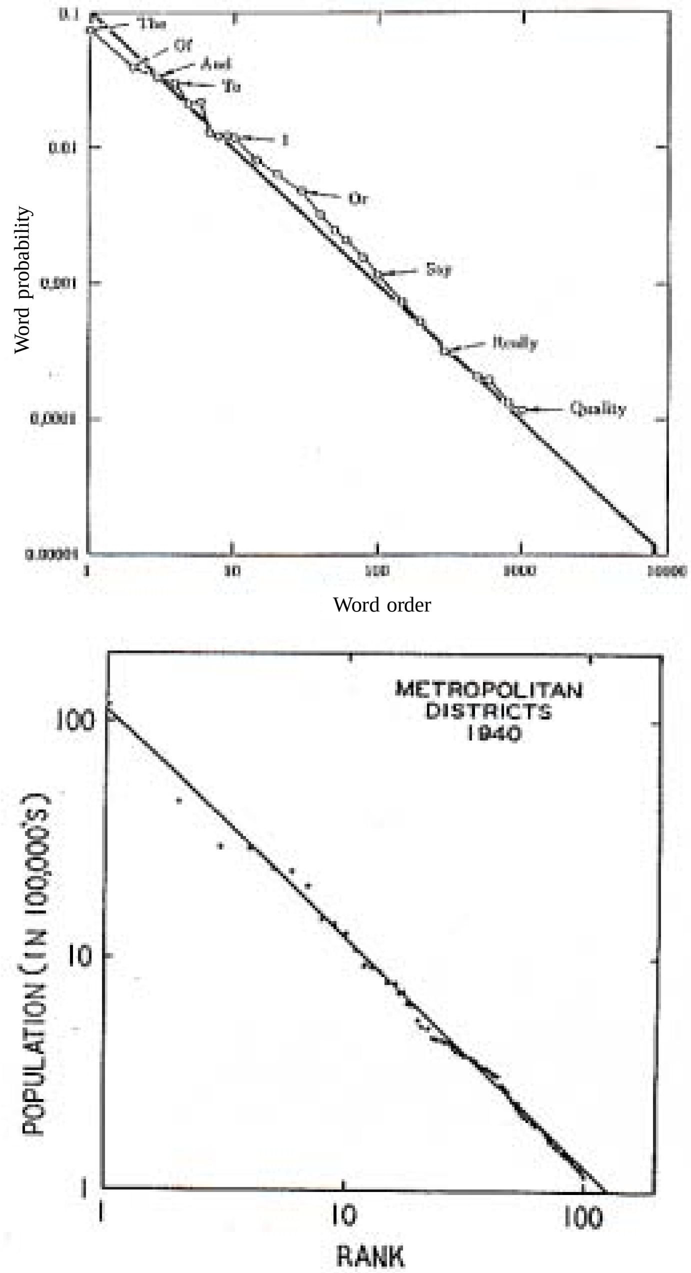
behavior, as interpreted by complexity theory, offers a qualitative paradigm for scientific productivity; it emphasizes that each of many factors has to be favorable to attain outstanding performance.

Beyond assessment looms the challenge, beset by familiar obstacles, of accomplishing significant and lasting change in institutions grown accustomed to modest or miserable performance. A strategy for such reform focuses on "positive deviants." This involves identifying exceptional people or practices that are already successful within an organization or community and devising means to amplify their impact. Inducing in this way change "from within rather than from without" has proved remarkably effective in reducing malnutrition of children in Vietnam and other poor countries. The same approach is now being increasingly applied to contend with other daunting societal problems as well as to enhance the performance of manufacturing or marketing firms.

ZIPF'S LAW AND PINK NOISE

George Kingsley Zipf (1902-1950), a professor of linguistics at Harvard, became intrigued by what he termed the "psycho-biology of language." This stemmed from discovering that if he ranked the different words in a given text by how often they were used, their frequency was approximately inversely proportional to the rank. Thus, the relative frequencies of the highest-ranking English words (*the, of, and, to,. . .*) are approximately 1, 1/2, 1/3, 1/4, . . . respectively. Likewise, if one word appears a thousand times in the text, ten words appear about a hundred times, a hundred words appear about ten times, and about a thousand words each occur just once.

Zipf devoted more than twenty years to examining similar correlations for many languages and for much other data, ranging from sizes of populations and



Examples of "Zipf's Law," illustrating rank-frequency distribution of English words (upper panel, from ref.6) and of populations of the one hundred largest metropolitan districts in the United States in 1940 (lower panel, from ref.2).

economic activities to the length of speeches in plays. He attempted to rationalize all this in a book published in 1949, intended to establish a *Principle of Least Effort* which would "facilitate an exact science of living behavior" in emulation of physics.[2] Today such correlations are regarded as empirical, although complexity theory has elucidated aspects linked to fractals and chaos.[3]

The term "Zipf's Law," referring to events whose frequency is approximately inversely proportional their rank, is applied both to common events (with top rank assigned to the most frequent, as with words) and to rare events (with top rank assigned to the most infrequent, as with sizes of cities or storms). A recent compilation of articles and books pertaining to Zipf's Law lists over 150 items.[4] It does not include, however, a 1928 paper by Edward Condon, a physicist, which evidently anticipated Zipf's original analysis of word frequencies.[5]

In the related phenomenon of "1/f noise," observed in a wide variety of physical systems such as semiconductor devices, the noise power is inversely proportional to the frequency.[6] This is called "pink noise" because the frequency dependence is intermediate between that of "white noise" (which does not vary with frequency) and "brown noise" (proportional to the inverse square of the frequency). Pink noise is often used as a test signal in acoustic research, because it has equal power in octave frequency bands, a property that approximately mimics many naturally occurring sounds. Pink noise also excites an approximately constant density of acoustic nerve endings in our ears. Analysis has shown that in most music the spectra of semitone intervals between successive notes and their amplitudes can both be approximated as inversely proportional to frequency over a large range.[7] Composers seem intuitively to write "pink music," intermediate between "white," which would have successive notes entirely random, and "brown," which would render the notes too predictable.

According to complexity theory, pink noise or Zipf's Law behavior typically arises for events or processes that require the contribution of many independent variables. The demonstration[8] involves some arduous mathematics, but its qualitative essence is simple. As a chemist, I naturally suggest an analogy to the daunting task of optimizing the yield of a multistep chemical synthesis. The maximum yield of the final product, the top-ranked result, can only be achieved in one way: by obtaining the largest possible yield in each of the successive steps. However, there are many ways to get less than the largest possible yield in one or more of the steps! Increasingly lower-ranked results thus can be obtained in increasingly many ways. This ensures that the rank or size of the final yield and its frequency or likelihood are inversely related.

Charles Townes, a remarkably productive physicist, has pointed to Zipf's Law as an intrinsic aspect of scientific productivity.[9] He notes that some scientists publish far more papers or obtain far more patents than the average, even though they may differ only a little in IQ from others. Whereas IQ is distributed in accord with the familiar bell-shaped curve, it is only one of many factors involved in human productivity. "Each of these factors brings in its own bell-shaped curve, and the sum of the many bell-shaped curves results in a 1/f-type law." As a consequence, high-ranking achievements will rarely emerge unless sufficient support is forthcoming for the inevitably far more numerous efforts that yield lesser results. To ensure good productivity, each of many factors has to be favorable. Society must value new ideas and discoveries; accept long-range prospects; foster diversity in approaches and institutions; tolerate failures and encourage trial and error, as nobody "can plan what scientific research is going to be successful." These requisites have been affirmed in other ways, but Zipf's Law adds a perspective aptly rooted in complex and chaotic processes.

AMPLIFYING POSITIVE DEVIANCE

Save the Children, in response to an appeal from the government of Vietnam, undertook in the 1990s an intensive effort to reduce childhood malnutrition, endemic in the rural villages. In desperation, the staff members in charge, Jerry and Monique Sternin, decided to try an unconventional approach. I will simply quote from their story,[10] as it has the character of a parable.

"We first sought out very poor families who had managed to avoid malnutrition. Although the parents in those families had access to no more resources than their neighbors, they somehow found enough food to keep their children healthy. By examining the behavior of these people, the positive deviants in the community, we hoped to find local strategies for combating malnutrition."

"It turned out that the mothers in those families were going out every day to nearby rice paddies and collecting tiny shrimps and crabs, which they were adding, along with sweet-potato greens, to their children's meals. They were also feeding their children three or four times a day, rather than the customary twice a day. The shellfish and greens were both readily available and free for the taking, but the conventional village wisdom held these foods to be inappropriate for young children. It was clear, therefore, that the immediate solution to the malnutrition problem did not require a lot of money or other outside resources; it simply required the community members to change their behavior and to start emulating the positive deviants in their midst."

"We launched a program to demonstrate to all the mothers the value of shellfish and greens and frequent feeding. For the first two weeks . . . the participating mothers were required to forage . . . and to bring a supply to the daily sessions, where they learned to cook them; [soon they] could see that the new foods did not make their children ill [but rather that the children were] becoming healthier. Within two years, 80% of the children participating in the project were no longer malnourished."

The project, begun in a few villages, was extended to many others in 20 provinces, in each case identifying local foods that had been employed by the positive deviants, such as peanuts, sesame seeds, snails, or dried fish. Save the Children has since used the approach in several other developing countries, with major impact on the lives of many millions of people. Other development organizations have adopted it to "address problems as various as ethnic conflicts and the spread of AIDS."

Sternin points out that "Most corporate change efforts resemble traditional development efforts: they focus on defining the organization's needs, and then they try to fulfill those needs by introducing resources and "best practices" from the outside. Often, though, the members of the organization resist the external solutions, and the desired performance gains prove either unattainable or fleeting." Now, however, companies and management-consulting groups are beginning to consider positive deviance to identify ways to improve performance and working conditions. Sternin[11] cites the case of a pharmaceutical company:

"[It had believed] that the more reps you had and the more calls you made on customers, the more you would sell. However, the positive deviants within the company, the most successful units, had fewer salespeople [and] made only one-third the usual number of visits to customers per day. . . . These reps were spending far more time with individual doctors, educating them on the benefits and uses of the products . . . and they were outselling the others by a big margin."

The strategy of amplifying positive deviants is itself in accord with the pragmatic and "hands-on" precepts of scientific research. It emphasizes the key role of "outliers," whose example can empower a community or institution to achieve performance well beyond presumed limitations.

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[1] Michael P. Doyle, Ed., *Academic Excellence* (Tucson, Ariz.: Research Corporation, 2000).

[2] George Kingsley Zipf, *Human Behavior and the Principle of Least Effort* (Cambridge, Mass.: Addison-Wesley Press, 1949).

[3] Murray Gell-Mann, *The Quark and the Jaguar* (San Francisco: W.H. Freeman and Co., 1994): 92–98.

[4] Wentian Li, "References on Zipf's Law," on web at http://www.linkage.rockefeller. edu/wli/zipf/.

[5] Edward U. Condon, "Statistics of Vocabulary," *Science* 67 (1928): 300.

[6] Manfred Schroeder, *Fractals, Chaos, and Power Laws* (San Francisco: W.H. Freeman and Co., 1991): 33–38, 107–112, 122–126.

[7] R.V. Voss and J. Clark, "1/f Noise in Music; Music from 1/f Noise, *Journal of the Acoustical Society* 63 (1978): 258.

[8] Elliot W. Montroll and Michael F. Shlesinger, "Maximum Entropy Formalism, Fractals, Scaling Phenomena, and 1/f Noise: A Tale of Tails," *Journal of Statistical Physics* 32 (1983): 209.

[9] Charles H. Townes, "Unpredictability in Science and Technology," in *Science and Society,* Martin Moscovits, Ed. (Concord, Ontario: House of Anansi Press, 1995): 31–42.

[10] Jerry Sternin and Robert Choo, "The Power of Positive Deviancy," *Harvard Business Review* 78 (January 2000): 14.

[11] David Dorsey, "Positive Deviant," *Fast Company* 41 (December 2000): 284; on web at http://www.fastcompany.com/online/41/sternin.html.

SECTION 4:
THE STUDY—INSTITUTIONAL SURVEY

Leon J. Radziemski, Coordinator, Academic Excellence Study

Capturing the data from the Institutional Survey and the Faculty Perspectives (Appendices A and B, respectively) presented a considerable logistical task. In order to achieve maximum utility, with database retrieval in mind, a logical, unbiased and comprehensive encoding system was devised. Using defined codes and their definitions, items were entered into Excel spreadsheets by institution. For the Institutional Survey, the Excel file carried the grants data, tables, and opinion/library data. Between the two surveys, more than 110,000 individual items were captured.

The database was developed in Microsoft FoxPro, which is a x-base data management application and language. Individual Excel sheets were then converted to comma delimited files (xxxyyyzz.csv, where xxx identifies an institution, yyy identifies the Institutional or Faculty survey, and zz identifies the Excel sheet number) and translated into the x-base database. Queries combining SQL (Structured Query Language) and traditional procedural programming were designed that resulted in tabular reports and new Excel spreadsheet outputs. This hybrid technique (individual institutional input -> aggregated into the database -> Excel spread sheet output) provided maximum flexibility for data accumulation and assessment. The data base queries provided the first-level retrieval of the information requested, while the Excel output could be further summed, rearranged or otherwise ordered to display the results clearly and concisely. A myriad of query possibilities exists. We have performed those that seemed obvious, but there is much more to be mined from these "two-dimensional" correlations.

The studies covered the period from January of 1990 through June of 2000, a total of 10.5 years. In some of our discussions of the data we refer to totals "over the decade;" our "decade" is actually 10.5 years long. When "per year" figures are given, the totals have been divided by 10.5.

There were several occasions where comparisons were made according to the type of institution. The institutional distribution according to private or public and those offering bachelors or advanced degrees for the 136 schools that completed the Institutional Survey is:

Type of institution	No. responding
Private, bachelor's degree only	90
Private, offer advanced degrees	14
Public, bachelor's degree only	8
Public, offer advanced degrees	24

The institutions are aggregated in various ways. If a division by private and public is made, the schools number 104 and 32, respectively; if the aggregation is by bachelors vs. advanced, they are 98 and 38, respectively.

Depending on the category being queried, other distinctions were determined to be useful. Raw sums of a quantity—grant dollars for example—do not take into account differences in institutional size including the number of faculty. So in given instances results are generally presented in various ways (i.e., raw sums, per institution, per faculty member, by type of institution). For "per faculty" results in the Institutional Survey results, we used the number of tenure-track faculty reported by the institutions in the year 2000, which will be found in Table 4.16, under the Year 2000 heading. That number may overrepresent the number of faculty, but not greatly because, as seen in Figure 4.49, the average number of faculty per institution grew by only 21% over the decade for which data were requested.

The assigned codes were the keys to systematic capture and subsequent interrogation of the grants data. They and their designations are discussed first, and then presented in tabular form.

The Ex/Int codes refer to whether the grant originated external to or internal to the institution. Early on we realized that the External and Internal categories listed on the Institutional Survey should be subdivided according to: (1) traditional faculty-driven external proposals; (2) external proposals whose awards would be given to the institution at some level for common departmental or institutional facilities, or for redistribution to faculty on a largely noncompetitive basis; and (3) awards made from internal funds, sometimes discretionary in nature, such as endowment income, state operating budget, or indirect cost returns from grants. Examples of the three categories respectively would be: a NSF-RUI-Research or an ACS-PRF Type B research award (Code 1); NSF-CCLI or HHMI awards (Code 2); institutional (internal) summer research support or start-up costs (Code 3).

Code	External/Internal
1	External Faculty
2	External Institutional
3	Internal Institutional

The codes below designate the departments in which grants originated. In the end there were many fewer grants in department units from Environmental Sciences, Marine Sciences and Neuroscience, so they were combined and included under the department category of "Interdisciplinary." The category "Institutes" was used for internal institutional organizations like research centers that typically used faculty from departments, although they might have their own staff as well.

Code	Department
1	Astronomy
2	Biology
3	Chemistry
4	Geology
5	Physics
6	Environmental Sciences
7	Marine Sciences
8	Neuroscience
9	Interdisciplinary
10	Institutes

The purposes of grants were designated by the institution on the Institutional Survey forms, and their designations were reviewed to ascertain the validity of the institution's interpretation. The original categories listed in the Institutional Survey were further divided to capture more information. We developed two sets of codes for these purposes, one pertaining to external-faculty grants, and the other to external-institutional grants and internal-institutional support. We counted basic and applied research together as one unit. Basic research generally included NSF, NIH, and ACS-PRF grants. Examples of applied research generally included Department of Energy or Department of Defense contracts, and grants from the Environmental Protection Agency.

Single-investigator grants primarily designed to benefit the community, such as the K–12 education enterprise or museums, were listed under outreach. Multiinvestigator grants designated for activities in a broader community—Eisenhower grants for example—were listed under external institutional awards under the appropriate purpose.

Code	Purpose for External Faculty Grants
1	Basic or applied research
2	Pedagogical research
3	Teaching and curriculum development
4	Outreach
5	Other
11	Research instrumentation
13	Teaching instrumentation

Code	Purpose for External/Internal Institutional Grants
1	Start-up
2	None
3	Matching-other
4	Institutional awards (e.g., HHMI)
5	Direct research support
6	Direct teaching support
7	New construction or renovations
8	Scholarships
9	Other
12	Matching-Research Instrumentation
13	Matching-Teaching Instrumentation
15	Research instrumentation
16	Teaching instrumentation

We started with six categories of funding sources: foundations, government (federal, state, local), international, institutional (internal allocations), corporate, and private (trustees, individual donors, small private foundations). In the end we had very few grants from international sources, so those were merged into the other sources as appropriate. For example, NATO grants were moved to the category of Government. Foundation grants included Research Corporation's Cottrell College Science awards; government grants included federal (e.g., NSF, NIH) as well as state and community grants. Institutional awards included start up and summer research support. Corporate support often took the form of equipment donations. Individual gifts often came from trustees, regents, donors, bequests, and small private foundations.

Code	Source type
1	Foundation
2	Government
3	International
4	Institution
5	Corporate
6	Individual(s)

GRANTS BY CATEGORY AND SOURCE

Grants by purposes, separated by External Faculty, External Institutional, or Internal Institutional categories, are described in Tables 4.1 through 4.9 and Figures 4.1 through 4.15. Grants by sources (foundation, government, institution, corporate, private) are described in Tables 4.10 through 4.14 and Figures 4.16 through 4.37. The total support reported from all sources over the decade was over $1,383,000,000. Government (federal, state, and local) support was greater than the sum of all other sources, just over $712,000,000. The total support for research and research instrumentation was over $682,000,000. Again, government was by far the largest funder of research and research instrumentation, just over $506,000,000.

Data reported on facilities and renovations need careful consideration. The total amount of facilities funding reported in Table 4.2 was approximately $300,000,000. However, in Table 4.15, institutions listed facilities and renovation expenditures as well; the decade's total in that column was just over $1,000,000,000. One component of this variance could be the way that public and private institutions acquired and reported these funds. For public institutions, facilities and renovations funds would, for the most part come from state or federal appropriations, not grants. Hence these would have been listed in the survey form in Table 1 but probably not in Table 2. In addition, however, some private institutions did not list a full accounting of expenditures for renovations and construction for Table 4.2 even after such discrepancies were noted to them. Bond issues for construction, for example, were not identified.

TABLES

The 10-year data supplied by the institutions in the three survey form tables, Other Institutional Support, Personnel, and Instructional Effort, are included in Tables 4.15 to 4.21 and Figures 4.38 to 4.62. The data are more completely reported for more recent rather than earlier years. However, when averages were taken of all institutions in a given year, only those providing data were counted. Some observations are warranted.

The interpretation of faculty salaries and benefits trends, Figures 4.43 and 4.44, is not as straightforward as it might appear. For example, faculty salaries and benefits can be lost by retirement of faculty with high salaries with replacement by lower salaried new faculty, or increased by the addition of new positions. Staff salaries and benefits, averaged per institution per year, doubled, while the salaries and benefits for regular faculty increased by 67% over the decade covered.

The survey table entitled "Personnel" contains some interesting results. Average regular faculty per institution, per year increased by 21% for the ten-year period covered by the table (Figure 4.49). For each year, the part-time faculty averaged from 3.5 to 5 per institution. For each year, the support personnel averaged from 8.4 to 11.2 per institution.

The final survey table dealt with Instructional Effort. The average number of courses per institution increased by close to 23% over the 10-year period (Figure 4.52). However, when divided into the number of students taught, the number of students per course remained remarkably constant at just over 25 for the 10-year period (Figure 4.54). The number of junior and senior science majors reported peaked in 1996 and 1997, and is declining (Figure 4.56). If true, this is a significant demographic trend for the natural sciences in the institutions surveyed. However, many institutions commented that these were estimates, so the reliability of the data cannot be verified.

Library resource information is provided in Table 4.22. It is arranged according to year 2000 budget.

INSTITUTIONAL AND FACULTY OPINIONS

Three sets of opinions were solicited from both institution representatives and individual faculty. Because one of the principal goals was to compare these responses, the institutional and faculty input are both treated here, although the faculty data were captured from the survey described in the following section.

Trends in Allocation of Time 1991–2000 (Institutional Survey, page 7) are presented in Figures 4.63 and 4.64, separated according to public and private institutions. Relative standard deviations (standard deviation divided by the average value) were about 20% for the first category (teaching) and 50% for the others. Nevertheless there is remarkable consistency between average public and private institutional response. Teaching estimates average between 50–60%, and the remainder are much lower.

Institutional opinions on Sources of Trends and a comparison of institutional and faculty opinions on the sources of trends are found in Figures 4.65 and 4.66.

In the latter, the institutional and faculty opinions on Sources of the Trends in Allocation of Time compare better than the relative standard deviation of about 30% warrants. The highest positive responses were on the categories: (a) incorporating information technology into teaching, (b) campus and other correspondence including e-mail, and (c) number of research students. Those reported to have changed the least included: (a) family/community/religious activities, (b) advising students on matters other than research, (c) exploring new research areas, (d) general education, and (e) non-major curricular development

Institutional opinions on Challenges and a comparison of institutional and faculty opinions on challenges are included in Figures 4.67 and 4.68. Again the relative standard deviations hovered around 30%. The most important challenges were deemed to be: (a) research, including released time, operating funds and leaves, (b) facilities for research, and (c) courses and laboratories for majors. Less important were: (a) information resources, electronic and paper, (b) support for personnel for research and research supervision, and (c) general education and non-major courses.

Narratives were received from 111 of the 136 responding institutions. They were abstracted according to the process described in Section 7.

Table 4.1. Total Funding Reported for All Purposes in All Study Institutions 1991–2000

External Funding (Faculty)	External Funding (Institution)	Internal Funding (Institution)	Total Funding	Number of Faculty in 2000	Average $ per Faculty Member (÷ 10.5 yrs)
24,964,285	19,942,712	1,045,610	45,952,607	78.7	55,609
33,520,706	7,594,180	1,275,360	42,390,246	76.0	53,121
36,447,776	2,512,923	1,137,954	40,098,653	82.6	46,234
6,723,343	25,286,326	7,464,293	39,473,962	24.0	156,643
5,691,654	32,594,225	99,800	38,385,679	38.0	96,205
26,044,917	6,704,931	3,272,726	36,022,574	34.2	100,313
3,046,373	32,808,562	30,000	35,884,935	29.0	117,849
2,619,468	7,371,166	21,733,740	31,724,374	20.3	148,836
24,338,333	4,270,873	2,493,493	31,102,699	52.1	56,855
11,576,462	8,916,596	2,557,820	23,050,878	69.7	31,497
10,123,865	10,948,087	1,534,999	22,606,951	68.0	31,662
3,228,135	1,565,900	17,755,671	22,549,706	54.0	39,770
11,257,519	10,856,393	266,038	22,379,950	143.0	14,905
17,882,959	2,562,590	1,803,873	22,249,422	82.6	25,654
3,544,528	17,673,197	587,071	21,804,796	15.9	130,607
12,456,039	6,918,761	2,394,302	21,769,102	54.0	38,393
1,317,525	826,092	18,316,528	20,460,145	29.0	67,193
4,931,778	11,269,027	3,944,325	20,145,130	33.3	57,615
2,925,548	14,513,866	2,525,762	19,965,176	30.0	63,382
1,852,182	15,142,824	1,119,500	18,114,506	27.0	63,896
6,719,396	7,597,952	3,497,931	17,815,279	37.0	45,857
9,635,326	5,442,518	2,649,671	17,727,515	30.5	55,355
822,471	14,306,538	2,550,200	17,679,209	14.3	117,744
1,734,204	1,117,649	14,600,300	17,452,153	12.7	130,875
2,748,714	14,434,333	49,600	17,232,647	30.0	54,707
4,482,777	7,241,869	5,358,673	17,083,319	42.3	38,463
11,569,780	3,173,704	2,062,901	16,806,385	68.0	23,538
5,838,915	10,042,461	773,000	16,654,376	31.0	51,166
10,569,041	2,404,047	3,658,266	16,631,354	48.0	32,999
7,893,493	7,161,830	731,896	15,787,219	26.6	56,524
720,714	14,581,434	412,037	15,714,185	21.0	71,266
4,491,737	9,495,350	1,452,032	15,439,119	27.7	53,083
1,880,500	11,131,587	2,241,788	15,253,875	41.0	35,433
7,125,992	7,467,403	53,065	14,646,460	21.8	63,986
618,887	11,148,583	2,722,361	14,489,831	20.0	68,999
6,204,174	5,284,053	2,933,896	14,422,123	24.3	56,524
11,192,696	2,752,066	356,379	14,301,141	73.0	18,658
10,521,544	1,466,325	2,177,580	14,165,449	49.0	27,532
5,616,381	6,726,429	57,620	12,400,430	34.5	34,232
4,862,076	4,231,761	2,174,839	11,268,676	36.0	29,811
1,810,470	8,388,342	807,703	11,006,515	23.9	43,859
5,756,692	2,952,227	2,273,221	10,982,140	28.0	37,354
2,012,959	7,043,624	1,879,411	10,935,994	29.0	35,915
948,143	8,999,528	877,399	10,825,070	53.5	19,270
4,339,483	4,548,693	1,775,893	10,664,069	39.5	25,712

➤

Table 4.1. Total Funding Reported for All Purposes in All Study Institutions 1991–2000

External Funding (Faculty)	External Funding (Institutional)	Internal Funding (Institutional)	Total Funding	Number of Faculty in 2000	Average $ per Faculty Member (› 10.5 yrs)
3,240,128	5,999,388	1,220,809	10,460,325	34.7	28,710
5,611,584	3,600,244	838,829	10,050,657	23.8	40,219
3,899,287	5,096,099	1,025,135	10,020,521	33.5	28,488
4,356,352	1,949,286	3,638,624	9,944,262	69.0	13,726
8,102,168	1,120,898	682,059	9,905,125	85.0	11,098
219,126	9,387,097	111,087	9,717,310	35.6	25,996
1,359,225	4,904,269	3,398,788	9,662,282	24.5	37,560
1,695,022	7,270,058	681,798	9,646,878	18.3	50,205
4,820,149	3,997,069	701,250	9,518,468	26.5	34,208
3,320,177	3,897,710	2,182,057	9,399,944	33.0	27,128
2,804,412	4,281,877	2,223,570	9,309,859	30.2	29,359
2,508,949	5,568,492	909,594	8,987,035	21.0	40,758
3,840,288	4,098,557	768,199	8,707,044	34.0	24,389
54,000	8,373,855	63,500	8,491,355	19.0	42,563
866,655	4,244,327	2,953,490	8,064,472	35.3	21,758
5,108,997	1,107,801	1,801,559	8,018,357	32.0	23,864
76,000	7,134,220	39,026	7,249,246	11.0	62,764
3,633,592	1,958,939	1,631,316	7,223,847	43.5	15,816
4,040,187	2,461,563	696,000	7,197,750	24.0	28,563
4,744,621	2,078,972	201,602	7,025,195	20.5	32,637
4,325,612	1,495,809	1,149,523	6,970,944	29.3	22,659
4,571,631	1,463,440	883,594	6,918,665	46.7	14,110
5,308,342	137,405	1,290,679	6,736,426	13.0	49,351
1,876,615	3,688,460	1,112,187	6,677,262	31.0	20,514
4,092,087	1,670,799	827,734	6,590,620	60.0	10,461
2,783,998	2,693,115	1,036,770	6,513,883	49.0	12,661
5,309,168	867,296	108,296	6,284,760	65.0	9,208
1,343,116	4,836,391	100,000	6,279,507	21.1	28,344
3,916,807	883,573	1,327,537	6,127,917	87.0	6,708
778,533	5,214,381	69,250	6,062,164	11.0	52,486
3,948,926	2,093,573	0	6,042,499	34.8	16,537
5,471,761	256,252	276,160	6,004,173	32.1	17,814
2,383,003	2,807,242	643,644	5,833,889	40.0	13,890
4,249,066	1,231,908	219,839	5,700,813	37.3	14,556
12,500	599,000	5,000,000	5,611,500	18.0	29,690
2,170,441	2,488,878	845,021	5,504,340	15.8	33,179
3,883,954	1,212,667	80,350	5,176,971	32.0	15,408
1,188,163	3,096,482	884,855	5,169,500	19.0	25,912
1,887,043	2,441,433	787,485	5,115,961	25.3	19,258
2,358,106	2,405,483	191,464	4,955,053	29.0	16,273
3,598,411	949,627	237,815	4,785,853	23.0	19,817
1,227,632	2,134,270	1,394,228	4,756,130	24.7	18,339
1,768,330	2,689,231	238,950	4,696,511	18.0	24,849
2,820,803	444,776	1,252,624	4,518,203	88.0	4,890
2,462,063	1,355,550	489,785	4,307,398	27.0	15,194
39,410	3,993,052	140,000	4,172,462	27.0	14,718

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Table 4.1 Total Funding Reported for All Purposes in All Study Institutions 1991–2000

External Funding (Faculty)	External Funding (Institutional)	Internal Funding (Institutional)	Total Funding	Number of Faculty in 2000	Average $ per Faculty Member (¸ 10.5 yrs)
1,138,392	2,855,710	149,567	4,143,669	13.0	30,357
3,645,551	350,000	126,622	4,122,173	13.5	29,081
1,006,232	1,457,069	1,480,779	3,944,080	42.0	8,943
733,003	3,131,313	72,000	3,936,316	24.0	15,620
1,681,398	447,532	1,706,541	3,835,471	26.5	13,784
868,207	2,540,367	316,833	3,725,407	44.0	8,064
76,490	1,450,295	2,191,252	3,718,037	9.0	39,344
704,610	2,614,077	281,596	3,600,283	24.4	14,053
1,861,585	470,998	1,049,703	3,382,286	30.5	10,561
935,852	1,972,252	473,853	3,381,957	22.0	14,641
1,987,281	594,390	755,598	3,337,269	27.0	11,772
2,490,646	252,620	498,106	3,241,372	35.0	8,820
2,989,762	138,241	0	3,128,003	30.0	9,930
617,806	2,199,630	305,889	3,123,325	19.0	15,656
190,997	2,661,149	160,208	3,012,354	16.0	17,931
1,910,665	591,969	467,846	2,970,480	38.0	7,445
2,006,496	448,508	477,769	2,932,773	54.4	5,134
1,004,482	1,220,014	680,040	2,904,536	25.0	11,065
1,814,839	768,307	148,207	2,731,353	34.0	7,651
1,322,657	1,109,619	293,437	2,725,713	15.0	17,306
860,087	615,092	1,209,401	2,684,580	30.0	8,522
670,964	955,321	841,036	2,467,321	34.5	6,811
1,323,104	712,904	350,141	2,386,149	31.0	7,331
1,248,132	833,665	272,988	2,354,785	12.0	18,689
402,258	680,000	1,246,798	2,329,056	21.0	10,563
540,530	1,738,642	38,000	2,317,172	12.6	17,515
0	1,537,250	770,695	2,307,945	15.4	14,273
1,615,428	372,548	295,300	2,283,276	13.0	16,727
590,008	1,484,730	124,000	2,198,738	22.0	9,518
1,104,199	1,050,882	16,500	2,171,581	17.0	12,166
872,494	1,197,572	88,200	2,158,266	16.0	12,847
1,498,271	495,750	141,687	2,135,708	57.3	3,550
729,989	614,400	779,890	2,124,279	12.0	16,859
1,269,423	534,868	253,273	2,057,564	43.0	4,557
466,628	667,974	849,525	1,984,127	25.0	7,559
362,680	1,143,450	305,396	1,811,526	19.0	9,080
925,651	449,382	259,154	1,634,187	20.0	7,782
1,248,849	62,937	116,671	1,428,457	28.0	4,859
214,200	9,723	1,058,078	1,282,001	26.0	4,696
304,217	708,080	249,300	1,261,597	19.5	6,162
115,168	701,749	274,000	1,090,917	17.0	6,112
37,800	976,688	57,000	1,071,488	9.0	11,339
841,956	169,579	19,734	1,031,269	27.8	3,533
507,143	130,087	168,980	806,210	24.0	3,199
20,000	773,507	0	793,507	16.0	4,723
Totals					
559,442,530	606,991,191	217,264,202	1,383,697,923		

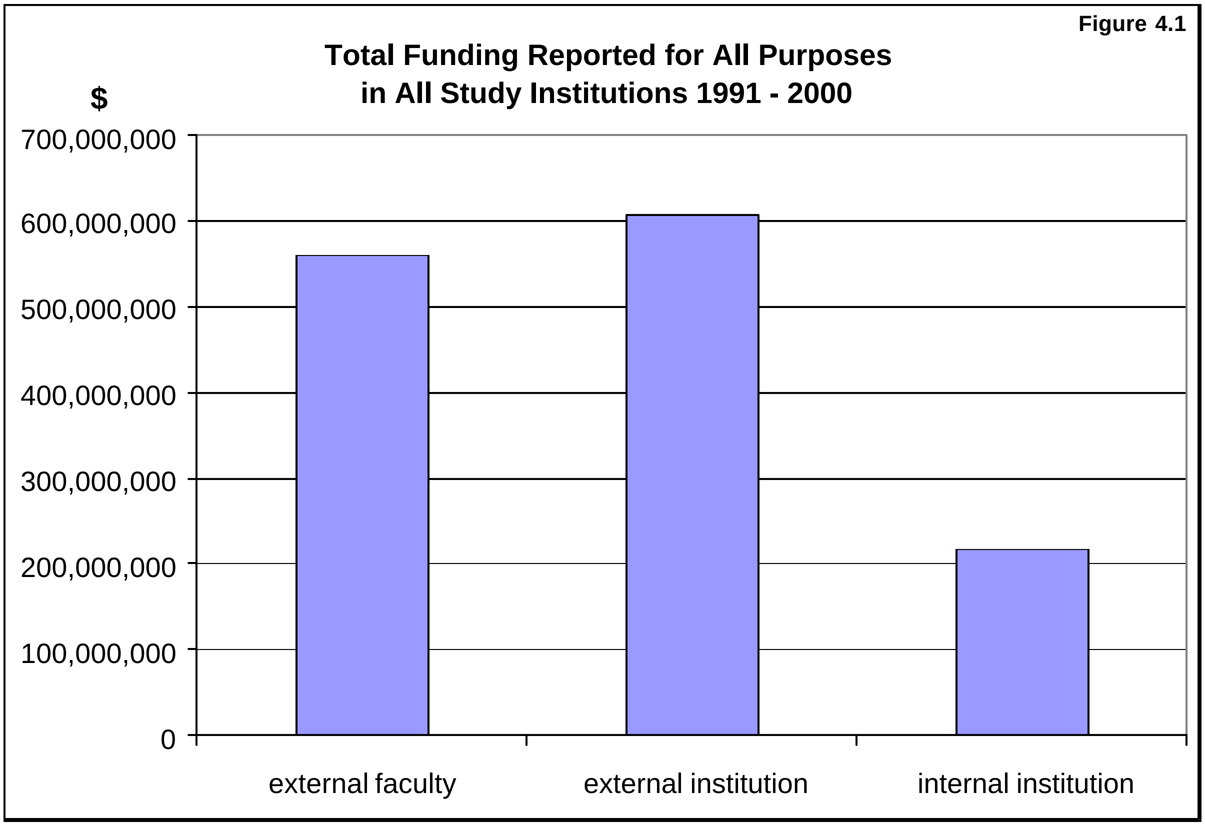


Figure 4.1
Total Funding Reported for All Purposes
in All Study Institutions 1991 - 2000
$
700,000,000
600,000,000
500,000,000
400,000,000
300,000,000
200,000,000
100,000,000
0
external faculty
external institution
internal institution

Figure 4.2

Total Funding Reported for All Purposes for 10.5 years, by Institution

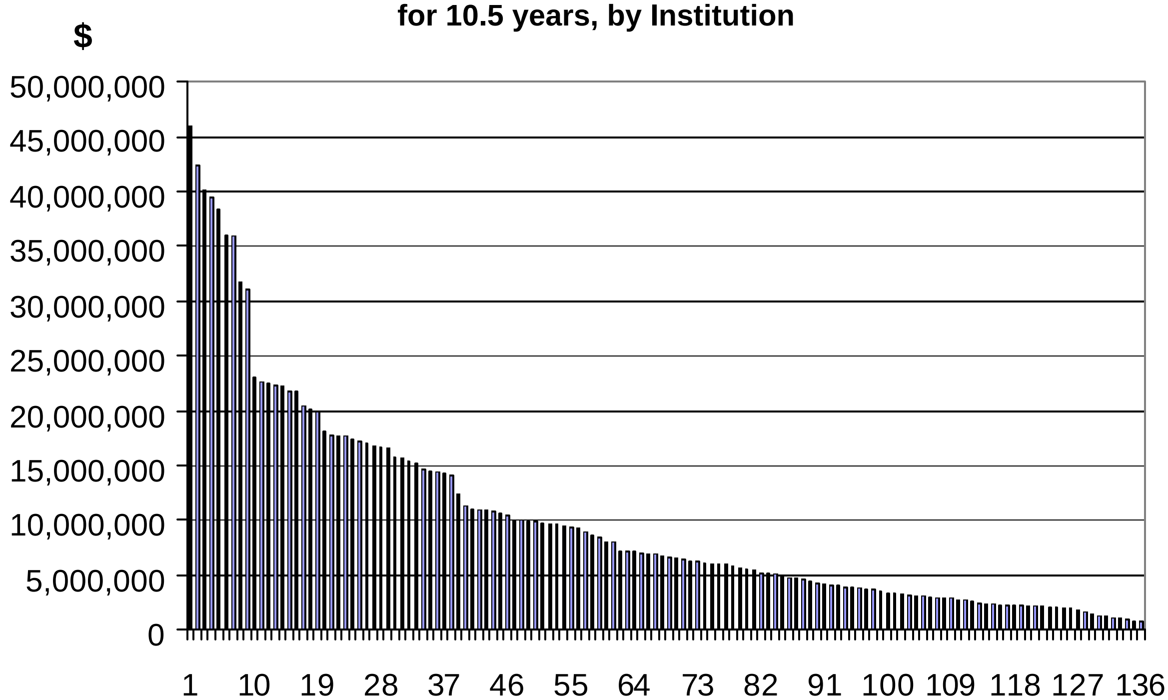
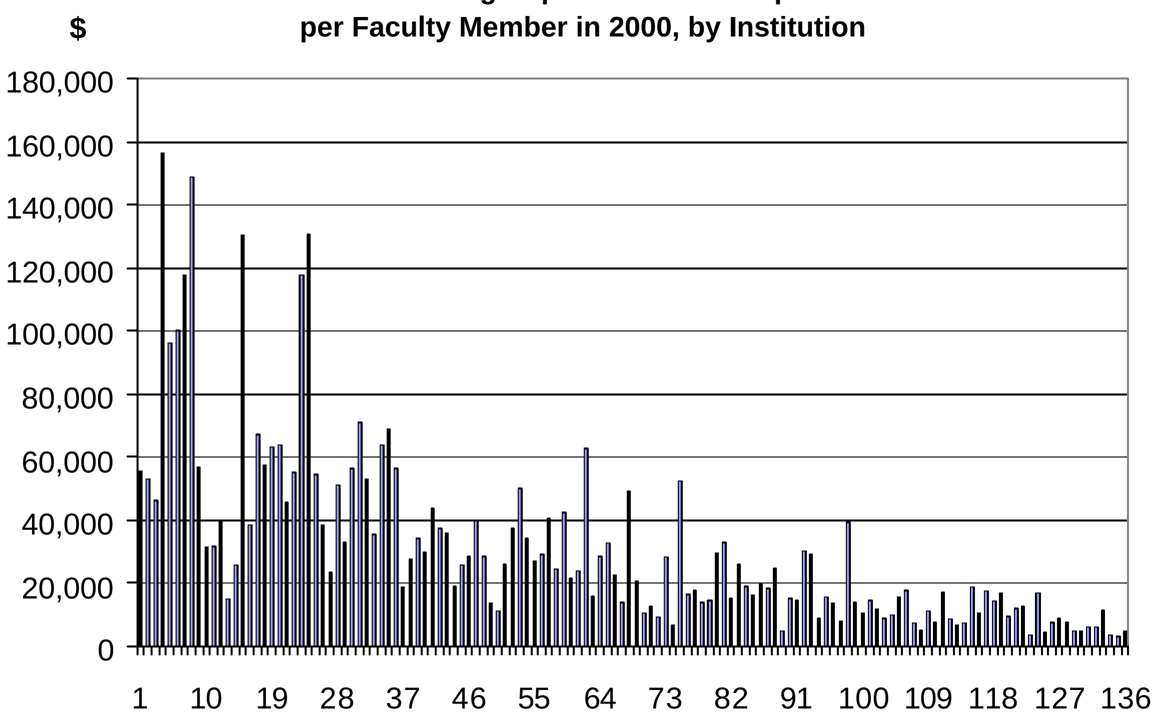


Figure 4.3

Total Funding Reported for All Purposes per Faculty Member in 2000, by Institution



*same institutional order as above

Figure 4.4

Total Funding for Internal Institutional Support Reported for All Study Institutions 1991 - 2000

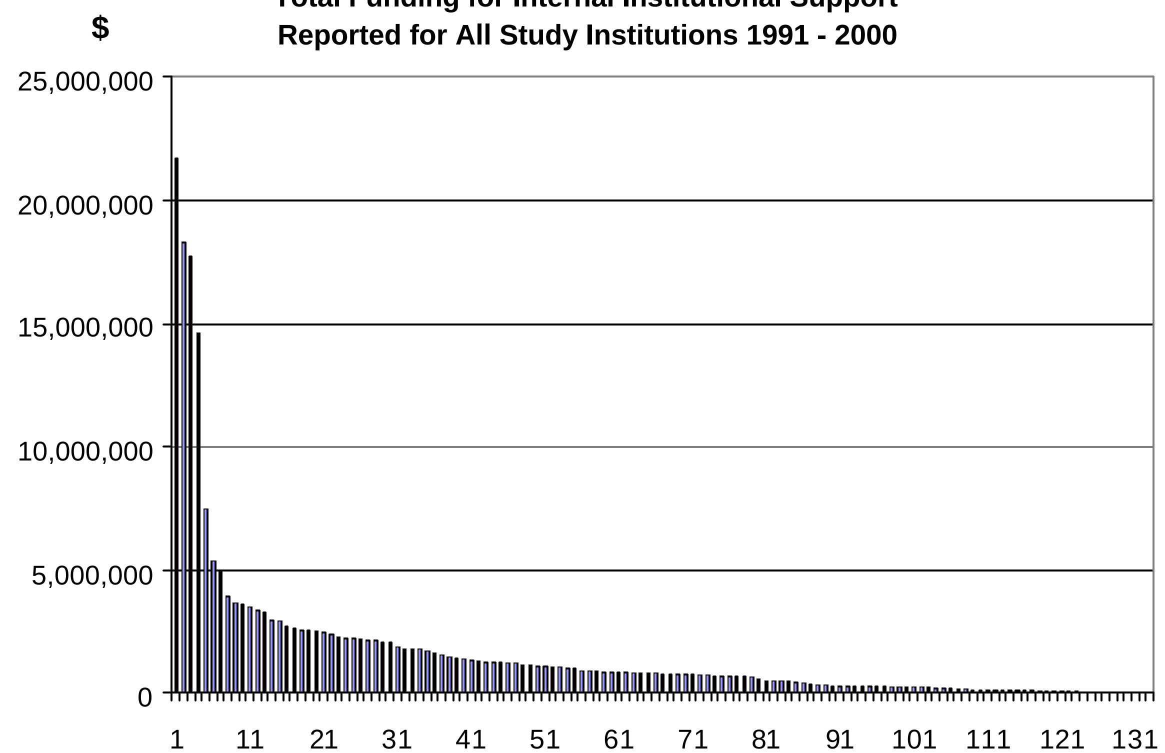


Figure 4.5

Total Governmental Support Reported by All Study Institutions 1991 - 2000

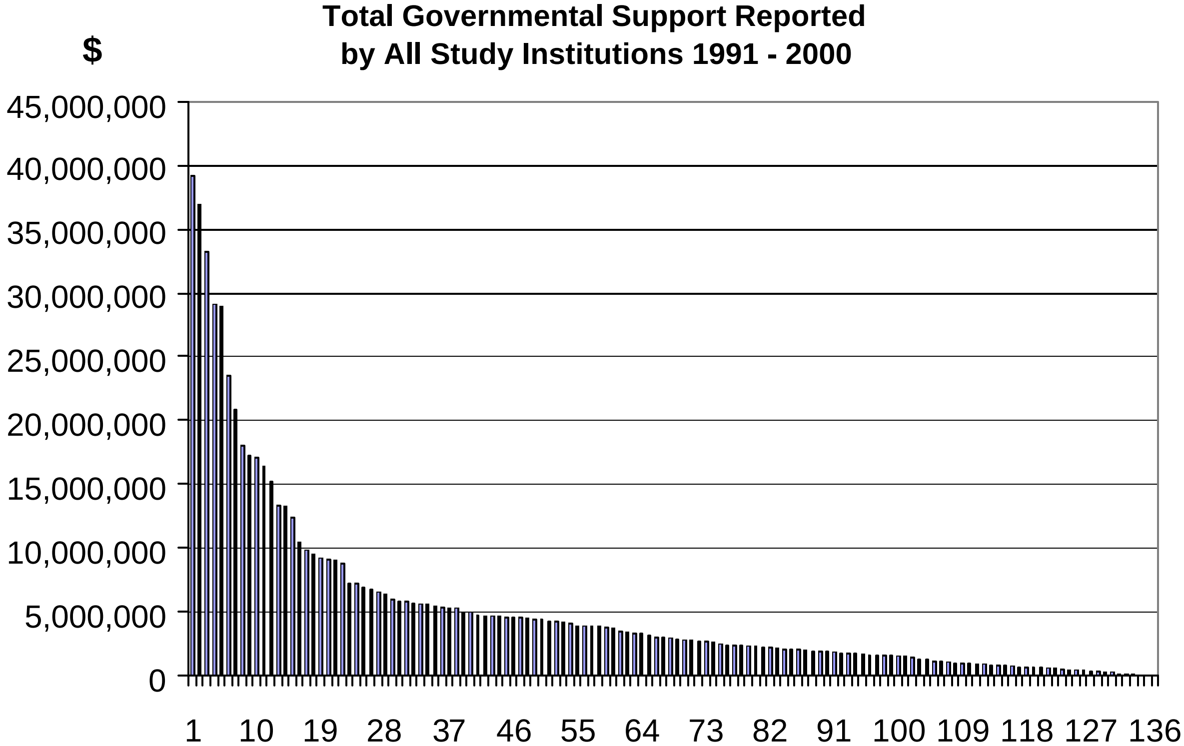


Table 4.2. Total Funding Reported for Facilities in Study Institutions 1991–2000

External Funding (Faculty)	External Funding (Institution)	Internal Funding (Institution)	Total Funding
0	20,046,810	6,332,644	26,379,454
0	24,319,986	0	24,319,986
0	3,122,170	19,713,080	22,835,250
0	0	17,401,000	17,401,000
0	0	16,710,737	16,710,737
0	13,423,876	0	13,423,876
0	8,876,875	2,200,000	11,076,875
0	10,960,000	0	10,960,000
0	0	10,200,000	10,200,000
0	9,877,561	0	9,877,561
0	7,875,609	1,875,609	9,751,218
0	9,168,774	75,087	9,243,861
0	9,175,000	0	9,175,000
0	8,744,387	0	8,744,387
0	6,717,040	0	6,717,040
0	5,977,198	55,589	6,032,787
0	3,972,257	959,429	4,931,686
0	4,400,000	0	4,400,000
0	3,270,000	630,000	3,900,000
0	3,228,733	0	3,228,733
0	950,000	2,124,057	3,074,057
0	3,062,500	0	3,062,500
0	2,925,904	0	2,925,904
0	2,388,300	280,000	2,668,300
0	1,150,000	1,423,194	2,573,194
0	2,524,850	0	2,524,850
0	450,000	1,987,000	2,437,000
0	2,420,795	0	2,420,795
0	1,591,112	606,084	2,197,196
0	2,110,000	0	2,110,000
0	0	2,000,000	2,000,000
0	1,130,000	780,000	1,910,000
0	1,768,460	60,283	1,828,743
0	1,520,000	300,000	1,820,000
0	1,650,000	0	1,650,000
0	1,300,000	307,136	1,607,136
0	1,600,000	0	1,600,000
0	1,600,000	0	1,600,000
0	1,550,000	0	1,550,000
0	1,500,000	0	1,500,000
0	282,365	1,200,000	1,482,365
0	1,343,000	0	1,343,000
0	1,333,488	0	1,333,488

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Table 4.2. Total Funding Reported for Facilities in Study Institutions 1991–2000

External Funding (Faculty)	External Funding (Institution)	Internal Funding (Institution)	Total Funding
0	306,000	997,408	1,303,408
0	1,266,072	0	1,266,072
0	629,000	500,000	1,129,000
0	413,650	709,605	1,123,255
0	1,118,000	0	1,118,000
0	726,077	384,051	1,110,128
0	1,107,000	0	1,107,000
0	385,000	640,000	1,025,000
0	850,000	0	850,000
0	736,241	0	736,241
0	704,288	0	704,288
0	351,280	351,280	702,560
0	300,000	350,000	650,000
0	563,155	0	563,155
0	266,444	266,444	532,888
0	520,000	0	520,000
0	375,000	145,000	520,000
0	14,375	498,900	513,275
0	509,803	0	509,803
0	500,000	0	500,000
0	434,250	0	434,250
0	426,578	0	426,578
0	419,656	0	419,656
0	400,000	0	400,000
0	358,000	0	358,000
0	315,917	0	315,917
0	264,408	4,602	269,010
0	257,815	0	257,815
0	238,541	0	238,541
0	1,000	228,785	229,785
0	224,344	0	224,344
0	175,000	0	175,000
0	125,650	0	125,650
0	125,000	0	125,000
0	117,110	0	117,110
0	0	89,500	89,500
0	0	60,000	60,000
0	38,000	0	38,000
0	10,000	9,000	19,000
0	0	15,000	15,000
Totals			
0	204,879,704	92,470,504	297,350,208

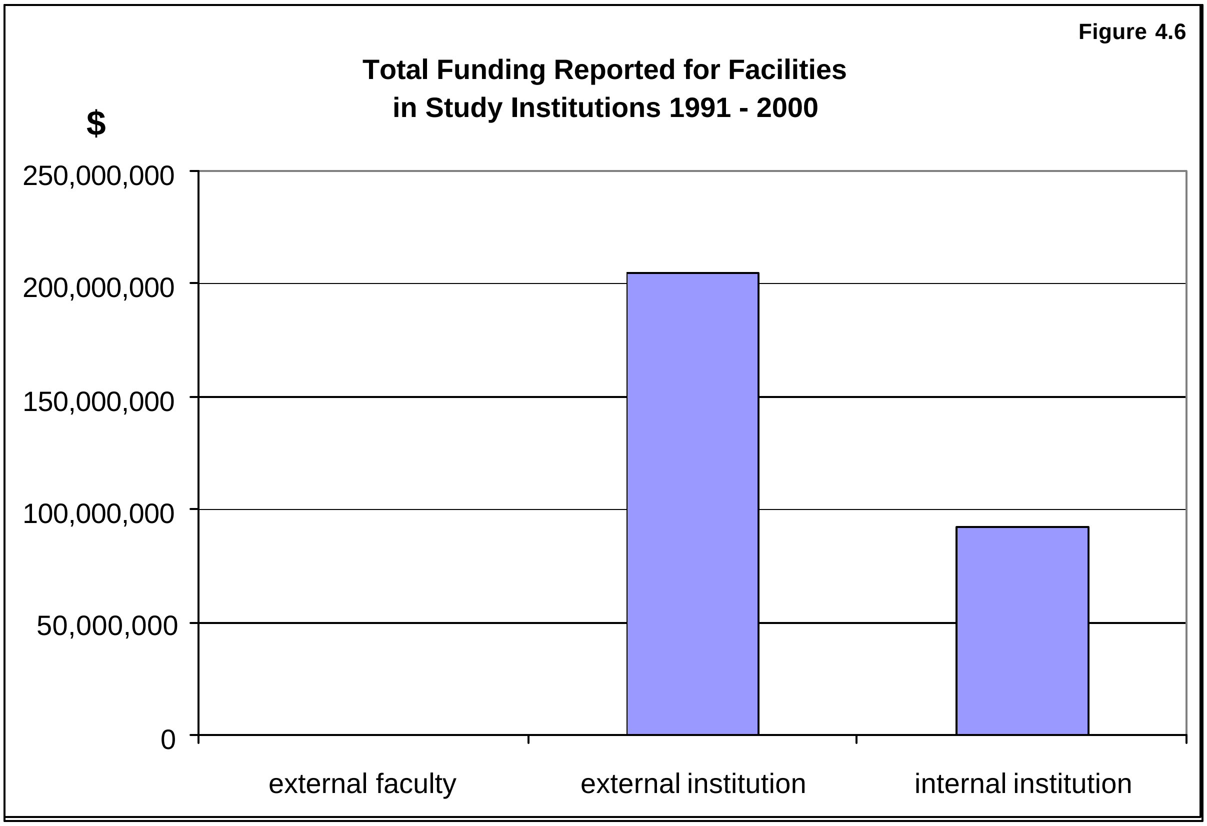
Figure 4.6
Total Funding Reported for Facilities
in Study Institutions 1991 - 2000
$
250,000,000
200,000,000
150,000,000
100,000,000
50,000,000
0
external faculty
external institution
internal institution

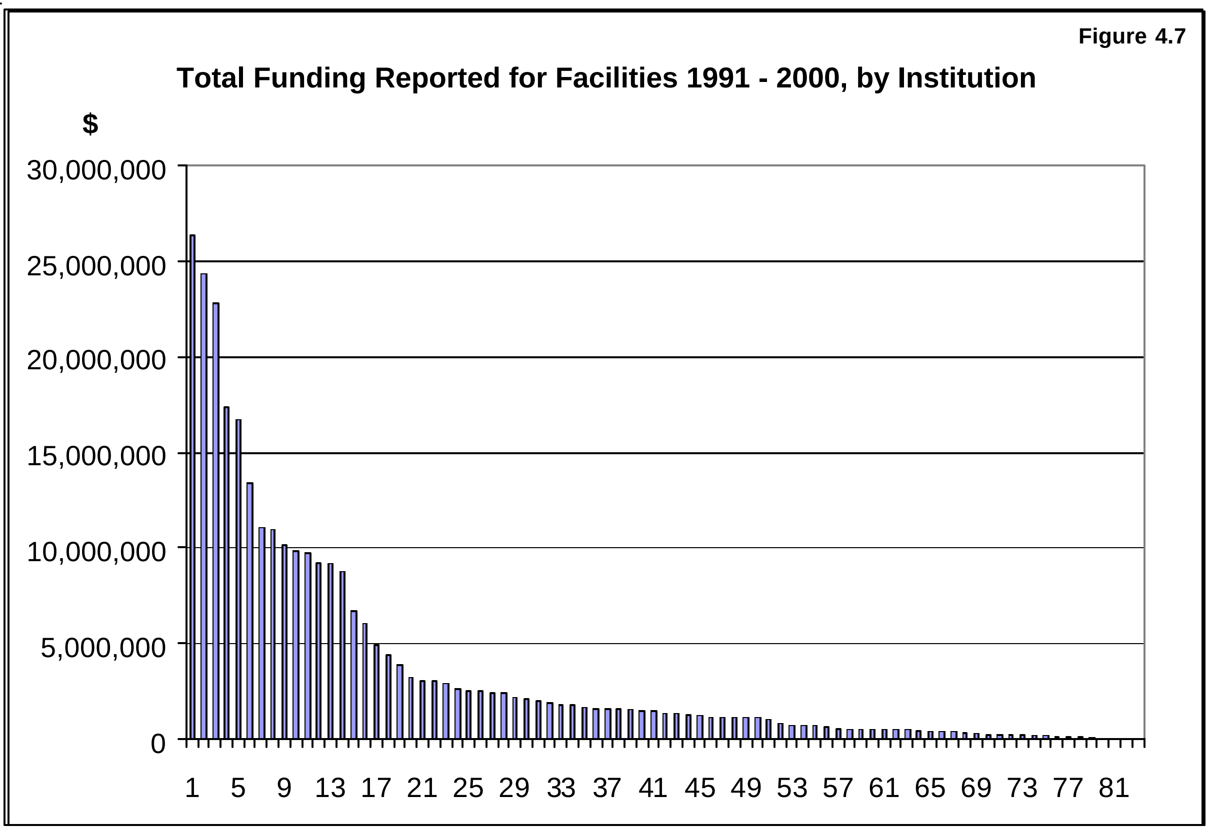
Figure 4.7
Total Funding Reported for Facilities 1991 - 2000, by Institution
$
30,000,000
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
0
1 5 9 13 17 21 25 29 33 37 41 45 49 53 57 61 65 69 73 77 81

Table 4.3. Total Funding for Research and Research Instrumentation Reported by Study Institutions for 1991–2000 (ordered by Total Funding)

External Funding (Faculty)	External Funding (Institution)	Internal Funding (Institution)	Total Funding	Number of Faculty in 2000	Average $ per Faculty Member (›10.5 yrs)
35,754,026	686,202	939,028	37,379,256	82.6	43,098
31,743,432	2,817,185	1,268,510	35,829,127	76.0	44,899
24,424,966	5,117,400	736,062	30,278,428	34.2	84,318
23,415,143	5,480,525	562,547	29,458,215	78.7	35,649
23,967,749	1,366,854	0	25,334,603	52.1	46,311
11,079,824	8,716,175	144,419	19,940,418	143.0	13,280
17,710,476	878,097	1,261,363	19,849,936	82.6	22,887
11,162,825	6,904,401	1,274,500	19,341,726	69.7	26,429
10,716,735	3,734,968	1,495,366	15,947,069	54.0	28,125
9,018,558	5,763,169	1,138,518	15,920,245	68.0	22,297
9,960,860	1,841,533	1,137,266	12,939,659	48.0	25,674
10,262,273	735,935	1,114,089	12,112,297	49.0	23,542
10,202,541	205,751	1,256,296	11,664,588	68.0	16,337
3,023,598	8,094,951	0	11,118,549	29.0	36,514
9,191,454	1,165,529	100,803	10,457,786	73.0	13,644
7,737,595	1,840,234	256,957	9,834,786	26.6	35,212
8,798,769	215,076	685,393	9,699,238	30.5	30,286
4,793,910	2,893,314	1,773,318	9,460,542	33.3	27,057
5,954,710	2,021,313	1,441,387	9,417,410	37.0	24,240
6,669,894	1,636,266	338,243	8,644,403	24.0	34,303
2,648,714	5,913,295	49,600	8,611,609	30.0	27,338
3,883,060	2,553,079	2,046,105	8,482,244	42.3	19,098
4,069,732	701,285	3,638,624	8,409,641	69.0	11,608
7,569,506	159,852	491,271	8,220,629	85.0	9,211
6,756,962	850,501	0	7,607,463	21.8	33,235
4,766,979	1,687,085	526,516	6,980,580	26.5	25,087
5,706,521	1,043,895	226,552	6,976,968	28.0	23,731
5,487,436	1,143,991	47,800	6,679,227	38.0	16,740
5,514,747	902,433	225,316	6,642,496	23.8	26,581
5,242,531	1,096,680	2,370	6,341,581	34.5	17,506
2,960,110	2,252,250	627,739	5,840,099	33.0	16,855
2,582,564	3,051,075	166,374	5,800,013	30.0	18,413
5,238,377	127,405	355,179	5,720,961	13.0	41,912
5,017,921	60,000	451,195	5,529,116	32.0	16,456
4,874,583	588,400	58,490	5,521,473	65.0	8,090
3,988,168	696,502	510,000	5,194,670	24.0	20,614
4,974,385	0	28,200	5,002,585	32.1	14,842
2,910,137	1,472,300	610,960	4,993,397	54.0	8,807
3,765,237	1,216,000	0	4,981,237	27.7	17,126
4,544,361	294,220	113,936	4,952,517	20.5	23,008
4,129,044	0	765,893	4,894,937	39.5	11,802
2,487,949	2,178,329	77,572	4,743,850	21.0	21,514
3,726,533	190,832	825,500	4,742,865	60.0	7,528
4,002,596	453,516	219,839	4,675,951	37.3	11,939
4,128,130	152,200	359,555	4,639,885	29.3	15,082
2,559,150	1,671,000	343,000	4,573,150	31.0	14,050

Table 4.3. Total Funding for Research and Research Instrumentation Reported by Study Institutions for 1991–2000 (ordered by Total Funding)

External Funding (Faculty)	External Funding (Institution)	Internal Funding (Institution)	Total Funding	Number of Faculty in 2000	Average $ per Faculty Member (÷10.5 yrs)
3,245,698	1,026,672	279,528	4,551,898	46.7	9,283
2,334,095	1,558,383	429,047	4,321,525	49.0	8,399
580,333	3,657,433	27,000	4,264,766	11.0	36,924
3,528,466	406,710	300,000	4,235,176	36.0	11,204
3,491,918	288,000	384,727	4,164,645	87.0	4,559
860,095	870,591	2,413,705	4,144,391	35.3	11,181
2,527,418	1,033,629	562,265	4,123,312	20.3	19,345
3,633,951	350,000	126,622	4,110,573	13.5	28,999
3,888,337	212,265	0	4,100,602	33.5	11,658
3,492,348	278,586	3,300	3,774,234	32.0	11,233
1,448,538	1,115,000	1,125,013	3,688,551	24.3	14,456
3,150,168	48,562	420,000	3,618,730	34.7	9,932
3,472,198	0	0	3,472,198	15.9	20,798
3,428,641	0	9,473	3,438,114	23.0	14,237
3,273,446	132,265	25,256	3,430,967	34.0	9,611
3,006,779	111,000	0	3,117,779	34.8	8,533
1,131,632	612,528	1,328,275	3,072,435	24.7	11,847
2,989,762	25,800	0	3,015,562	30.0	9,573
2,284,406	699,496	26,764	3,010,666	29.0	9,887
2,374,231	580,849	25,500	2,980,580	27.0	10,514
2,326,023	69,996	577,850	2,973,869	40.0	7,081
2,777,339	0	81,248	2,858,587	43.5	6,259
2,485,873	83,755	274,080	2,843,708	35.0	7,738
1,660,182	200,916	907,421	2,768,519	26.5	9,950
591,477	1,763,516	412,037	2,767,030	21.0	12,549
1,986,959	458,170	270,990	2,716,119	29.0	8,920
1,618,093	460,000	597,763	2,675,856	41.0	6,216
2,273,940	363,000	0	2,636,940	30.2	8,316
2,154,949	273,661	170,351	2,598,961	15.8	15,666
1,357,725	761,830	243,863	2,363,418	24.5	9,187
957,403	1,281,194	96,635	2,335,232	23.9	9,306
1,685,055	298,248	285,080	2,268,383	30.5	7,083
1,831,907	157,500	276,131	2,265,538	27.0	7,991
615,102	1,365,539	272,396	2,253,037	24.4	8,794
1,721,493	415,000	82,383	2,218,876	25.3	8,353
1,148,333	854,014	142,336	2,144,683	19.0	10,750
1,608,702	507,070	0	2,115,772	27.0	7,463
1,159,045	323,568	530,218	2,012,831	88.0	2,178
1,224,525	331,256	415,364	1,971,145	29.0	6,473
1,814,619	0	148,207	1,962,826	34.0	5,498
1,690,491	230,823	0	1,921,314	18.0	10,166
1,653,693	257,600	0	1,911,293	31.0	5,872
720,607	581,676	584,627	1,886,910	42.0	4,279
1,192,401	567,992	100,000	1,860,393	21.1	8,397
1,799,156	12,000	0	1,811,156	54.4	3,171
994,982	450,174	318,374	1,763,530	25.0	6,718

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Table 4.3. Total Funding for Research and Research Instrumentation Reported by Study Institutions for 1991–2000 (ordered by Total Funding)

External Funding (Faculty)	External Funding (Institution)	Internal Funding (Institution)	Total Funding	Number of Faculty in 2000	Average $ per Faculty Member (÷10.5 yrs)
388,854	100,000	1,246,798	1,735,652	21.0	7,871
1,406,405	226,362	76,200	1,708,967	38.0	4,283
1,067,073	355,633	253,273	1,675,979	43.0	3,712
39,410	1,621,488	0	1,660,898	27.0	5,859
1,216,282	273,217	165,238	1,654,737	12.0	13,133
1,186,610	91,000	322,604	1,600,214	31.0	4,916
1,322,657	57,500	50,500	1,430,657	15.0	9,084
1,248,849	62,937	116,671	1,428,457	28.0	4,859
572,048	689,921	154,491	1,416,460	53.5	2,522
544,700	146,284	593,536	1,284,520	34.5	3,546
1,015,045	77,050	189,616	1,281,711	18.3	6,670
840,695	134,256	205,000	1,179,951	20.0	5,619
839,119	323,409	0	1,162,528	17.0	6,513
824,997	251,456	38,200	1,114,653	16.0	6,635
729,989	100,000	258,113	1,088,102	12.0	8,636
672,688	305,336	18,000	996,024	14.3	6,634
676,197	0	316,833	993,030	44.0	2,149
806,168	0	123,158	929,326	57.3	1,545
811,607	0	87,800	899,407	13.0	6,589
190,997	467,292	160,208	818,497	16.0	4,872
710,913	101,257	0	812,170	24.0	3,223
627,853	75,000	34,160	737,013	13.0	5,399
617,669	66,400	40,884	724,953	30.0	2,301
672,813	30,000	15,734	718,547	27.8	2,462
666,273	40,500	0	706,773	12.7	5,300
408,832	257,000	19,000	684,832	20.0	3,261
596,856	0	32,000	628,856	19.0	3,152
590,008	36,219	0	626,227	22.0	2,711
54,000	475,543	38,500	568,043	19.0	2,847
552,993	0	0	552,993	22.0	2,394
540,530	0	0	540,530	12.6	4,086
37,800	427,850	57,000	522,650	9.0	5,531
338,884	16,360	47,842	403,086	25.0	1,536
201,723	1,500	129,526	332,749	19.0	1,668
194,570	0	125,339	319,909	26.0	1,172
164,217	141,453	0	305,670	19.5	1,493
269,826	0	0	269,826	24.0	1,071
76,490	128,250	29,385	234,125	9.0	2,478
0	154,582	60,586	215,168	15.4	1,331
214,626	0	0	214,626	35.6	574
110,168	0	54,000	164,168	17.0	920
7,500	57,500	0	65,000	11.0	563
12,500	9,000	0	21,500	18.0	114
20,000	0	0	20,000	16.0	119
Totals					
508,404,739	124,948,825	49,025,675	682,379,239		

Table 4.4. Total Funding Reported for Research and Research Instrumentation per Faculty Member in 2000, per institution (ordered by Average $ per Faculty Member)

External Funding (Faculty)	External Funding (Institution)	Internal Funding (Institution)	Total Funding	Number of Faculty in 2000	Average $ per Faculty Member (› 10.5 yrs)
24,424,966	5,117,400	736,062	30,278,428	34.2	84,318
23,967,749	1,366,854	0	25,334,603	52.1	46,311
31,743,432	2,817,185	1,268,510	35,829,127	76.0	44,899
35,754,026	686,202	939,028	37,379,256	82.6	43,098
5,238,377	127,405	355,179	5,720,961	13.0	41,912
580,333	3,657,433	27,000	4,264,766	11.0	36,924
3,023,598	8,094,951	0	11,118,549	29.0	36,514
23,415,143	5,480,525	562,547	29,458,215	78.7	35,649
7,737,595	1,840,234	256,957	9,834,786	26.6	35,212
6,669,894	1,636,266	338,243	8,644,403	24.0	34,303
6,756,962	850,501	0	7,607,463	21.8	33,235
8,798,769	215,076	685,393	9,699,238	30.5	30,286
3,633,951	350,000	126,622	4,110,573	13.5	28,999
10,716,735	3,734,968	1,495,366	15,947,069	54.0	28,125
2,648,714	5,913,295	49,600	8,611,609	30.0	27,338
4,793,910	2,893,314	1,773,318	9,460,542	33.3	27,057
5,514,747	902,433	225,316	6,642,496	23.8	26,581
11,162,825	6,904,401	1,274,500	19,341,726	69.7	26,429
9,960,860	1,841,533	1,137,266	12,939,659	48.0	25,674
4,766,979	1,687,085	526,516	6,980,580	26.5	25,087
5,954,710	2,021,313	1,441,387	9,417,410	37.0	24,240
5,706,521	1,043,895	226,552	6,976,968	28.0	23,731
10,262,273	735,935	1,114,089	12,112,297	49.0	23,542
4,544,361	294,220	113,936	4,952,517	20.5	23,008
17,710,476	878,097	1,261,363	19,849,936	82.6	22,887
9,018,558	5,763,169	1,138,518	15,920,245	68.0	22,297
2,487,949	2,178,329	77,572	4,743,850	21.0	21,514
3,472,198	0	0	3,472,198	15.9	20,798
3,988,168	696,502	510,000	5,194,670	24.0	20,614
2,527,418	1,033,629	562,265	4,123,312	20.3	19,345
3,883,060	2,553,079	2,046,105	8,482,244	42.3	19,098
2,582,564	3,051,075	166,374	5,800,013	30.0	18,413
5,242,531	1,096,680	2,370	6,341,581	34.5	17,506
3,765,237	1,216,000	0	4,981,237	27.7	17,126
2,960,110	2,252,250	627,739	5,840,099	33.0	16,855
5,487,436	1,143,991	47,800	6,679,227	38.0	16,740
5,017,921	60,000	451,195	5,529,116	32.0	16,456
10,202,541	205,751	1,256,296	11,664,588	68.0	16,337
2,154,949	273,661	170,351	2,598,961	15.8	15,666
4,128,130	152,200	359,555	4,639,885	29.3	15,082
4,974,385	0	28,200	5,002,585	32.1	14,842
1,448,538	1,115,000	1,125,013	3,688,551	24.3	14,456
3,428,641	0	9,473	3,438,114	23.0	14,237
2,559,150	1,671,000	343,000	4,573,150	31.0	14,050
9,191,454	1,165,529	100,803	10,457,786	73.0	13,644
11,079,824	8,716,175	144,419	19,940,418	143.0	13,280

Table 4.4. Total Funding Reported for Research and Research Instrumentation from Study Institutions 1991–2000 (ordered by Average $ per Faculty Member)

External Funding (Faculty)	External Funding (Institution)	Internal Funding (Institution)	Total Funding	Number of Faculty in 2000	Average $ per Faculty Member (¸ 10.5 yrs)
1,216,282	273,217	165,238	1,654,737	12.0	13,133
591,477	1,763,516	412,037	2,767,030	21.0	12,549
4,002,596	453,516	219,839	4,675,951	37.3	11,939
1,131,632	612,528	1,328,275	3,072,435	24.7	11,847
4,129,044	0	765,893	4,894,937	39.5	11,802
3,888,337	212,265	0	4,100,602	33.5	11,658
4,069,732	701,285	3,638,624	8,409,641	69.0	11,608
3,492,348	278,586	3,300	3,774,234	32.0	11,233
3,528,466	406,710	300,000	4,235,176	36.0	11,204
860,095	870,591	2,413,705	4,144,391	35.3	11,181
1,148,333	854,014	142,336	2,144,683	19.0	10,750
2,374,231	580,849	25,500	2,980,580	27.0	10,514
1,690,491	230,823	0	1,921,314	18.0	10,166
1,660,182	200,916	907,421	2,768,519	26.5	9,950
3,150,168	48,562	420,000	3,618,730	34.7	9,932
2,284,406	699,496	26,764	3,010,666	29.0	9,887
3,273,446	132,265	25,256	3,430,967	34.0	9,611
2,989,762	25,800	0	3,015,562	30.0	9,573
957,403	1,281,194	96,635	2,335,232	23.9	9,306
3,245,698	1,026,672	279,528	4,551,898	46.7	9,283
7,569,506	159,852	491,271	8,220,629	85.0	9,211
1,357,725	761,830	243,863	2,363,418	24.5	9,187
1,322,657	57,500	50,500	1,430,657	15.0	9,084
1,986,959	458,170	270,990	2,716,119	29.0	8,920
2,910,137	1,472,300	610,960	4,993,397	54.0	8,807
615,102	1,365,539	272,396	2,253,037	24.4	8,794
729,989	100,000	258,113	1,088,102	12.0	8,636
3,006,779	111,000	0	3,117,779	34.8	8,533
2,334,095	1,558,383	429,047	4,321,525	49.0	8,399
1,192,401	567,992	100,000	1,860,393	21.1	8,397
1,721,493	415,000	82,383	2,218,876	25.3	8,353
2,273,940	363,000	0	2,636,940	30.2	8,316
4,874,583	588,400	58,490	5,521,473	65.0	8,090
1,831,907	157,500	276,131	2,265,538	27.0	7,991
388,854	100,000	1,246,798	1,735,652	21.0	7,871
2,485,873	83,755	274,080	2,843,708	35.0	7,738
3,726,533	190,832	825,500	4,742,865	60.0	7,528
1,608,702	507,070	0	2,115,772	27.0	7,463
1,685,055	298,248	285,080	2,268,383	30.5	7,083
2,326,023	69,996	577,850	2,973,869	40.0	7,081
994,982	450,174	318,374	1,763,530	25.0	6,718
1,015,045	77,050	189,616	1,281,711	18.3	6,670
824,997	251,456	38,200	1,114,653	16.0	6,635
672,688	305,336	18,000	996,024	14.3	6,634
811,607	0	87,800	899,407	13.0	6,589
839,119	323,409	0	1,162,528	17.0	6,513

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Table 4.4. Total Funding Reported for Research and Research Instrumentation from Study Institutions 1991–2000 (ordered by Average $ per Faculty Member)

External Funding (Faculty)	External Funding (Institution)	Internal Funding (Institution)	Total Funding	Number of Faculty in 2000	Average $ per Faculty Member (÷ 10.5 yrs)
1,224,525	331,256	415,364	1,971,145	29.0	6,473
2,777,339	0	81,248	2,858,587	43.5	6,259
1,618,093	460,000	597,763	2,675,856	41.0	6,216
1,653,693	257,600	0	1,911,293	31.0	5,872
39,410	1,621,488	0	1,660,898	27.0	5,859
840,695	134,256	205,000	1,179,951	20.0	5,619
37,800	427,850	57,000	522,650	9.0	5,531
1,814,619	0	148,207	1,962,826	34.0	5,498
627,853	75,000	34,160	737,013	13.0	5,399
666,273	40,500	0	706,773	12.7	5,300
1,186,610	91,000	322,604	1,600,214	31.0	4,916
190,997	467,292	160,208	818,497	16.0	4,872
1,248,849	62,937	116,671	1,428,457	28.0	4,859
3,491,918	288,000	384,727	4,164,645	87.0	4,559
1,406,405	226,362	76,200	1,708,967	38.0	4,283
720,607	581,676	584,627	1,886,910	42.0	4,279
540,530	0	0	540,530	12.6	4,086
1,067,073	355,633	253,273	1,675,979	43.0	3,712
544,700	146,284	593,536	1,284,520	34.5	3,546
408,832	257,000	19,000	684,832	20.0	3,261
710,913	101,257	0	812,170	24.0	3,223
1,799,156	12,000	0	1,811,156	54.4	3,171
596,856	0	32,000	628,856	19.0	3,152
54,000	475,543	38,500	568,043	19.0	2,847
590,008	36,219	0	626,227	22.0	2,711
572,048	689,921	154,491	1,416,460	53.5	2,522
76,490	128,250	29,385	234,125	9.0	2,478
672,813	30,000	15,734	718,547	27.8	2,462
552,993	0	0	552,993	22.0	2,394
617,669	66,400	40,884	724,953	30.0	2,301
1,159,045	323,568	530,218	2,012,831	88.0	2,178
676,197	0	316,833	993,030	44.0	2,149
201,723	1,500	129,526	332,749	19.0	1,668
806,168	0	123,158	929,326	57.3	1,545
338,884	16,360	47,842	403,086	25.0	1,536
164,217	141,453	0	305,670	19.5	1,493
0	154,582	60,586	215,168	15.4	1,331
194,570	0	125,339	319,909	26.0	1,172
269,826	0	0	269,826	24.0	1,071
110,168	0	54,000	164,168	17.0	920
214,626	0	0	214,626	35.6	574
7,500	57,500	0	65,000	11.0	563
20,000	0	0	20,000	16.0	119
12,500	9,000	0	21,500	18.0	114
Totals					
508,404,739	124,948,825	49,025,675	682,379,239		

Figure 4.8

Total Funding Reported for Research and Research Instrumentation in Study Institutions 1991 - 2000

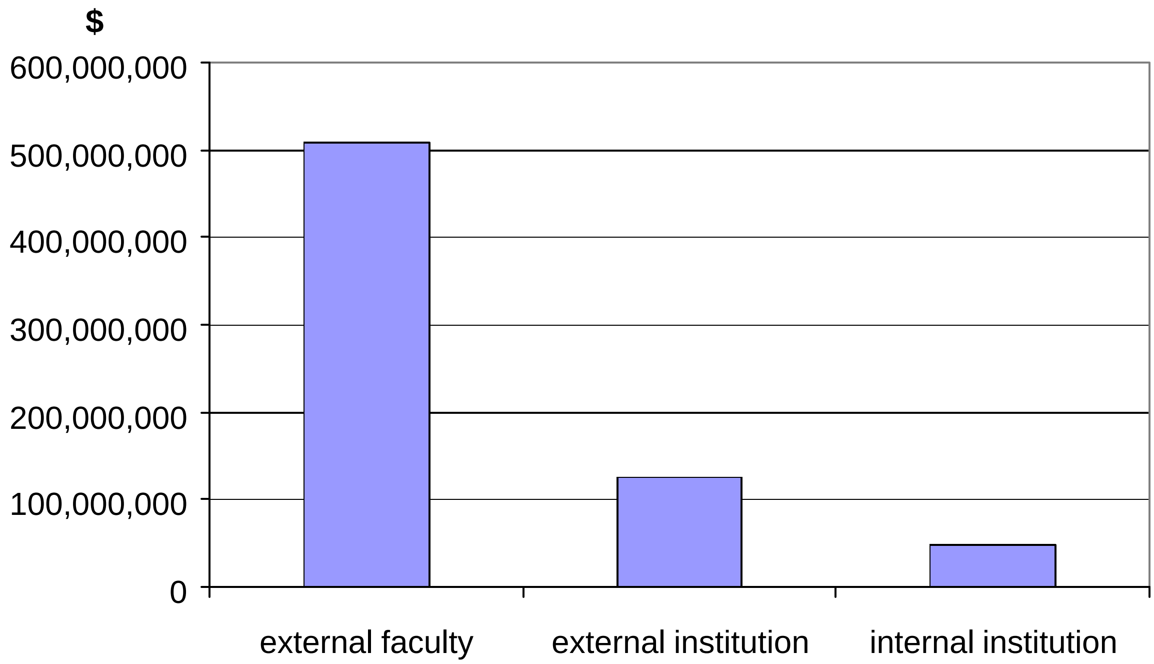


Figure 4.9

Total Funding for Research and Research Instrumentation, per Institution, per Faculty Member 1991 - 2000

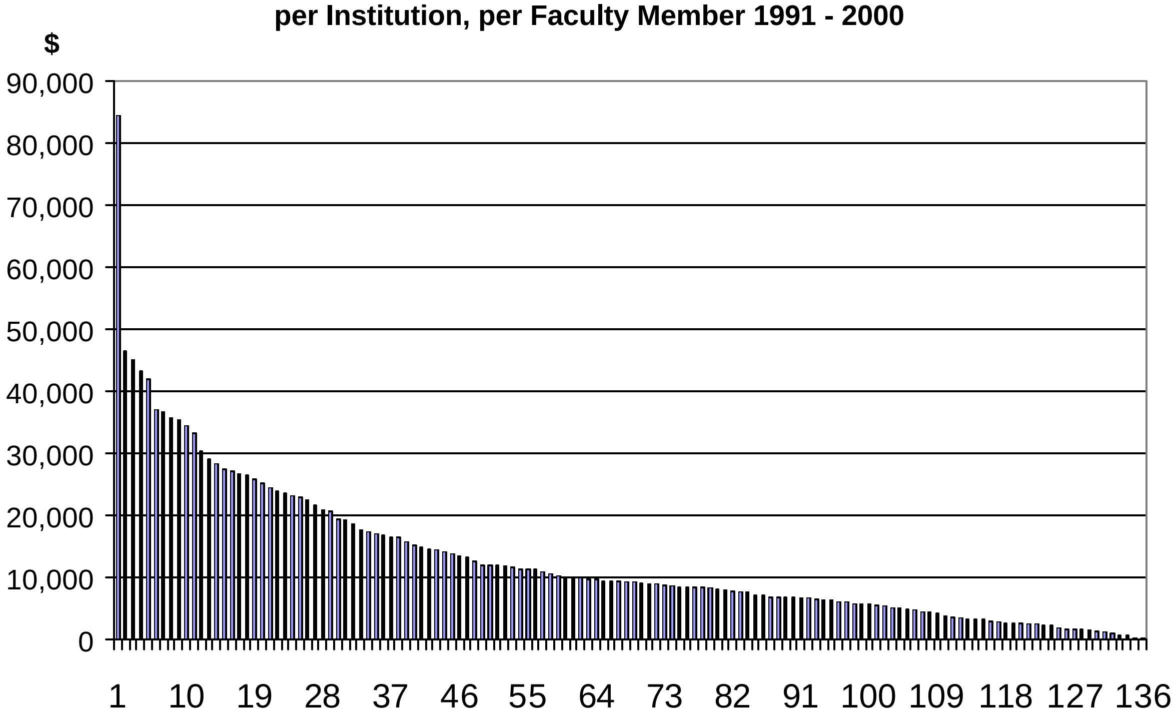


Figure 4.10

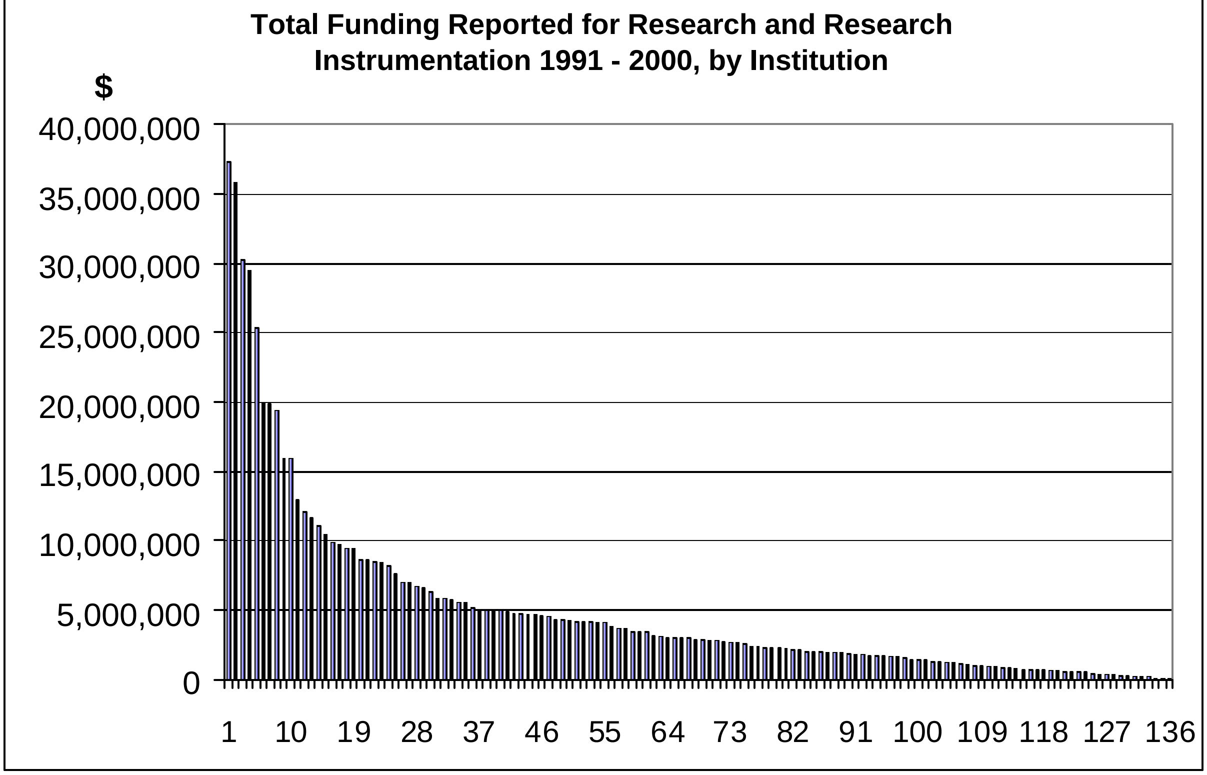
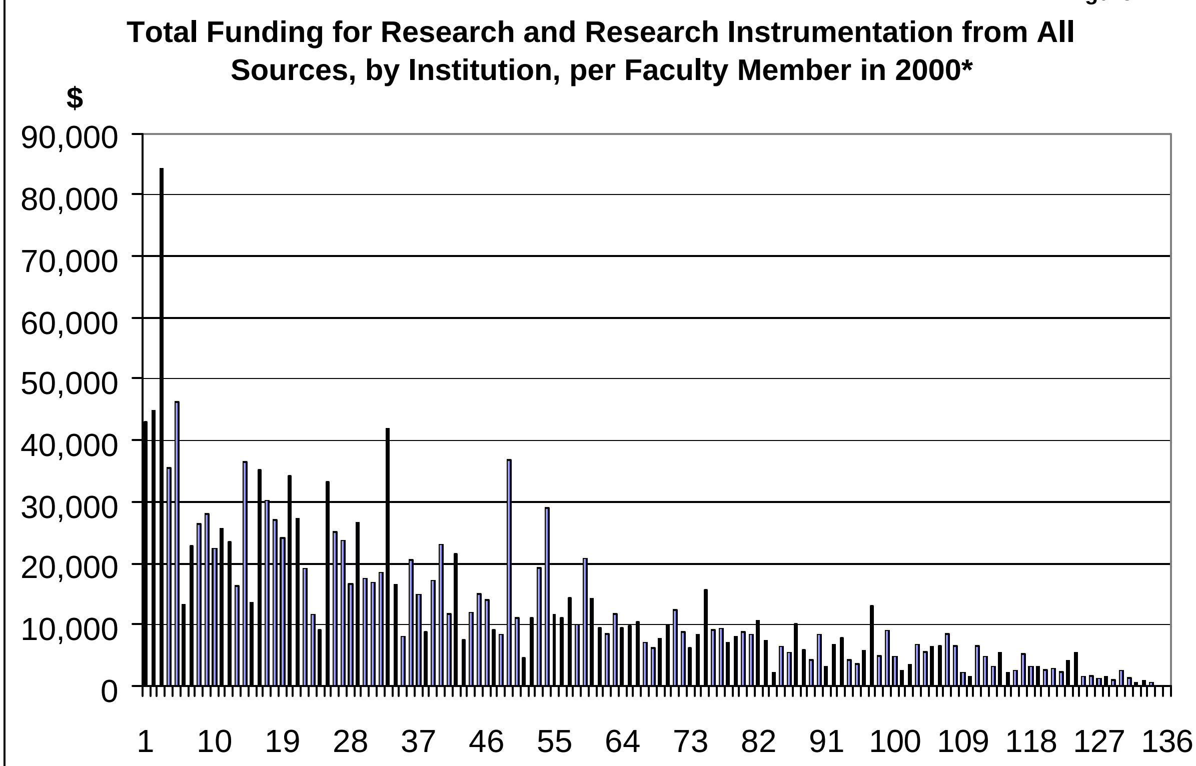


Figure 4.11



* same order of institutions as above

Table 4.5. Total Funding Reported for Research and Research Instrumentation from Public Advanced Degree Institutions 1991–2000

External Funding (Faculty)	External Funding (Institution)	Internal Funding (Institution)	Total Funding	Number of Faculty in 2000	Average $ per Faculty Member (÷10.5 yrs)
35,754,026	686,202	939,028	37,379,256	82.6	43,098
31,743,432	2,817,185	1,268,510	35,829,127	76.0	44,899
24,424,966	5,117,400	736,062	30,278,428	34.2	84,318
23,415,143	5,480,525	562,547	29,458,215	78.7	35,649
11,079,824	8,716,175	144,419	19,940,418	143.0	13,280
17,710,476	878,097	1,261,363	19,849,936	82.6	22,887
11,162,825	6,904,401	1,274,500	19,341,726	69.7	26,429
10,716,735	3,734,968	1,495,366	15,947,069	54.0	28,125
9,018,558	5,763,169	1,138,518	15,920,245	68.0	22,297
10,202,541	205,751	1,256,296	11,664,588	68.0	16,337
9,191,454	1,165,529	100,803	10,457,786	73.0	13,644
4,069,732	701,285	3,638,624	8,409,641	69.0	11,608
7,569,506	159,852	491,271	8,220,629	85.0	9,211
4,874,583	588,400	58,490	5,521,473	65.0	8,090
3,726,533	190,832	825,500	4,742,865	60.0	7,528
4,002,596	453,516	219,839	4,675,951	37.3	11,939
3,245,698	1,026,672	279,528	4,551,898	46.7	9,283
2,334,095	1,558,383	429,047	4,321,525	49.0	8,399
3,491,918	288,000	384,727	4,164,645	87.0	4,559
2,326,023	69,996	577,850	2,973,869	40.0	7,081
1,159,045	323,568	530,218	2,012,831	88.0	2,178
720,607	581,676	584,627	1,886,910	42.0	4,279
1,799,156	12,000	0	1,811,156	54.4	3,171
572,048	689,921	154,491	1,416,460	53.5	2,522

Table 4.6. Total Funding Reported for Research and Research Instrumentation from Private Advanced Degree Institutions 1991–2000

External Funding (Faculty)	External Funding (Institution)	Internal Funding (Institution)	Total Funding	Number of Faculty in 2000	Average $ per Faculty Member (÷10.5 yrs)
9,960,860	1,841,533	1,137,266	12,939,659	48.0	25,674
10,262,273	735,935	1,114,089	12,112,297	49.0	23,542
6,669,894	1,636,266	338,243	8,644,403	24.0	34,303
2,960,110	2,252,250	627,739	5,840,099	33.0	16,855
5,017,921	60,000	451,195	5,529,116	32.0	16,456
3,988,168	696,502	510,000	5,194,670	24.0	20,614
2,910,137	1,472,300	610,960	4,993,397	54.0	8,807
4,129,044	0	765,893	4,894,937	39.5	11,802
2,989,762	25,800	0	3,015,562	30.0	9,573
1,814,619	0	148,207	1,962,826	34.0	5,498
1,067,073	355,633	253,273	1,675,979	43.0	3,712
617,669	66,400	40,884	724,953	30.0	2,301
672,813	30,000	15,734	718,547	27.8	2,462
269,826	0	0	269,826	24.0	1,071

Table 4.7. Total Funding Reported for Research and Research Instrumentation from Public Baccalaureate Degree Institutions 1991–2000

External Funding (Faculty)	External Funding (Institution)	Internal Funding (Institution)	Total Funding	Number of Faculty in 2000	Average $ per Faculty Member (÷10.5 yrs)
4,974,385	0	28,200	5,002,585	32.1	14,842
3,528,466	406,710	300,000	4,235,176	36.0	11,204
2,485,873	83,755	274,080	2,843,708	35.0	7,738
1,653,693	257,600	0	1,911,293	31.0	5,872
1,406,405	226,362	76,200	1,708,967	38.0	4,283
1,186,610	91,000	322,604	1,600,214	31.0	4,916
676,197	0	316,833	993,030	44.0	2,149
806,168	0	123,158	929,326	57.3	1,545

Table 4.8. Total Funding Reported for Research and Research Instrumentation from Private Baccalaureate Degree Institutions 1991–2000

External Funding (Faculty)	External Funding (Institution)	Internal Funding (Institution)	Total Funding	Number of Faculty in 2000	Average $ per Faculty Member (›10.5 yrs)
23,967,749	1,366,854	0	25,334,603	52.1	46,311
3,023,598	8,094,951	0	11,118,549	29.0	36,514
7,737,595	1,840,234	256,957	9,834,786	26.6	35,212
8,798,769	215,076	685,393	9,699,238	30.5	30,286
4,793,910	2,893,314	1,773,318	9,460,542	33.3	27,057
5,954,710	2,021,313	1,441,387	9,417,410	37.0	24,240
2,648,714	5,913,295	49,600	8,611,609	30.0	27,338
3,883,060	2,553,079	2,046,105	8,482,244	42.3	19,098
6,756,962	850,501	0	7,607,463	21.8	33,235
4,766,979	1,687,085	526,516	6,980,580	26.5	25,087
5,706,521	1,043,895	226,552	6,976,968	28.0	23,731
5,487,436	1,143,991	47,800	6,679,227	38.0	16,740
5,514,747	902,433	225,316	6,642,496	23.8	26,581
5,242,531	1,096,680	2,370	6,341,581	34.5	17,506
2,582,564	3,051,075	166,374	5,800,013	30.0	18,413
5,238,377	127,405	355,179	5,720,961	13.0	41,912
3,765,237	1,216,000	0	4,981,237	27.7	17,126
4,544,361	294,220	113,936	4,952,517	20.5	23,008
2,487,949	2,178,329	77,572	4,743,850	21.0	21,514
4,128,130	152,200	359,555	4,639,885	29.3	15,082
2,559,150	1,671,000	343,000	4,573,150	31.0	14,050
580,333	3,657,433	27,000	4,264,766	11.0	36,924
860,095	870,591	2,413,705	4,144,391	35.3	11,181
2,527,418	1,033,629	562,265	4,123,312	20.3	19,345
3,633,951	350,000	126,622	4,110,573	13.5	28,999
3,888,337	212,265	0	4,100,602	33.5	11,658
3,492,348	278,586	3,300	3,774,234	32.0	11,233
1,448,538	1,115,000	1,125,013	3,688,551	24.3	14,456
3,150,168	48,562	420,000	3,618,730	34.7	9,932
3,472,198	0	0	3,472,198	15.9	20,798
3,428,641	0	9,473	3,438,114	23.0	14,237
3,273,446	132,265	25,256	3,430,967	34.0	9,611
3,006,779	111,000	0	3,117,779	34.8	8,533
1,131,632	612,528	1,328,275	3,072,435	24.7	11,847
2,284,406	699,496	26,764	3,010,666	29.0	9,887
2,374,231	580,849	25,500	2,980,580	27.0	10,514
2,777,339	0	81,248	2,858,587	43.5	6,259
1,660,182	200,916	907,421	2,768,519	26.5	9,950
591,477	1,763,516	412,037	2,767,030	21.0	12,549
1,986,959	458,170	270,990	2,716,119	29.0	8,920
1,618,093	460,000	597,763	2,675,856	41.0	6,216
2,273,940	363,000	0	2,636,940	30.2	8,316
2,154,949	273,661	170,351	2,598,961	15.8	15,666
1,357,725	761,830	243,863	2,363,418	24.5	9,187
957,403	1,281,194	96,635	2,335,232	23.9	9,306

Table 4.8. Total Funding Reported for Research and Research Instrumentation from Private Baccalaureate Degree Institutions 1991–2000

External Funding (Faculty)	External Funding (Institution)	Internal Funding (Institution)	Total Funding	Number of Faculty in 2000	Average $ per Faculty Member (÷10.5 yrs)
1,685,055	298,248	285,080	2,268,383	30.5	7,083
1,831,907	157,500	276,131	2,265,538	27.0	7,991
615,102	1,365,539	272,396	2,253,037	24.4	8,794
1,721,493	415,000	82,383	2,218,876	25.3	8,353
1,148,333	854,014	142,336	2,144,683	19.0	10,750
1,608,702	507,070	0	2,115,772	27.0	7,463
1,224,525	331,256	415,364	1,971,145	29.0	6,473
1,690,491	230,823	0	1,921,314	18.0	10,166
1,192,401	567,992	100,000	1,860,393	21.1	8,397
994,982	450,174	318,374	1,763,530	25.0	6,718
388,854	100,000	1,246,798	1,735,652	21.0	7,871
39,410	1,621,488	0	1,660,898	27.0	5,859
1,216,282	273,217	165,238	1,654,737	12.0	13,133
1,322,657	57,500	50,500	1,430,657	15.0	9,084
1,248,849	62,937	116,671	1,428,457	28.0	4,859
544,700	146,284	593,536	1,284,520	34.5	3,546
1,015,045	77,050	189,616	1,281,711	18.3	6,670
840,695	134,256	205,000	1,179,951	20.0	5,619
839,119	323,409	0	1,162,528	17.0	6,513
824,997	251,456	38,200	1,114,653	16.0	6,635
729,989	100,000	258,113	1,088,102	12.0	8,636
672,688	305,336	18,000	996,024	14.3	6,634
811,607	0	87,800	899,407	13.0	6,589
190,997	467,292	160,208	818,497	16.0	4,872
710,913	101,257	0	812,170	24.0	3,223
627,853	75,000	34,160	737,013	13.0	5,399
666,273	40,500	0	706,773	12.7	5,300
408,832	257,000	19,000	684,832	20.0	3,261
596,856	0	32,000	628,856	19.0	3,152
590,008	36,219	0	626,227	22.0	2,711
54,000	475,543	38,500	568,043	19.0	2,847
552,993	0	0	552,993	22.0	2,394
540,530	0	0	540,530	12.6	4,086
37,800	427,850	57,000	522,650	9.0	5,531
338,884	16,360	47,842	403,086	25.0	1,536
201,723	1,500	129,526	332,749	19.0	1,668
194,570	0	125,339	319,909	26.0	1,172
164,217	141,453	0	305,670	19.5	1,493
76,490	128,250	29,385	234,125	9.0	2,478
0	154,582	60,586	215,168	15.4	1,331
214,626	0	0	214,626	35.6	574
110,168	0	54,000	164,168	17.0	920
7,500	57,500	0	65,000	11.0	563
12,500	9,000	0	21,500	18.0	114
20,000	0	0	20,000	16.0	119

Figure 4.12

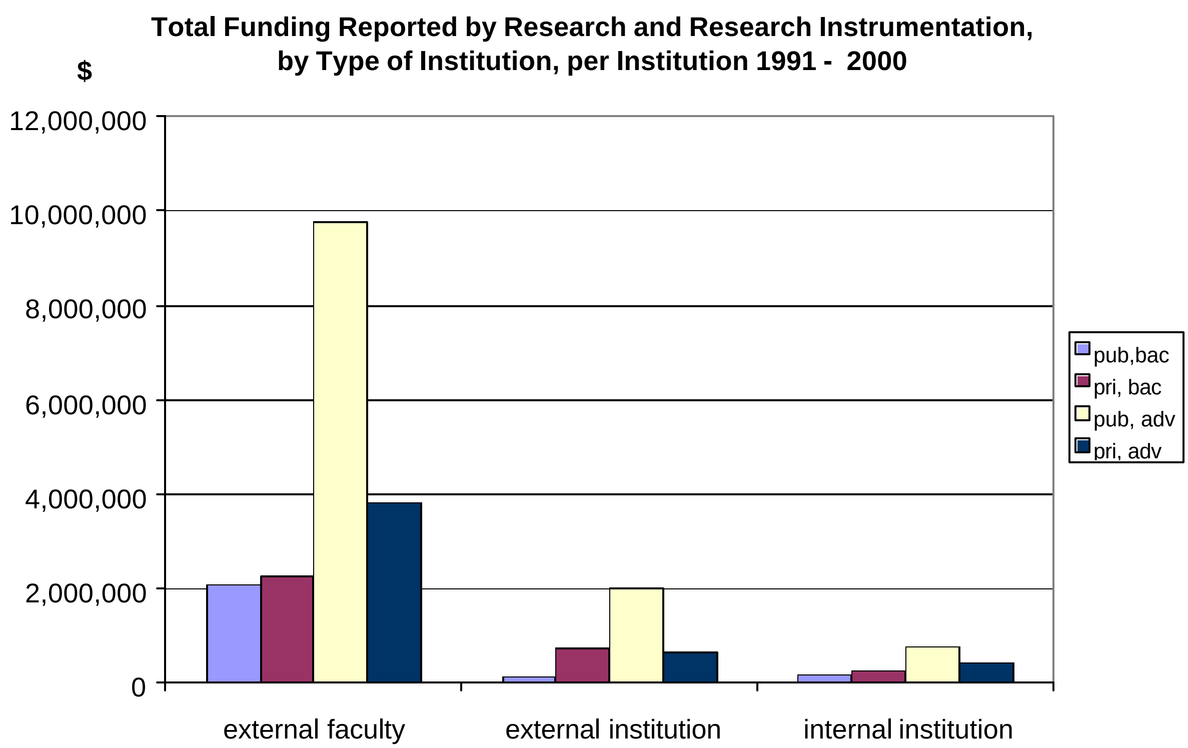


Figure 4.13

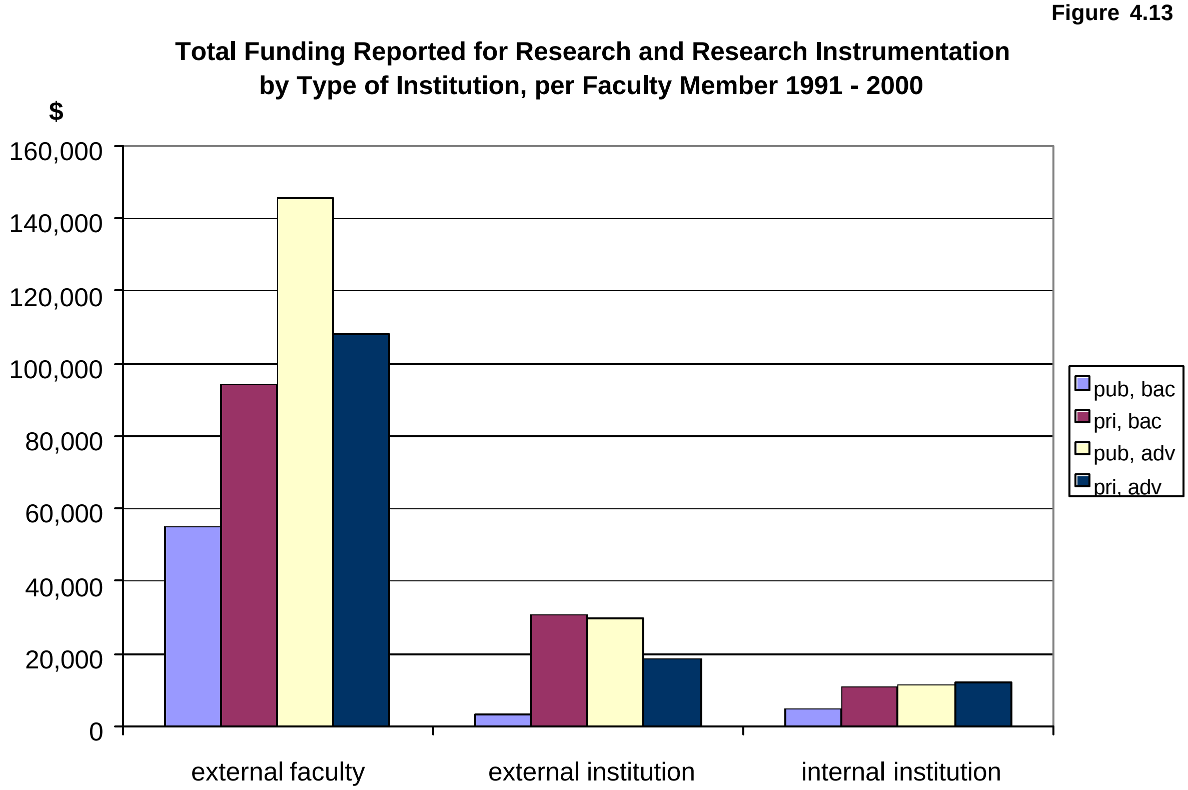


Table 4.9. Total Funding Reported for Teaching and Pedagogy in All Study Institutions 1991–2000

External Funding (Faculty)	External Funding (Institution)	Internal Funding (Institution)	Total Funding	Number of Faculty in 2000	Average $ per Faculty Member (¸ 10.5 yrs)
735,843	11,159,427	197,954	12,093,224	78.7	14,635
303,703	7,958,197	311,681	8,573,581	53.5	15,262
4,467,361	2,934,573	97,613	7,499,547	24.3	29,393
22,775	6,054,105	0	6,076,880	29.0	19,957
1,243,352	3,876,995	6,850	5,127,197	76.0	6,425
515,000	3,631,330	492,603	4,638,933	27.7	15,950
100,000	4,519,131	0	4,619,131	30.0	14,664
0	4,459,604	0	4,459,604	19.0	22,354
764,686	2,955,402	135,790	3,855,878	37.0	9,925
194,218	3,571,759	15,000	3,780,977	38.0	9,476
1,932,690	1,416,442	229,520	3,578,652	73.0	4,669
75,783	552,326	2,532,200	3,160,309	14.3	21,048
557,869	1,949,060	261,262	2,768,191	42.3	6,233
295,067	1,295,416	974,590	2,565,073	33.0	7,403
89,960	2,039,841	328,984	2,458,785	34.7	6,748
1,197,472	1,188,649	0	2,386,121	68.0	3,342
208,555	2,014,708	125,361	2,348,624	20.0	11,184
1,500	1,339,465	998,042	2,339,007	24.5	9,092
262,407	996,587	1,061,706	2,320,700	41.0	5,391
250,353	1,813,881	18,750	2,082,984	34.5	5,750
1,141,180	633,740	301,892	2,076,812	54.0	3,663
1,145,571	397,228	465,528	2,008,327	46.7	4,096
92,050	1,343,072	563,927	1,999,049	20.3	9,379
32,000	1,238,100	609,216	1,879,316	28.0	6,392
77,839	1,658,408	129,350	1,865,597	18.0	9,871
71,224	1,479,222	278,600	1,829,046	33.3	5,231
21,290	1,715,109	0	1,736,399	24.0	6,890
509,139	1,117,710	109,407	1,736,256	13.0	12,720
26,000	1,325,454	318,489	1,669,943	29.0	5,484
1,067,931	545,559	0	1,613,490	12.7	12,100
210,439	1,278,693	114,000	1,603,132	39.5	3,865
233,160	1,045,643	257,638	1,536,441	52.1	2,809
684,641	518,384	262,390	1,465,415	68.0	2,052
1,950	1,109,736	350,577	1,462,263	33.5	4,157
0	1,121,545	334,960	1,456,505	23.9	5,804
433,962	961,046	53,288	1,448,296	85.0	1,623
942,147	466,573	0	1,408,720	34.8	3,855
527,972	563,794	294,388	1,386,154	30.2	4,371
349,870	991,334	42,196	1,383,400	21.8	6,044
135,000	1,241,988	3,000	1,379,988	143.0	919
138,049	1,133,037	88,826	1,359,912	30.0	4,317
129,237	1,185,551	0	1,314,788	21.0	5,963
0	1,265,987	19,700	1,285,687	29.0	4,222
10,000	1,178,771	65,794	1,254,565	40.0	2,987
165,550	930,933	131,700	1,228,183	25.3	4,623
67,750	1,077,610	68,345	1,213,705	15.9	7,270

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Table 4.9. Total Funding Reported for Teaching and Pedagogy in All Study Institutions 1991–2000

External Funding (Faculty)	External Funding (Institution)	Internal Funding (Institution)	Total Funding	Number of Faculty in 2000	Average $ per Faculty Member (¸ 10.5 yrs)
0	1,069,916	140,510	1,210,426	35.3	3,266
676,753	495,750	14,506	1,187,009	57.3	1,973
78,576	628,145	478,529	1,185,250	32.0	3,528
233,684	381,451	558,745	1,173,880	43.5	2,570
803,821	147,798	207,500	1,159,119	13.0	8,492
53,170	964,847	98,734	1,116,751	26.5	4,013
203,515	431,008	477,769	1,112,292	54.4	1,947
133,398	952,967	2,234	1,088,599	60.0	1,728
578,977	293,194	214,744	1,086,915	18.3	5,657
836,557	42,442	167,741	1,046,740	30.5	3,269
640,050	401,783	0	1,041,833	34.2	2,901
121,982	734,877	179,470	1,036,329	29.3	3,369
0	699,034	314,733	1,013,767	19.0	5,082
174,780	823,343	0	998,123	27.0	3,521
265,080	727,473	0	992,553	17.0	5,561
709,585	121,208	120,716	951,509	88.0	1,030
9,500	757,340	162,666	929,506	25.0	3,541
21,000	617,669	286,266	924,935	21.0	4,195
56,004	464,131	364,753	884,888	26.6	3,168
337,794	517,268	15,335	870,397	87.0	953
0	660,217	185,957	846,174	15.8	5,101
120,889	704,144	18,250	843,283	19.0	4,227
11,285	651,531	180,420	843,236	23.8	3,374
349,053	256,252	207,960	813,265	32.1	2,413
7,800	786,538	9,200	803,538	24.4	3,136
608,181	177,514	0	785,695	48.0	1,559
32,519	750,500	0	783,019	24.0	3,107
198,200	552,660	0	750,860	11.0	6,501
395,308	278,896	49,806	724,010	65.0	1,061
99,120	557,992	55,737	712,849	34.0	1,997
5,000	701,749	0	706,749	17.0	3,959
637,750	0	67,426	705,176	82.6	813
136,494	529,504	27,537	693,535	31.0	2,131
282,327	395,681	10,112	688,120	42.0	1,560
129,314	374,570	178,585	682,469	49.0	1,326
170,680	152,750	349,623	673,053	30.5	2,102
66,770	440,876	152,220	659,866	30.0	2,095
165,260	453,680	0	618,940	20.5	2,875
65,832	471,737	75,500	613,069	27.0	2,163
13,404	580,000	0	593,404	21.0	2,691
95,490	335,622	161,345	592,457	38.0	1,485
222,922	191,250	166,408	580,580	31.0	1,784
193,917	361,093	0	555,010	69.7	758
212,143	341,415	0	553,558	69.0	764
122,674	401,890	18,867	543,431	27.0	1,917
0	541,064	0	541,064	27.0	1,909

Table 4.9. Total Funding Reported for Teaching and Pedagogy in All Study Institutions 1991–2000

External Funding (Faculty)	External Funding (Institution)	Internal Funding (Institution)	Total Funding	Number of Faculty in 2000	Average $ per Faculty Member (¸ 10.5 yrs)
15,000	521,298	0	536,298	12.0	4,256
382,859	149,252	0	532,111	22.0	2,304
237,317	130,087	145,162	512,566	24.0	2,034
31,844	475,000	0	506,844	24.0	2,011
93,000	151,836	253,063	497,899	29.0	1,635
0	247,956	219,801	467,757	12.0	3,712
118,846	336,264	7,110	462,220	82.6	533
0	458,857	0	458,857	16.0	2,731
394,425	50,897	1,268	446,590	49.0	868
391,606	0	47,050	438,656	32.0	1,306
70,956	315,126	44,154	430,236	20.0	2,049
21,216	245,816	157,090	424,122	26.5	1,524
0	372,045	37,710	409,755	9.0	4,336
33,237	357,921	0	391,158	16.0	2,328
96,000	287,605	0	383,605	24.7	1,479
169,770	147,785	48,562	366,117	23.0	1,516
20,950	319,223	17,500	357,673	19.0	1,793
0	145,853	210,109	355,962	15.4	2,201
317,998	0	22,245	340,243	54.0	600
0	340,000	0	340,000	18.0	1,799
85,978	253,950	0	339,928	36.0	899
126,264	208,496	0	334,760	34.5	924
4,773	168,865	134,026	307,664	35.0	837
118,471	139,579	4,000	262,050	27.8	898
52,350	179,235	0	231,585	43.0	513
4,500	218,323	0	222,823	35.6	596
0	218,642	0	218,642	12.6	1,653
150,715	63,178	0	213,893	21.1	965
67,500	134,680	0	202,180	11.0	1,750
0	199,625	0	199,625	22.0	864
140,000	56,824	0	196,824	19.5	961
0	107,637	65,437	173,074	15.0	1,099
68,394	88,151	0	156,545	44.0	339
105,744	41,008	3,450	150,202	25.0	572
105,500	25,000	0	130,500	31.0	401
16,500	9,723	95,699	121,922	26.0	447
0	98,507	0	98,507	16.0	586
0	89,441	0	89,441	30.0	284
64,965	10,000	5,000	79,965	13.0	586
0	68,307	0	68,307	34.0	191
63,005	0	0	63,005	37.3	161
0	31,425	0	31,425	9.0	333
Totals					
35,278,786	123,635,311	19,889,457	178,803,554		

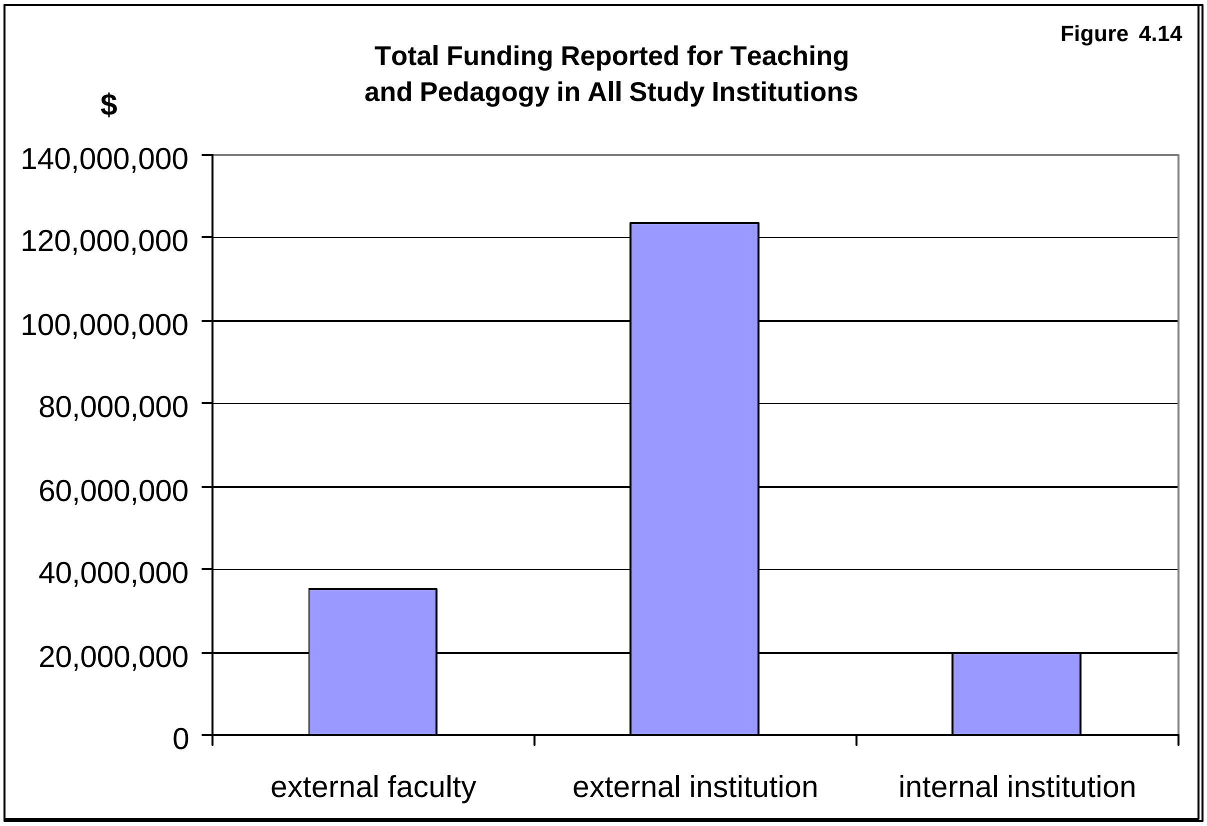
Figure 4.14
Total Funding Reported for Teaching
and Pedagogy in All Study Institutions
$
140,000,000
120,000,000
100,000,000
80,000,000
60,000,000
40,000,000
20,000,000
0
external faculty
external institution
internal institution

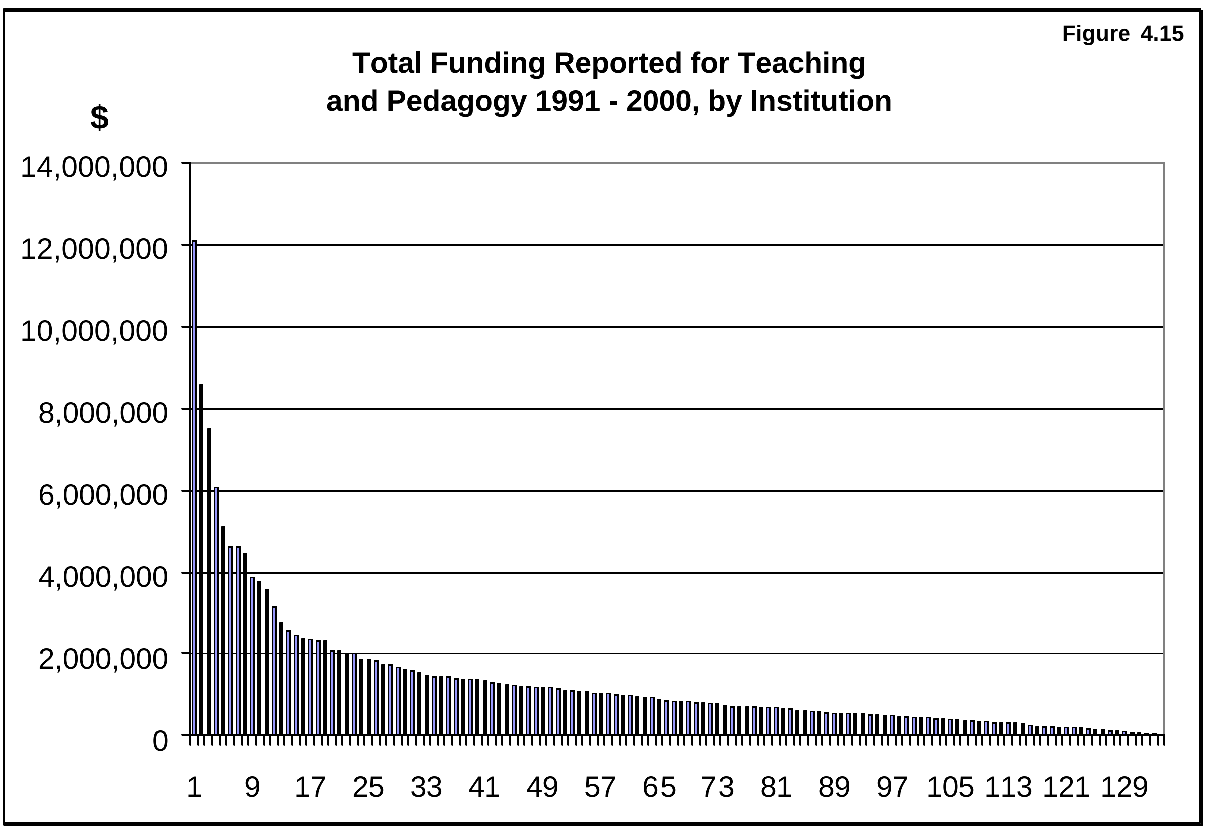
Figure 4.15
Total Funding Reported for Teaching
and Pedagogy 1991 - 2000, by Institution
$
14,000,000
12,000,000
10,000,000
8,000,000
6,000,000
4,000,000
2,000,000
0
1 9 17 25 33 41 49 57 65 73 81 89 97 105 113 121 129

Table 4.10. Funding by Source for All Purposes in All Study Institutions 1991–2000

Private Foundation Sources (fdn)	Government Sources (gov)	Institutional Source (inst)	Corporate Sources (corp)	Private Sources (pvt)	Total Funding All Sources
2,556,105	39,363,213	818,935	3,092,136	122,218	45,952,607
1,739,173	36,955,751	1,275,360	2,414,962	5,000	42,390,246
3,064,971	33,251,329	1,135,823	2,637,417	9,113	40,098,653
4,678,662	5,567,698	7,464,293	2,490,410	19,272,899	39,473,962
4,703,985	5,837,174	99,800	3,003,370	24,741,350	38,385,679
247,998	29,117,913	3,272,726	3,325,800	58,137	36,022,574
2,376,094	28,918,193	30,000	3,720,824	839,824	35,884,935
2,495,634	4,257,557	21,733,740	1,110,490	2,126,953	31,724,374
1,576,138	23,547,846	2,493,493	1,893,542	1,591,680	31,102,699
1,398,801	17,297,943	2,557,820	1,639,814	156,500	23,050,878
175,905	18,032,640	1,534,999	2,863,407	0	22,606,951
855,950	2,751,624	17,755,671	785,628	400,833	22,549,706
1,101,564	20,889,628	266,038	122,720	0	22,379,950
1,348,354	16,447,729	1,803,873	2,603,779	45,687	22,249,422
2,558,917	3,344,718	587,071	554,090	14,760,000	21,804,796
1,097,164	17,099,543	2,394,302	861,584	316,509	21,769,102
311,516	1,014,656	18,316,528	224,286	593,159	20,460,145
2,964,147	7,214,096	3,944,325	1,796,701	4,225,861	20,145,130
8,942,240	3,864,678	2,525,762	497,572	4,134,924	19,965,176
11,072,623	3,033,905	1,119,500	799,578	2,088,900	18,114,506
2,263,196	9,543,060	3,497,931	2,024,416	486,676	17,815,279
4,311,490	9,120,564	2,649,671	120,790	1,525,000	17,727,515
355,000	785,725	2,550,200	556,833	13,431,451	17,679,209
680,930	1,593,284	14,600,300	395,989	181,650	17,452,153
1,450,000	15,218,097	49,600	14,950	500,000	17,232,647
3,396,064	5,598,037	5,358,673	494,443	2,236,102	17,083,319
886,036	13,287,824	2,062,901	569,624	0	16,806,385
2,954,636	12,439,140	773,000	461,500	26,100	16,654,376
597,610	9,862,944	3,658,266	2,407,534	105,000	16,631,354
4,998,541	9,027,707	731,896	282,760	746,315	15,787,219
8,497,250	1,840,161	412,037	1,146,439	3,818,298	15,714,185
4,767,413	5,844,764	1,421,700	2,087,932	1,317,310	15,439,119
10,275,700	2,405,745	2,241,788	239,842	90,800	15,253,875
3,667,927	8,846,368	53,065	1,126,500	952,600	14,646,460
2,759,400	473,909	2,722,361	74,286	8,459,875	14,489,831
1,683,555	6,923,773	2,933,896	1,707,084	1,173,815	14,422,123
286,254	13,382,869	356,379	275,639	0	14,301,141
161,858	10,498,256	2,177,580	1,118,756	208,999	14,165,449
3,596,635	4,553,827	57,620	2,521,052	1,671,296	12,400,430
25,000	6,782,412	2,174,839	140,975	2,145,450	11,268,676
1,578,287	2,939,957	807,703	914,000	4,766,568	11,006,515
1,736,583	6,532,038	2,273,221	183,216	257,082	10,982,140
1,120,980	3,010,850	1,879,411	279,968	4,426,400	10,935,994
235,683	9,248,173	877,399	463,815	0	10,825,070
697,110	7,281,461	1,775,893	909,605	0	10,664,069
4,097,080	3,891,351	1,220,809	416,062	835,023	10,460,325

Table 4.10. Funding by Source for All Purposes in All Study Institutions 1991–2000

Private Foundation Sources (fdn)	Government Sources (gov)	Institutional Source (inst)	Corporate Sources (corp)	Private Sources (pvt)	Total Funding All Sources
1,572,800	6,032,743	838,829	231,172	1,375,113	10,050,657
2,016,010	4,939,770	1,025,135	1,175,986	863,620	10,020,521
111,980	5,285,599	3,638,624	905,204	2,855	9,944,262
114,185	5,439,713	682,059	3,669,168	0	9,905,125
168,500	244,399	111,087	311,100	8,882,224	9,717,310
2,329,600	3,324,131	3,398,788	442,463	167,300	9,662,282
2,958,782	5,679,498	681,798	226,800	100,000	9,646,878
1,364,378	6,387,078	701,250	257,562	808,200	9,518,468
1,279,227	3,840,932	2,092,057	1,736,928	450,800	9,399,944
1,839,603	2,327,069	2,223,570	569,534	2,350,083	9,309,859
1,032,834	2,503,635	909,594	103,933	4,437,039	8,987,035
1,896,700	3,407,112	768,199	741,976	1,893,057	8,707,044
937,764	52,540	63,500	505,543	6,932,008	8,491,355
3,761,192	882,795	2,953,490	441,995	25,000	8,064,472
635,604	5,257,369	1,801,559	204,377	119,448	8,018,357
1,665,000	45,180	39,026	78,000	5,422,040	7,249,246
1,309,250	3,832,991	1,631,316	252,290	198,000	7,223,847
1,575,384	4,578,237	696,000	332,548	15,581	7,197,750
554,502	4,615,607	201,602	1,359,734	293,750	7,025,195
811,132	4,639,062	1,149,523	361,227	10,000	6,970,944
110,871	5,369,284	883,594	530,402	24,514	6,918,665
526,790	4,737,587	1,290,679	83,054	98,316	6,736,426
1,689,687	3,849,388	1,112,187	26,000	0	6,677,262
1,243,228	4,423,618	832,141	62,653	28,980	6,590,620
111,112	4,403,266	1,036,770	962,735	0	6,513,883
391,101	4,280,315	108,296	1,505,048	0	6,284,760
1,210,325	802,119	100,000	928,330	3,238,733	6,279,507
116,032	4,171,792	1,327,537	491,056	21,500	6,127,917
985,000	4,650,218	69,250	0	357,696	6,062,164
1,299,900	2,658,336	0	1,225,263	859,000	6,042,499
55,000	4,521,863	276,160	1,149,875	1,275	6,004,173
189,774	4,640,069	643,644	319,539	40,863	5,833,889
450,123	4,988,354	219,839	42,497	0	5,700,813
0	611,500	5,000,000	0	0	5,611,500
1,269,795	2,887,235	845,021	88,090	414,199	5,504,340
1,141,531	3,747,884	80,350	27,100	180,106	5,176,971
940,724	2,272,802	884,855	634,762	436,357	5,169,500
1,278,000	1,905,461	787,485	245,015	900,000	5,115,961
426,596	4,125,793	191,464	186,200	25,000	4,955,053
1,054,527	3,488,511	237,815	0	5,000	4,785,853
403,000	2,744,754	1,394,228	36,579	177,569	4,756,130
1,578,491	2,707,847	238,950	167,023	4,200	4,696,511
163,154	2,794,437	1,252,624	307,988	0	4,518,203
723,426	2,381,156	489,785	546,703	166,328	4,307,398
1,865,350	2,050,456	140,000	60,635	56,021	4,172,462

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Table 4.10. Funding by Source for All Purposes in All Study Institutions 1991–2000

Private Foundation Sources (fdn)	Government Sources (gov)	Institutional Source (inst)	Corporate Sources (corp)	Private Sources (pvt)	Total Funding All Sources
718,315	2,323,187	145,567	190,600	766,000	4,143,669
1,519,856	1,895,898	126,622	579,797	0	4,122,173
115,160	2,106,327	1,480,779	241,814	0	3,944,080
1,571,138	2,136,864	72,000	151,814	4,500	3,936,316
319,804	1,795,741	1,706,541	13,385	0	3,835,471
76,152	3,138,234	316,833	194,188	0	3,725,407
255,000	369,385	2,191,252	901,500	900	3,718,037
1,782,160	994,367	281,596	408,407	133,753	3,600,283
277,654	2,001,111	1,049,703	53,818	0	3,382,286
701,300	1,898,834	473,853	105,970	202,000	3,381,957
101,618	1,648,442	755,598	415,255	416,356	3,337,269
267,369	2,246,982	498,106	162,071	66,844	3,241,372
221,428	2,363,333	0	478,315	64,927	3,128,003
140,150	925,464	288,389	133,772	1,635,550	3,123,325
416,000	49,997	160,208	750,000	1,636,149	3,012,354
181,200	2,112,112	467,846	196,764	12,558	2,970,480
409,373	1,595,405	477,769	450,226	0	2,932,773
167,400	463,751	680,040	1,444,911	148,434	2,904,536
720,220	1,172,971	148,207	641,025	48,930	2,731,353
601,550	1,433,861	293,437	396,865	0	2,725,713
128,528	1,310,739	1,209,401	14,500	21,412	2,684,580
548,224	1,062,861	841,036	4,000	11,200	2,467,321
264,379	1,740,629	350,141	31,000	0	2,386,149
200,369	1,556,093	272,988	40,000	285,335	2,354,785
325,000	641,258	1,246,798	66,000	50,000	2,329,056
1,621,530	652,442	38,000	5,200	0	2,317,172
1,100,000	265,803	770,695	0	171,447	2,307,945
393,697	1,594,279	295,300	0	0	2,283,276
1,244,230	658,508	124,000	172,000	0	2,198,738
318,000	1,639,639	16,500	300	197,142	2,171,581
972,285	1,008,271	88,200	32,514	56,996	2,158,266
41,765	1,763,020	141,687	189,236	0	2,135,708
39,638	1,289,351	779,890	15,400	0	2,124,279
108,214	1,498,864	253,273	187,182	10,031	2,057,564
416,606	402,815	834,525	154,181	176,000	1,984,127
730,361	680,109	305,396	95,660	0	1,811,526
405,000	811,017	259,154	20,000	139,016	1,634,187
62,937	1,145,859	116,671	102,990	0	1,428,457
43,000	110,758	1,058,078	70,165	0	1,282,001
407,272	591,390	249,300	13,635	0	1,261,597
687,250	118,067	274,000	11,600	0	1,090,917
559,470	422,593	57,000	24,425	8,000	1,071,488
60,297	754,059	15,279	0	201,634	1,031,269
15,000	497,230	168,980	125,000	0	806,210
675,000	118,507	0	0	0	793,507
Totals:					
191,435,022	712,276,062	216,878,516	90,191,692	172,698,246	1,383,697,923

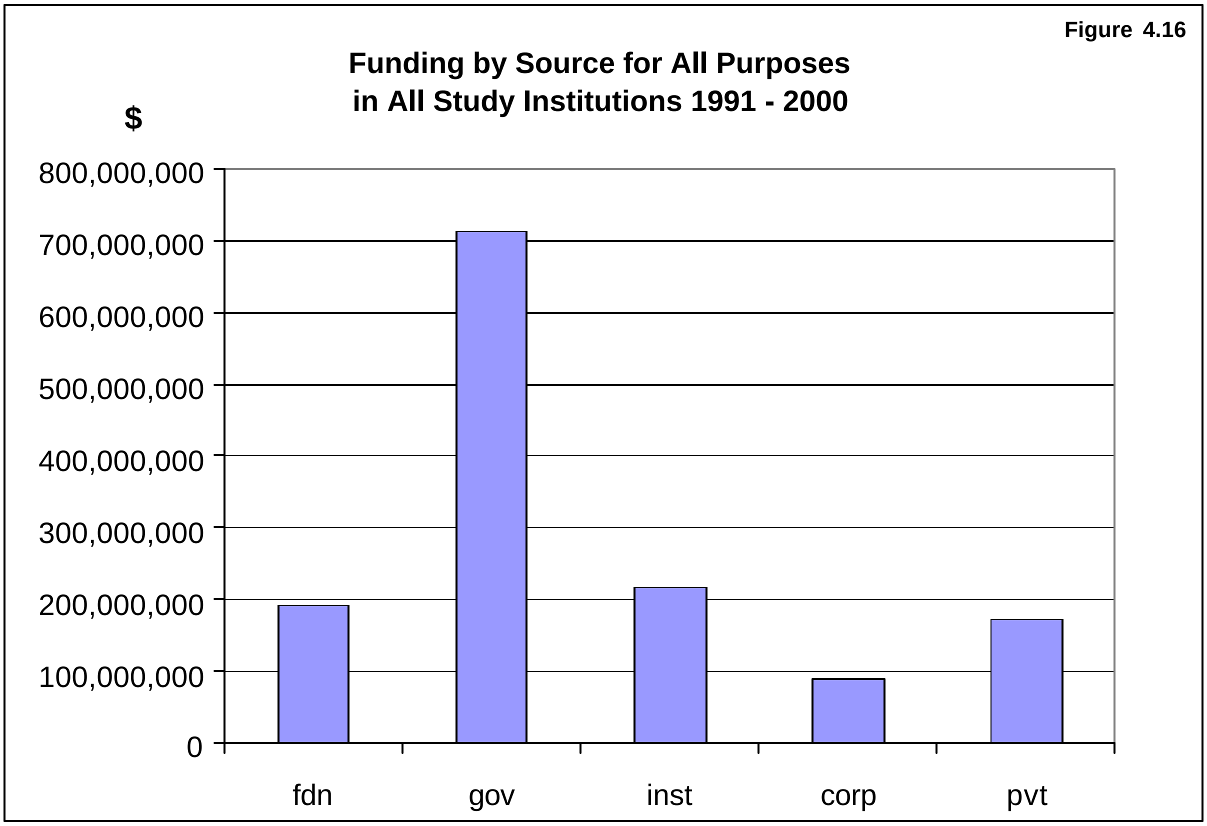


Figure 4.16
Funding by Source for All Purposes
in All Study Institutions 1991 - 2000
$
800,000,000
700,000,000
600,000,000
500,000,000
400,000,000
300,000,000
200,000,000
100,000,000
0
fdn
gov
inst
corp
pvt

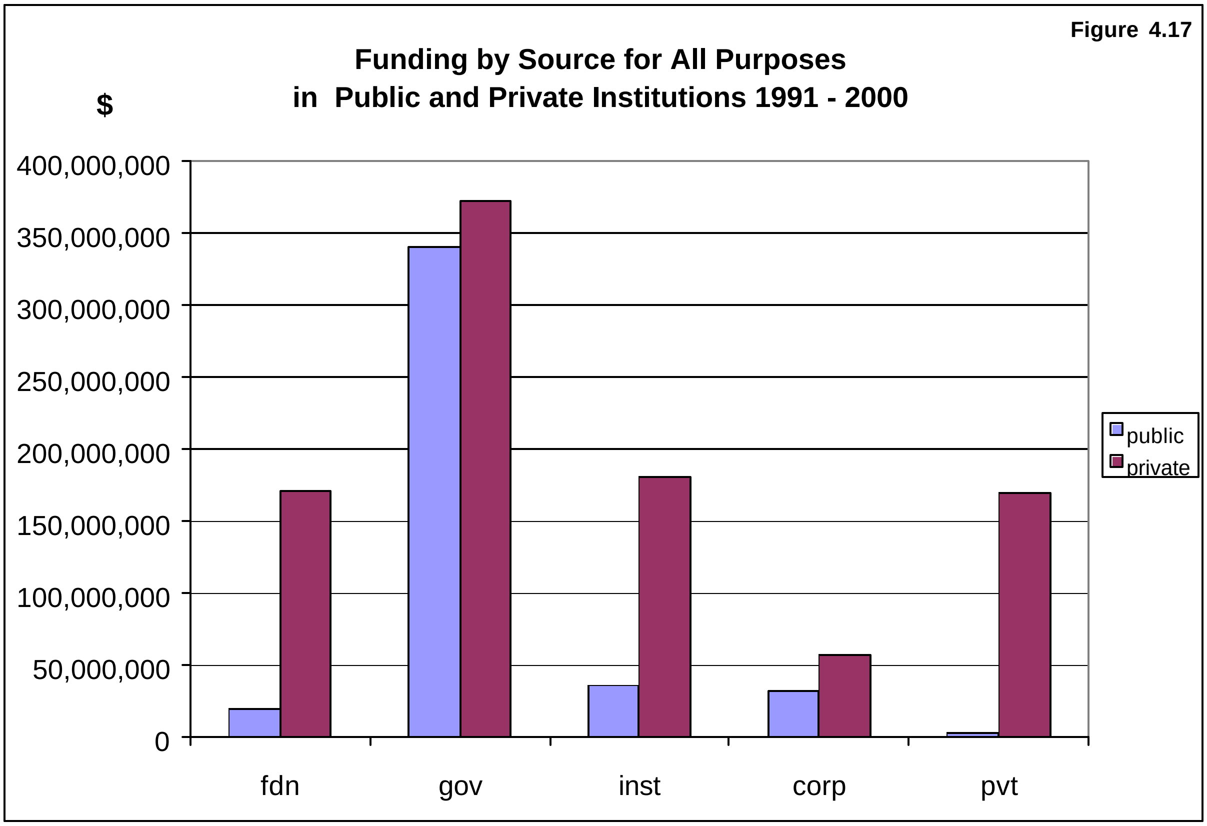


Figure 4.17
Funding by Source for All Purposes
in Public and Private Institutions 1991 - 2000
$
400,000,000
350,000,000
300,000,000
250,000,000
200,000,000
150,000,000
100,000,000
50,000,000
0
fdn
gov
inst
corp
pvt
public
private

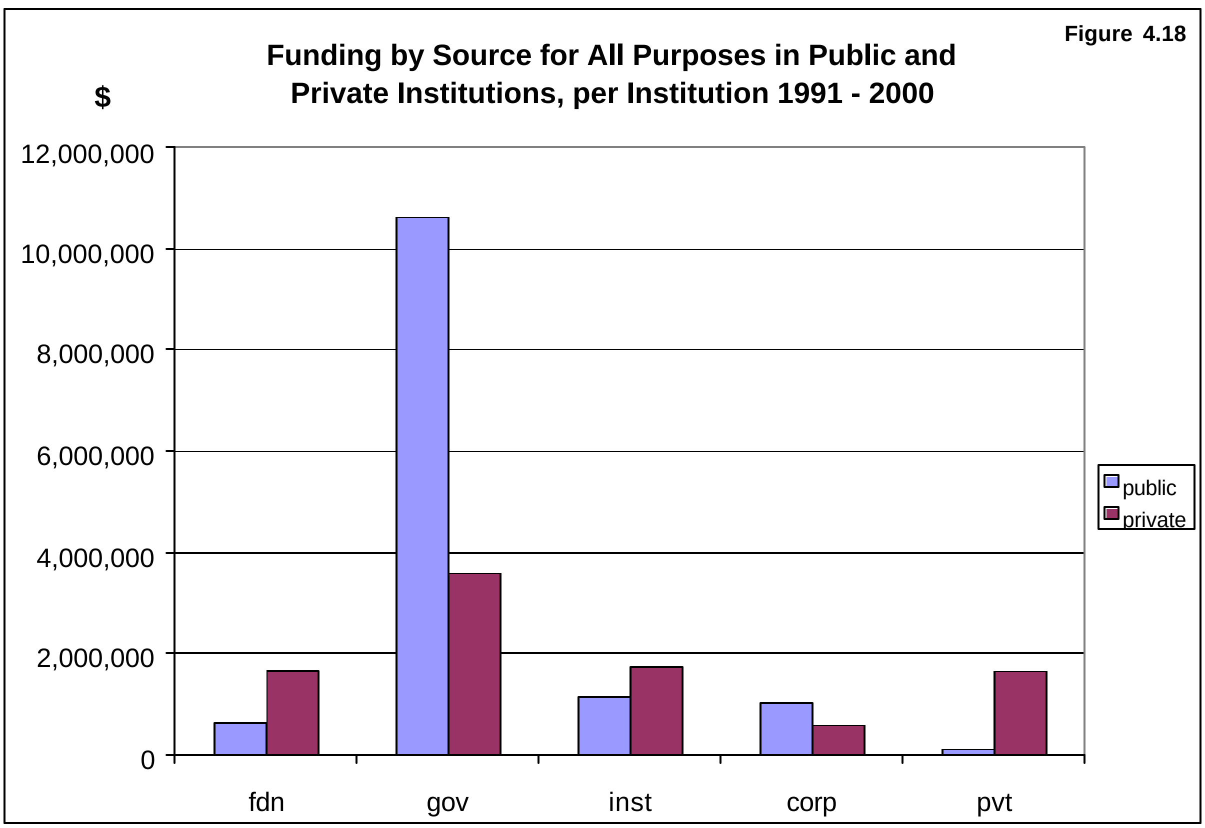


Figure 4.18
Funding by Source for All Purposes in Public and
Private Institutions, per Institution 1991 - 2000
$
12,000,000
10,000,000
8,000,000
6,000,000
4,000,000
2,000,000
0
fdn
gov
inst
corp
pvt
public
private

Figure 4.19

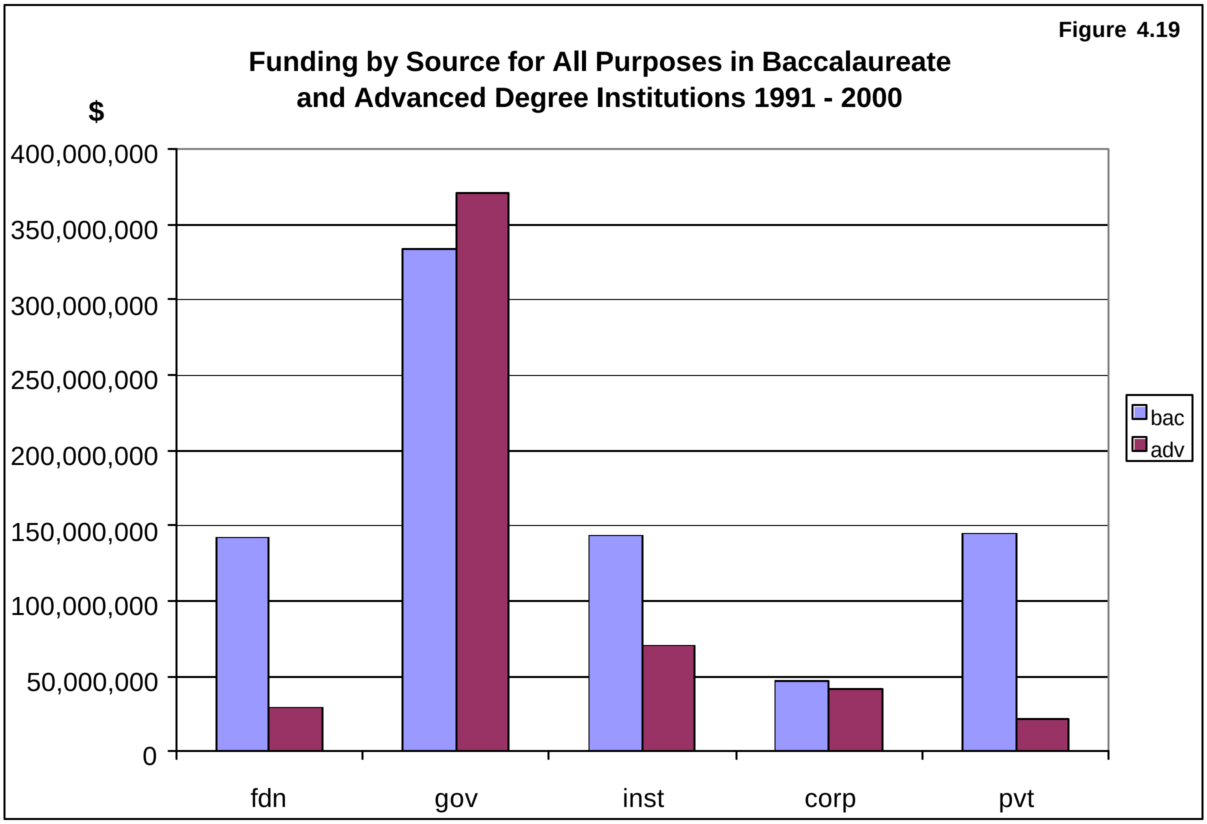
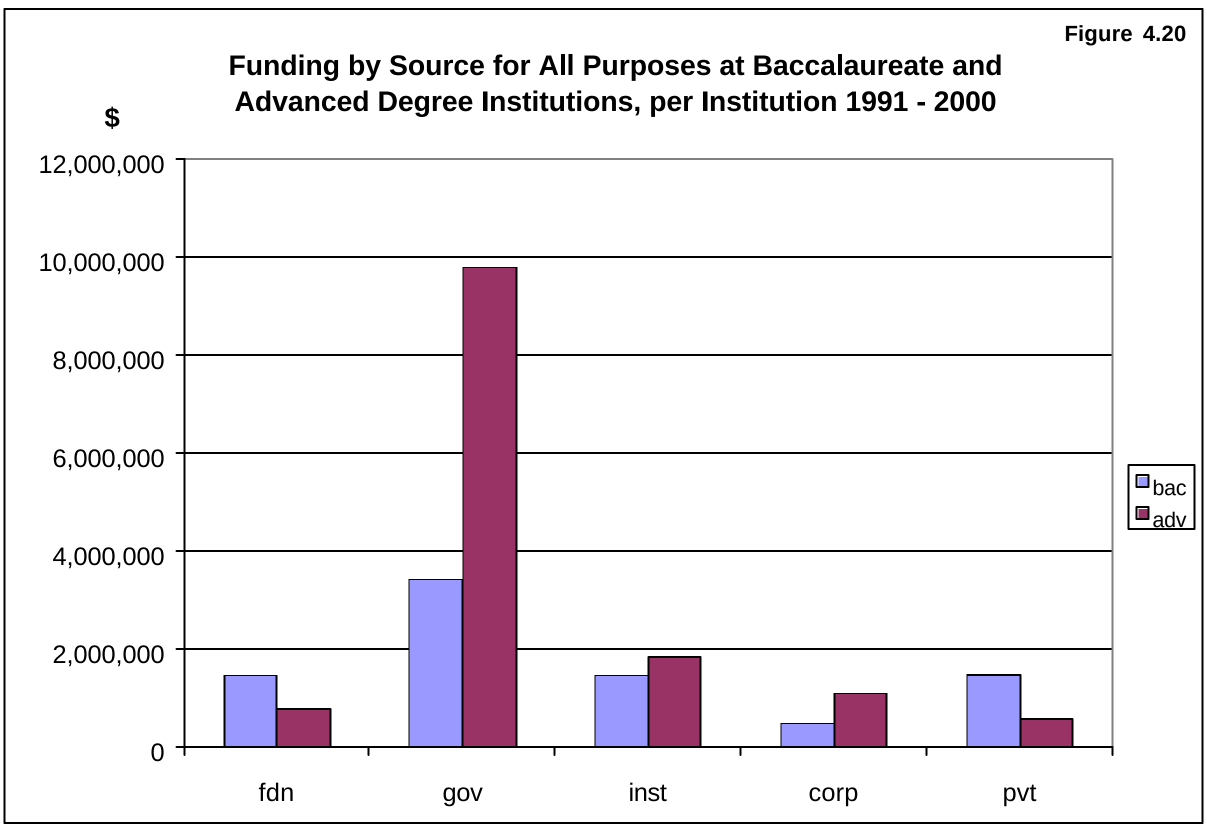


Figure 4.20



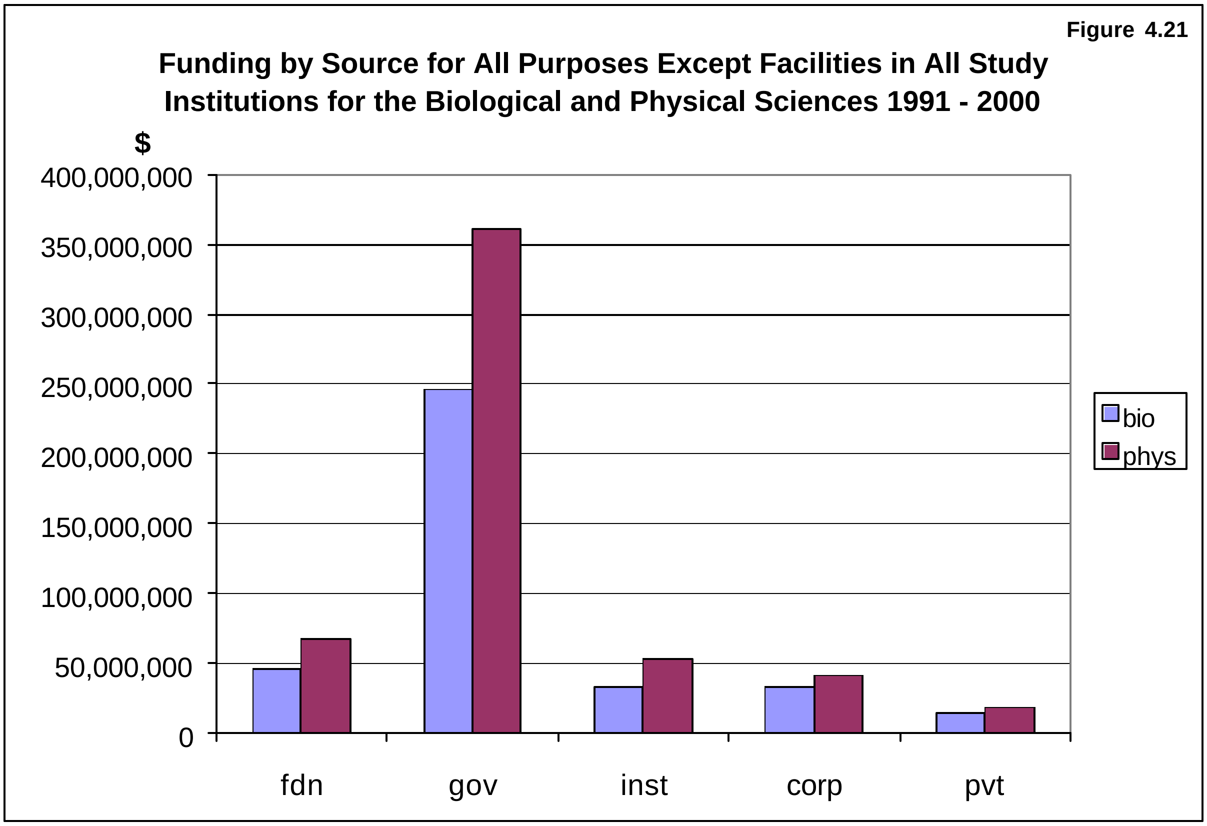


Figure 4.21
Funding by Source for All Purposes Except Facilities in All Study Institutions for the Biological and Physical Sciences 1991 - 2000
$
400,000,000
350,000,000
300,000,000
250,000,000
200,000,000
150,000,000
100,000,000
50,000,000
0
fdn
gov
inst
corp
pvt
bio
phys

Table 4.11. Funding by Source for New Facilities and Renovations in Study Institutions 1991–2000

Private Foundation Sources (fdn)	Government Sources (gov)	Institutional Sources (inst)	Corporate Sources (corp)	Private Sources (pvt)	Total Funding All Sources
2,294,911	0	6,332,644	270,000	17,481,899	26,379,454
30,000	100,000	0	0	24,189,986	24,319,986
0	850,000	19,713,080	175,000	2,097,170	22,835,250
0	0	17,401,000	0	0	17,401,000
0	0	16,710,737	0	0	16,710,737
0	0	0	366,644	13,057,232	13,423,876
1,250,000	0	2,200,000	0	7,626,875	11,076,875
0	0	0	0	10,960,000	10,960,000
0	0	10,200,000	0	0	10,200,000
7,000,000	791,407	0	148,654	1,937,500	9,877,561
4,750,000	875,609	1,875,609	100,000	2,150,000	9,751,218
0	0	75,087	290,550	8,878,224	9,243,861
9,175,000	0	0	0	0	9,175,000
7,560,000	0	0	285,666	898,721	8,744,387
1,550,000	0	0	60,000	5,107,040	6,717,040
1,230,000	512,324	55,589	696,000	3,538,874	6,032,787
350,000	983,975	959,429	1,688,282	950,000	4,931,686
0	0	0	0	4,400,000	4,400,000
0	3,270,000	630,000	0	0	3,900,000
150,000	0	0	0	3,078,733	3,228,733
0	200,000	2,124,057	750,000	0	3,074,057
0	2,062,500	0	1,000,000	0	3,062,500
450,000	1,325,904	0	650,000	500,000	2,925,904
850,000	0	280,000	50,000	1,488,300	2,668,300
750,000	400,000	1,423,194	0	0	2,573,194
0	2,024,850	0	0	500,000	2,524,850
250,000	0	1,987,000	100,000	100,000	2,437,000
0	2,420,795	0	0	0	2,420,795
200,000	601,112	606,084	0	790,000	2,197,196
1,425,000	525,000	0	0	160,000	2,110,000
0	0	2,000,000	0	0	2,000,000
0	1,130,000	780,000	0	0	1,910,000
0	1,768,460	60,283	0	0	1,828,743
0	900,000	300,000	0	620,000	1,820,000
0	0	0	750,000	900,000	1,650,000
1,000,000	0	307,136	150,000	150,000	1,607,136
0	1,600,000	0	0	0	1,600,000
1,400,000	0	0	0	200,000	1,600,000
0	1,550,000	0	0	0	1,550,000
1,400,000	0	0	0	100,000	1,500,000
100,000	182,365	1,200,000	0	0	1,482,365

Table 4.11. Funding by Source for New Facilities and Renovations in Study Institutions 1991–2000

Private Foundation Sources (fdn)	Government Sources (gov)	Institutional Sources (inst)	Corporate Sources (corp)	Private Sources (pvt)	Total Funding All Sources
0	446,500	0	0	896,500	1,343,000
0	0	0	66,000	1,267,488	1,333,488
150,000	156,000	997,408	0	0	1,303,408
0	676,072	0	500,000	90,000	1,266,072
500,000	129,000	500,000	0	0	1,129,000
0	393,650	709,605	20,000	0	1,123,255
0	965,000	0	3,000	150,000	1,118,000
0	576,077	384,051	150,000	0	1,110,128
0	1,107,000	0	0	0	1,107,000
175,000	210,000	640,000	0	0	1,025,000
0	0	0	0	850,000	850,000
0	736,241	0	0	0	736,241
250,000	396,592	0	0	57,696	704,288
0	351,280	351,280	0	0	702,560
0	300,000	350,000	0	0	650,000
0	563,155	0	0	0	563,155
0	266,444	266,444	0	0	532,888
0	375,000	145,000	0	0	520,000
520,000	0	0	0	0	520,000
0	14,375	498,900	0	0	513,275
250,000	259,803	0	0	0	509,803
0	0	0	0	500,000	500,000
0	434,250	0	0	0	434,250
0	426,578	0	0	0	426,578
0	419,656	0	0	0	419,656
0	0	0	0	400,000	400,000
0	179,000	0	0	179,000	358,000
0	315,917	0	0	0	315,917
18,408	146,000	4,602	0	100,000	269,010
0	0	0	257,815	0	257,815
0	238,541	0	0	0	238,541
0	0	228,785	1,000	0	229,785
0	224,344	0	0	0	224,344
175,000	0	0	0	0	175,000
0	125,650	0	0	0	125,650
0	125,000	0	0	0	125,000
0	117,110	0	0	0	117,110
0	0	89,500	0	0	89,500
0	0	60,000	0	0	60,000
0	38,000	0	0	0	38,000
10,000	0	9,000	0	0	19,000
0	0	15,000	0	0	15,000
83 institutions					
Totals					
45,213,319	34,786,536	92,470,504	8,528,611	116,351,238	297,350,208

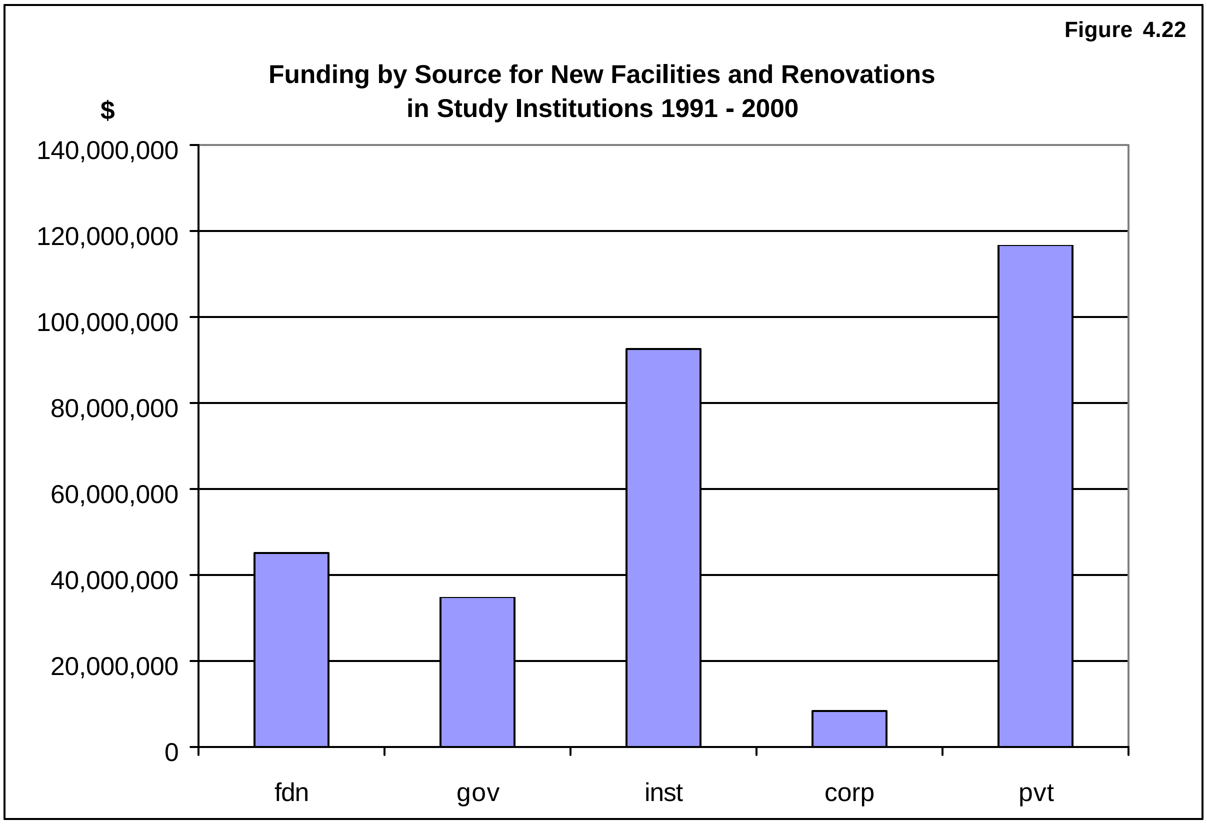


Figure 4.22
Funding by Source for New Facilities and Renovations
in Study Institutions 1991 - 2000
$
140,000,000
120,000,000
100,000,000
80,000,000
60,000,000
40,000,000
20,000,000
0
fdn
gov
inst
corp
pvt

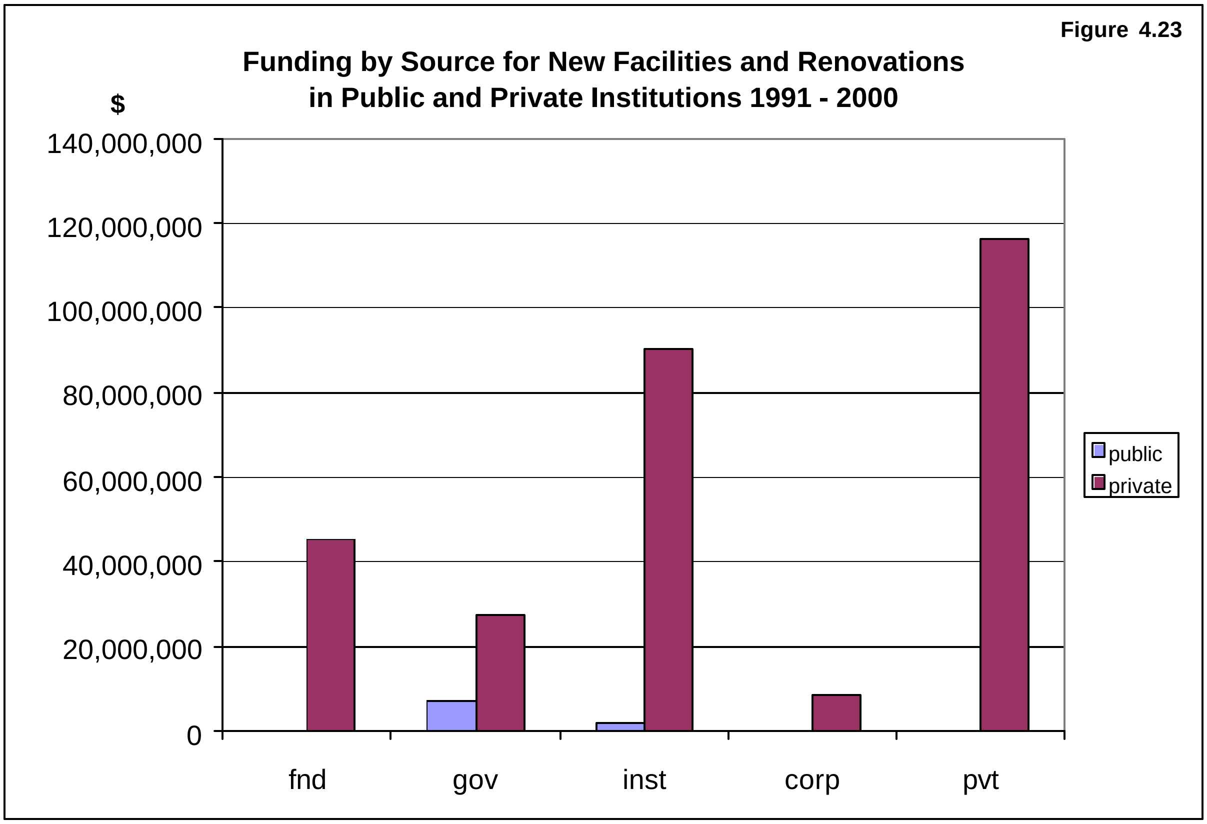


Figure 4.23
Funding by Source for New Facilities and Renovations
in Public and Private Institutions 1991 - 2000
$
140,000,000
120,000,000
100,000,000
80,000,000
60,000,000
40,000,000
20,000,000
0
fnd
gov
inst
corp
pvt
public
private

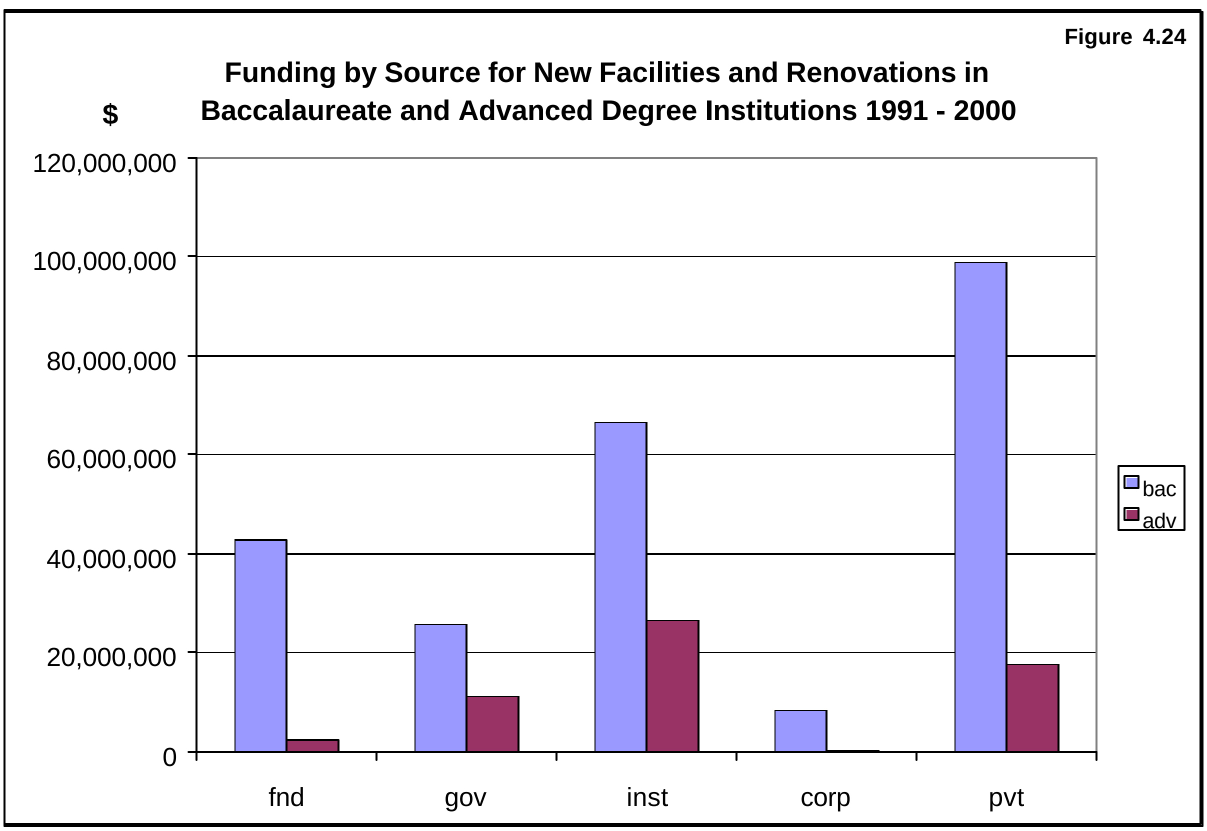


Figure 4.24
Funding by Source for New Facilities and Renovations in
Baccalaureate and Advanced Degree Institutions 1991 - 2000
$
120,000,000
100,000,000
80,000,000
60,000,000
40,000,000
20,000,000
0
fnd
gov
inst
corp
pvt
bac
adv

Table 4.12. Funding by Source for Research and Research Instrumentation in All Study Institutions 1991–2000

Private Foundation Sources (fdn)	Government Sources (gov)	Institutional Sources (inst)	Corporate Sources (corp)	Private Sources (pvt)	Total Funding All Sources
1,384,971	32,461,692	936,897	2,586,583	9,113	37,379,256
701,974	31,665,589	1,268,510	2,188,054	5,000	35,829,127
247,998	25,927,570	736,062	3,316,798	50,000	30,278,428
941,674	25,876,765	428,522	2,199,487	11,767	29,458,215
477,138	21,874,662	0	1,635,347	1,347,456	25,334,603
241,334	19,531,145	144,419	23,520	0	19,940,418
14,500	15,925,407	1,261,363	2,603,779	44,887	19,849,936
623,929	15,659,483	1,274,500	1,627,314	156,500	19,341,726
1,097,164	12,794,203	1,495,366	352,126	208,210	15,947,069
175,905	11,872,733	1,138,518	2,733,089	0	15,920,245
402,610	9,049,249	1,137,266	2,350,534	0	12,939,659
149,358	9,622,687	1,114,089	1,039,496	186,667	12,112,297
497,859	9,458,813	1,256,296	451,620	0	11,664,588
0	7,894,094	0	2,530,824	693,631	11,118,549
286,254	9,810,590	100,803	260,139	0	10,457,786
741,076	7,907,678	256,957	282,760	646,315	9,834,786
601,490	8,241,565	685,393	120,790	50,000	9,699,238
1,059,647	5,387,681	1,773,318	1,075,982	163,914	9,460,542
1,079,196	5,110,340	1,441,387	1,523,382	263,105	9,417,410
614,646	5,303,104	338,243	2,072,410	316,000	8,644,403
0	8,547,059	49,600	14,950	0	8,611,609
1,268,857	4,394,687	2,046,105	292,595	480,000	8,482,244
90,530	3,861,107	3,638,624	816,525	2,855	8,409,641
114,185	4,190,055	491,271	3,425,118	0	8,220,629
901,463	6,608,100	0	97,900	0	7,607,463
845,851	5,139,651	526,516	232,562	236,000	6,980,580
1,476,803	5,085,647	226,552	123,966	64,000	6,976,968
875,846	4,951,149	47,800	704,432	100,000	6,679,227
922,800	4,837,875	225,316	177,892	478,613	6,642,496
1,049,198	2,681,590	2,370	1,187,127	1,421,296	6,341,581
765,050	2,931,582	537,739	1,322,928	282,800	5,840,099
2,144,869	2,495,423	166,374	103,863	889,484	5,800,013
496,790	4,709,587	355,179	61,089	98,316	5,720,961
504,528	4,446,516	451,195	126,877	0	5,529,116
391,101	3,765,585	58,490	1,306,297	0	5,521,473
644,484	3,808,157	510,000	216,448	15,581	5,194,670
55,000	3,976,025	28,200	942,085	1,275	5,002,585
743,350	2,528,126	610,960	726,128	384,833	4,993,397
1,366,650	3,167,827	0	328,650	118,110	4,981,237
373,717	3,845,855	113,936	430,259	188,750	4,952,517
197,110	3,022,329	765,893	909,605	0	4,894,937
652,034	2,021,422	77,572	92,333	1,900,489	4,743,850
733,228	3,104,825	829,319	46,513	28,980	4,742,865
450,123	3,968,472	219,839	37,517	0	4,675,951
240,900	3,789,375	359,555	250,055	0	4,639,885
714,636	3,396,914	343,000	92,500	26,100	4,573,150

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Table 4.12. Funding by Source for Research and Research Instrumentation in All Study Institutions 1991–2000

Private Foundation Sources (fdn)	Government Sources (gov)	Institutional Sources (inst)	Corporate Sources (corp)	Private Sources (pvt)	Total Funding All Sources
110,871	3,676,520	279,528	460,465	24,514	4,551,898
111,112	2,868,631	429,047	912,735	0	4,321,525
195,000	4,042,766	27,000	0	0	4,264,766
25,000	3,849,751	300,000	59,975	450	4,235,176
116,032	3,167,864	384,727	474,522	21,500	4,164,645
733,316	730,055	2,413,705	267,315	0	4,144,391
1,162,329	2,358,405	562,265	10,530	29,783	4,123,312
1,512,356	1,891,798	126,622	579,797	0	4,110,573
409,260	3,468,323	0	192,380	30,639	4,100,602
342,939	3,344,278	3,300	27,100	56,617	3,774,234
741,055	1,601,606	1,125,013	148,377	72,500	3,688,551
442,331	2,381,314	420,000	210,062	165,023	3,618,730
245,000	2,803,898	0	423,300	0	3,472,198
240,785	3,182,856	9,473	0	5,000	3,438,114
131,700	3,078,636	25,256	108,110	87,265	3,430,967
599,900	2,271,616	0	237,263	9,000	3,117,779
403,000	1,304,581	1,328,275	36,579	0	3,072,435
198,428	2,273,892	0	478,315	64,927	3,015,562
341,596	2,499,806	26,764	142,500	0	3,010,666
321,706	2,168,580	25,500	383,230	81,564	2,980,580
180,174	1,855,443	577,850	319,539	40,863	2,973,869
180,950	2,568,099	81,248	28,290	0	2,858,587
252,194	2,088,519	274,080	162,071	66,844	2,843,708
278,588	1,582,510	907,421	0	0	2,768,519
438,250	1,501,342	412,037	376,885	38,516	2,767,030
188,980	1,968,289	270,990	43,075	26,400	2,716,119
581,650	1,286,323	597,763	119,320	90,800	2,675,856
374,603	1,355,508	0	448,829	458,000	2,636,940
139,015	2,220,305	170,351	33,985	35,305	2,598,961
576,600	1,122,392	243,863	413,963	6,600	2,363,418
173,287	803,021	96,635	43,000	1,219,289	2,335,232
228,209	1,711,396	285,080	43,698	0	2,268,383
41,650	1,354,401	276,131	235,000	358,356	2,265,538
1,323,160	557,462	272,396	100,019	0	2,253,037
122,500	1,638,978	82,383	125,015	250,000	2,218,876
671,724	1,300,861	142,336	29,762	0	2,144,683
342,623	1,428,175	0	310,574	34,400	2,115,772
163,154	1,134,823	530,218	184,636	0	2,012,831
311,516	868,323	415,364	191,286	184,656	1,971,145
0	1,124,664	148,207	641,025	48,930	1,962,826
228,491	1,602,335	0	86,288	4,200	1,921,314
310,577	1,574,716	0	26,000	0	1,911,293
115,160	953,689	584,627	233,434	0	1,886,910
160,325	536,738	100,000	928,330	135,000	1,860,393
390,388	985,404	0	435,364	0	1,811,156
49,900	299,581	318,374	1,062,857	32,818	1,763,530

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Table 4.12. Funding by Source for Research and Research Instrumentation in All Study Institutions 1991–2000

Private Foundation Sources (fdn)	Government Sources (gov)	Institutional Sources (inst)	Corporate Sources (corp)	Private Sources (pvt)	Total Funding All Sources
0	487,854	1,246,798	1,000	0	1,735,652
134,200	1,373,943	76,200	124,624	0	1,708,967
60,664	1,164,829	253,273	187,182	10,031	1,675,979
34,850	1,575,266	0	2,500	48,282	1,660,898
148,200	1,215,548	165,238	30,000	95,751	1,654,737
249,379	1,005,231	322,604	23,000	0	1,600,214
89,050	1,197,057	50,500	94,050	0	1,430,657
62,937	1,145,859	116,671	102,990	0	1,428,457
85,683	781,952	154,491	394,334	0	1,416,460
190,224	489,560	593,536	0	11,200	1,284,520
278,112	767,683	189,616	46,300	0	1,281,711
395,000	503,195	205,000	0	76,756	1,179,951
168,000	820,819	0	300	173,409	1,162,528
310,615	683,328	38,200	25,514	56,996	1,114,653
35,888	778,701	258,113	15,400	0	1,088,102
262,500	376,963	18,000	103,387	235,174	996,024
62,152	587,723	316,833	26,322	0	993,030
41,765	667,727	123,158	96,676	0	929,326
143,947	667,660	87,800	0	0	899,407
416,000	49,997	160,208	0	192,292	818,497
140,200	547,122	0	120,348	4,500	812,170
103,315	323,838	30,160	188,700	91,000	737,013
128,528	519,629	40,884	14,500	21,412	724,953
60,297	584,916	13,279	0	60,055	718,547
370,180	300,194	0	36,399	0	706,773
559,400	55,146	19,000	51,286	0	684,832
140,150	357,624	32,000	51,772	47,310	628,856
177,520	448,707	0	0	0	626,227
237,764	45,000	38,500	118,184	128,595	568,043
51,300	497,893	0	3,800	0	552,993
21,530	513,800	0	5,200	0	540,530
420,850	29,800	57,000	7,000	8,000	522,650
25,000	269,063	47,842	60,181	1,000	403,086
56,000	136,213	129,526	11,010	0	332,749
43,000	97,905	125,339	53,665	0	319,909
157,272	148,398	0	0	0	305,670
15,000	129,826	0	125,000	0	269,826
127,500	51,490	29,385	25,750	0	234,125
0	0	60,586	0	154,582	215,168
38,500	158,076	0	18,050	0	214,626
46,000	62,568	54,000	1,600	0	164,168
0	0	0	0	65,000	65,000
0	21,500	0	0	0	21,500
0	20,000	0	0	0	20,000
Totals:					
51,653,682	506,698,066	48,796,883	58,981,072	16,031,151	682,379,239

Figure 4.25

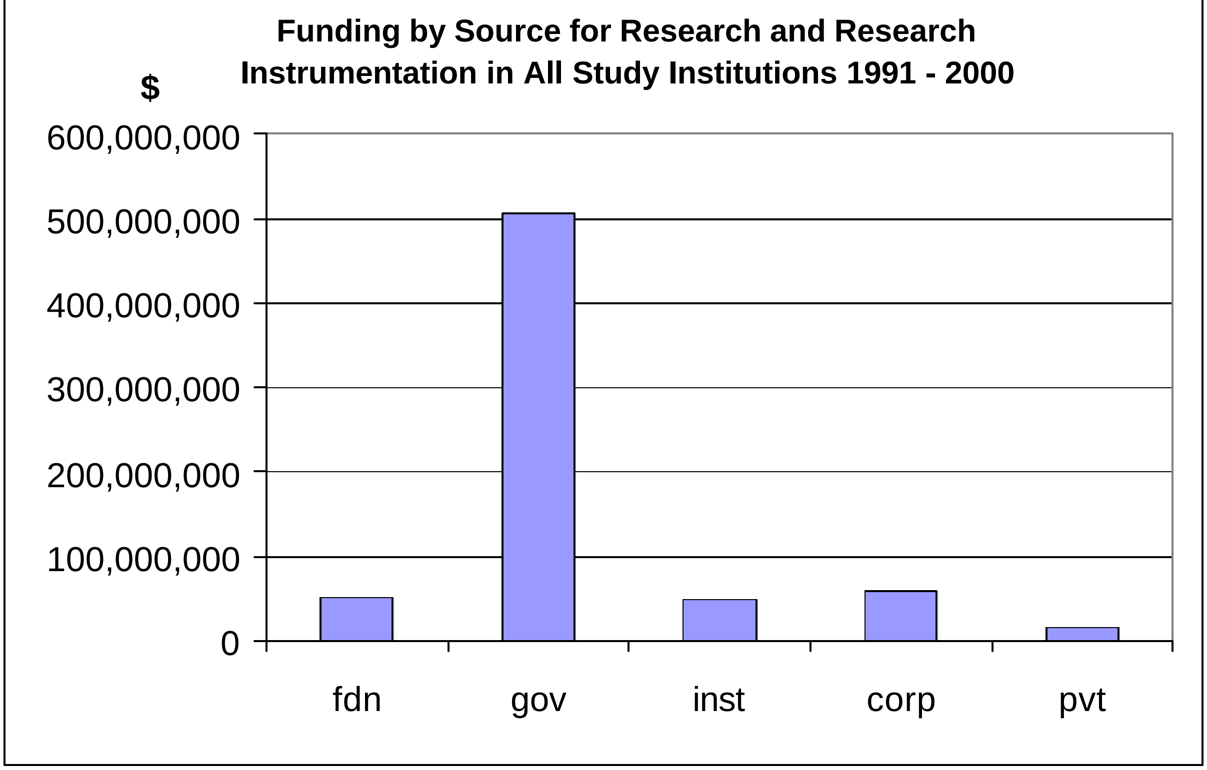

Figure 4.26

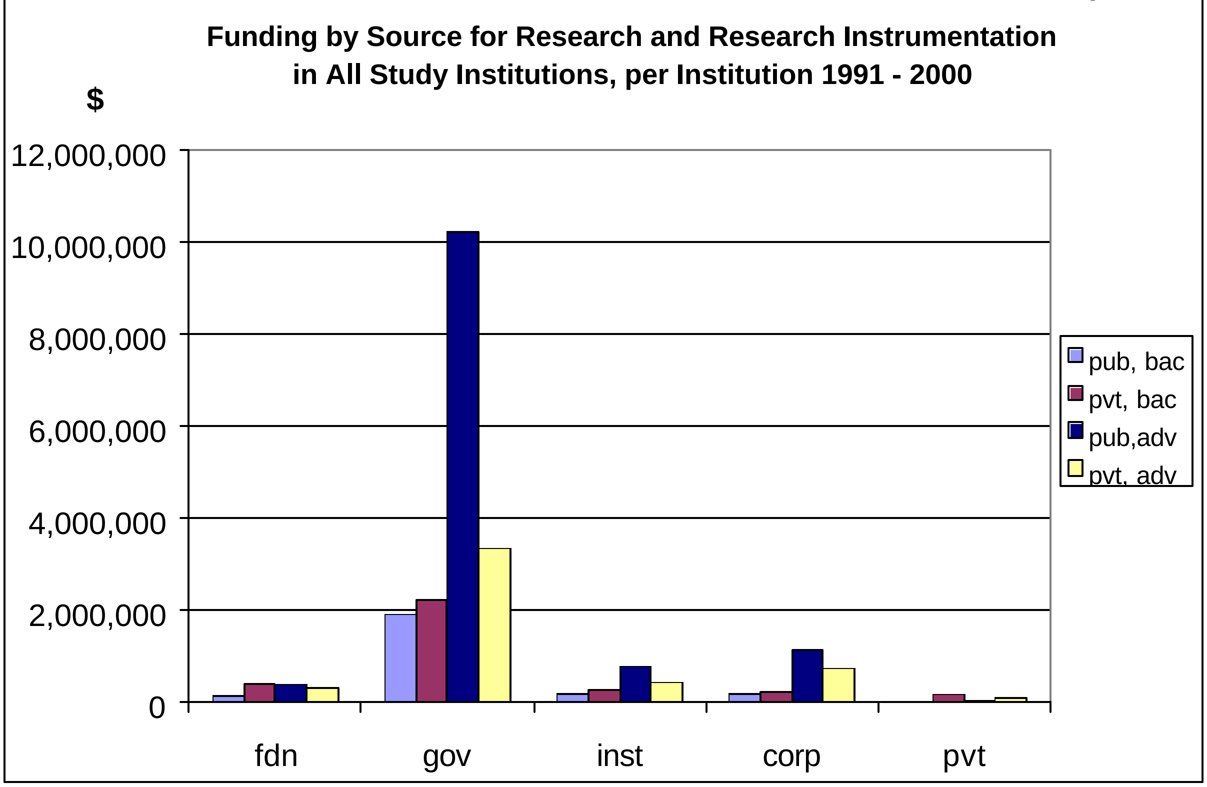

Figure 4.27

Funding by Source for Research and Research Instrumentation in Public and Private Institutions 1991 - 2000

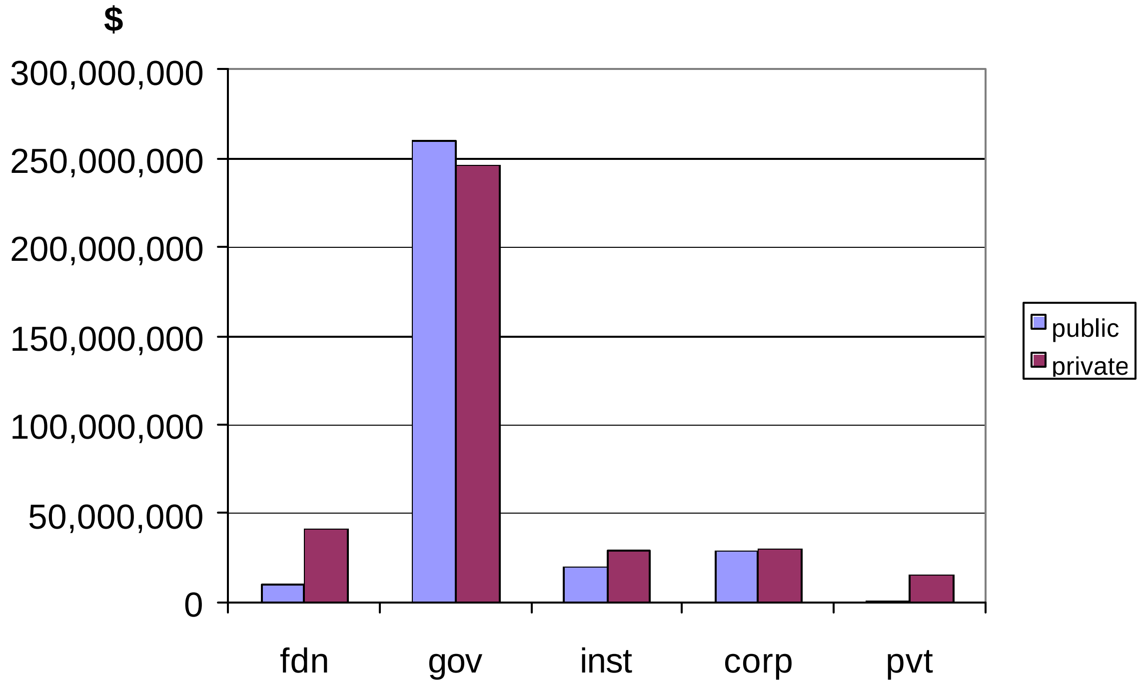

Figure 4.28

Funding by Source for Research and Research Instrumentation in Public and Private Institutions, per Institution 1991 - 2000

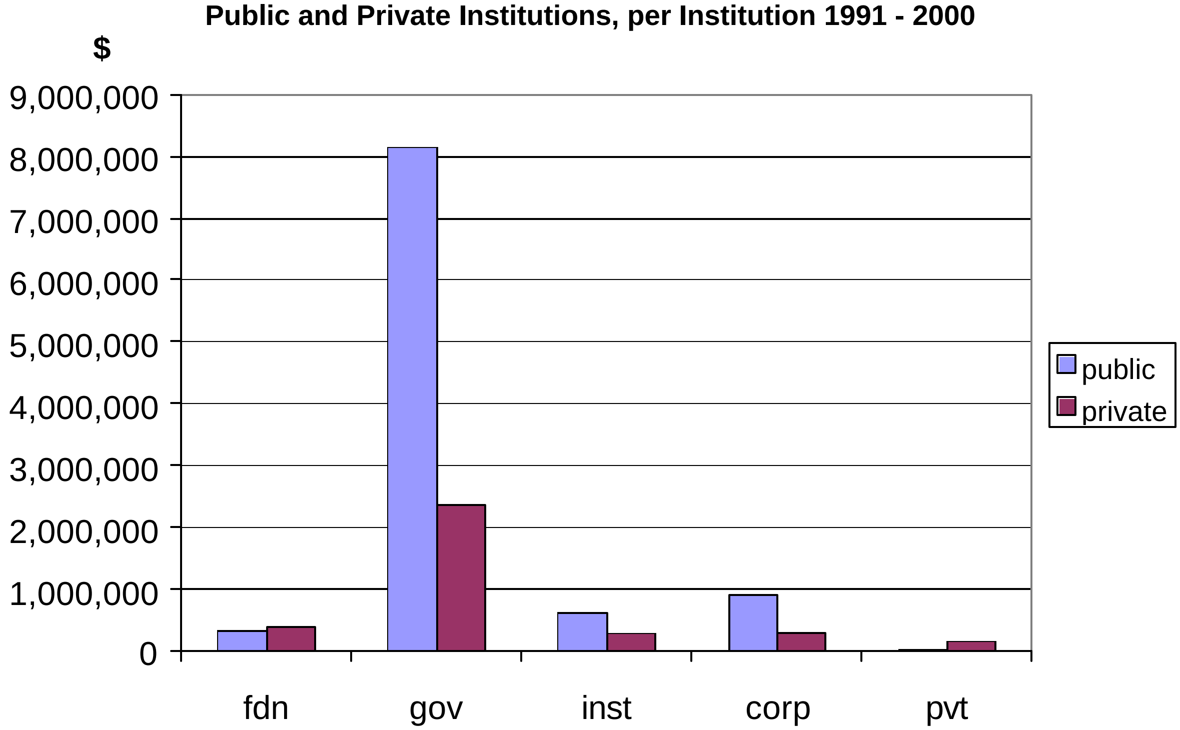

Figure 4.29

Funding by Source for Research and Research Instrumentation in Baccalaureate and Advanced Degree Institutions 1991 - 2000

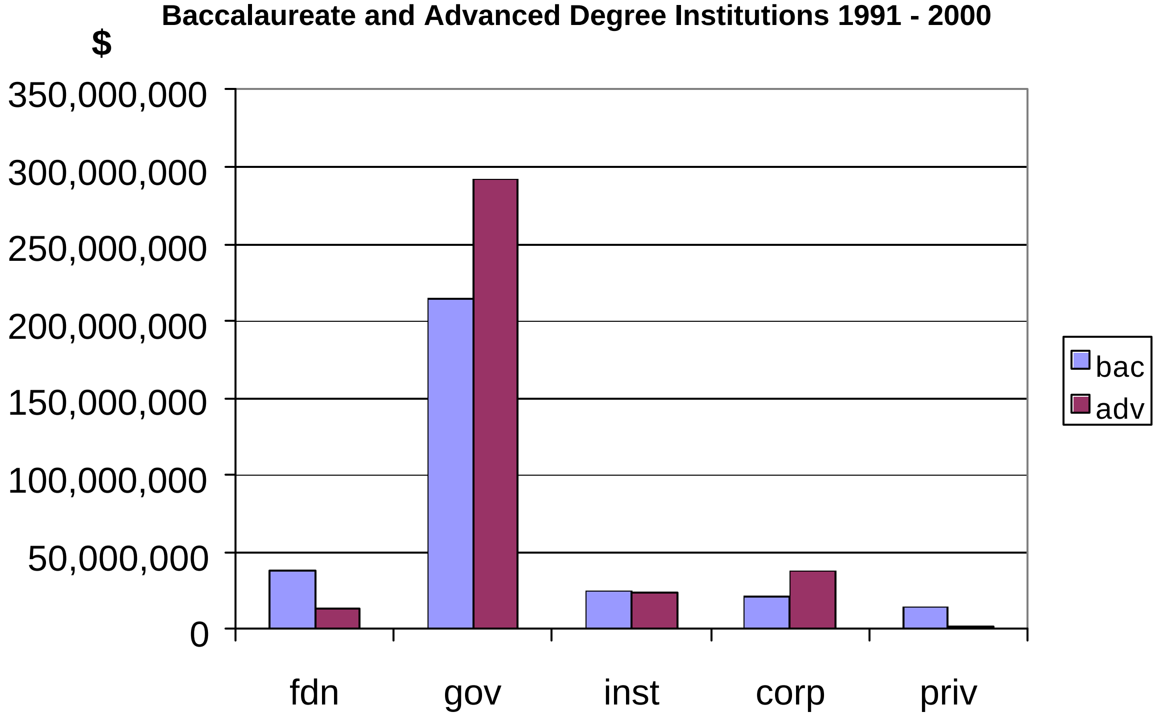

Figure 4.30

Funding by Source for Research and Research Instrumentation in Advanced and Baccalaureate Degree Insitutions, per Institution 1991 - 2000

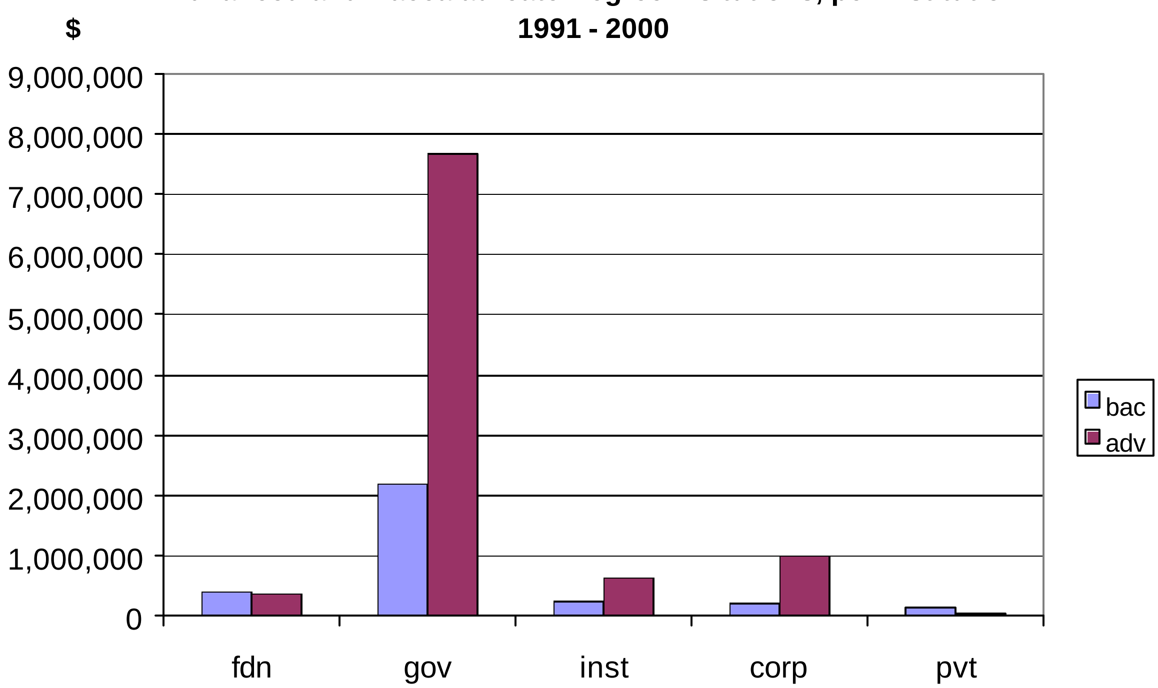

Table 4.13. Funding by Source for Research Instrumentation in All Study Institutions 1991–2000

Private Foundation Sources (fdn)	Government Sources (gov)	Institutional Sources (inst)	Corporate Sources (corp)	Private Sources (pvt)	Total Funding All Sources
0	646,375	735,584	997,658	0	2,379,617
1,250,011	106,050	39,474	0	763,484	2,159,019
992,657	337,842	211,681	0	0	1,542,180
500,000	466,170	275,000	171,785	0	1,412,955
49,494	1,306,176	26,280	5,000	0	1,386,950
77,500	732,092	141,164	200,062	198,500	1,349,318
21,500	217,262	1,017,451	0	0	1,256,213
0	1,006,634	118,681	27,369	0	1,152,684
0	1,125,669	0	0	0	1,125,669
400,000	0	591,263	29,320	0	1,020,583
499,999	0	225,316	10,000	201,000	936,315
220,000	610,622	60,997	0	0	891,619
548,766	50,000	54,160	217,585	0	870,511
0	649,781	87,900	5,000	0	742,681
202,000	252,566	0	248,584	0	703,150
0	385,167	97,614	142,333	72,500	697,614
0	0	342,941	350,000	0	692,941
0	682,868	0	0	0	682,868
0	395,854	253,857	0	0	649,711
60,000	13,581	0	543,166	0	616,747
0	365,159	0	204,381	0	569,540
375,000	182,934	0	0	0	557,934
0	405,829	131,897	4,222	0	541,948
25,000	361,931	142,336	10,000	0	539,267
241,303	286,647	0	0	0	527,950
0	313,221	203,159	0	0	516,380
0	125,000	221,000	145,000	25,000	516,000
25,000	119,803	0	25,000	338,000	507,803
225,000	110,000	157,814	0	0	492,814
178,000	138,000	134,636	36,739	0	487,375
458,030	8,000	2,370	12,500	2,000	482,900
0	140,900	334,555	0	0	475,455
195,000	236,008	26,764	0	0	457,772
0	0	429,499	0	0	429,499
0	47,000	0	358,056	15,550	420,606
0	225,879	182,382	1,185	0	409,446
0	0	392,020	0	0	392,020

Table 4.13. Funding by Source for Research Instrumentation in All Study Institutions 1991–2000

Private Foundation Sources (fdn)	Government Sources (gov)	Institutional Sources (inst)	Corporate Sources (corp)	Private Sources (pvt)	Total Funding All Sources
150,000	138,147	100,000	0	0	388,147
0	204,371	114,294	33,985	31,452	384,102
0	0	383,531	0	0	383,531
0	227,994	150,394	0	0	378,388
200,000	0	0	114,413	58,564	372,977
0	83,755	274,080	0	0	357,835
150,000	0	0	80,000	100,000	330,000
0	125,483	0	202,268	0	327,751
0	79,929	223,863	1,500	0	305,292
122,000	0	0	142,650	35,000	299,650
240,000	57,348	0	0	0	297,348
0	0	292,906	0	0	292,906
25,000	33,200	30,000	147,000	55,000	290,200
60,000	143,217	0	0	59,000	262,217
62,500	19,413	15,000	19,137	124,046	240,096
0	0	204,774	31,988	0	236,762
0	0	231,000	0	0	231,000
20,000	101,939	96,635	0	10,000	228,574
0	33,750	189,616	1,800	0	225,166
0	100,000	0	125,000	0	225,000
118,882	0	0	76,684	24,139	219,705
0	61,800	80,156	75,000	0	216,956
0	0	205,000	0	10,000	215,000
0	100,000	104,506	0	0	204,506
0	177,333	0	25,000	0	202,333
0	199,002	0	0	0	199,002
0	125,000	67,530	0	0	192,530
0	157,764	0	19,000	0	176,764
150,000	16,845	0	0	0	166,845
150,000	0	0	0	15,000	165,000
160,000	0	0	0	0	160,000
0	101,000	52,750	0	0	153,750
0	0	0	0	150,000	150,000
0	146,710	0	0	0	146,710
0	135,122	0	0	0	135,122
0	0	125,339	0	0	125,339
0	124,000	0	0	0	124,000

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Table 4.13. Funding by Source for Research Instrumentation in All Study Institutions 1991–2000

Private Foundation Sources (fdn)	Government Sources (gov)	Institutional Sources (inst)	Corporate Sources (corp)	Private Sources (pvt)	Total Funding All Sources
0	111,000	0	0	9,000	120,000
0	0	119,751	0	0	119,751
0	71,096	43,750	0	4,000	118,846
20,000	3,000	20,000	0	75,000	118,000
0	77,574	0	33,961	0	111,535
0	0	17,504	2,410	87,265	107,179
20,000	86,219	0	0	0	106,219
0	105,840	0	0	0	105,840
25,000	24,147	50,000	0	0	99,147
0	0	84,976	0	0	84,976
0	27,000	57,000	0	0	84,000
0	72,524	0	0	0	72,524
72,000	0	0	0	0	72,000
0	69,000	0	0	0	69,000
0	0	0	0	65,000	65,000
0	41,647	17,849	0	0	59,496
45,600	0	0	0	0	45,600
0	12,202	28,200	0	0	40,402
0	38,400	0	0	0	38,400
0	36,387	0	0	0	36,387
0	36,000	0	0	0	36,000
0	28,000	0	7,000	0	35,000
0	0	25,750	750	0	26,500
0	25,800	0	0	0	25,800
0	22,650	0	0	0	22,650
0	21,000	0	0	0	21,000
0	0	2,850	15,000	0	17,850
12,000	1,003	0	0	0	13,003
12,500	0	0	0	0	12,500
0	1,734	0	9,000	0	10,734
0	10,180	0	0	0	10,180
0	5,000	0	4,780	0	9,780
0	0	5,473	0	0	5,473
0	0	4,200	0	0	4,200
0	0	0	1,028	0	1,028
Totals					
8,359,742	15,671,545	10,056,472	4,914,299	2,528,500	41,530,558

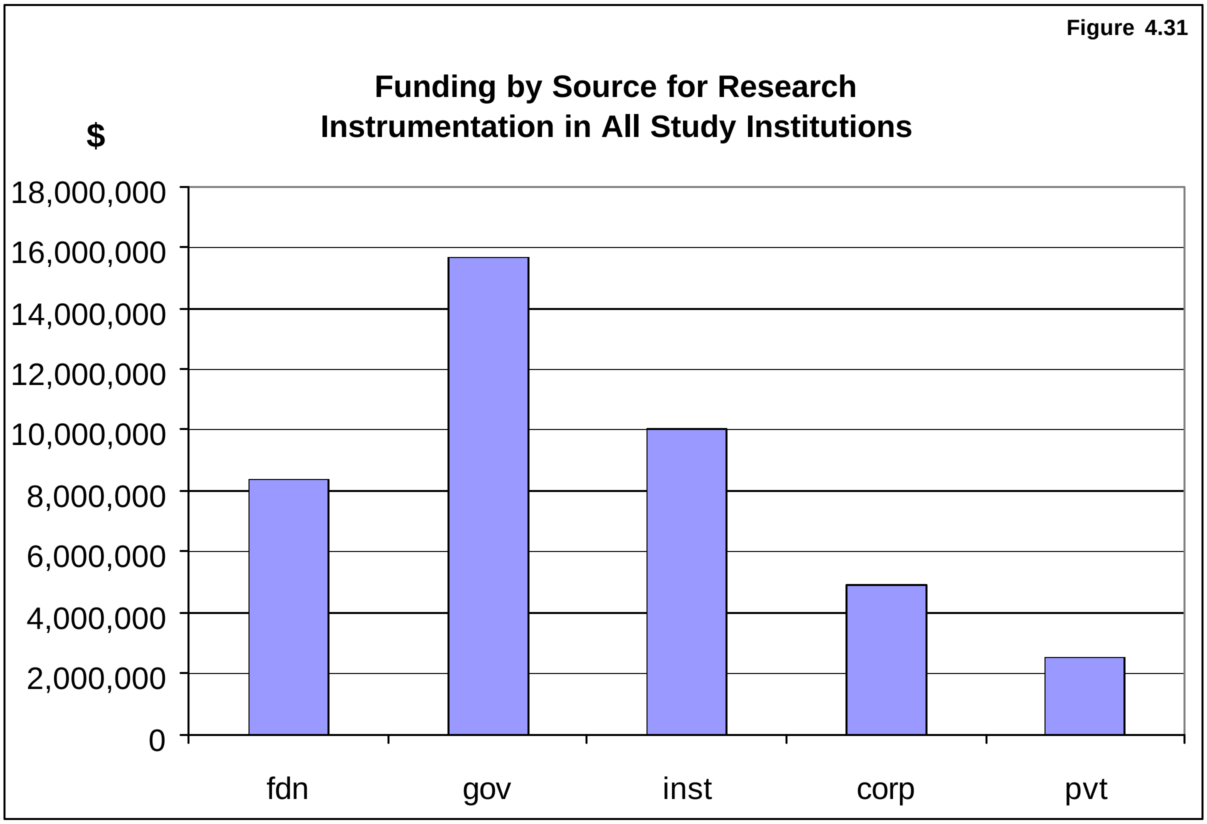


Figure 4.31
Funding by Source for Research Instrumentation in All Study Institutions
$
18,000,000
16,000,000
14,000,000
12,000,000
10,000,000
8,000,000
6,000,000
4,000,000
2,000,000
0
fdn
gov
inst
corp
pvt

Figure 4.32

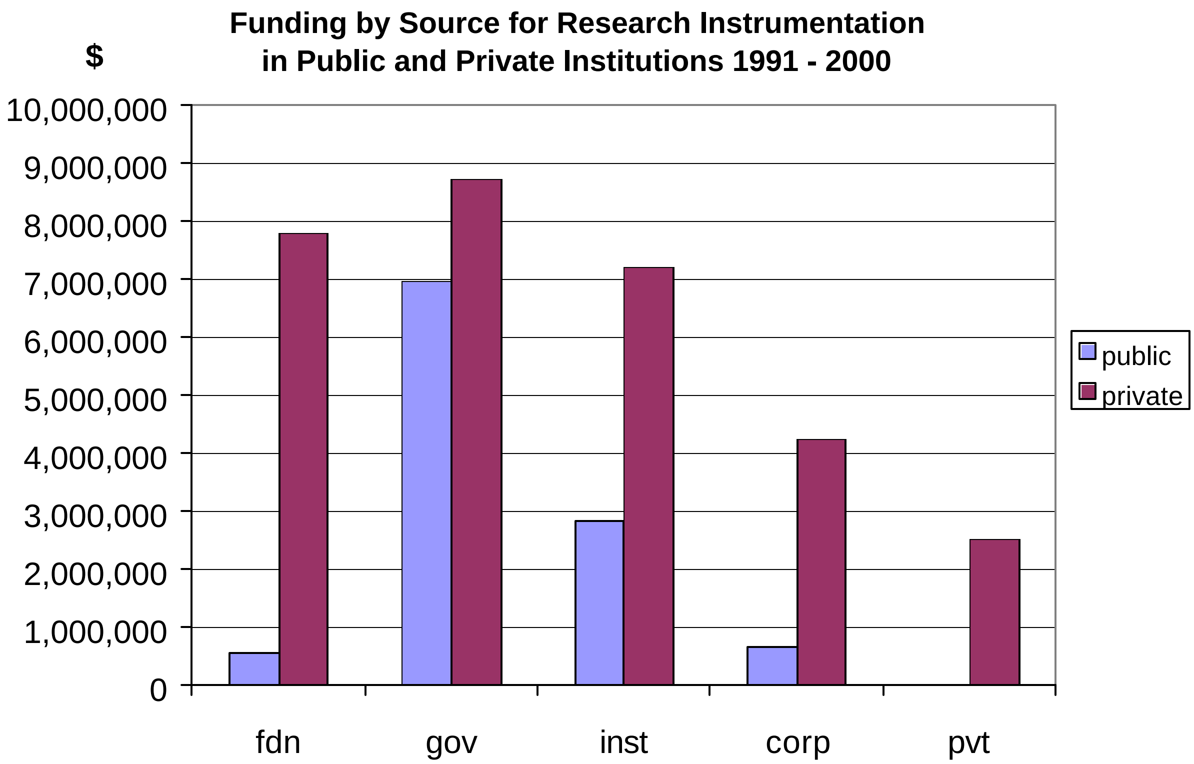
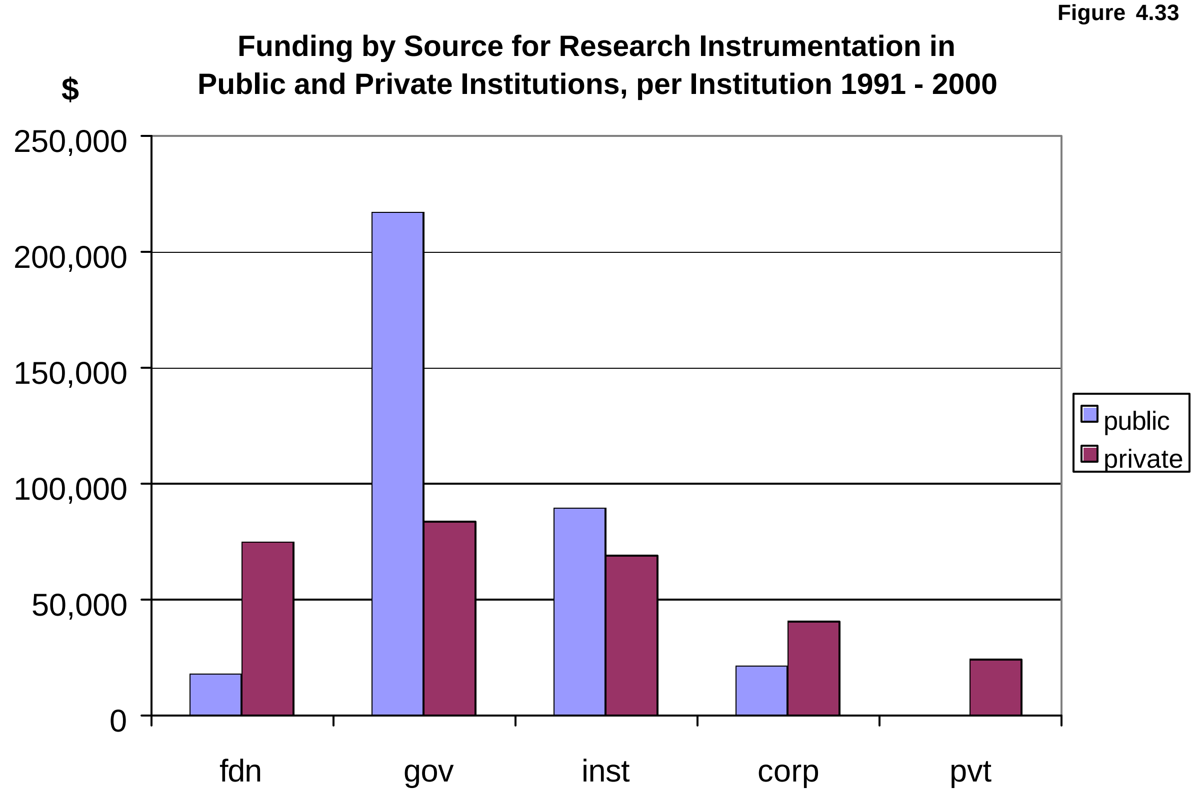


Figure 4.33



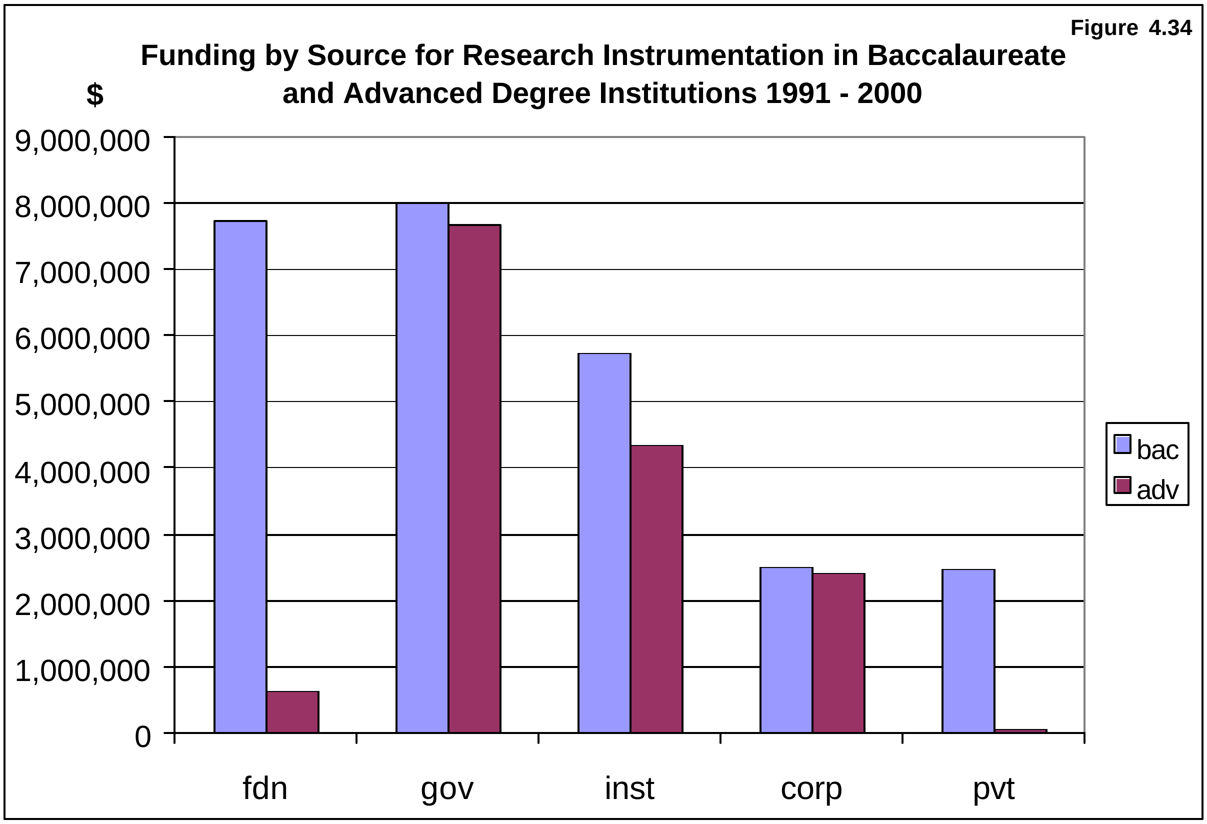


Figure 4.34
Funding by Source for Research Instrumentation in Baccalaureate and Advanced Degree Institutions 1991 - 2000
$
9,000,000
8,000,000
7,000,000
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
fdn
gov
inst
corp
pvt
bac
adv

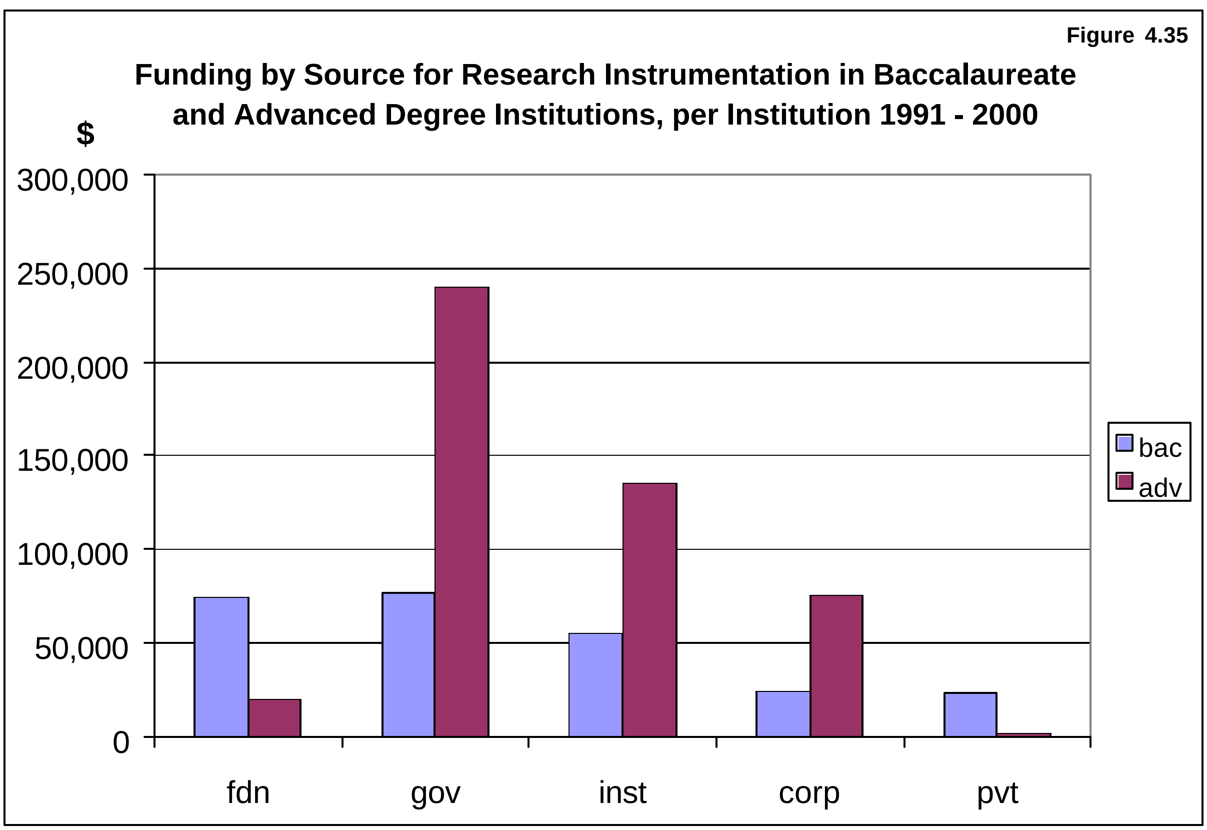


Figure 4.35
Funding by Source for Research Instrumentation in Baccalaureate and Advanced Degree Institutions, per Institution 1991 - 2000
$
300,000
250,000
200,000
150,000
100,000
50,000
0
fdn
gov
inst
corp
pvt
bac
adv

Table 4.14. Funding by Source for Teaching and Pedagogy at All Study Institutions 1991–2000

Private Foundation Sources (fdn)	Government Sources (gov)	Institutional Sources (inst)	Corporate Sources (corp)	Private Sources (pvt)	Total Funding All Sources
1,557,440	9,974,399	197,954	363,431	0	12,093,224
150,000	8,087,419	311,681	24,481	0	8,573,581
830,000	4,900,052	97,613	1,376,882	295,000	7,499,547
498,680	5,383,200	0	190,000	5,000	6,076,880
137,199	4,773,027	6,850	210,121	0	5,127,197
2,375,000	1,481,462	462,271	71,000	249,200	4,638,933
100,000	4,519,131	0	0	0	4,619,131
150,000	0	0	101,184	4,208,420	4,459,604
384,000	2,611,483	135,790	501,034	223,571	3,855,878
826,039	776,025	15,000	2,113,218	50,695	3,780,977
0	3,336,632	229,520	12,500	0	3,578,652
67,500	334,762	2,532,200	86,802	139,045	3,160,309
327,207	1,163,350	261,262	60,000	956,372	2,768,191
353,133	844,350	974,590	225,000	168,000	2,565,073
1,386,764	610,037	328,984	133,000	0	2,458,785
62,000	2,214,290	0	109,831	0	2,386,121
950,000	417,263	125,361	23,000	833,000	2,348,624
328,000	984,465	998,042	28,500	0	2,339,007
19,050	1,119,422	1,061,706	120,522	0	2,320,700
24,000	1,637,749	18,750	152,485	250,000	2,082,984
0	1,754,920	301,892	20,000	0	2,076,812
0	1,498,907	465,528	43,892	0	2,008,327
60,000	600,162	563,927	774,960	0	1,999,049
178,109	1,052,741	609,216	39,250	0	1,879,316
550,000	1,105,512	129,350	80,735	0	1,865,597
48,900	779,977	278,600	592,719	128,850	1,829,046
398,899	1,306,834	0	30,666	0	1,736,399
15,000	1,536,349	109,407	500	75,000	1,736,256
72,000	1,042,561	318,489	236,893	0	1,669,943
92,500	1,293,090	0	77,500	150,400	1,613,490
500,000	989,132	114,000	0	0	1,603,132
0	1,036,558	257,638	242,245	0	1,536,441
0	1,149,648	262,390	53,377	0	1,465,415
188,000	870,335	350,577	10,370	42,981	1,462,263
175,000	771,545	334,960	175,000	0	1,456,505
0	1,236,658	53,288	158,350	0	1,448,296
200,000	386,720	0	822,000	0	1,408,720
65,000	571,561	294,388	118,205	337,000	1,386,154
107,000	893,204	42,196	340,500	500	1,383,400
0	1,302,788	3,000	74,200	0	1,379,988
353,011	199,275	88,826	3,500	715,300	1,359,912
300,000	118,983	0	483,888	411,917	1,314,788
20,000	1,178,987	19,700	42,000	25,000	1,285,687
9,600	1,179,171	65,794	0	0	1,254,565
550,000	266,483	131,700	30,000	250,000	1,228,183

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Table 4.14. Funding by Source for Teaching and Pedagogy at All Study Institutions 1991-2000

Private Foundation Sources (fdn)	Government Sources (gov)	Institutional Sources (inst)	Corporate Sources (corp)	Private Sources (pvt)	Total Funding All Sources
473,750	540,820	68,345	130,790	0	1,213,705
828,366	152,740	140,510	63,810	25,000	1,210,426
0	1,095,293	14,506	77,210	0	1,187,009
131,076	391,197	478,529	75,000	109,448	1,185,250
31,500	523,635	558,745	60,000	0	1,173,880
25,000	926,619	207,500	0	0	1,159,119
75,570	915,247	98,734	0	27,200	1,116,751
13,485	606,176	477,769	14,862	0	1,112,292
0	1,070,637	2,822	15,140	0	1,088,599
252,262	514,709	214,744	105,200	0	1,086,915
0	878,999	167,741	0	0	1,046,740
0	1,032,831	0	9,002	0	1,041,833
0	816,187	179,470	30,672	10,000	1,036,329
269,000	356,034	314,733	0	74,000	1,013,767
5,000	634,323	0	248,800	110,000	998,123
150,000	818,820	0	0	23,733	992,553
0	755,131	120,716	75,662	0	951,509
107,500	164,170	162,666	379,554	115,616	929,506
380,800	257,869	286,266	0	0	924,935
0	520,135	364,753	0	0	884,888
0	842,562	15,335	12,500	0	870,397
130,780	347,930	185,957	21,613	159,894	846,174
482,155	296,478	18,250	46,400	0	843,283
0	662,816	180,420	0	0	843,236
0	484,805	207,960	120,500	0	813,265
209,000	385,197	9,200	186,388	13,753	803,538
20,000	603,695	0	57,000	105,000	785,695
150,000	633,019	0	0	0	783,019
240,000	210,860	0	0	300,000	750,860
0	476,730	49,806	197,474	0	724,010
155,000	4,670	55,737	199,450	297,992	712,849
641,250	55,499	0	10,000	0	706,749
30,000	599,500	67,426	8,250	0	705,176
15,000	642,998	27,537	8,000	0	693,535
0	669,628	10,112	8,380	0	688,120
12,500	469,052	178,585	5,000	17,332	682,469
29,445	289,715	349,623	4,270	0	673,053
0	507,646	152,220	0	0	659,866
130,785	58,680	0	429,475	0	618,940
200,000	110,332	75,500	142,473	84,764	613,069
325,000	153,404	0	65,000	50,000	593,404
45,000	344,809	161,345	41,303	0	592,457
25,500	388,672	166,408	0	0	580,580
0	555,010	0	0	0	555,010
21,450	457,972	0	74,136	0	553,558

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Table 4.14. Funding by Source for Teaching and Pedagogy at All Study Institutions 1991–2000

Private Foundation Sources (fdn)	Government Sources (gov)	Institutional Sources (inst)	Corporate Sources (corp)	Private Sources (pvt)	Total Funding All Sources
57,968	261,341	18,867	180,255	25,000	543,431
0	475,190	0	58,135	7,739	541,064
52,169	326,695	0	10,000	147,434	536,298
0	435,941	0	96,170	0	532,111
0	367,404	145,162	0	0	512,566
0	231,844	0	0	275,000	506,844
0	146,333	253,063	33,000	65,503	497,899
3,750	244,206	219,801	0	0	467,757
0	455,110	7,110	0	0	462,220
0	0	0	0	458,857	458,857
0	410,322	1,268	35,000	0	446,590
0	391,606	47,050	0	0	438,656
10,000	294,822	44,154	20,000	61,260	430,236
41,216	213,231	157,090	12,585	0	424,122
127,500	117,895	37,710	125,750	900	409,755
73,475	310,683	0	7,000	0	391,158
0	278,989	0	0	104,616	383,605
11,900	305,655	48,562	0	0	366,117
0	251,923	0	82,000	23,750	357,673
0	136,803	210,109	0	9,050	355,962
35,000	223,498	22,245	59,500	0	340,243
0	340,000	0	0	0	340,000
0	332,928	0	7,000	0	339,928
0	334,760	0	0	0	334,760
15,175	158,463	134,026	0	0	307,664
0	118,471	2,000	0	141,579	262,050
47,550	184,035	0	0	0	231,585
130,000	86,323	0	2,500	4,000	222,823
80,000	138,642	0	0	0	218,642
0	188,893	0	0	25,000	213,893
15,000	45,180	0	17,000	125,000	202,180
54,000	145,625	0	0	0	199,625
0	183,189	0	13,635	0	196,824
12,500	95,137	65,437	0	0	173,074
0	150,545	0	6,000	0	156,545
14,000	98,752	3,450	34,000	0	150,202
90,000	25,000	0	15,500	0	130,500
0	9,723	95,699	16,500	0	121,922
0	98,507	0	0	0	98,507
0	89,441	0	0	0	89,441
30,000	28,000	5,000	16,965	0	79,965
20,000	48,307	0	0	0	68,307
0	63,005	0	0	0	63,005
0	30,000	0	1,425	0	31,425
Totals					
20,936,408	111,386,287	19,840,213	14,126,975	12,513,671	178,803,554

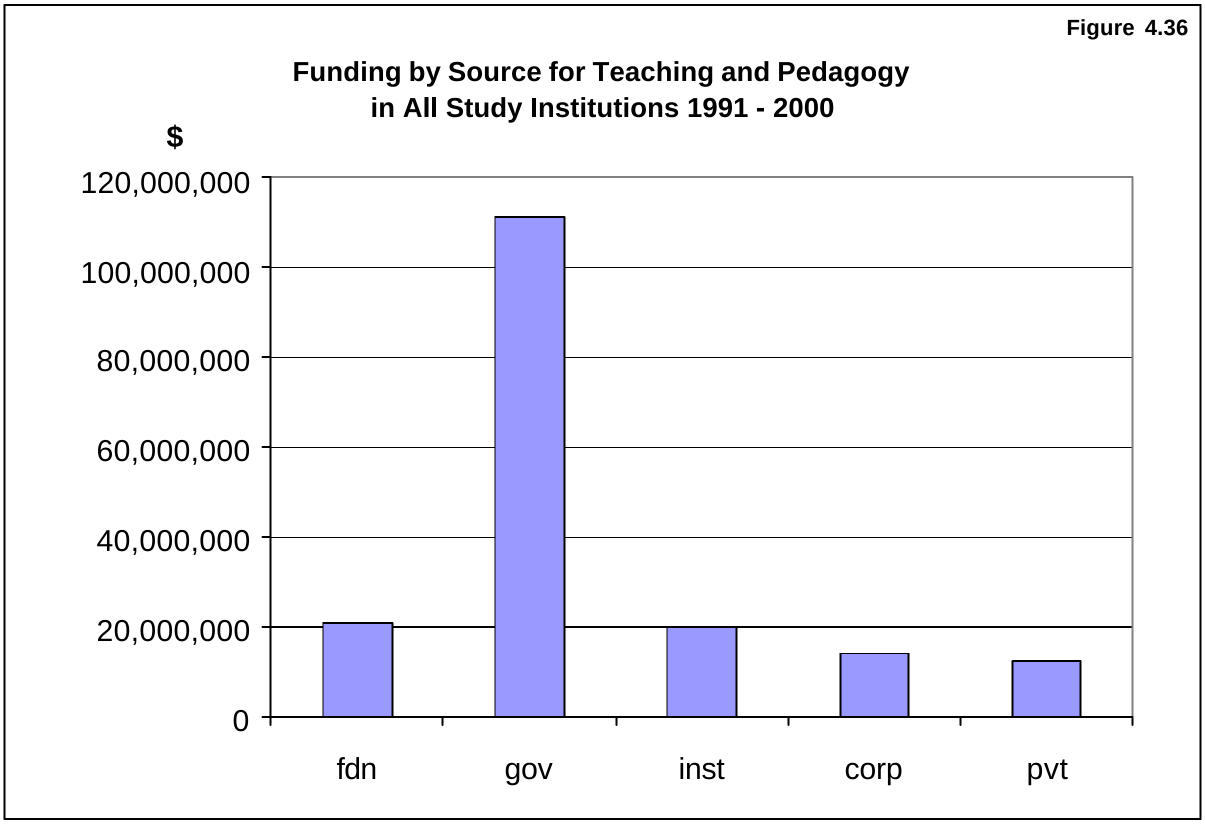


Figure 4.36
Funding by Source for Teaching and Pedagogy
in All Study Institutions 1991 - 2000
$
120,000,000
100,000,000
80,000,000
60,000,000
40,000,000
20,000,000
0
fdn
gov
inst
corp
pvt

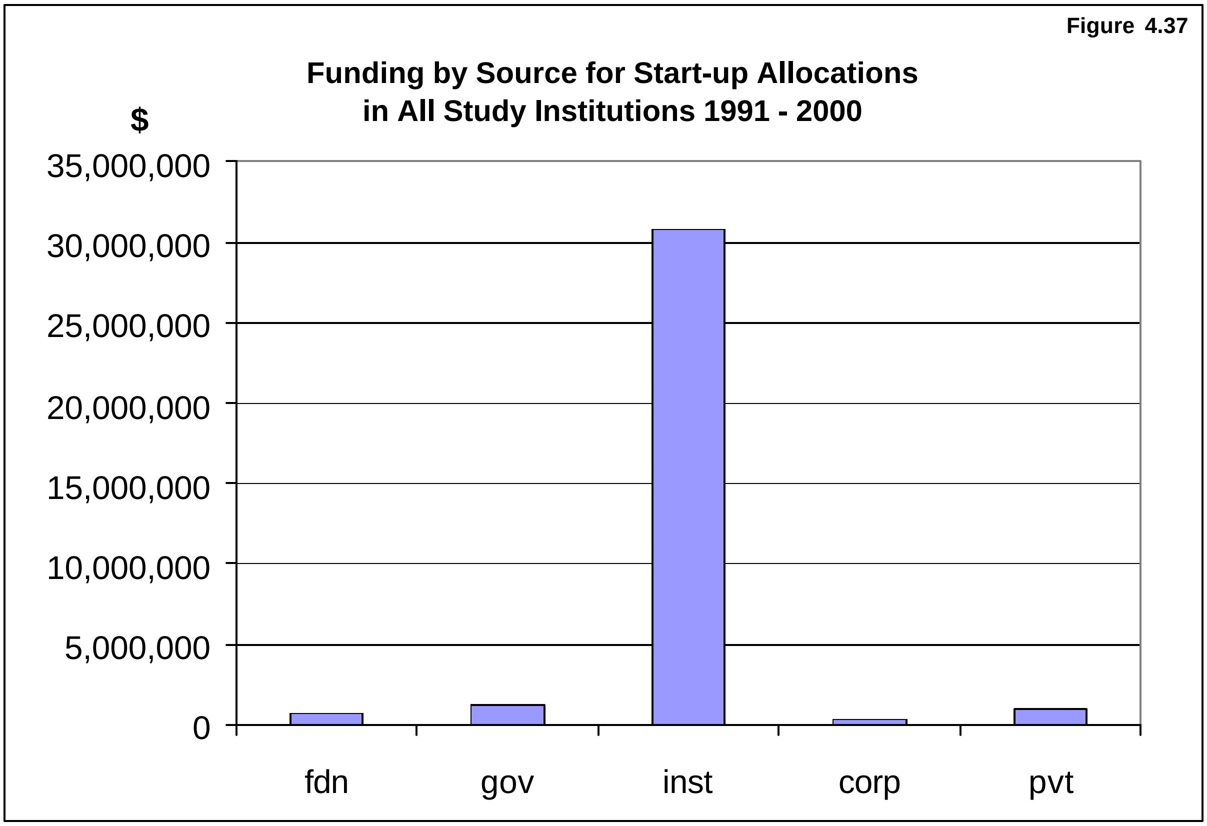


Figure 4.37
Funding by Source for Start-up Allocations
in All Study Institutions 1991 - 2000
$
35,000,000
30,000,000
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
0
fdn
gov
inst
corp
pvt

Figure 4.38

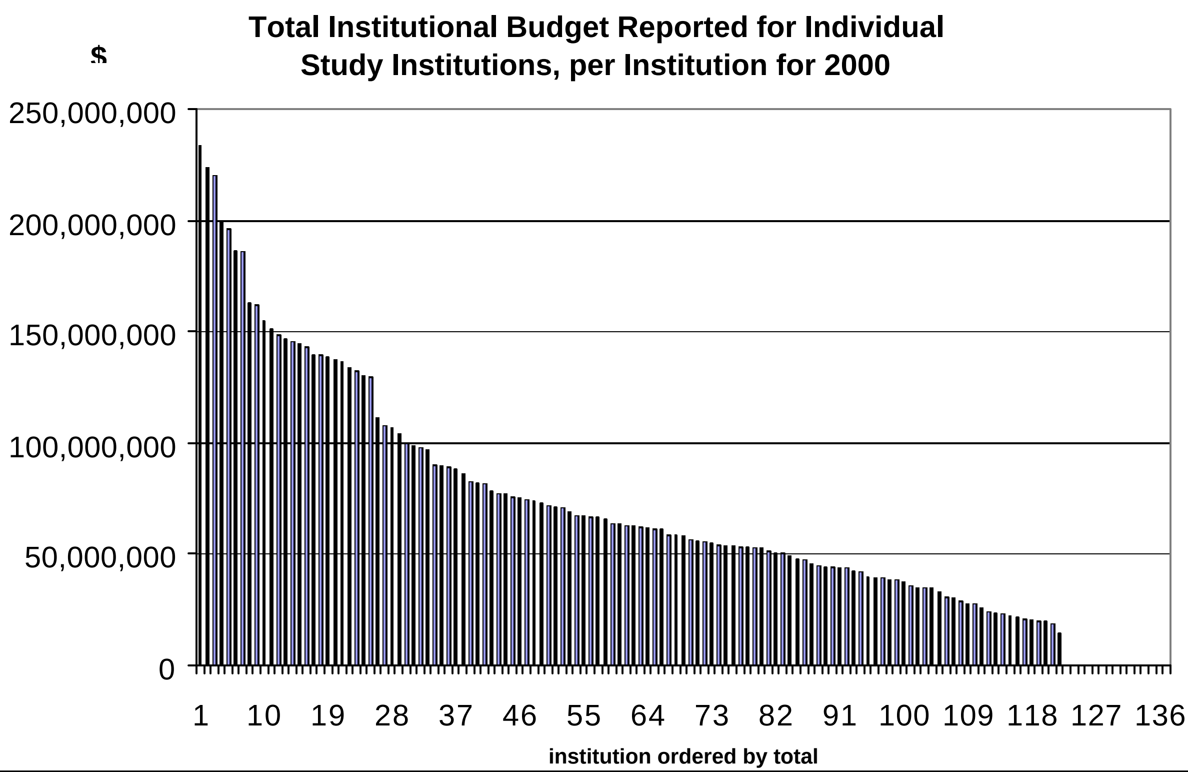


Figure 4.39

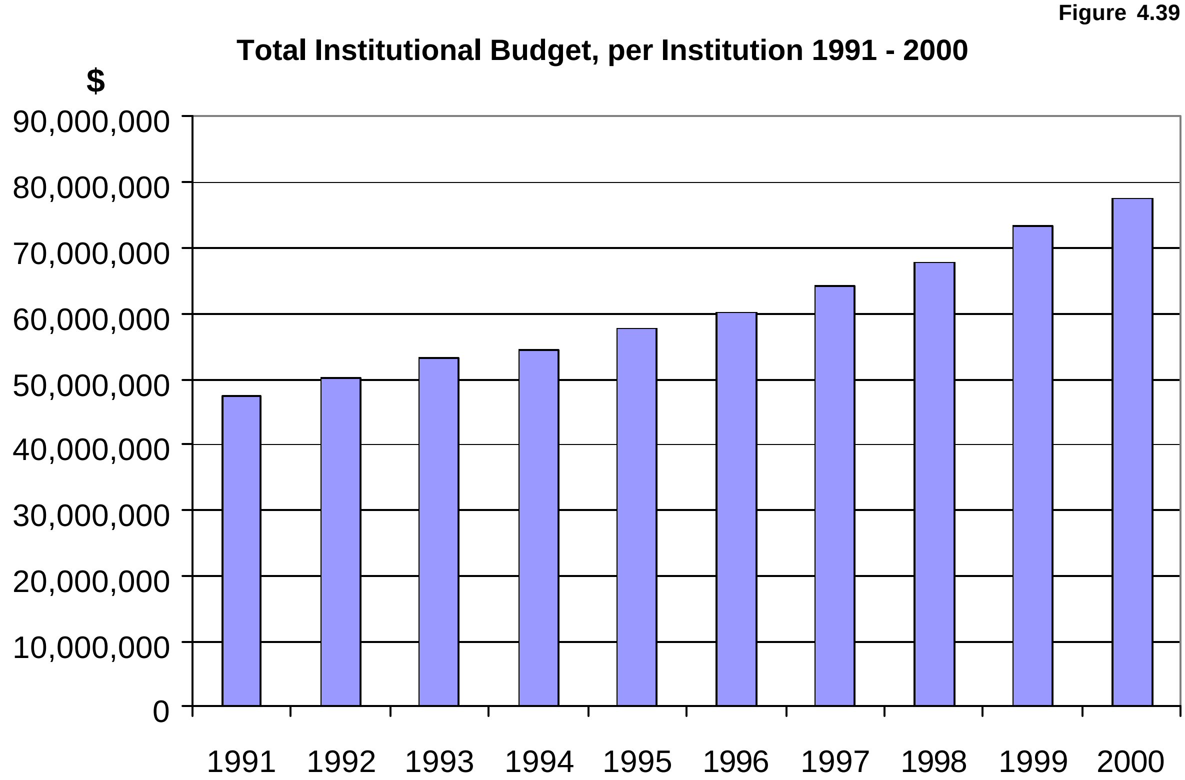


Table 4.15. Total Funding for New Facilities and Renovations Reported by Study Institutions 1991–2000

Total Funding (descending order)
92,878,858
66,189,529
48,000,000
44,693,000
44,017,754
34,599,991
27,257,100
26,097,000
25,530,690
25,000,000
24,775,000
24,062,602
22,767,740
22,046,622
21,716,351
20,258,747
19,892,660
17,700,000
17,502,682
17,429,564
15,951,000
15,824,821
15,300,000
14,955,000
14,830,999
14,668,630
14,159,499
13,233,167
13,101,425
12,931,825
12,217,452
12,068,019
11,456,000
11,266,934
10,542,433
10,367,260

Total Funding (descending order)
10,088,501
9,978,994
9,754,374
9,661,288
9,344,618
8,840,926
8,781,546
8,560,250
7,906,657
7,500,000
7,248,319
6,847,961
6,847,435
5,852,000
5,404,242
5,396,656
4,964,993
4,585,313
4,392,286
4,158,999
4,053,740
3,281,982
3,078,507
2,862,480
2,633,717
2,314,369
2,037,181
1,995,488
1,859,175
1,774,048
1,722,454
1,662,398
1,626,937
1,553,398
1,548,997
1,352,850

Total Funding (descending order)
1,302,000
1,271,670
1,073,381
1,000,000
921,000
870,123
850,581
765,962
740,000
628,752
602,920
597,500
595,853
547,000
541,600
505,645
447,596
433,098
430,383
403,937
383,950
350,058
342,101
248,540
237,750
228,728
223,999
220,000
125,363
113,388
70,769
60,145
44,993
39,296
Total
1,053,981,514

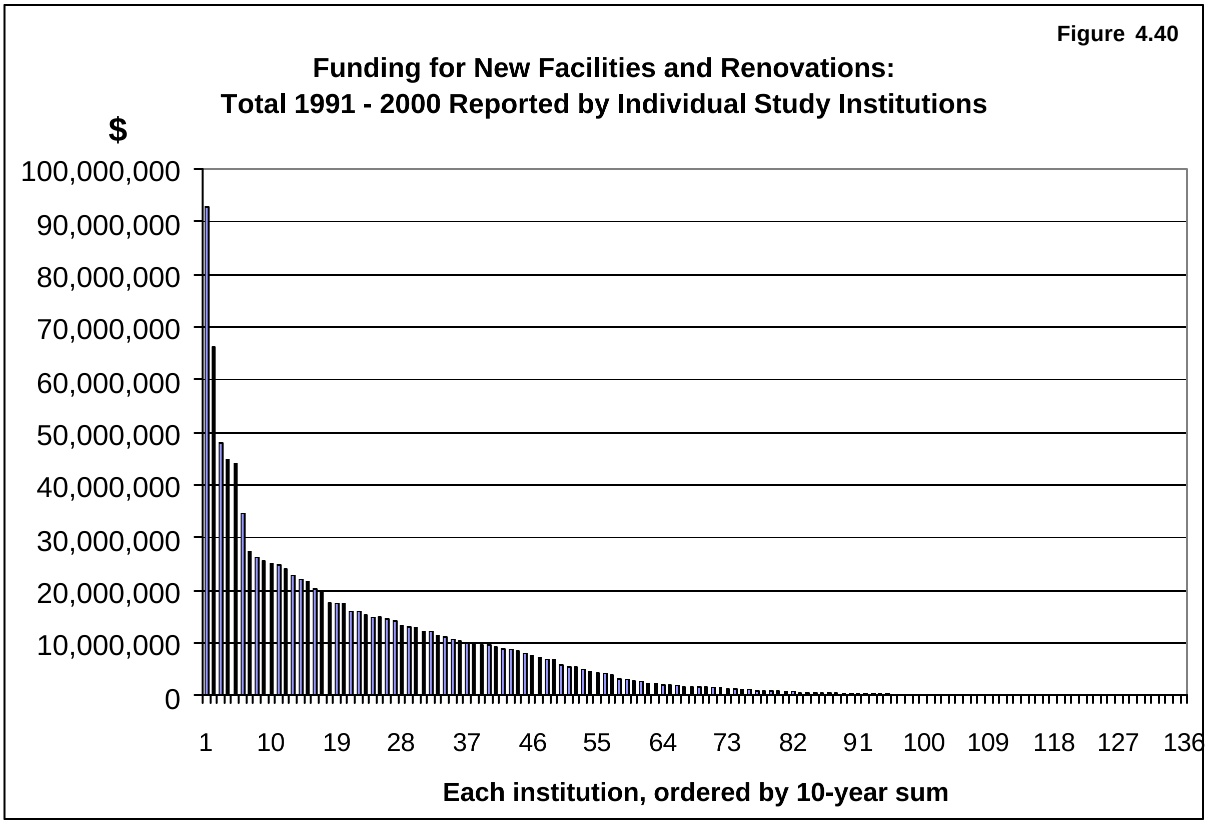


Figure 4.40
Funding for New Facilities and Renovations:
Total 1991 - 2000 Reported by Individual Study Institutions
$
100,000,000
90,000,000
80,000,000
70,000,000
60,000,000
50,000,000
40,000,000
30,000,000
20,000,000
10,000,000
0
1 10 19 28 37 46 55 64 73 82 91 100 109 118 127 136
Each institution, ordered by 10-year sum

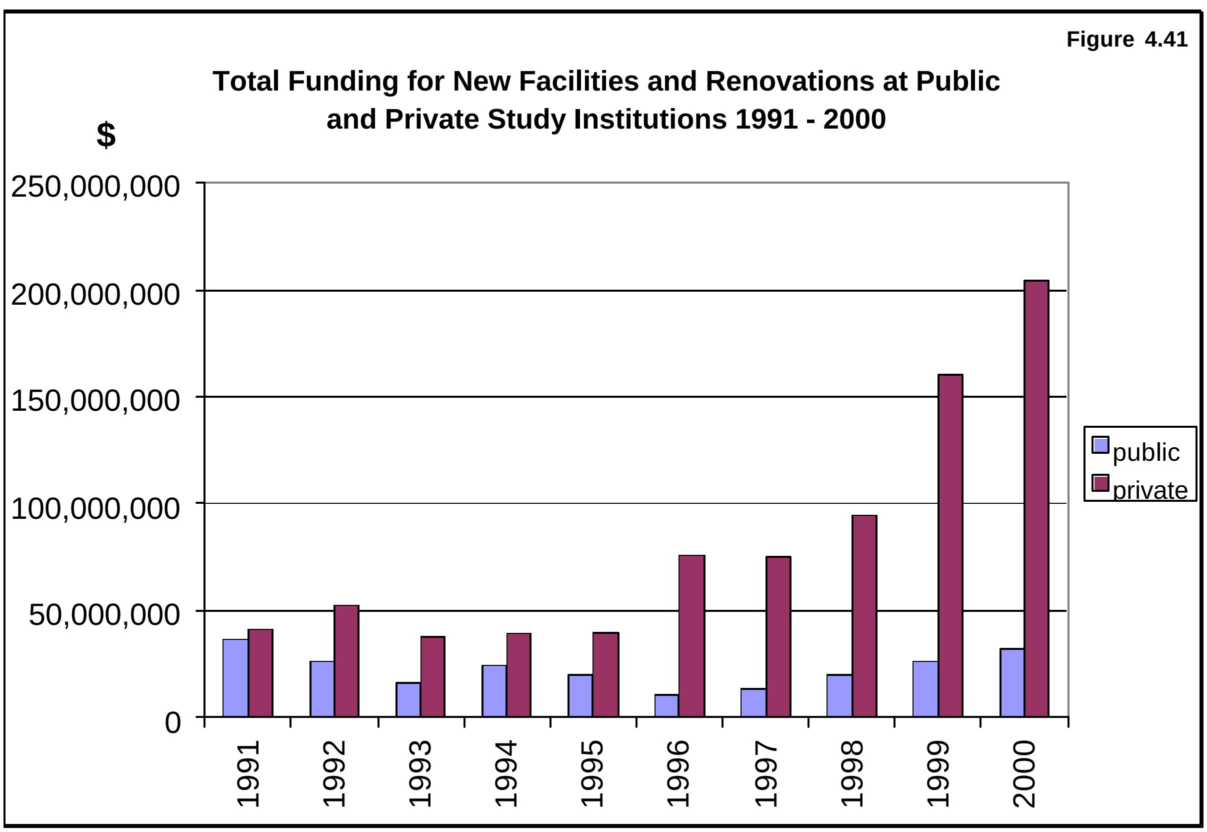


Figure 4.41
Total Funding for New Facilities and Renovations at Public and Private Study Institutions 1991 - 2000
$
250,000,000
200,000,000
150,000,000
100,000,000
50,000,000
0
1991 1992 1993 1994 1995 1996 1997 1998 1999 2000
public
private

Figure 4.42

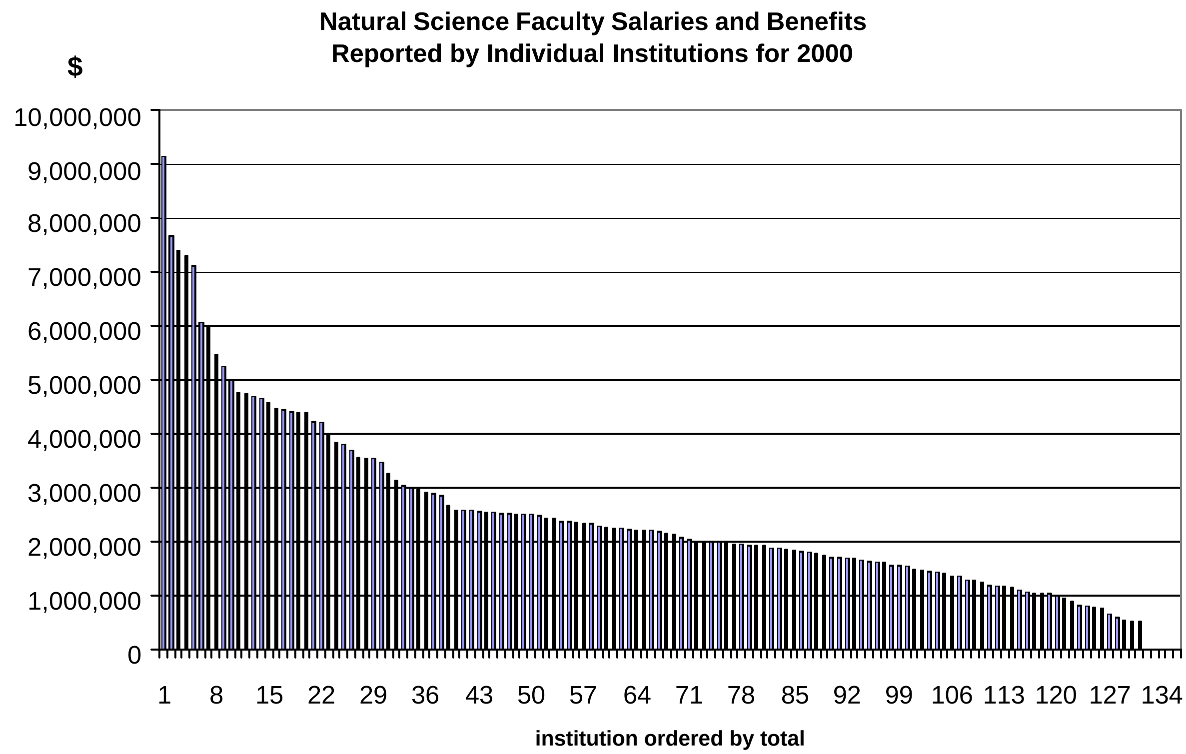

Natural Science Faculty Salaries and Benefits
Reported by Individual Institutions for 2000
$
10,000,000
9,000,000
8,000,000
7,000,000
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
1 8 15 22 29 36 43 50 57 64 71 78 85 92 99 106 113 120 127 134
institution ordered by total

Figure 4.43

Average Natural Sciences Faculty Salaries and Benefits per Faculty Member 1991 - 2000

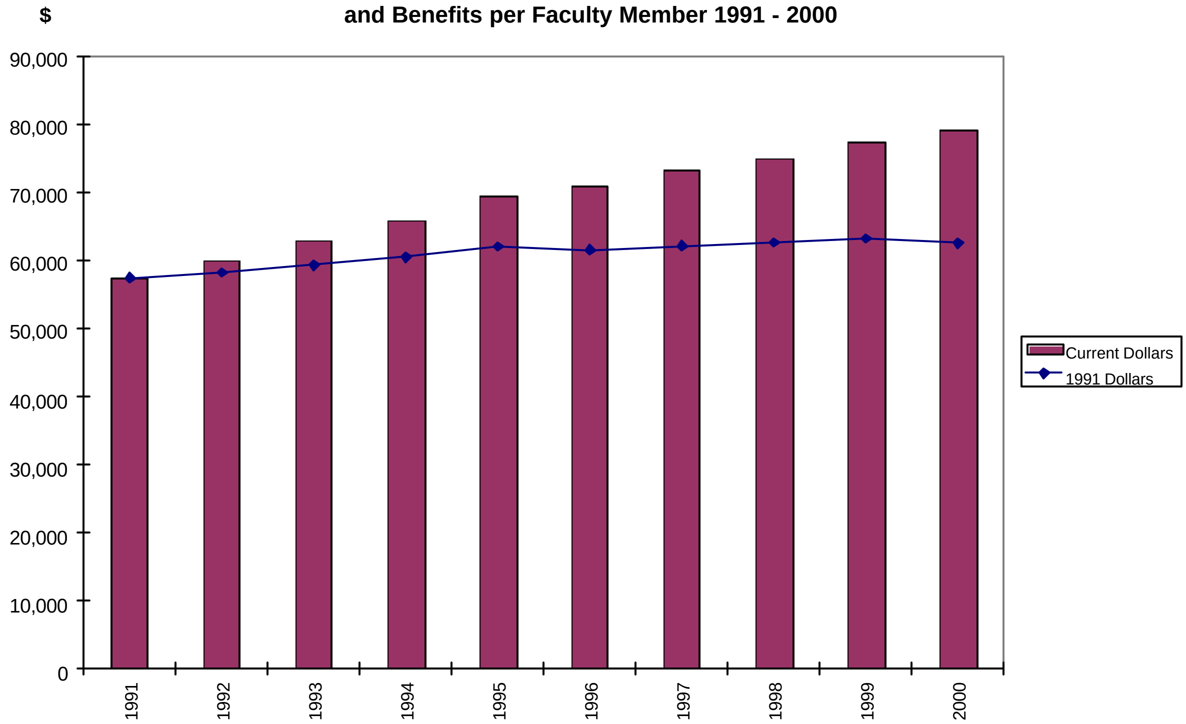


Figure 4.44

Average Natural Sciences Faculty Salaries and Benefits per Institution 1991 - 2000

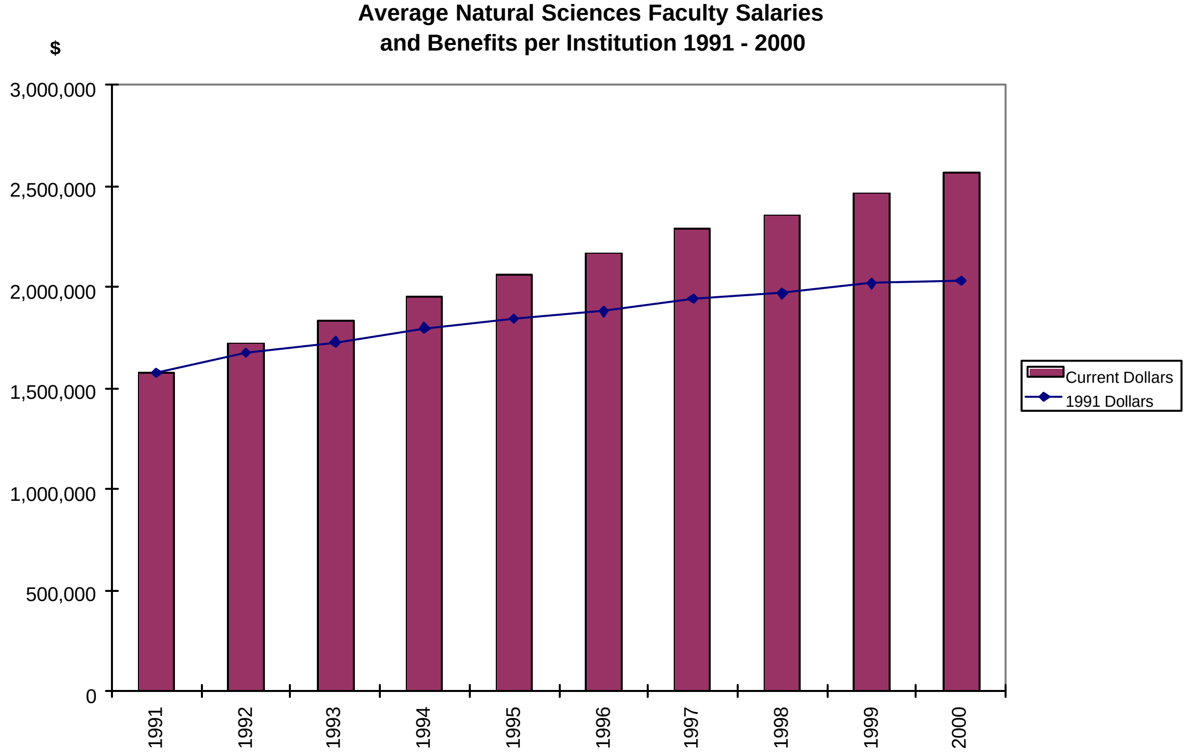
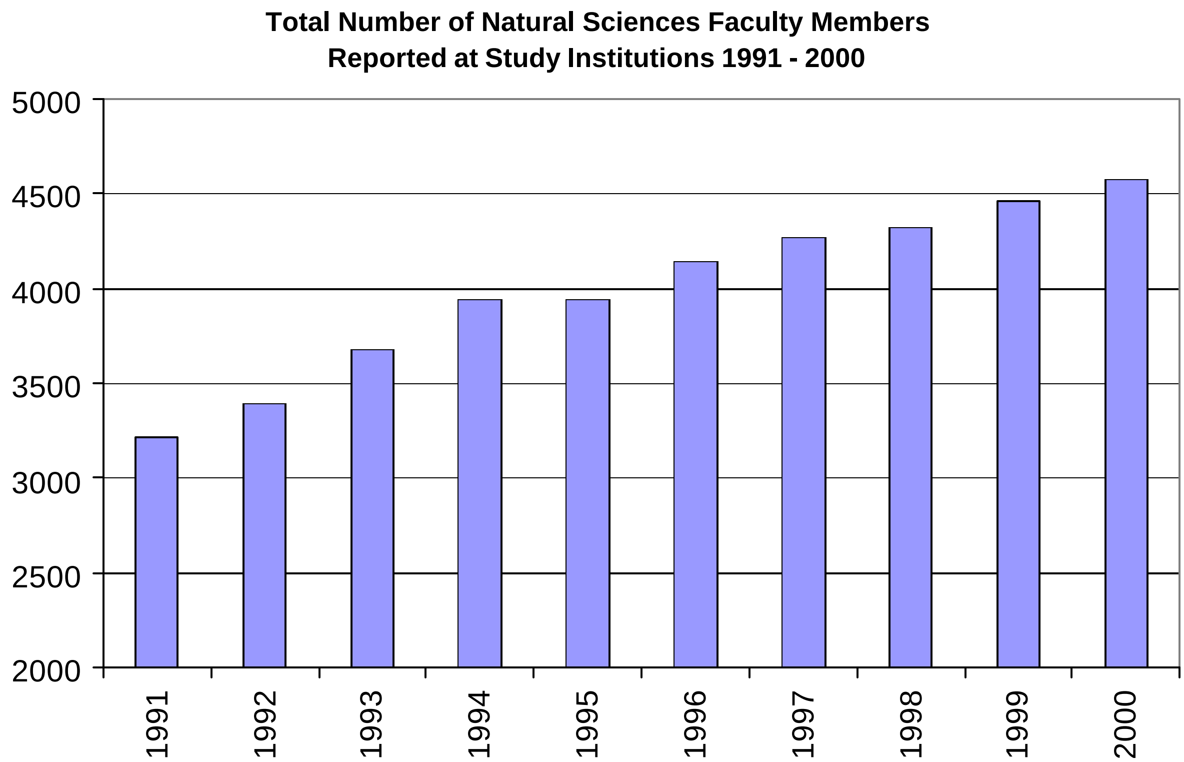


Figure 4.45


Total Number of Natural Sciences Faculty Members
Reported at Study Institutions 1991 - 2000
5000
4500
4000
3500
3000
2500
2000
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000

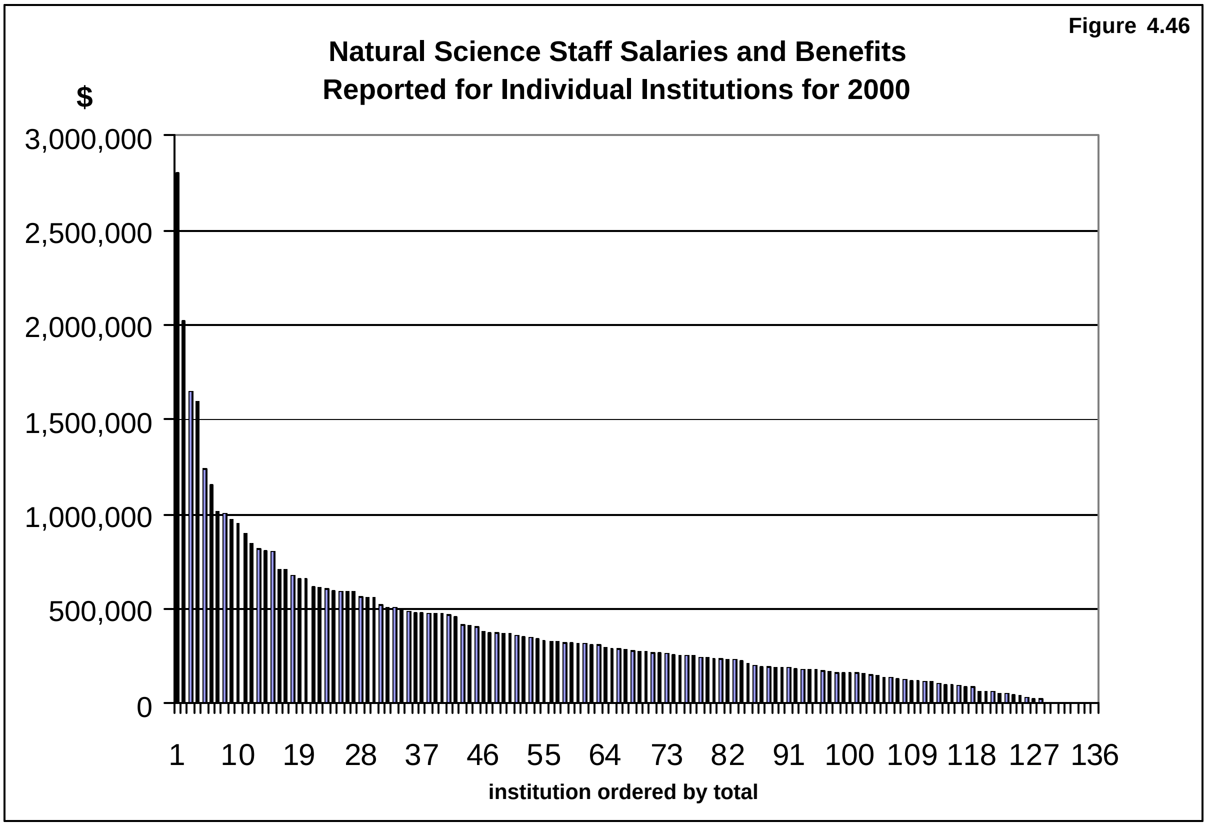


Figure 4.46
Natural Science Staff Salaries and Benefits
Reported for Individual Institutions for 2000
$
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
1 10 19 28 37 46 55 64 73 82 91 100 109 118 127 136
institution ordered by total

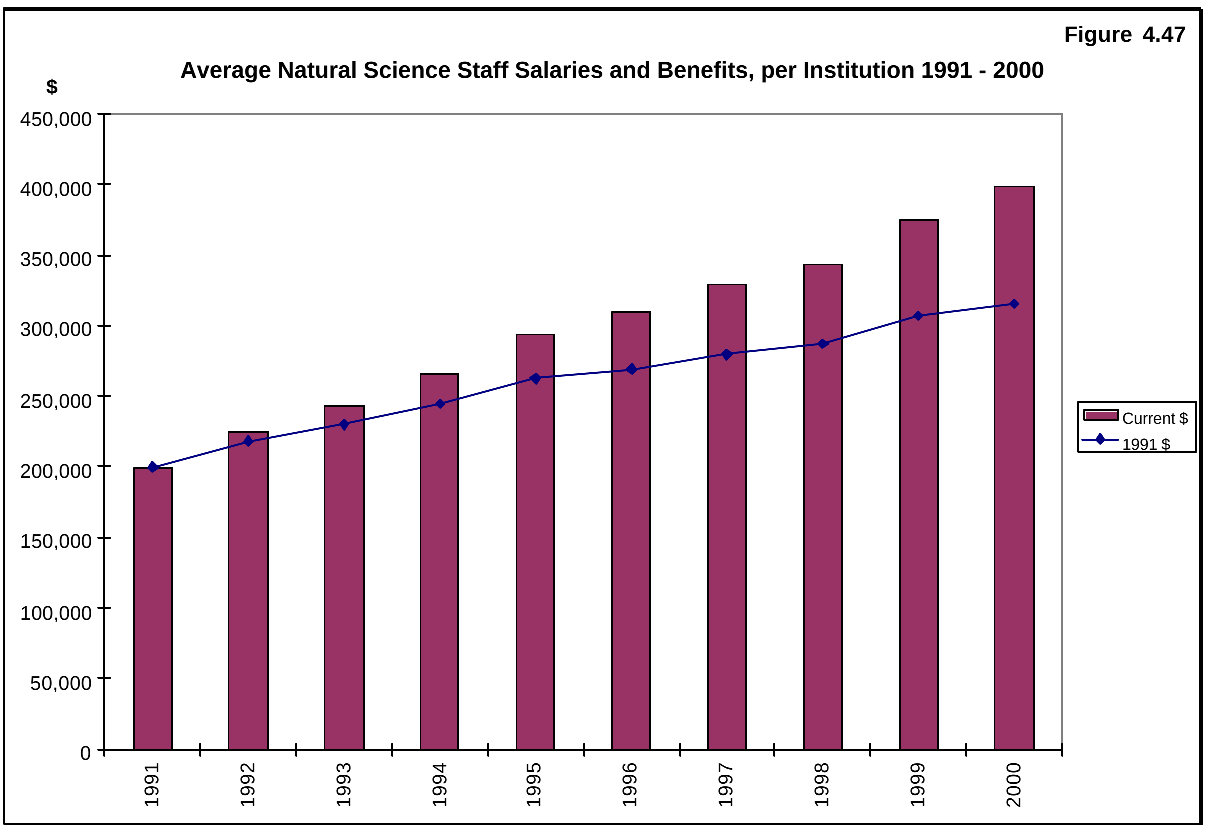


Figure 4.47
Average Natural Science Staff Salaries and Benefits, per Institution 1991 - 2000
$
450,000
400,000
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
Current $
1991 $

Table 4.16. Total Number of Regular Faculty in the Natural Sciences Reported by Study Institutions

1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
103.0	116.0	106.0	109.0	106.0	116.0	137.0	143.0	141.0	143.0
N/A	0.0	68.0	74.0	79.0	80.0	83.0	82.0	89.0	88.0
78.0	81.0	84.0	88.0	86.0	87.0	86.0	88.0	86.0	87.0
N/A	N/A	N/A	76.0	80.0	87.1	85.0	90.0	87.0	85.0
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	82.4	82.6
N/A	82.7	77.6	78.6	76.7	76.9	77.9	79.0	80.5	82.6
95.0	95.0	89.9	89.9	81.1	84.5	79.2	80.4	80.2	78.7
73.3	75.2	74.6	73.7	78.0	78.7	79.3	76.2	75.5	76.0
N/A	N/A	46.0	50.0	57.0	62.0	67.0	67.0	71.0	73.0
N/A	N/A	N/A	81.5	76.5	78.5	79.2	74.8	71.0	69.7
N/A	N/A	70.0	68.0	67.0	67.0	69.0	65.0	66.0	69.0
66.0	67.0	63.0	63.0	61.0	63.0	65.0	68.0	69.0	68.0
68.0	71.0	71.0	71.0	67.0	67.0	66.0	65.0	66.0	68.0
N/A	N/A	N/A	N/A	N/A	49.0	52.0	53.0	61.0	65.0
56.0	62.0	64.0	66.0	62.0	63.0	64.0	62.0	62.0	60.0
56.8	57.4	56.6	55.5	55.0	51.8	53.6	52.7	53.8	57.3
67.0	70.0	66.5	62.5	61.5	58.8	61.9	57.2	53.6	54.4
52.0	54.0	58.0	61.0	59.0	59.0	59.0	56.0	57.0	54.0
46.0	44.0	46.0	43.0	48.0	50.0	50.0	51.0	50.0	54.0
53.0	49.0	49.0	50.0	49.0	50.0	52.0	52.0	50.5	53.5
51.1	51.1	50.1	50.1	49.6	49.6	50.6	51.6	50.6	52.1
39.0	47.0	45.0	53.0	39.0	41.0	46.0	37.0	45.0	49.0
51.1	52.9	51.9	51.2	49.5	51.3	53.0	49.9	47.9	49.0
41.0	41.0	41.0	42.0	43.0	42.0	43.0	43.0	46.0	48.0
33.9	36.4	37.7	38.3	40.1	42.2	42.6	43.0	45.5	46.7
12.0	16.0	16.0	24.0	26.0	27.0	33.0	34.0	38.0	44.0
38.0	37.0	39.5	41.5	42.0	43.0	45.0	42.5	44.0	43.5
40.5	37.0	38.5	37.0	41.0	38.5	37.5	40.0	43.5	43.0
40.9	41.7	39.9	40.8	40.4	40.8	39.0	39.4	40.4	42.3
29.0	31.0	32.0	37.0	37.5	40.5	41.5	43.0	39.5	42.0
39.0	36.0	39.0	40.0	39.0	41.0	41.0	41.0	43.0	41.0
38.0	39.0	35.0	38.0	39.0	40.0	42.0	43.0	41.0	40.0
36.0	37.0	37.0	36.0	35.0	39.0	38.5	40.5	39.0	39.5
33.0	33.0	34.0	35.0	35.0	35.0	34.0	34.0	38.0	38.0
34.0	33.0	34.0	33.0	31.0	32.0	32.0	35.0	39.0	38.0
27.9	33.2	32.9	31.5	34.0	34.0	33.1	35.3	36.1	37.3
30.0	31.0	33.0	31.0	31.0	36.0	37.0	39.0	37.0	37.0
23.3	26.3	22.5	25.5	29.0	28.0	31.5	36.0	29.3	36.0
32.8	34.5	32.8	36.9	35.7	36.9	36.1	34.3	34.6	35.6
N/A	N/A	32.3	34.7	32.8	31.7	31.0	35.0	35.5	35.3
33.0	34.0	33.0	36.0	37.0	36.0	35.0	35.0	35.0	35.0
26.5	27.5	27.5	27.5	30.9	29.3	32.5	32.0	31.8	34.8
30.8	32.2	36.2	35.2	36.3	35.9	37.2	32.1	35.0	34.7
27.5	28.5	31.0	33.5	37.5	37.5	37.0	35.0	37.0	34.5
35.7	35.2	35.7	35.9	34.9	36.0	35.9	35.9	35.9	34.5

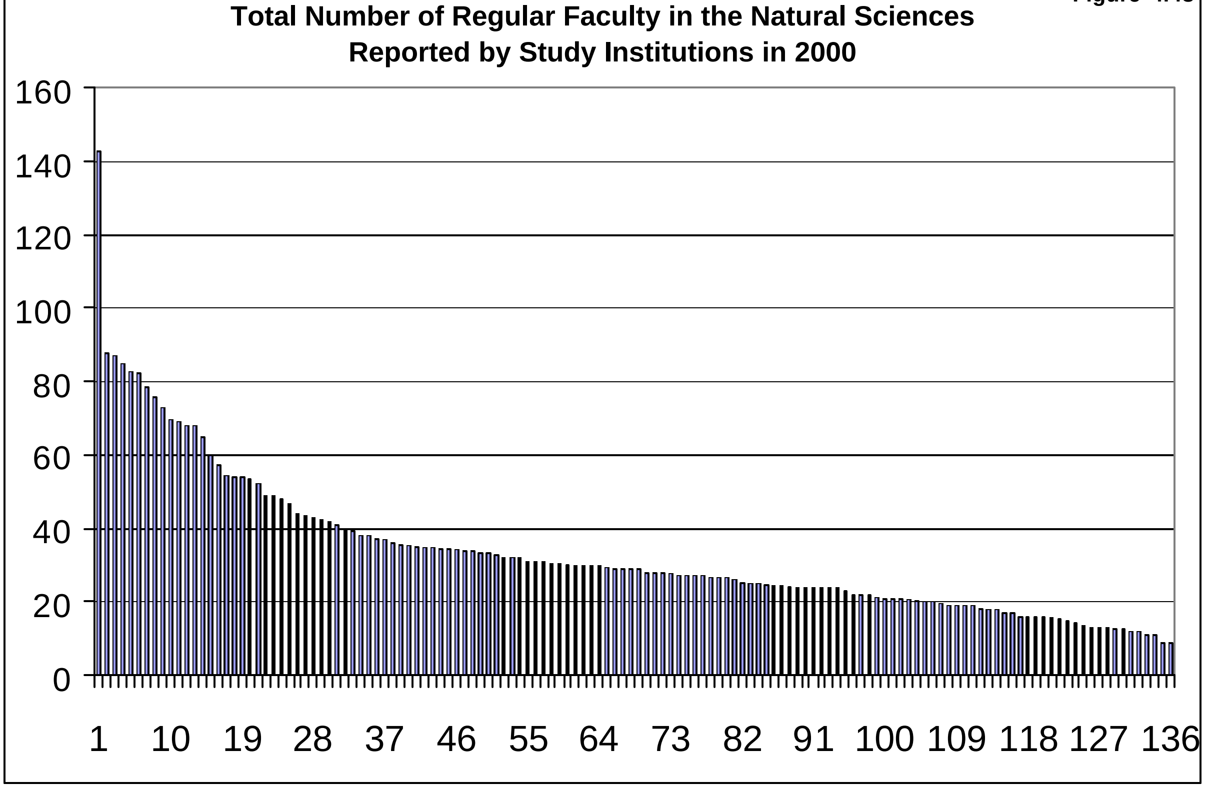
Table 4.16. Total Number of Regular Faculty in the Natural Sciences Reported by Study Institutions

1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
40.4	38.3	36.1	36.1	34.2	36.3	36.7	35.6	35.4	34.2
N/A	N/A	N/A	35.0	35.0	33.0	34.0	35.0	34.0	34.0
34.0	29.0	27.0	29.5	32.0	31.0	33.0	34.0	33.0	34.0
30.3	30.3	30.3	29.3	29.3	30.3	30.5	30.5	33.8	33.5
27.3	27.6	27.3	26.5	26.3	31.4	32.0	32.3	32.5	33.3
26.0	28.0	29.0	28.5	28.0	28.0	29.0	30.0	30.0	33.0
23.0	23.8	25.0	27.0	27.0	29.0	29.0	29.4	30.5	32.1
25.0	25.0	24.0	27.0	28.0	26.0	29.0	27.0	29.0	32.0
27.0	25.0	26.0	29.0	29.0	29.0	30.0	30.0	32.0	32.0
23.0	23.0	22.0	24.0	26.0	25.0	27.0	27.0	30.0	31.0
N/A	N/A	N/A	N/A	N/A	29.0	32.0	33.0	30.0	31.0
28.0	29.0	29.0	30.0	30.0	31.0	30.0	31.5	31.5	31.0
27.2	27.6	27.1	24.7	27.2	29.0	29.8	30.0	28.8	30.5
21.2	22.4	23.0	23.0	24.4	26.1	29.2	29.8	29.5	30.5
22.5	22.0	24.0	24.0	25.5	26.5	27.0	29.2	30.2	30.2
21.0	22.0	25.0	25.0	26.0	23.0	24.0	25.0	28.0	30.0
N/A	N/A	N/A	N/A	N/A	N/A	27.0	28.0	28.0	30.0
N/A	N/A	N/A	N/A	N/A	N/A	N/A	27.0	29.0	30.0
28.0	27.0	27.0	28.0	28.0	28.0	28.0	29.0	28.0	30.0
20.8	22.5	22.5	21.7	19.5	21.3	23.5	25.8	26.5	29.3
25.0	25.0	25.0	24.0	25.0	27.0	27.0	28.0	28.0	29.0
N/A	N/A	17.0	20.0	22.0	21.0	25.0	25.0	27.0	29.0
25.0	25.0	25.0	25.0	26.0	25.0	26.0	28.0	28.0	29.0
27.0	29.0	27.0	29.0	28.0	28.0	27.0	27.0	27.0	29.0
27.0	28.0	28.0	28.0	27.5	28.0	27.0	27.5	28.0	28.0
25.0	22.0	24.0	23.0	23.0	27.0	27.0	28.0	28.0	28.0
N/A	25.2	25.2	15.7	24.3	26.3	26.8	25.3	27.8	27.8
23.0	25.0	24.3	25.0	26.5	23.4	23.3	28.4	27.4	27.7
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	27.0
25.0	25.0	25.0	26.0	26.0	26.0	26.0	26.0	26.0	27.0
24.0	25.0	24.0	24.0	24.0	25.0	26.0	27.0	28.0	27.0
24.0	24.0	25.0	25.0	25.0	25.0	26.0	26.0	27.0	27.0
N/A	N/A	30.8	28.5	31.6	30.8	28.9	28.5	27.6	26.6
24.0	25.0	26.0	27.0	27.0	27.0	27.0	27.0	26.0	26.5
22.5	22.5	23.0	24.5	23.5	23.5	24.5	24.5	26.5	26.5
21.0	23.0	24.0	24.0	25.0	26.0	27.0	25.0	27.0	26.0
24.0	23.0	24.3	27.4	N/A	25.0	26.5	24.9	25.0	25.3
26.0	25.0	25.0	25.0	24.0	23.0	23.0	23.0	24.0	25.0
22.0	22.0	21.0	22.0	22.0	24.0	23.0	24.0	23.0	25.0
23.0	24.5	22.5	23.0	24.0	23.0	24.5	24.5	23.0	24.7
21.0	21.0	19.5	24.0	24.0	25.0	25.5	24.5	25.0	24.5
28.0	26.5	25.0	24.0	22.5	25.0	25.0	24.7	25.3	24.4
22.3	23.3	23.3	23.3	23.3	23.3	24.3	24.3	24.3	24.3
20.0	21.0	22.0	23.0	24.0	24.0	23.0	26.0	22.0	24.0
23.5	25.0	23.0	23.0	26.0	28.5	27.5	26.5	24.0	24.0

Table 4.16. Total Number of Regular Faculty in the Natural Sciences Reported by Study Institutions

1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
21.0	22.0	25.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
21.0	22.0	22.5	23.0	23.0	23.0	23.0	23.0	23.0	24.0
21.5	21.5	22.5	23.9	22.9	22.9	22.9	22.9	23.9	23.9
22.8	22.7	23.5	24.0	26.7	25.3	25.2	25.0	25.7	23.8
19.0	22.0	21.0	24.0	22.0	24.0	22.0	22.0	22.0	23.0
17.0	17.0	17.0	17.0	19.0	20.0	20.0	22.0	22.0	22.0
24.0	24.0	24.0	24.0	23.0	23.0	23.0	23.0	23.0	22.0
19.2	19.9	21.2	20.2	19.5	26.0	25.4	22.3	20.3	21.8
18.5	16.5	16.0	17.8	17.3	16.7	17.7	19.5	21.2	21.1
15.0	15.0	15.0	15.0	17.0	18.0	20.0	21.0	22.0	21.0
N/A	N/A	N/A	N/A	N/A	16.0	16.0	17.0	19.0	21.0
18.5	18.5	18.5	19.5	19.5	19.5	20.5	20.5	20.5	21.0
19.3	19.4	19.9	19.9	19.5	19.5	19.5	19.5	20.5	20.5
15.5	19.0	18.0	15.0	18.2	18.5	19.8	20.8	22.2	20.3
12.0	12.0	12.0	12.0	12.0	14.0	14.0	17.0	18.0	20.0
16.0	14.0	15.0	15.0	13.0	16.0	16.0	16.0	18.0	20.0
15.0	15.0	16.0	16.0	17.0	18.0	19.0	19.0	19.5	19.5
20.0	20.0	20.0	20.0	20.0	20.0	21.0	20.0	19.0	19.0
19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0
17.0	18.0	17.0	17.0	18.0	18.0	18.0	18.0	19.0	19.0
13.0	14.0	13.0	15.0	16.0	15.0	16.0	15.0	17.0	19.0
18.0	18.0	18.0	18.0	18.0	16.5	18.5	16.0	18.0	18.3
18.0	17.0	17.0	18.0	18.0	21.0	18.0	18.0	21.0	18.0
14.0	15.0	15.0	15.0	15.0	13.0	13.0	14.0	14.0	18.0
16.0	16.0	16.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
N/A	N/A	16.0	16.0	17.0	17.0	17.0	17.0	17.0	17.0
12.0	12.0	11.0	11.0	13.0	12.0	12.0	12.0	15.0	16.0
12.0	12.0	12.0	12.0	14.0	15.0	15.0	15.0	15.0	16.0
15.0	15.0	15.0	15.0	15.0	15.0	16.0	16.0	16.0	16.0
14.5	16.8	17.6	19.3	19.4	15.6	16.8	16.2	15.4	15.9
11.3	10.8	12.3	13.0	12.3	13.7	12.8	15.5	16.2	15.8
21.6	21.5	18.3	16.7	17.4	16.8	18.0	17.2	17.5	15.4
11.0	11.0	13.0	13.0	13.0	13.0	14.0	14.0	14.0	15.0
6.9	9.8	8.1	8.8	10.1	12.0	11.8	14.0	14.7	14.3
10.0	12.0	12.0	12.6	13.6	13.5	13.5	13.5	13.5	13.5
14.0	14.0	13.0	14.0	13.0	14.0	13.0	13.0	13.0	13.0
14.0	10.0	14.0	15.0	14.0	12.0	13.0	15.0	13.6	13.0
12.0	13.0	14.0	14.0	14.0	14.0	13.0	14.0	14.0	13.0
10.8	11.6	11.6	9.9	10.9	12.0	12.1	12.6	12.9	12.7
9.5	9.5	9.5	9.5	9.5	9.5	11.6	12.6	12.6	12.6
10.0	11.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
12.0	11.0	11.0	12.0	12.0	12.0	11.0	10.0	12.0	12.0
8.0	8.0	9.0	9.0	9.0	9.0	10.0	10.0	10.0	11.0
8.0	8.0	9.0	7.0	7.0	9.0	9.0	10.0	10.0	11.0
9.0	8.0	8.0	7.0	8.0	8.0	10.0	10.0	9.0	9.0
N/A	N/A	8.0	8.0	8.0	8.0	8.0	8.0	8.0	9.0

Figure 4.48


Total Number of Regular Faculty in the Natural Sciences
Reported by Study Institutions in 2000
160
140
120
100
80
60
40
20
0
1
10
19
28
37
46
55
64
73
82
91
100
109
118
127
136

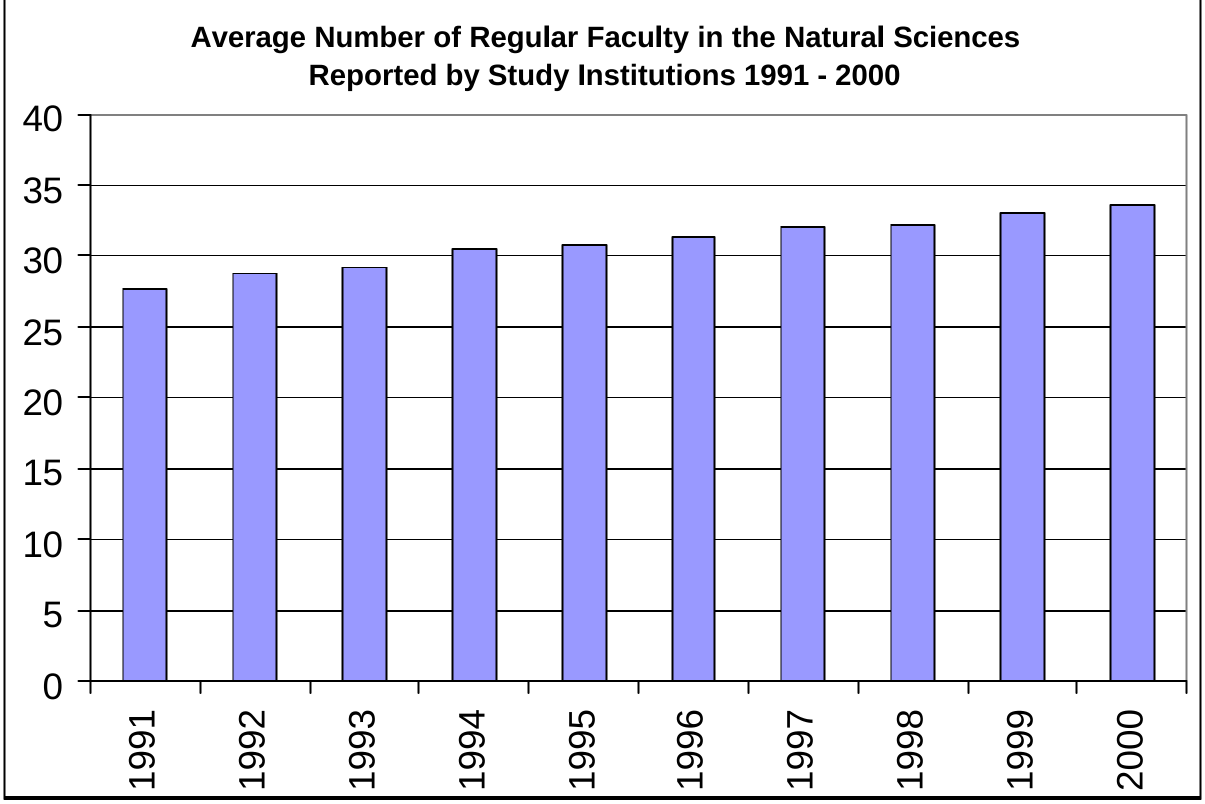

Average Number of Regular Faculty in the Natural Sciences
Reported by Study Institutions 1991 - 2000
40
35
30
25
20
15
10
5
0
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000

Table 4.17. Numbers of Part-time Faculty in the Natural Sciences Reported by Study Institutions

1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
N/A	N/A	N/A	33.9	37.2	38.1	40.0	41.1	43.7	47.3
33.3	36.0	37.0	35.5	37.5	39.8	37.9	37.9	43.4	46.2
N/A	N/A	47.0	49.0	56.0	78.0	63.0	61.0	52.0	43.0
N/A	N/A	32.1	31.0	35.6	33.5	33.8	34.7	33.3	32.3
14.0	16.0	16.0	15.0	21.0	18.0	23.0	29.0	25.0	27.0
12.7	12.0	14.7	18.0	24.0	24.0	24.7	22.3	22.2	21.4
28.5	29.0	36.2	37.6	47.4	49.5	45.8	17.5	27.7	20.8
7.6	8.5	11.3	11.6	15.8	16.1	17.3	19.8	18.5	20.8
N/A	11.2	18.4	13.1	19.8	19.4	23.5	25.0	24.6	20.0
27.0	21.2	13.3	19.3	30.0	24.5	25.2	30.4	27.6	16.6
40.0	24.0	24.0	16.0	9.0	13.0	17.0	16.0	18.0	15.0
N/A	N/A	N/A	N/A	N/A	N/A	N/A	10.0	18.0	14.0
17.4	15.3	15.2	15.4	15.5	14.1	12.7	10.5	11.5	12.1
9.0	8.0	9.0	11.0	14.0	11.0	11.0	13.0	12.0	12.0
N/A	N/A	N/A	8.8	6.9	8.1	13.6	10.8	10.6	11.9
N/A	N/A	N/A	N/A	N/A	N/A	4.8	6.3	10.5	10.5
2.0	4.0	4.0	1.0	4.0	6.0	7.0	8.0	9.0	10.0
N/A	N/A	11.0	13.0	12.0	14.0	17.0	14.0	15.0	10.0
7.2	9.6	6.8	10.6	8.1	6.9	7.1	8.9	9.2	9.7
8.1	4.2	4.6	9.0	12.0	12.4	10.2	11.6	11.2	9.7
2.9	5.9	4.0	5.6	6.6	5.1	4.7	5.0	7.4	9.1
9.6	9.4	7.3	7.0	7.3	10.0	7.3	8.7	8.6	8.8
4.9	7.0	5.7	14.0	9.2	11.8	6.7	10.1	7.9	8.8
N/A	N/A	N/A	N/A	3.2	5.4	6.3	7.2	6.3	7.9
5.1	2.2	0.5	0.0	7.1	8.4	8.0	8.4	8.6	7.7
N/A	N/A	3.5	8.5	8.1	8.5	8.2	8.7	7.7	7.6
4.3	4.9	6.0	5.4	7.8	10.1	7.8	6.6	7.3	7.3
4.0	4.0	9.0	8.0	8.0	7.0	8.0	8.0	7.0	7.0
5.0	6.0	7.0	6.0	5.0	6.0	6.0	6.0	6.0	7.0
4.0	5.0	5.0	6.0	6.0	6.0	6.0	6.0	7.0	7.0
5.0	5.0	6.0	8.5	4.5	7.5	8.5	6.0	11.0	6.0
6.0	5.0	5.0	6.0	6.0	6.0	7.0	7.0	7.0	6.0
N/A	N/A	N/A	N/A	N/A	6.0	6.0	5.0	6.0	6.0
5.6	6.7	6.0	8.1	8.0	8.4	8.7	7.2	6.0	5.6
3.8	4.2	5.6	3.7	3.0	3.3	5.0	4.7	2.3	5.3
3.9	3.9	3.9	4.1	5.1	5.3	5.3	5.3	5.8	5.3
4.8	4.0	2.9	3.8	4.9	5.9	3.5	4.1	6.1	5.2
3.0	5.0	5.0	6.0	9.0	3.0	2.0	2.0	4.0	5.0
5.0	5.0	6.0	6.0	7.0	6.0	6.0	6.0	6.0	5.0
2.0	4.0	6.0	3.0	5.0	6.0	3.0	6.0	3.0	5.0
4.8	5.5	4.5	5.0	6.0	5.8	6.5	7.3	6.0	4.8
6.3	4.5	4.5	4.2	4.0	6.4	4.3	6.3	5.0	4.6
6.4	6.8	6.9	8.9	8.9	5.7	5.9	6.2	6.4	4.5
0.5	0.2	1.5	6.2	3.2	4.0	4.2	4.0	3.4	4.5
N/A	N/A	0.5	1.5	1.5	1.5	1.0	1.5	1.5	4.5

➤

Table 4.17. Numbers of Part-time Faculty in the Natural Sciences Reported by Study Institutions

1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
3.4	6.4	4.1	4.0	3.5	5.1	4.8	3.7	4.5	4.2
2.3	5.0	4.0	5.0	3.3	4.5	3.3	3.3	4.9	4.1
0.0	1.0	2.0	0.0	0.0	2.0	5.0	5.0	2.3	4.0
1.0	5.0	3.0	1.0	1.0	2.0	2.0	2.0	1.0	4.0
1.0	1.0	4.0	4.0	3.0	5.0	3.0	4.0	5.0	4.0
2.0	2.3	2.7	2.7	3.0	2.7	2.3	2.3	3.0	4.0
0.2	0.9	0.4	0.0	3.4	2.9	2.9	2.7	2.6	3.6
3.7	1.0	4.5	2.9	5.2	5.4	4.7	5.8	2.7	3.6
0.5	1.0	1.8	2.0	3.8	1.8	2.0	2.5	3.0	3.2
0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	4.0	3.0
3.0	4.6	4.5	4.8	4.8	4.5	4.8	4.0	3.5	2.9
1.1	1.0	3.0	3.5	3.1	3.3	2.3	3.2	3.8	2.9
N/A	6.4	0.2	0.5	1.8	2.6	7.6	2.2	2.3	2.8
2.8	2.6	3.1	0.7	2.3	1.2	1.4	0.5	0.5	2.8
3.0	2.0	1.3	0.3	1.0	4.0	3.0	2.5	3.0	2.8
0.8	0.6	1.4	6.6	5.8	3.4	2.8	3.3	2.4	2.7
0.3	0.0	0.0	0.0	4.4	1.4	1.7	1.1	4.5	2.5
1.2	1.4	2.2	1.9	N/A	1.6	2.0	2.8	1.3	2.5
2.0	1.0	1.0	2.0	1.0	2.0	1.0	1.0	1.5	2.5
1.0	2.0	N/A	0.5	0.3	2.0	1.5	2.0	3.0	2.5
0.8	0.8	0.8	0.8	1.8	1.8	1.7	1.6	2.0	2.4
0.5	0.0	0.0	2.0	1.5	1.8	1.5	1.8	2.0	2.3
0.8	0.0	0.5	2.2	2.3	3.1	2.6	3.0	4.8	2.3
0.3	0.3	0.3	0.3	0.3	0.3	0.6	1.4	2.0	2.2
0.3	3.0	4.0	3.0	1.3	1.4	2.5	1.8	1.0	2.2
1.2	1.2	1.5	1.5	1.5	1.3	2.0	1.0	2.0	2.0
2.5	2.5	2.5	2.0	2.0	1.5	1.3	1.5	2.5	2.0
2.0	3.0	3.0	5.0	7.0	7.0	5.0	4.0	4.0	2.0
2.0	3.0	2.5	3.0	2.0	3.0	2.8	3.5	3.0	2.0
1.9	3.0	2.4	0.9	1.9	3.3	2.3	2.3	1.4	1.8
2.8	1.0	1.5	3.2	1.0	1.3	1.2	1.0	1.1	1.7
2.0	1.3	1.3	0.9	1.4	0.7	1.5	1.4	2.0	1.7
1.3	1.3	0.8	1.6	1.5	0.9	1.7	1.1	1.4	1.7
4.5	5.8	3.3	2.1	2.8	2.8	4.3	1.8	1.8	1.5
2.2	1.6	2.0	3.3	4.3	2.2	2.7	4.5	2.7	1.5
1.3	2.3	4.5	2.3	3.3	3.1	2.3	1.8	2.1	1.4
0.0	0.0	0.0	0.7	0.7	0.0	0.0	0.7	0.4	1.4
2.7	1.2	2.7	1.9	1.9	2.0	1.9	2.3	2.3	1.4
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.7	1.3
1.3	0.5	0.3	3.3	2.0	1.3	1.0	5.0	3.3	1.3
1.5	2.2	2.0	0.7	0.5	0.5	0.5	0.8	0.7	1.3
0.5	0.3	0.5	1.5	1.3	1.2	2.0	1.7	1.3	1.3
0.2	0.5	0.3	0.8	0.5	0.5	0.0	0.6	1.3	1.3
3.3	4.5	2.0	2.3	3.0	2.0	1.8	2.0	1.5	1.2
5.0	1.0	0.0	0.0	1.0	0.0	2.0	2.0	2.0	1.0

Table 4.17. Numbers of Part-time Faculty in the Natural Sciences Reported by Study Institutions

1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
N/A	N/A	2.0	1.0	3.0	1.0	4.0	1.0	2.0	1.0
1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0	1.0	1.0
0.0	0.0	0.0	0.0	0.0	0.0	2.0	1.0	1.0	1.0
1.0	1.0	0.0	1.0	1.0	2.0	1.0	1.0	2.0	1.0
1.0	1.0	1.0	0.5	1.0	1.0	1.0	0.0	1.0	1.0
1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1.0	1.0	0.0	1.0	0.0	0.0	1.0	0.0	0.0	1.0
0.2	0.9	1.7	2.5	0.9	1.7	1.0	0.6	0.5	0.9
2.8	1.3	1.8	1.5	2.2	2.5	2.0	2.0	1.8	0.8
0.0	0.0	0.4	1.2	0.7	0.0	1.6	0.6	0.6	0.8
N/A	N/A	1.2	1.0	0.0	2.6	2.3	2.3	1.8	0.8
0.3	0.3	0.5	0.5	0.5	0.3	0.3	1.0	0.8	0.8
0.0	0.0	0.0	0.0	0.0	0.1	0.7	0.7	0.7	0.7
0.0	0.0	0.0	0.0	0.3	0.0	0.3	0.0	1.0	0.7
N/A	N/A	0.8	0.8	0.8	2.0	0.8	0.8	0.5	0.5
N/A	N/A	N/A	0.5	0.5	0.5	0.5	0.5	0.5	0.5
0.5	0.5	1.0	1.5	1.0	1.0	1.5	2.0	0.5	0.5
0.7	0.7	0.8	0.3	0.5	0.6	0.8	0.7	0.5	0.5
0.8	0.2	0.2	0.7	0.7	0.4	1.7	1.7	1.7	0.4
1.4	2.5	2.0	0.8	0.9	0.0	0.3	1.0	0.0	0.3
0.2	0.3	0.2	0.3	0.2	0.3	0.3	0.5	0.2	0.2
0.3	0.1	1.9	0.4	0.4	0.1	0.9	1.1	0.2	0.1
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N/A	N/A	N/A	2.0	2.0	4.0	4.0	0.0	1.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	1.5	0.8	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.5	0.0
N/A	N/A	N/A	N/A	N/A	0.0	0.0	0.0	0.0	0.0
0.7	0.3	0.0	0.0	0.8	1.0	1.5	0.0	0.0	0.0
0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.8	0.5	0.0	0.5	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.3	0.3	0.0	0.5	0.5	1.3	0.5	1.0	0.8	0.0
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.3	1.1	1.3	3.0	3.5	6.3	0.0	3.0	1.3	0.0
6.9	5.5	4.9	3.5	6.8	5.3	6.8	8.7	10.7	N/A
0.0	0.0	0.0	0.5	0.0	0.5	0.0	1.5	0.0	0.0

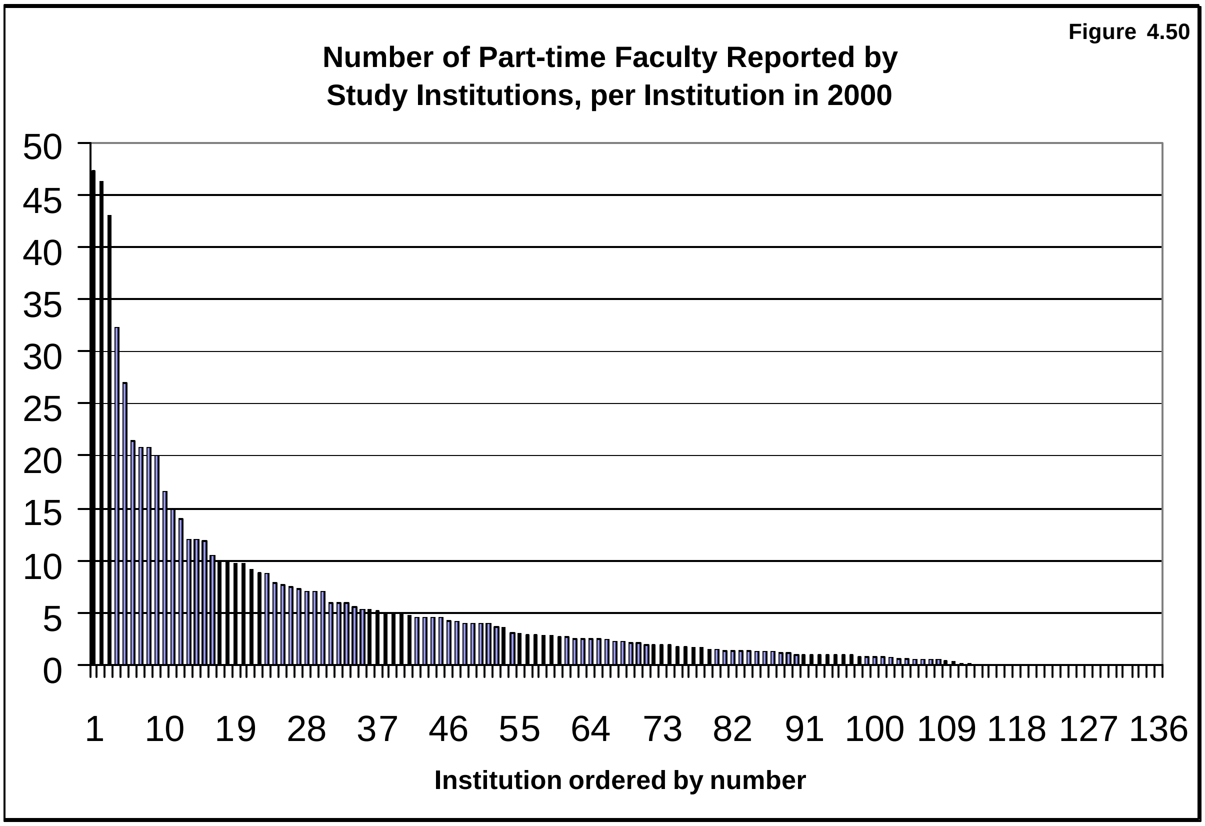


Figure 4.50
Number of Part-time Faculty Reported by Study Institutions, per Institution in 2000
50
45
40
35
30
25
20
15
10
5
0
1 10 19 28 37 46 55 64 73 82 91 100 109 118 127 136
Institution ordered by number

Table 4.18. Number of Support Personnel in the Natural Sciences Reported by Study Institutions

1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
44.8	51.2	55.6	58.7	59.8	56.3	58.1	60.0	62.6	60.2
20.8	31.5	19.2	22.2	34.3	31.1	17.4	21.5	42.8	59.0
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	47.0	52.0
N/A	N/A	N/A	38.5	38.0	40.1	41.9	44.3	47.8	48.6
36.0	39.0	37.0	32.0	37.0	38.0	40.0	38.0	41.0	42.0
N/A	24.3	24.6	23.3	24.6	27.6	27.4	29.3	29.0	29.5
11.0	19.0	20.0	22.0	21.0	21.0	24.7	26.2	28.5	29.2
19.8	19.7	20.3	20.3	20.3	20.5	20.4	21.1	22.4	28.4
41.2	41.2	34.0	30.0	29.5	28.5	27.5	28.7	29.0	28.0
23.9	23.2	24.5	24.7	24.7	24.0	25.0	24.6	24.8	25.9
23.0	22.0	22.0	22.0	23.0	24.0	23.0	24.0	24.0	24.0
17.0	17.0	18.0	18.0	19.0	20.0	21.0	19.0	20.0	24.0
19.0	25.0	17.0	25.0	28.0	26.0	23.0	20.0	21.0	23.0
16.0	16.1	16.3	16.5	16.6	18.7	16.9	18.1	24.0	22.8
N/A	N/A	N/A	N/A	N/A	20.0	19.0	19.2	20.2	22.2
15.0	15.0	16.0	17.0	17.0	19.0	18.5	17.8	18.8	22.0
N/A	N/A	N/A	N/A	N/A	N/A	N/A	9.0	20.0	20.0
3.0	3.0	6.0	6.0	7.0	11.0	13.0	14.0	14.0	20.0
25.5	20.0	19.0	18.0	19.0	19.0	19.0	19.0	19.0	20.0
18.8	18.0	16.5	18.0	17.9	20.2	20.0	22.0	22.5	19.5
N/A	N/A	13.8	15.5	14.2	13.2	13.1	17.5	17.8	19.2
19.0	20.0	19.0	19.0	17.0	17.0	17.0	19.0	19.0	19.0
16.3	14.0	17.4	13.1	19.3	18.6	17.7	21.0	20.5	18.7
16.0	16.0	16.0	17.0	17.0	17.0	17.0	18.0	18.0	18.0
21.5	25.0	25.5	23.0	26.0	25.0	19.5	19.0	19.5	18.0
12.0	12.0	12.0	14.0	14.0	17.0	17.0	15.0	15.0	18.0
N/A	N/A	13.4	13.6	15.2	17.4	15.9	19.2	18.6	17.4
16.4	17.4	19.4	19.4	18.4	15.4	13.5	16.3	17.1	16.8
16.4	16.4	17.7	17.7	17.4	16.4	16.3	16.4	16.4	16.4
N/A	N/A	N/A	N/A	N/A	14.0	14.0	15.0	15.0	15.0
N/A	N/A	14.0	14.0	14.0	14.0	14.0	14.0	15.0	15.0
14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5
12.0	12.0	12.0	12.0	12.0	13.0	13.0	13.0	14.0	14.0
7.0	7.0	9.0	9.0	10.0	9.0	10.0	10.0	10.0	14.0
N/A	N/A	N/A	N/A	N/A	10.5	11.5	11.5	12.8	13.9
8.2	8.2	8.2	9.2	10.2	12.2	12.2	13.2	13.2	13.2
12.1	10.2	10.7	10.9	12.4	10.7	11.5	10.2	10.9	12.1
9.8	10.2	10.1	10.1	10.5	10.8	10.9	11.0	10.6	12.1
N/A	N/A	9.0	10.0	10.0	11.0	11.0	12.0	12.0	12.0
11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8
11.0	11.5	11.1	11.7	11.7	12.7	12.6	11.6	11.7	11.7
7.8	7.8	7.8	8.0	10.0	10.0	10.0	10.0	11.5	11.7
11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4
10.0	10.0	11.0	11.0	10.0	10.0	10.0	10.0	11.0	11.0
N/A	N/A	N/A	9.0	9.0	10.0	12.0	11.0	10.5	11.0

Table 4.18. Number of Support Personnel in the Natural Sciences Reported by Study Institutions

1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
10.0	10.0	10.0	10.0	10.0	10.5	10.5	10.5	10.0	11.0
11.0	11.0	11.0	12.0	12.0	10.5	10.5	11.5	11.5	10.5
8.3	8.3	8.3	8.3	8.3	8.3	8.3	9.3	9.3	10.2
10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
9.5	9.5	9.5	10.0	9.0	9.0	9.0	9.0	10.0	10.0
10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
13.5	11.5	11.5	10.5	12.6	12.6	11.4	11.8	11.8	9.8
5.3	5.3	5.3	6.3	6.3	6.3	7.3	9.3	9.3	9.3
7.2	7.2	7.2	7.8	8.8	8.8	8.8	8.8	8.8	9.1
8.0	8.0	8.0	8.0	8.0	8.0	9.0	9.0	9.0	9.0
8.5	8.5	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
8.0	8.0	8.0	8.0	8.0	8.0	9.0	9.0	9.0	9.0
5.5	5.5	5.5	6.0	6.0	8.0	7.0	8.0	9.0	9.0
6.5	6.5	6.5	7.5	8.0	8.0	8.0	8.0	8.0	9.0
7.3	8.9	8.3	8.3	8.3	8.3	8.3	8.9	8.9	8.9
5.0	5.0	5.5	5.0	5.5	7.5	7.5	7.5	8.5	8.5
6.5	6.5	6.5	7.5	N/A	7.5	8.5	8.5	8.5	8.5
8.5	8.5	8.5	8.5	8.5	8.3	8.3	8.1	8.1	8.1
5.6	5.6	5.8	6.1	6.1	6.1	6.1	7.6	7.6	8.0
4.0	4.0	7.0	7.0	8.0	8.0	8.0	8.0	8.0	8.0
N/A	N/A	6.0	7.0	7.5	8.5	7.5	9.5	8.5	8.0
7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	8.0	8.0
6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	7.5	7.5
6.0	6.0	6.0	6.0	8.0	6.0	6.0	6.0	7.0	7.0
5.0	7.0	5.0	5.0	5.0	5.0	6.0	6.0	6.0	7.0
4.0	5.0	6.0	6.0	6.0	6.0	6.0	7.0	7.0	7.0
7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	7.0
7.1	7.1	7.1	6.6	6.6	6.4	6.9	6.9	6.9	6.9
4.1	4.1	4.1	4.9	4.9	5.2	5.2	4.9	4.9	6.9
7.7	7.7	7.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7
4.0	3.0	4.0	4.7	4.0	4.0	6.8	6.0	6.0	6.5
8.0	8.0	7.0	7.0	6.5	7.0	7.5	7.5	7.8	6.5
5.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
6.3	6.3	6.3	6.3	6.5	6.5	6.0	6.0	6.3	6.3
5.0	5.4	5.4	5.4	5.4	5.6	5.5	5.5	6.4	6.3
4.5	4.6	4.6	5.1	5.1	5.1	6.2	6.2	6.2	6.2
4.9	5.0	5.0	5.9	5.8	5.9	6.2	7.0	5.8	6.2
5.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
5.1	5.1	5.1	5.7	5.9	5.9	5.9	5.9	5.9	5.9
3.8	4.0	4.0	4.9	4.8	4.2	5.5	5.5	5.8	5.8
N/A	N/A	N/A	N/A	N/A	3.4	3.4	3.5	4.4	5.8
4.4	4.4	4.4	4.6	4.9	4.9	5.2	5.2	5.5	5.5
4.0	4.0	4.0	3.5	3.5	3.5	5.3	5.5	5.5	5.5

Table 4.18. Number of Support Personnel in the Natural Sciences Reported by Study Institutions

1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.9	5.3	5.3
4.6	5.1	5.4	5.4	5.4	5.2	5.2	5.3	5.3	5.3
N/A	N/A	N/A	N/A	N/A	N/A	3.0	4.0	4.0	5.0
5.0	5.0	4.0	4.0	4.0	5.0	5.0	5.0	5.0	5.0
4.0	4.0	4.0	4.0	4.0	5.0	5.0	5.0	5.0	5.0
7.0	4.5	4.5	4.5	4.0	5.2	5.2	4.9	4.9	4.9
4.0	3.9	4.3	4.0	4.1	4.1	5.1	4.6	4.6	4.6
4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.6
2.5	2.5	3.5	3.5	3.5	3.5	3.8	3.5	4.5	4.3
0.5	0.5	1.5	1.5	1.5	1.8	2.8	2.8	2.8	4.3
3.0	3.0	3.0	3.0	4.0	4.3	4.3	4.3	4.3	4.3
4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
3.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
5.5	6.5	6.5	5.5	3.0	3.5	3.5	3.5	4.0	4.0
5.0	5.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
1.5	1.5	1.5	1.5	3.5	3.5	3.5	3.5	3.5	4.0
2.8	2.8	2.8	3.3	3.5	3.8	3.8	4.0	4.0	4.0
3.0	3.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0	4.0
4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
3.5	3.5	3.5	3.5	3.5	3.5	3.5	4.0	4.0	4.0
3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.9	3.9
1.7	1.7	1.7	1.7	1.7	2.5	3.3	3.7	3.7	3.7
3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
N/A	N/A	N/A	N/A	N/A	3.2	3.2	3.2	3.2	3.0
3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
2.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0	3.0	3.0
2.0	2.0	2.0	3.0	3.0	3.0	3.0	2.0	3.0	3.0
2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0
1.8	1.8	1.8	1.8	2.3	2.8	2.8	2.8	2.8	2.8
2.8	2.8	2.8	3.3	3.3	3.3	2.8	2.8	2.3	2.8
N/A	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
1.5	1.5	1.5	2.0	2.0	2.0	2.0	2.5	2.5	2.5
2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
0.0	0.0	0.5	0.5	0.5	0.5	0.5	1.8	1.8	2.0
0.0	0.5	0.5	0.5	0.5	1.0	2.0	1.8	2.0	2.0
2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0	2.0	2.0
1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.5	1.5
0.5	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0
N/A	N/A	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
0.0	0.5	0.5	0.5	0.5	0.5	1.0	1.0	1.0	1.0
0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
12.0	12.0	12.3	18.0	21.5	21.5	21.5	21.8	21.7	N/A

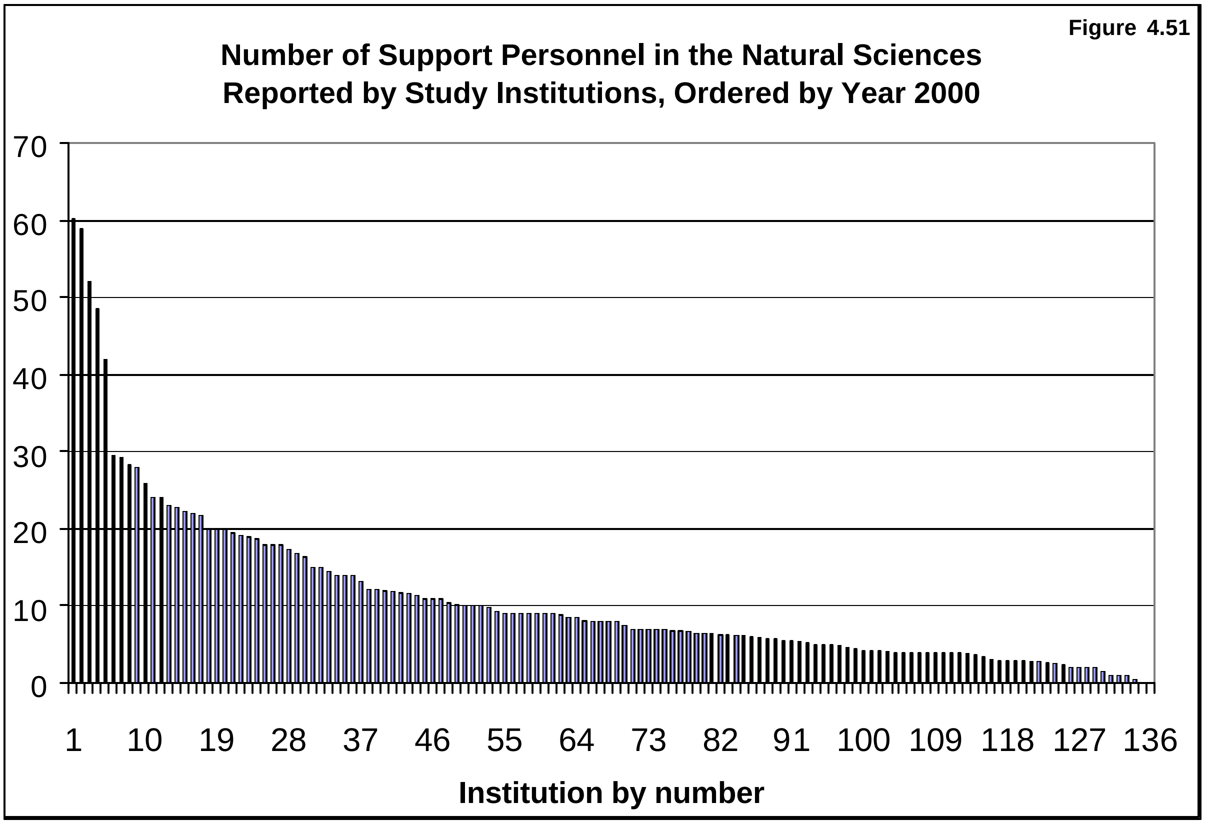


Figure 4.51
Number of Support Personnel in the Natural Sciences
Reported by Study Institutions, Ordered by Year 2000
70
60
50
40
30
20
10
0
1
10
19
28
37
46
55
64
73
82
91
100
109
118
127
136
Institution by number

Table 4.19. Number of Courses Taught in the Natural Sciences per Year Reported by All Study Institutions*

1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
N/A	531	525	517	522	547	548	568	555	554
231	252	254	274	315	318	300	354	473	478
383	372	355	342	359	429	516	552	520	462
440	445	450	440	430	420	425	430	430	420
N/A	N/A	N/A	N/A	N/A	341	353	366	398	396
310	308	338	346	352	363	371	376	393	392
293	294	315	325	341	345	364	375	381	386
393	370	384	388	385	399	381	376	365	373
387	402	413	400	379	379	368	375	367	368
226	244	267	287	314	319	335	344	340	335
429	474	340	335	294	272	306	310	301	326
N/A	N/A	N/A	335	N/A	336	337	330	313	320
115	137	132	171	210	220	236	292	310	316
N/A	223	212	224	257	272	290	300	286	297
N/A	412	280	279	283	286	293	276	281	287
223	253	266	295	294	285	236	224	232	271
250	245	255	248	219	215	220	230	227	262
308	277	285	298	301	312	292	273	258	255
122	128	140	200	197	207	215	217	221	252
232	251	279	272	283	275	259	255	249	249
207	214	226	231	234	208	248	239	231	249
N/A	N/A	N/A	N/A	231	240	218	221	224	232
273	285	271	276	282	279	283	283	288	231
246	246	250	227	229	235	229	234	210	227
N/A	N/A	225	226	230	220	215	224	211	219
205	202	191	204	193	202	195	202	203	206
182	226	189	187	204	218	194	213	246	196
N/A	N/A	132	140	148	145	185	174	181	196
110	91	108	108	108	111	136	129	127	190
150	164	164	176	173	176	178	181	198	189
154	161	161	169	168	180	183	186	181	186
136	135	138	130	163	159	165	170	176	182
164	161	167	181	180	175	171	174	186	181
131	124	130	148	147	147	153	164	166	176
148	147	151	142	150	143	150	155	167	165
N/A	N/A	N/A	120	129	124	119	150	166	165
15	72	167	172	181	178	177	164	195	163
102	111	109	119	113	127	122	129	151	161
N/A	104	103	102	98	103	103	101	146	158
108	112	113	123	128	128	135	134	134	154
106	110	120	143	138	148	148	154	153	153
112	124	134	132	136	139	145	154	141	148
151	155	155	163	157	176	167	179	193	147
N/A	N/A	N/A	N/A	N/A	N/A	128	129	130	143
124	148	156	141	151	120	120	116	130	137

Table 4.19. Number of Courses Taught in the Natural Sciences per Year Reported by All Study Institutions*

1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
134	131	136	128	135	142	139	135	137	137
85	95	89	98	93	100	94	95	102	136
105	103	125	118	130	126	123	132	140	135
111	121	133	121	103	128	128	126	131	132
109	106	102	104	100	119	130	107	111	131
100	108	104	128	135	134	124	141	139	129
100	100	108	112	103	117	111	114	113	127
108	110	110	112	115	117	140	123	116	126
127	130	123	127	124	124	117	116	128	124
170	138	161	119	136	196	145	172	167	123
130	116	126	128	113	118	119	123	122	123
122	125	127	132	138	129	129	127	130	123
155	166	144	181	190	118	121	126	119	120
94	105	114	109	103	105	115	114	124	119
137	142	127	136	134	128	115	111	119	119
104	80	91	92	89	92	96	101	101	116
107	117	108	106	113	111	123	122	127	114
N/A	N/A	94	99	114	88	90	89	105	114
84	90	109	102	96	101	103	113	111	113
111	113	123	116	122	125	116	118	120	113
92	94	89	100	104	103	102	99	105	113
91	84	100	96	85	87	83	107	84	112
107	100	105	119	113	95	85	97	109	110
116	121	112	126	129	125	120	123	115	110
101	99	92	105	115	124	142	120	115	109
87	101	104	104	118	132	121	122	115	109
95	95	94	104	103	109	104	111	108	107
87	80	85	93	94	108	105	113	105	105
91	89	98	96	96	110	108	113	117	103
92	98	102	98	98	102	101	106	101	101
75	75	73	70	82	81	85	90	101	100
91	109	101	117	135	91	94	99	99	100
92	92	95	90	99	98	100	94	101	99
100	108	108	110	109	121	117	120	101	99
69	67	66	72	76	84	80	95	97	97
87	82	92	87	87	87	86	90	88	97
68	60	68	77	83	79	80	85	90	96
74	74	82	78	83	81	87	94	96	96
82	86	85	85	90	101	106	97	89	93
92	86	79	83	81	87	85	93	91	93
68	77	76	74	75	77	80	86	90	91
N/A	N/A	N/A	N/A	92	95	96	110	107	86
70	71	70	71	71	75	83	85	85	85
93	104	94	81	89	86	84	88	86	84
78	75	76	73	75	73	73	76	79	82

Table 4.19. Number of Courses Taught in the Natural Sciences per Year Reported by All Study Institutions*

1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
49	43	45	48	58	65	72	70	78	82
56	58	68	64	72	70	78	78	83	82
82	73	84	73	73	75	72	84	82	81
88	88	92	83	85	81	78	88	87	80
54	61	67	76	76	76	76	77	78	78
74	78	85	77	84	75	75	69	78	78
40	53	68	62	66	65	63	68	80	77
66	68	65	70	75	75	73	77	77	77
73	82	72	77	73	76	78	78	74	76
59	59	51	54	59	62	65	69	69	74
N/A	N/A	N/A	N/A	N/A	74	77	78	72	74
N/A	65	65	64	63	72	65	71	69	74
70	71	76	66	74	74	75	72	76	73
66	71	62	60	65	62	66	64	76	73
55	51	54	47	54	55	59	66	65	73
73	69	73	74	82	79	86	75	75	73
65	64	67	71	71	74	76	74	76	73
76	82	77	64	85	89	67	77	73	72
84	77	85	73	82	76	72	73	66	71
77	70	70	71	76	76	73	68	72	70
73	71	61	62	67	71	60	63	65	67
59	64	65	65	59	66	69	70	67	67
56	60	57	69	70	69	70	69	69	67
49	54	49	50	53	63	62	56	70	67
79	78	72	71	58	63	60	63	69	66
64	64	62	62	60	65	64	63	62	65
55	55	60	65	58	63	67	58	65	63
63	63	64	63	63	63	64	63	63	63
78	69	71	68	63	76	68	60	72	62
N/A	N/A	N/A	N/A	N/A	N/A	61	67	63	60
100	101	101	100	88	95	96	84	76	60
45	43	41	41	47	39	44	48	56	59
54	48	57	54	55	57	63	52	61	59
34	37	38	34	39	44	51	63	64	59
44	46	43	37	49	49	57	49	57	57
49	48	49	49	48	51	53	50	55	56
61	64	61	62	65	67	66	66	62	55
59	53	53	53	59	59	56	52	54	54
43	46	56	46	40	46	44	54	54	52
33	34	43	44	49	47	51	49	52	49
38	38	44	40	39	42	38	43	48	49
36	38	37	37	39	45	46	42	42	43
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0

* One institution not included in table because of uncharacteristically high totals.

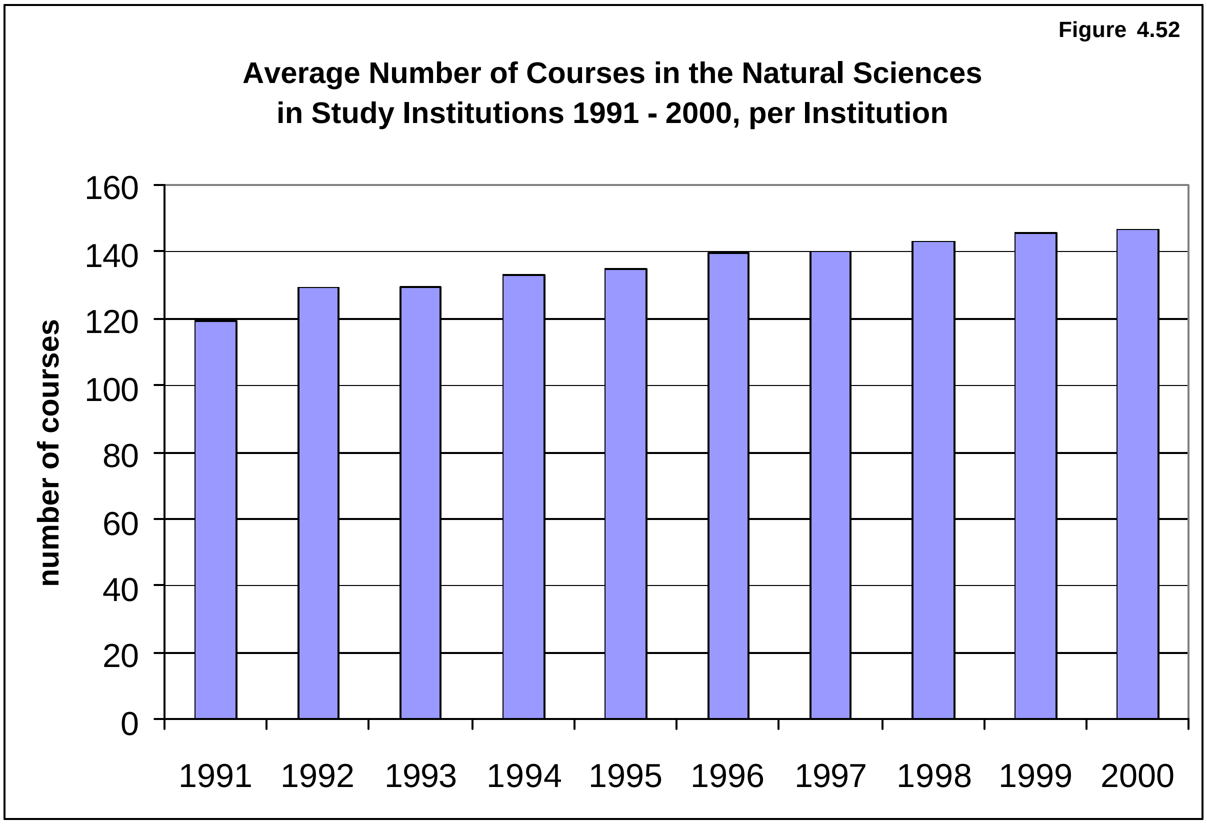


Figure 4.52
Average Number of Courses in the Natural Sciences
in Study Institutions 1991 - 2000, per Institution
number of courses
0
20
40
60
80
100
120
140
160
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000

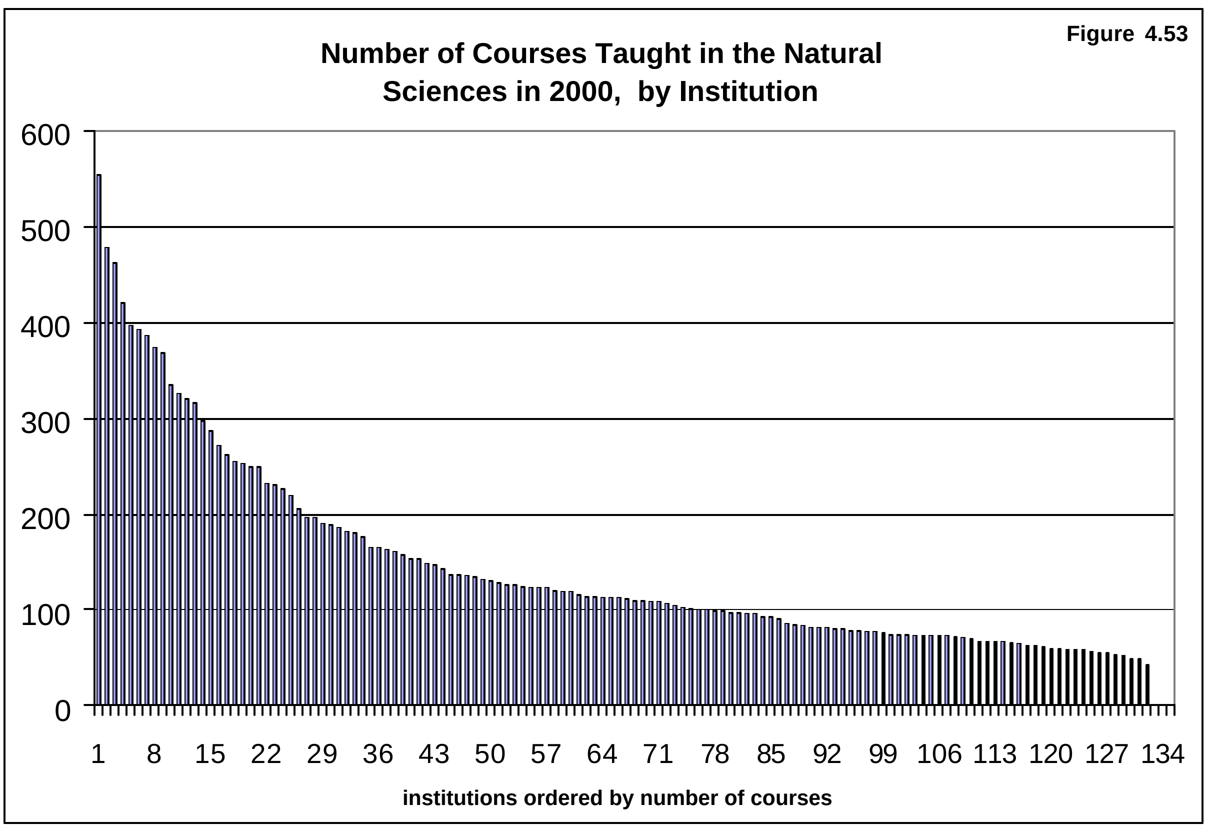


Figure 4.53
Number of Courses Taught in the Natural
Sciences in 2000, by Institution
0
100
200
300
400
500
600
1
8
15
22
29
36
43
50
57
64
71
78
85
92
99
106
113
120
127
134
institutions ordered by number of courses

Figure 4.54

Average Number of Students in the Natural Sciences at Study Institutions 1991 - 2000, per Course

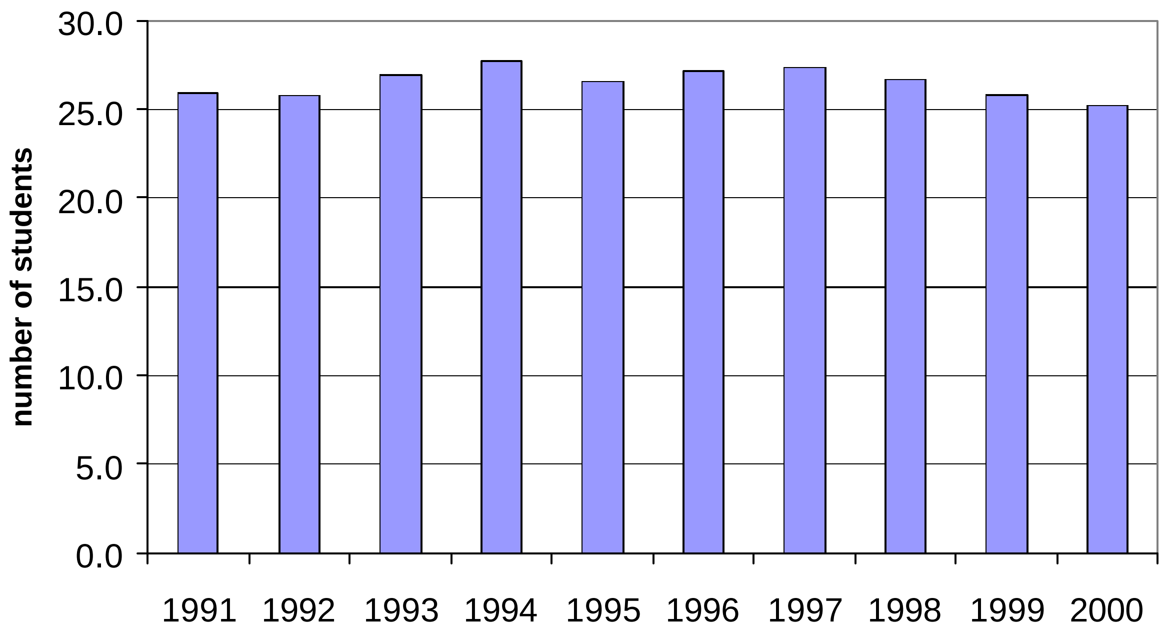


Table 4.20. Number of Students Enrolled in Courses in the Natural Sciences Reported by Study Institutions*

1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
N/A	N/A	N/A	N/A	N/A	18,889	20,005	20,123	19,768	18,338
17,443	18,100	17,970	17,148	17,824	17,321	17,256	16,880	17,321	17,447
N/A	17,095	16,805	16,286	16,381	15,888	15,671	15,869	15,914	15,567
19,147	19,440	16,882	15,561	14,180	12,915	15,103	14,915	14,504	14,310
N/A	N/A	N/A	17,794	N/A	17,766	18,064	17,831	15,887	14,181
11,763	12,101	11,802	12,528	12,602	12,748	12,784	12,283	12,246	12,067
10,331	10,369	11,049	11,994	12,456	12,270	12,793	13,074	13,059	12,022
11,955	11,883	10,847	10,751	11,244	11,610	12,359	11,915	11,469	11,158
10,600	10,984	12,042	12,731	13,144	12,808	12,771	12,267	11,323	10,961
7,793	8,722	9,759	11,473	11,331	11,464	11,183	10,991	10,897	10,600
11,066	11,376	11,330	11,414	11,105	10,510	10,233	9,482	9,609	9,818
5,699	6,534	8,419	9,157	9,452	9,573	9,750	9,560	9,415	9,556
6,527	6,914	6,997	7,180	7,271	7,588	7,726	8,135	8,138	9,162
8,483	8,924	9,783	9,220	8,889	8,479	8,743	8,645	8,784	8,858
6,915	7,010	7,628	7,683	7,746	8,001	8,781	8,635	8,844	8,761
8,160	8,192	7,037	8,532	8,610	8,461	8,498	8,569	8,565	8,625
10,412	10,936	11,283	10,652	10,822	10,520	10,404	10,286	10,252	8,011
5,710	5,685	7,172	5,543	5,419	5,368	5,686	7,305	5,878	7,447
5,924	6,143	6,200	6,685	6,080	7,454	9,043	8,425	7,852	7,200
5,503	5,599	5,960	5,772	5,974	6,070	6,487	6,326	6,925	6,833
4,474	4,583	5,095	5,678	5,398	4,883	5,212	4,939	4,964	6,655
N/A	N/A	N/A	N/A	N/A	5,242	5,456	6,487	6,406	6,436
1,925	2,808	2,820	3,437	3,980	4,779	5,365	5,818	6,219	6,231
N/A	N/A	6,505	6,173	6,275	6,057	6,221	6,371	6,212	5,795
5,200	5,351	5,703	6,471	5,359	5,677	5,438	5,412	4,759	5,362
6,019	6,511	7,312	7,133	6,934	6,602	6,362	6,271	6,409	5,326
3,535	4,161	4,481	5,154	4,675	5,052	5,065	5,043	4,831	4,900
N/A	5,083	5,097	4,462	4,800	4,940	4,948	4,974	4,613	4,510
4,884	4,839	5,162	5,087	5,135	5,390	5,686	4,694	4,772	4,470
4,069	3,986	4,400	4,618	4,677	4,683	4,656	4,622	4,857	4,214
3,795	3,449	3,382	4,005	3,692	4,166	4,433	4,091	4,139	4,140
3,176	3,267	3,446	3,970	3,388	3,644	3,732	3,909	3,979	4,135
3,392	3,608	3,674	3,818	4,149	4,183	4,119	4,216	4,147	4,025
N/A	N/A	N/A	3,865	3,942	3,609	3,683	4,086	4,056	3,990
2,593	2,885	3,053	3,374	3,540	3,441	3,351	3,778	3,704	3,939
N/A	N/A	3,595	3,547	3,679	3,612	2,777	3,314	3,289	3,583
N/A	N/A	N/A	N/A	3,914	4,071	3,934	3,748	3,747	3,527
2,238	2,667	2,826	2,759	2,920	2,943	3,168	3,069	3,271	3,321
2,729	3,169	3,395	3,369	3,460	3,389	3,430	3,405	3,313	3,293
3,008	3,189	3,194	2,837	3,381	2,971	3,145	3,090	3,100	3,177
2,305	2,558	2,671	2,884	2,806	3,035	3,011	3,303	3,169	3,173
N/A	2,270	2,502	2,888	3,302	3,514	3,432	3,303	3,140	3,164
3,378	3,685	3,833	3,870	3,996	3,978	3,666	3,428	3,201	3,151
1,975	2,311	2,534	2,759	2,485	2,549	2,463	2,970	2,913	3,120
2,736	2,824	2,962	3,100	3,077	3,319	3,047	3,008	2,926	3,098

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Table 4.20. Number of Students Enrolled in Courses in the Natural Sciences Reported by Study Institutions*

1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
2,800	2,882	2,994	3,179	2,854	2,960	3,052	3,070	3,102	3,040
143	962	2,884	3,593	3,789	3,127	3,174	3,162	3,945	3,018
3,315	3,487	3,535	3,222	3,848	3,452	3,238	3,220	2,943	2,899
N/A	1,865	2,320	2,694	2,737	2,937	2,995	3,017	3,120	2,789
2,211	2,785	3,077	3,059	2,998	3,057	2,964	2,664	2,851	2,782
2,166	2,356	2,415	2,764	2,604	2,709	2,659	2,761	2,777	2,777
2,670	2,789	3,063	3,112	3,207	3,075	3,034	3,044	3,002	2,772
2,445	2,952	2,951	3,089	3,193	2,078	2,909	2,926	3,064	2,744
2,194	2,413	2,415	2,642	2,710	2,654	2,590	2,623	2,691	2,731
3,219	3,020	2,982	2,714	2,846	2,727	2,769	2,806	2,872	2,730
2,002	2,074	2,550	2,783	2,657	2,558	2,373	2,332	2,448	2,680
1,048	1,556	2,523	2,896	2,928	2,937	2,819	2,561	2,658	2,654
2,549	2,700	3,008	3,104	3,156	3,015	2,932	2,757	2,691	2,648
2,569	2,700	2,809	2,933	3,107	2,861	2,622	2,632	2,641	2,583
2,699	2,817	2,869	3,034	3,157	3,149	2,887	2,922	2,689	2,577
2,507	2,878	2,467	2,321	2,463	2,682	2,499	2,692	3,093	2,542
2,333	2,406	2,694	2,663	2,507	2,574	2,429	2,381	2,411	2,533
2,377	2,636	2,482	2,609	2,739	2,532	2,585	2,358	2,352	2,461
2,019	2,140	2,230	2,101	2,040	1,961	2,068	2,253	2,314	2,461
2,056	2,091	2,879	2,820	2,666	2,413	2,360	2,410	2,608	2,394
2,355	2,443	2,577	2,688	2,657	2,601	2,519	2,524	2,362	2,389
2,847	2,504	3,005	3,614	3,553	3,566	3,327	2,940	2,456	2,381
2,249	2,328	2,532	2,569	2,626	2,694	2,585	2,491	2,516	2,355
2,287	2,447	2,598	2,711	2,604	2,650	2,497	2,436	2,396	2,354
2,628	2,925	3,017	2,876	2,756	2,595	2,530	2,491	2,550	2,344
1,817	1,920	2,296	2,289	2,197	2,528	2,349	2,614	2,475	2,327
2,602	2,680	2,673	2,979	3,290	3,463	2,935	2,727	2,438	2,286
2,494	2,577	2,559	2,917	2,947	2,522	2,554	2,467	2,207	2,252
N/A	N/A	1,718	1,721	1,923	1,956	2,066	2,106	2,224	2,238
2,470	2,813	2,503	2,083	2,124	2,091	2,087	2,220	2,165	2,179
1,908	1,963	2,148	2,204	2,371	2,373	2,304	2,161	2,167	2,122
2,428	2,512	2,489	2,566	2,776	2,642	2,740	2,567	2,104	2,117
1,658	1,590	1,599	1,756	1,982	1,991	2,011	1,929	2,126	2,103
1,667	1,764	1,787	1,765	1,875	1,928	2,089	1,930	2,026	2,017
2,307	2,279	2,494	2,356	2,356	2,227	2,316	2,149	1,994	2,000
1,370	1,367	1,367	1,502	1,769	1,876	1,950	2,030	1,945	1,991
1,749	1,815	1,937	2,024	1,904	1,891	1,771	1,757	1,850	1,991
1,275	1,353	1,272	1,513	1,588	1,448	1,532	1,705	1,737	1,972
1,919	2,008	2,255	2,369	2,277	2,264	2,333	2,316	2,177	1,896
1,723	1,750	2,092	2,063	2,089	2,218	2,354	2,374	2,322	1,890
1,608	1,762	1,834	1,895	1,714	1,713	1,777	1,636	1,953	1,871
1,575	1,701	1,887	2,104	2,216	2,088	1,918	1,915	1,987	1,860
1,423	1,566	1,536	1,635	1,731	1,643	1,702	1,754	1,585	1,854
1,565	1,732	1,702	1,873	1,863	1,875	1,742	1,837	1,753	1,843
1,856	1,809	1,745	1,742	1,784	1,764	1,936	1,998	1,854	1,823

* Two institutions not included in table because of uncharacteristically high totals.

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Table 4.20. Number of Students Enrolled in Courses in the Natural Sciences Reported by Study Institutions*

1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1,072	1,109	1,327	1,256	1,415	1,547	1,691	1,742	1,600	1,778
2,129	2,283	2,341	2,194	1,708	2,049	2,028	2,075	2,046	1,756
1,122	1,155	1,455	1,881	1,693	1,572	1,481	1,700	1,711	1,728
1,273	1,428	1,720	1,544	1,775	1,663	1,725	1,640	1,699	1,710
1,511	1,568	1,693	1,878	1,808	1,917	1,838	1,751	1,507	1,707
N/A	N/A	N/A	N/A	N/A	1,804	1,776	1,689	1,762	1,699
1,600	1,692	1,899	1,852	1,826	1,930	1,915	1,954	1,860	1,694
1,483	1,545	1,919	1,885	1,896	1,782	1,699	1,782	1,762	1,649
1,555	1,487	1,362	1,583	1,545	1,730	1,697	1,626	1,652	1,646
N/A	1,522	1,618	1,522	1,806	1,756	1,780	1,775	1,676	1,635
1,161	1,101	1,087	1,164	1,282	1,577	1,419	1,495	1,734	1,612
1,327	1,469	1,655	1,664	1,663	1,737	1,706	1,595	1,616	1,583
1,025	1,024	1,186	1,177	1,306	1,390	1,472	1,668	1,636	1,578
1,211	1,430	1,444	1,556	1,512	1,510	1,350	1,335	1,317	1,567
1,244	1,404	1,379	1,318	1,683	1,866	1,867	1,911	1,754	1,553
1,417	1,350	1,470	1,608	1,815	1,611	1,372	1,362	1,383	1,544
878	1,059	1,057	1,229	1,291	1,476	1,510	1,535	1,569	1,522
1,236	1,295	1,325	1,311	1,308	1,416	1,397	1,476	1,463	1,520
1,375	1,431	1,630	1,559	1,654	1,607	1,644	1,589	1,616	1,487
N/A	1,593	1,575	1,557	1,548	1,670	1,581	1,468	1,292	1,395
1,465	1,288	1,339	1,409	1,332	1,518	1,588	1,403	1,449	1,375
1,278	1,258	1,287	1,319	1,222	1,173	1,209	1,266	1,430	1,333
1,444	1,448	1,608	1,433	1,404	1,531	1,606	1,462	1,355	1,331
1,775	1,634	1,708	1,653	1,597	1,557	1,411	1,573	1,638	1,321
785	1,146	1,320	1,099	856	933	878	1,345	1,281	1,280
1,166	1,219	1,209	1,266	1,325	1,388	1,259	1,260	1,191	1,241
1,025	989	1,177	1,291	1,294	1,211	1,173	1,166	1,233	1,174
1,204	1,489	1,368	1,448	1,352	1,548	1,334	1,313	1,232	1,168
N/A	N/A	N/A	N/A	N/A	N/A	1,205	1,203	1,135	1,110
570	676	762	813	767	777	835	888	952	990
1,222	1,071	965	1,177	1,358	1,338	1,249	1,070	1,127	986
768	802	889	1,177	1,146	1,077	1,067	991	1,066	976
615	590	634	817	864	841	949	927	883	902
565	647	651	720	819	823	967	963	939	844
1,038	876	948	891	870	843	793	768	670	736
337	339	320	407	487	650	676	708	743	654
540	570	555	555	685	675	690	630	630	645
581	510	515	584	525	588	558	633	602	644
N/A	N/A	N/A	N/A	637	739	728	683	631	586
422	440	433	432	484	481	530	547	522	508
189	214	256	241	252	239	267	271	290	340
112	94	67	54	46	108	109	100	102	95
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

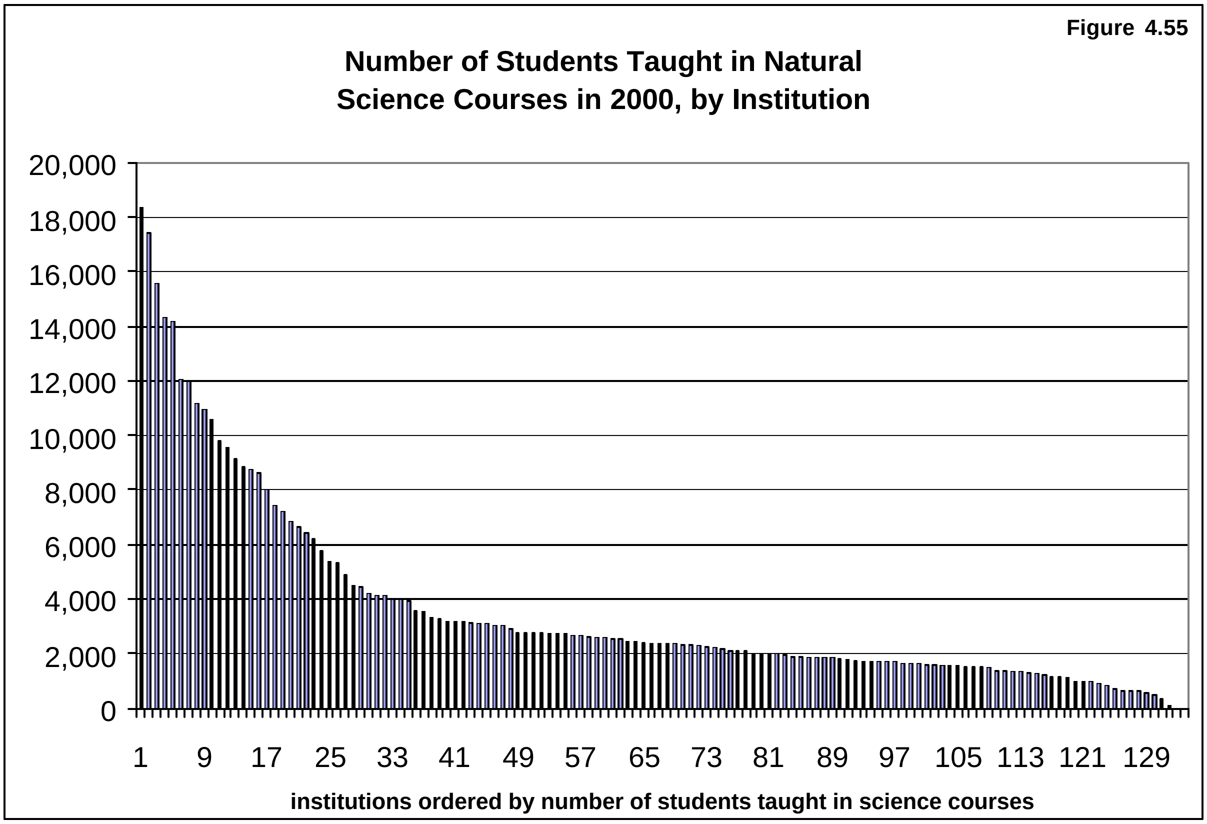


Figure 4.55
Number of Students Taught in Natural Science Courses in 2000, by Institution
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
1 9 17 25 33 41 49 57 65 73 81 89 97 105 113 121 129
institutions ordered by number of students taught in science courses

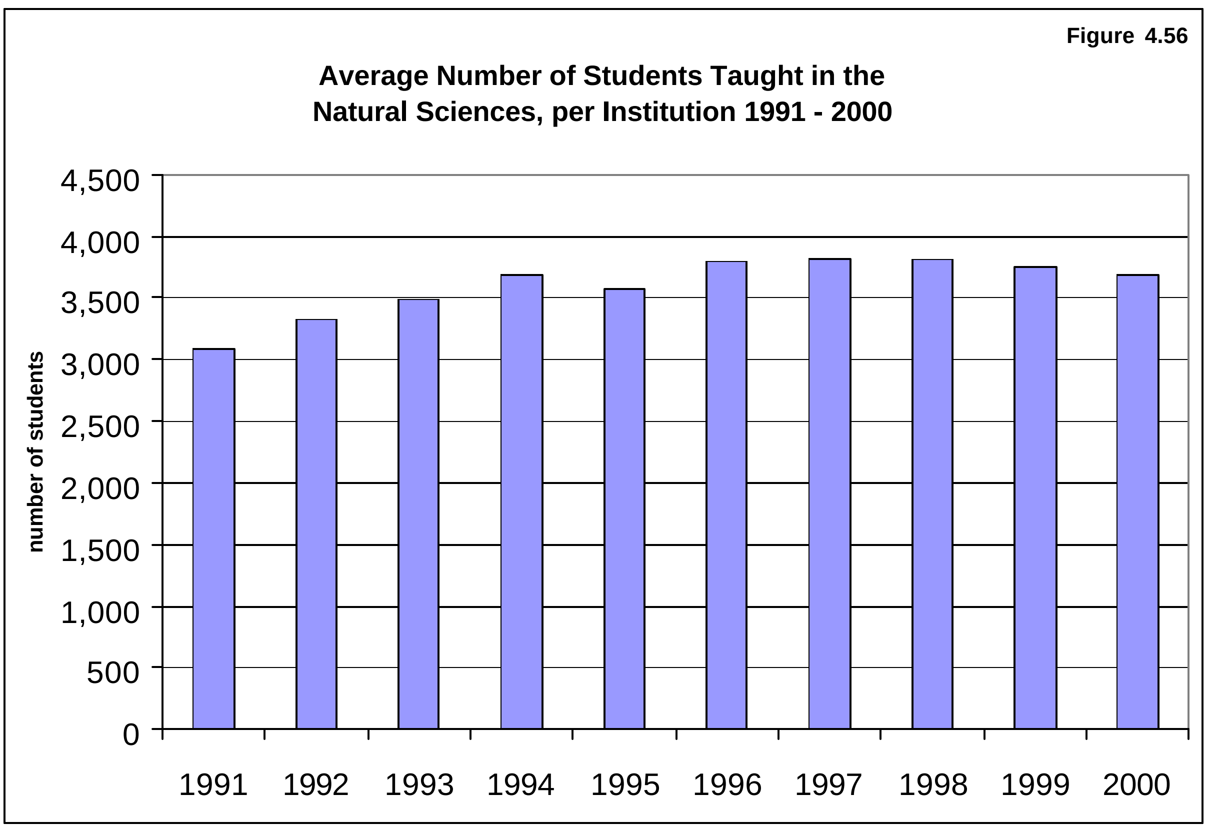
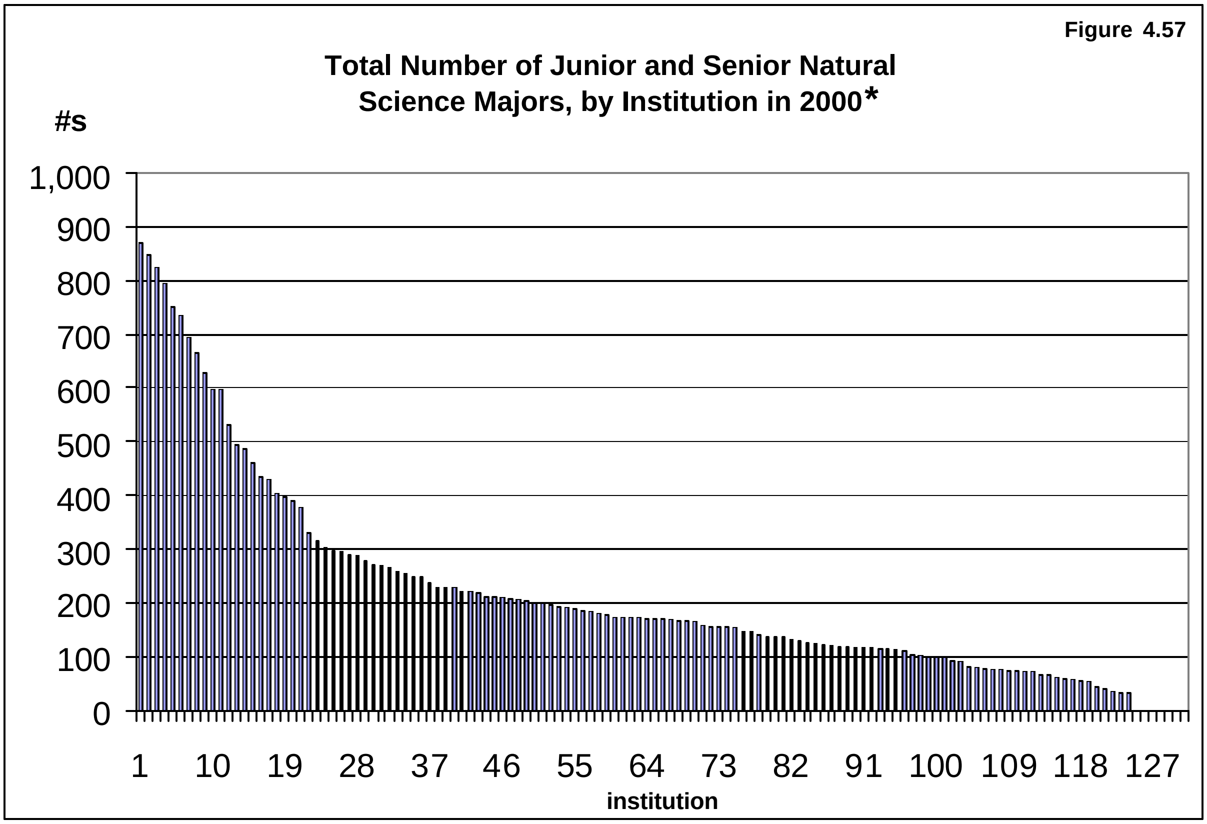
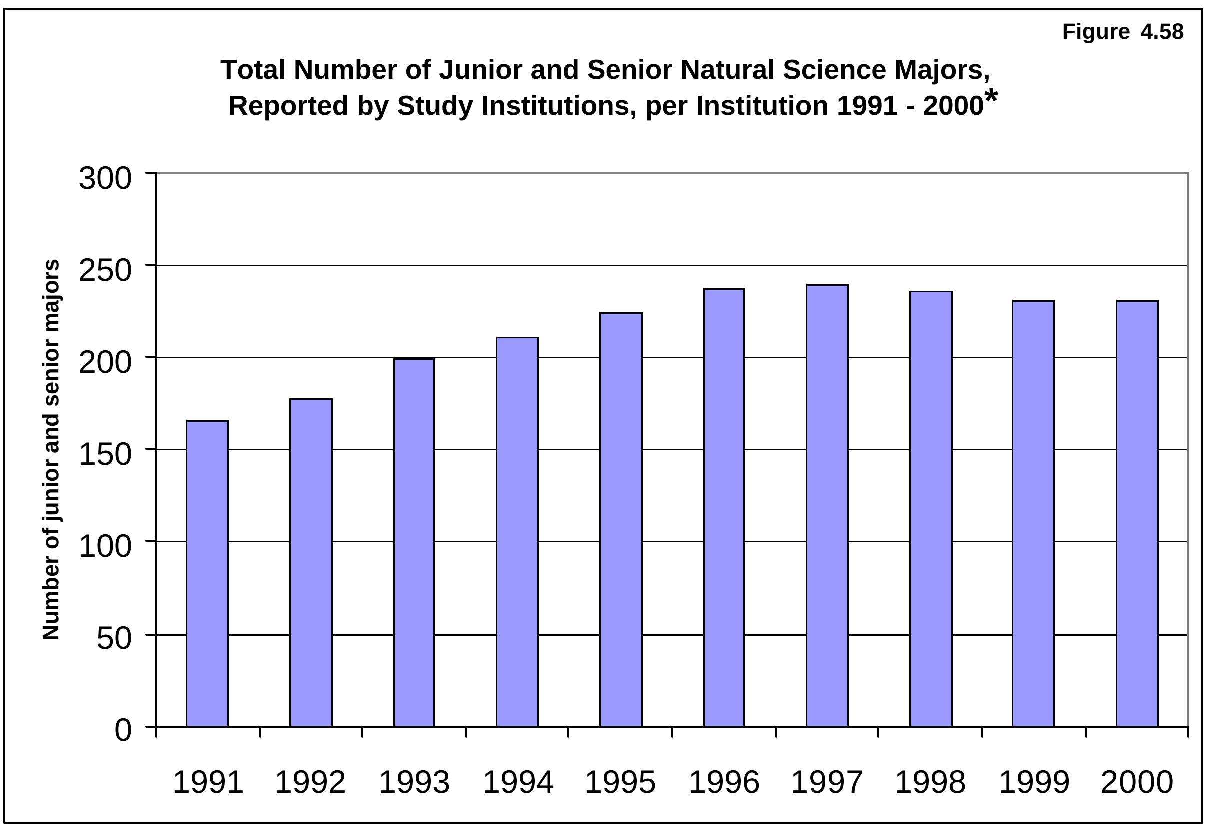


Figure 4.56
Average Number of Students Taught in the Natural Sciences, per Institution 1991 - 2000
number of students
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1991 1992 1993 1994 1995 1996 1997 1998 1999 2000





* Five institutions not included in calculations because of uncharacteristically high totals.

Table 4.21. Number of Summer Research Students in the Natural Sciences Reported by Study Institutions 1991–2000*

1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Total
41	40	N/A	N/A	N/A	N/A	N/A	N/A	164	152	397
103	102	104	103	108	108	107	109	109	110	1063
69	81	74	75	72	83	86	109	102	99	850
87	83	89	102	97	94	118	121	116	88	995
48	51	73	84	110	110	86	105	111	85	863
N/A	N/A	N/A	76	75	61	66	64	74	81	497
42	56	38	48	50	55	46	100	78	78	591
57	59	54	59	59	62	56	60	64	72	602
70	70	70	70	70	70	70	70	70	70	700
N/A	N/A	N/A	N/A	N/A	N/A	N/A	31	66	70	167
N/A	N/A	N/A	N/A	N/A	40	50	60	65	70	285
32	25	31	31	44	40	44	37	51	69	404
32	40	28	31	37	40	45	56	47	66	422
46	59	69	66	70	70	53	65	56	64	618
23	29	25	43	56	58	81	65	73	63	516
32	40	36	42	48	50	60	59	59	61	487
44	52	62	65	56	44	50	66	80	60	579
49	47	44	50	54	53	61	90	66	57	571
12	13	14	15	16	17	24	47	53	55	266
26	27	32	32	40	40	48	48	55	55	403
37	41	39	49	46	52	45	54	52	53	468
57	46	49	44	47	45	52	49	51	53	493
15	15	15	20	20	25	30	40	40	50	270
10	22	32	29	33	34	33	42	44	49	328
N/A	15	14	13	14	16	38	33	49	49	241
18	20	22	31	31	26	22	23	31	48	272
45	49	56	59	51	43	50	47	49	45	494
19	19	13	29	32	37	37	50	37	44	317
14	22	34	32	22	44	41	38	44	42	333
80	75	86	73	70	71	55	60	54	41	665
40	40	40	40	40	40	40	40	40	40	400
34	33	43	44	50	58	40	40	38	39	419
33	41	37	29	30	31	33	35	32	38	339
30	27	33	52	39	35	39	46	38	38	377
27	29	31	28	27	32	35	31	34	37	311
33	34	28	31	35	40	35	40	30	37	343
12	15	17	20	27	27	30	27	32	37	244
0	0	18	26	0	8	14	19	13	36	134
40	46	43	31	27	30	37	49	42	35	380
4	10	9	10	8	8	16	35	31	34	165
17	15	16	22	28	29	30	27	35	34	199
9	18	14	29	26	19	21	17	12	34	253
13	14	13	17	20	25	26	27	35	33	223
N/A	N/A	N/A	N/A	N/A	N/A	41	46	48	33	168
19	28	34	43	43	32	42	39	32	33	345

* NOTE: N/A signifies data not available

Table 4.21. Number of Summer Research Students in the Natural Sciences Reported by Study Institutions 1991–2000*

1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Total
28	37	23	22	20	34	27	21	32	32	276
N/A	N/A	N/A	24	34	31	19	24	28	32	192
17	14	11	16	16	28	25	26	41	32	226
31	43	40	35	37	35	20	37	40	32	350
20	26	33	35	26	30	37	47	45	31	330
40	40	40	40	40	49	40	42	40	31	402
27	30	32	34	27	27	21	26	30	29	283
21	24	22	23	25	27	25	29	27	28	251
9	17	23	24	16	13	41	28	29	27	227
11	12	11	18	18	24	18	19	27	27	185
6	12	11	8	15	18	23	31	34	27	185
11	12	9	16	7	12	14	25	26	26	158
N/A	8	8	13	13	21	23	21	25	26	158
15	19	22	21	23	16	19	20	17	26	198
1	3	3	0	9	16	34	37	25	25	153
18	23	23	22	22	22	21	23	25	24	223
5	8	7	8	11	19	20	17	17	24	136
18	19	19	24	24	20	26	21	22	24	217
11	16	24	19	29	22	16	22	17	24	200
9	5	4	10	11	12	21	19	27	23	141
12	10	8	4	6	40	30	23	18	22	173
11	4	13	13	12	15	16	18	20	22	144
3	1	0	3	12	12	14	19	13	21	98
6	8	10	10	11	15	17	20	23	21	141
13	14	19	17	14	17	22	20	19	21	176
N/A	N/A	N/A	N/A	N/A	N/A	29	31	23	20	103
2	2	2	3	2	6	9	18	19	20	83
8	8	8	10	9	12	12	16	17	20	120
5	5	5	6	15	11	15	16	18	20	116
15	17	19	17	17	22	20	19	20	20	186
19	22	17	19	15	13	15	14	9	19	162
9	11	8	13	18	15	16	11	15	19	135
12	11	12	17	16	12	10	8	14	18	130
0	0	0	0	2	5	4	14	14	18	57
13	11	15	19	31	28	18	13	17	18	183
8	10	7	12	8	24	13	14	12	17	125
7	7	7	6	6	12	17	15	14	17	108
14	18	23	16	21	17	19	18	18	16	180
3	3	3	5	4	6	6	7	9	16	62
7	8	10	7	14	4	10	11	11	15	97
5	4	8	2	6	10	14	16	15	15	95
16	17	18	19	22	17	17	13	14	14	167
4	11	12	15	17	19	20	9	9	14	130
2	2	1	2	2	3	5	7	9	13	46
32	21	9	13	6	13	8	11	15	13	141

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Table 4.21. Number of Summer Research Students in the Natural Sciences Reported by Study Institutions 1991–2000*

1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Total
N/A	N/A	N/A	N/A	16	17	23	12	8	13	89
N/A	N/A	N/A	N/A	8	7	3	9	9	12	48
5	5	5	5	7	8	10	12	12	12	81
N/A	N/A	N/A	N/A	N/A	N/A	0	7	5	12	24
10	10	10	10	10	10	10	13	17	11	111
5	8	9	10	8	6	12	12	13	11	94
N/A	17	13	16	22	15	14	15	12	10	134
13	11	14	12	8	12	12	9	11	10	112
N/A	20	37	17	27	3	7	7	7	10	135
N/A	N/A	N/A	8	18	11	20	29	20	9	115
0	8	8	8	6	6	4	9	9	9	67
7	6	7	9	8	9	7	9	9	9	80
2	2	4	13	5	5	14	8	9	9	71
3	4	3	1	4	5	9	9	10	8	56
3	2	2	9	9	8	10	12	12	8	75
0	0	1	1	4	9	7	10	5	7	44
9	5	13	11	9	1	6	5	10	7	76
10	11	10	7	8	10	8	12	10	6	92
3	3	4	4	5	5	6	6	6	6	48
6	10	7	8	10	13	9	7	15	6	91
6	2	4	2	3	3	4	3	8	5	40
10	11	15	10	6	5	8	9	8	4	86
N/A	N/A	N/A	0	0	8	9	2	2	4	25
6	4	4	3	3	3	2	3	3	3	34
1	1	1	2	5	11	9	7	7	2	46
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
2	2	2	2	2	0	0	0	1	0	11
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
40	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	40

Figure 4.59

Total Number of Summer Research Students in the Natural Sciences Reported by Study Institutions, per institution in 2000

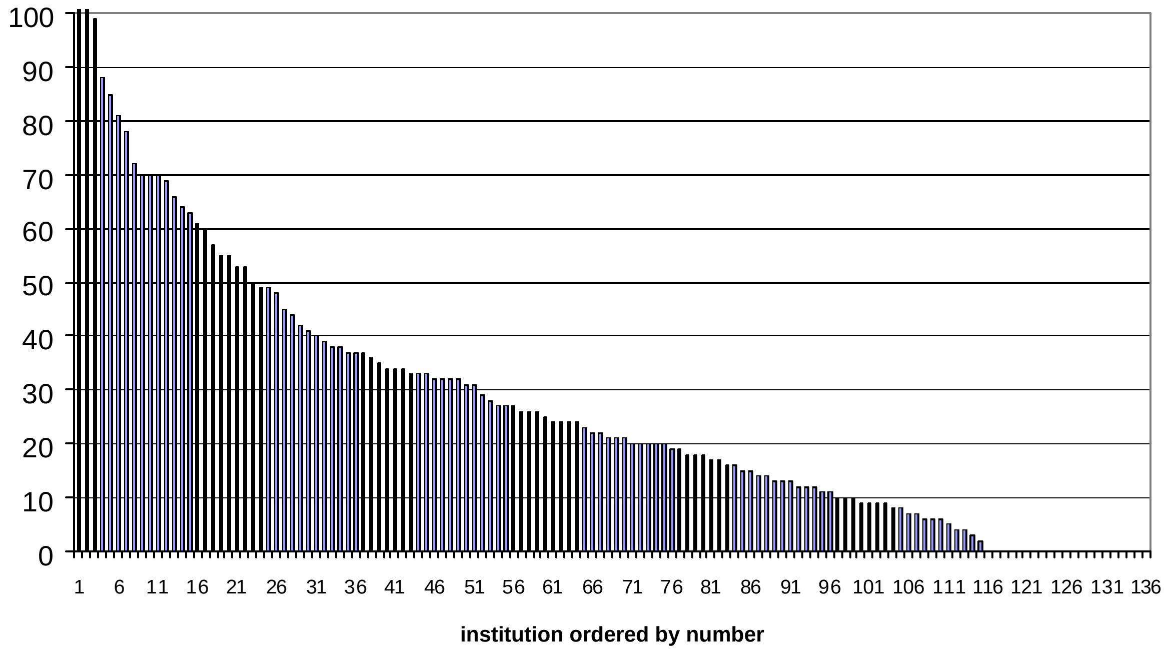
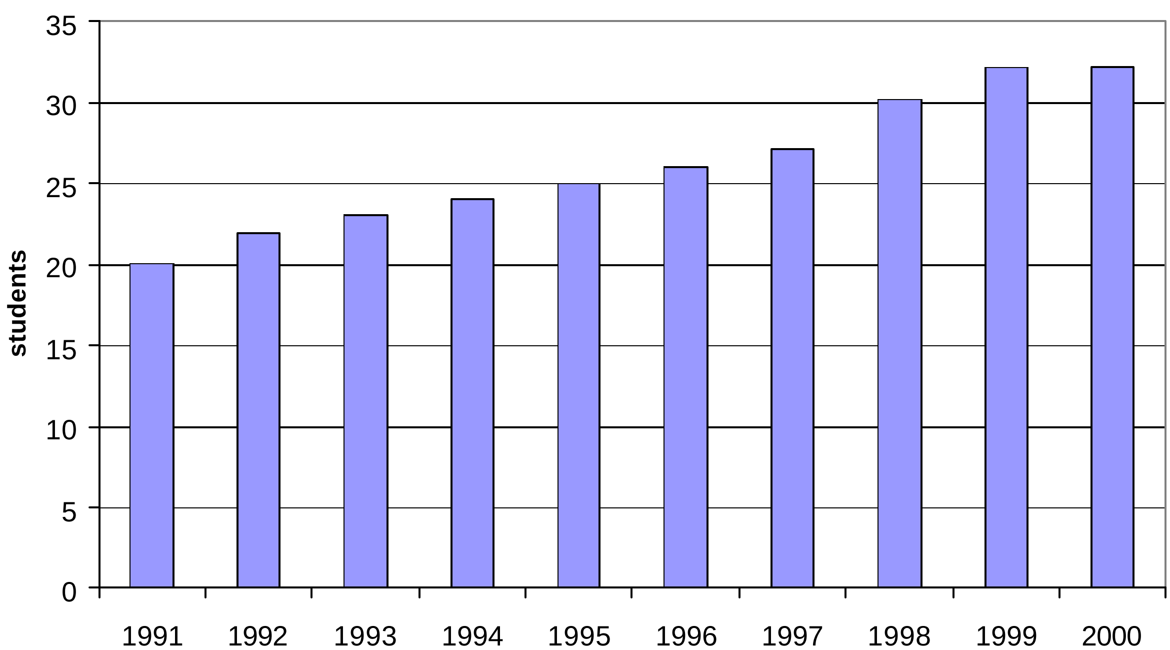


Figure 4.60

Average Number of Summer Research Students Reported by Study Institutions, per Institution 1991 - 2000



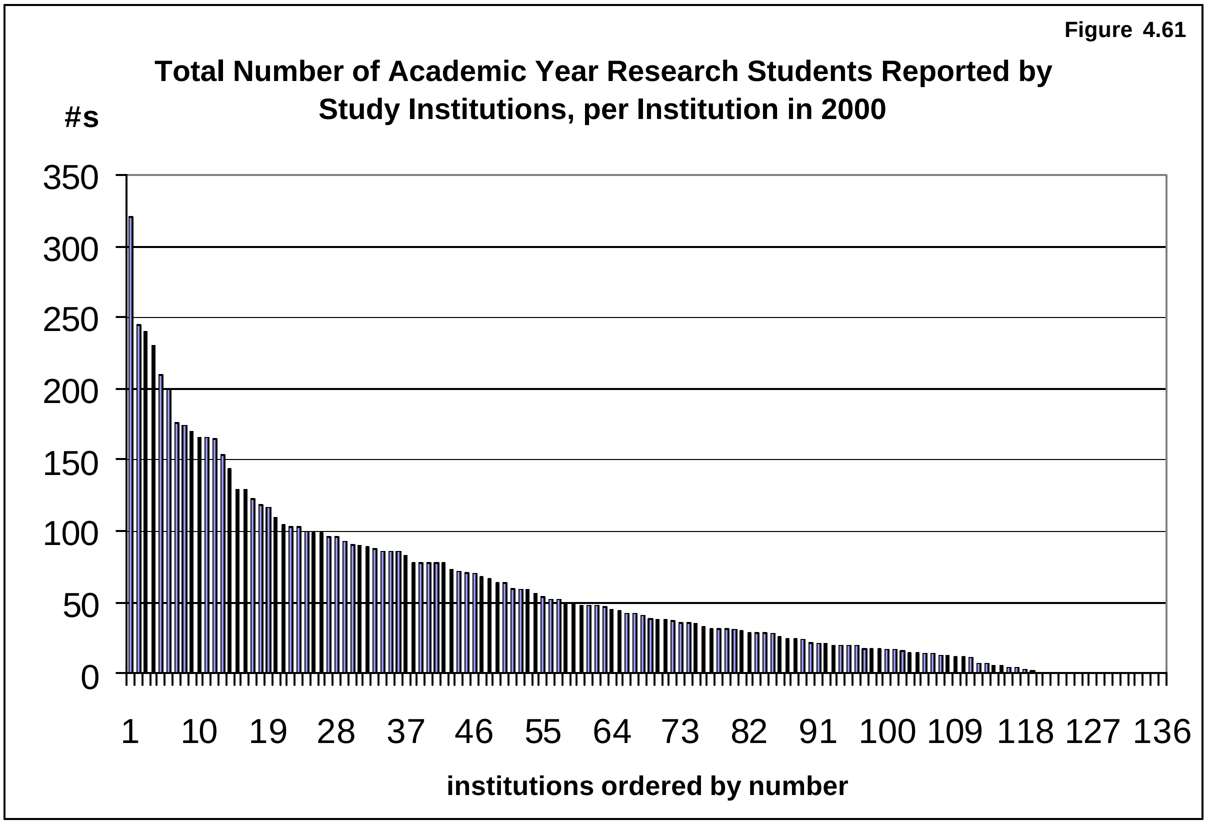


Figure 4.61
Total Number of Academic Year Research Students Reported by Study Institutions, per Institution in 2000
#s
350
300
250
200
150
100
50
0
1
10
19
28
37
46
55
64
73
82
91
100
109
118
127
136
institutions ordered by number

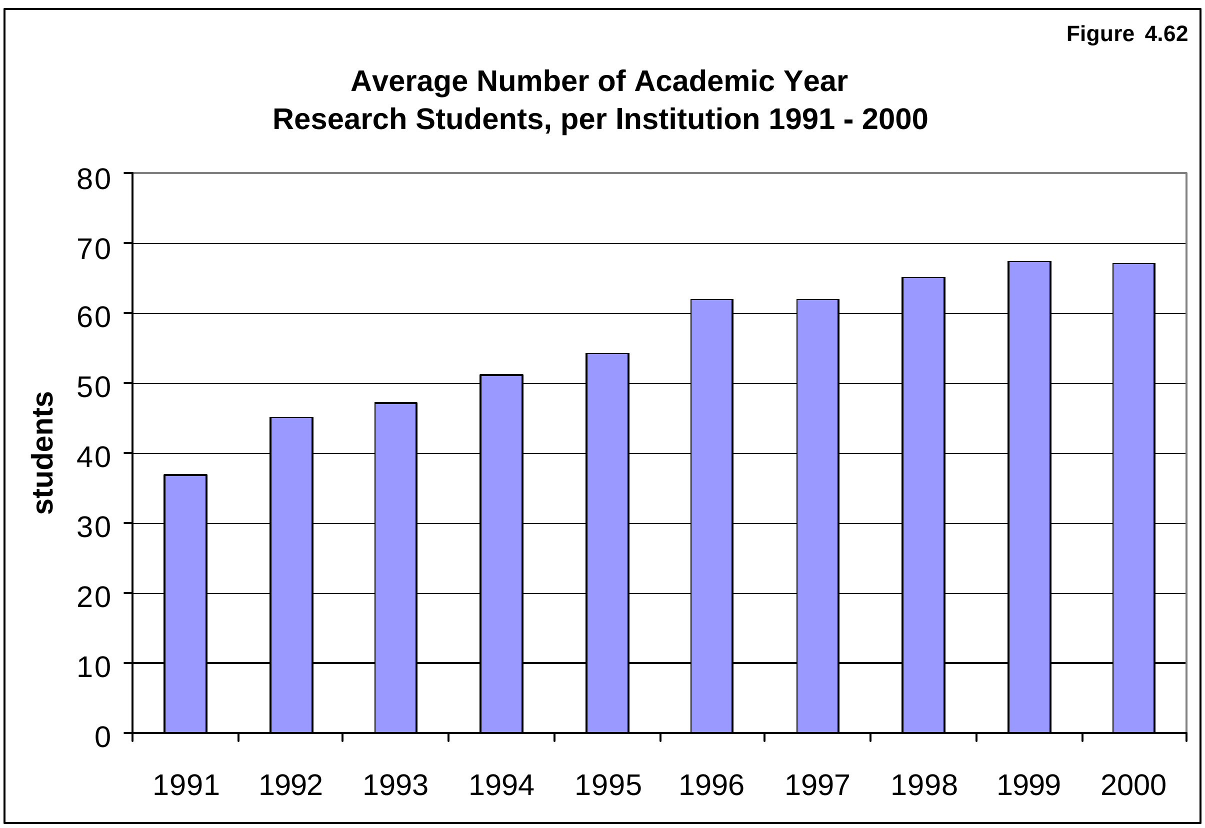


Figure 4.62
Average Number of Academic Year Research Students, per Institution 1991 - 2000
students
80
70
60
50
40
30
20
10
0
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000

Table 4.22. Library Resources for Science Reported by All Study Institutions

Science Journal Subscriptions	Chem Abstracts	Science Citation Index	Abstracts/ Citations online	Library Science Pub Budget 1991	Library Science Pub Budget 2000	% of Total Library Budget 2000
854	Yes	Yes	Yes	1,130,000	3,080,000	39
1400	Yes	No	Yes	1,551,070	3,055,555	39
1300	Yes	No	Yes	N/A	2,866,000	40
466	Yes	No	Yes	1,186,076	2,841,601	28
589	No	No	Yes	945,700	2,667,708	33
451	No	No	Yes	1,249,290	2,640,900	N/A
692	No	No	Yes	1,127,099	2,637,921	21
172	Yes	Yes	Yes	N/A	2,518,589	16
618	No	No	Yes	1,574,726	2,035,474	32
370	No	No	Yes	1,026,519	1,988,492	24
302	Yes	No	Yes	990,000	1,963,628	25
320	No	No	Yes	944,827	1,920,542	26
700	Yes	No	Yes	960,539	1,900,000	20
397	No	No	Yes	823,208	1,807,922	16
331	Yes	No	Yes	1,613,543	1,740,476	23
1395	Yes	Yes	Yes	816,214	1,722,604	39
47	Yes	No	Yes	N/A	1,702,230	36
333	No	No	Yes	924,700	1,593,168	20
908	No	Yes	Yes	1,047,001	1,581,357	33
514	Yes	Yes	Yes	770,601	1,547,205	31
801	Yes	Yes	Yes	1,119,193	1,531,324	43
567	No	No	Yes	625,390	1,523,818	22
596	No	No	Yes	579,947	1,509,999	29
325	No	No	Yes	780,000	1,500,000	30
325	No	No	Yes	926,777	1,500,000	12
412	Yes	No	Yes	536,400	1,480,000	18
289	Yes	Yes	Yes	1,304,432	1,460,000	19
595	No	No	Yes	949,300	1,414,000	45
180	Yes	Yes	Yes	N/A	1,400,000	25
488	Yes	No	Yes	882,265	1,398,877	34
641	No	No	Yes	817,081	1,373,885	35
372	Yes	No	Yes	793,440	1,364,026	31
300	Yes	No	Yes	682,286	1,358,450	33
324	No	No	Yes	672,640	1,350,200	30
700	Yes	Yes	Yes	935,507	1,334,000	34
493	Yes	Yes	Yes	844,745	1,280,946	36
752	Yes	No	Yes	826,996	1,260,515	21
292	No	No	Yes	705,321	1,255,779	30
205	Yes	No	Yes	422,000	1,255,000	15
139	No	No	Yes	632,370	1,242,050	11
410	Yes	No	Yes	870,900	1,225,150	43
707	Yes	No	Yes	1,310,000	1,200,000	30
484	Yes	No	Yes	669,689	1,188,108	38
302	No	No	Yes	666,000	1,184,000	33
137	Yes	Yes	Yes	556,745	1,170,651	5
180	Yes	No	Yes	612,000	1,150,000	6

NOTE: N/A signifies data not available

Table 4.22. Library Resources for Science Reported by All Study Institutions

Science Journal Subscriptions	Chem Abstracts	Science Citation Index	Abstracts/ Citations online	Library Science Pub Budget 1991	Library Science Pub Budget 2000	% of Total Library Budget 2000
356	No	No	Yes	N/A	1,126,644	33
249	No	No	Yes	562,928	1,100,000	30
351	Yes	No	Yes	683,080	1,096,000	26
508	No	No	Yes	761,380	1,091,591	N/A
353	No	No	Yes	471,766	1,082,306	29
349	No	No	Yes	651,648	1,073,299	32
350	No	Yes	Yes	560,253	1,072,115	27
647	No	No	Yes	728,008	1,065,718	42
750	No	No	Yes	927,373	1,053,575	42
246	No	No	Yes	447,112	1,007,000	19
218	Yes	No	Yes	503,000	1,003,951	14
110	No	No	Yes	500,000	1,000,000	28
384	No	No	Yes	N/A	982,500	N/A
184	No	No	Yes	544,984	972,995	25
284	No	Yes	Yes	597,000	972,000	29
350	No	No	Yes	540,000	960,000	N/A
171	No	No	Yes	726,000	945,379	18
285	Yes	No	Yes	457,000	920,000	48
163	No	No	Yes	690,701	909,913	10
167	No	No	Yes	382,000	883,954	20
158	No	No	Yes	678,812	850,000	25
560	Yes	Yes	Yes	690,794	843,336	41
161	Yes	No	Yes	445,000	841,000	44
262	No	No	Yes	475,500	834,000	22
909	No	No	Yes	436,000	830,000	32
121	No	No	Yes	395,046	817,364	13
350	No	No	Yes	435,000	798,791	30
123	No	No	Yes	446,750	798,100	14
186	No	No	Yes	424,635	792,260	17
180	No	No	Yes	377,353	771,195	11
132	Yes	Yes	Yes	1,100,000	750,000	26
243	No	No	Yes	481,000	747,000	35
160	No	No	Yes	370,000	733,300	21
140	No	No	Yes	482,996	732,400	14
260	No	No	Yes	609,405	724,413	20
196	No	No	Yes	533,032	718,761	27
116	Yes	No	Yes	339,000	698,000	30
390	No	No	Yes	472,000	691,000	33
55	No	No	Yes	303,000	674,142	12
208	Yes	No	Yes	832,474	672,721	41
150	No	No	Yes	379,000	643,000	26
200	No	No	Yes	300,000	627,329	30
76	No	No	Yes	325,472	598,917	12
253	Yes	No	Yes	421,500	580,000	50
223	Yes	No	Yes	604,000	574,000	27
233	No	No	Yes	445,000	571,908	26

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Table 4.22. Library Resources for Science Reported by All Study Institutions

Science Journal Subscriptions	Chem Abstracts	Science Citation Index	Abstracts/ Citations online	Library Science Pub Budget 1991	Library Science Pub Budget 2000	% of Total Library Budget 2000
216	No	No	Yes	208,268	568,777	N/A
293	No	Yes	Yes	N/A	533,928	20
379	No	No	Yes	392,511	509,728	58
300	Yes	Yes	Yes	250,000	500,000	65
40	Yes	No	Yes	188,145	498,898	25
192	No	No	No	321,000	492,000	32
226	No	Yes	Yes	448,350	482,000	63
220	No	No	Yes	298,300	479,100	22
80	Yes	No	Yes	234,793	477,814	15
248	No	No	Yes	397,700	469,843	N/A
71	No	No	Yes	255,703	457,447	19
82	No	No	Yes	200,000	430,000	13
207	No	No	Yes	265,986	423,484	37
98	No	No	Yes	196,000	394,500	25
374	No	No	Yes	331,000	389,996	33
170	No	No	Yes	236,821	382,504	16
157	Yes	No	No	230,500	373,600	27
95	No	No	No	N/A	369,300	24
368	No	No	Yes	302,153	365,000	27
170	No	No	Yes	250,742	356,032	N/A
247	No	No	Yes	204,472	348,770	30
142	Yes	No	Yes	238,367	336,280	12
213	Yes	No	Yes	266,728	334,336	10
190	No	No	No	199,125	317,436	35
188	No	No	Yes	212,000	315,000	18
570	Yes	Yes	Yes	182,500	292,500	N/A
166	No	No	Yes	218,042	274,300	28
41	No	No	Yes	N/A	250,400	12
300	No	No	Yes	220,000	250,000	30
127	No	No	Yes	137,232	246,299	12
136	No	No	Yes	202,310	220,770	8
65	No	No	Yes	142,242	192,982	21
132	Yes	Yes	Yes	111,150	192,660	26
44	Yes	No	No	80,750	186,000	17
20	No	No	Yes	110,850	183,400	20
49	No	No	Yes	137,000	177,000	19
60	No	No	Yes	123,152	161,918	20
33	No	No	Yes	115,500	147,161	15
93	No	No	Yes	31,000	90,500	23
60	Yes	Yes	Yes	18,950	43,900	19
69	Yes	No	Yes	63,675	37,911	9
69	No	No	Yes	26,375	28,749	5
N/A	No	No	No	N/A	N/A	N/A
355	No	No	Yes	N/A	N/A	N/A

Figure 4.63

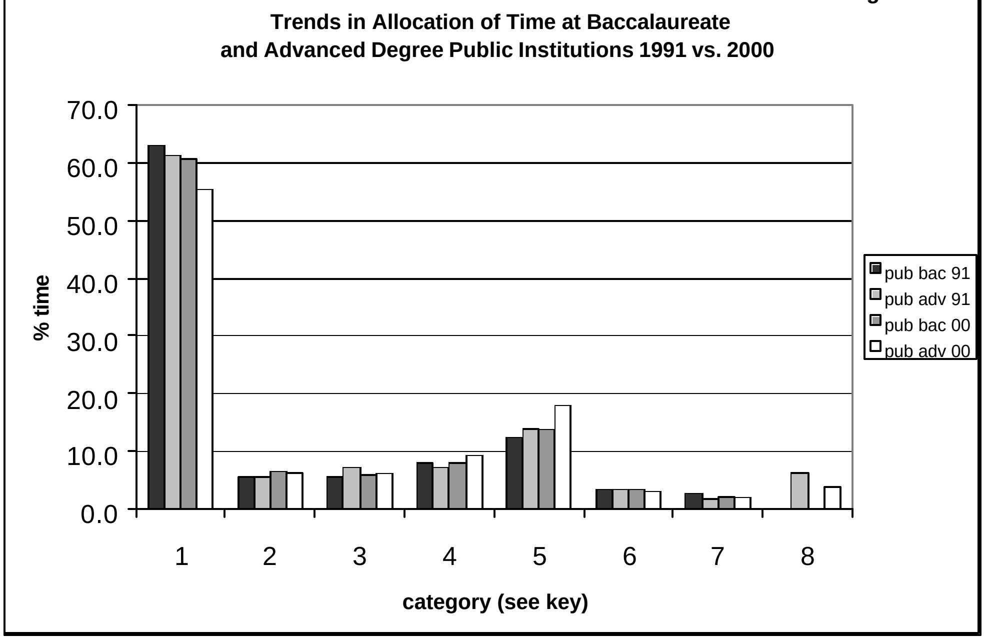
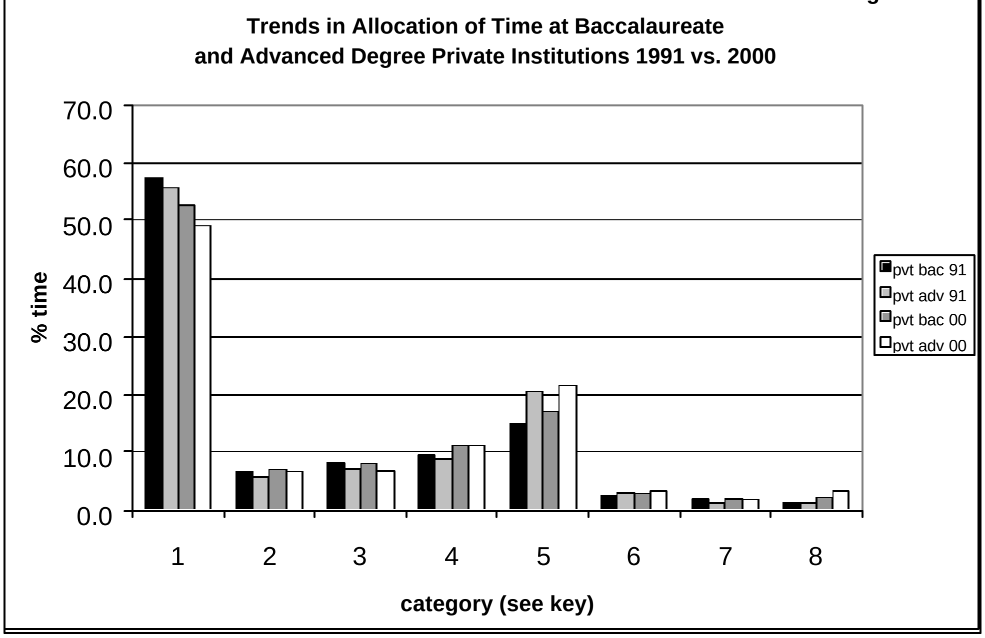
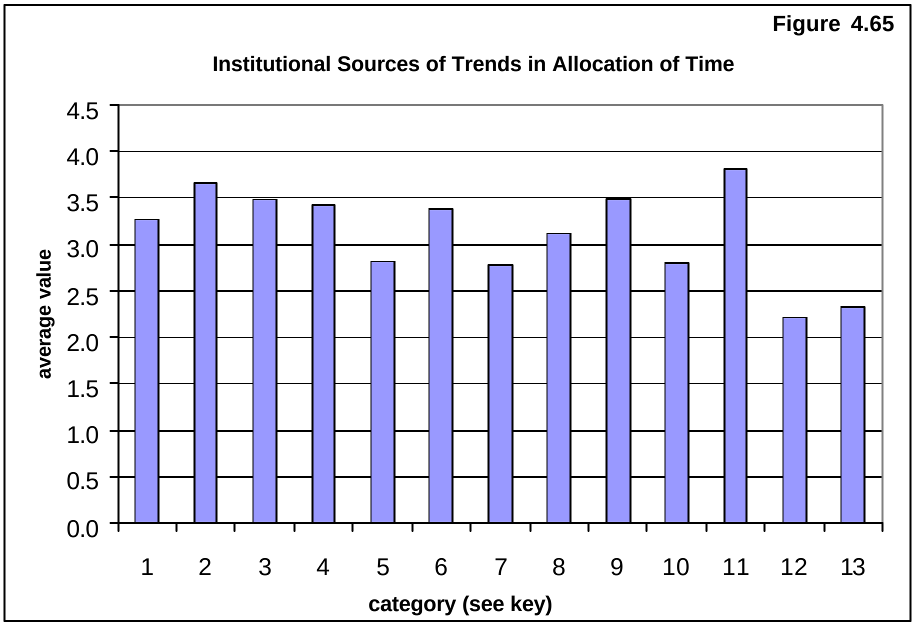


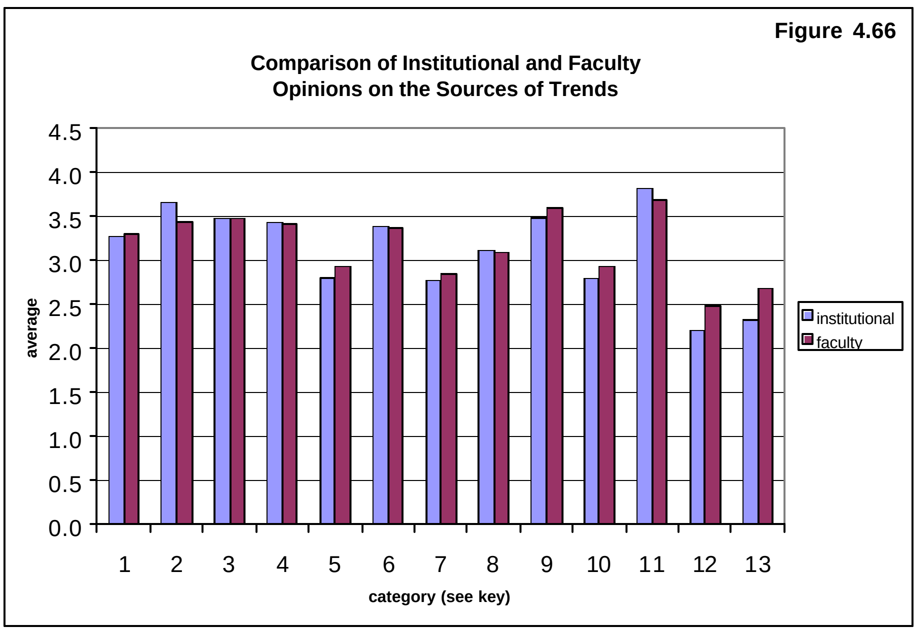
Figure 4.64



KEY

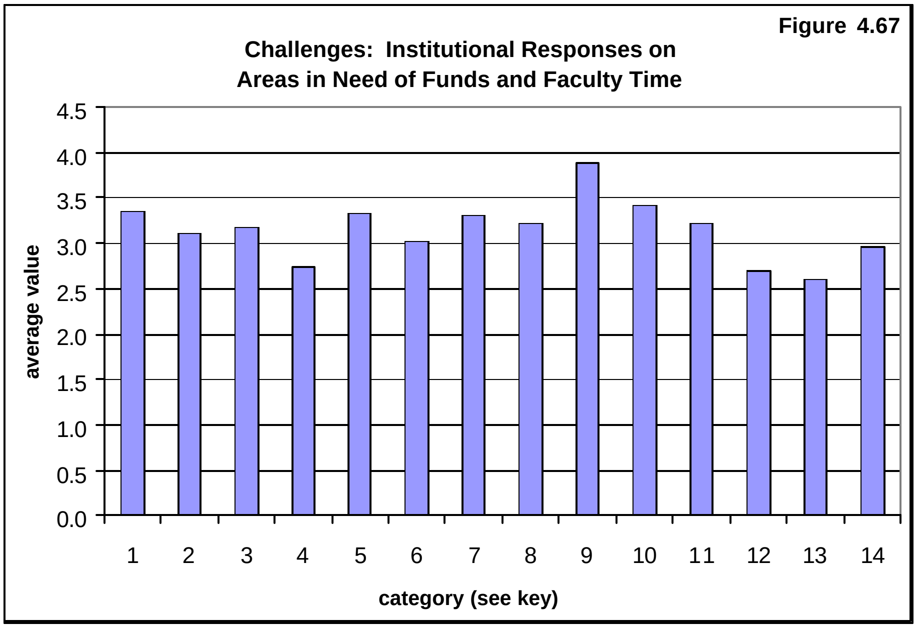
1. Classroom and laboratory teaching (including preparation time)	____%
2. Pedagogical research and curriculum development (including proposals, presentations and papers)	____%
3. Advising students on matters other than research	____%
4. Administration, committee work and campus correspondence	____%
5. Basic/applied research (incl. reading, planning, writing, giving talks & advising)	____%
6. Science-related community outreach	____%
7. External consulting	____%
8. Other ____	____%
Total	**100%**

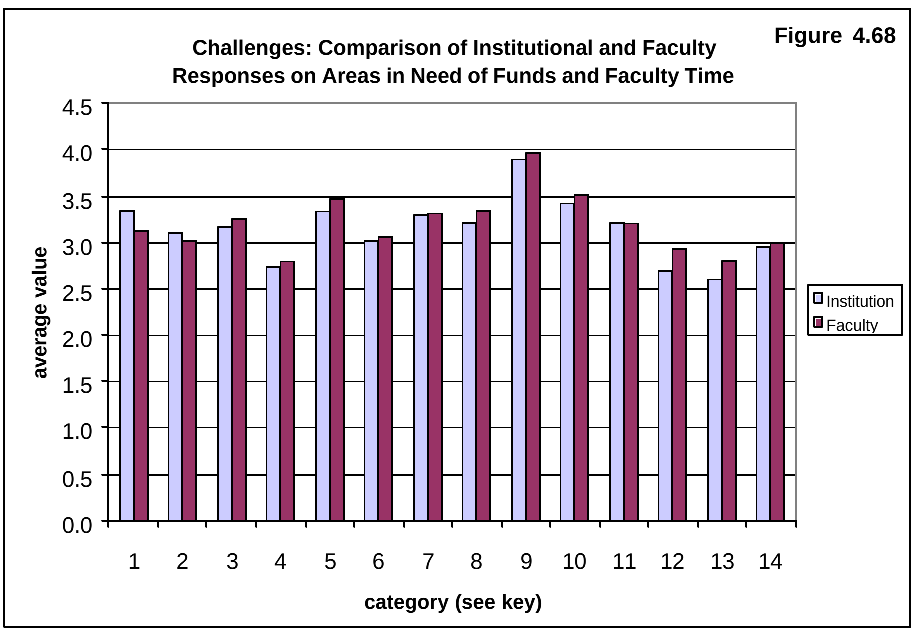




KEY

	much less			much more	
1. Numbers of students in courses and laboratories	1	2	3	4	5
2. Numbers of research students	1	2	3	4	5
3. Assessment of teaching and research	1	2	3	4	5
4. Inquiry-based curriculum development and teaching	1	2	3	4	5
5. General education and non-major curriculum development	1	2	3	4	5
6. Basic/applied research (incl. reading, planning, writing, giving talks & advising)	1	2	3	4	5
7. Exploring new research areas	1	2	3	4	5
8. Facilities planning and development	1	2	3	4	5
9. Campus and other correspondence, including e-mail	1	2	3	4	5
10. Advising students on matters other than research	1	2	3	4	5
11. Incorporating information technology into teaching	1	2	3	4	5
12. Family/community/religious activities	1	2	3	4	5
13. Other ___________________________	1	2	3	4	5





KEY

		least important			most important	
1.	Information technology, including web access to information	1	2	3	4	5
2.	Interdisciplinary teaching and research	1	2	3	4	5
3.	Classroom and laboratory student/faculty ratio	1	2	3	4	5
4.	General education and non-major courses	1	2	3	4	5
5.	Courses and laboratories for majors	1	2	3	4	5
6.	Faculty teaching skills and curriculum development	1	2	3	4	5
7.	Teaching equipment and supplies	1	2	3	4	5
8.	Support personnel for teaching	1	2	3	4	5
9.	Research, incl. released time, operating funds and leaves	1	2	3	4	5
10.	Facilities for research	1	2	3	4	5
11.	Facilities for teaching	1	2	3	4	5
12.	Support personnel for research and research supervision	1	2	3	4	5
13.	Information resources: electronic and paper	1	2	3	4	5
14.	Other ________________________________	1	2	3	4	5

SECTION 5:
THE STUDY—FACULTY PERSPECTIVES SURVEY

Leon J. Radziemski and George Rubottom, Coordinators, Academic Excellence Study

In the Faculty Perspectives Survey we captured and coded demographic information, grants, publications, presentations, opinions and narratives for each faculty member who reported. The coding system used for this part of the Study was patterned after that described for the Institutional Survey and no further elaboration will be given here. The demographic information included the departmental affiliation, current rank, Ph.D. year, year of appointment and year of tenure at the current institution. Gender information was available in most cases, so that information was recorded, making follow up inquiries when necessary. The analysis of the faculty opinion data was described in the Institutional Survey section of the Study and will not be further discussed. Due to time restrictions the narratives provided by faculty respondents have not yet been analyzed at the time the SourceBook went to press. For each institution a spreadsheet was used to accumulate all the faculty information for that school. Those spread sheets were loaded into the FoxPro data base described above. In all, 2980 faculty members reported, compared to 4474 listed by the institutions in Table 4.16 as year 2000 faculty members, representing 66.6%

FACULTY DEMOGRAPHICS

Figures 5.1 through 5.8 display the following demographic data summed over all faculty at all study institutions: Ph.D. year, male and female faculty Ph.D. year, trends in male and female faculty Ph.D. year, start-year at current institution, start-year at current institution for male faculty, start-year at current institution for female faculty, distribution of faculty respondents across current rank, and gender distribution of faculty respondents across current rank. Figures 5.4 through 5.6 show increasing numbers of hires through 1999. The fall off in 2000 occurs because the survey only considered the period through June 30, 2000, so only spring 2000 hires were recorded. In both Ph.D. and start-year categories, women are gaining as a percentage of the total. Figures 5.7 and 5.8 show the distribution of faculty respondents across gender and rank.

GRANTS

Basic information about grants reported by faculty member is displayed in Table 5.1 and Figures 5.9 through 5.20. In the Faculty Perspectives, only External Faculty awards as defined in the Institutional Survey were counted. If other types of grants from sources such as HHMI or NSF-ILI were listed, they were not included in the totals since they are designated for larger segments of the institution than a single faculty member or a single research unit. The Total Grants and Total Grant dollars reported in Table 5.1 encompass totals that include both research- and education- related activities. Note that the table is ordered by the Total Grant dollars column. Total Grants include those awards designated specifically for faculty-initiated research, educational operations such as course and curriculum development, and outreach efforts. Research Grants and Research Grant dollars are a subset that includes only basic and applied research grants and single-investigator research instrumentation. Examples of research grants that were included are NSF-RUI research awards and ACS-PRF Type B grants. Research grants accounted for 89% of the total dollars we recorded in the faculty survey.

Also reported in Table 5.1 is the percentage of faculty reporting for each institution. That percentage varies from 11% to more than 100%. In the latter case it is likely that some regular faculty are on less than full-time appointments, that is, the head count is greater than the full-time-equivalent (FTE). Some emeriti who retired during the survey period submitted surveys, and they would not have been listed among an institution's year 2000 regular faculty. Institutions with less than fifty percent faculty response will find data in this section less valid than those whose faculty response was greater than seventy percent. Since fully two thirds of faculty from surveyed institutions did respond, however, the validity of the composite data can be judged accordingly.

In Table 5.2, total grant amount is separated according to the rank of the reporting faculty member: Professor, Associate Professor, or Assistant Professor, and takes into account years of service during 1990–2000. The table is ordered by the last column, Research Dollars/All Ranks/Year. At the bottom of Table 5.2, the averages are presented by All Institutions, Private, Public, Baccalaureate and Advance Degree institutions. Note the "grand averages" of the last column: 0.43 research grants (all ranks) per year, and $23,625 in research dollars (all ranks) per year. Figures 5.22 to 5.25 illustrate the results.

PUBLICATIONS AND PRESENTATIONS

Publications and Presentations by faculty in the natural sciences over the period under study are presented in Table 5.3 and Figures 5.26 through 5.29. Note the sums and averages at the bottom of the table. Because of uncertainties in origin of publication from faculty who began their academic appointment during the surveyed period, publication counts started with the year following the year of their academic appointment. Peer-reviewed research publications comprised 91% of those reported. When we could not verify that a publication had been peer reviewed, that publication was not included in the survey results. Faculty reported student authors, but we doubt that we have captured every publication that included an undergraduate coauthor. Similarly, we know that we included publications of faculty from their doctoral or postdoctoral research that included undergraduate coauthors. A publication with multiple student authors was counted as a unit. About one out of four publications included student authors.

Regarding presentations, the instructions requested a list of invited talks at other institutions or professional meetings. The material presented was culled to emphasize distinctive invitations, for example presenting a named invited lecture, or an invited keynote address at a major conference. Invitations to overseas meetings were accepted as were presentations at premier research institutions, but local departmental seminars were excluded.

Research publications separated by the rank of the faculty member reporting them (Professor, Associate Professor, or Assistant Professor) and taking into account years of service during 1990–2000 are given in Table 5.4 and Figures 5.30 through 5.32. At the bottom of Table 5.4, the averages are presented by All Institutions, Private, Public, Baccalaureate and Advance Degree institutions. The "grand average" for total research publications (all ranks) per year is 0.54.

The relationships between publications and grant dollar productivities is explored in Figures 5.33–5.35. Each point represents the aggregated faculty numbers for an institution. All institutions were included. For the comparison of research publications versus research dollars (Figure 5.33), the slope indicates $36,000 per publication using a regression analysis where y=mx.

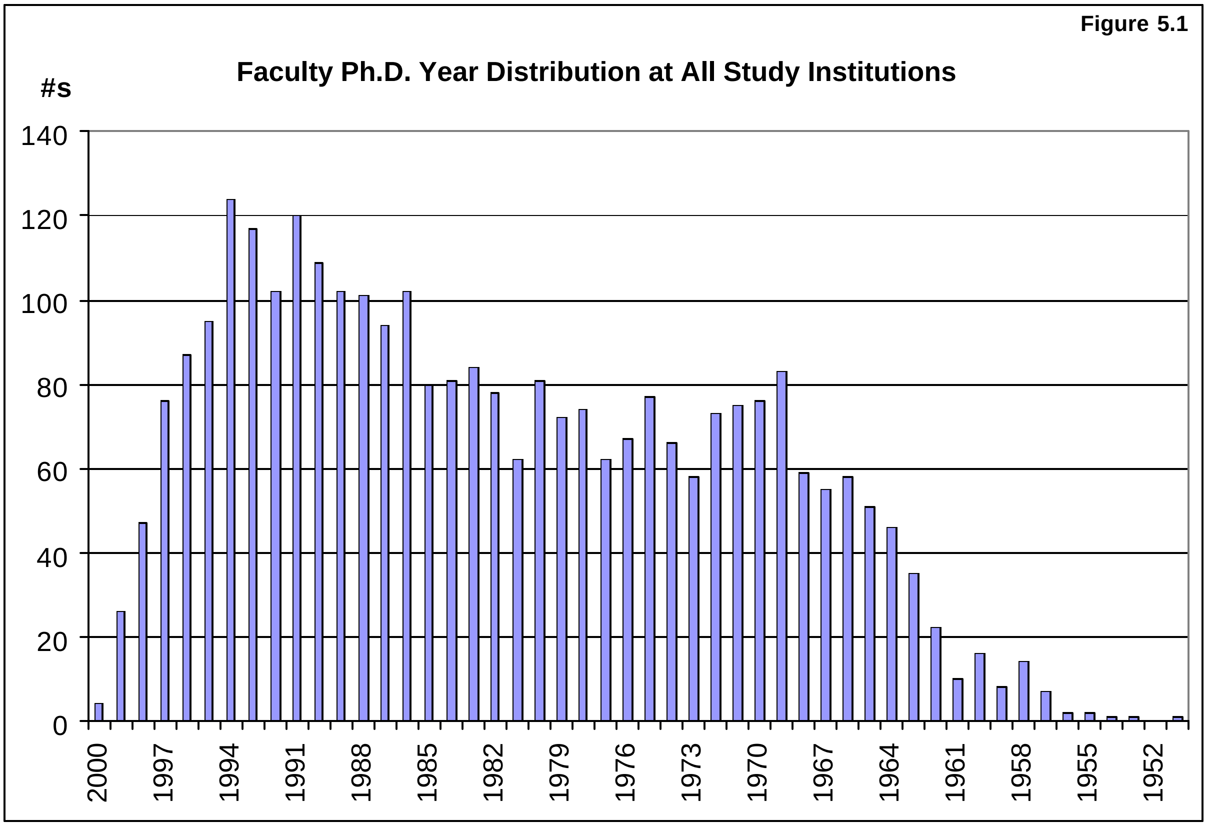


Figure 5.1
Faculty Ph.D. Year Distribution at All Study Institutions
#s
140
120
100
80
60
40
20
0
2000
1997
1994
1991
1988
1985
1982
1979
1976
1973
1970
1967
1964
1961
1958
1955
1952

Figure 5.2

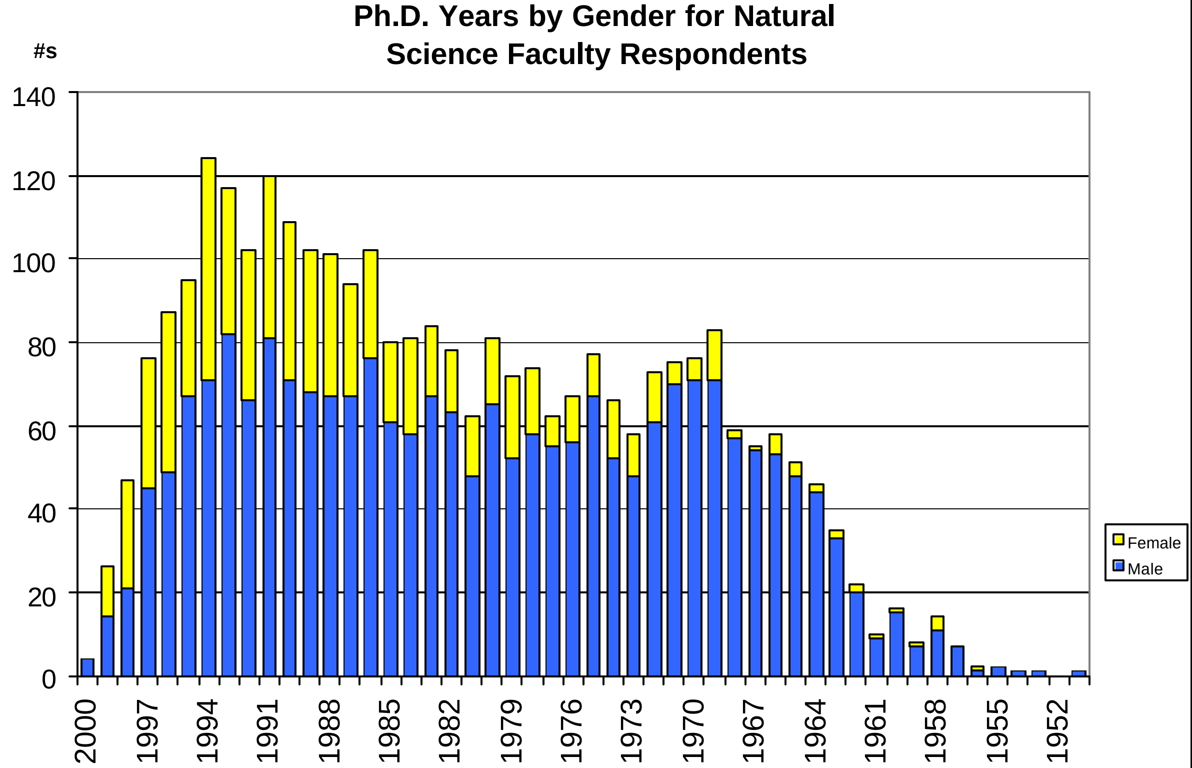


Figure 5.3

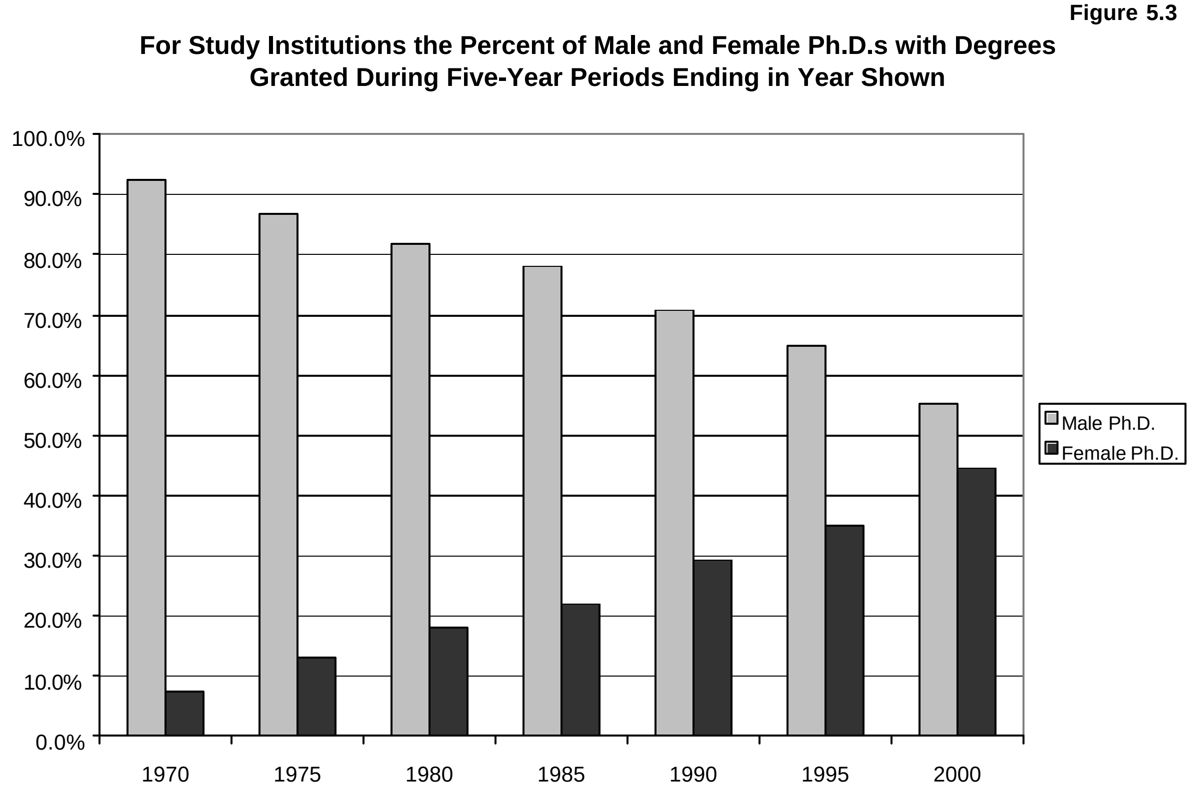
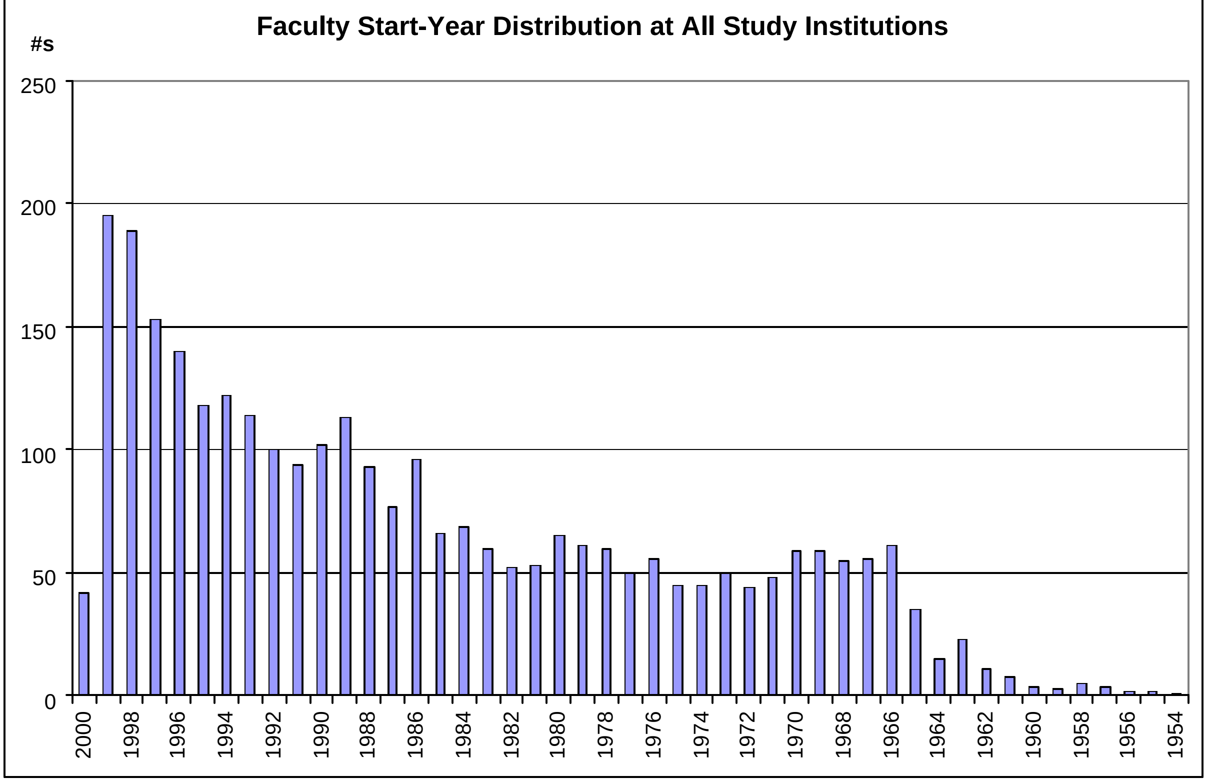


Figure 5.4


Faculty Start-Year Distribution at All Study Institutions
#s
250
200
150
100
50
0
2000
1998
1996
1994
1992
1990
1988
1986
1984
1982
1980
1978
1976
1974
1972
1970
1968
1966
1964
1962
1960
1958
1956
1954

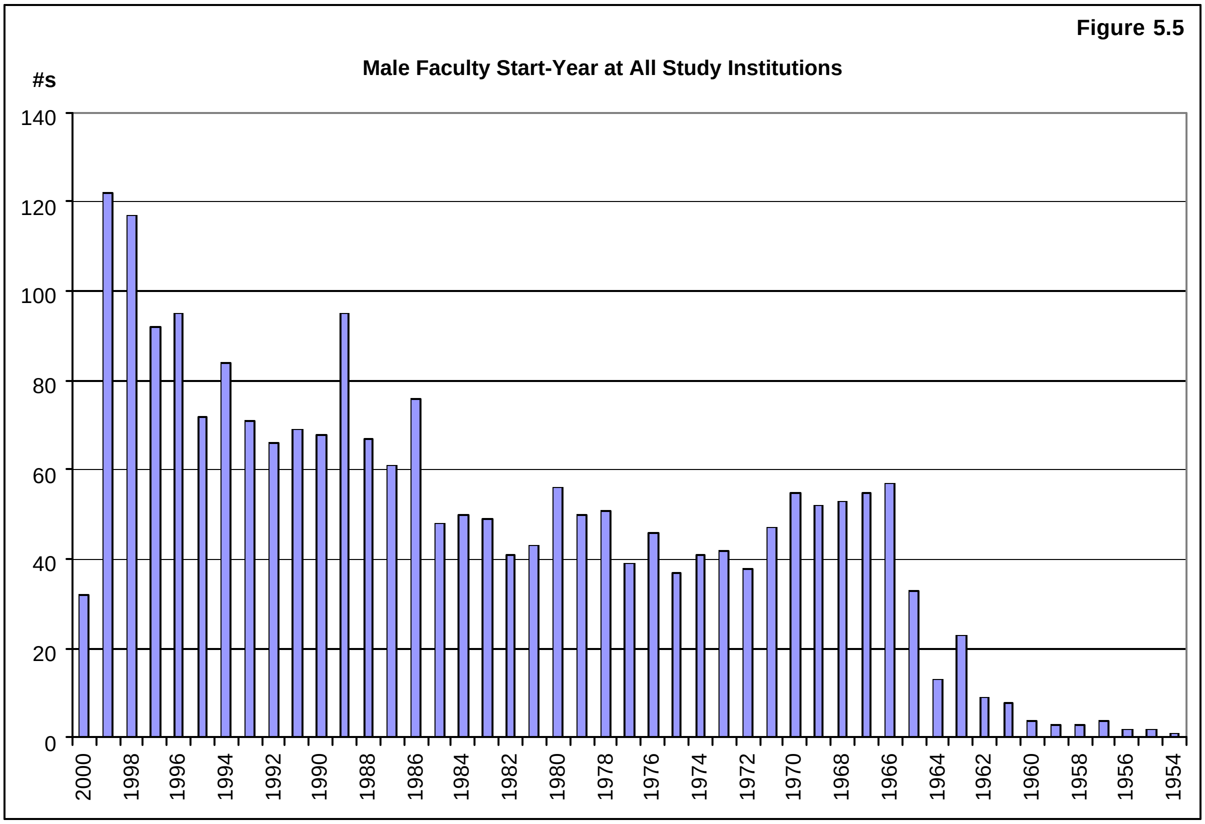


Figure 5.5
Male Faculty Start-Year at All Study Institutions
#s
140
120
100
80
60
40
20
0
2000
1998
1996
1994
1992
1990
1988
1986
1984
1982
1980
1978
1976
1974
1972
1970
1968
1966
1964
1962
1960
1958
1956
1954

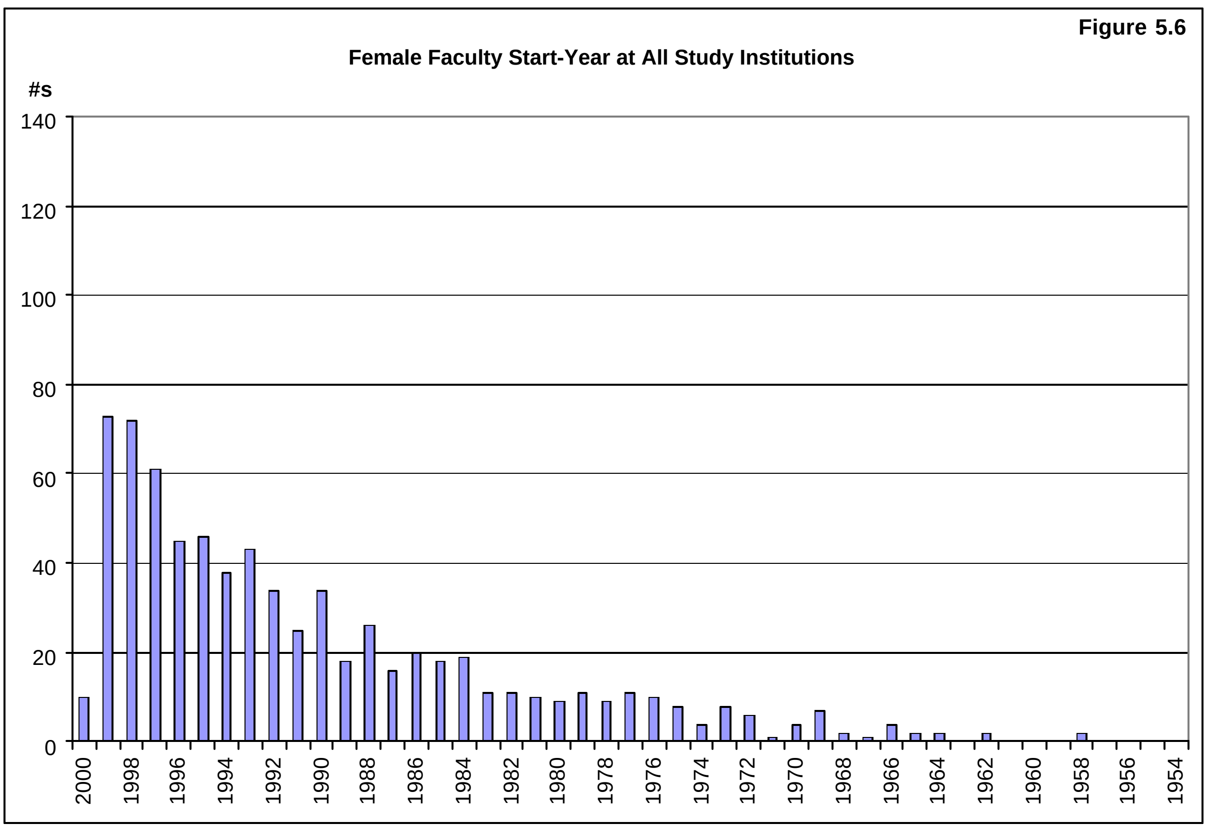


Figure 5.6
Female Faculty Start-Year at All Study Institutions
#s
140
120
100
80
60
40
20
0
2000
1998
1996
1994
1992
1990
1988
1986
1984
1982
1980
1978
1976
1974
1972
1970
1968
1966
1964
1962
1960
1958
1956
1954

Figure 5.7

Distribution of Faculty Respondents Across Ranks

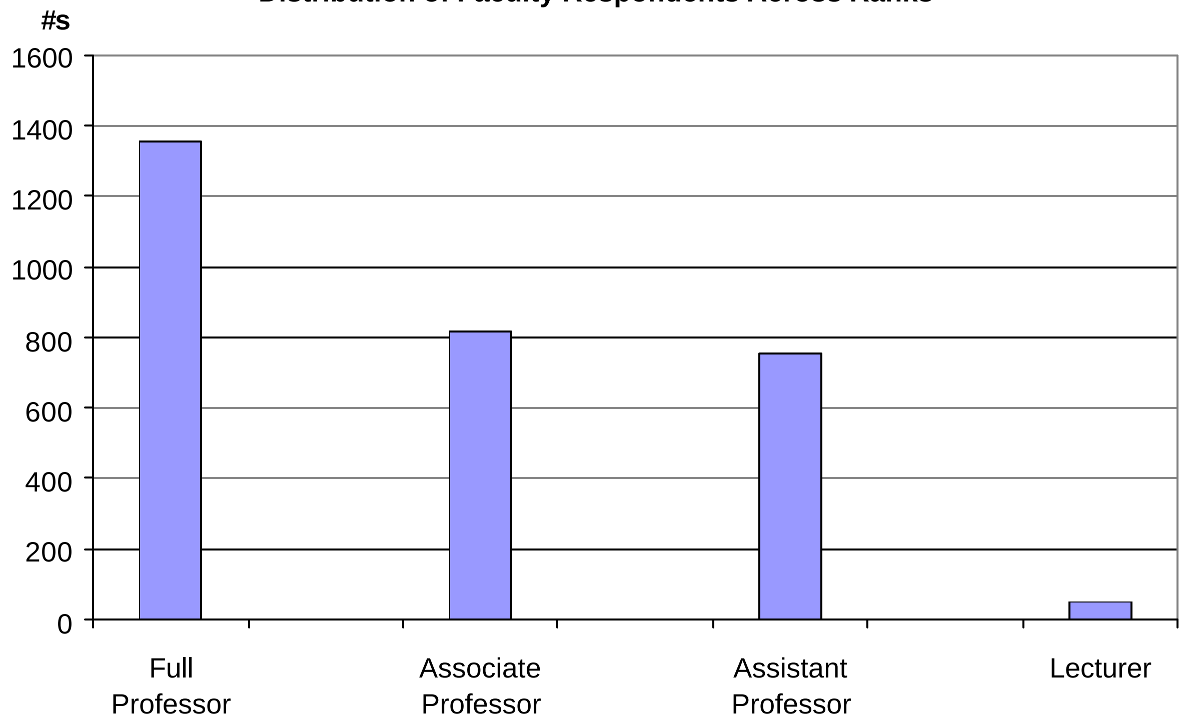


Figure 5.8

Gender Distribution of Faculty Respondents Across Ranks

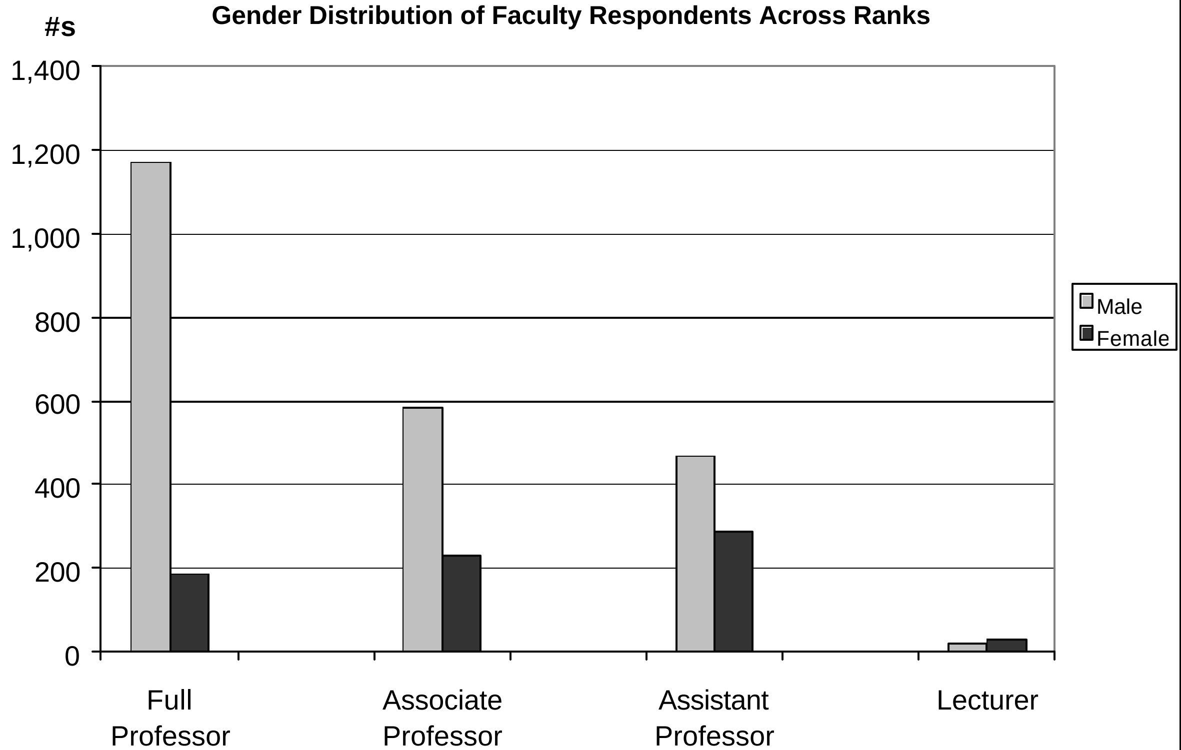


Table 5.1. Funding Reported by Faculty in All Study Institutions 1991–2000

Total Grants	Total Grant $	$ per Grant	Research Grants	Research Grant $	$ per Research Grant	Number of Faculty	Faculty Responding	% Response
272	23,214,772	85,348	259	22,565,741	87,126	82.6	65	78.7
455	23,198,268	50,985	391	18,441,703	47,165	78.7	53	67.3
150	20,840,674	138,938	143	20,769,275	145,240	52.1	39	74.9
138	12,947,748	93,824	107	8,961,622	83,753	34.2	46	134.5
117	9,734,129	83,198	101	8,831,961	87,445	143	55	38.5
146	9,285,422	63,599	130	8,567,563	65,904	76	27	35.5
122	8,614,535	70,611	105	8,404,688	80,045	85	63	74.1
162	8,163,459	50,392	134	6,556,277	48,927	54	33	61.1
71	7,374,334	103,864	69	7,324,141	106,147	13	13	100.0
117	7,344,868	62,777	109	7,174,868	65,824	69.7	38	54.5
94	6,856,522	72,942	84	6,384,522	76,006	30.5	40	131.2
58	6,620,607	114,148	49	6,347,606	129,543	21.8	22	100.9
130	5,639,792	43,383	118	5,403,657	45,794	23.8	24	100.8
78	5,513,512	70,686	66	5,266,821	79,800	37	23	62.2
60	5,467,526	91,125	52	5,044,597	97,011	34.5	32	92.8
61	5,123,133	83,986	58	4,916,033	84,759	24	24	100.0
52	5,091,034	97,905	44	4,865,221	110,573	38	29	76.3
77	5,031,214	65,340	72	4,965,714	68,968	26.6	28	105.3
90	5,029,184	55,880	64	3,270,777	51,106	68	37	54.4
111	4,676,482	42,130	89	4,116,578	46,254	36	27	75.0
33	4,514,188	136,794	27	4,228,554	156,613	29	17	58.6
180	4,513,020	25,072	168	4,155,494	24,735	32.1	23	71.7
68	4,460,478	65,595	63	4,292,901	68,141	39.5	36	91.1
76	4,294,111	56,501	51	2,830,201	55,494	34	28	82.4
70	4,274,408	61,063	36	4,452,058	123,668	68	12	17.7
83	4,210,250	50,726	69	3,821,892	55,390	32	31	96.9
55	4,169,440	75,808	54	4,151,440	76,879	31	24	77.4
78	4,073,379	52,223	67	3,831,853	57,192	33.3	27	81.1
103	4,048,298	39,304	97	3,904,901	40,257	20.5	18	87.8
49	4,030,859	82,262	27	1,243,171	46,043	24.3	21	86.4
54	3,658,327	67,747	46	3,196,393	69,487	27.7	25	90.3
94	3,613,015	38,436	75	3,002,909	40,039	60	31	51.7
127	3,523,967	27,748	106	2,835,794	26,753	87	52	59.8
54	3,515,130	65,095	51	3,499,440	68,616	33.5	36	107.5
79	3,422,988	43,329	66	3,051,906	46,241	65	48	73.9
75	3,366,916	44,892	54	2,792,401	51,711	29.3	24	81.9
52	3,294,855	63,363	44	3,024,232	68,733	32	25	78.1
53	3,157,375	59,573	45	2,749,684	61,104	42.3	40	94.6
76	3,156,294	41,530	56	2,081,902	37,177	46.7	55	117.8
109	3,093,393	28,380	95	2,758,943	29,042	33	30	90.9
63	2,908,834	46,172	51	2,728,504	53,500	15.9	22	138.4
52	2,849,736	54,803	44	2,682,693	60,970	28	19	67.9
53	2,820,333	53,214	46	2,508,092	54,524	30	30	100.0
46	2,786,304	60,572	43	2,781,204	64,679	49	34	69.4
41	2,701,158	65,882	40	2,688,758	67,219	26.5	11	41.5
65	2,502,309	38,497	42	2,072,537	49,346	34.7	23	66.3

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Table 5.1. Funding Reported by Faculty in All Study Institutions 1991–2000

Total Grants	Total Grant $	$ per Grant	Research Grants	Research Grant $	$ per Research Grant	Number of Faculty	Faculty Responding	% Response
54	2,498,030	46,260	51	2,436,492	47,774	43.5	15	34.5
76	2,443,236	32,148	70	2,262,236	32,318	27	23	85.2
40	2,382,010	59,550	36	2,249,446	62,485	29	18	62.1
114	2,378,137	20,861	96	2,025,008	21,094	49	49	100.0
61	2,332,976	38,246	57	2,155,738	37,820	30	29	96.7
65	2,118,034	32,585	51	1,653,789	32,427	88	47	53.4
64	2,005,302	31,333	41	1,613,845	39,362	41	28	68.3
41	2,004,954	48,901	31	1,596,314	51,494	30.2	23	76.2
82	1,963,966	23,951	75	1,767,182	23,562	54.4	42	77.2
32	1,959,463	61,233	30	1,920,463	64,015	23	17	73.9
68	1,956,105	28,766	56	1,778,721	31,763	40	22	55.0
16	1,950,463	121,904	16	1,950,463	121,904	13	10	76.9
12	1,948,453	162,371	9	1,912,353	212,484	13.5	11	81.5
50	1,930,415	38,608	44	1,802,603	40,968	37.3	16	42.9
68	1,801,493	26,493	63	1,578,813	25,061	69	20	29.0
26	1,799,839	69,225	24	1,742,839	72,618	15.8	15	94.9
58	1,695,313	29,230	56	1,609,853	28,747	21	17	81.0
31	1,677,516	54,113	29	1,611,516	55,570	29	21	72.4
50	1,651,814	33,036	44	635,304	14,439	12.7	13	102.4
20	1,640,745	82,037	19	1,626,315	85,596	20.3	17	83.7
44	1,602,209	36,414	40	1,352,609	33,815	54	24	44.4
43	1,570,919	36,533	30	1,459,428	48,648	19	15	79.0
26	1,546,841	59,494	25	1,517,396	60,696	30.5	18	59.0
24	1,500,533	62,522	18	1,171,178	65,065	18	12	66.7
78	1,482,980	19,013	39	1,001,188	25,671	38	24	63.2
30	1,448,436	48,281	27	1,440,361	53,347	28	15	53.6
58	1,424,661	24,563	27	1,090,034	40,372	30	23	76.7
33	1,411,892	42,785	18	1,041,663	57,870	27	15	55.6
33	1,364,276	41,342	30	1,341,976	44,733	12	6	50.0
16	1,356,961	84,810	16	1,356,961	84,810	15	12	80.0
25	1,356,587	54,263	25	1,356,587	54,263	24	17	70.8
61	1,316,759	21,586	58	1,306,294	22,522	16	16	100.0
26	1,244,150	47,852	36	1,102,150	30,615	21.1	18	85.3
28	1,199,943	42,855	22	874,273	39,740	34.8	18	51.7
20	1,189,602	59,480	20	1,189,602	59,480	73	15	20.6
34	1,139,558	33,516	28	1,090,958	38,963	31	17	54.8
15	1,126,499	75,100	15	1,126,499	75,100	26.5	18	67.9
43	1,086,323	25,263	39	1,054,329	27,034	27	22	81.5
17	1,004,415	59,083	9	805,415	89,491	11	8	72.7
40	983,106	24,578	30	782,009	26,067	24	19	79.2
55	977,789	17,778	19	596,903	31,416	24.4	24	98.4
48	924,527	19,261	33	617,653	18,717	20	21	105.0
34	908,985	26,735	23	635,700	27,639	14.3	9	62.9
10	893,896	89,390	10	893,896	89,390	34	22	64.7
8	866,173	108,272	8	866,173	108,272	30	10	33.3

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Table 5.1. Funding Reported by Faculty in All Institutions 1991–2000

Total Grants	Total Grant $	$ per Grant	Research Grants	Research Grant $	$ per Research Grant	Number of Faculty	Faculty Responding	% Response
36	866,076	24,058	34	837,076	24,620	23.9	18	75.3
16	860,273	53,767	14	754,273	53,877	24.7	12	48.6
41	859,690	20,968	27	506,537	18,761	53.5	40	74.8
19	827,842	43,571	9	406,647	45,183	18.3	18	98.4
16	822,130	51,383	13	548,370	42,182	22	17	77.3
26	803,255	30,894	19	434,548	22,871	34.5	25	72.5
29	801,748	27,646	26	762,548	29,329	22	21	95.5
32	782,165	24,443	30	698,165	23,272	24.5	25	102.0
6	758,828	126,471	4	719,928	179,982	18	6	33.3
30	746,275	24,876	25	654,823	26,193	29	24	82.8
21	705,291	33,585	16	649,941	40,621	12	12	100.0
22	692,955	31,498	18	590,367	32,798	19	21	110.5
20	689,432	34,472	20	689,432	34,472	82.6	11	13.3
25	673,428	26,937	21	660,708	31,462	42	30	71.4
30	660,650	22,022	9	182,577	20,286	13	13	100.0
21	569,630	27,125	13	470,630	36,202	44	14	31.8
34	537,700	15,815	26	443,700	17,065	19	19	100.0
29	510,072	17,589	18	360,107	20,006	31	14	45.2
7	502,081	71,726	4	265,081	66,270	27.8	10	36.0
39	487,370	12,497	29	438,542	15,122	35.6	24	67.4
6	471,769	78,628	6	471,769	78,628	25.3	3	11.9
23	435,183	18,921	19	401,683	21,141	25	22	88.0
28	423,768	15,135	24	255,768	10,657	19	14	73.7
25	366,956	14,678	22	300,028	13,638	57.3	11	19.2
24	361,233	15,051	17	237,120	13,948	19.5	16	82.1
12	353,063	29,422	9	324,230	36,026	21	14	66.7
19	347,592	18,294	18	340,092	18,894	43	9	20.9
6	327,065	54,511	3	147,232	49,077	12.6	9	71.4
9	324,514	36,057	7	312,164	44,595	16	10	62.5
15	299,306	19,954	15	299,306	19,954	26	15	57.7
2	271,041	135,521	1	33,724	33,724	24	15	62.5
24	250,302	10,429	13	140,743	10,826	25	17	68.0
19	248,544	13,081	9	111,781	12,420	27	14	51.9
17	245,154	14,421	12	160,925	13,410	20	12	60.0
20	235,470	11,774	15	189,470	12,631	16	13	81.3
10	234,155	23,416	7	200,718	28,674	17	16	94.1
9	222,768	24,752	4	83,500	20,875	21	17	81.0
17	219,313	12,901	14	175,693	12,550	17	15	88.2
7	142,441	20,349	5	138,941	27,788	35.3	10	28.3
7	114,299	16,328	2	24,999	12,500	11	9	81.8
6	46,490	7,748	6	46,490	7,748	9	9	100.0
4	28,463	7,116	3	27,750	9,250	9	5	55.6
Totals								
7,134	369,918,644	51,853	5,956	328,045,876	55,078	4,475	2,980	66.59

Figure 5.9

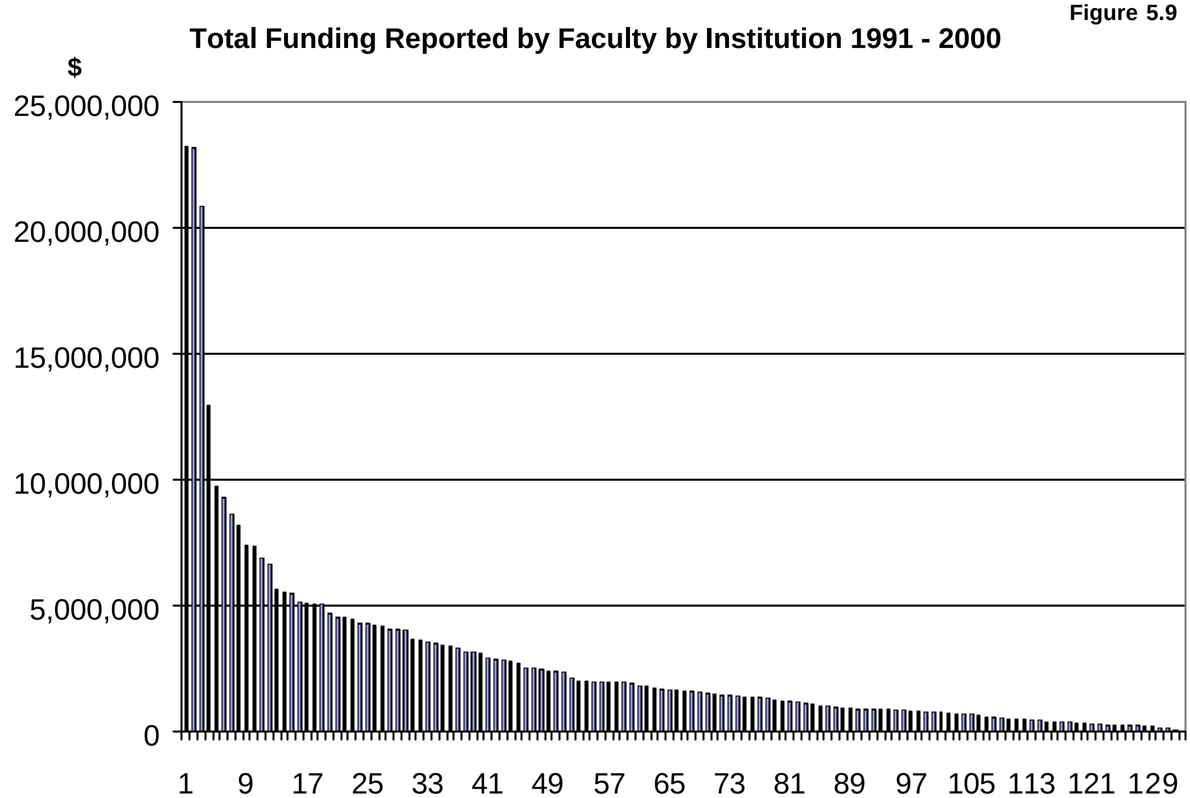
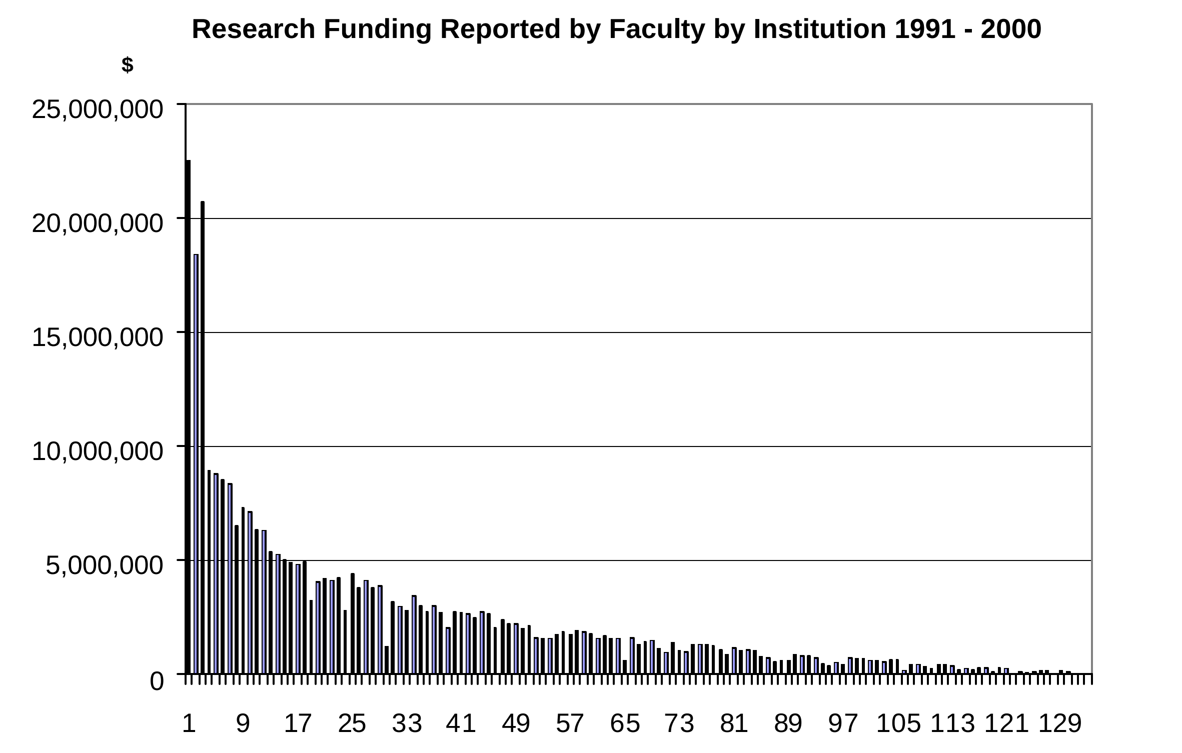


Figure 5.10



* same institutional order as above

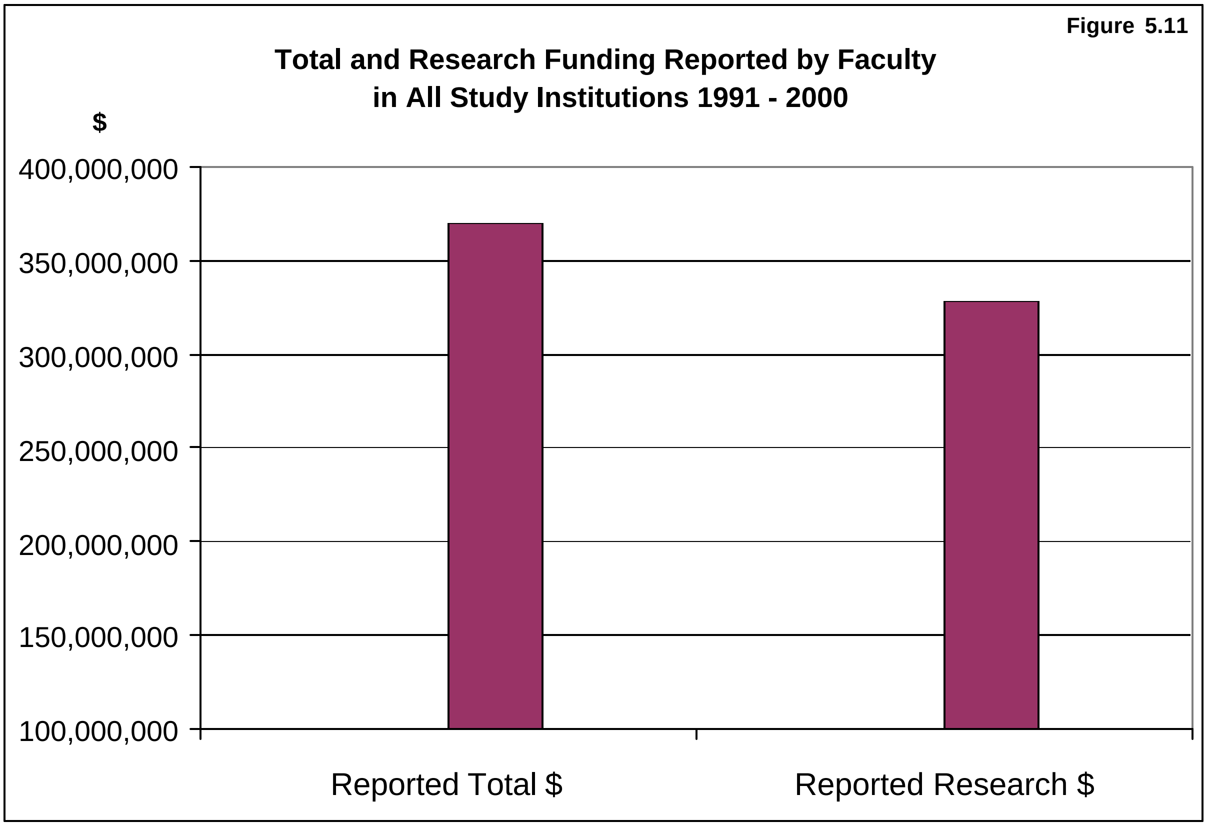


Figure 5.11
Total and Research Funding Reported by Faculty
in All Study Institutions 1991 - 2000
$
400,000,000
350,000,000
300,000,000
250,000,000
200,000,000
150,000,000
100,000,000
Reported Total $
Reported Research $

Figure 5.12

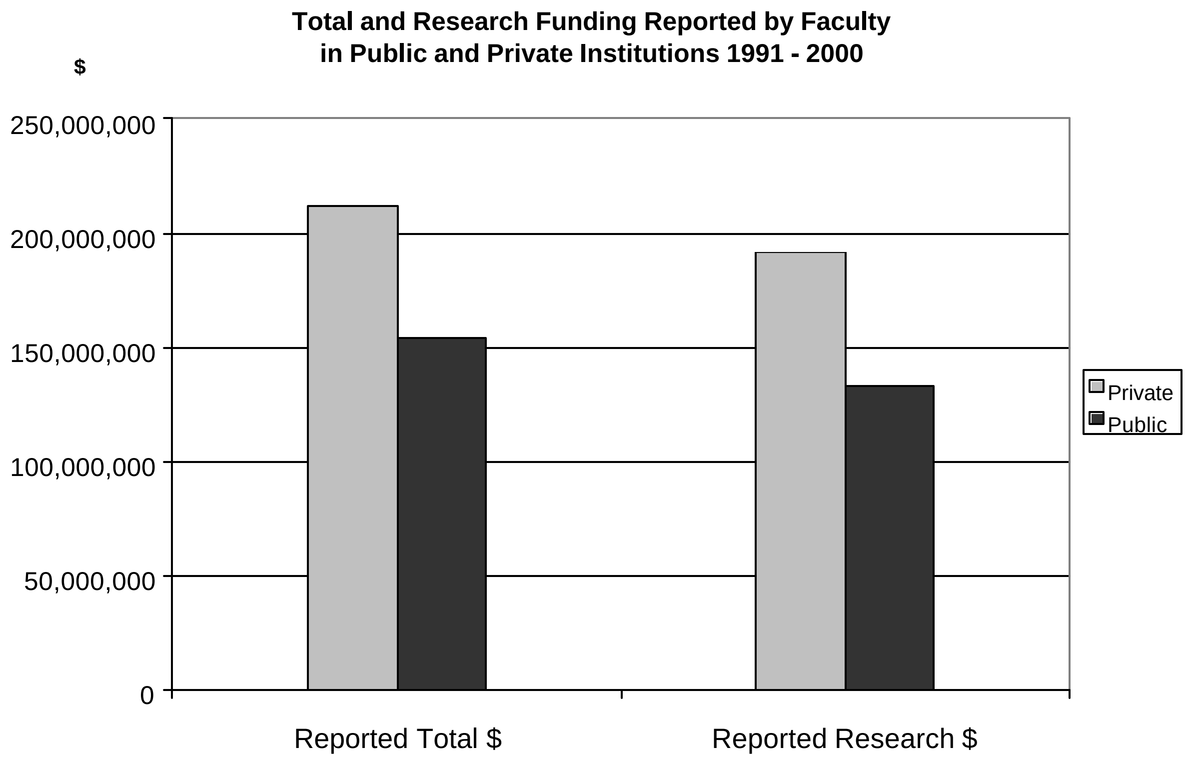
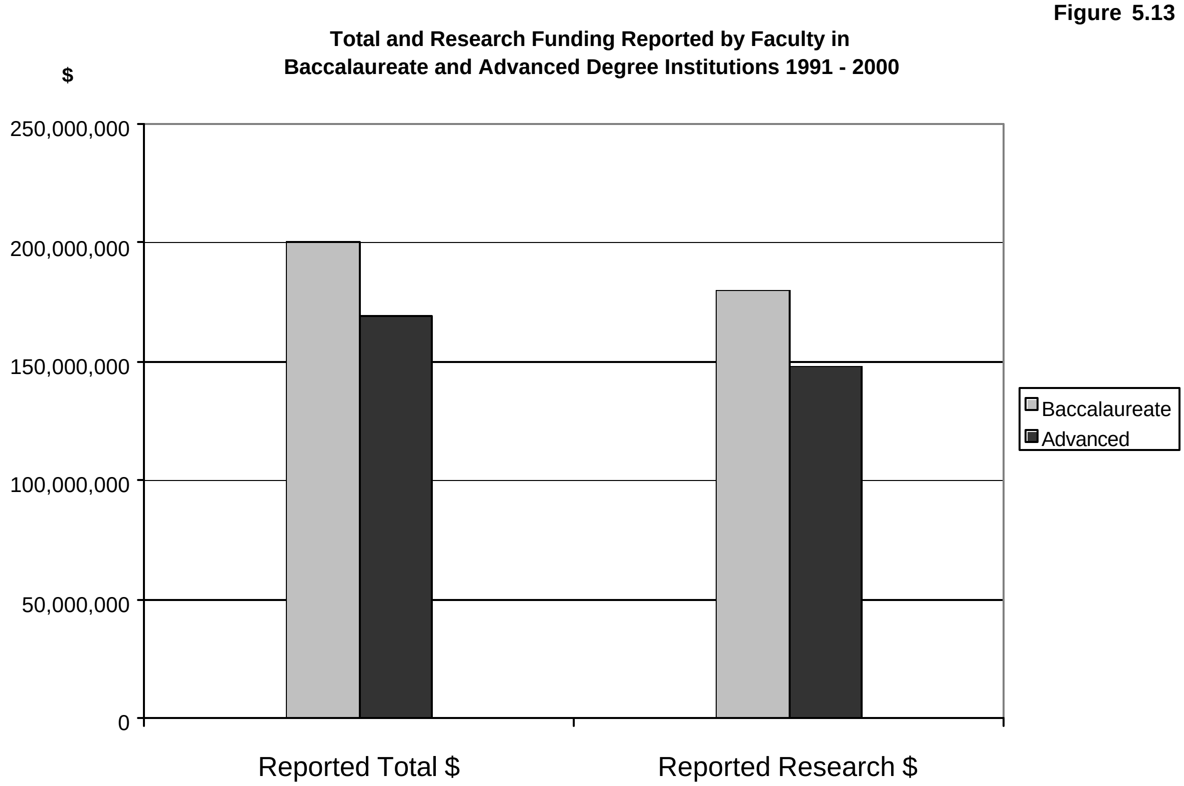


Figure 5.13



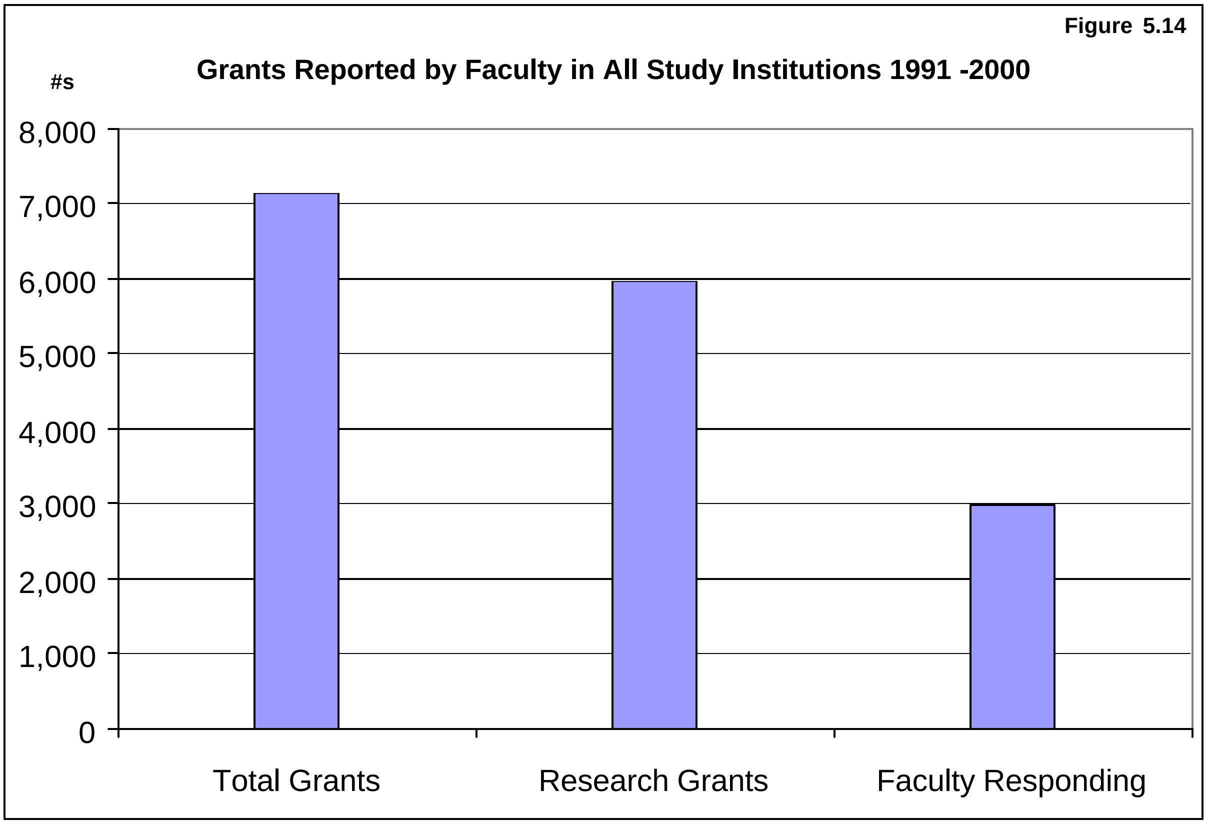


Figure 5.14
Grants Reported by Faculty in All Study Institutions 1991 -2000
#s
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
Total Grants
Research Grants
Faculty Responding

Figure 5.15

Grants Reported by Faculty in Public and Private Institutions 1991 - 2000

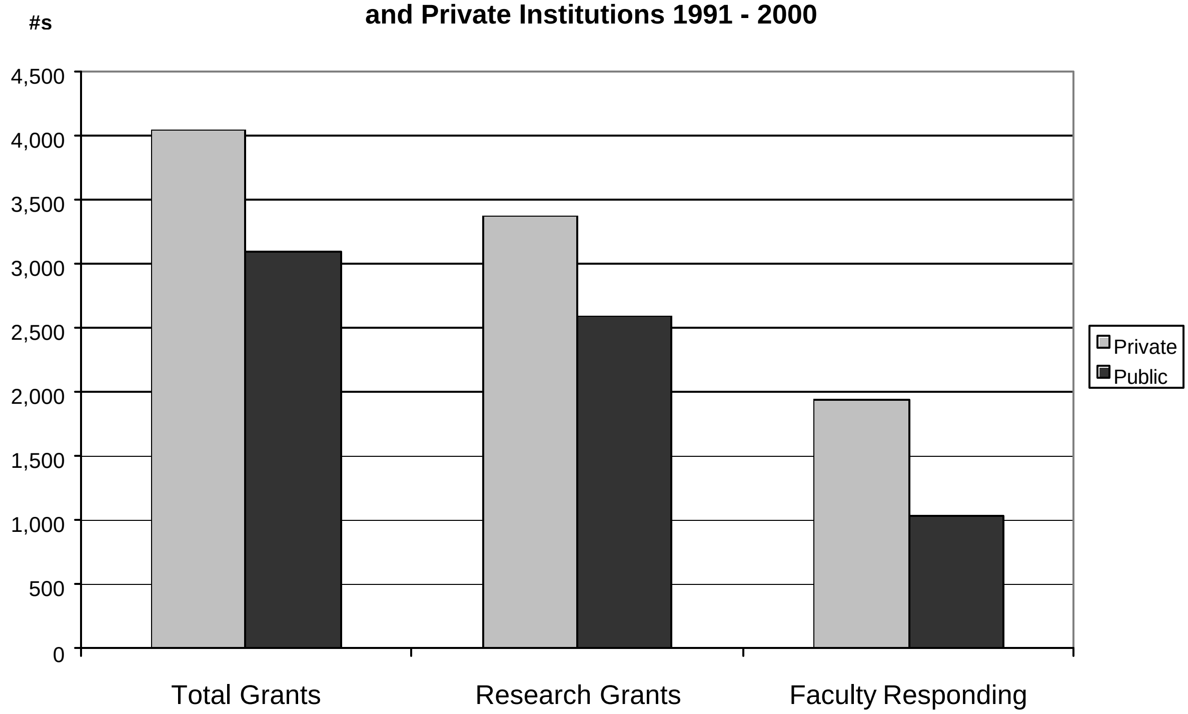
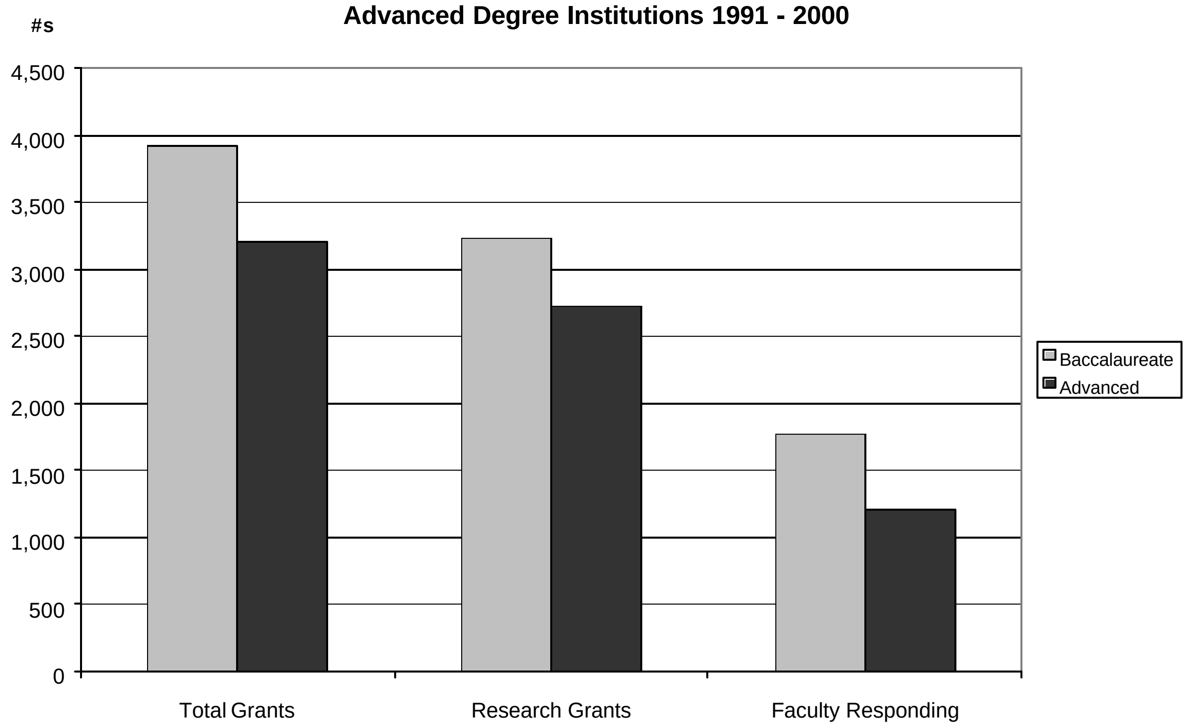


Figure 5.16

Grants Reported by Faculty in Baccalaureate and Advanced Degree Institutions 1991 - 2000



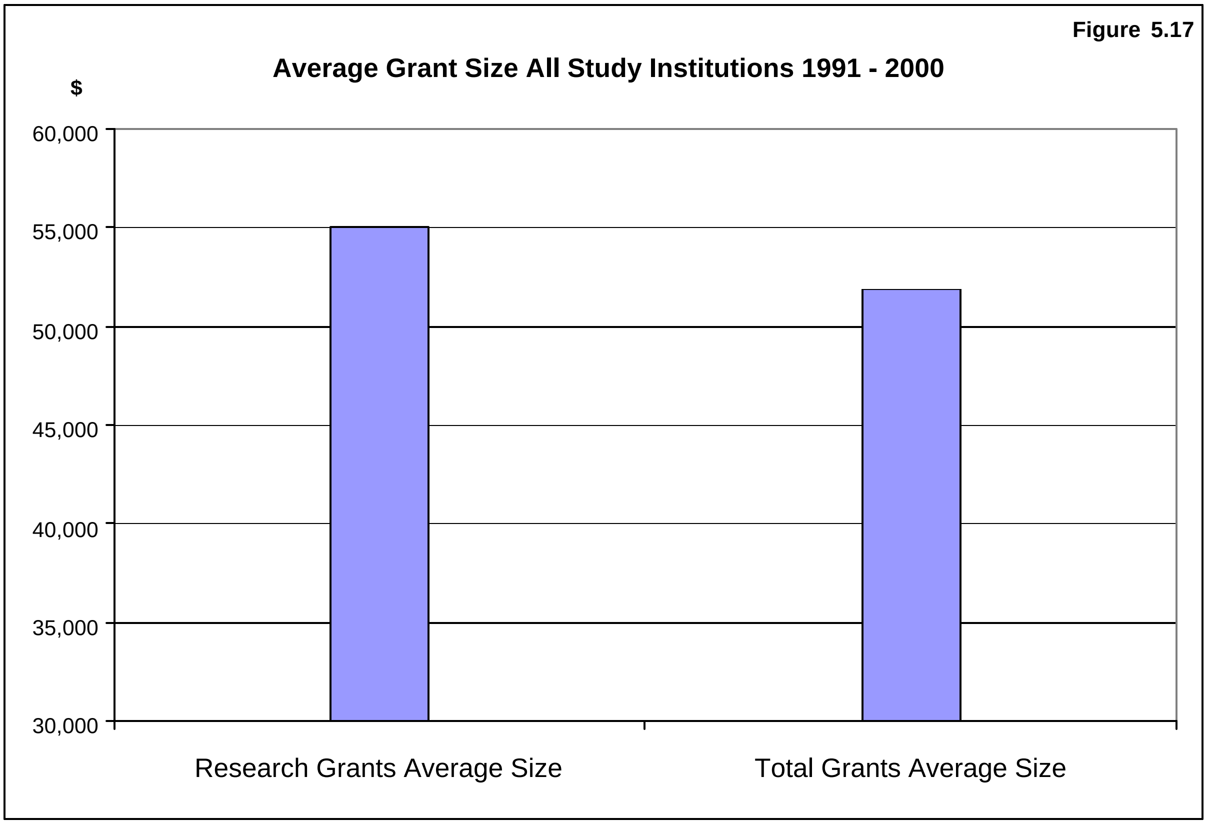


Figure 5.17
Average Grant Size All Study Institutions 1991 - 2000
$
60,000
55,000
50,000
45,000
40,000
35,000
30,000
Research Grants Average Size
Total Grants Average Size

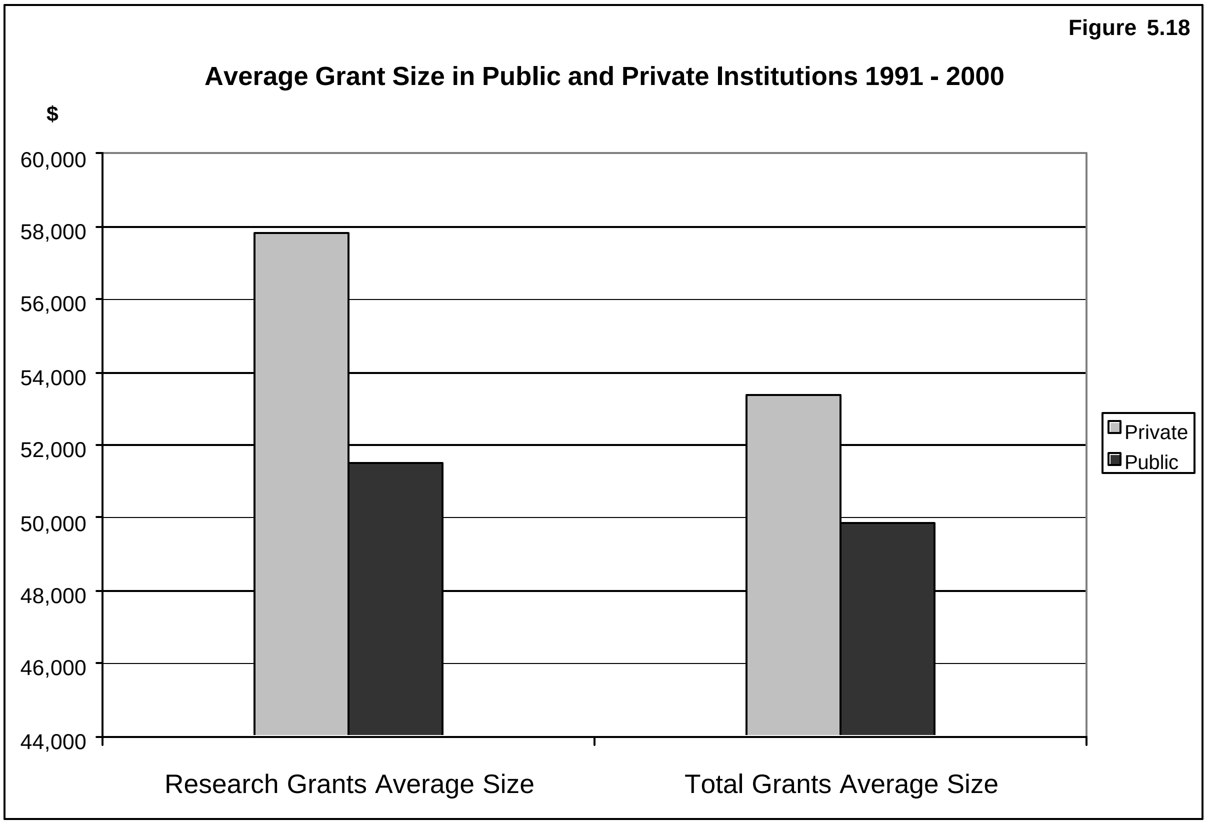


Figure 5.18
Average Grant Size in Public and Private Institutions 1991 - 2000
$
60,000
58,000
56,000
54,000
52,000
50,000
48,000
46,000
44,000
Private
Public
Research Grants Average Size
Total Grants Average Size

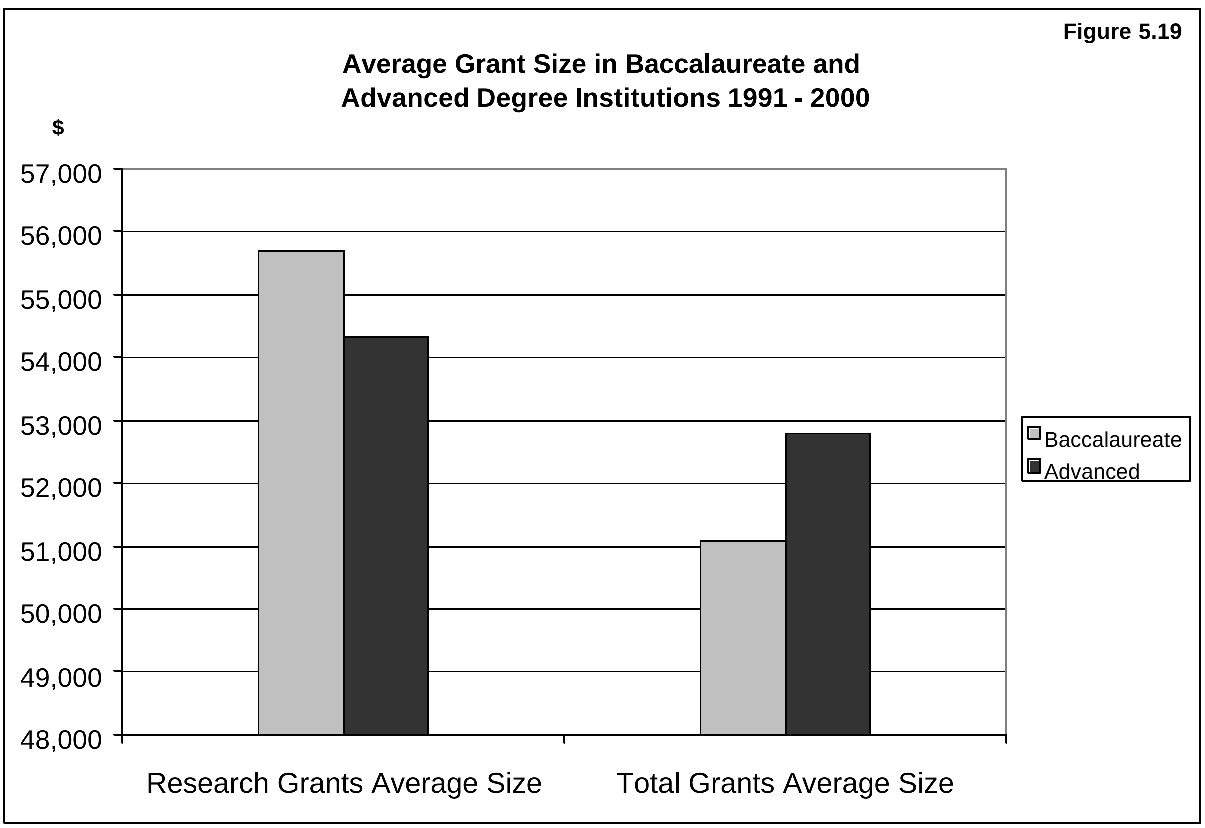


Figure 5.19
Average Grant Size in Baccalaureate and
Advanced Degree Institutions 1991 - 2000
$
57,000
56,000
55,000
54,000
53,000
52,000
51,000
50,000
49,000
48,000
Baccalaureate
Advanced
Research Grants Average Size
Total Grants Average Size

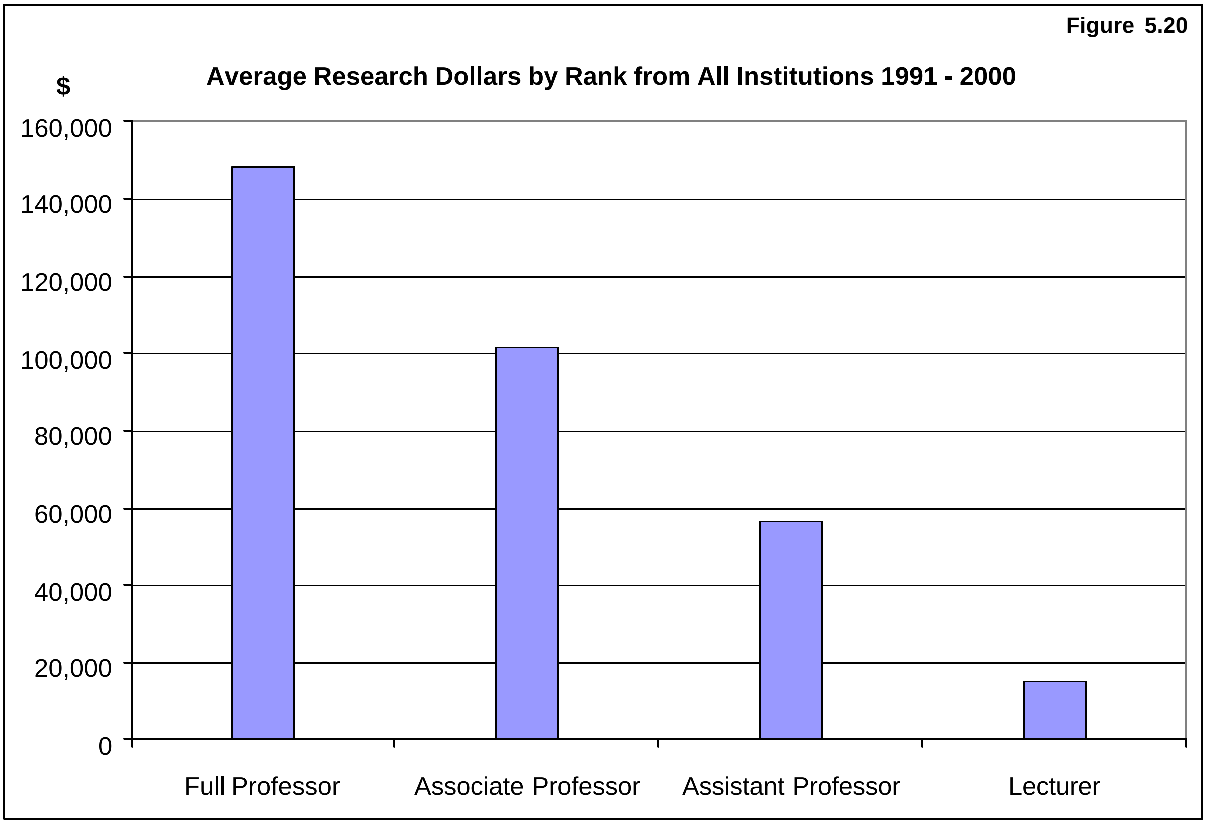


Figure 5.20
Average Research Dollars by Rank from All Institutions 1991 - 2000
$
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
Full Professor
Associate Professor
Assistant Professor
Lecturer

Table 5.2. Research Grants and Research Dollars per Faculty Member by Rank per Year of Service During 1991 - 2000

Research Grants/Full Prof./Year	Research Grants/Assoc. Prof./Year	Research Grants/Asst. Prof./Year	Research Dollars/Full Prof./Year	Research Dollars/Assoc. Prof./Year	Research Dollars/Asst. Prof./Year	Research Grants/All Ranks/Year	Research Dollars/All Ranks/Year
0.50	0.46	0.65	63,673	61,522	146,399	0.51	74,309
0.55	0.64	0.68	77,596	49,921	60,721	0.61	64,530
0.29	0.00	0.00	61,689	0	0	0.29	61,689
0.46	0.70	0.00	69,435	11,234	0	0.50	61,408
1.30	0.44	0.57	62,810	6,766	16,006	1.20	56,060
1.76	0.57	0.50	58,416	42,867	38,125	1.24	50,778
0.53	0.39	0.29	73,312	68,355	24,233	0.39	50,579
0.73	0.79	0.84	44,582	68,663	50,650	0.75	50,044
0.49	0.74	0.74	56,229	33,768	41,871	0.57	49,583
0.31	0.31	0.20	76,265	44,825	2,950	0.30	46,984
0.58	0.50	0.57	45,276	22,783	53,748	0.57	45,927
0.64	0.51	0.75	30,841	66,689	23,250	0.61	41,050
0.48	0.19	0.37	66,333	30,029	32,809	0.32	38,623
0.81	0.73	0.94	53,314	29,828	30,394	0.78	38,454
0.43	0.48	0.52	38,582	21,969	56,151	0.46	38,216
1.48	0.24	0.33	69,607	12,672	10,667	0.79	36,751
0.64	0.28	0.82	45,403	15,433	24,194	0.56	36,513
2.10	0.14	0.00	58,638	2,857	0	1.31	36,326
0.91	0.50	0.78	24,309	4,000	88,831	0.79	35,315
1.70	0.62	0.60	41,867	15,429	17,760	1.41	34,774
0.19	0.32	0.57	29,176	26,750	72,119	0.31	34,383
0.87	0.60	0.33	29,904	23,249	116,000	0.81	33,977
0.62	0.19	1.09	49,726	1,381	34,693	0.64	33,891
0.39	0.40	0.22	34,200	37,179	6,778	0.39	33,774
0.36	0.44	0.54	25,073	39,860	42,963	0.41	32,815
0.35	0.19	0.27	36,365	13,217	12,333	0.32	31,139
0.52	1.29	0.73	28,308	43,648	27,839	0.67	30,443
0.55	0.36	0.00	36,513	15,279	0	0.48	29,319
0.37	0.25	0.29	32,650	14,657	25,484	0.34	28,749
0.37	0.33	0.50	37,909	23,693	16,702	0.37	28,730
0.38	0.26	0.37	28,412	21,128	30,301	0.36	27,619
0.46	0.35	1.00	37,217	15,805	45,601	0.42	27,049
0.39	0.57	0.50	28,269	34,145	2,425	0.43	26,855
0.33	0.43	1.00	24,667	26,736	57,749	0.38	25,863
0.19	0.61	0.43	2,619	47,210	38,057	0.39	25,460
0.91	0.56	0.25	32,417	11,840	1,250	0.78	25,276
0.41	0.27	0.25	31,746	11,187	27,639	0.35	24,033
0.83	0.70	0.50	15,922	52,460	12,667	0.76	23,203
1.62	0.29	0.58	56,218	20,852	11,381	0.43	22,991
0.29	0.22	0.44	47,973	21,353	8,896	0.31	22,990
0.29	0.38	0.33	19,618	25,457	26,066	0.33	22,922
0.00	0.19	0.10	0	51,762	8,401	0.13	22,855
0.27	0.22	0.30	29,740	10,164	6,101	0.27	22,806
0.20	0.20	0.33	32,287	2,500	11,333	0.21	22,794
0.29	0.48	0.33	19,289	19,676	35,962	0.37	22,204
0.29	0.18	0.50	23,086	21,839	14,033	0.26	22,127
0.19	0.29	0.00	26,593	15,973	0	0.24	21,283
0.39	0.21	0.91	13,281	21,002	57,481	0.42	21,239
0.34	0.39	0.42	10,342	22,290	37,009	0.38	20,942
0.26	0.35	0.44	17,081	22,579	24,904	0.33	20,828

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Table 5.2. Research Grants and Research Dollars per Faculty Member by Rank per Year of Service During 1991 - 2000

Research Grants/Full Prof./Year	Research Grants/Assoc. Prof./Year	Research Grants/Asst. Prof./Year	Research Dollars/Full Prof./Year	Research Dollars/Assoc. Prof./Year	Research Dollars/Asst. Prof./Year	Research Grants/All Ranks/Year	Research Dollars/All Ranks/Year
0.36	0.32	0.41	21,773	16,503	20,579	0.36	20,491
0.38	0.21	0.50	17,215	19,883	26,107	0.31	20,154
0.40	0.45	1.00	20,353	19,495	34,000	0.42	20,136
0.34	0.41	0.00	17,997	22,138	0	0.37	19,916
0.42	0.18	0.55	25,348	5,754	15,246	0.39	19,830
0.35	0.18	0.36	37,747	9,638	8,923	0.27	19,365
0.31	0.54	0.50	10,481	21,398	40,488	0.41	19,015
0.16	0.40	0.33	7,055	56,867	49,808	0.21	18,951
0.29	0.26	0.27	17,067	25,850	2,255	0.27	18,611
0.64	0.54	0.50	24,248	15,395	9,994	0.58	18,337
0.44	0.24	0.31	16,535	24,829	16,200	0.38	18,243
0.26	0.24	0.43	18,313	17,004	22,357	0.27	18,179
0.35	0.30	0.36	9,279	17,322	44,110	0.32	17,579
0.48	0.27	0.68	23,934	4,426	27,380	0.43	17,014
0.89	0.24	0.33	14,218	22,004	16,073	0.67	16,707
0.00	0.14	0.33	0	18,357	15,176	0.25	16,568
0.27	0.25	0.35	11,440	14,564	49,747	0.27	16,367
0.26	0.46	0.20	12,208	28,231	23,700	0.30	16,078
0.22	0.30	0.43	19,159	15,146	4,171	0.28	15,903
0.27	0.35	0.38	12,297	20,836	9,494	0.31	15,467
0.50	0.19	0.32	60,000	4,871	25,589	0.25	15,327
0.50	0.31	0.25	22,737	7,333	6,263	0.40	15,128
0.29	0.14	0.00	22,168	11,381	0	0.19	14,977
0.64	0.27	0.25	17,486	13,275	10,583	0.44	14,864
0.55	0.48	0.26	18,923	8,392	6,935	0.50	14,598
0.34	0.36	0.40	18,857	9,204	5,068	0.35	13,723
0.60	0.53	1.00	11,633	15,671	9,167	0.60	13,398
0.60	0.00	0.00	12,821	0	0	0.60	12,821
0.24	0.00	0.24	15,457	0	6,181	0.24	12,784
0.29	0.32	0.00	5,135	17,487	0	0.31	12,499
0.27	0.16	0.25	17,565	4,744	8,420	0.23	12,389
0.32	0.31	0.46	18,255	3,930	8,346	0.33	12,069
0.14	0.33	0.40	1,483	15,510	12,828	0.30	11,978
0.35	0.40	0.25	10,827	12,583	12,875	0.37	11,941
0.37	0.40	0.63	11,334	9,952	23,356	0.40	11,458
0.35	0.35	0.17	9,358	16,984	671	0.33	11,396
0.10	0.24	0.38	6,961	12,468	10,381	0.24	11,050
0.23	0.67	0.50	9,812	19,957	16,676	0.27	10,727
0.38	0.42	0.50	14,777	5,134	6,500	0.40	10,637
0.43	0.32	0.71	10,607	9,982	16,072	0.40	10,621
0.32	0.41	0.58	10,420	6,508	16,642	0.40	10,394
0.25	0.28	0.23	7,533	15,693	2,438	0.26	10,247
0.38	0.56	0.60	10,038	4,955	23,942	0.43	10,185
0.33	0.14	0.36	6,429	7,423	20,727	0.28	10,121
0.19	0.33	1.07	8,057	12,300	7,246	0.40	9,906
0.27	0.00	0.29	11,470	0	3,714	0.27	9,825
0.50	0.25	0.50	10,218	8,919	17,553	0.36	9,629
0.19	0.50	0.31	9,502	265	11,444	0.23	9,621
0.48	0.30	0.40	8,175	9,343	16,927	0.43	9,040
0.00	0.29	0.40	0	476	26,788	0.32	8,964

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Table 5.2. Research Grants and Research Dollars per Faculty Member by Rank per Year of Service During 1991 - 2000

Research Grants/Full Prof./Year	Research Grants/Assoc. Prof./Year	Research Grants/Asst. Prof./Year	Research Dollars/Full Prof./Year	Research Dollars/Assoc. Prof./Year	Research Dollars/Asst. Prof./Year	Research Grants/All Ranks/Year	Research Dollars/All Ranks/Year
0.67	0.00	0.33	9,366	0	1,667	0.64	8,696
0.19	0.30	0.50	2,657	5,565	34,541	0.29	8,380
0.48	0.19	0.60	9,348	4,857	10,400	0.41	8,200
0.44	0.71	0.53	6,079	8,133	12,778	0.57	8,197
0.24	0.24	0.27	10,387	4,568	5,290	0.24	7,978
0.00	0.26	0.23	0	8,884	5,737	0.25	7,773
0.28	0.30	0.00	4,483	10,330	0	0.29	7,519
0.12	0.33	0.17	4,971	10,315	17,506	0.16	7,134
0.19	0.14	0.00	16,710	1,833	0	0.16	7,015
0.19	0.10	0.00	12,381	1,641	0	0.14	7,011
0.21	0.56	0.29	3,457	9,914	7,712	0.37	6,825
0.43	0.23	0.75	3,486	9,081	7,696	0.35	6,668
0.29	0.35	0.00	7,873	5,877	0	0.33	6,639
0.15	0.67	0.25	3,766	31,513	4,563	0.21	6,596
0.29	0.23	0.64	7,714	4,838	15,973	0.28	6,556
0.17	0.35	0.69	1,739	8,763	11,694	0.31	5,793
0.22	0.26	0.50	6,878	4,656	10,000	0.25	5,718
0.10	0.14	0.50	95	1,943	26,486	0.19	5,352
0.46	0.19	0.67	3,305	7,339	8,677	0.39	5,191
0.27	0.31	0.00	5,648	3,031	0	0.28	4,823
0.19	0.32	0.67	7,595	3,521	7,483	0.31	4,690
0.17	0.23	0.00	2,480	5,667	0	0.20	4,251
0.25	0.17	0.63	4,497	2,083	2,694	0.31	3,861
0.10	0.32	0.00	2,395	3,735	0	0.28	3,477
0.21	0.41	0.60	1,476	6,340	1,980	0.32	3,365
0.25	0.00	0.50	3,072	0	7,500	0.27	3,337
0.10	0.00	0.00	3,212	0	0	0.10	3,212
0.24	0.11	0.50	2,815	2,943	5,288	0.22	3,120
0.48	0.10	0.00	2,381	2,149	0	0.29	2,268
0.10	0.10	0.00	95	2,619	0	0.10	1,988
0.10	0.10	0.58	2,238	1,760	1,872	0.18	1,915
0.00	0.10	0.25	0	1,428	2,500	0.14	1,724
0.10	0.00	0.20	1,238	0	350	0.12	1,067
All Institutions:							
0.47	0.35	0.47	26,770	17,484	27,103	0.43	23,625
Private Institutions:							
0.37	0.33	0.43	22,248	17,457	26,163	0.36	20,908
Public Institutions:							
0.63	0.43	0.57	34,325	17,559	29,271	0.57	29,195
Baccalaureate Institutions:							
0.41	0.33	0.44	23,141	17,331	26,674	0.38	21,436
Advanced Degree Institutions:							
0.55	0.40	0.52	31,753	17,762	27,811	0.50	26,997

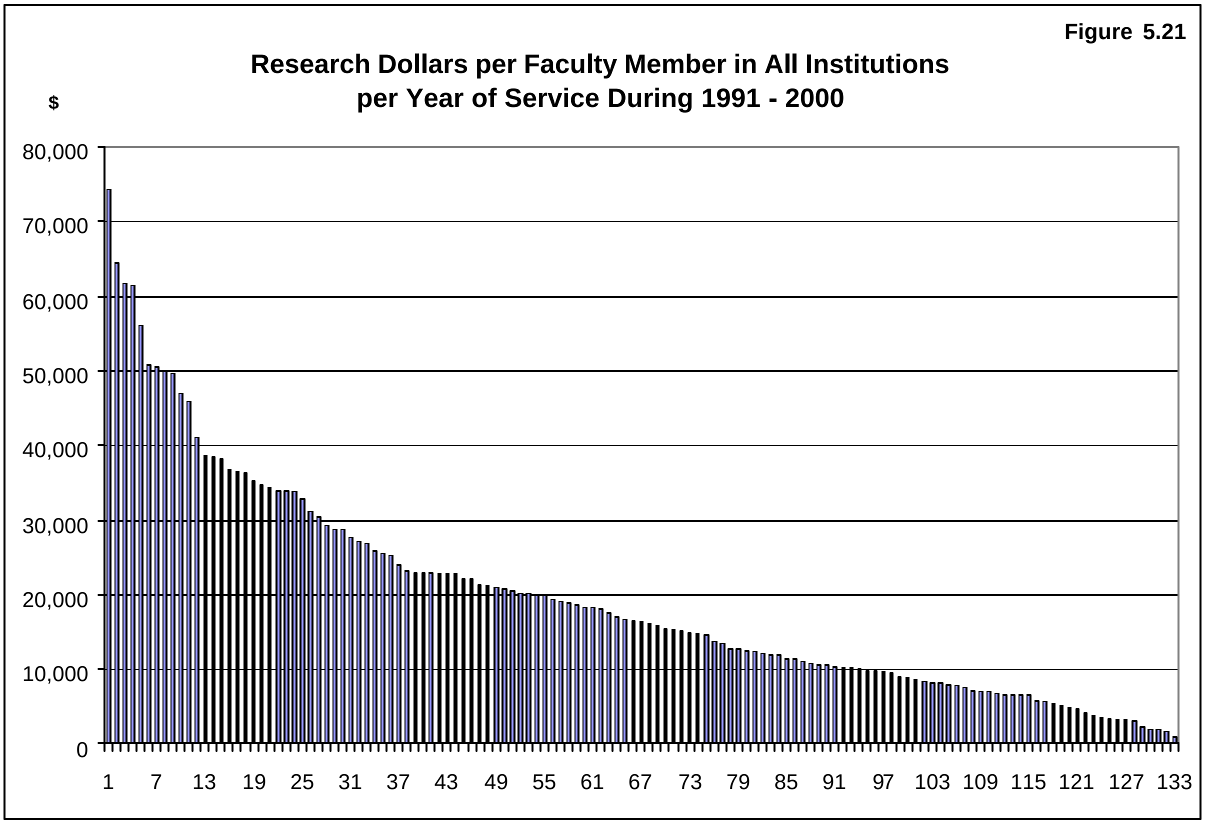
Figure 5.21
Research Dollars per Faculty Member in All Institutions
per Year of Service During 1991 - 2000
$
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
1 7 13 19 25 31 37 43 49 55 61 67 73 79 85 91 97 103 109 115 121 127 133

Figure 5.22

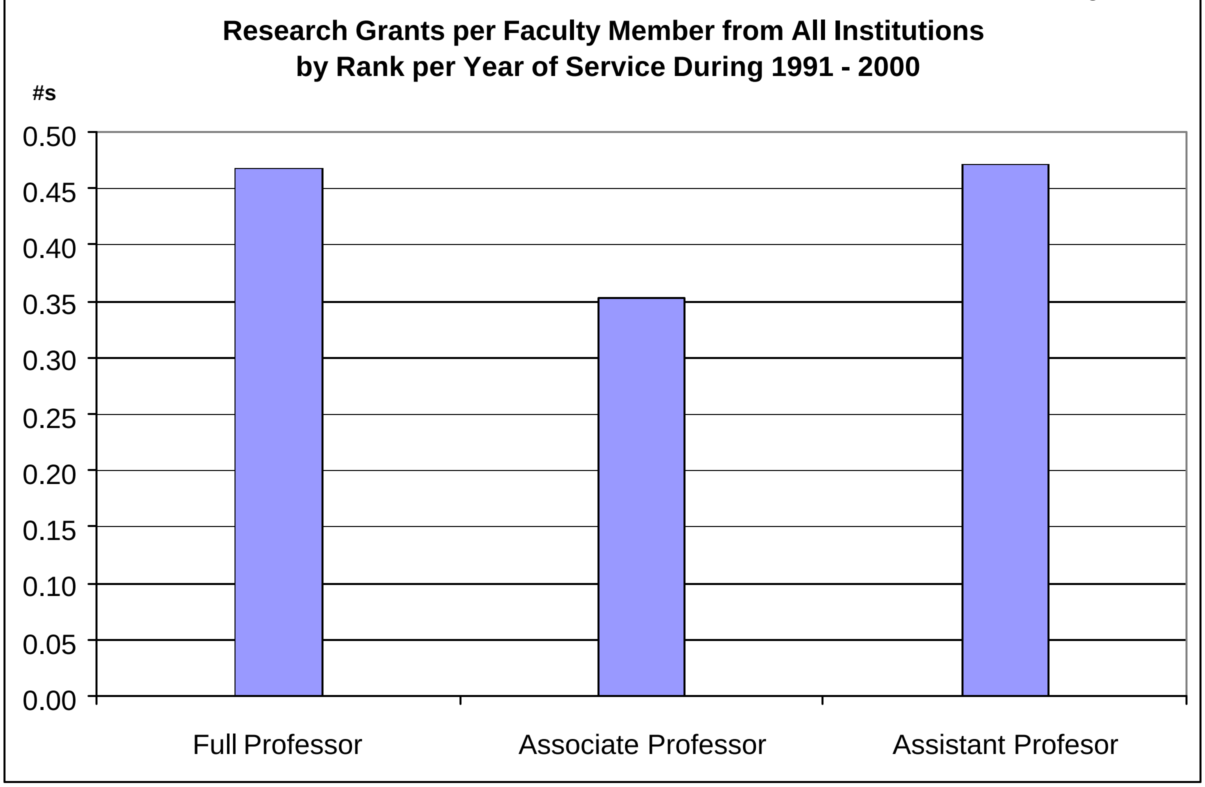

Figure 5.23

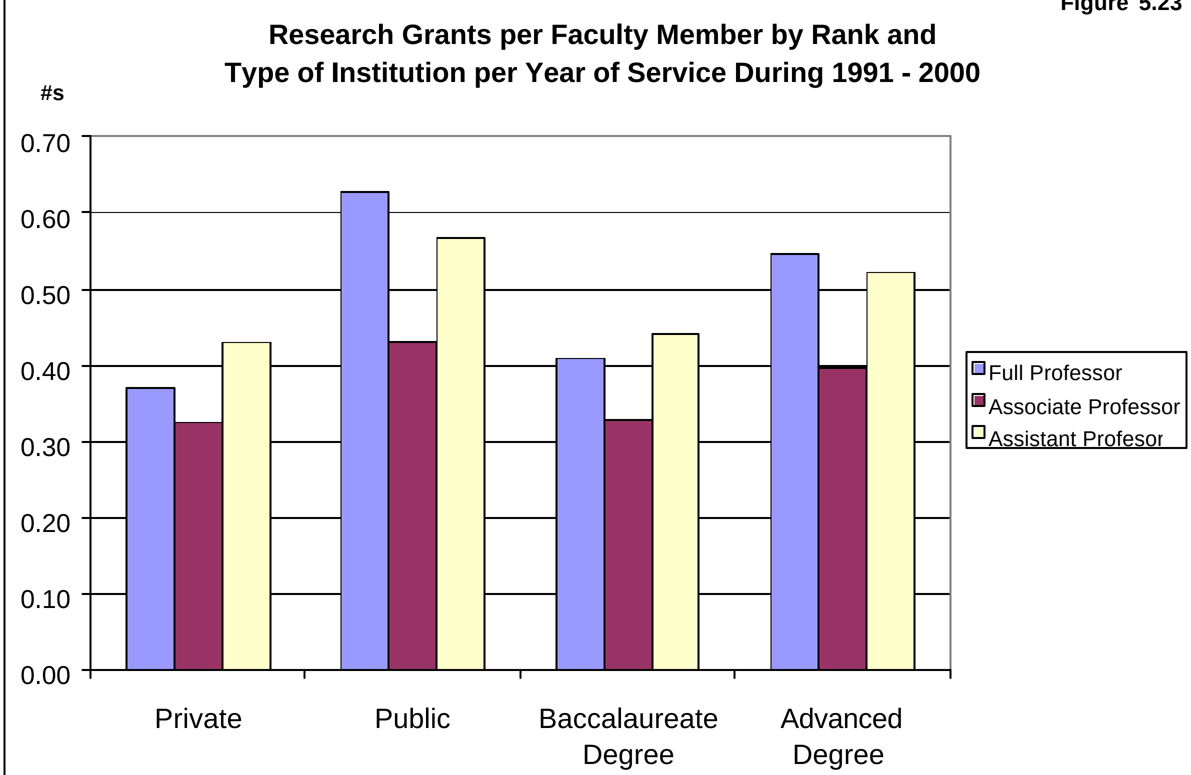

Figure 5.24

Research Grant Dollars per Faculty Member from All Institutions by Rank per Year of Service During 1991 - 2000

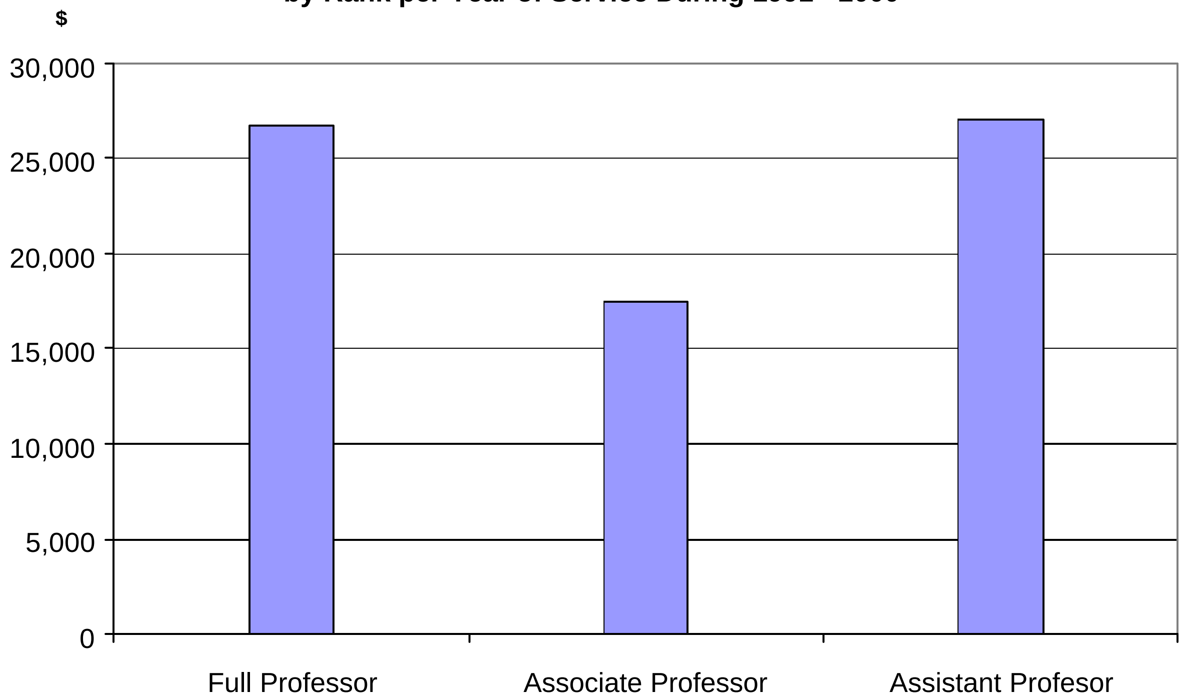

Figure 5.25

Research Grant Dollars per Faculty Member by Rank and Type of Institution per Year of Service During 1991 - 2000

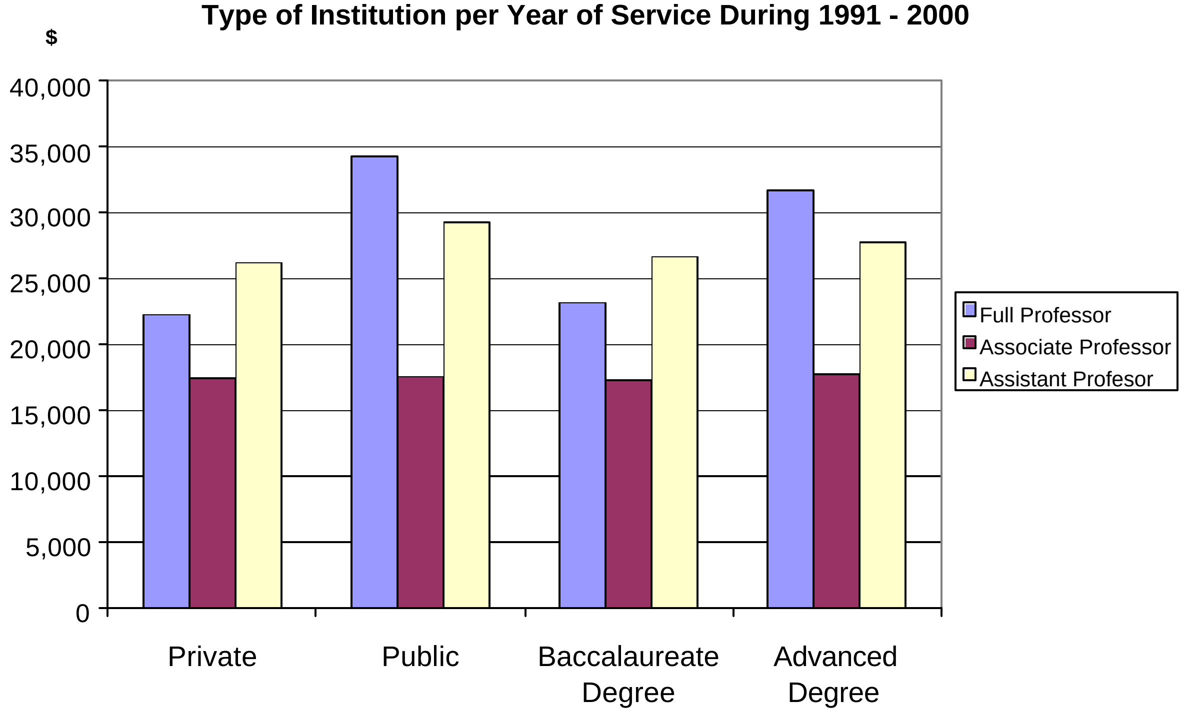

Table 5.3. Publications and Presentations by Faculty in the Natural Sciences in All Institutions 1991 - 2000

Total Publications	Research Publications	Number of Faculty	Faculty Respondents	Research Publications per Respondent	Publications with Students	% Publications with Students	Invited Presentations	Presentations per Respondent
343	338	76.0	27	12.5	76	22.2%	39	1.4
470	468	52.1	39	12.0	218	46.4%	235	6.0
153	148	13.0	13	11.4	56	36.6%	125	9.6
745	726	82.6	65	11.2	76	10.2%	149	2.3
248	244	24.0	24	10.2	40	16.1%	56	2.3
36	30	25.3	3	10.0	31	86.1%	11	3.7
185	169	20.5	18	9.4	73	39.5%	44	2.4
250	241	33.3	27	8.9	112	44.8%	48	1.8
79	78	12.6	9	8.7	25	31.6%	2	0.2
112	95	26.5	11	8.6	49	43.8%	49	4.5
50	50	12.0	6	8.3	37	74.0%	6	1.0
154	123	43.5	15	8.2	66	42.9%	45	3.0
174	163	21.8	22	7.4	25	14.4%	42	1.9
349	338	34.2	46	7.3	94	26.9%	87	1.9
177	171	31.0	24	7.1	63	35.6%	68	2.8
235	232	54.0	33	7.0	70	29.8%	41	1.2
200	193	26.6	28	6.9	41	20.5%	50	1.8
170	166	27.7	25	6.6	35	20.6%	33	1.3
156	151	37.0	23	6.6	48	30.8%	42	1.8
228	223	49.0	34	6.6	47	20.6%	25	0.7
159	145	34.7	23	6.3	46	28.9%	27	1.2
347	330	78.7	53	6.2	47	13.5%	104	2.0
99	93	27.0	15	6.2	40	40.4%	15	1.0
206	196	34.5	32	6.1	63	30.6%	68	2.1
153	144	23.8	24	6.0	45	29.4%	28	1.2
235	213	33.5	36	5.9	26	11.1%	45	1.3
59	59	35.3	10	5.9	13	22.0%	6	0.6
128	112	28.0	19	5.9	59	46.1%	52	2.7
233	223	69.7	38	5.9	65	27.9%	74	1.9
170	159	38.0	29	5.5	18	10.6%	50	1.7
254	218	30.5	40	5.5	51	20.1%	172	4.3
65	65	24.7	12	5.4	16	24.6%	10	0.8
100	92	23.0	17	5.4	26	26.0%	33	1.9
276	265	49.0	49	5.4	46	16.7%	18	0.4
180	162	33.0	30	5.4	111	61.7%	29	1.0
239	215	42.3	40	5.4	89	37.2%	39	1.0
116	102	24.0	19	5.4	26	22.4%	11	0.6
155	149	34.0	28	5.3	64	41.3%	53	1.9
125	121	32.1	23	5.3	32	25.6%	1	0.0
119	89	20.3	17	5.2	36	30.3%	11	0.6
127	112	27.0	22	5.1	30	23.6%	21	1.0
182	182	39.5	36	5.1	29	15.9%	20	0.6
150	131	41.0	28	4.7	59	39.3%	38	1.4
93	70	19.0	15	4.7	25	26.9%	2	0.1
152	142	32.0	31	4.6	62	40.8%	41	1.3

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Table 5.3. Publications and Presentations by Faculty in the Natural Sciences in All Institutions 1991 - 2000

Total Publications	Research Publications	Number of Faculty	Faculty Respondents	Research Publications per Respondent	Publications with Students	% Publications with Students	Invited Presentations	Presentations per Respondent
97	91	69.0	20	4.6	11	11.3%	25	1.3
85	81	30.5	18	4.5	20	23.5%	5	0.3
123	106	29.3	24	4.4	50	40.7%	20	0.8
117	101	27.0	23	4.4	32	27.4%	27	1.2
52	51	15.0	12	4.3	17	32.7%	7	0.6
81	72	21.0	17	4.2	23	28.4%	45	2.6
120	91	15.9	22	4.1	43	35.8%	14	0.6
76	70	31.0	17	4.1	18	23.7%	3	0.2
123	102	32.0	25	4.1	17	13.8%	11	0.4
187	171	54.4	42	4.1	68	36.4%	29	0.7
126	118	30.0	29	4.1	30	23.8%	22	0.8
227	210	87.0	52	4.0	11	4.8%	29	0.6
39	36	14.3	9	4.0	27	69.2%	17	1.9
56	46	68.0	12	3.8	2	3.6%	14	1.2
66	65	24.0	17	3.8	23	34.8%	5	0.3
98	91	54.0	24	3.8	41	41.8%	18	0.8
60	53	44.0	14	3.8	22	36.7%	8	0.6
125	115	60.0	31	3.7	35	28.0%	14	0.5
88	81	40.0	22	3.7	18	20.5%	4	0.2
97	92	24.5	25	3.7	21	21.6%	26	1.0
96	87	24.4	24	3.6	20	20.8%	9	0.4
106	76	24.3	21	3.6	31	29.2%	56	2.7
50	39	82.6	11	3.5	23	46.0%	0	0.0
56	52	28.0	15	3.5	8	14.3%	15	1.0
17	17	9.0	5	3.4	7	41.2%	6	1.2
85	81	38.0	24	3.4	21	24.7%	17	0.7
55	49	15.8	15	3.3	19	34.5%	12	0.8
76	68	19.0	21	3.2	33	43.4%	17	0.8
61	58	29.0	18	3.2	22	36.1%	54	3.0
56	48	73.0	15	3.2	9	16.1%	21	1.4
35	32	13.0	10	3.2	8	22.9%	9	0.9
50	47	26.0	15	3.1	15	30.0%	8	0.5
90	72	30.2	23	3.1	27	30.0%	3	0.1
133	115	68.0	37	3.1	36	27.1%	37	1.0
40	40	12.7	13	3.1	16	40.0%	11	0.8
89	55	18.3	18	3.1	20	22.5%	53	2.9
54	45	17.0	15	3.0	18	33.3%	5	0.3
35	35	20.0	12	2.9	1	2.9%	12	1.0
31	29	30.0	10	2.9	1	3.2%	4	0.4
76	69	29.0	24	2.9	28	36.8%	10	0.4
197	157	46.7	55	2.9	21	10.7%	39	0.7
165	155	143.0	55	2.8	0	0.0%	21	0.4
69	59	29.0	21	2.8	17	24.6%	40	1.9
52	47	25.0	17	2.8	14	26.9%	12	0.7
76	57	22.0	21	2.7	19	25.0%	23	1.1
182	165	85.0	63	2.6	17	9.3%	40	0.6

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Table 5.3. Publications and Presentations by Faculty in the Natural Sciences in All Institutions 1991 - 2000

Total Publications	Research Publications	Number of Faculty	Faculty Respondents	Research Publications per Respondent	Publications with Students	% Publications with Students	Invited Presentations	Presentations per Respondent
65	47	34.8	18	2.6	13	20.0%	6	0.3
58	56	34.0	22	2.5	2	3.4%	22	1.0
151	122	65.0	48	2.5	41	27.2%	31	0.6
96	75	30.0	30	2.5	21	21.9%	42	1.4
63	57	30.0	23	2.5	18	28.6%	8	0.3
50	39	19.5	16	2.4	22	44.0%	9	0.6
34	29	18.0	12	2.4	7	20.6%	2	0.2
36	29	12.0	12	2.4	14	38.9%	2	0.2
23	21	43.0	9	2.3	2	8.7%	0	0.0
63	44	19.0	19	2.3	11	17.5%	15	0.8
33	32	19.0	14	2.3	6	18.2%	2	0.1
57	49	25.0	22	2.2	7	12.3%	4	0.2
37	37	29.0	17	2.2	5	13.5%	8	0.5
34	30	27.0	14	2.1	4	11.8%	8	0.6
42	34	17.0	16	2.1	9	21.4%	10	0.6
20	19	9.0	9	2.1	5	25.0%	3	0.3
117	99	88.0	47	2.1	19	16.2%	10	0.2
44	35	22.0	17	2.1	11	25.0%	2	0.1
94	82	53.5	40	2.1	11	11.7%	10	0.3
53	51	34.5	25	2.0	11	20.8%	16	0.6
66	61	42.0	30	2.0	7	10.6%	15	0.5
34	32	16.0	16	2.0	10	29.4%	9	0.6
23	22	13.5	11	2.0	2	8.7%	5	0.5
46	42	20.0	21	2.0	3	6.5%	32	1.5
45	26	21.0	14	1.9	11	24.4%	7	0.5
24	24	13.0	13	1.8	6	25.0%	5	0.4
30	26	24.0	15	1.7	12	40.0%	6	0.4
19	19	57.3	11	1.7	5	26.3%	1	0.1
52	31	26.5	18	1.7	7	13.5%	2	0.1
34	27	21.0	17	1.6	3	8.8%	7	0.4
45	42	36.0	27	1.6	7	15.6%	9	0.3
43	28	21.1	18	1.6	8	18.6%	11	0.6
16	12	11.0	8	1.5	0	0.0%	3	0.4
30	19	31.0	14	1.4	5	16.7%	1	0.1
30	20	37.3	16	1.3	2	6.7%	10	0.6
26	22	23.9	18	1.2	6	23.1%	6	0.3
15	13	16.0	13	1.0	5	33.3%	3	0.2
57	24	35.6	24	1.0	7	12.3%	4	0.2
8	8	16.0	10	0.8	1	12.5%	6	0.6
3	3	11.0	9	0.3	0	0.0%	0	0.0
1	1	18.0	6	0.2	0	0.0%	1	0.2
0	0	27.8	10	0.0	0	0.0%	0	0.0
Totals								
14,528	13,222	4,475	2,980	4.4	3,732	25.7%	3,395	1.1

Figure 5.26

Research Publications per Respondent in All Institutions 1991 -2000

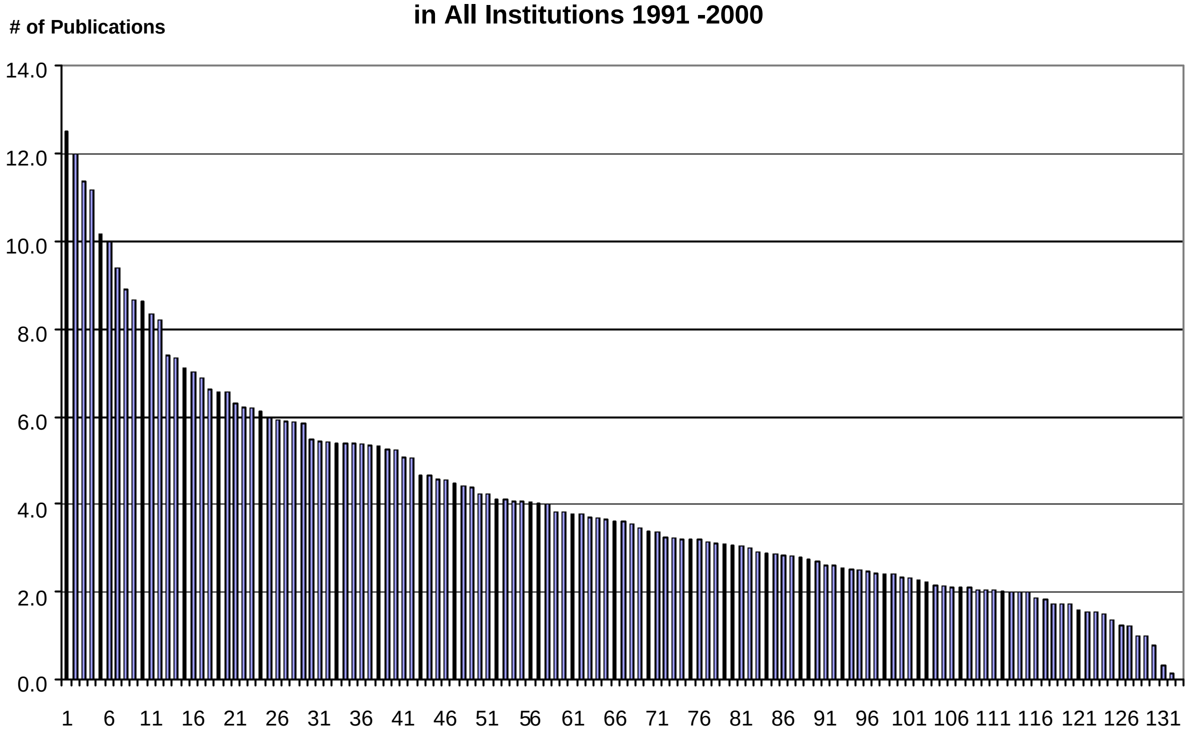
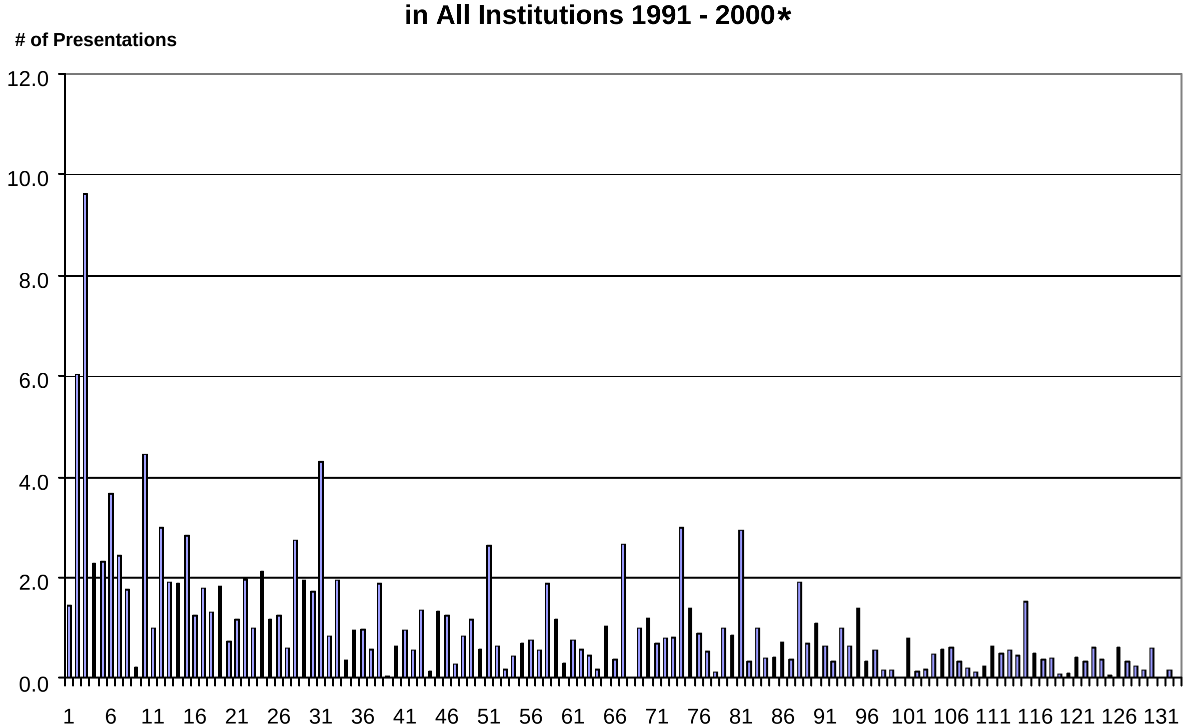


Figure 5.27

Invited Presentations per Respondent in All Institutions 1991 - 2000*



* same institutional order as above

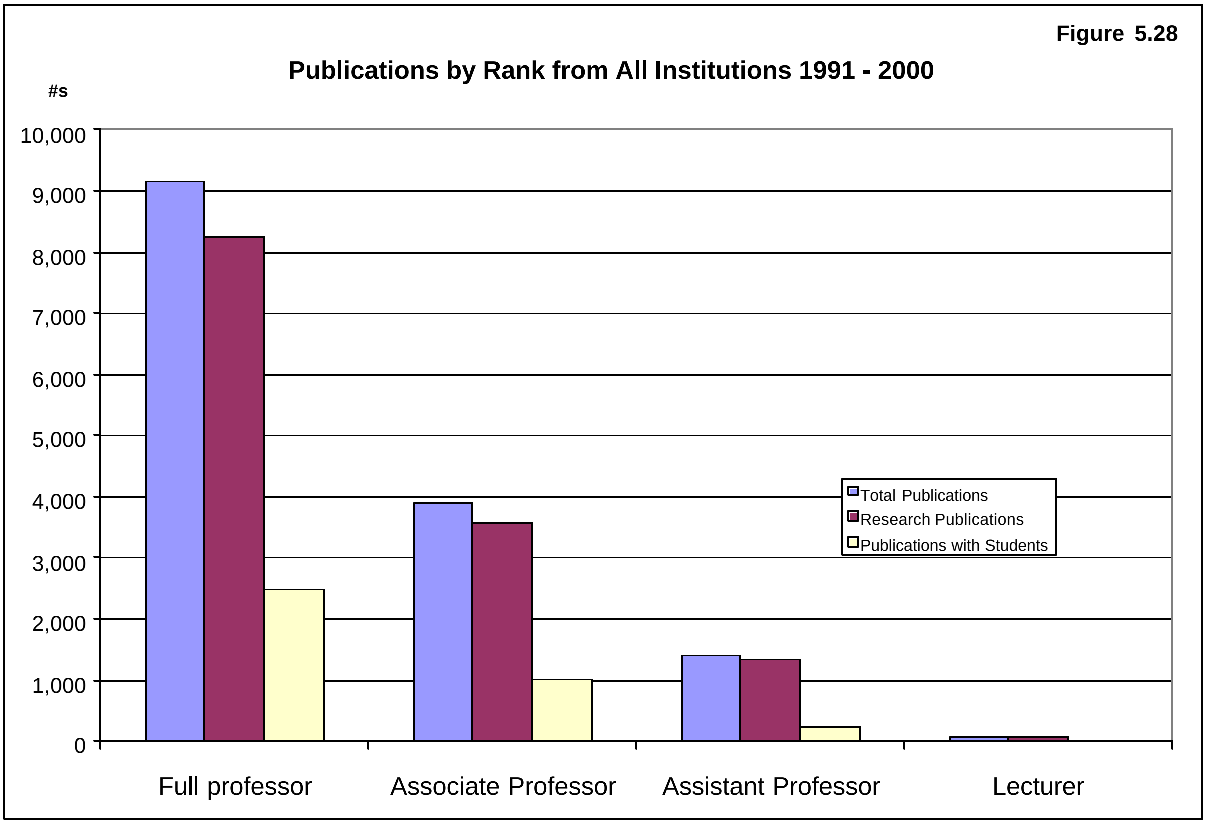


Figure 5.28
Publications by Rank from All Institutions 1991 - 2000
#s
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
Total Publications
Research Publications
Publications with Students
Full professor
Associate Professor
Assistant Professor
Lecturer

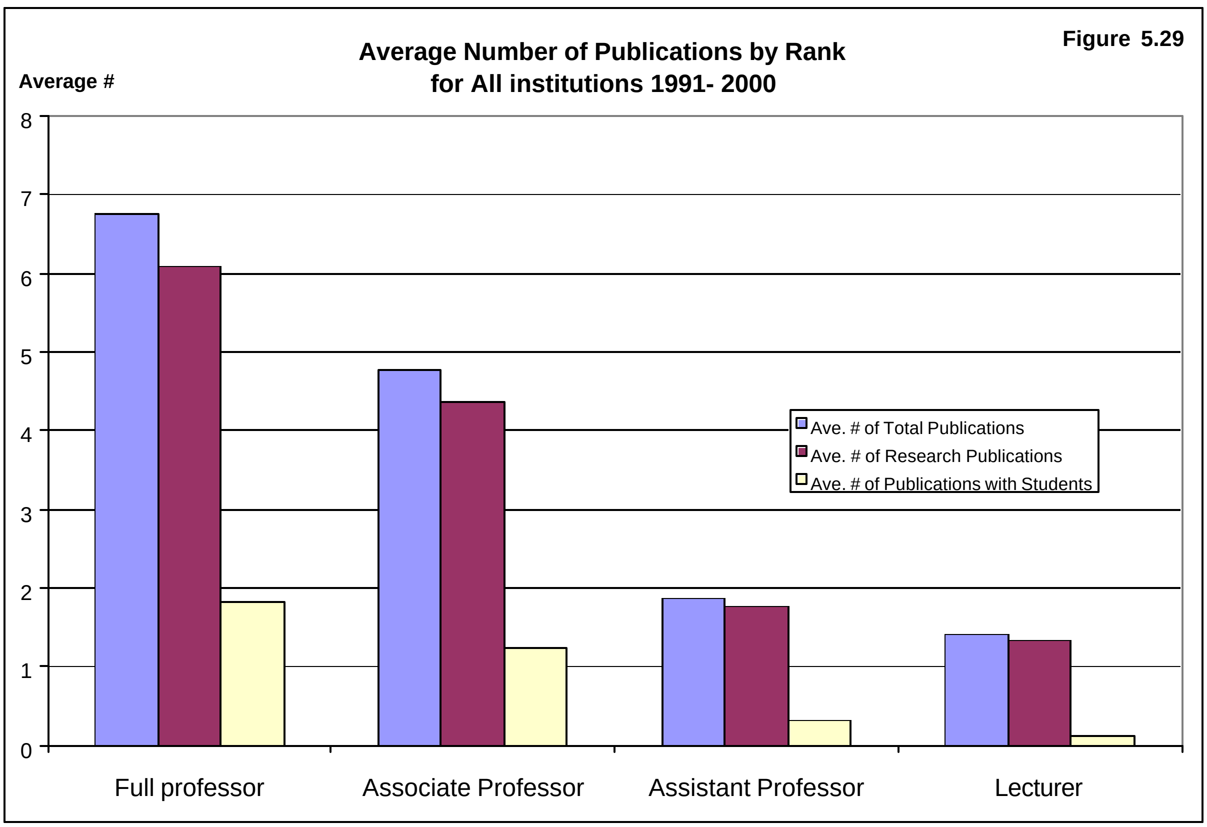


Figure 5.29
Average Number of Publications by Rank
for All institutions 1991- 2000
Average #
8
7
6
5
4
3
2
1
0
Ave. # of Total Publications
Ave. # of Research Publications
Ave. # of Publications with Students
Full professor
Associate Professor
Assistant Professor
Lecturer

Table 5.4. Total and Research Publications per Faculty Member by Rank per Year of Service During 1991 - 2000

Total Pubs./Full Prof./Year	Total Pubs./Assoc. Prof./Year	Total Pubs./Asst. Prof./Year	Research Pubs./Full Prof./Year	Research Pubs./Assoc. Prof./Year	Research Pubs./Asst. Prof./Year	Total Pubs./All Ranks/Year	Research Pubs./All Ranks/Year
2.03	1.27	0.63	2.01	1.24	0.59	1.71	1.69
1.58	1.51	0.59	1.57	1.51	0.59	1.44	1.44
1.56	1.09	0.84	1.54	0.99	0.82	1.35	1.32
1.87	0.83	1.05	1.81	0.81	1.00	1.34	1.30
1.43	0.69	0.39	1.41	0.69	0.39	1.17	1.15
1.57	0.59	0.14	1.57	0.54	0.14	1.13	1.11
1.37	0.44	0.75	1.24	0.44	0.75	1.20	1.10
1.52	0.16	1.67	1.52	0.16	1.67	1.02	1.02
0.98	1.43	0.54	0.94	1.41	0.50	1.03	0.99
1.39	1.12	0.00	1.03	1.01	0.00	1.23	0.98
1.29	1.02	0.50	1.03	0.98	0.50	1.16	0.98
1.13	0.87	0.93	1.01	0.87	0.92	1.01	0.95
1.22	0.50	0.57	1.19	0.45	0.57	0.97	0.94
1.71	0.86	0.00	1.62	0.62	0.00	1.13	0.94
1.05	0.78	0.44	1.04	0.76	0.44	0.89	0.88
0.90	0.91	0.65	0.86	0.91	0.65	0.88	0.86
0.92	0.71	0.93	0.90	0.68	0.85	0.86	0.83
1.01	0.52	0.58	0.93	0.52	0.58	0.83	0.78
1.03	0.61	0.25	0.89	0.58	0.25	0.88	0.77
0.91	0.75	0.32	0.84	0.75	0.32	0.79	0.75
0.70	1.06	0.46	0.69	1.00	0.46	0.77	0.74
0.95	0.81	0.20	0.95	0.77	0.20	0.75	0.73
0.78	0.80	0.33	0.76	0.76	0.33	0.76	0.73
0.71	0.97	0.42	0.64	0.89	0.42	0.80	0.73
0.80	0.46	0.86	0.76	0.44	0.86	0.74	0.71
0.91	0.19	0.43	0.88	0.13	0.41	0.75	0.71
0.79	0.91	0.47	0.64	0.84	0.47	0.80	0.71
0.71	0.80	0.79	0.68	0.75	0.72	0.73	0.69
0.80	0.53	0.86	0.71	0.50	0.79	0.73	0.67
0.63	0.87	0.59	0.58	0.82	0.59	0.70	0.66
0.77	0.72	0.26	0.68	0.68	0.26	0.72	0.65
0.87	0.36	0.69	0.72	0.34	0.64	0.75	0.65
0.67	0.00	0.53	0.67	0.00	0.53	0.64	0.64
0.56	0.82	0.42	0.48	0.79	0.42	0.68	0.63
0.60	1.42	0.75	0.48	0.96	0.75	0.84	0.63
0.63	0.62	1.17	0.61	0.60	1.17	0.64	0.62
0.82	0.25	0.67	0.78	0.25	0.67	0.64	0.62
0.77	0.71	0.39	0.77	0.66	0.36	0.64	0.61
0.49	0.68	1.08	0.49	0.68	1.08	0.61	0.61
0.35	0.86	0.28	0.33	0.84	0.25	0.63	0.61
0.70	0.61	0.58	0.65	0.46	0.58	0.67	0.60
0.82	0.73	0.79	0.51	0.73	0.75	0.80	0.60
0.69	0.48	0.74	0.55	0.48	0.71	0.67	0.60
0.72	0.50	2.00	0.67	0.46	2.00	0.65	0.59
0.77	0.47	0.43	0.75	0.41	0.43	0.63	0.59
0.49	0.59	0.86	0.49	0.59	0.86	0.57	0.57
0.49	0.63	4.00	0.38	0.57	4.00	0.64	0.56
0.85	0.88	0.18	0.78	0.63	0.15	0.64	0.55
0.59	0.68	0.37	0.53	0.63	0.37	0.59	0.54
0.62	0.58	0.69	0.52	0.51	0.69	0.62	0.54

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Table 5.4. Total and Research Publications per Faculty Member by Rank per Year of Service During 1991 - 2000

Total Pubs./Full Prof./Year	Total Pubs./Assoc. Prof./Year	Total Pubs./Asst. Prof./Year	Research Pubs./Full Prof./Year	Research Pubs./Assoc. Prof./Year	Research Pubs./Asst. Prof./Year	Total Pubs./All Ranks/Year	Research Pubs./All Ranks/Year
0.64	0.33	0.63	0.55	0.33	0.63	0.57	0.53
1.52	0.08	0.31	1.48	0.03	0.31	0.56	0.51
0.49	0.63	1.00	0.42	0.56	1.00	0.57	0.51
0.68	0.48	0.22	0.63	0.44	0.22	0.54	0.51
0.55	0.61	0.67	0.42	0.56	0.67	0.59	0.50
0.52	0.00	0.46	0.52	0.00	0.46	0.50	0.50
0.56	0.54	0.48	0.49	0.52	0.48	0.54	0.50
0.57	0.65	0.51	0.50	0.51	0.46	0.57	0.49
0.52	0.53	0.54	0.48	0.52	0.49	0.52	0.49
0.50	0.59	0.39	0.46	0.56	0.36	0.52	0.48
0.69	0.34	0.27	0.63	0.31	0.27	0.53	0.48
0.67	0.56	0.35	0.67	0.45	0.31	0.54	0.48
1.33	0.32	0.44	1.14	0.29	0.44	0.52	0.48
0.63	0.37	0.17	0.63	0.35	0.17	0.48	0.47
0.51	0.22	0.50	0.50	0.22	0.50	0.48	0.47
0.53	0.62	0.25	0.50	0.59	0.18	0.51	0.47
0.65	0.36	0.55	0.59	0.36	0.55	0.49	0.47
0.42	0.54	0.54	0.38	0.54	0.50	0.49	0.46
0.51	0.65	0.33	0.38	0.59	0.24	0.54	0.45
0.58	0.64	0.00	0.41	0.54	0.00	0.59	0.45
0.59	0.44	0.59	0.46	0.29	0.59	0.56	0.45
0.57	0.40	0.37	0.50	0.36	0.37	0.49	0.44
0.52	0.62	0.56	0.27	0.48	0.52	0.58	0.41
0.47	0.15	0.60	0.43	0.05	0.60	0.45	0.41
0.19	0.58	0.75	0.19	0.58	0.75	0.40	0.40
0.49	0.05	0.62	0.46	0.05	0.54	0.42	0.40
0.70	0.21	0.09	0.50	0.17	0.09	0.55	0.40
0.53	0.52	0.27	0.39	0.48	0.18	0.48	0.39
0.50	0.22	0.33	0.46	0.17	0.33	0.43	0.39
0.66	0.37	0.26	0.51	0.32	0.22	0.48	0.38
0.53	0.44	0.17	0.41	0.35	0.17	0.49	0.38
0.49	0.10	0.00	0.40	0.10	0.00	0.46	0.37
0.29	0.42	5.00	0.28	0.41	5.00	0.38	0.36
0.50	0.15	0.33	0.46	0.15	0.33	0.38	0.36
0.35	0.57	0.05	0.32	0.56	0.05	0.38	0.35
0.39	0.36	0.71	0.31	0.36	0.71	0.41	0.35
0.75	0.24	0.41	0.44	0.13	0.41	0.57	0.35
0.19	0.79	0.41	0.10	0.75	0.41	0.41	0.35
0.50	0.19	0.80	0.41	0.15	0.80	0.41	0.34
0.38	0.49	0.63	0.26	0.39	0.56	0.45	0.34
0.32	0.32	0.44	0.32	0.32	0.44	0.33	0.33
0.26	0.43	0.86	0.21	0.35	0.62	0.41	0.32
0.75	0.30	0.50	0.31	0.20	0.46	0.54	0.32
0.52	0.32	0.18	0.52	0.26	0.18	0.35	0.32
0.48	0.22	0.83	0.37	0.20	0.83	0.36	0.30
0.29	0.08	0.80	0.25	0.00	0.80	0.33	0.29
0.32	0.62	0.27	0.29	0.54	0.24	0.32	0.29
0.43	0.32	0.15	0.34	0.27	0.10	0.37	0.29
0.37	0.32	0.25	0.37	0.25	0.08	0.34	0.29
0.23	0.35	0.50	0.23	0.28	0.50	0.31	0.29

Table 5.4. Total and Research Publications per Faculty Member by Rank per Year of Service During 1991 - 2000

Total Pubs./Full Prof./Year	Total Pubs./Assoc. Prof./Year	Total Pubs./Asst. Prof./Year	Research Pubs./Full Prof./Year	Research Pubs./Assoc. Prof./Year	Research Pubs./Asst. Prof./Year	Total Pubs./All Ranks/Year	Research Pubs./All Ranks/Year
0.23	0.35	0.43	0.22	0.34	0.43	0.29	0.28
0.28	0.37	0.40	0.20	0.35	0.32	0.33	0.28
0.31	0.35	0.44	0.23	0.29	0.44	0.34	0.28
0.15	0.33	0.19	0.15	0.33	0.19	0.27	0.27
0.50	0.00	0.33	0.26	0.00	0.33	0.46	0.27
0.31	0.08	0.60	0.24	0.08	0.60	0.32	0.26
0.19	0.27	1.50	0.15	0.27	1.50	0.28	0.25
0.45	0.05	0.00	0.43	0.05	0.00	0.27	0.25
0.20	0.37	0.00	0.19	0.37	0.00	0.26	0.25
0.36	0.43	0.13	0.23	0.36	0.13	0.36	0.25
0.28	0.26	0.00	0.26	0.26	0.00	0.26	0.25
0.25	0.29	0.24	0.19	0.28	0.24	0.27	0.25
0.31	0.20	0.00	0.29	0.20	0.00	0.26	0.24
0.31	0.19	0.29	0.26	0.19	0.29	0.26	0.24
0.23	0.35	0.36	0.18	0.35	0.36	0.27	0.24
0.25	0.36	0.00	0.20	0.28	0.00	0.29	0.23
0.27	0.23	0.37	0.23	0.18	0.37	0.27	0.23
0.32	0.16	0.30	0.29	0.16	0.30	0.24	0.23
0.19	0.30	0.38	0.12	0.25	0.32	0.28	0.23
0.38	0.21	0.33	0.33	0.17	0.33	0.25	0.22
0.04	0.52	0.50	0.04	0.52	0.50	0.21	0.21
0.30	0.00	0.00	0.30	0.00	0.00	0.20	0.20
0.25	0.44	0.27	0.25	0.09	0.19	0.30	0.20
0.32	0.23	0.00	0.21	0.15	0.00	0.29	0.19
0.13	1.80	0.00	0.06	1.80	0.00	0.25	0.19
0.05	0.38	0.21	0.03	0.34	0.16	0.20	0.17
0.24	0.38	0.00	0.15	0.21	0.00	0.27	0.17
0.51	0.21	0.20	0.15	0.10	0.16	0.29	0.12
0.19	0.09	0.40	0.19	0.06	0.40	0.13	0.11
0.08	0.11	0.00	0.08	0.11	0.00	0.09	0.09
0.08	0.00	0.17	0.08	0.00	0.17	0.09	0.09
0.33	0.00	0.00	0.33	0.00	0.00	0.02	0.02
All Institutions:							
0.66	0.53	0.48	0.60	0.48	0.45	0.60	0.54
Private Institutions:							
0.65	0.54	0.50	0.58	0.49	0.48	0.60	0.54
Public Institutions:							
0.67	0.49	0.43	0.62	0.45	0.40	0.60	0.55
Baccalaureate Institutions							
0.64	0.53	0.52	0.56	0.48	0.49	0.59	0.53
Advanced Degree Institutions:							
0.69	0.52	0.41	0.65	0.48	0.39	0.61	0.57

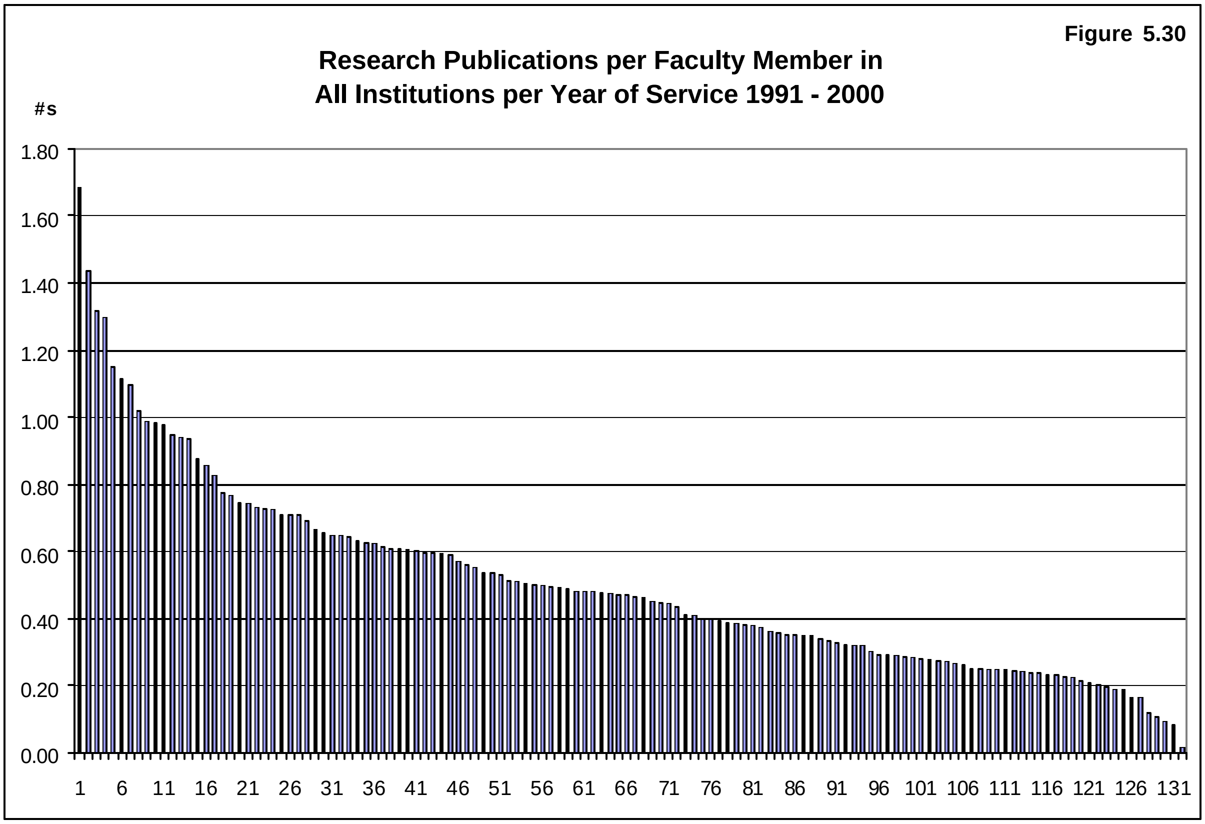
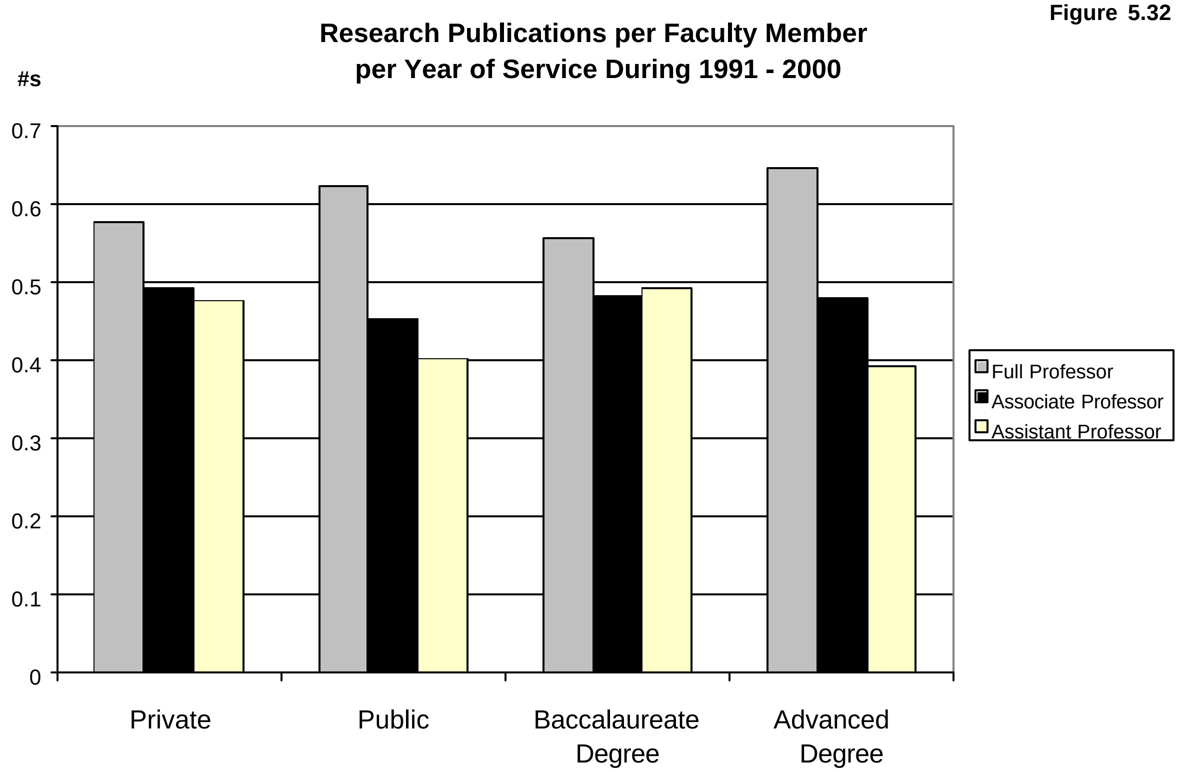


Figure 5.30
Research Publications per Faculty Member in
All Institutions per Year of Service 1991 - 2000
#s
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
1 6 11 16 21 26 31 36 41 46 51 56 61 66 71 76 81 86 91 96 101 106 111 116 121 126 131

Figure 5.31

Figure 5.32



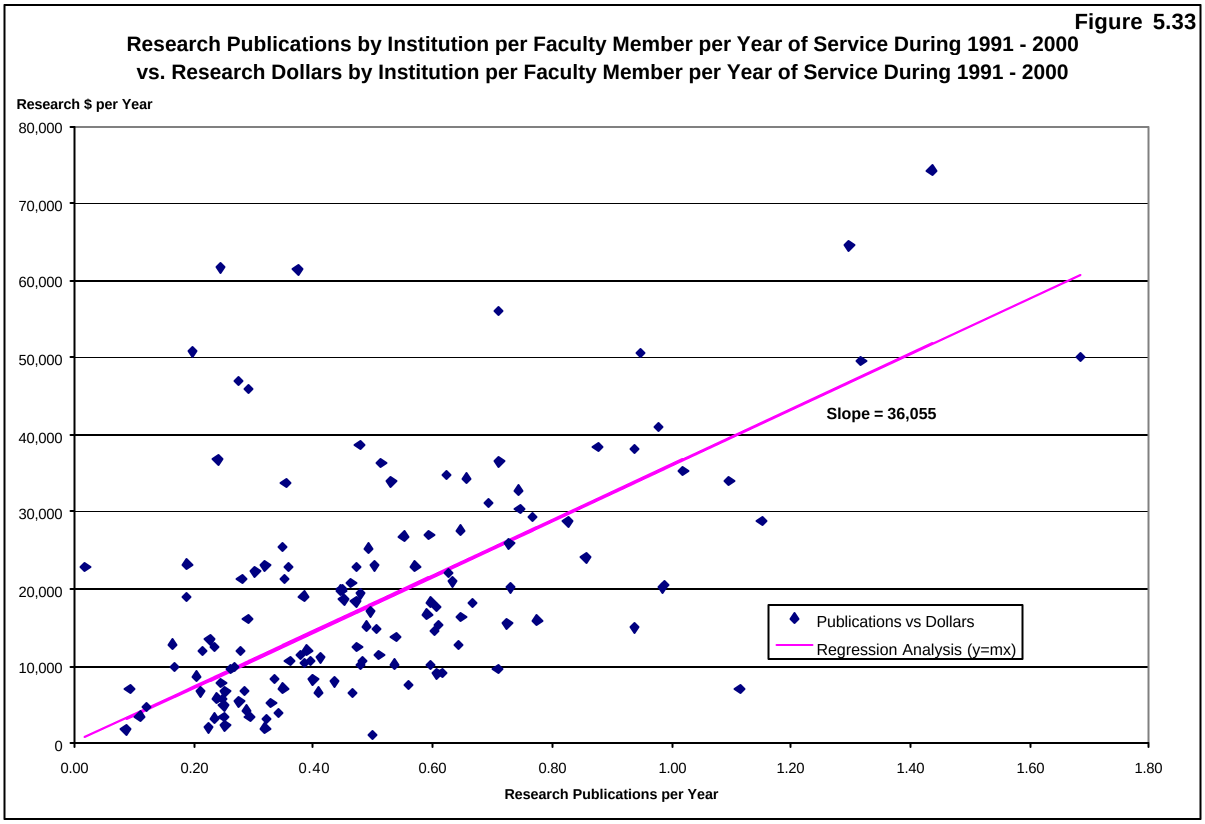


Figure 5.33
Research Publications by Institution per Faculty Member per Year of Service During 1991 - 2000
vs. Research Dollars by Institution per Faculty Member per Year of Service During 1991 - 2000
Research $ per Year
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
1.60
1.80
Research Publications per Year
Slope = 36,055
Publications vs Dollars
Regression Analysis (y=mx)

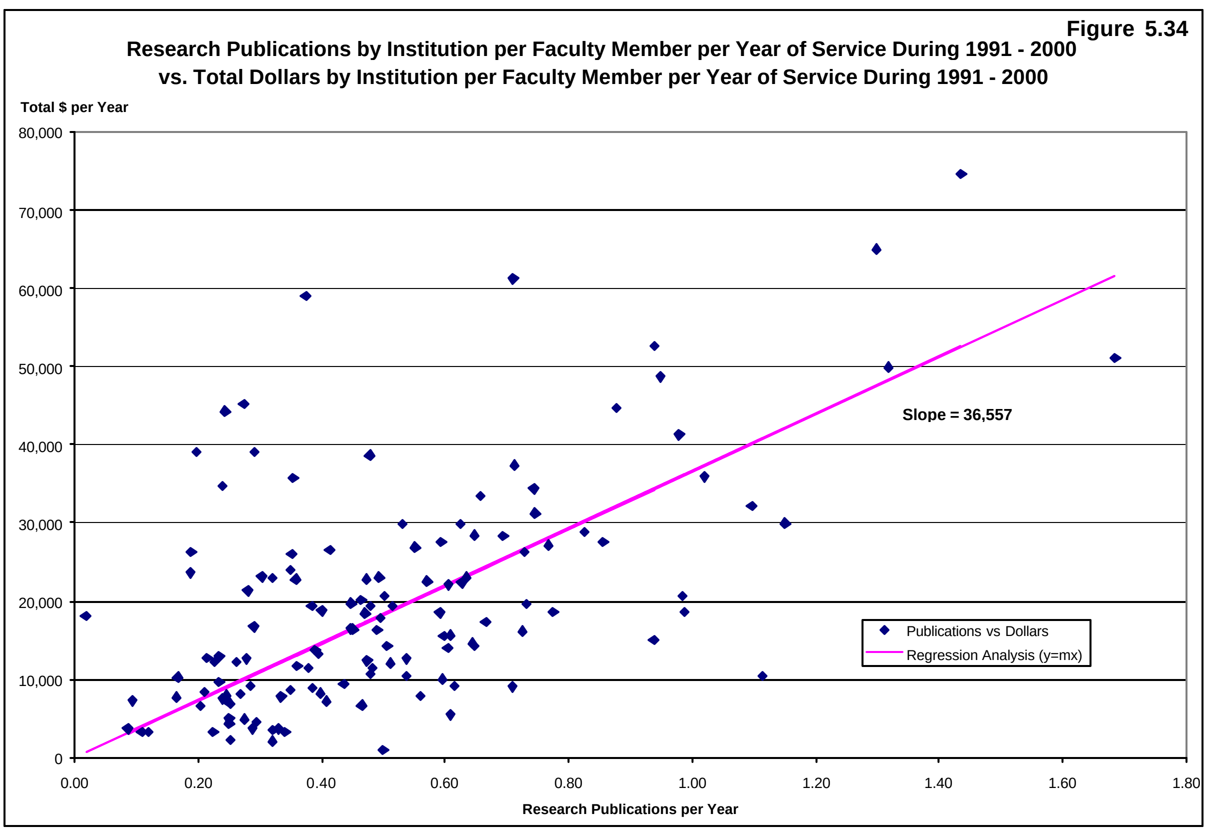


Figure 5.34
Research Publications by Institution per Faculty Member per Year of Service During 1991 - 2000
vs. Total Dollars by Institution per Faculty Member per Year of Service During 1991 - 2000
Total $ per Year
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
1.60
1.80
Research Publications per Year
Slope = 36,557
Publications vs Dollars
Regression Analysis (y=mx)

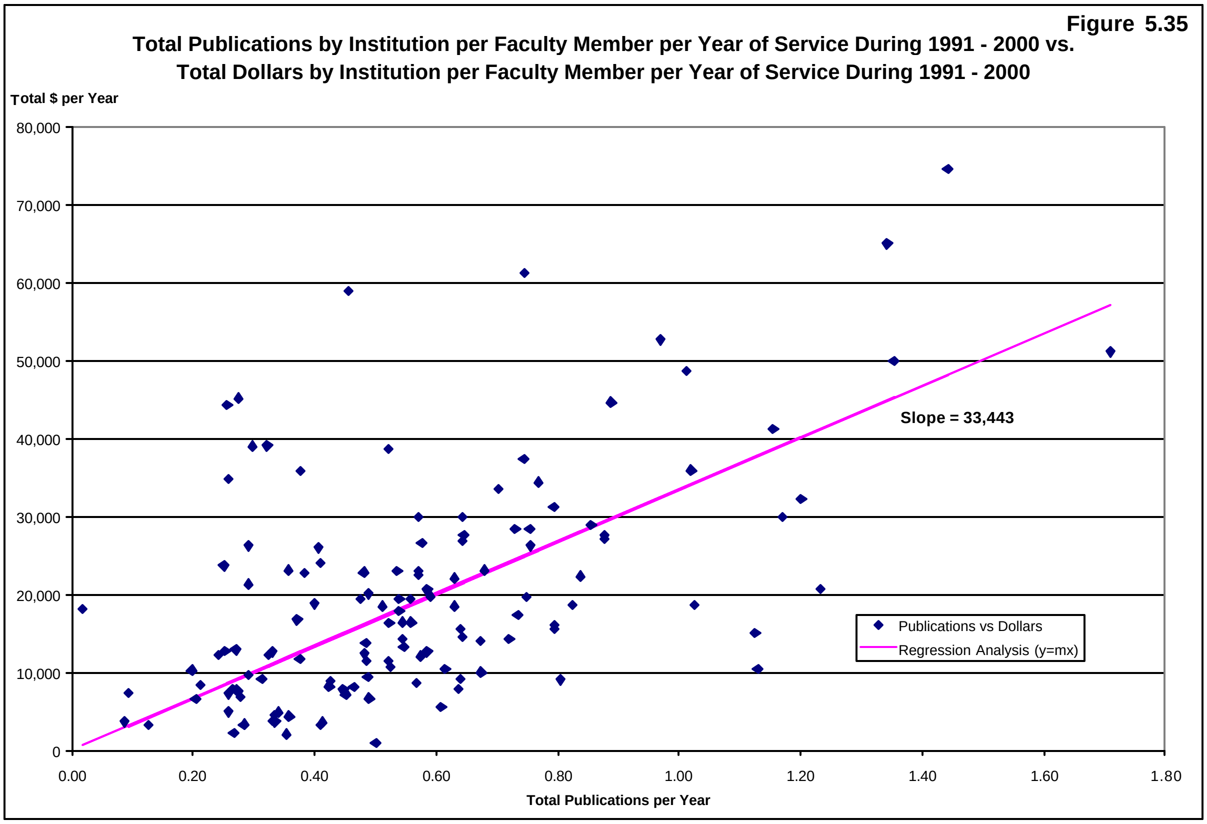


Figure 5.35
Total Publications by Institution per Faculty Member per Year of Service During 1991 - 2000 vs.
Total Dollars by Institution per Faculty Member per Year of Service During 1991 - 2000
Total $ per Year
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
1.60
1.80
Total Publications per Year
Slope = 33,443
Publications vs Dollars
Regression Analysis (y=mx)

SECTION 6:
CLUSTER ANALYSIS AND COMPARISONS

The Models for Cluster Analyses

Michael P. Doyle, Vice President, Research Corporation

Modeling is relatively new to academic institutions. The natural sciences have a long history of modeling, but only when related to the science itself and not to its social structure. In contrast, the social sciences have taken modeling of organizational units to a high level of confidence. Consequently, when we approached this opportunity to cluster institutions according to information provided from the Study, there were no previous models upon which we could rely to construct those relevant to this Study. After extensive discussions among those most familiar with the extent and limitations of the Study data, we settled upon two comparative models that could provide relevant institutional characteristics. One of these—the Enrollment Model—included data related to the production of scientists without direct reference to research activity. The other—the Research Model—included those characteristics that are widely associated with research productivity. A comparison of the outcomes from the two models was anticipated to provide a measure of the importance of research in the production of scientists. Core characteristics were identified for each of the clusters.

The analyses were conducted with data for all surveyed institutions and with subgroups defined as private institutions, public institutions, bachelors degree granting institutions and advanced degree granting institutions. In this way each institution would be within three clusters for each model: all institutions, private or public institutions, and bachelors or advanced degree granting institutions. Because the Research Model used publication data from the Faculty Perspectives, institutions that did not submit this information could not be included in this analysis.

Other models using different measures could be selected to determine institutional profiles, and other data could be measured against existing clusters. Unfortunately, time did not permit such analyses at this time.

THE ENROLLMENT MODEL

The Enrollment Model consists of seven basic measures of institutional characteristics that were determined to be related to the production of scientists. Included in these models were those measures that often characterize institutional operations or their ability to attract students, such as SAT scores and institutional costs. The composite listing of these measures is:

1. Median SAT Mathematics scores for each institution (not used in clustering, but entered as a characteristic for this model)
2. Median SAT Verbal scores for each institution (not used in clustering, but entered as a characteristic of this model)
3. Total Cost per school year for each in-

stitution

4. Baccalaureate degrees per calculated FTE for the same year, each year for 1985–1997 (13 years included individually)
5. Science baccalaureate degrees per total baccalaureate degrees for the same year, each year for 1985–1997 (13 years included individually)
6. Number of doctorate alumni in astronomy, chemistry, geosciences, physics, and biological sciences for three-year periods (three measures: 1991–1993, 1994–1996, and 1997–1999)
7. Number of doctorate alumni in astronomy, chemistry, geosciences, physics, and biological sciences for three-year periods divided by the number of science baccalaureate degrees produced in the same period six years earlier (three measures: ratio of Ph.D. 1991–1993 to B.S. 1985–1987, ratio of Ph.D. 1994–1996 to B.S. 1988–1990, and ratio of Ph.D. 1997–1999 to B.S. 1991–1993)

All of these data were taken from Institutional Data from External Sources (Section 2). Because not all institutions used SAT scores as measures of entering students, this information was not used to define clusters of institutions; however, the SAT data was defined as a characteristic of institutions in a cluster and measured for these units. In all, thirty separate measures were used, although the incremental contribution of data for individual years in multiple year measures was very small. The graphical displays have been restricted to the seven basic measures in which the multiple measures for 4, 5, 6, and 7 have been collapsed into composites within each measure.

The data presented in this section identify cluster sets for all institutions and for each of the subsets of institutions. In each case a cluster is identified as having specific characteristics that are the averages of the thirty specific measures for the institutions in that cluster. For example, six clusters have been identified for "All Institutions" in the Enrollment Model. The number of institutions in each of the six clusters is given along with the average number of each measure calculated from the sum of the institutions in that cluster. Similarly, for "Advanced Degree Institutions" there are four clusters in the Enrollment Model; Cluster 1 is composed of 18 institutions, Clusters 2 and 3 have 8 institutions each, and Cluster 4 has 4 institutions. A value is provided for each measure calculated as the average from the sum of the measure for the institutions in the cluster.

THE RESEARCH MODEL

The Research Model also consists of seven basic measures of institutional characteristics that were determined to be associated with research productivity. Included in this model were faculty research grants and grant dollars, as well as publications of faculty in peer-reviewed journals. Two measures related to the preparation of students who went on to obtain Ph.D. degrees, numbers 6 and 7, were the same as those in the Enrollment Model. The composite listing of these measures is:

1. Total number of grants per faculty member at the responding institution (1990–2000) from the External Faculty Awards in the Institutional Survey (includes research, education, outreach, etc.)
2. Total number of research grants per faculty member at the responding institution (1990–2000) from the External Faculty Awards in the Institutional Survey (scientific research only)

3. Total publications in peer-reviewed journals per faculty member at the responding institution (1990–2000) from Faculty Perspectives survey (includes research and education)
4. Total awards from NSF-RUI, NIH-AREA, Research Corporation CCSA, and ACS-PRF Type B programs to faculty at the responding institution (1990–2000) from Institutional Data from External Sources
5. Total external grant dollars per faculty member at the responding institution (1990–2000) from the External Faculty Awards in the Institutional Survey (includes research, education, outreach, etc.)
6. Number of doctorate alumni in astronomy, chemistry, geosciences, physics, and biological sciences for three year periods (three measures: 1991–1993, 1994–1996, and 1997–1999) from Institutional Data from External Sources
7. Number of doctorate alumni in astronomy, chemistry, geosciences, physics, and biological sciences for three-year periods divided by the number of science baccalaureate degrees produced in the same period three years earlier (three measures: ratio of Ph.D. 1991–1993 to B.S. 1985–1987, ratio of Ph.D. 1994–1996 to B.S. 1988–1990, and ratio of Ph.D. 1997–1999 to B.S. 1991–1993) from Institutional Data from External Sources

In all, eleven separate measures were used. Institutional Survey data were used for grant award numbers and amount because the corresponding reports from the Faculty Perspectives survey represented only about a seventy percent response. The data are as complete as was the reporting for the Institutional Surveys; the primary limitation in faculty publications (no. 3 above) is in the percentage of faculty respondents from that institution. Three institutions did not provide Faculty Perspectives for natural science departments, so there were no data for faculty publications and cluster analyses could not be implemented. Graphical displays have been restricted to the seven basic measures in which the multiple measures for 6 and 7 have been collapsed into composites within each measure.

The data in this section identify cluster sets for all institutions and for each of the subsets of institutions. In each case a cluster is identified as having specific characteristics that are the averages of the eleven specific measures from the institutions in that cluster. For example, seven clusters have been identified for "All Institutions" in the Research Model. The number of institutions in each of the seven clusters is given along with the average number of each measure calculated from the sum of the institutions in that cluster. In addition, a graph is provided that plots the measure as a function of number of faculty members in the natural sciences with identification of the cluster number; in this three-dimensional array certain members of clusters can be seen to be "outliers" in the correlation.

A Cluster Analysis Approach to Identify Unique Subgroups of Predominantly Undergraduate Institutions

Ronald J. Mogavero and Todd W. Gustafson, East Pond Analytics, Inc.

The Study provided a wealth of information across a broad range of institutions. Considered independently, keen insights could be developed at the institutional level, and with careful descriptive analysis, findings could be gleaned across institutions as well. However, preliminary descriptive data analyses of the Institutional Survey and Faculty Perspectives Survey revealed complex patterns of response between and within sub-groups of institutions. This suggested that an analysis of underlying facets of the data held promise in identifying unique subgroups of institutions for further analysis.

After data entry was completed, information from the survey response data base for the institutional and faculty surveys was investigated extensively. Descriptive statistical analyses were performed on all responses, and supplementary graphs, charts, and other descriptive and analytical techniques were employed in an effort to extract and organize the information contained in this large data base. Investigations were initially undertaken "one variable at a time." They were informative, but clearly limited in their descriptive and explanatory power, and they sometimes raised more questions than they seemed to answer. Analyzing "two variables simultaneously" often helped in identifying complex patterns, but additionally reinforced the suspicion of a high degree of correlation that existed among many of the survey responses.

The extensive process of sifting through these data one variable at a time, then two variables at a time, etc., suggested that, among other things, there seemed to exist natural subgroups of schools, but the identification of these subgroups was elusive. For example, upon analyzing the "median SAT-Math" score responses for the 102 schools for which this information was available, it was quite easy to identify and form "natural sub-groups of the schools" which reflected the pattern that (i) within a sub-group, the schools were strikingly similar to one another when measured by the single response variable (i.e., "median SAT Math" score); and (ii) between any two sub-groups, the schools were strikingly different from one another when measured by the single response variable.

Alternately, upon analyzing the "Number of Alumni Doctorates per Bachelor of Science Graduate" (a derived measure computed from two raw survey responses), it was quite easy to identify and form natural sub-groups of the schools which also reflected the pattern that (i) within a sub-group, the schools were strikingly similar to one another when measured by the single response variable (i.e., "Number of Alumni Doctorates per Bachelor of Science Graduate"); and (ii) between any two sub-groups, the schools were strikingly different from one another when measured by the single response variable.

A limitation of this "one-variable-at-a-time" approach became apparent rapidly. The schools in one of the natural sub-groups of schools formed using the "median SAT Math Scores" would be widely dispersed among the natural sub-groups formed using the "Number of Research Grants per Faculty Member", and conversely. Schools deemed similar using one criterion or measure (e.g., "median SAT Math Scores") were dissimilar using another single criterion or measure (e.g., "Number of Alumni Doctorates per Bachelor of Science Graduate").

It became increasingly clear that techniques which could (i) simultaneously process the joint information contained in multiple survey question responses, (ii) deal with or adjust for cross-correlations in the survey response data, and (iii) accommodate derived measures in the analysis would offer hope in amplifying our ability to identify key patterns synthesizing the information contained within this survey data.

In the discussion below, each of these issues is reviewed in turn. First, we review what measures were derived from the survey data and how they were incorporated into a preliminary analysis. However, these data in themselves still proved too complex to interpret. Finally, we introduce cluster analysis as an available technique to help synthesize and reveal some of the key dimensions of the data, and ultimately, identify the groups of institutions that exhibit similar patterns of response and characteristics.

DERIVED MEASURES

We made extensive use of "Indexed Response Measures" to assist in our analysis of the survey database. Computationally, this is a two-step process. To illustrate this concept, consider the following two direct response measures on the survey for an institution: (i) the number of baccalaureate degrees granted in 1985, and (ii) the number of calculated full-time equivalent undergraduates in 1985. In step one we compute an overall average number of baccalaureate degrees in 1985 per calculated full-time equivalent undergraduates in 1985—across all 136 institutions in the survey—we would divide the total number of baccalaureate degrees granted in 1985 (summed across ALL 136 schools) by the total number of calculated full time equivalent undergraduates in 1985 (summed across ALL 136 schools). This derived overall average would describe, with a single measure, the overall average number of baccalaureate degrees granted in 1985 per calculated full-time equivalent undergraduates in 1985. We call this the Overall Average.

But the question remains, how does a particular institution compare to this "Universe Overall Average?" So in step two, for each institution, we compute the total number of baccalaureate degrees granted in 1985 (for that individual school) divided by the number of calculated full time equivalent undergraduates in 1985 (for that individual school), and we call this number the School Average. The Indexed Response Measure for Baccalaureates per Calculated Full Time Equivalent Undergraduate is then computed as the "School Average divided by the Overall Average."

Interpretation:

If the Index exceeds a value of 1, then the number for the school being viewed exceeds the norm for the universe in terms of the number of baccalaureate degrees per student enrolled in 1985.

If this Index equals 1, then the number for the school being viewed equals exactly the norm for the universe in terms of the number of baccalaureate degrees per student enrolled in 1985.

If this Index is less than 1, then the school at issue falls below the norm of the universe in terms of the number of baccalaureate degrees per student enrolled in 1985.

ENROLLMENT AND RESEARCH MODELS

As mentioned above, two institutional models were developed which attempted to describe different aspects of institutional activity and characteristics. The "Enrollment Model" is based on numerous response measures and indices derived from survey response measures reflecting enrollment characteristics of the 136 institutions, but not referring to factors directly related to research activity. The "Research Model" is based on numerous response measures and indices derived from survey response measures reflecting research activity characteristics of the 136 institutions, but not referring to factors directly related to enrollment attributes. In both model structures the analytical effort focused on identifying natural subgroups or clusters within the universe of institutions under study (i.e., all, private, public, bachelors, advanced degree) which were mutually exclusive, and exhaustive, and displayed measurably different profiles of the performance measures employed in each model.

Enrollment Model: 33 Dimensions

In the Enrollment Model a total of 33 variables were used in the cluster formation process. These survey-based variables represented surrogates that could be used to characterize the flow of students through the matriculation process, the attainment of bachelors degrees, and on to the doctorate degrees received by alumni. Three of these were survey response variables, and 30 were computed indices measuring varying facets of student enrollment attributes.

Definitions:

The three survey response variables were the Number of Alumni Doctorates attained in the successive three year periods from (i) 1991–1993, (ii) 1994–1996, and (iii) 1997–1999.

The 30 index measures used were as follows:

<u>Three indices</u> of alumni doctorates in a three-year period per BSc graduates in a three-year period during the preceding six years:

-Index of Alumni Doctorates 1991–1993 per BSc 1985–1987
-Index of Alumni Doctorates 1994–1996 per BSc 1988–1990
-Index of Alumni Doctorates 1997–1999 per BSc 1991–1993

<u>Thirteen indices</u> of Baccalaureate degrees in a specific year per Calculated Full Time Undergraduate Enrolled in the Same Year:

-Index of (Bac in YY per CFTE in YY): {YY = 1985, 1986,. . . 1997)

<u>Thirteen indices</u> of Science Baccalaureate degrees in a specific year per all Baccalaureate degrees in the Same Year:

-Index of (Science Bac in YY per Bac. in YY): {YY = 1985, 1986,. . . 1997)

<u>One index</u> of Fiscal Year 1999 Endowment per Calculated Full Time Undergraduate Enrolled in 1997

Research Model: 11 Dimensions

In the Research Model a total of 11 variables were used in the cluster formation process. These survey-based variables were felt to represent surrogates, which could be used to characterize the nature and level of research activity prevailing at each institution. Three of these were survey response variables, and 8 were computed indices measuring careers to the Ph.D. degree.

Definitions:

The three survey response variables were the Number of Ph.D. degrees received by alumni in the successive three-year periods from (i) 1991–1993, (ii) 1994–1996, and (iii) 1997–1999.

The eight index measures used were as follows:

Three indices of alumni doctorates in a three- year period per BSc.Graduates in a three-year period six years preceding:
-Index of Alumni Doctorates 1991–1993 per BSc 1985–1987

One index of Total Number of Faculty Awards per Faculty Member

One index of Total External Faculty Research Grant Dollars per Faculty Member

One index of Total Number of Grants per Faculty Member

One index of Total Number of Research Grants per Faculty Member

One index of Number of Faculty Publications per Faculty Member

The use of indices enhanced our analyses by making it easier to identify outliers when investigating institutional differences within a single measure or response. But, however powerful these indices are for identifying extreme distributional patterns between institutions, they still suffered from the limitations inherent in "one variable at a time" analyses when one faces a data set with complex cross-correlations existing between multiple response measures.

We needed to enhance the analyses by moving to a multivariate technique, which would enable us to conquer the complexities of the cross-correlation patterns existing between multiple responses, and to develop appropriate sub-groups of institutes which demonstrated measurably homogenous patterns within these sub-groups, and measurably different patterns between these sub-groups. To accomplish this we used cluster analysis techniques.

CLUSTERING METHODOLOGY

Overview. Cluster analysis is a multivariate computational procedure. It draws heavily on statistical concepts, with the purpose of placing objects into groups or clusters suggested by the data, not defined a priori, such that the objects in a given cluster tend to be similar to each other in some sense, and objects in different clusters tend to be dissimilar. We utilized this approach on the Study data as an aid in forming groups or clusters of schools. They were suggested by the survey response data (and derived measures), not defined a priori, such that the schools in a given cluster tend to be similar to each other in some sense (i.e., schools in different clusters tend to be dissimilar). This modeling approach was employed for both the Enrollment and the Research Models.

Clusters were developed for five School Universes.Separate analyses were performed to identify clusters of schools for five different universes of schools:

- All institutions
- Private institutions only
- Public institutions only
- Bachelors degree-granting institutions only
- Advanced Degree-granting institutions only

Some key questions need to be answered when developing these clusters. Do given schools tend to "cluster" with a predictable and stable group of other institutions—independent of the set of alternate candidate institutions? Or, did the cluster in which a school was placed and the set of schools deemed "similar" to it (i.e., placed in the same cluster), vary substantially, dependent on whether alternate candidates were private or public, or bachelors degree-granting or advanced degree-granting schools?

Under this approach, each institution is placed into three clusters under each model (i.e., Enrollment Model and Research Model). For example, Bowdoin College is placed into a cluster for (i) All Institutions, (ii) Private institutions, and (iii) Bachelors Degree Institutions; and

Central Michigan University is placed into a cluster for (i) All institutions, (ii) Public institutions, and (iii) Advanced Degree institutions, etc.

Cluster Formation and Identification Process. For each of the five "Universes of Institutions," and in both the Enrollment Model and Research Model, a standard process was used to identify and form the clusters of schools:

1. Build an analysis data set containing the school identification code and, for each school in the universe being analyzed, the full set of clustering and profiling variables from the survey data base or derived from survey data base variables. In the Enrollment Model this involved the 33 clustering variables described previously. In the Research Model this involved the 11 clustering variables described previously.

2. Perform a principal components analysis; "rotate" the original cluster variables, and select a number of the principal components which account for at least 90% of the variance in the analysis data set, yet reduce the number of (rotated) variables to be used in the cluster formation process.

This process accomplishes two key objectives in efficiently working towards cluster formation. First, the orthonormal rotation of the original clustering variables creates a set of uncorrelated principal components (transformed clustering variables) which are uncorrelated, yet account for the same total amount of variance {information} as existed in the original set of clustering variables. Second, by selecting a smaller number of principal components to use in the clustering process (i.e., that subset which accounts for 90% of the variance {information} in the original set of clustering variables) we can dramatically reduce the computational effort needed in forming the clusters.

In the case of the Enrollment Model, this orthonormal rotation and "90% selection rule" enabled us to use between 6 and 12 rotated clustering variables (principal components) versus the original 33 cluster variables. In the case of the Research Model, this orthonormal rotation and "90% selection rule" enabled us to use between 4 and 5 rotated clustering variables (principal components) versus the original 11 cluster variables.

3. Execute the cluster formation process: this heuristic computational process aggregates individual schools into subgroups or clusters of the original universe of schools using a method that uses a hierarchical aggregating process.

Mutually exclusive and exhaustive subgroups of schools are formed in a manner, which strives to accomplish two simultaneous objectives:

(i) Form clusters of schools which will have a small variability (or 'distance') among the schools within the cluster; and

(ii) Form clusters so that the distance between the centroids of different clusters formed will be 'large' relative to the magnitude of the average pooled within cluster variability.

These objectives are analogous to, for those familiar with Analysis of Variance and Regression procedures, the "F-Statistic" used to test for significant differences between the means of a control variable at different levels.

The numerator term of the "F-Statistic" is the "average sum of squared deviations of between group means" [analogous to the "between cluster centroid distance of (ii.) above]. The denominator term of the "F-Statistic" is the "average pooled sum of squared deviations of within group means" [analogous to the "pooled within cluster variability of (i) above].

In ANOVA/Regression applications, a large "F-Statistic" is indicative of a statistically significant difference between group means (ANOVA), or a slope significantly different from zero (Regression).

In the clustering process the objective is to form clusters of schools so that a large "F-Statistic" is attained – that is, the between-cluster distances [variance, numerator, (ii)] are large compared to the pooled within-cluster variances [denominator, (i)].

PROFILE THE CLUSTERS

Cluster Profiling: after clusters have been formed with the process outlined and described above, statistical measures were used to "profile" the attributes of each cluster to enable a readily understood tabular picture of how the clusters were similar and/or different along the different dimensions of the "centroid" of each cluster (with respect to the average values in each cluster, of the clustering variables, and the original survey response measures used to derive the clustering indices and variables).

Table 6.1. Enrollment Model Profile for All Study Institutions

Cluster	#	Total cost per school yr	SAT math	SAT verb	Ph.D.s 91-93	Ph.D.s 94-96	Ph.D.s 97-99	PhD 91-93 per BSc 85-87	PhD 94-96 per BSc 88-90	PhD 97-99 per BSc 91-93
1	27	13,277	545.9	542.3	16.52	20.22	23.93	0.08	0.10	0.13
2	14	8,255	542.5	534.5	9.79	10.86	13.93	0.05	0.06	0.09
3	25	22,232	578.9	578.8	12.44	12.16	12.28	0.09	0.08	0.10
4	19	22,241	578.4	577.6	11.37	12.32	14.21	0.09	0.12	0.12
5	34	27,960	649.4	654.6	32.85	34.88	36.94	0.17	0.18	0.20
6	17	24,190	622.5	628.2	32.94	30.88	31.47	0.20	0.20	0.20

KEY

1. **Cluster number**
2. **# -** number of schools in cluster
3. **Total cost per school yr** - total $ cost per school year
4. **SAT math –** SAT mathematics score (not used in clustering)
5. **SAT verb –** SAT verbal score (not used in clustering)
6. **Ph.D.s YR-YR–** number of doctorates by alumni; (3 different time periods, **3** cluster variables)
7. **Ph.D. YR-YR per BSc YR-YR-** number of doctorates by alumni per Bachelors of Science; (3 different time periods, **3** cluster variables)
8. **Total Bac per CFTE YR-** number of bachelors degrees per calculated FTEs; by year 1985 thru 1997 (**13** cluster variables)
9. **Total BSc per Total Bac YR-** number of science bachelors degrees per number of total bachelors degrees; by year 1985 thru 1997 (**13** cluster variables)

Table 6.2. Enrollment Model Profile for All Study Institutions

Total Baccalaureate Degrees per Calculated Full-time Enrollment 1985 - 1997

Cluster	#	Total Bac per CFTE 85	Total Bac per CFTE 86	Total Bac per CFTE 87	Total Bac per CFTE 88	Total Bac per CFTE 89	Total Bac per CFTE 90	Total Bac per CFTE 91
1	27	0.19	0.21	0.19	0.19	0.19	0.19	0.21
2	14	0.14	0.13	0.13	0.13	0.12	0.12	0.13
3	25	0.24	0.24	0.23	0.23	0.24	0.24	0.25
4	19	0.22	0.21	0.20	0.19	0.19	0.20	0.22
5	34	0.24	0.23	0.24	0.25	0.25	0.25	0.25
6	17	0.21	0.21	0.20	0.20	0.21	0.21	0.23

Cluster	#	Total Bac per CFTE 92	Total Bac per CFTE 93	Total Bac per CFTE 94	Total Bac per CFTE 95	Total Bac per CFTE 96	Total Bac per CFTE 97
1	27	0.22	0.22	0.22	0.21	0.21	0.21
2	14	0.14	0.16	0.16	0.17	0.16	0.16
3	25	0.25	0.25	0.25	0.24	0.24	0.23
4	19	0.22	0.22	0.21	0.22	0.22	0.21
5	34	0.26	0.26	0.25	0.24	0.24	0.25
6	17	0.25	0.22	0.20	0.20	0.21	0.22

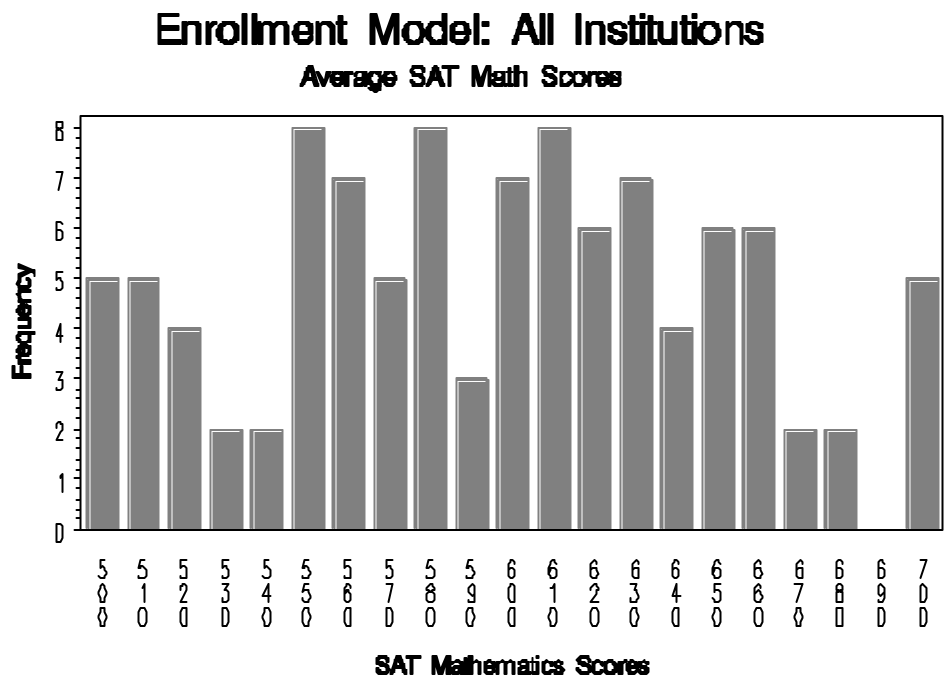
Table 6.3. Enrollment Model Profile for All Study Institutions

Total Number of B.Sc. Degrees per Total Number of Bachelor's Degrees 1985 - 1997

Cluster	#	Total BSc per Total Bac 85	Total BSc per Total Bac 86	Total BSc per Total Bac 87	Total BSc per Total Bac 88	Total BSc per Total Bac 89	Total BSc per Total Bac 90	Total BSc per Total Bac 91
1	27	0.06	0.05	0.05	0.05	0.05	0.05	0.05
2	14	0.10	0.09	0.08	0.07	0.07	0.07	0.07
3	25	0.08	0.08	0.07	0.07	0.07	0.07	0.06
4	19	0.13	0.12	0.11	0.10	0.11	0.11	0.11
5	34	0.15	0.14	0.14	0.13	0.12	0.12	0.13
6	17	0.23	0.22	0.22	0.19	0.20	0.19	0.19

Cluster	#	Total BSc per Total Bac 92	Total BSc per Total Bac 93	Total BSc per Total Bac 94	Total BSc per Total Bac 95	Total BSc per Total Bac 96	Total BSc per Total Bac 97
1	27	0.05	0.05	0.06	0.06	0.07	0.07
2	14	0.07	0.09	0.09	0.09	0.10	0.10
3	25	0.07	0.07	0.08	0.09	0.09	0.10
4	19	0.11	0.13	0.12	0.13	0.14	0.15
5	34	0.13	0.15	0.15	0.17	0.18	0.18
6	17	0.19	0.19	0.20	0.23	0.23	0.23

Figure 6.1



Enrollment Model: All Institutions
Average SAT Math Scores
Frequency
0
1
2
3
4
5
6
7
8
500
510
520
530
540
550
560
570
580
590
600
610
620
630
640
650
660
670
680
690
700
SAT Mathematics Scores

Table 6.4

Enrollment Model: All Institutions
Average SAT Mathematics Scores - by cluster

Cluster Number	No. of Schools in Cluster	Average SAT Math Scores
1	27	546
2	14	543
3	25	579
4	19	578
5	34	649
6	17	623

Figure 6.2

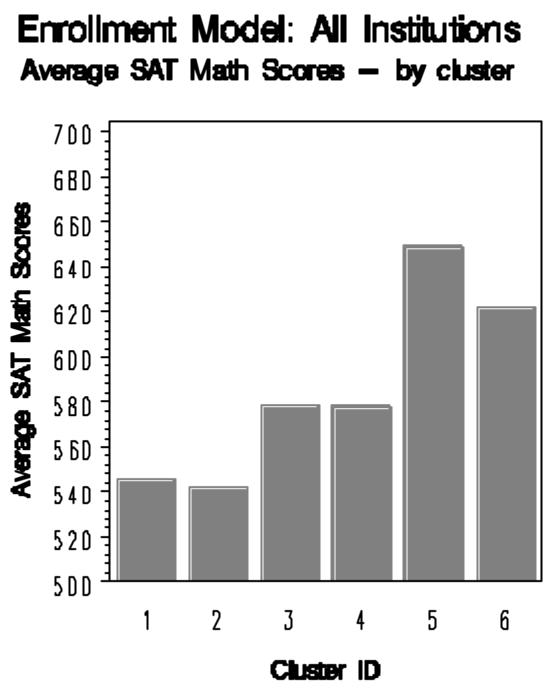


Figure 6.3

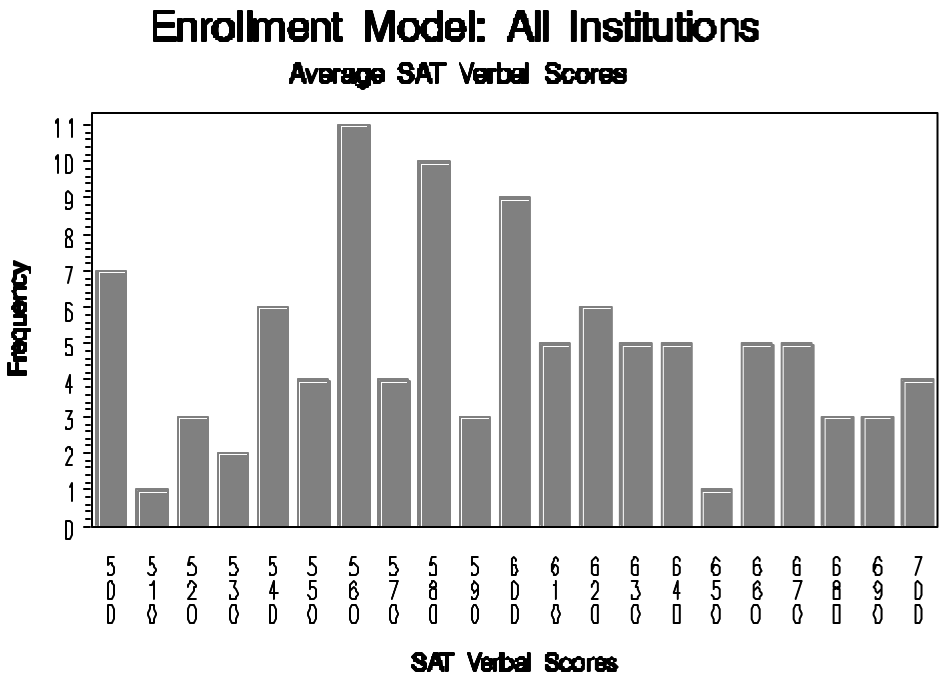

Enrollment Model: All Institutions
Average SAT Verbal Scores
Frequency
0
1
2
3
4
5
6
7
8
9
10
11
500
510
520
530
540
550
560
570
580
590
600
610
620
630
640
650
660
670
680
690
700
SAT Verbal Scores

Table 6.5

Enrollment Model: All Institutions
Average SAT Verbal Scores - by cluster

Cluster Number	No. of Schools in Cluster	AverageSAT Verbal Scores
1	27	542
2	14	535
3	25	579
4	19	578
5	34	655
6	17	628

Figure 6.4

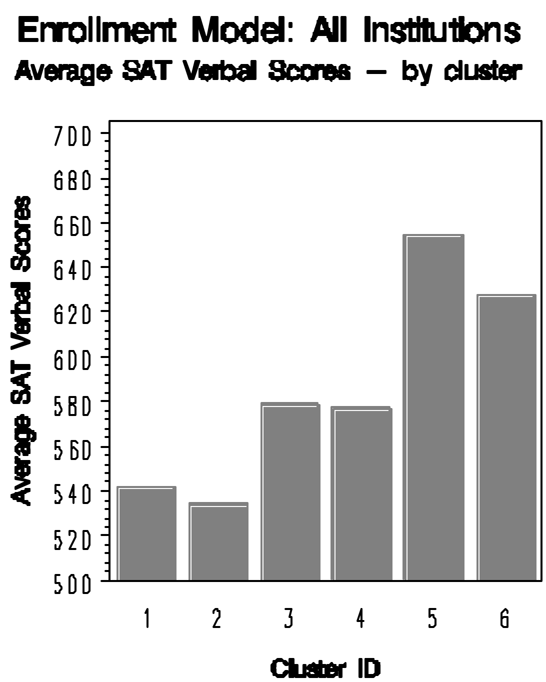
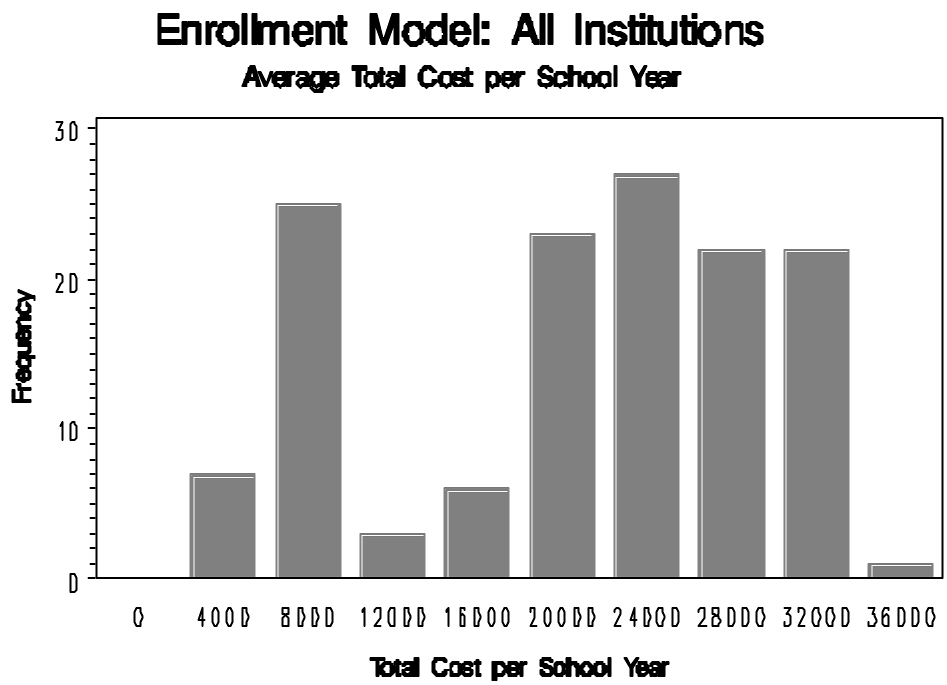


Figure 6.5



Enrollment Model: All Institutions
Average Total Cost per School Year
Frequency
0
10
20
30
0
4000
8000
12000
16000
20000
24000
28000
32000
36000
Total Cost per School Year

Table 6.6

Enrollment Model: All Institutions
Average Total Cost per School Year - by cluster

Cluster Number	No. of Schools in Cluster	Average Total Cost per School Year
1	27	13,277
2	14	8,255
3	25	22,232
4	19	22,241
5	34	27,960
6	17	24,190

Figure 6.6

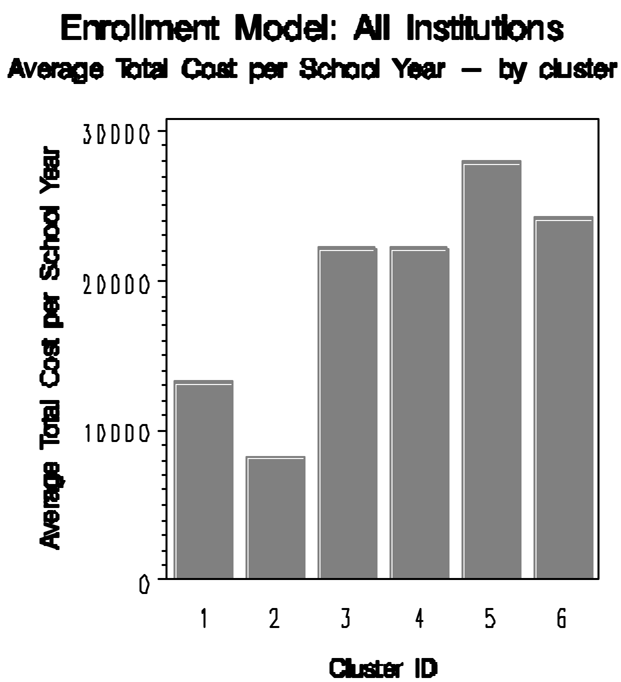


Figure 6.7

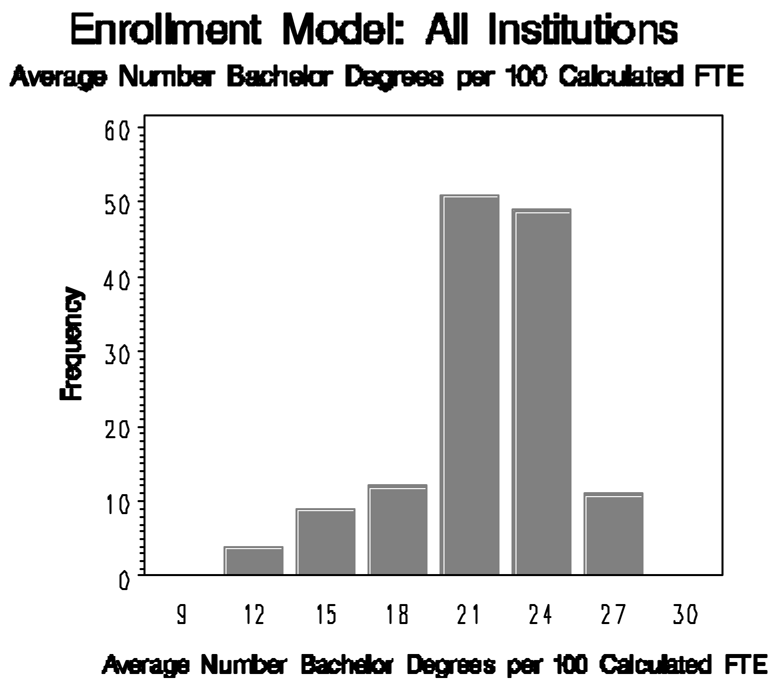

Enrollment Model: All Institutions
Average Number Bachelor Degrees per 100 Calculated FTE
Frequency
0
10
20
30
40
50
60
9
12
15
18
21
24
27
30
Average Number Bachelor Degrees per 100 Calculated FTE

Table 6.7

Enrollment Model: All Institutions

Average Bachelors per Calculated FTE - by cluster

Cluster Number	No. of Schools in Cluster	Average Number of Bachelor's Degrees per Calculated FTE
1	27	0.2031
2	14	0.1433
3	25	0.2401
4	19	0.2097
5	34	0.2460
6	17	0.2129

Figure 6.8

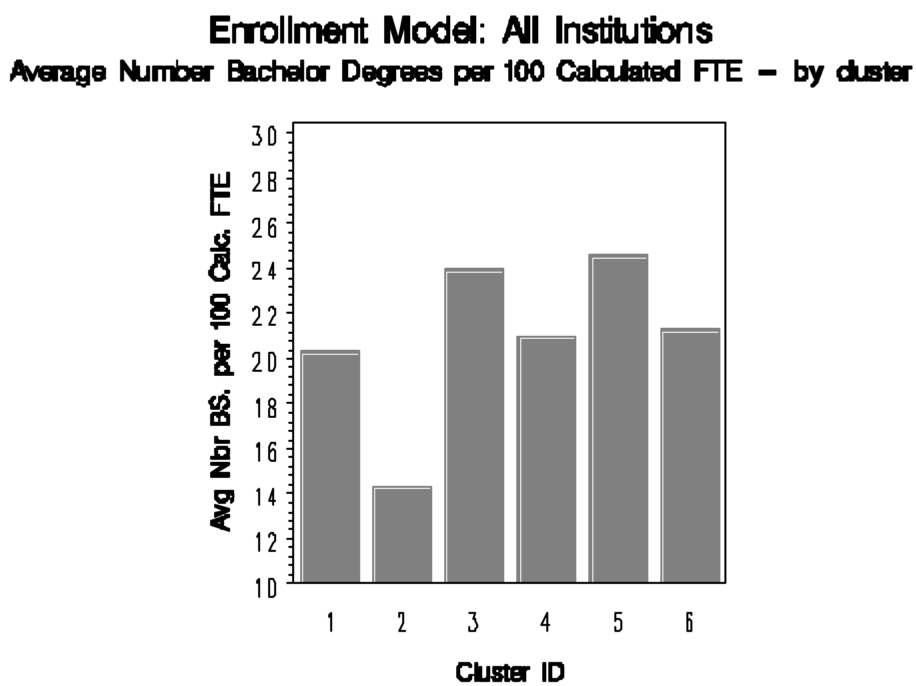


Figure 6.9

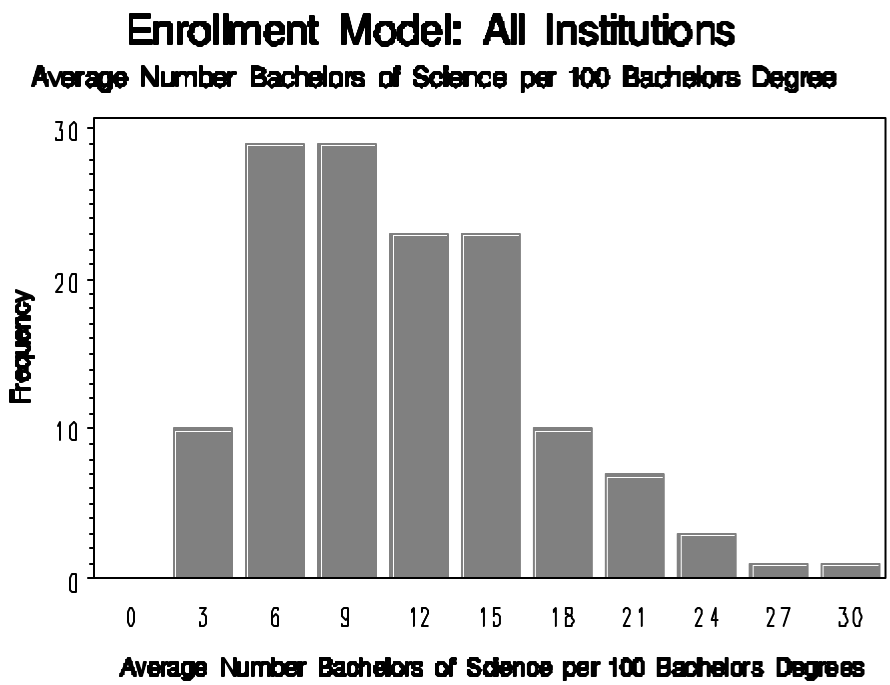

Enrollment Model: All Institutions
Average Number Bachelors of Science per 100 Bachelors Degree
Frequency
30
20
10
0
0
3
6
9
12
15
18
21
24
27
30
Average Number Bachelors of Science per 100 Bachelors Degrees

Table 6.8

Enrollment Model: All Institutions

Average Bachelors of Science per Bachelors Degree - by cluster

Cluster Number	No. of Schools in Cluster	Average Number Bachelors of Science per Bachelors Degrees
1	27	0.05483
2	14	0.08551
3	25	0.07727
4	19	0.12085
5	34	0.14453
6	17	0.20766

Figure 6.10

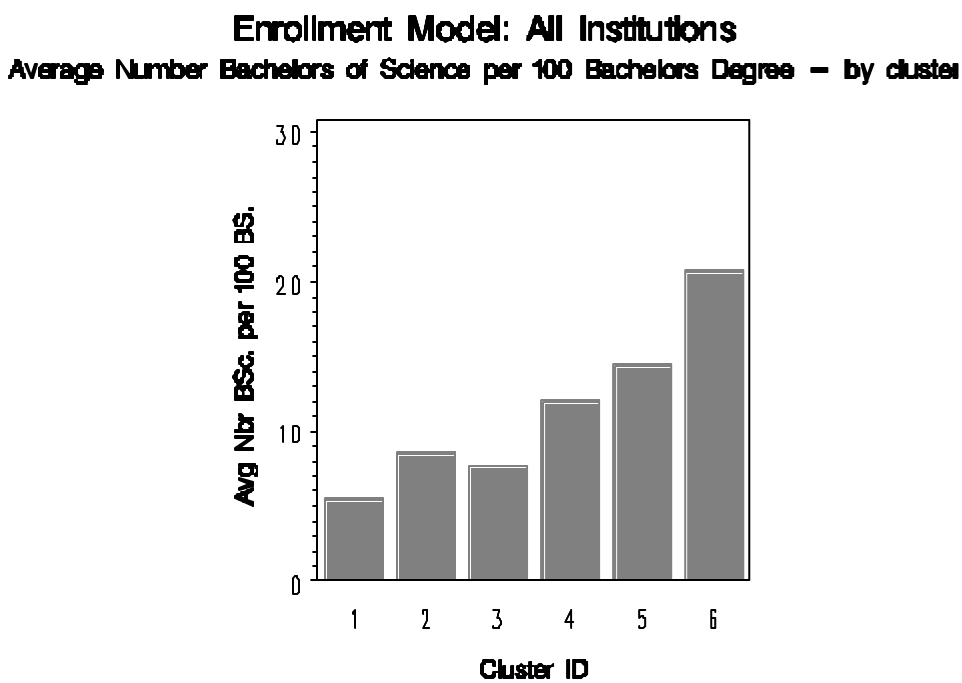


Figure 6.11

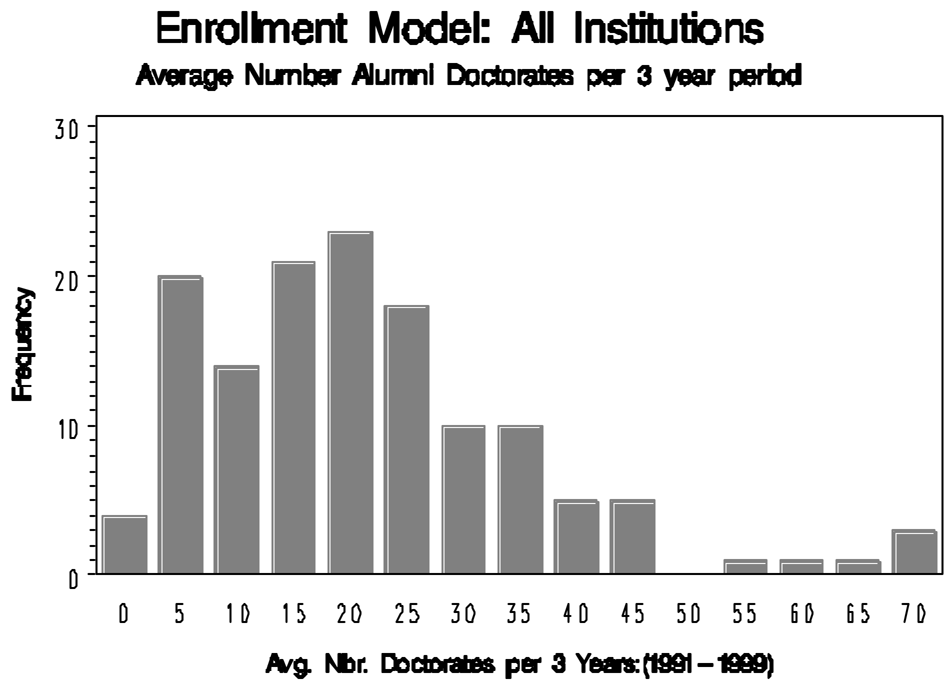

Enrollment Model: All Institutions
Average Number Alumni Doctorates per 3 year period
Frequency
0
10
20
30
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70
Avg. Nbr. Doctorates per 3 Years:(1991 – 1999)

Table 6.9

Enrollment Model: All Institutions

Average Alumni Doctorates per 3 year period(1991-1999) - by cluster

Cluster Number	No. of Schools in Cluster	Average Number Alumni Doctorates per 3 year period
1	27	20.22
2	14	11.52
3	25	12.29
4	19	12.63
5	34	34.89
6	17	31.76

Figure 6.12

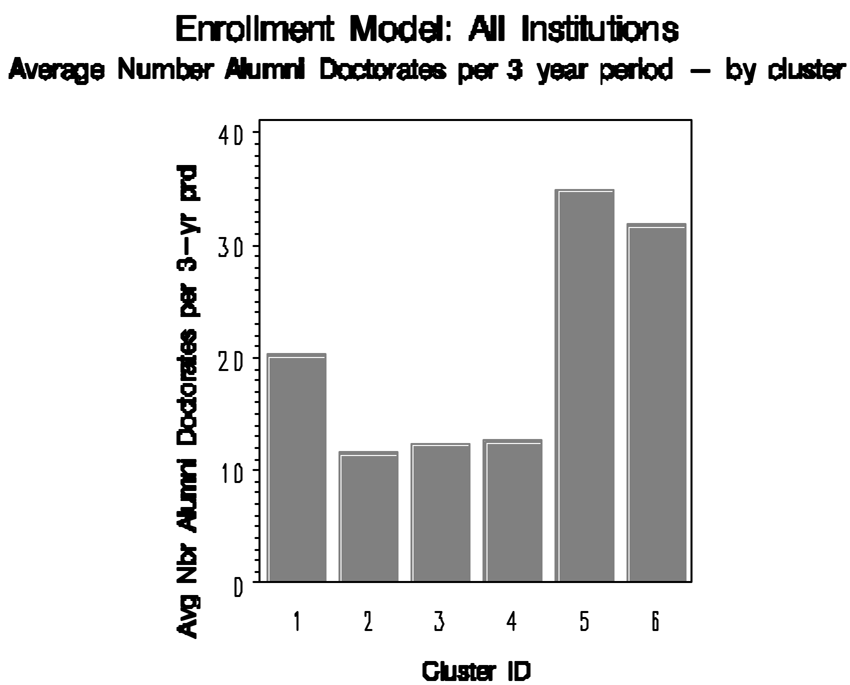
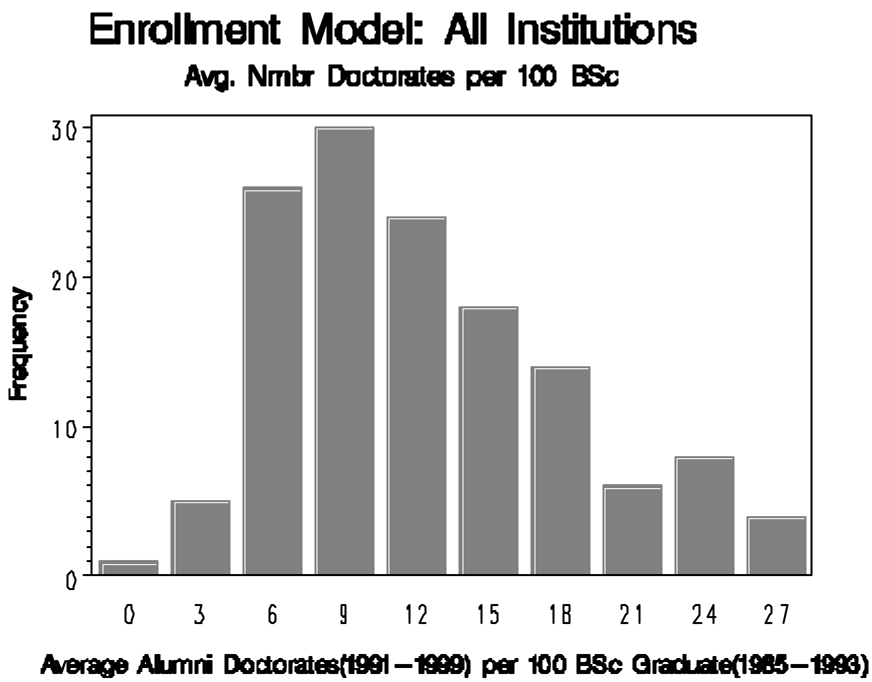


Figure 6.13



Enrollment Model: All Institutions
Avg. Nmbr Doctorates per 100 BSc
30
20
10
0
Frequency
0
3
6
9
12
15
18
21
24
27
Average Alumni Doctorates(1991–1999) per 100 BSc Graduate(1985–1993)

Table 6.10

Enrollment Model: All Institutions

Average Alumni Doctorates(1991-1999) per BSc Graduate(1985-1993) - by cluster

Cluster Number	No. of Schools in Cluster	Average Alumni Doctorates(1991-1999) per B.Sc. Graduate(1985-1993)
1	27	0.10
2	14	0.06
3	25	0.09
4	19	0.11
5	34	0.18
6	17	0.20

Figure 6.14

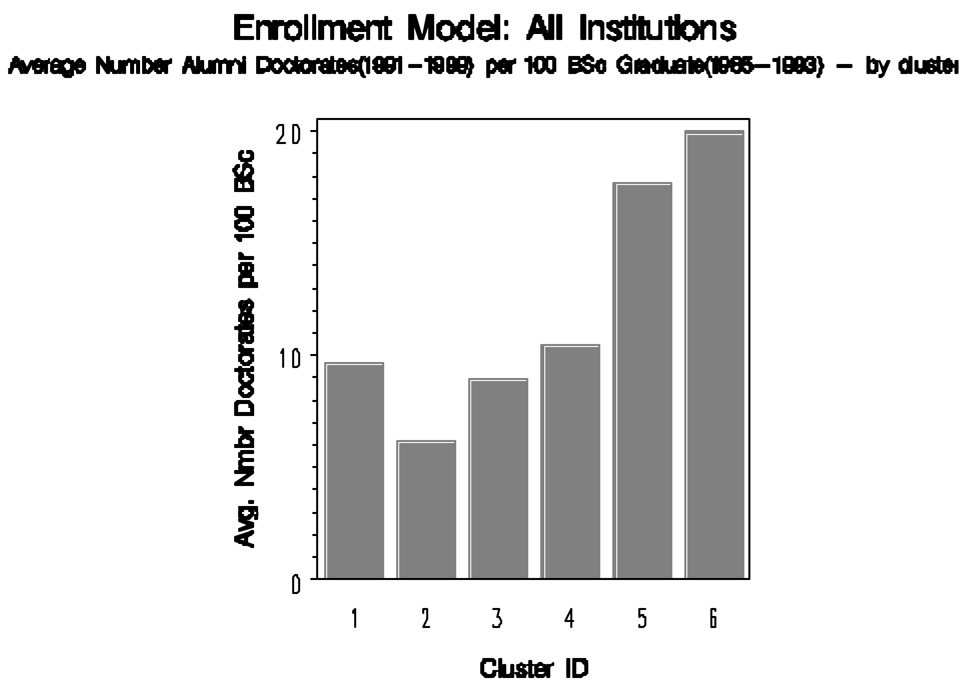


Table 6.15. Enrollment Model Profile for Private Study Institutions

Cluster	#	Total cost per school yr	SAT math	SAT verb	Ph.D.s 91-93	Ph.D.s 94-96	Ph.D.s 97-99	PhD 91-93 per BSc 85-87	PhD 94-96 per BSc 88-90	PhD 97-99 per BSc 91-93
1	28	22,228	564.9	563.3	10.75	12.71	14.68	0.09	0.12	0.15
2	27	28,584	646.7	646.7	29.33	30.63	32.44	0.15	0.16	0.19
3	26	23,158	604.9	608.0	19.23	19.12	20.35	0.13	0.14	0.15
4	17	24,604	588.0	591.9	13.35	12.53	12.94	0.10	0.09	0.10
5	6	28,812	687.0	710.0	66.67	63.67	65.33	0.34	0.34	0.36

KEY

1. **Cluster number**
2. **# -** number of schools in cluster
3. **Total cost per school yr** - total $ cost per school year
4. **SAT math –** SAT mathematics score (not used in clustering)
5. **SAT verb –** SAT verbal score (not used in clustering)
6. **Ph.D.s YR-YR–** number of doctorates by alumni; (3 different time periods, **3** cluster variables)
7. **Ph.D. YR-YR per BSc YR-YR-** number of doctorates by alumni per Bachelors of Science; (3 different time periods, **3** cluster variables)
8. **Total Bac per CFTE YR-** number of bachelors degrees per calculated FTEs; by year 1985 thru 1997 (**13** cluster variables)
9. **Total BSc per Total Bac YR-** number of science bachelors degrees per number of total bachelors degrees; by year 1985 thru 1997 (**13** cluster variables)

Table 6.16. Enrollment Model Profile for Private Study Institutions

Total Baccalaureate Degrees per Calculated Full-time Enrollment 1985 - 1997

Cluster	#	Total Bac per CFTE 85	Total Bac per CFTE 86	Total Bac per CFTE 87	Total Bac per CFTE 88	Total Bac per CFTE 89	Total Bac per CFTE 90	Total Bac per CFTE 91
1	28	0.20	0.21	0.20	0.19	0.19	0.20	0.21
2	27	0.24	0.24	0.25	0.25	0.25	0.26	0.25
3	26	0.21	0.21	0.19	0.20	0.21	0.21	0.23
4	17	0.24	0.24	0.24	0.23	0.24	0.25	0.26
5	6	0.22	0.22	0.23	0.23	0.23	0.25	0.23

Cluster	#	Total Bac per CFTE 92	Total Bac per CFTE	Total Bac per CFTE 94	Total Bac per CFTE 95	Total Bac per CFTE 96	Total Bac per CFTE 97
1	28	0.21	0.22	0.21	0.21	0.21	0.20
2	27	0.26	0.26	0.25	0.24	0.24	0.24
3	26	0.24	0.23	0.21	0.21	0.22	0.22
4	17	0.26	0.26	0.25	0.24	0.25	0.23
5	6	0.26	0.24	0.23	0.24	0.23	0.24

Table 6.17. Enrollment Model Profile for Private Study Institutions

Total Number of B.Sc. Degrees per Total Number of Bachelor's Degrees 1985 - 1997

Cluster	#	Total BSc per Total Bac 85	Total BSc per Total Bac 86	Total BSc per Total Bac 87	Total BSc per Total Bac 88	Total BSc per Total Bac 89	Total BSc per Total Bac 90	Total BSc per Total Bac 91
1	28	0.09	0.08	0.07	0.07	0.07	0.06	0.06
2	27	0.15	0.14	0.13	0.13	0.12	0.12	0.12
3	26	0.19	0.17	0.17	0.16	0.16	0.15	0.15
4	17	0.09	0.09	0.08	0.08	0.07	0.07	0.07
5	6	0.24	0.23	0.21	0.21	0.20	0.20	0.22

Cluster	#	Total BSc per Total Bac 92	Total BSc per Total Bac	Total BSc per Total Bac 94	Total BSc per Total Bac 95	Total BSc per Total Bac 96	Total BSc per Total Bac 97
1	28	0.07	0.08	0.08	0.08	0.09	0.10
2	27	0.14	0.15	0.16	0.17	0.18	0.18
3	26	0.15	0.16	0.17	0.18	0.19	0.19
4	17	0.08	0.07	0.09	0.10	0.10	0.10
5	6	0.21	0.22	0.22	0.25	0.24	0.25

Figure 6.15

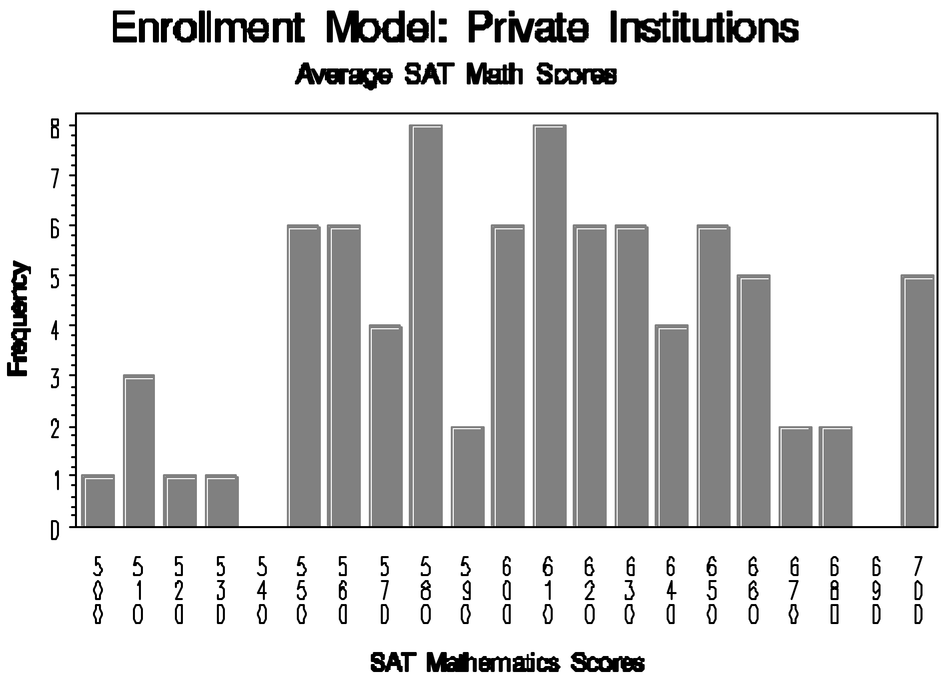

Enrollment Model: Private Institutions
Average SAT Math Scores
Frequency
0
1
2
3
4
5
6
7
8
500
510
520
530
540
550
560
570
580
590
600
610
620
630
640
650
660
670
680
690
700
SAT Mathematics Scores

Table 6.18

Enrollment Model: Private Institutions

Average SAT Mathematics Scores - by cluster

Cluster Number	No. of Schools in Cluster	Average SAT Math Scores
1	28	565
2	27	647
3	26	605
4	17	588
5	6	687

Figure 6.16

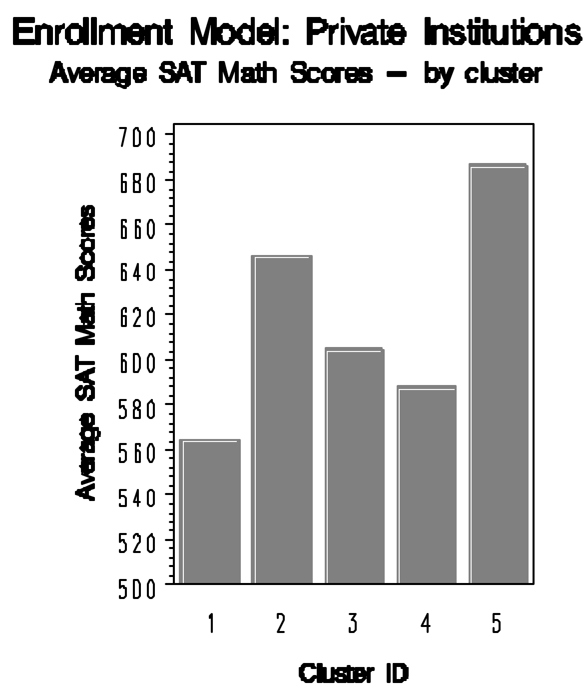


Figure 6.17

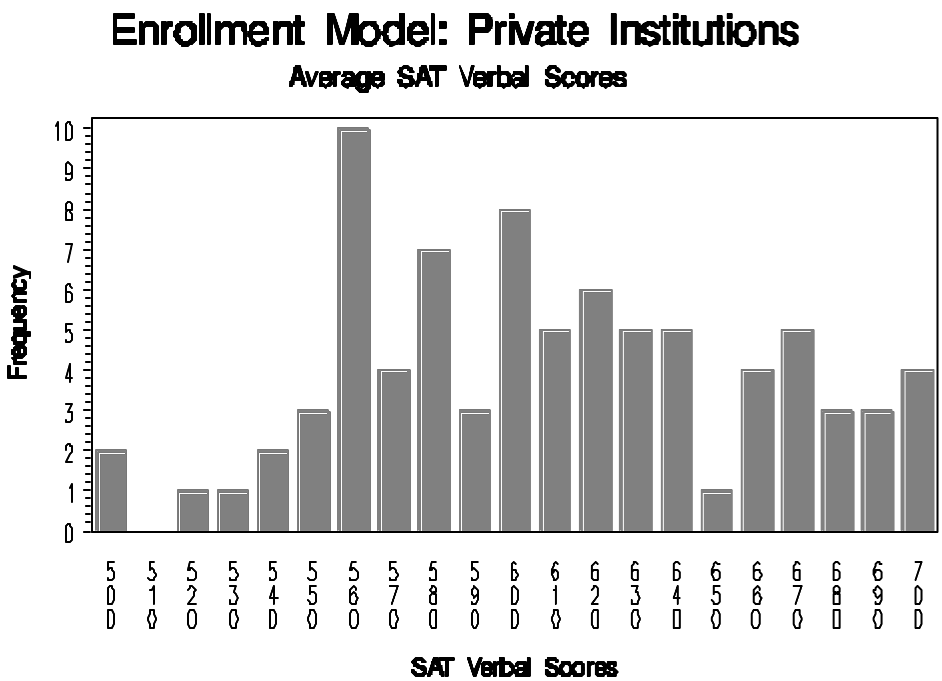

Enrollment Model: Private Institutions
Average SAT Verbal Scores
Frequency
10
9
8
7
6
5
4
3
2
1
0
500
510
520
530
540
550
560
570
580
590
600
610
620
630
640
650
660
670
680
690
700
SAT Verbal Scores

Table 6.16

Enrollment Model: Private Institutions

Average SAT Verbal Scores - by cluster

Cluster Number	No. of Schools in Cluster	Average SAT Verbal Scores
1	28	563
2	27	647
3	26	608
4	17	592
5	6	710

Figure 6.18

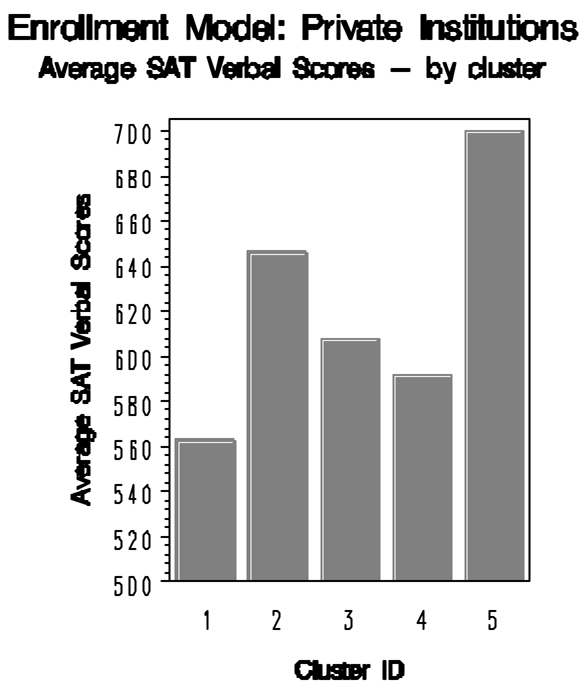


Figure 6.19

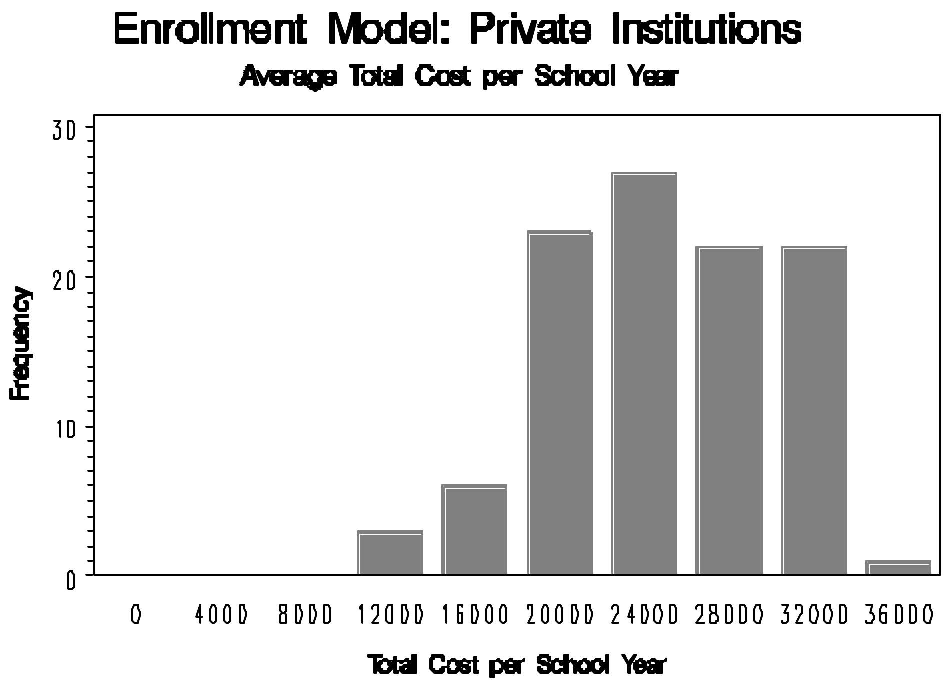

Enrollment Model: Private Institutions
Average Total Cost per School Year
Frequency
0
10
20
30
0
4000
8000
12000
16000
20000
24000
28000
32000
36000
Total Cost per School Year

Table 6.17

Enrollment Model: Private Institutions
Average Total Cost per School Year - by cluster

Cluster Number	No. of Schools in Cluster	Average Total Cost per School Year
1	28	22228
2	27	28584
3	26	23158
4	17	24604
5	6	28812

Figure 6.20

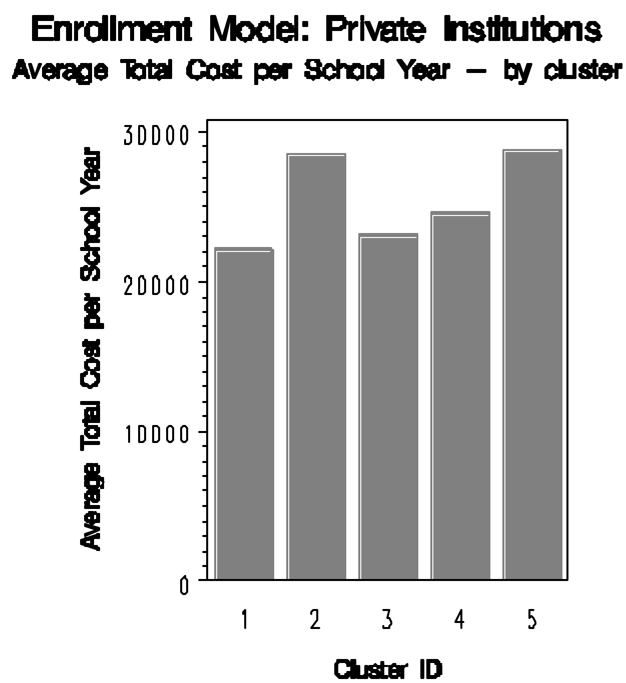


Figure 6.21

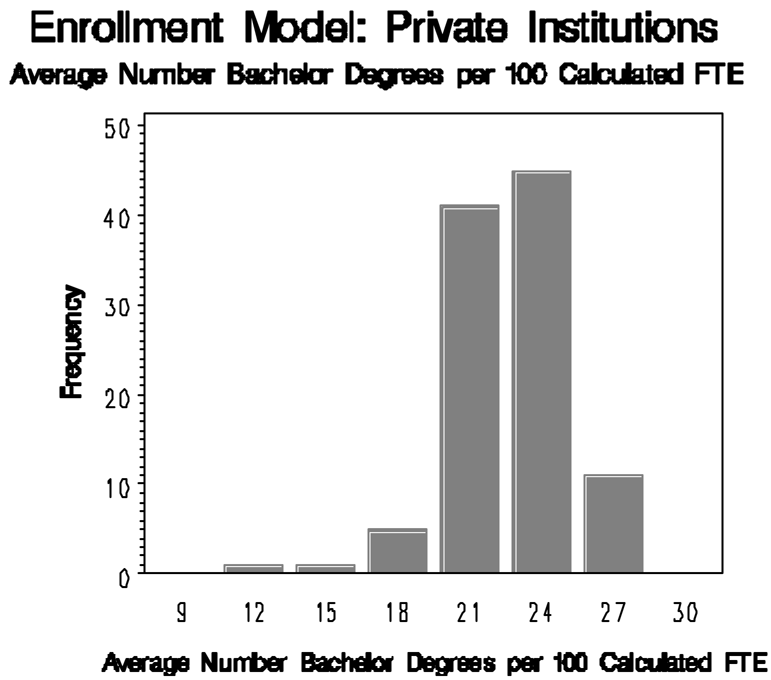

Enrollment Model: Private Institutions
Average Number Bachelor Degrees per 100 Calculated FTE
Frequency
50
40
30
20
10
0
9
12
15
18
21
24
27
30
Average Number Bachelor Degrees per 100 Calculated FTE

Table 6.18

Enrollment Model: Private Institutions

Average Bachelors per Calculated FTE - by cluster

Cluster Number	No. of Schools in Cluster	Average Number of Bachelor's Degrees per Calculated FTE
1	28	0.2045
2	27	0.2484
3	26	0.2130
4	17	0.2444
5	6	0.2349

Figure 6.22

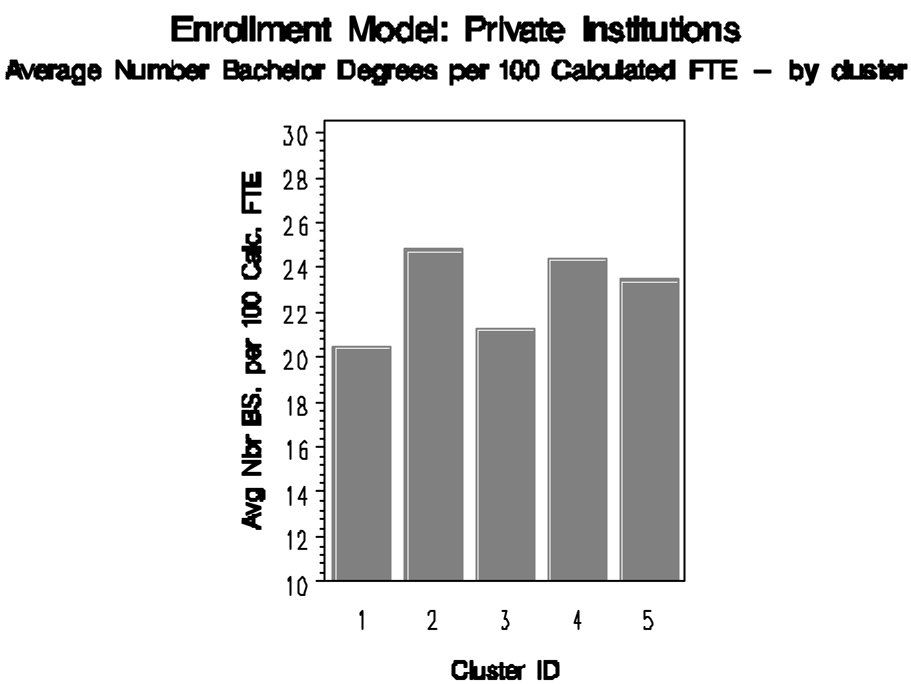


Figure 6.23

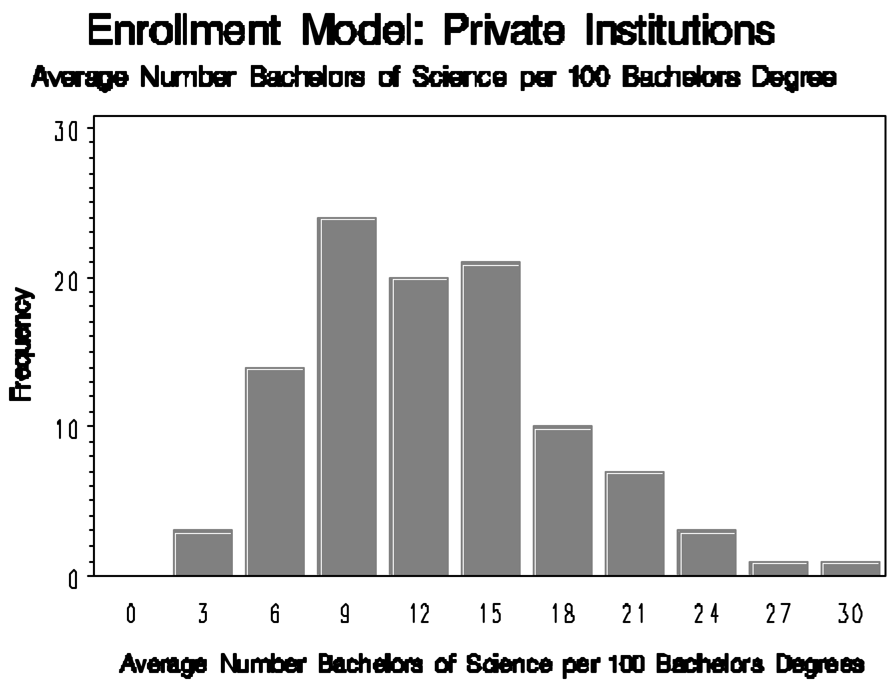

Enrollment Model: Private Institutions
Average Number Bachelors of Science per 100 Bachelors Degree
Frequency
30
20
10
0
0
3
6
9
12
15
18
21
24
27
30
Average Number Bachelors of Science per 100 Bachelors Degrees

Table 6.19

Enrollment Model: Private Institutions

Average Bachelors of Science per Bachelors Degree - by cluster

Cluster Number	No. of Schools in Cluster	Average Number of Bachelors of Science per Bachelors Degrees
1	28	0.07689
2	27	0.14424
3	26	0.16744
4	17	0.08466
5	6	0.22232

Figure 6.24

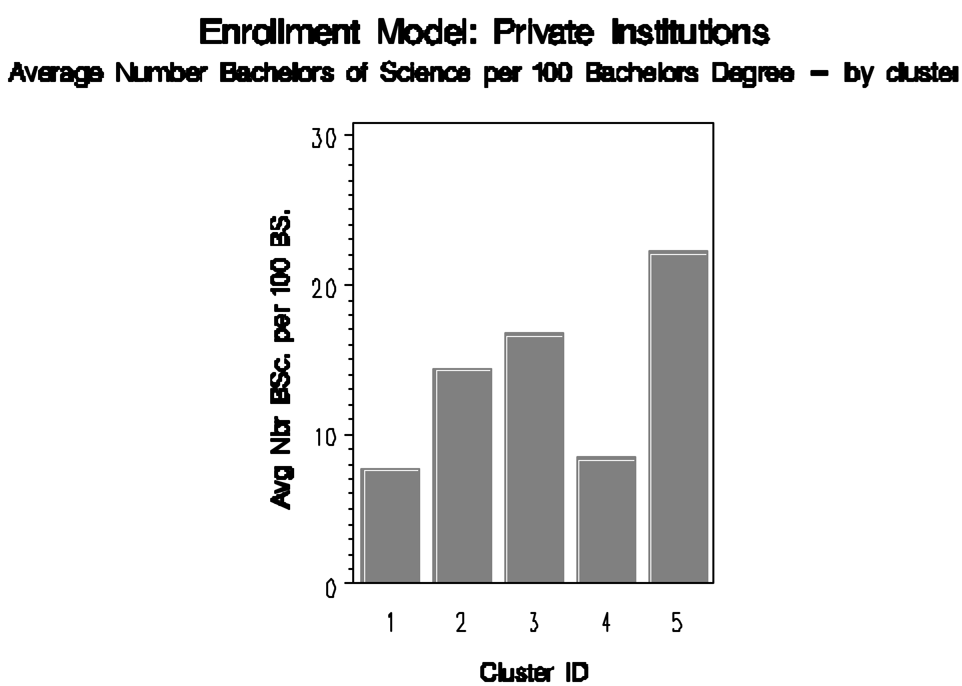
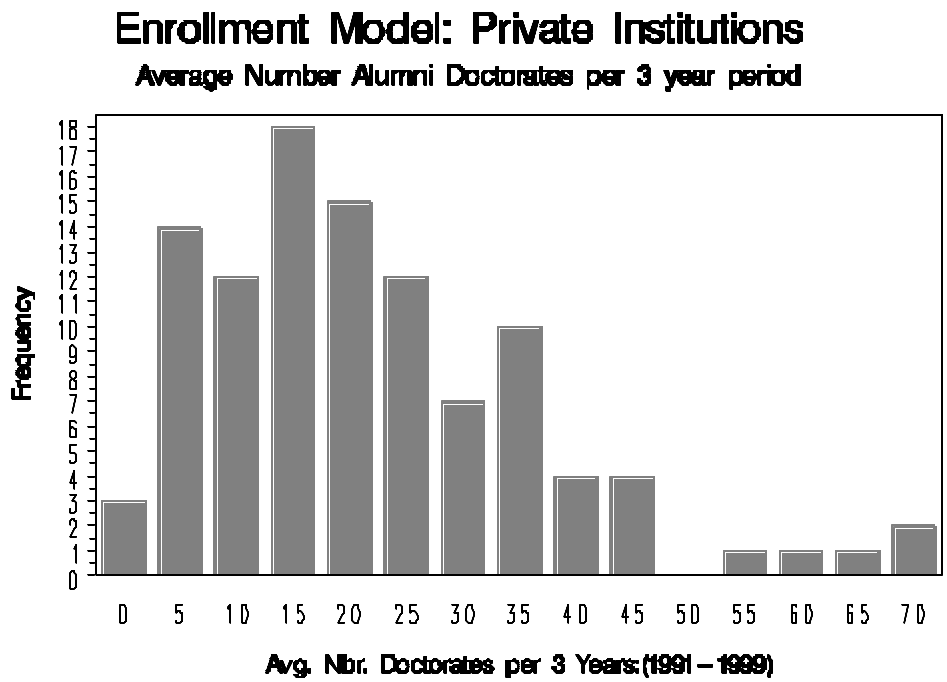


Figure 6.25



Enrollment Model: Private Institutions
Average Number Alumni Doctorates per 3 year period
Frequency
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70
Avg. Nbr. Doctorates per 3 Years:(1991 – 1999)

Table 6.20

Enrollment Model: Private Institutions

Average Alumni Doctorates per 3 year period(1991-1999) - by cluster

Cluster Number	No. of Schools in Cluster	Average Number of Alumni Doctorates per 3-year period
1	28	12.71
2	27	30.80
3	26	19.56
4	17	12.94
5	6	65.22

Figure 6.26

Enrollment Model: Private Institutions

Average Number Alumni Doctorates per 3 year period – by cluster

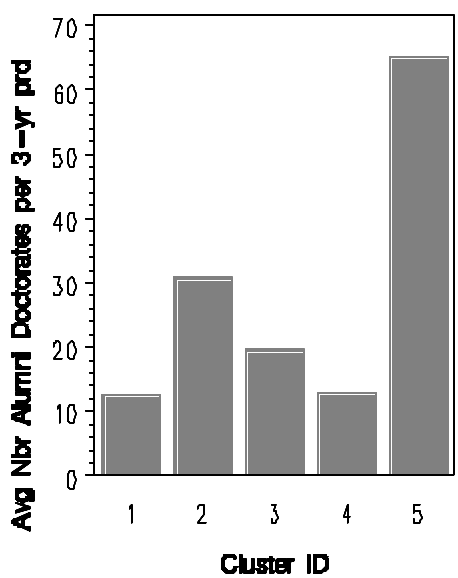


Figure 6.27

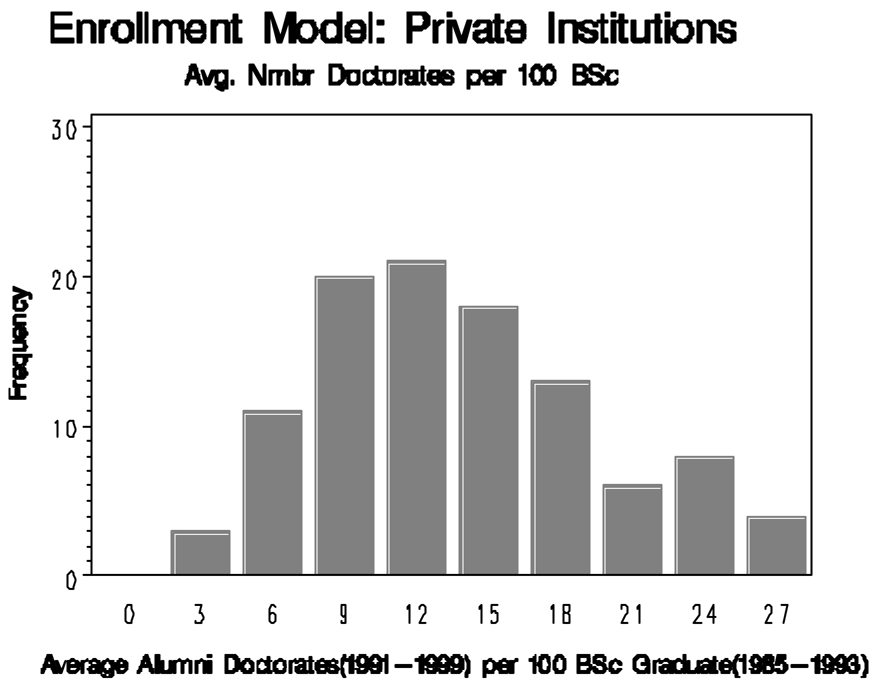

Enrollment Model: Private Institutions
Avg. Nmbr Doctorates per 100 BSc
Frequency
30
20
10
0
0
3
6
9
12
15
18
21
24
27
Average Alumni Doctorates(1991-1999) per 100 BSc Graduate(1985-1993)

Table 6.21

Enrollment Model: Private Institutions

Average Alumni Doctorates(1991-1999) per BSc Graduate(1985-1993) - by cluster

Cluster Number	No. of Schools in Cluster	Average Alumni Doctorates(1991-1999) per B.Sc. Graduate(1985-1993)
1	28	0.11
2	27	0.16
3	26	0.13
4	17	0.10
5	6	0.34

Figure 6.28

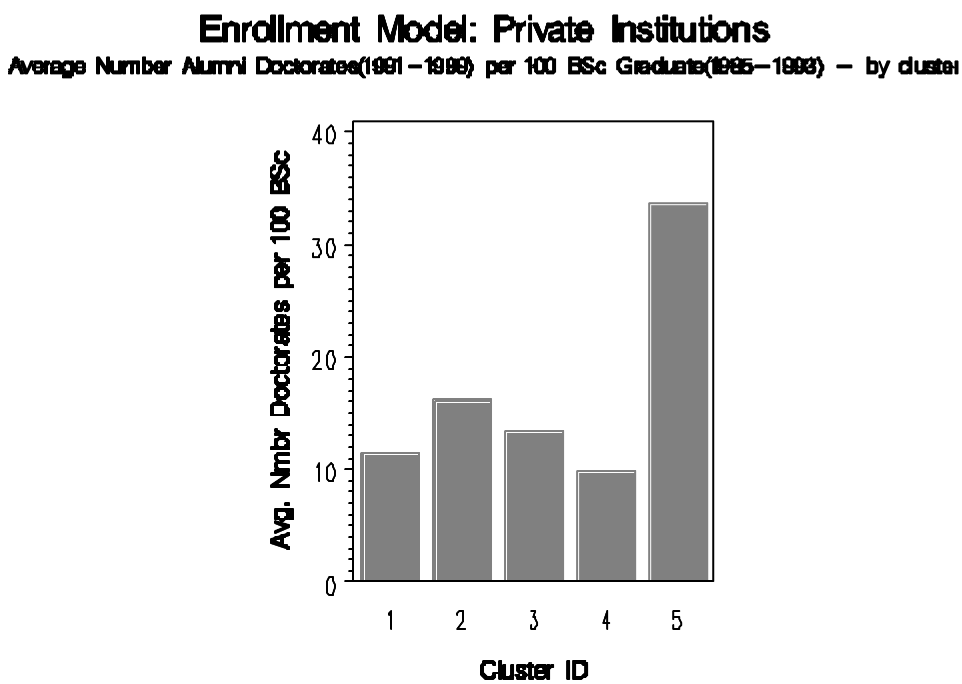


Table 6.22. Enrollment Model Profile for Public Study Institutions

Cluster	#	Total cost per school yr	SAT math	SAT verb	Ph.D.s 91-93	Ph.D.s 94-96	Ph.D.s 97-99	PhD 91-93 per BSc 85-87	PhD 94-96 per BSc 88-90	PhD 97-99 per BSc 91-93
1	14	7,415	528.7	521.4	15.93	20.71	23.50	0.06	0.07	0.09
2	9	7,486	577.7	573.8	25.22	28.44	35.00	0.08	0.10	0.12
3	9	6,188	527.8	525.3	13.00	14.00	15.22	0.06	0.07	0.08

KEY

1. **Cluster number**
2. **# -** number of schools in cluster
3. **Total cost per school yr** - total $ cost per school year
4. **SAT math –** SAT mathematics score (not used in clustering)
5. **SAT verb –** SAT verbal score (not used in clustering)
6. **Ph.D.s YR-YR–** number of doctorates by alumni; (3 different time periods, **3** cluster variables)
7. **Ph.D. YR-YR per BSc YR-YR-** number of doctorates by alumni per Bachelors of Science; (3 different time periods, **3** cluster variables)
8. **Total Bac per CFTE YR-** number of bachelors degrees per calculated FTEs; by year 1985 thru 1997 (**13** cluster variables)
9. **Total BSc per Total Bac YR-** number of science bachelors degrees per number total bachelors degrees; by year 1985 thru 1997 (**13** cluster variables)

Table 6.23. Enrollment Model Profile for Public Study Institutions

Total Baccalaureate Degrees per Calculated Full-time Enrollment 1985 - 1997

Cluster	#	Total Bac per CFTE 85	Total Bac per CFTE 86	Total Bac per CFTE 87	Total Bac per CFTE 88	Total Bac per CFTE 89	Total Bac per CFTE 90	Total Bac per CFTE 91
1	14	0.20	0.23	0.20	0.20	0.20	0.20	0.21
2	9	0.16	0.17	0.16	0.16	0.16	0.16	0.17
3	9	0.15	0.15	0.14	0.14	0.13	0.13	0.14

Cluster	#	Total Bac per CFTE 92	Total Bac per CFTE 93	Total Bac per CFTE 94	Total Bac per CFTE 95	Total Bac per CFTE 96	Total Bac per CFTE 97
1	14	0.23	0.23	0.24	0.23	0.22	0.21
2	9	0.18	0.19	0.19	0.19	0.19	0.19
3	9	0.15	0.16	0.17	0.17	0.17	0.17

Table 6.24. Enrollment Model Profile for Public Study Institutions

Total Number of B.Sc. Degrees per Total Number of Bachelor's Degrees 1985 – 1997

Cluster	#	Total BSc per Total Bac 85	Total BSc per Total Bac 86	Total BSc per Total Bac 87	Total BSc per Total Bac 88	Total BSc per Total Bac 89	Total BSc per Total Bac 90	Total BSc per Total Bac 91
1	14	0.05	0.04	0.04	0.04	0.04	0.04	0.04
2	9	0.12	0.11	0.11	0.10	0.09	0.10	0.10
3	9	0.06	0.06	0.06	0.05	0.05	0.05	0.05

Cluster	#	Total BSc per Total Bac 92	Total BSc per Total Bac 93	Total BSc per Total Bac 94	Total BSc per Total Bac 95	Total BSc per Total Bac 96	Total BSc per Total Bac 97
1	14	0.04	0.04	0.05	0.05	0.05	0.05
2	9	0.10	0.11	0.12	0.13	0.13	0.14
3	9	0.05	0.05	0.06	0.07	0.07	0.07

Figure 6.29

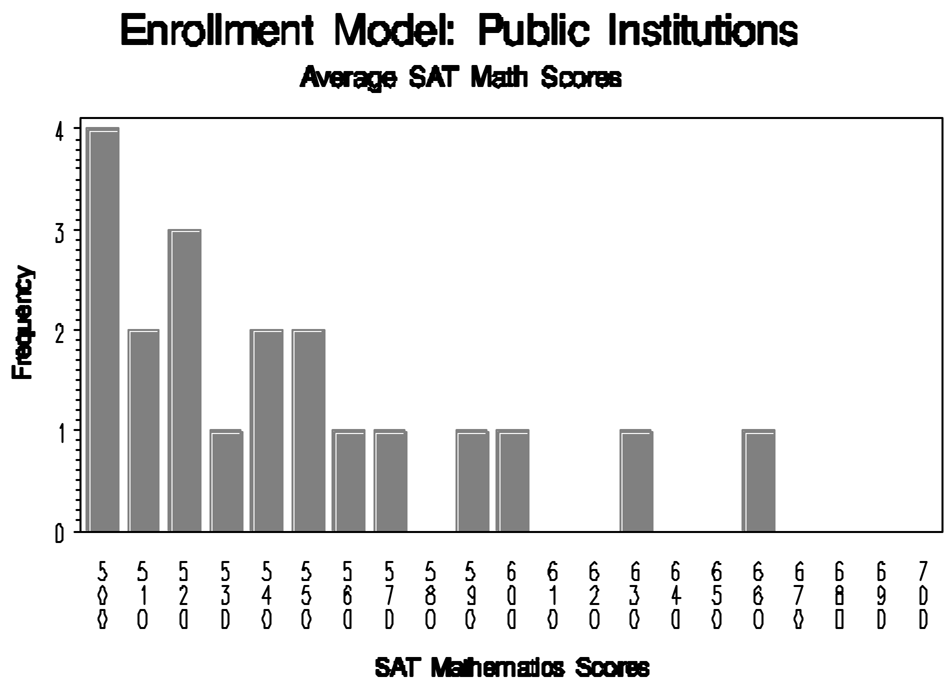

Enrollment Model: Public Institutions
Average SAT Math Scores
Frequency
0
1
2
3
4
500
510
520
530
540
550
560
570
580
590
600
610
620
630
640
650
660
670
680
690
700
SAT Mathematics Scores

Table 6.25

Enrollment Model: Public Institutions
Average SAT Mathematics Scores - by cluster

Cluster Number	No. of Schools in Cluster	Average SAT Math Scores
1	14	529
2	9	578
3	9	528

Figure 6.30

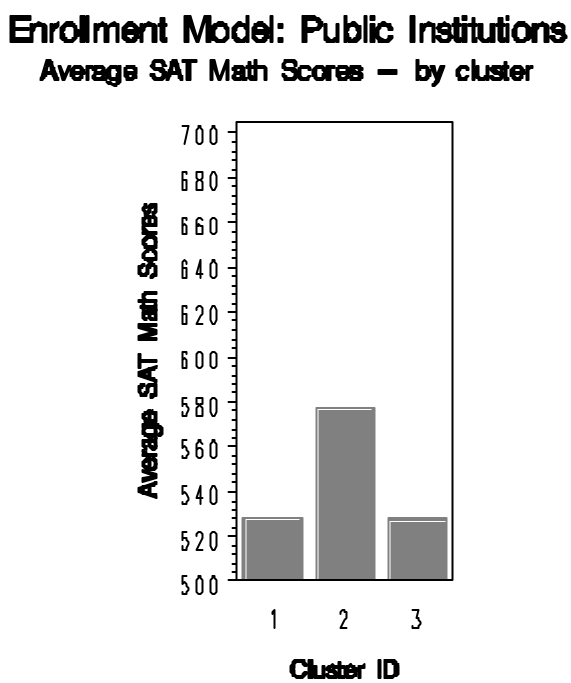
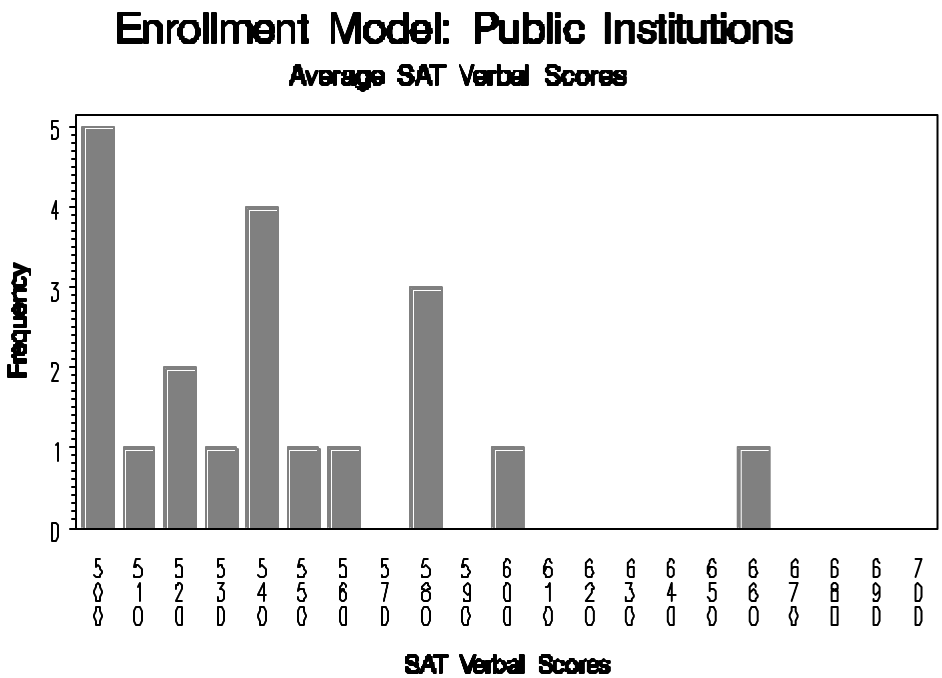


Figure 6.31



Enrollment Model: Public Institutions
Average SAT Verbal Scores
Frequency
0
1
2
3
4
5
500
510
520
530
540
550
560
570
580
590
600
610
620
630
640
650
660
670
680
690
700
SAT Verbal Scores

Table 6.26

Enrollment Model: Public Institutions

Average SAT Verbal Scores - by cluster

Cluster Number	No. of Schools in Cluster	Average SAT Verbal Scores
1	14	521
2	9	574
3	9	525

Figure 6.32

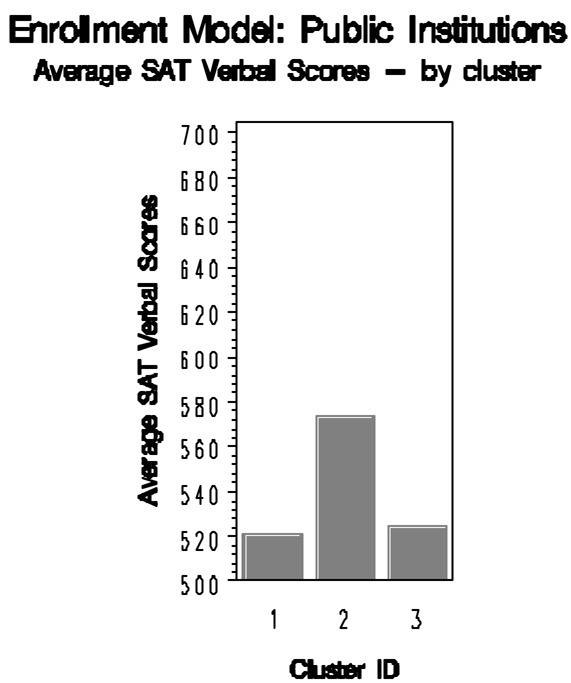


Figure 6.33

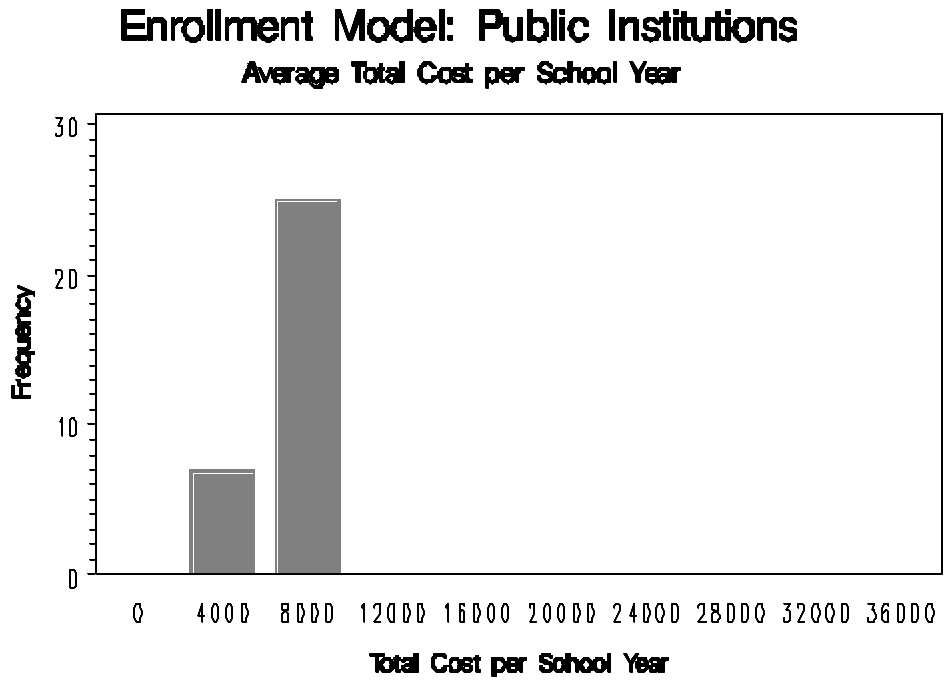

Enrollment Model: Public Institutions
Average Total Cost per School Year
30
20
10
0
Frequency
0
4000
8000
12000
16000
20000
24000
28000
32000
36000
Total Cost per School Year

Table 6.27

Enrollment Model: Public Institutions
Average Total Cost per School Year - by cluster

Cluster Number	No. of Schools in Cluster	Average Total Cost per School Year
1	14	7415
2	9	7486
3	9	6188

Figure 6.34

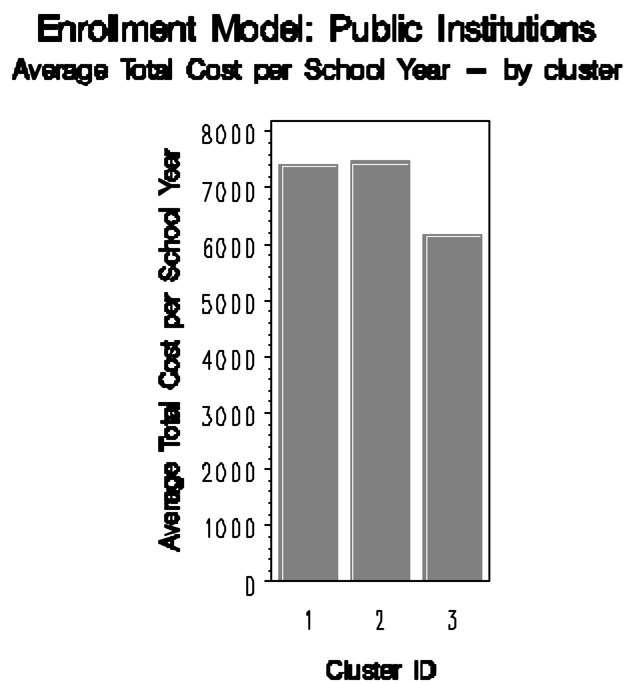


Figure 6.35

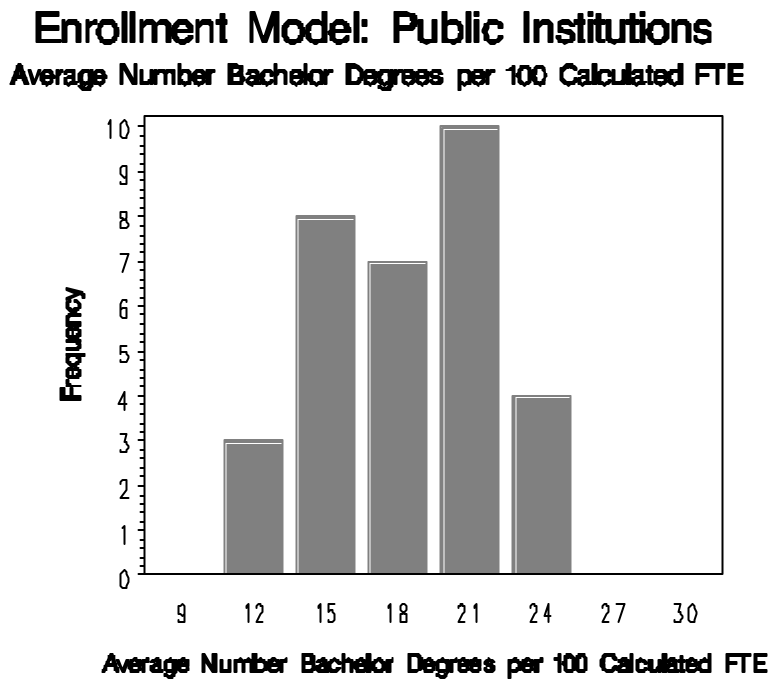

Enrollment Model: Public Institutions
Average Number Bachelor Degrees per 100 Calculated FTE
Frequency
10
9
8
7
6
5
4
3
2
1
0
9
12
15
18
21
24
27
30
Average Number Bachelor Degrees per 100 Calculated FTE

Table 6.28

Enrollment Model: Public Institutions

Average Bachelors per Calculated FTE - by cluster

Cluster Number	No. of Schools in Cluster	Average Number of Bachelor's Degrees per Calculated FTE
1	14	0.2141
2	9	0.1745
3	9	0.1510

Figure 6.36

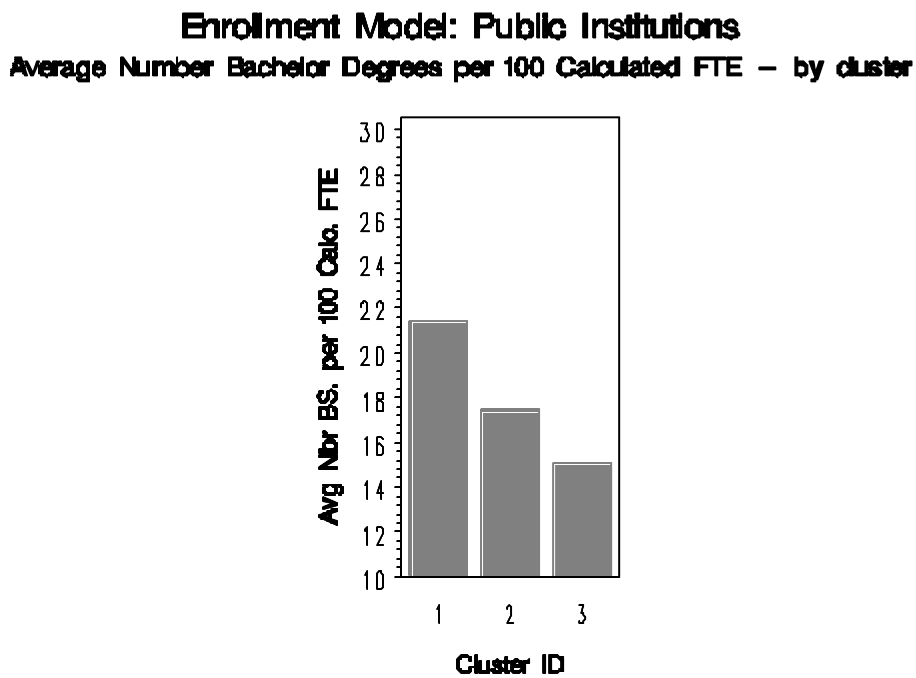
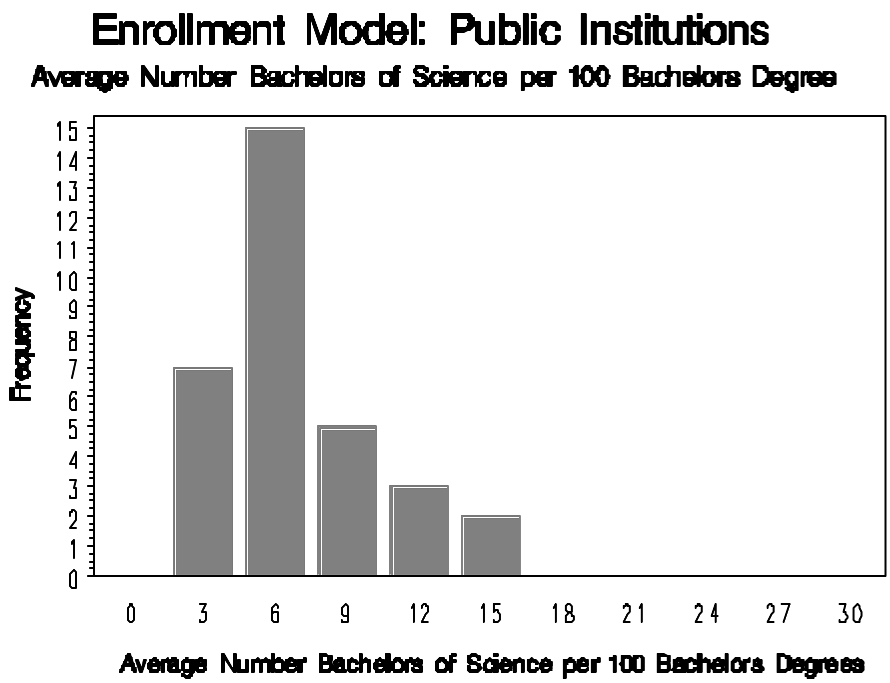


Figure 6.37



Enrollment Model: Public Institutions
Average Number Bachelors of Science per 100 Bachelors Degree
Frequency
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
0
3
6
9
12
15
18
21
24
27
30
Average Number Bachelors of Science per 100 Bachelors Degrees

Table 6.29

Enrollment Model: Public Institutions

Average Bachelors of Science per Bachelors Degree - by cluster

Cluster Number	No. of Schools in Cluster	Average Number Bachelors of Science per Bachelors Degrees
1	14	0.04433
2	9	0.11449
3	9	0.05827

Figure 6.38

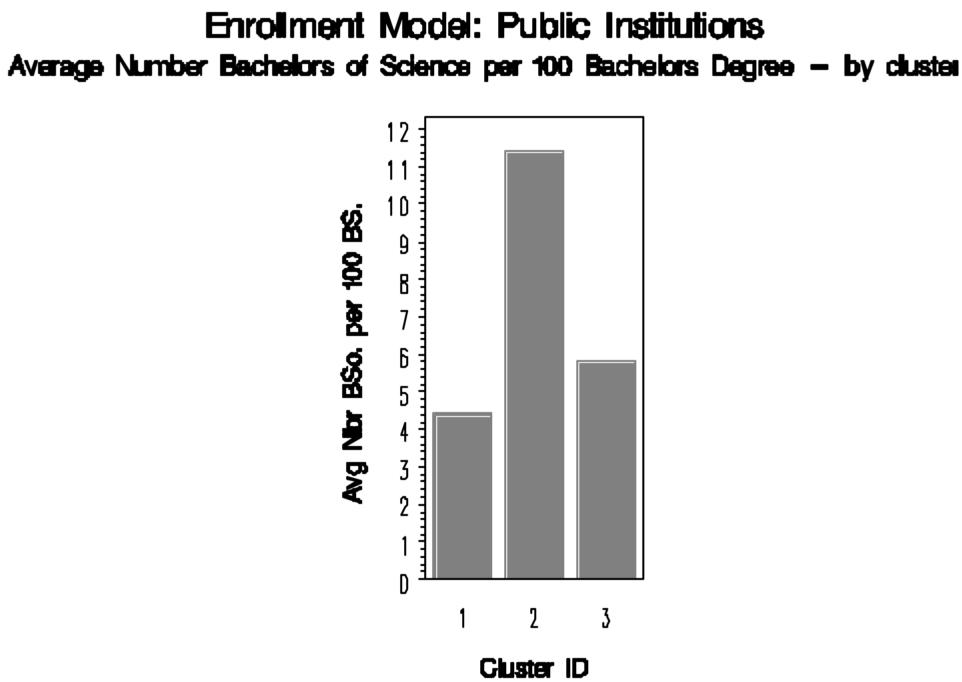


Figure 6.39

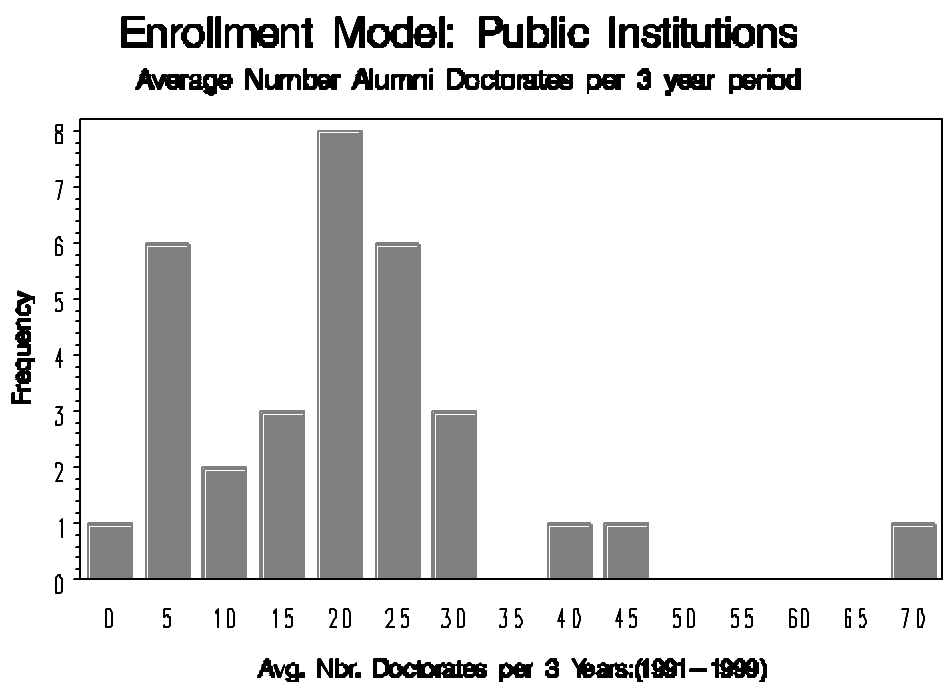

Enrollment Model: Public Institutions
Average Number Alumni Doctorates per 3 year period
Frequency
0
1
2
3
4
5
6
7
8
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70
Avg. Nbr. Doctorates per 3 Years:(1991 – 1999)

Table 6.30

Enrollment Model: Public Institutions
Average Alumni Doctorates per 3 year period(1991-1999) - by cluster

Cluster Number	No. of Schools in Cluster	Average Number Alumni Doctorates per 3 year period
1	14	20.05
2	9	29.56
3	9	14.07

Figure 6.40

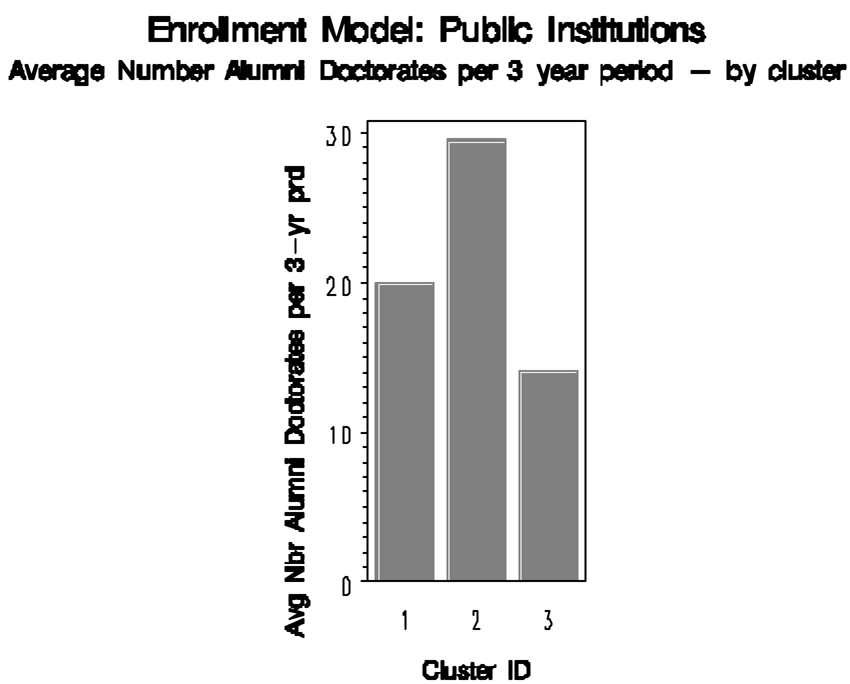


Figure 6.41

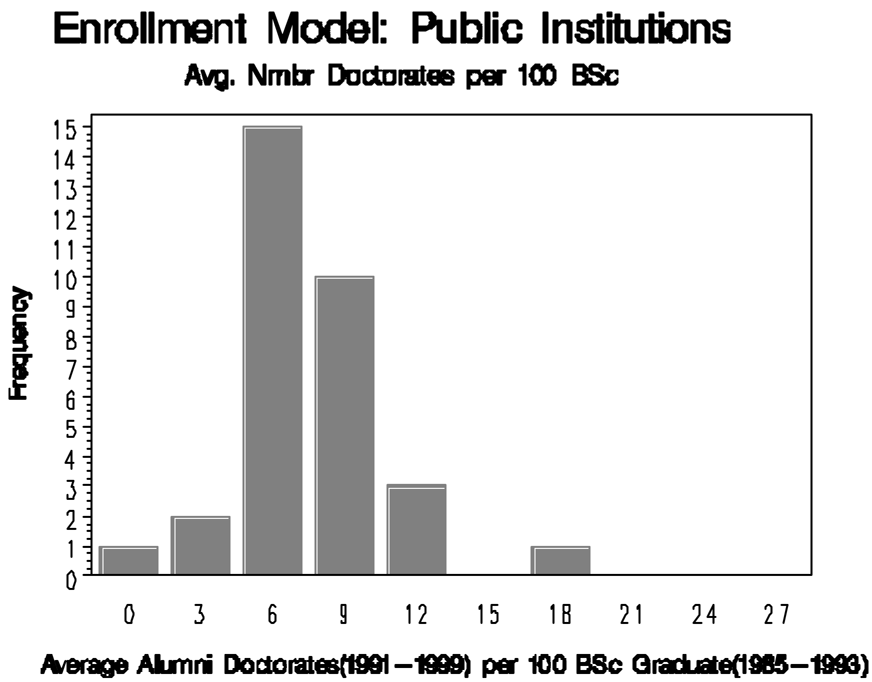

Enrollment Model: Public Institutions
Avg. Nmbr Doctorates per 100 BSc
Frequency
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
0
3
6
9
12
15
18
21
24
27
Average Alumni Doctorates(1991-1999) per 100 BSc Graduate(1985-1993)

Table 6.31

Enrollment Model: Public Institutions

Average Alumni Doctorates(1991-1999) per BSc Graduate(1985-1993) - by cluster

Cluster Number	No. of Schools in Cluster	Average Alumni Doctorates(1991-1999) per B.Sc. Graduate(1985-1993)
1	14	0.07
2	9	0.09
3	9	0.06

Figure 6.41

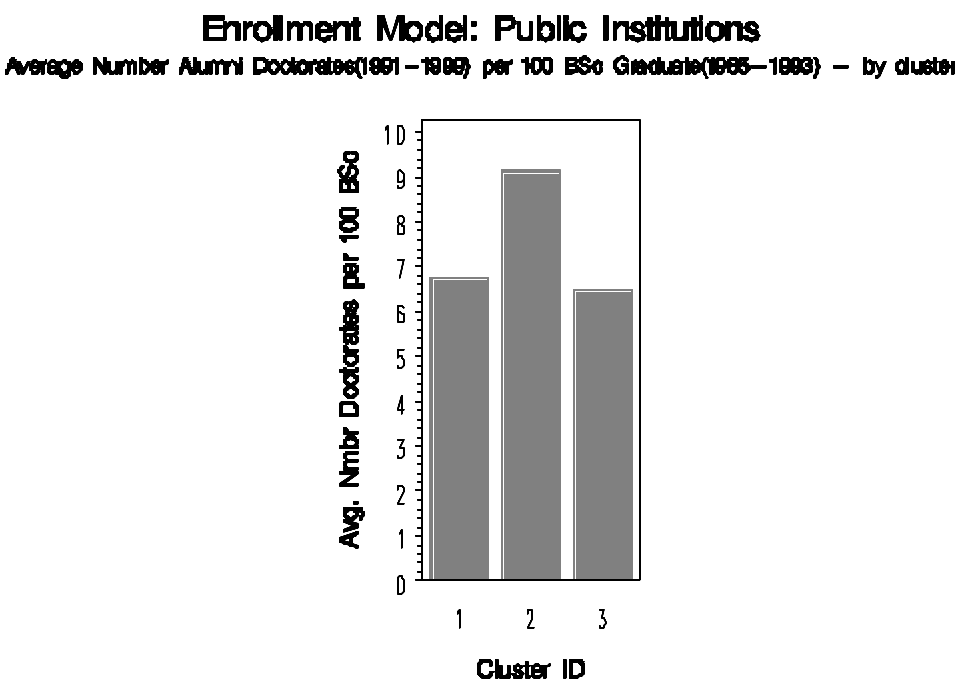


Table 6.31. Enrollment Model Profile for Baccalaureate Degree Study Institutions

Cluster	#	Total cost per school yr	SAT math	SAT verb	Ph.D.s 91-93	Ph.D.s 94-96	Ph.D.s 97-99	PhD 91-93 per BSc 85-87	PhD 94-96 per BSc 88-90	PhD 97-99 per BSc 91-93
1	22	29,034	648.2	648.3	31.32	31.05	32.23	0.16	0.17	0.19
2	23	23,619	587.4	587.9	12.00	11.87	13.43	0.10	0.09	0.11
3	18	23,488	592.3	595.3	13.33	15.06	17.94	0.11	0.14	0.16
4	13	12,577	522.3	530.5	7.08	7.08	8.85	0.05	0.06	0.08
5	17	22,889	603.2	609.6	22.71	22.12	21.71	0.15	0.16	0.16
6	5	29,563	693.8	717.5	71.20	67.60	71.80	0.36	0.36	0.39

KEY

1. **Cluster number**
2. **# -** number of schools in cluster
3. **Total cost per school yr** - total $ cost per school year
4. **SAT math –** SAT mathematics score (not used in clustering)
5. **SAT verb –** SAT verbal score (not used in clustering)
6. **Ph.D.s YR-YR–** number of doctorates by alumni; (3 different time periods, **3** cluster variables)
7. **Ph.D. YR-YR per BSc YR-YR-** number of doctorates by alumni per Bachelors of Science; (3 different time periods, **3** cluster variables)
8. **Total Bac per CFTE YR-** number of bachelors degrees per calculated FTEs; by year 1985 thru 1997 (**13** cluster variables)
9. **Total BSc per Total Bac YR-** number of science bachelors degrees per number of total bachelors degrees; by year 1985 thru 1997 (**13** cluster variables)

Table 6.32. Enrollment Model Profile for Baccalaureate Degree Study Institutions

Total Baccalaureate Degrees per Calculated Full-time Enrollment 1985 - 1997

Cluster	#	Total Bac per CFTE 85	Total Bac per CFTE 86	Total Bac per CFTE 87	Total Bac per CFTE 88	Total Bac per CFTE 89	Total Bac per CFTE 90	Total Bac per CFTE 91
1	22	0.25	0.24	0.25	0.25	0.26	0.26	0.26
2	23	0.23	0.23	0.23	0.23	0.23	0.24	0.25
3	18	0.22	0.20	0.20	0.20	0.20	0.21	0.22
4	13	0.16	0.16	0.15	0.15	0.15	0.16	0.16
5	17	0.21	0.21	0.19	0.20	0.21	0.21	0.23
6	5	0.22	0.22	0.22	0.23	0.23	0.24	0.24

Cluster	#	Total Bac per CFTE 92	Total Bac per CFTE 93	Total Bac per CFTE 94	Total Bac per CFTE r95	Total Bac per CFTE 96	Total Bac per CFTE 97
1	22	0.26	0.26	0.25	0.24	0.25	0.25
2	23	0.25	0.25	0.25	0.24	0.24	0.23
3	18	0.22	0.22	0.21	0.22	0.22	0.21
4	13	0.16	0.17	0.16	0.17	0.18	0.18
5	17	0.25	0.23	0.21	0.20	0.21	0.21
6	5	0.26	0.23	0.23	0.24	0.23	0.24

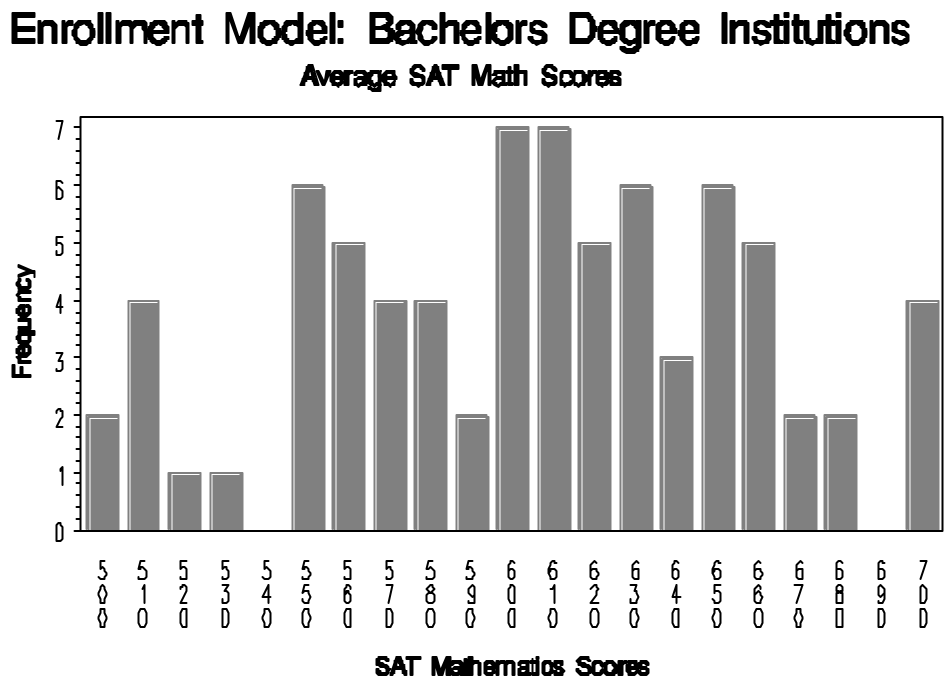
Table 6.33. Enrollment Model Profile for Baccalaureate Degree Study Institutions

Total Number of B.Sc. Degrees per Total Number of Bachelor's Degrees 1985 - 1997

Cluster	#	Total BSc per Total Bac 85	Total BSc per Total Bac 86	Total BSc per Total Bac 87	Total BSc per Total Bac 88	Total BSc per Total Bac 89	Total BSc per Total Bac 90	Total BSc per Total Bac 91
1	22	0.15	0.15	0.14	0.13	0.12	0.13	0.13
2	23	0.09	0.09	0.08	0.07	0.07	0.07	0.06
3	18	0.12	0.10	0.11	0.10	0.10	0.10	0.10
4	13	0.09	0.09	0.08	0.07	0.07	0.07	0.07
5	17	0.21	0.20	0.20	0.17	0.18	0.16	0.17
6	5	0.25	0.23	0.22	0.21	0.21	0.20	0.22

Cluster	#	Total BSc per Total Bac 92	Total BSc per Total Bac 93	Total BSc per Total Bac 94	Total BSc per Total Bac 95	Total BSc per Total Bac 96	Total BSc per Total Bac 97
1	22	0.14	0.15	0.16	0.18	0.18	0.18
2	23	0.08	0.07	0.09	0.09	0.10	0.10
3	18	0.11	0.12	0.11	0.12	0.14	0.15
4	13	0.07	0.08	0.09	0.09	0.09	0.09
5	17	0.16	0.17	0.18	0.21	0.20	0.21
6	5	0.22	0.23	0.23	0.25	0.25	0.26

Figure 6.42



Enrollment Model: Bachelors Degree Institutions
Average SAT Math Scores
Frequency
0
1
2
3
4
5
6
7
500
510
520
530
540
550
560
570
580
590
600
610
620
630
640
650
660
670
680
690
700
SAT Mathematics Scores

Table 6.34

Enrollment Model: Bachelors Degree Institutions
Average SAT Mathematics Scores - by cluster

Cluster Number	No. of Schools in Cluster	Average SAT Math Scores
1	22	648
2	23	587
3	18	592
4	13	522
5	17	603
6	5	694

Figure 6.43

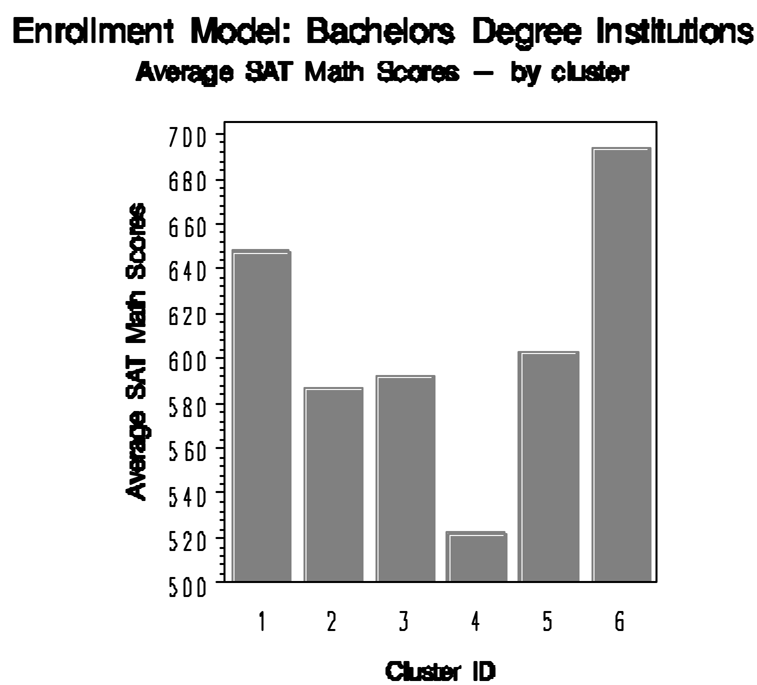


Figure 6.44

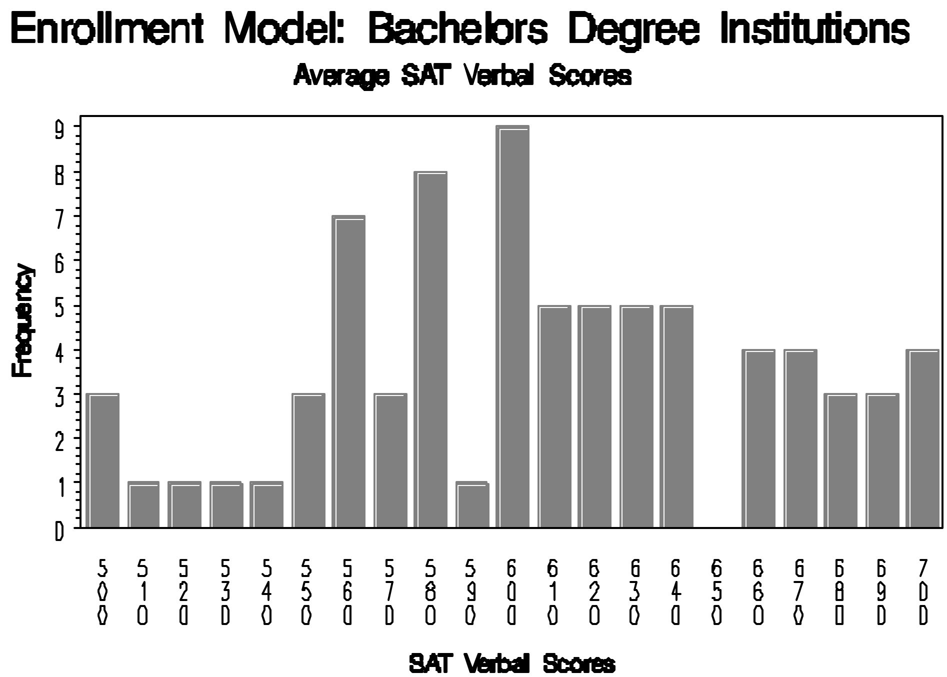

Enrollment Model: Bachelors Degree Institutions
Average SAT Verbal Scores
Frequency
0
1
2
3
4
5
6
7
8
9
500
510
520
530
540
550
560
570
580
590
600
610
620
630
640
650
660
670
680
690
700
SAT Verbal Scores

Table 6.35

Enrollment Model: Bachelors Degree Institutions

Average SAT Verbal Scores - by cluster

Cluster Number	No. of Schools in Cluster	Average SAT Verbal Scores
1	22	648
2	23	588
3	18	595
4	13	531
5	17	610
6	5	718

Figure 6.45

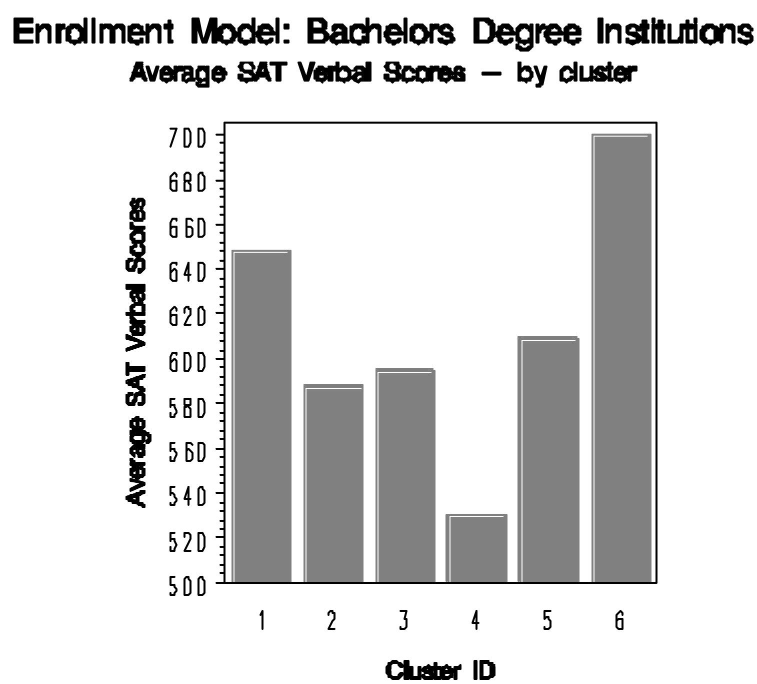


Figure 6.46

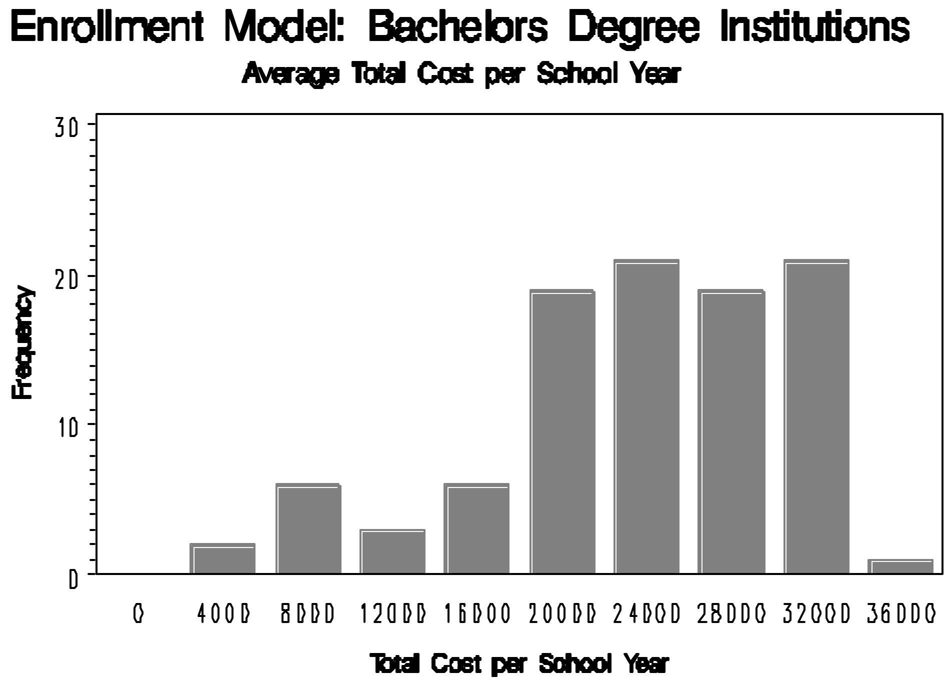

Enrollment Model: Bachelors Degree Institutions
Average Total Cost per School Year
Frequency
30
20
10
0
0
4000
8000
12000
16000
20000
24000
28000
32000
36000
Total Cost per School Year

Table 6.36

Enrollment Model: Bachelors Degree Institutions

Average Total Cost per School Year - by cluster

Cluster Number	No. of Schools in Cluster	Average Total Cost per School Year
1	22	29,034
2	23	23,619
3	18	23,488
4	13	12,577
5	17	22,889
6	5	29,563

Figure 6.47

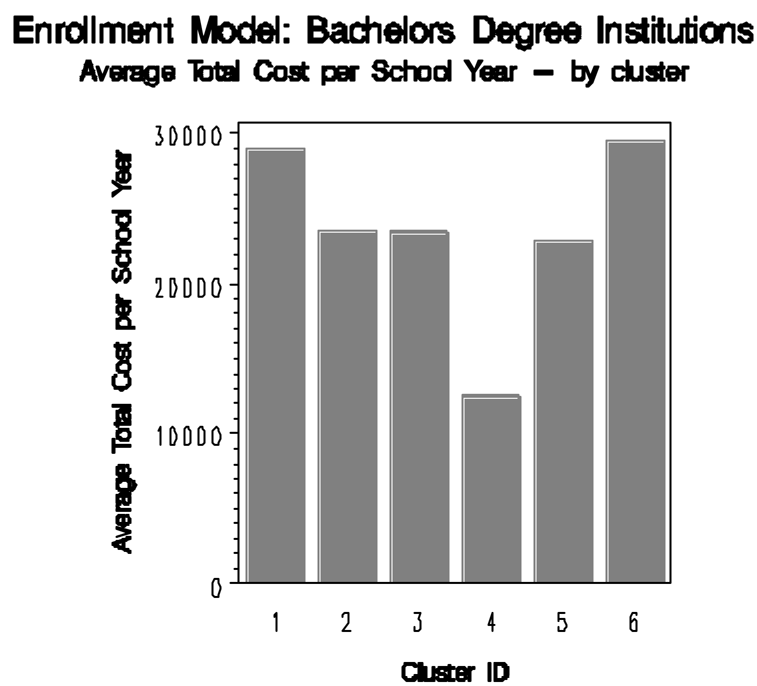


Figure 6.48

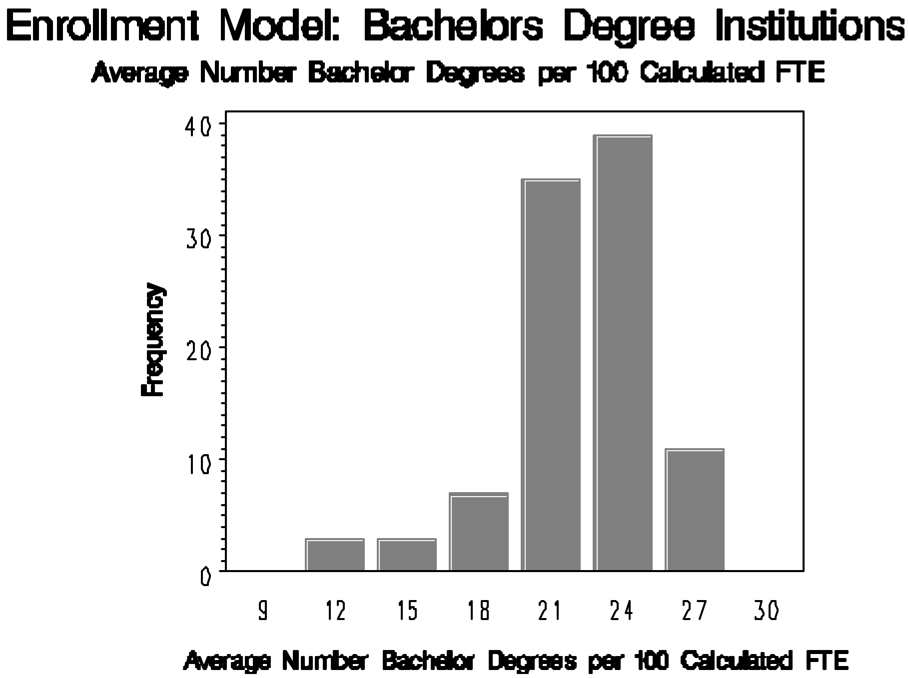

Enrollment Model: Bachelors Degree Institutions
Average Number Bachelor Degrees per 100 Calculated FTE
Frequency
40
30
20
10
0
9
12
15
18
21
24
27
30
Average Number Bachelor Degrees per 100 Calculated FTE

Table 6.37

Enrollment Model: Bachelors Degree Institutions

Average Bachelors per Calculated FTE - by cluster

Cluster Number	No. of Schools in Cluster	Average Number of Bachelor's Degrees per Calculated FTE
1	22	0.2528
2	23	0.2389
3	18	0.2114
4	13	0.1623
5	17	0.2131
6	5	0.2330

Figure 6.49

Figure 6.50

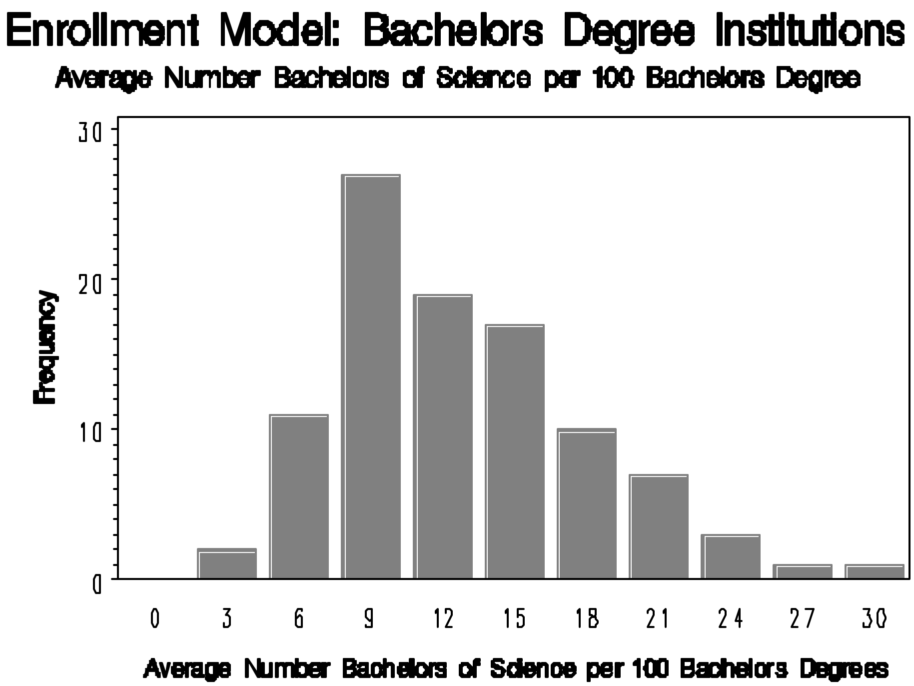

Enrollment Model: Bachelors Degree Institutions
Average Number Bachelors of Science per 100 Bachelors Degree
Frequency
0
10
20
30
0
3
6
9
12
15
18
21
24
27
30
Average Number Bachelors of Science per 100 Bachelors Degrees

Table 6.38

Enrollment Model: Bachelors Degree Institutions

Average Bachelors of Science per Bachelors Degree - by cluster

Cluster Number	No. of Schools in Cluster	Average Number of Bachelors of Science per Bachelor's Degrees
1	22	0.14771
2	23	0.08166
3	18	0.11325
4	13	0.08065
5	17	0.18667
6	5	0.22904

Figure 6.51

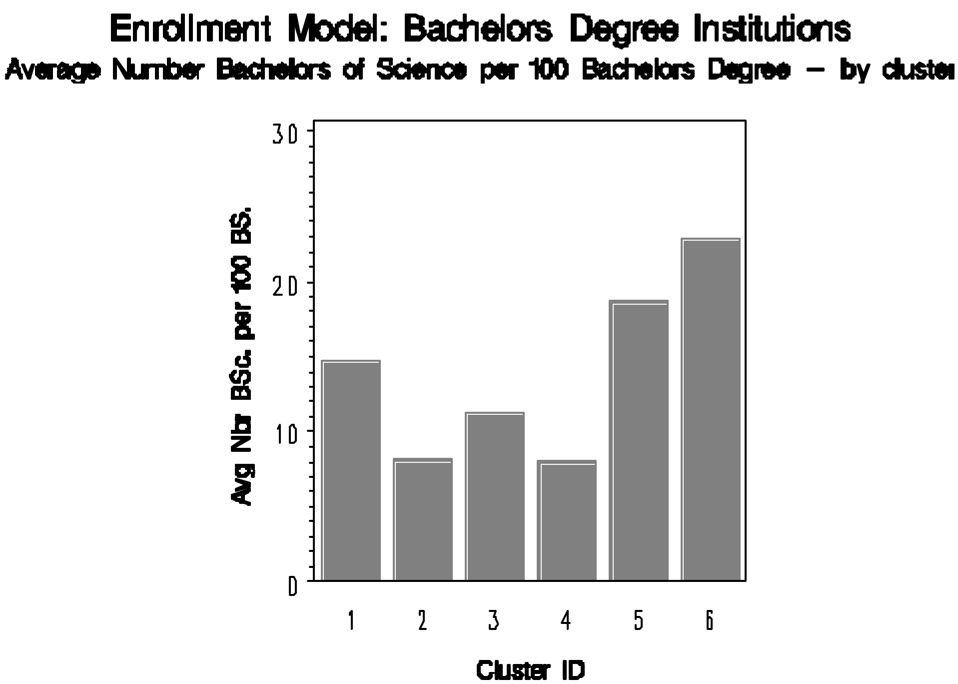


Figure 6.52

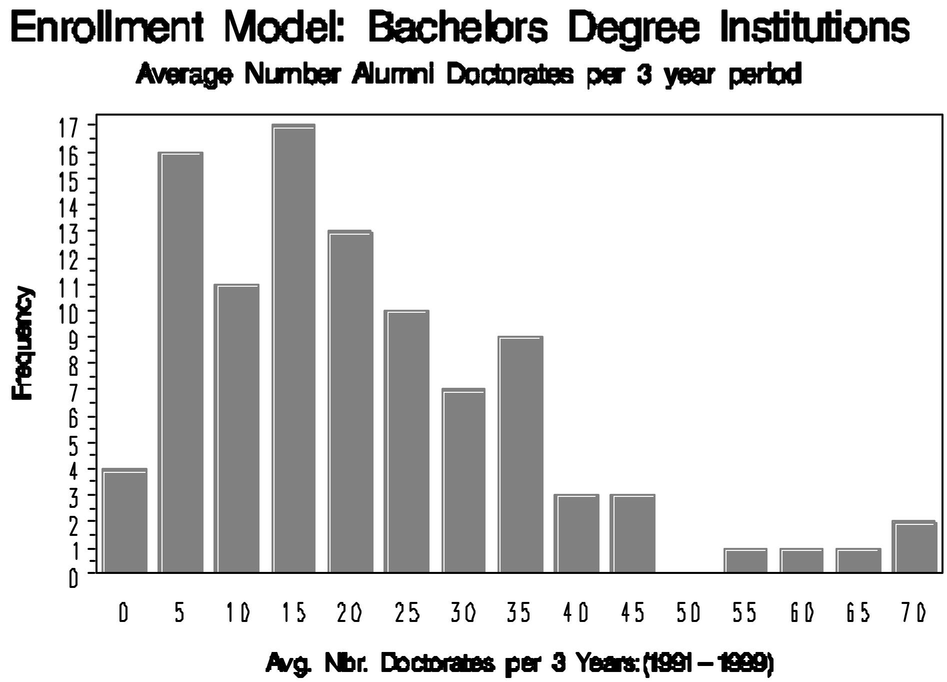

Enrollment Model: Bachelors Degree Institutions
Average Number Alumni Doctorates per 3 year period
Frequency
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70
Avg. Nbr. Doctorates per 3 Years:(1991 – 1999)

Table 6.39

Enrollment Model: Bachelors Degree Institutions

Average Alumni Doctorates per 3 year period(1991-1999) - by cluster

Cluster Number	No. of Schools in Cluster	Average Number of Alumni Doctorates per 3-year period
1	22	31.53
2	23	12.43
3	18	15.44
4	13	7.67
5	17	22.18
6	5	70.20

Figure 6.53

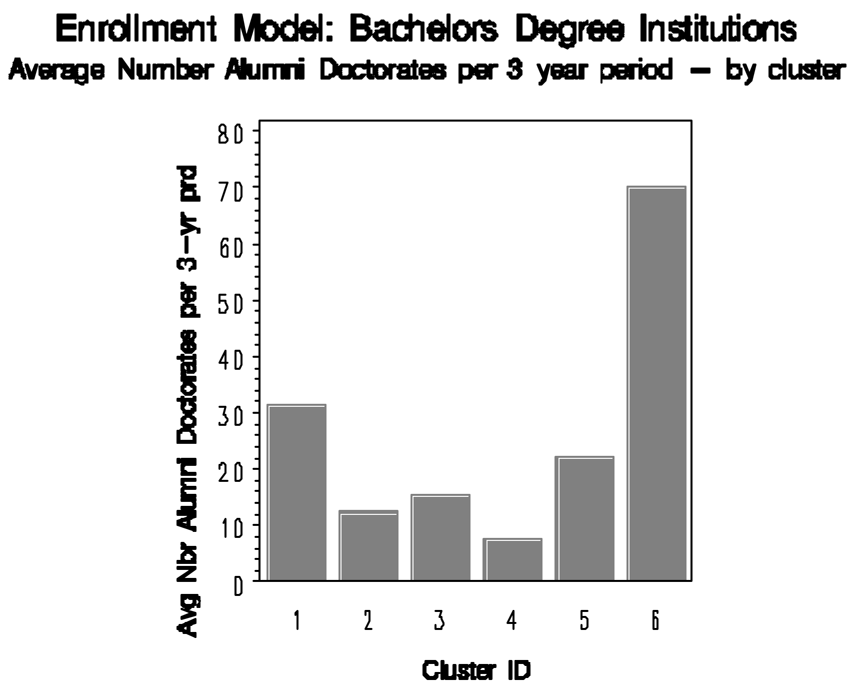
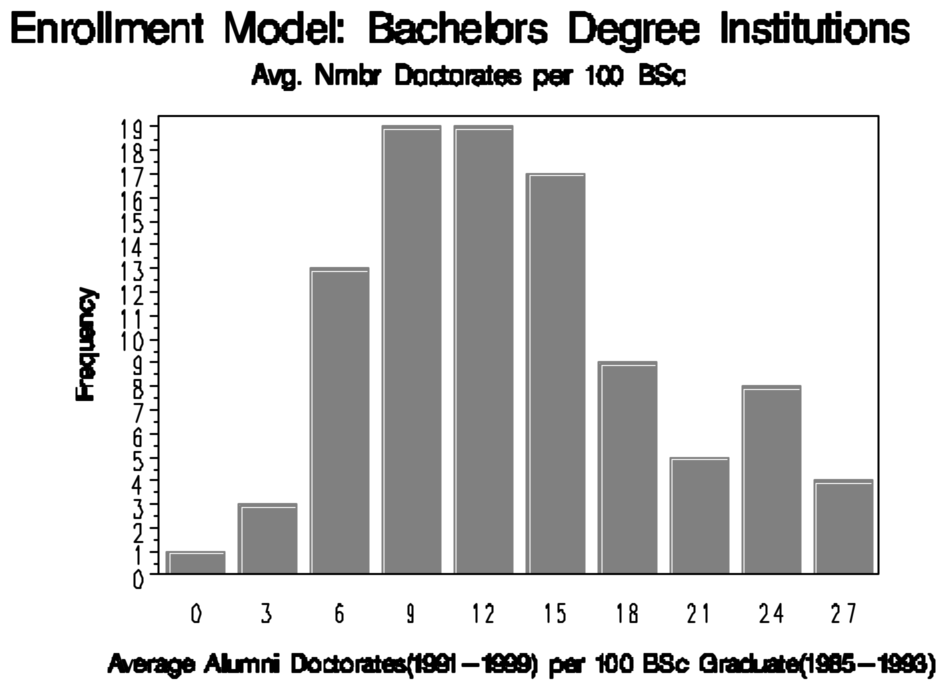


Figure 6.54



Enrollment Model: Bachelors Degree Institutions
Avg. Nmbr Doctorates per 100 BSc
Frequency
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
0
3
6
9
12
15
18
21
24
27
Average Alumni Doctorates(1991−1999) per 100 BSc Graduate(1985−1993)

Table 6.40

Enrollment Model: Bachelors Degree Institutions

Average Alumni Doctorates(1991-1999) per BSc Graduate(1985-1993) - by cluster

Cluster Number	No. of Schools in Cluster	Average Alumni Doctorates(1991-1999) per B.Sc. Graduate(1985-1993)
1	22	0.17
2	23	0.10
3	18	0.13
4	13	0.06
5	17	0.15
6	5	0.36

Figure 6.55

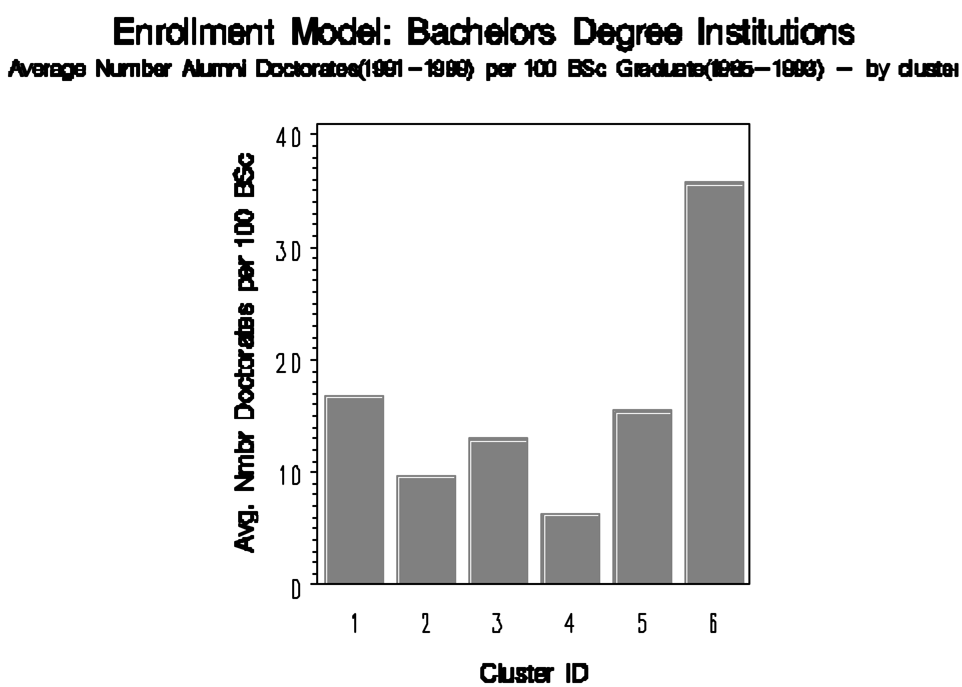


Table 6.41. Enrollment Model Profile for Advanced Degree Study Institutions

Cluster	#	Total cost per school yr	SAT math	SAT verb	Ph.D.s 91-93	Ph.D.s 94-96	Ph.D.s 97-99	PhD 91-93 per BSc 85-87	PhD 94-96 per BSc 88-90	PhD 97-99 per BSc 91-93
1	18	10,880	537.6	531.0	15.78	19.67	23.61	0.06	0.07	0.11
2	8	6,312	571.7	550.7	16.38	17.75	21.50	0.07	0.08	0.09
3	8	22,907	584.6	590.0	26.13	28.88	29.50	0.10	0.12	0.14
4	4	19,880	637.5	615.0	31.00	46.75	48.00	0.13	0.25	0.20

KEY

1. **Cluster number**
2. **# -** number of schools in cluster
3. **Total cost per school yr** - total $ cost per school year
4. **SAT math –** SAT mathematics score (not used in clustering)
5. **SAT verb –** SAT verbal score (not used in clustering)
6. **Ph.D.s YR-YR–** number of doctorates by alumni; (3 different time periods, **3** cluster variables)
7. **Ph.D. YR-YR per BSc YR-YR-** number of doctorates by alumni per Bachelors of Science; (3 different time periods, **3** cluster variables)
8. **Total Bac per CFTE YR-** number of bachelors degrees per calculated FTEs;by year 1985 thru 1997 (**13** cluster variables)
9. **Total BSc per Total Bac YR-** number of science bachelors degrees per number of total bachelors degrees; by year 1985 thru 1997 (**13** cluster variables)

Table 6.42. Enrollment Model Profile for Advanced Degree Study Institutions

Total Baccalaureate Degrees per Calculated Full-time Enrollment 1985 - 1997

Cluster	#	Total Bac per CFTE 85	Total Bac per CFTE 86	Total Bac per CFTE 87	Total Bac per CFTE 88	Total Bac per CFTE 89	Total Bac per CFTE 90	Total Bac per CFTE 91
1	18	0.20	0.22	0.20	0.20	0.20	0.20	0.22
2	8	0.14	0.15	0.14	0.14	0.13	0.13	0.14
3	8	0.21	0.23	0.21	0.21	0.21	0.22	0.22
4	4	0.22	0.22	0.21	0.21	0.20	0.22	0.22

Cluster	#	Total Bac per CFTE 92	Total Bac per CFTE 93	Total Bac per CFTE 94	Total Bac per CFTE 95	Total Bac per CFTE 96	Total Bac per CFTE 97
1	18	0.23	0.23	0.24	0.23	0.22	0.22
2	8	0.15	0.16	0.17	0.17	0.16	0.17
3	8	0.23	0.24	0.24	0.23	0.22	0.22
4	4	0.23	0.24	0.23	0.21	0.21	0.20

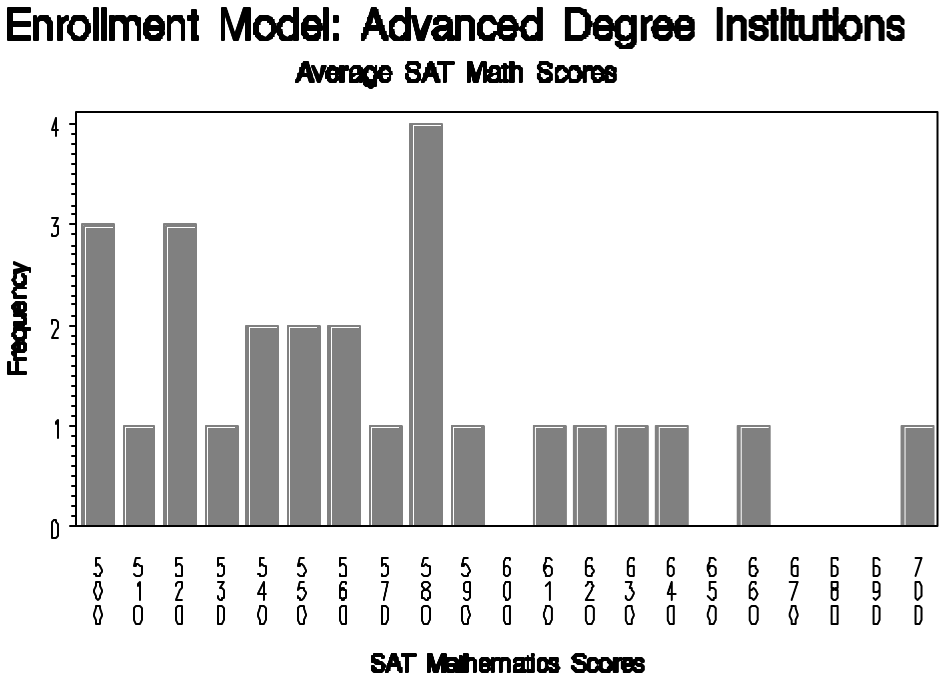
Table 6.43. Enrollment Model Profile for Advanced Degree Study Institutions

Total Number of B.Sc. Degrees per Total Number of Bachelor's Degrees 1985 - 1997

Cluster	#	Total BSc per Total Bac 85	Total BSc per Total Bac 86	Total BSc per Total Bac 87	Total BSc per Total Bac 88	Total BSc per Total Bac 89	Total BSc per Total Bac 90	Total BSc per Total Bac 91
1	18	0.05	0.05	0.05	0.05	0.04	0.04	0.04
2	8	0.09	0.08	0.07	0.07	0.07	0.06	0.07
3	8	0.14	0.13	0.13	0.13	0.11	0.12	0.11
4	4	0.07	0.06	0.07	0.06	0.07	0.06	0.08

Cluster	#	Total BSc per Total Bac 92	Total BSc per Total Bac 93	Total BSc per Total Bac 94	Total BSc per Total Bac 95	Total BSc per Total Bac 96	Total BSc per Total Bac 97
1	18	0.04	0.04	0.05	0.05	0.06	0.06
2	8	0.07	0.08	0.08	0.09	0.09	0.10
3	8	0.12	0.12	0.14	0.14	0.15	0.15
4	4	0.08	0.08	0.07	0.09	0.09	0.10

Figure 6.56



Enrollment Model: Advanced Degree Institutions
Average SAT Math Scores
Frequency
0
1
2
3
4
500
510
520
530
540
550
560
570
580
590
600
610
620
630
640
650
660
670
680
690
700
SAT Mathematics Scores

Table 6.44

Enrollment Model: Advanced Degree Institutions

Average SAT Mathematics Scores - by cluster

Cluster Number	No. of Schools in Cluster	Average SAT Math Scores
1	18	538
2	8	572
3	8	585
4	4	638

Figure 6.57

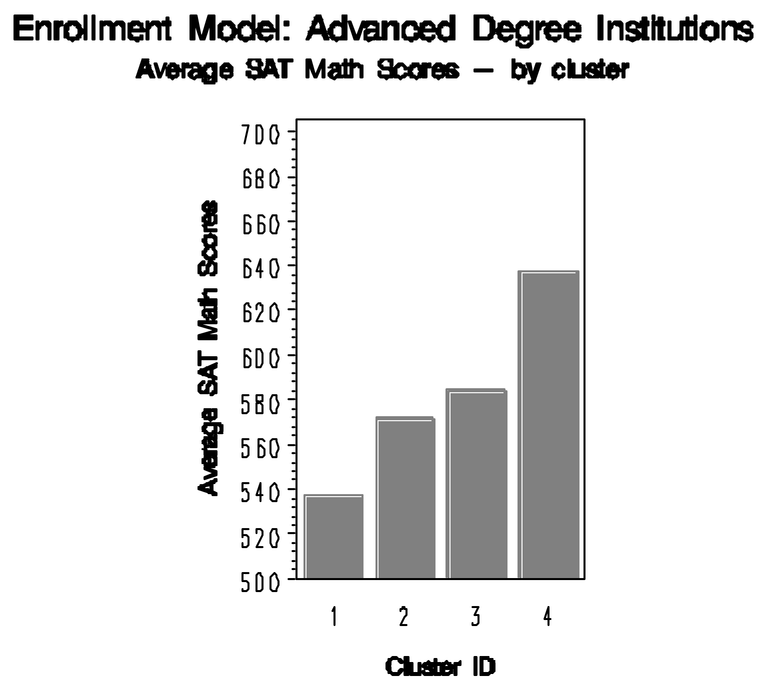


Figure 6.58

Enrollment Model: Advanced Degree Institutions

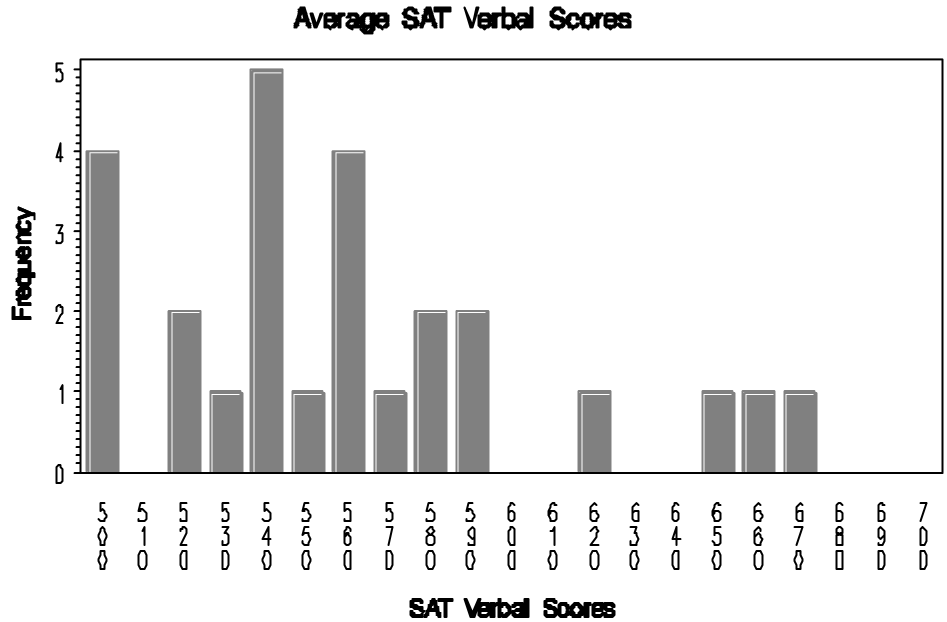


Table 6.45

Enrollment Model: Advanced Degree Institutions

Average SAT Verbal Scores - by cluster

Cluster Number	No. of Schools in Cluster	Average SAT Verbal Scores
1	18	531
2	8	551
3	8	590
4	4	615

Figure 6.59

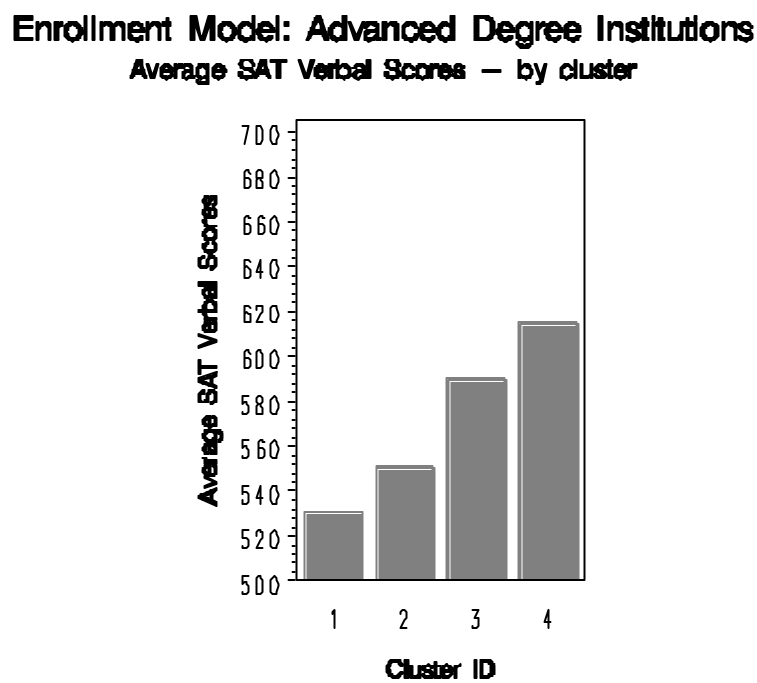


Figure 6.60

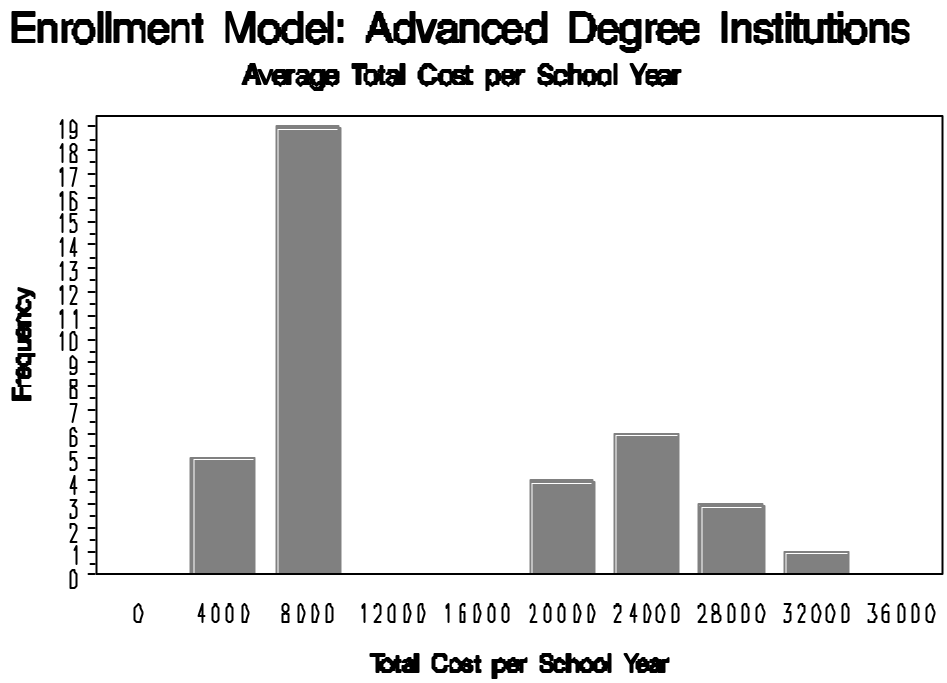

Enrollment Model: Advanced Degree Institutions
Average Total Cost per School Year
Frequency
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
0
4000
8000
12000
16000
20000
24000
28000
32000
36000
Total Cost per School Year

Table 6.46

Enrollment Model: Advanced Degree Institutions

Average Total Cost per School Year - by cluster

Cluster Number	No. of Schools in Cluster	Average Total Cost per School Year
1	18	10,880
2	8	6,312
3	8	22,907
4	4	19,880

Figure 6.61

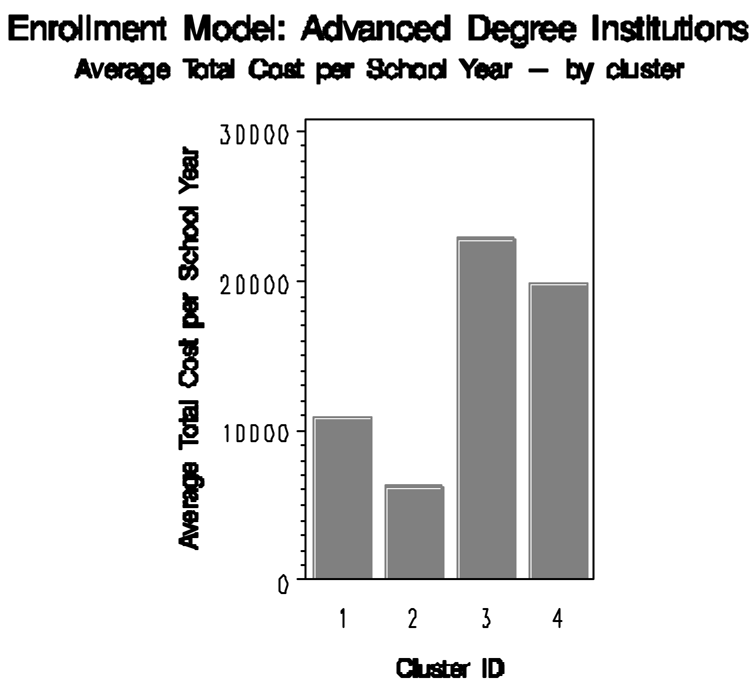


Figure 6.62

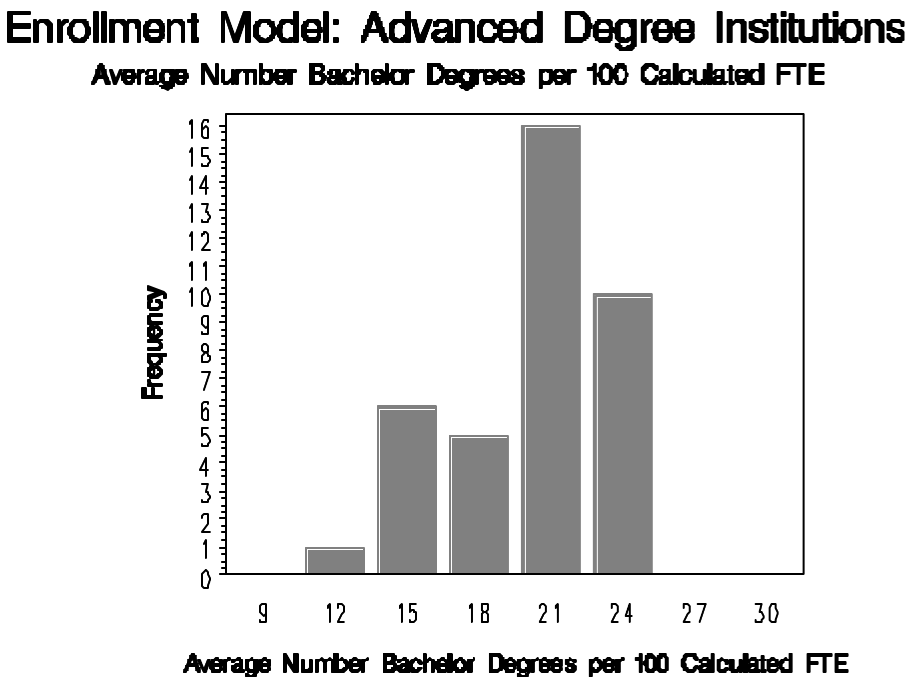

Enrollment Model: Advanced Degree Institutions
Average Number Bachelor Degrees per 100 Calculated FTE
Frequency
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
9
12
15
18
21
24
27
30
Average Number Bachelor Degrees per 100 Calculated FTE

Table 6.47

Enrollment Model: Advanced Degree Institutions

Average Bachelors per Calculated FTE - by cluster

Cluster Number	No. of Schools in Cluster	Average Number of Bachelor's Degrees per Calculated FTE
1	18	0.2144
2	8	0.1501
3	8	0.2225
4	4	0.2162

Figure 6.63

Enrollment Model: Advanced Degree Institutions

Average Number Bachelor Degrees per 100 Calculated FTE – by cluster

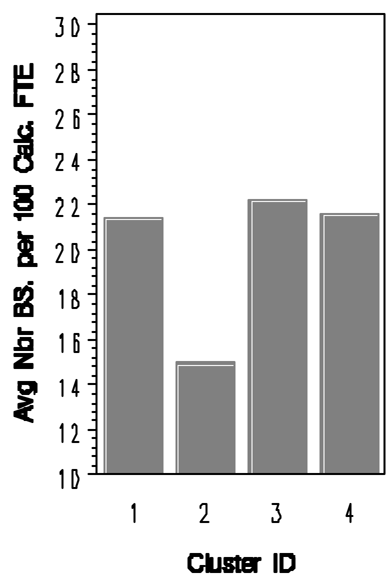
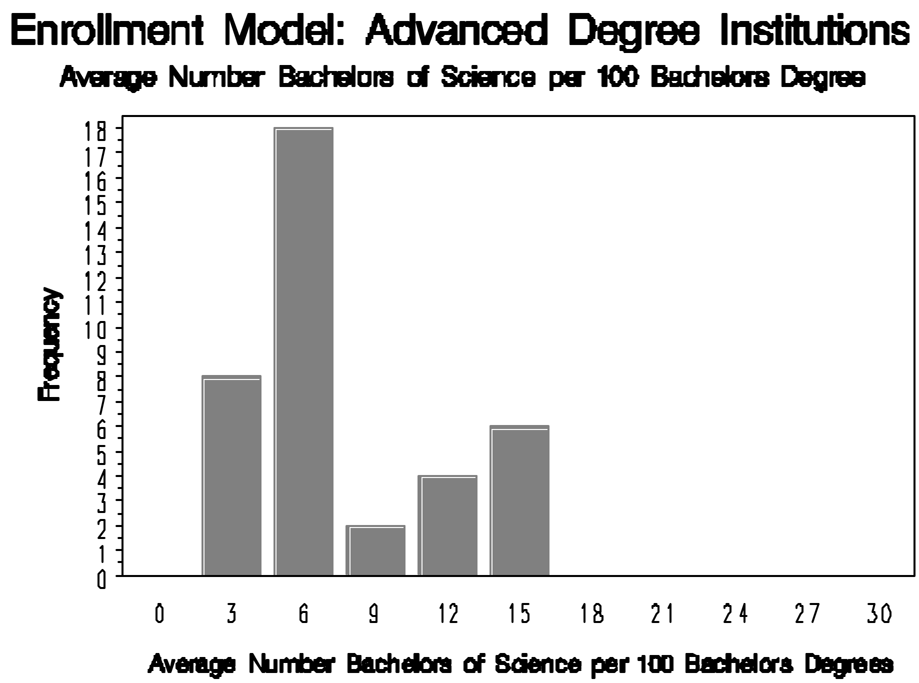


Figure 6.64



Enrollment Model: Advanced Degree Institutions
Average Number Bachelors of Science per 100 Bachelors Degree
Frequency
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
0
3
6
9
12
15
18
21
24
27
30
Average Number Bachelors of Science per 100 Bachelors Degrees

Table 6.48

Enrollment Model: Advanced Degree Institutions

Average Bachelors of Science per Bachelors Degree - by cluster

Cluster Number	No. of Schools in Cluster	Average Number Bachelors of Science per Bachelors Degrees
1	18	0.04780
2	8	0.07783
3	8	0.12914
4	4	0.07501

Figure 6.65

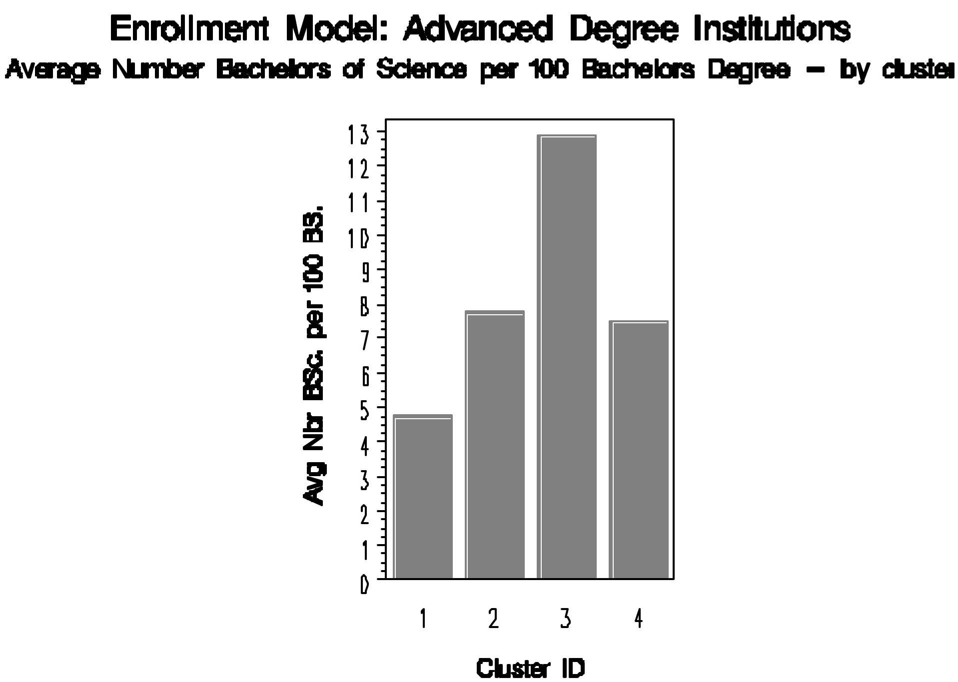


Figure 6.66

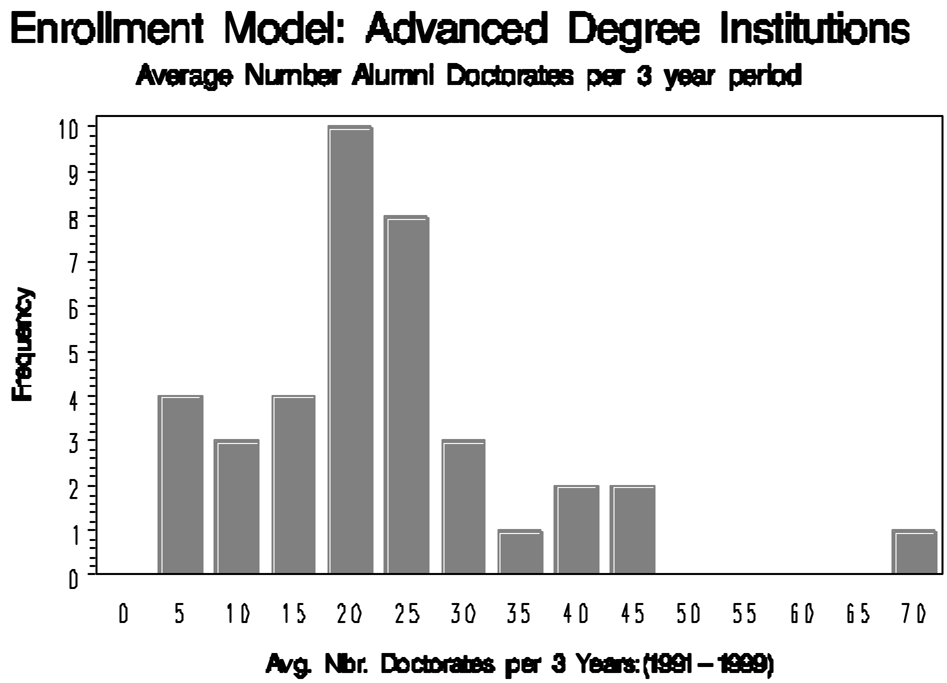

Enrollment Model: Advanced Degree Institutions
Average Number Alumni Doctorates per 3 year period
Frequency
0
1
2
3
4
5
6
7
8
9
10
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70
Avg. Nbr. Doctorates per 3 Years:(1991 – 1999)

Table 6.49

Enrollment Model: Advanced Degree Institutions

Average Alumni Doctorates per 3 year period(1991-1999) - by cluster

Cluster Number	No. of Schools in Cluster	Average Number of Alumni Doctorates per 3 year period
1	18	19.69
2	8	18.54
3	8	28.17
4	4	41.92

Figure 6.67

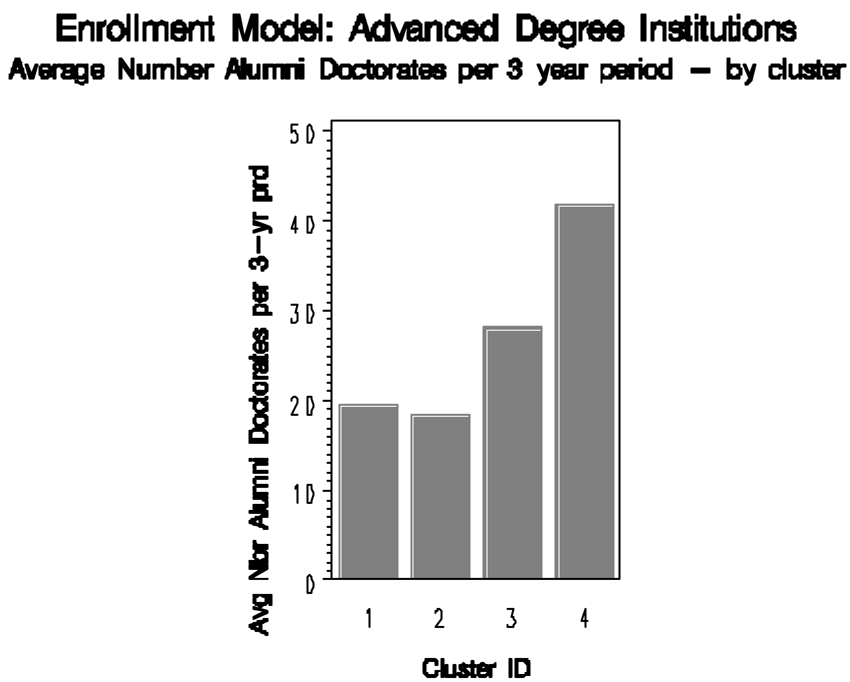
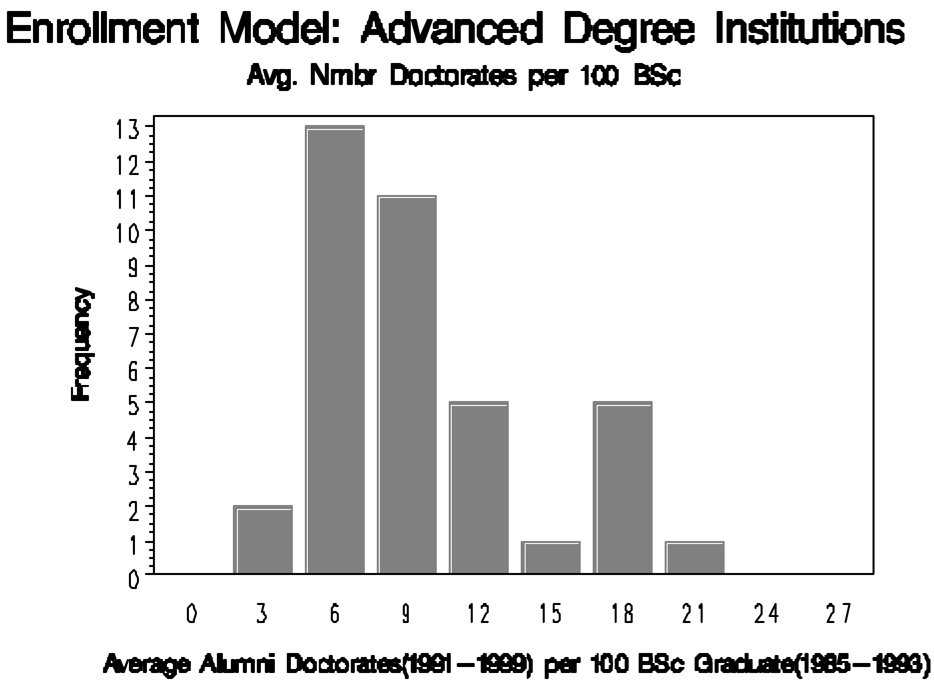


Figure 6.68



Enrollment Model: Advanced Degree Institutions
Avg. Nmbr Doctorates per 100 BSc
Frequency
0
1
2
3
4
5
6
7
8
9
10
11
12
13
0
3
6
9
12
15
18
21
24
27
Average Alumni Doctorates(1991–1999) per 100 BSc Graduate(1985–1993)

Table 6.50

Enrollment Model: Advanced Degree Institutions

Average Alumni Doctorates(1991-1999) per BSc Graduate(1985-1993) - by cluster

Cluster Number	No. of Schools in Cluster	Average Alumni Doctorates(1991-1999) per B.Sc. Graduate(1985-1993)
1	18	0.08
2	8	0.07
3	8	0.12
4	4	0.18

Figure 6.69

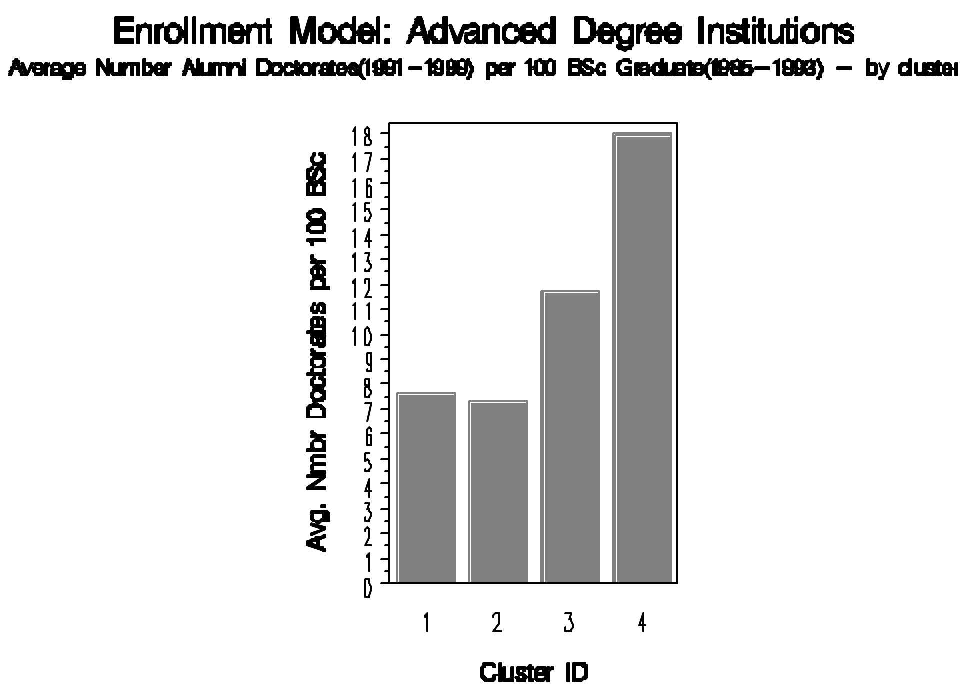


Table 6.51. Research Model Profile for All Study Institutions

Cluster	#	# grants per fac.	res grants per fac.	ttl amt per fac.	# fac pubs per fac	total awd per fac	# doc by alum 91-93	# doc. by alum 94-96	# doc. by alum 97-99	doc 91-93 per bsc 85-87	doc 94-96 per bsc 88-90	doc 97-99 per bsc 91-93
1	45	1.49	1.23	68444	3.05	0.38	14.42	15.73	16.62	0.09	0.10	0.10
2	20	1.30	0.92	52706	1.44	0.18	5.05	5.20	6.00	0.05	0.05	0.07
3	25	1.16	0.97	61882	2.33	0.52	20.48	23.28	24.76	0.14	0.17	0.17
4	9	3.91	3.34	196198	3.88	0.57	15.11	17.78	19.89	0.07	0.09	0.10
5	17	2.01	1.76	118396	4.32	1.01	32.24	30.71	35.29	0.17	0.17	0.22
6	5	2.37	1.96	161417	5.54	1.50	71.20	67.60	71.80	0.36	0.36	0.39
7	11	6.68	6.21	380093	7.47	1.26	34.27	37.27	43.00	0.14	0.15	0.19

KEY

1. **# grnts per fac -** # of External Faculty Grants per # Regular Faculty(from Institution Survey personnel section)
2. **Res grants per fac -** # of External Faculty Research Grants per # Regular Faculty (from Institution Survey personnel section)
3. **Ttl amt per fac –** Total $ of External Faculty Research Grants per # Regular Faculty (from Institution Survey personnel section)
4. **# fac pub per fac –** Number of Faculty Publications per # Regular Faculty (from Institution Survey personnel section)
5. **total awd per fac –** Total # Awards per # Regular Faculty (from Institution Survey personnel section)
6. **# doc by alum 91-93, # doc per alum 94-96, # doc by alum 97-99 –** number of doctorates by alumni; (3 different time periods, **3** cluster variables)
7. **doc 91-93 per bsc 85-87, doc 94-96 per bsc 88-90, doc 97-99 per bsc91-93 -** number of doctorates by alumni per Bachelors of Science; (3 different time periods, **3** cluster variables)

Figure 6.70

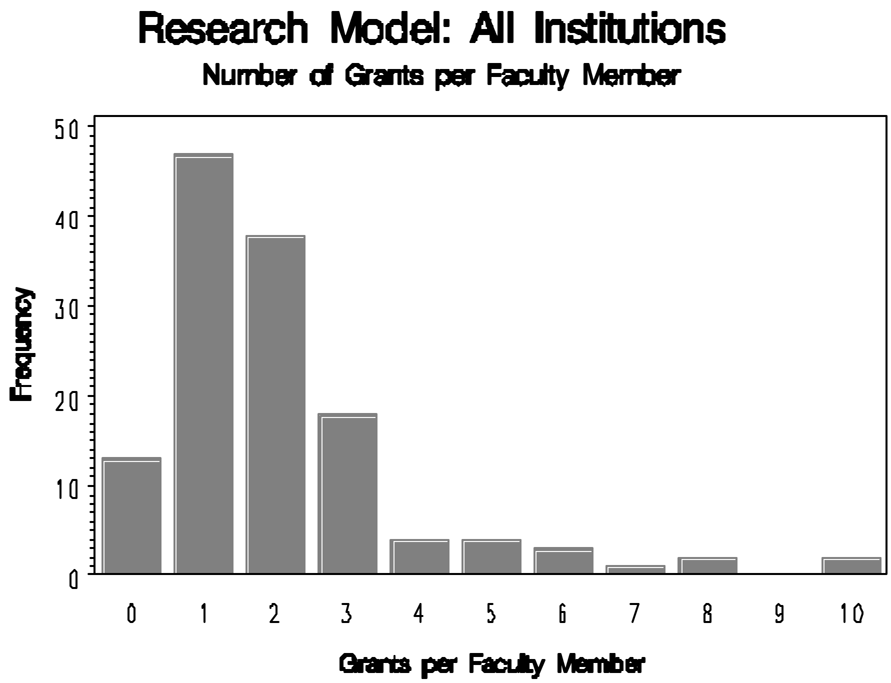


Table 6.52

Research Model: All Institutions

Average Number Grants per Faculty Member - by cluster

Cluster Number	No. of Schools in Cluster	Number of Grants per Faculty Member
1	45	1.49
2	20	1.30
3	25	1.16
4	9	3.91
5	18	2.01
6	5	2.37
7	11	6.68

Figure 6.71

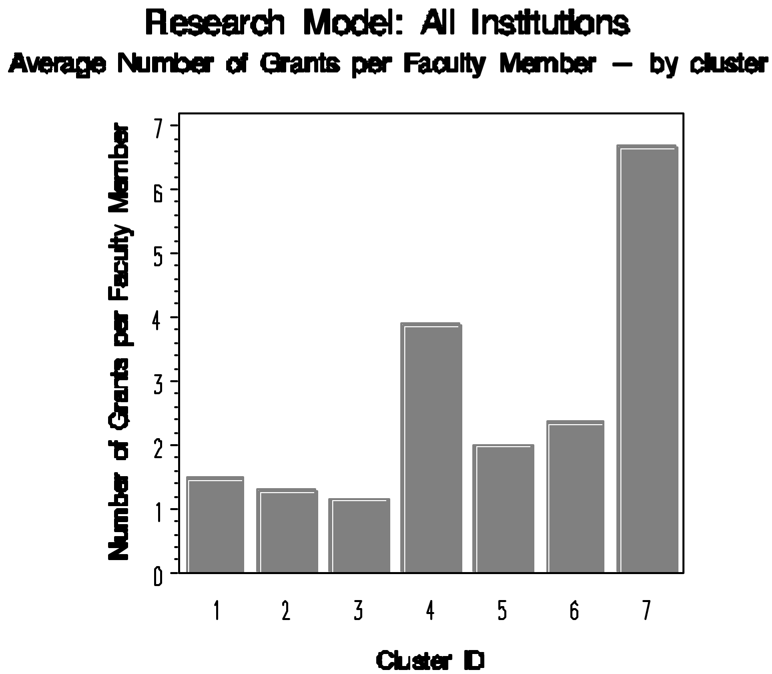


Figure 6.72

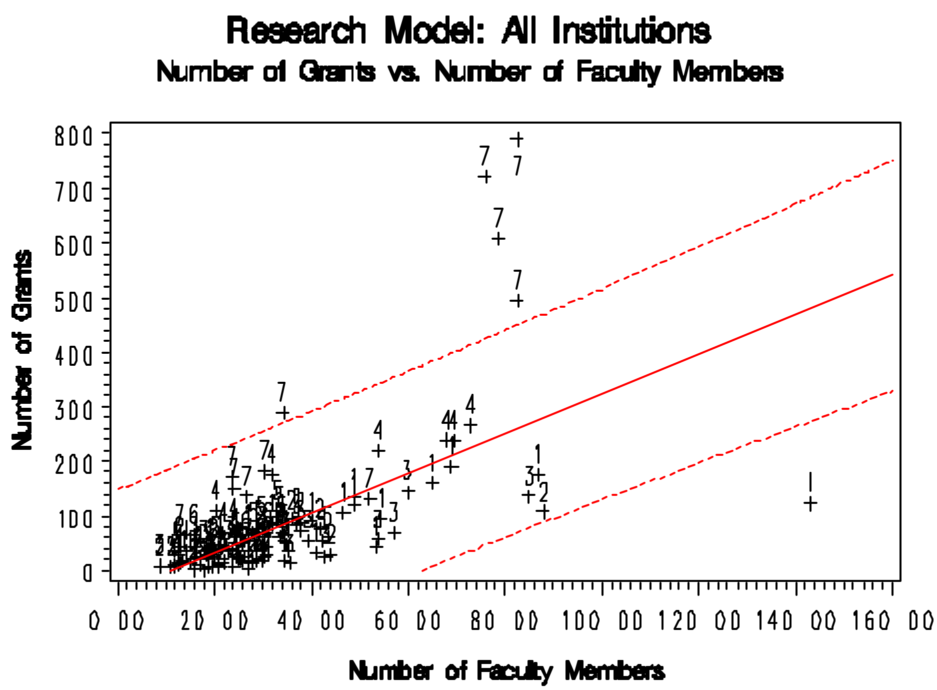


Figure 6.73

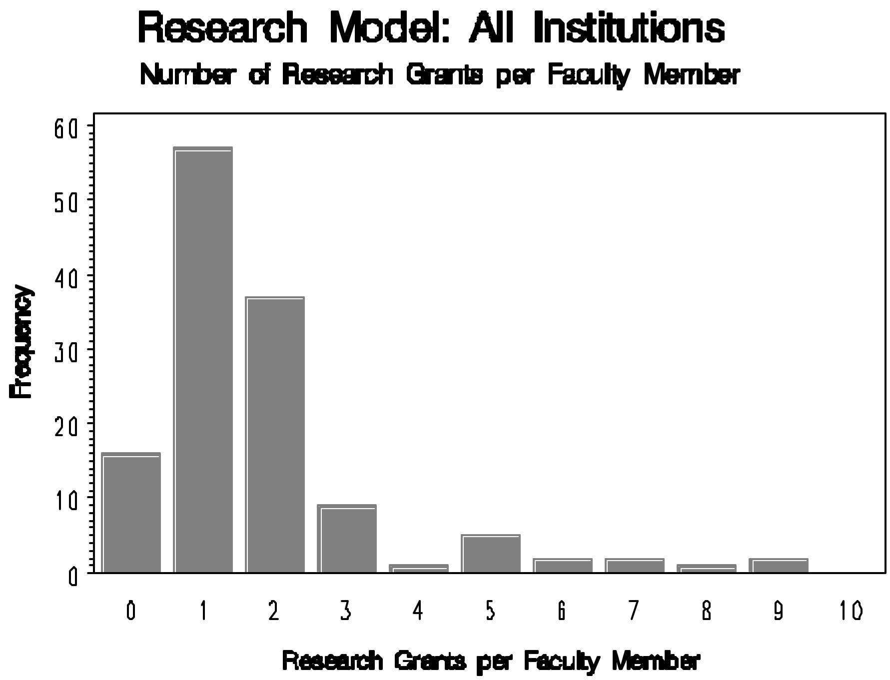


Table 6.53

Research Model: All Institutions

Average Number Research Grants per Faculty Member - by cluster

Cluster Number	No. of Schools in Cluster	Number of Research Grants per Faculty Member
1	45	1.23
2	20	0.92
3	25	0.97
4	9	3.34
5	18	1.76
6	5	1.96
7	11	6.21

Figure 6.74

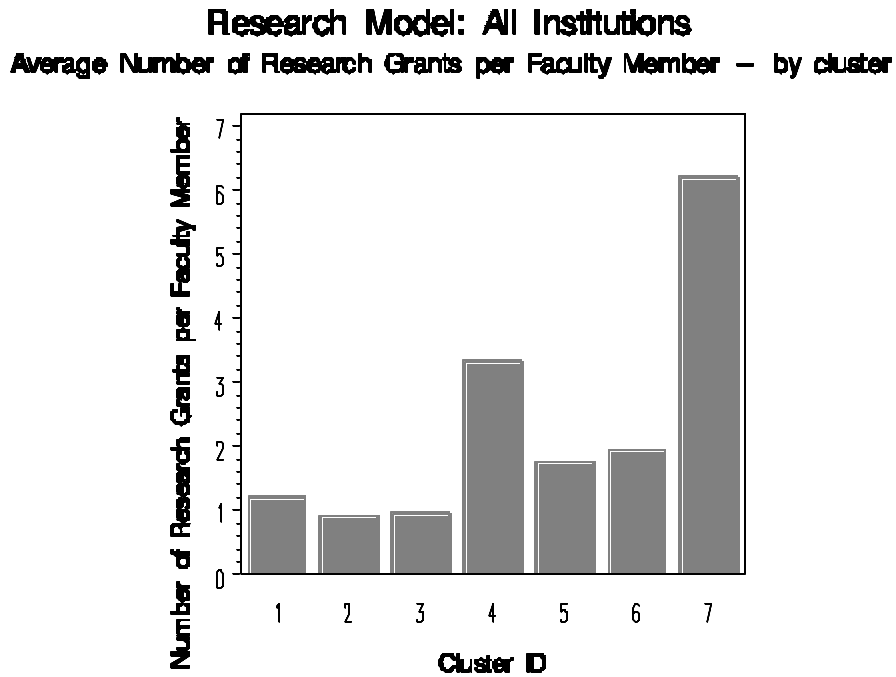


Figure 6.75

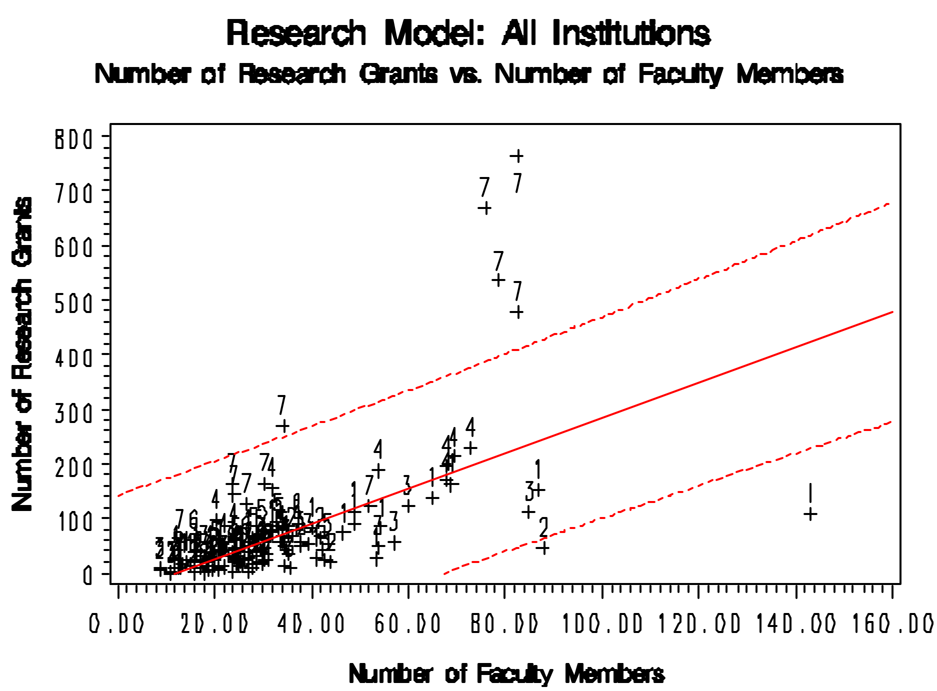


Figure 6.76

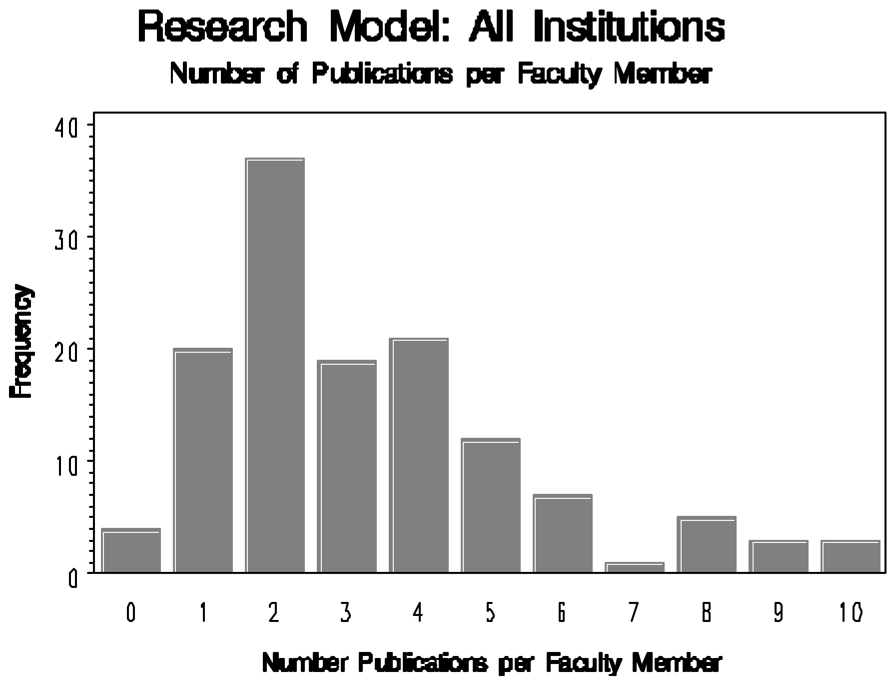


Table 6.54

Research Model: All Institutions

Average Number of Publications per Faculty Member - by cluster

Cluster Number	No. of Schools in Cluster	Number of Publications per Faculty Member
1	45	3.05
2	20	1.44
3	25	2.33
4	9	3.88
5	18	4.32
6	5	5.54
7	11	7.47

Figure 6.77

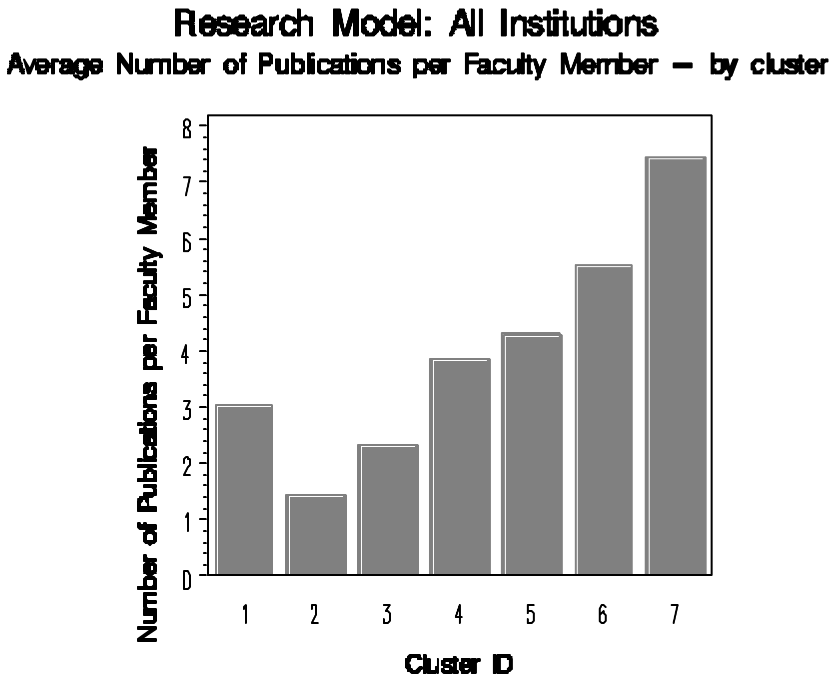


Figure 6.78

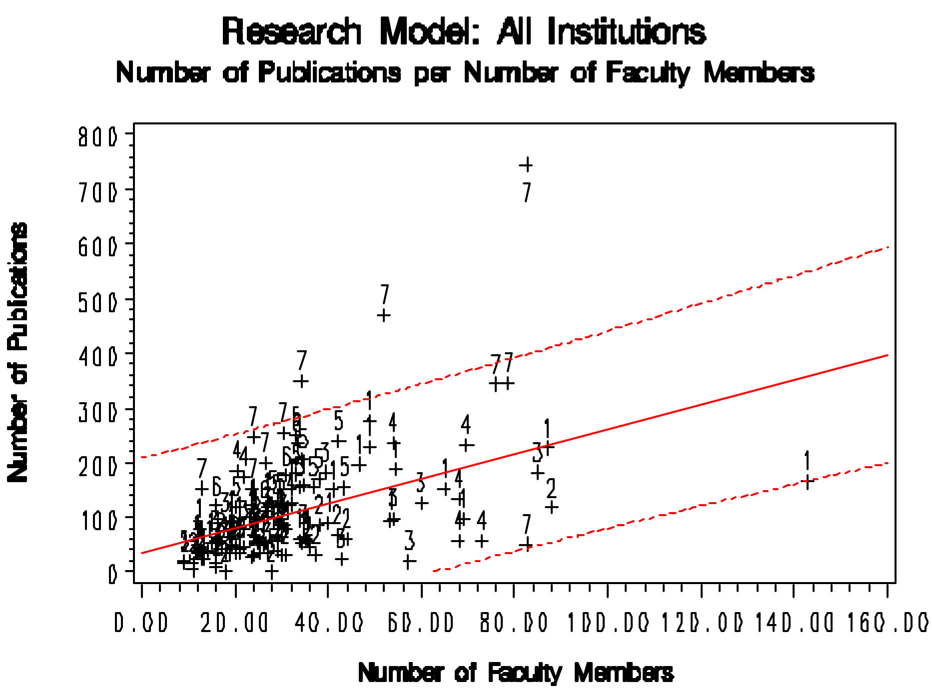


Figure 6.79

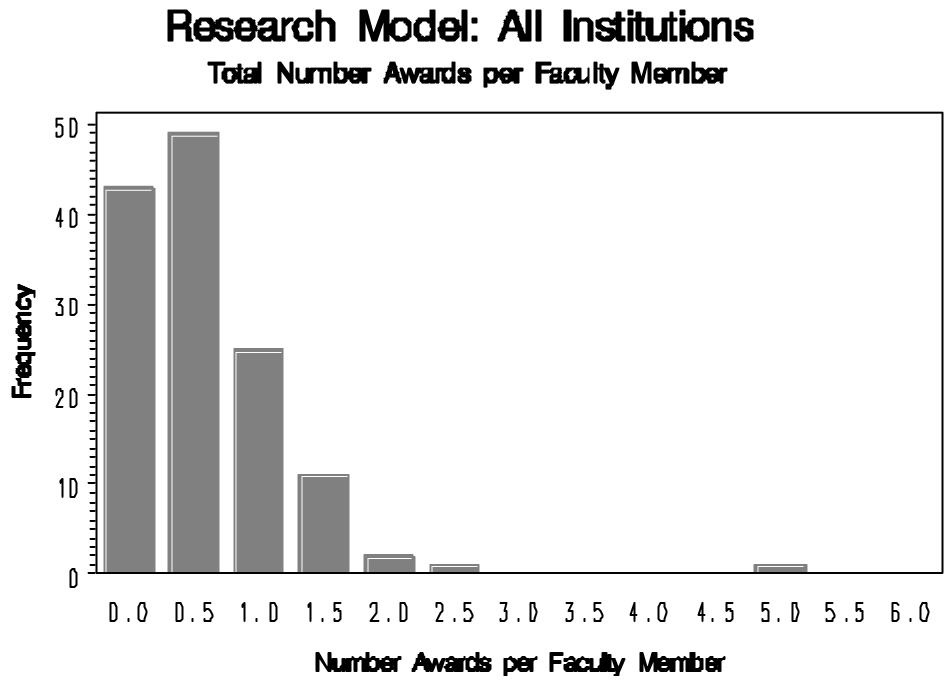


Table 6.55

Research Model: All Institutions

Average Number Awards per Faculty Member - by cluster

Cluster Number	No. of Schools in Cluster	Total Number of Awards per Faculty Member
1	45	0.38
2	20	0.18
3	25	0.52
4	9	0.57
5	18	1.01
6	5	1.50
7	11	1.26

Figure 6.80

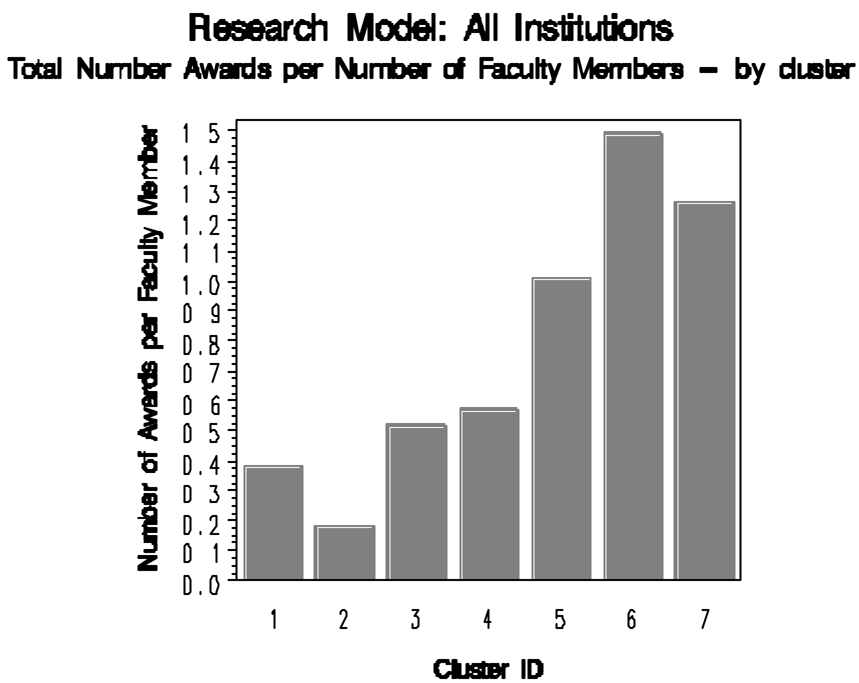


Figure 6.81

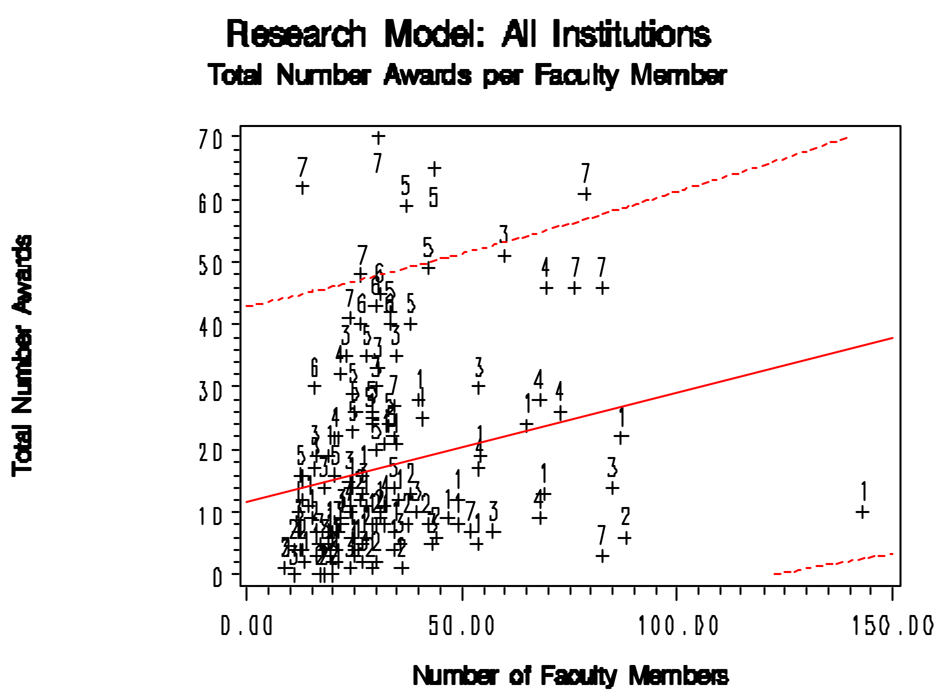


Figure 6.82

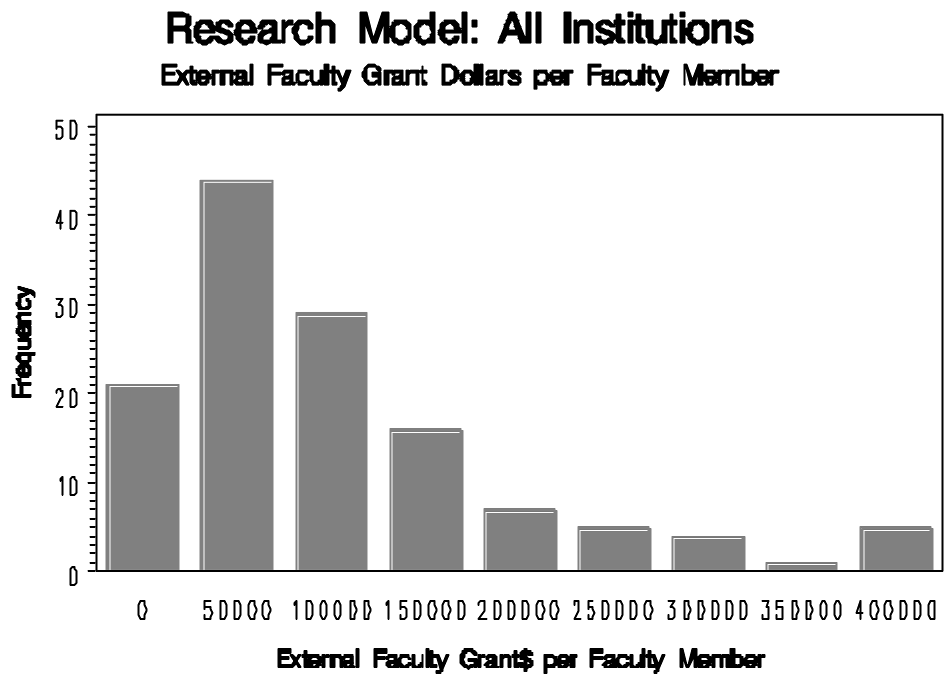


Table 6.56

Research Model: All Institutions

Average External Faculty Grant Dollars per Faculty Member- by cluster

Cluster Number	No. of Schools in Cluster	External Faculty Grant Dollars per Faculty Member
1	45	68,444.48
2	20	52,705.57
3	25	61,882.10
4	9	196,198.12
5	18	118,396.31
6	5	161,417.14
7	11	380,093.14

Figure 6.83

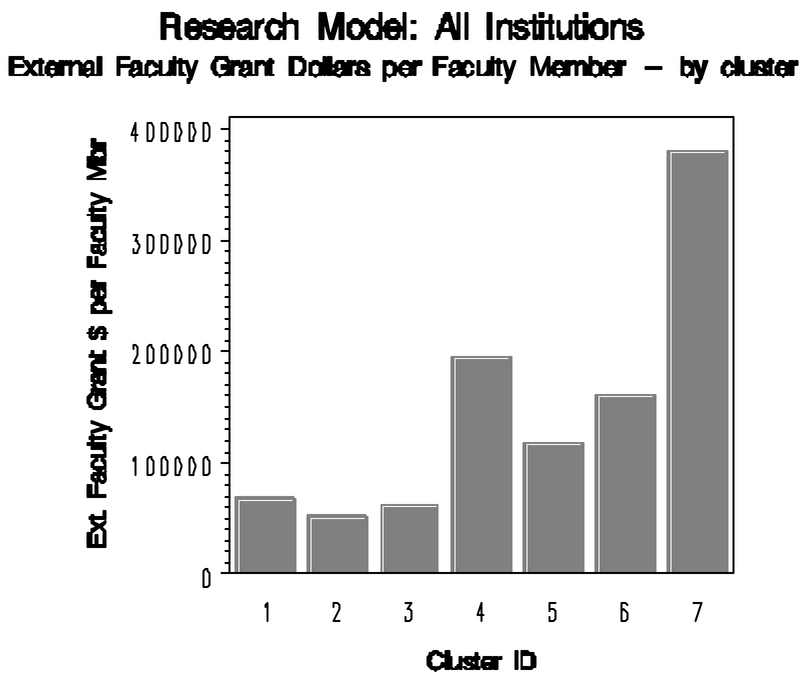


Figure 6.84

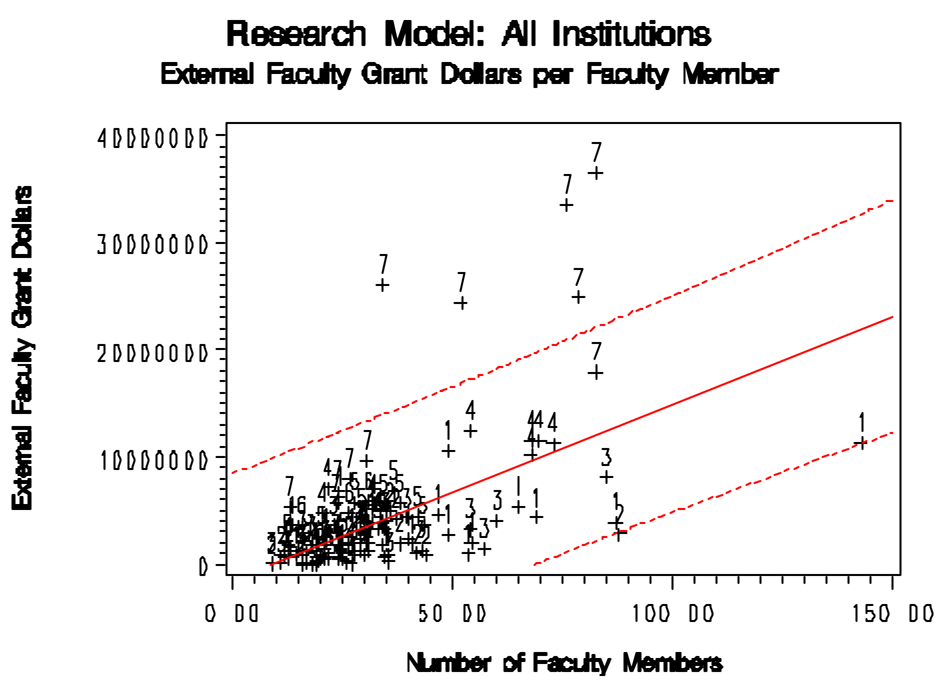


Figure 6.85

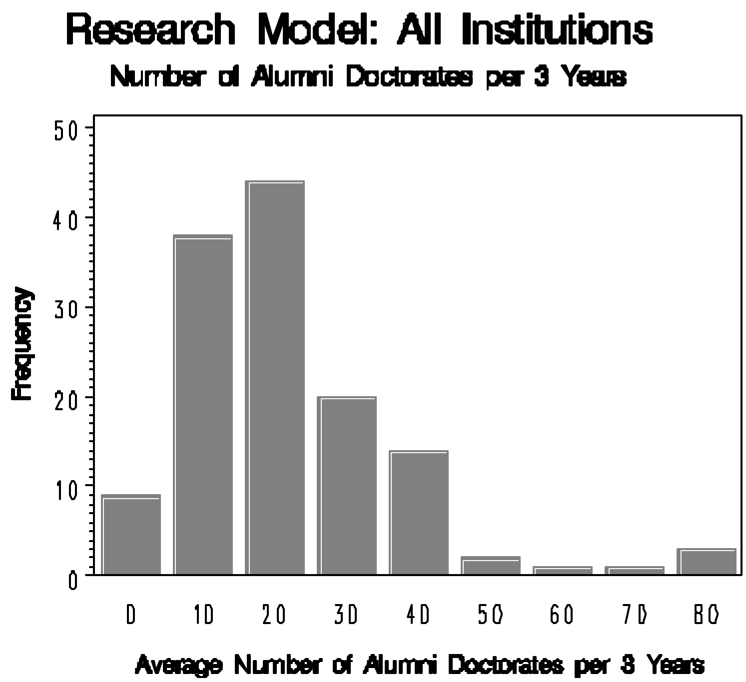


Table 6.57

Research Model: All Institutions

Average Number of Alumni Doctorates per 3 Years - by cluster

Cluster Number	No. of Schools in Cluster	Number of Alumni Doctorates per 3 Years
1	45	15.59
2	20	5.42
3	25	22.84
4	9	17.59
5	18	32.75
6	5	70.20
7	11	38.18

Figure 6.86

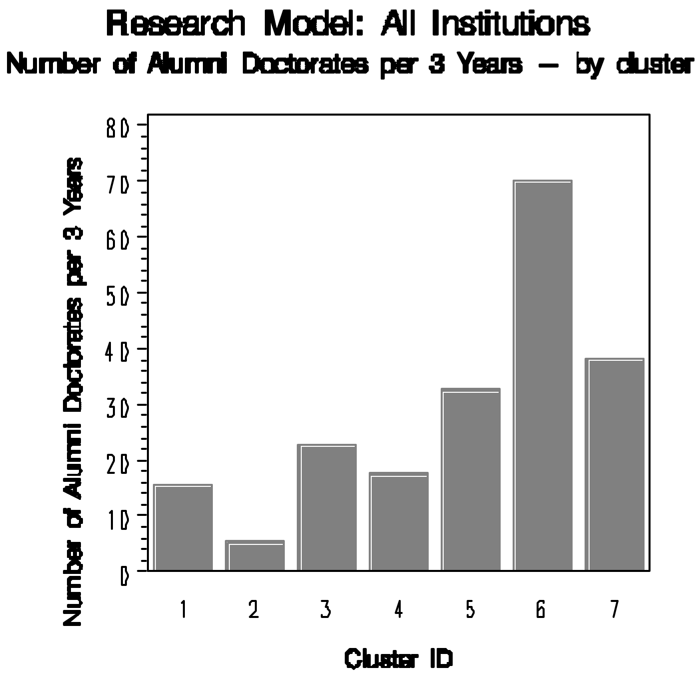

Research Model: All Institutions
Number of Alumni Doctorates per 3 Years — by cluster
Number of Alumni Doctorates per 3 Years
80
70
60
50
40
30
20
10
0
1
2
3
4
5
6
7
Cluster ID

Figure 6.87

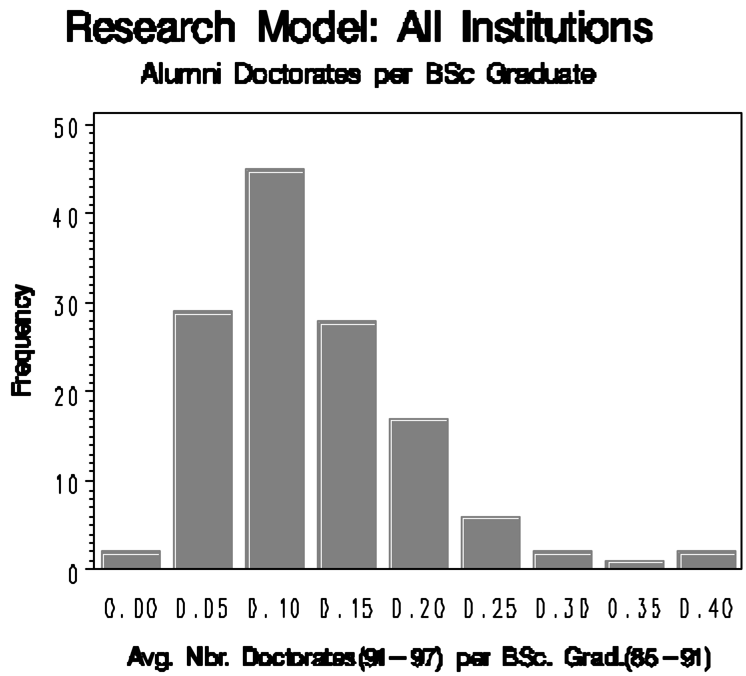


Table 6.58

Research Model: All Institutions

Average Alumni Doctorates per BSc Graduate - by cluster

Cluster Number	No. of Schools in Cluster	Alumni Doctorates per B.Sc. Graduate
1	45	0.10
2	20	0.06
3	25	0.16
4	9	0.09
5	18	0.19
6	5	0.37
7	11	0.16

Figure 6.88

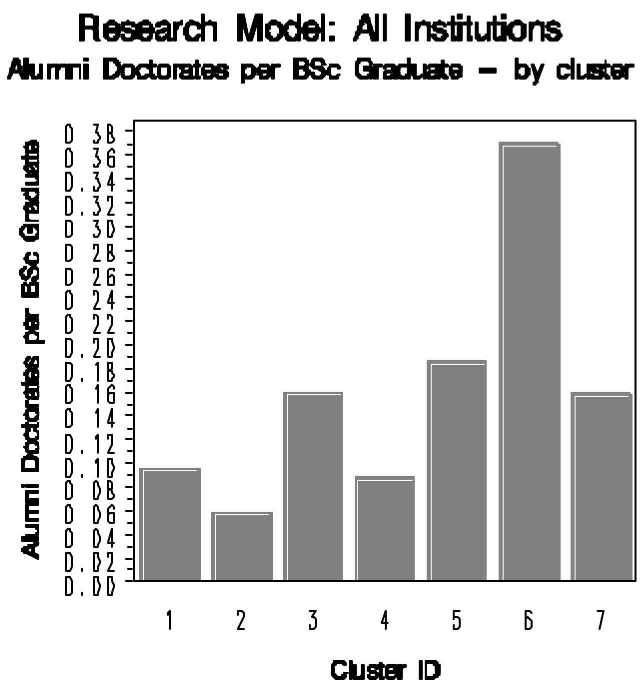


Figure 6.89

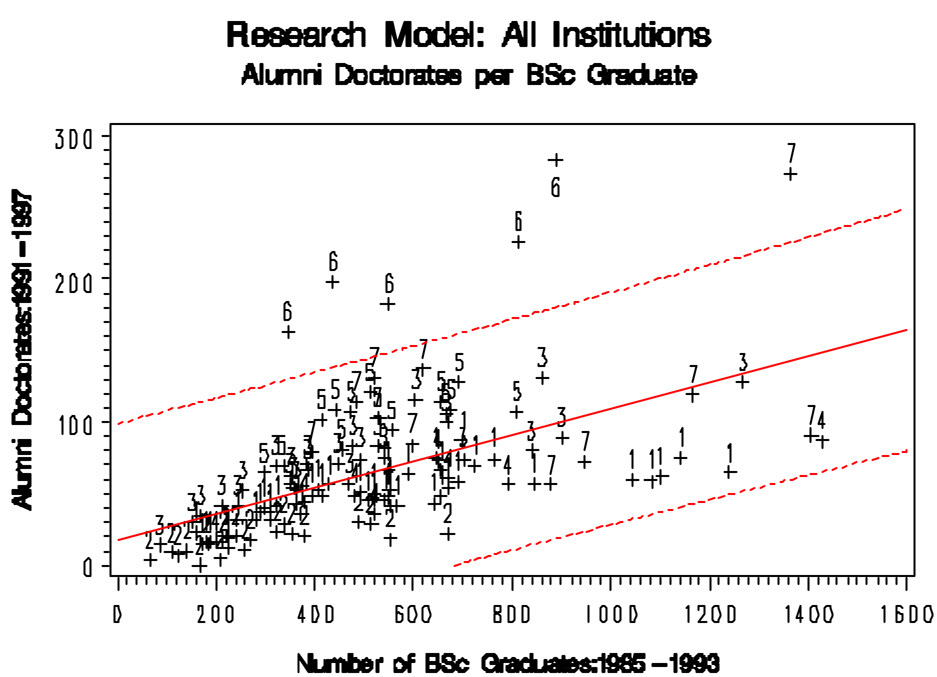


Table 6.59. Research Model Profile for Private Study Institutions

Cluster	#	# grants per fac	res grants per fac	ttl amt per fac	# fac pubs per fac	total awd per fac	# doc by alum 91-93	# doc by alum 94-96	# doc by alum 97-99	doc 91-93 per bsc 85-87	doc 94-96 per bsc 88-90	doc 97-99 per bsc 91-93
1	29	0.84	0.60	33511	1.79	0.20	8.97	9.21	10.00	0.09	0.11	0.11
2	23	1.24	1.05	73343	2.97	0.68	25.13	27.30	26.91	0.17	0.18	0.19
3	23	1.81	1.55	99855	3.37	0.52	13.74	13.96	14.74	0.09	0.09	0.11
4	14	2.18	1.93	154906	5.05	0.94	30.29	30.64	36.43	0.15	0.16	0.22
5	5	2.37	1.96	161417	5.54	1.50	71.20	67.60	71.80	0.36	0.36	0.39
6	7	5.45	4.96	299213	8.77	1.94	27.57	27.57	32.00	0.15	0.16	0.20

KEY

1. **# grnts per fac -** #of External Faculty Grants per # Regular Faculty(from Institution Survey personnel section)
2. **Res grants per fac -** #of External Faculty Research Grants per # Regular Faculty (from Institution Survey personnel section)
3. **Ttl amt per fac –** Total$ of External Faculty Research Grants per # Regular Faculty (from Institution Survey personnel section)
4. **# fac pub per fac –** Number of Faculty Publications per # Regular Faculty (from Institution Survey personnel section)
5. **total awd per fac –** Total # Awards per # Regular Faculty (from Institution Survey personnel section)
6. **# doc by alum 91-93, # doc per alum 94-96, # doc by alum 97-99 –** number of doctorates by alumni; (3 different time periods, **3** cluster variables)
7. **doc 91-93 per bsc 85-87, doc 94-96 per bsc 88-90, doc 97-99 per bsc91-93 -** number of doctorates by alumni per Bachelors of Science; (3 different time periods, **3** cluster variables)

Figure 6.90

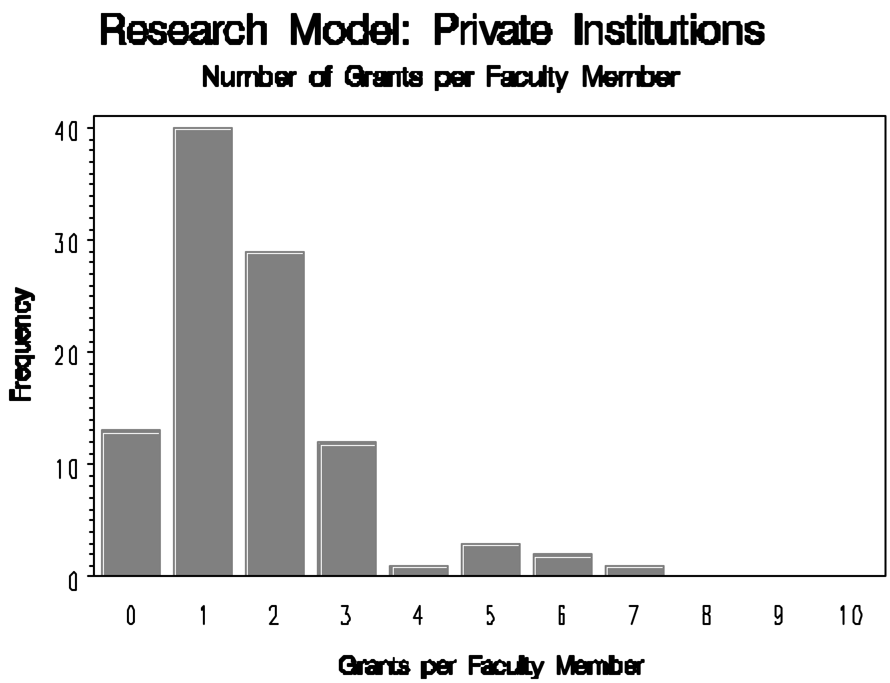


Table 6.60

Research Model: Private Institutions

Average Number Grants per Faculty Member - by cluster

Cluster Number	No. of Schools in Cluster	Number of Grants per Faculty Member
1	29	0.84
2	23	1.24
3	23	1.81
4	15	2.18
5	5	2.37
6	7	5.45

Figure 6.91

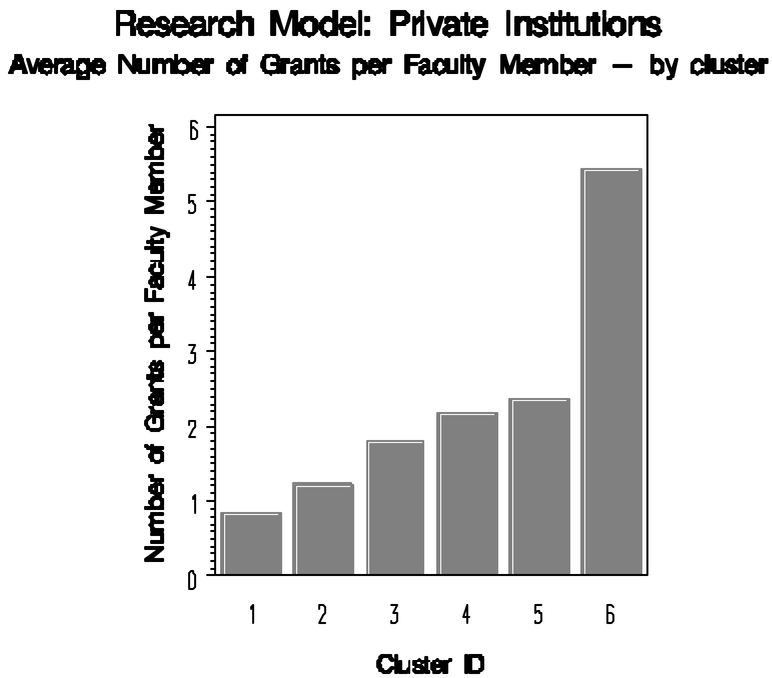
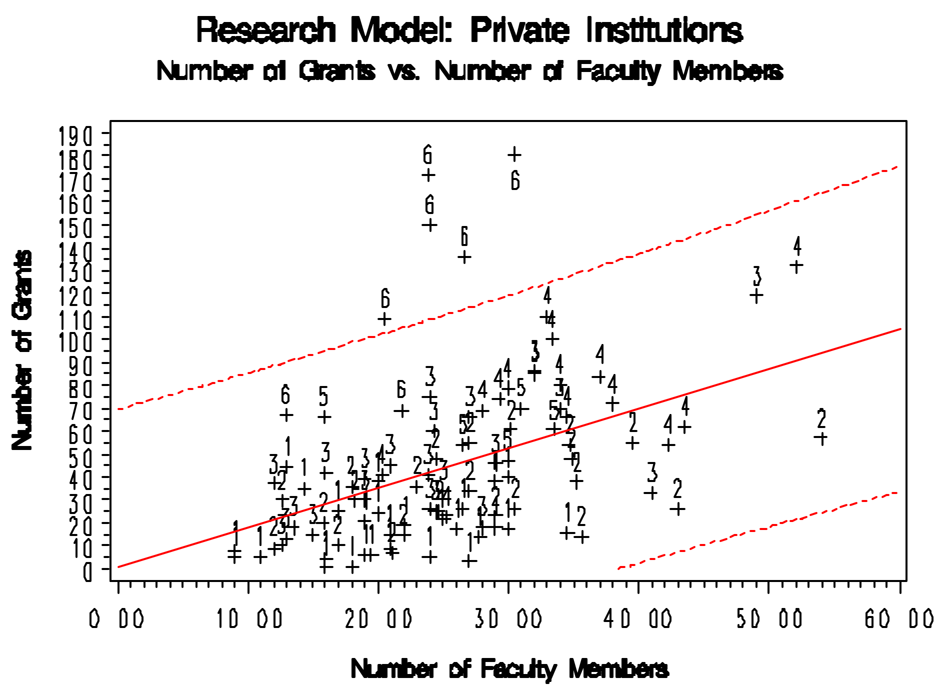


Figure 6.92



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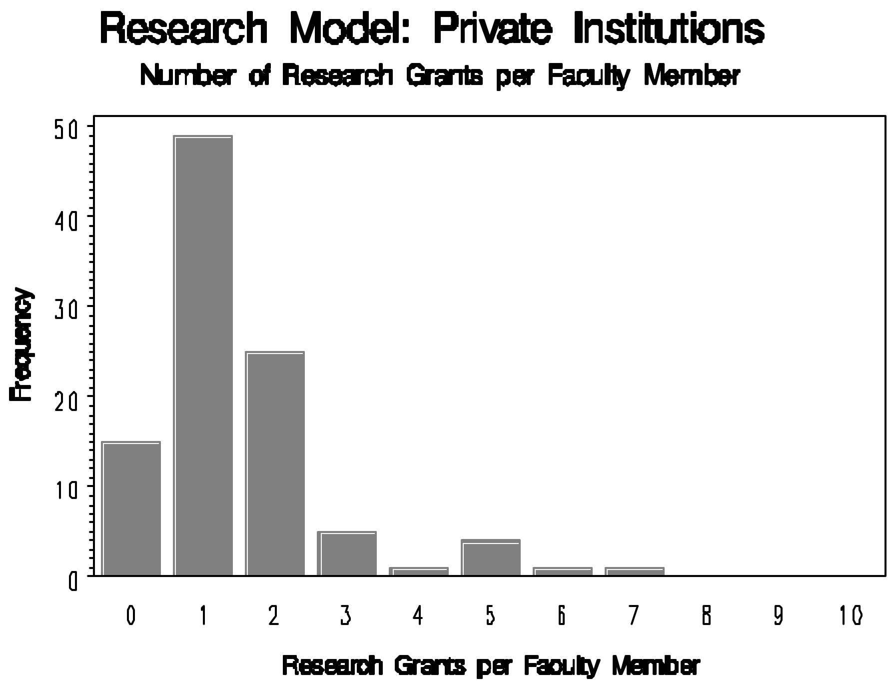


Table 6.61

Research Model: Private Institutions

Average Number Research Grants per Faculty Member - by cluster

Cluster Number	No. of Schools in Cluster	Number of Research Grants per Faculty Member
1	29	0.60
2	23	1.05
3	23	1.55
4	15	1.93
5	5	1.96
6	7	4.96

Figure 6.94

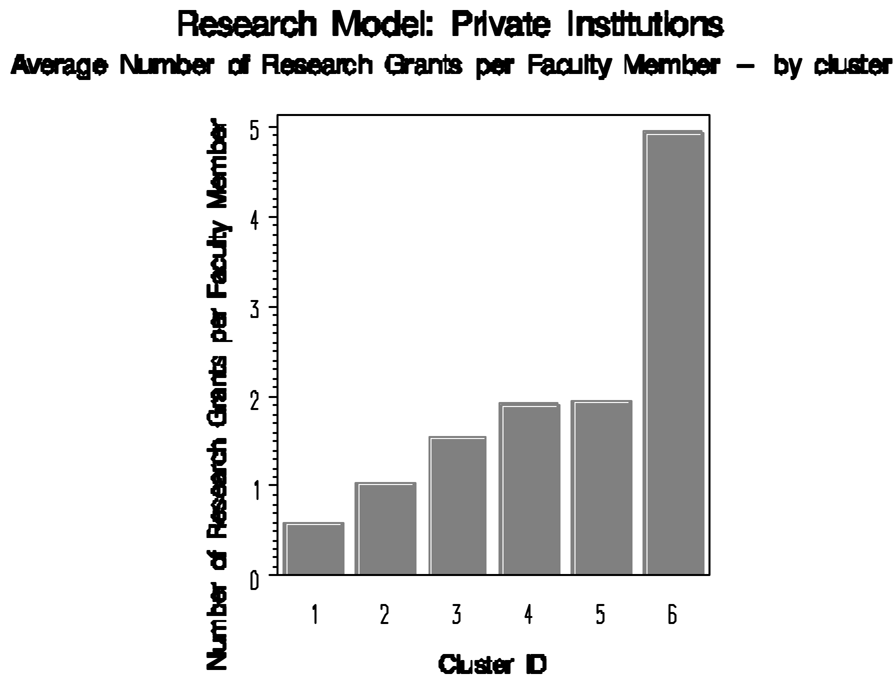


Figure 6.95

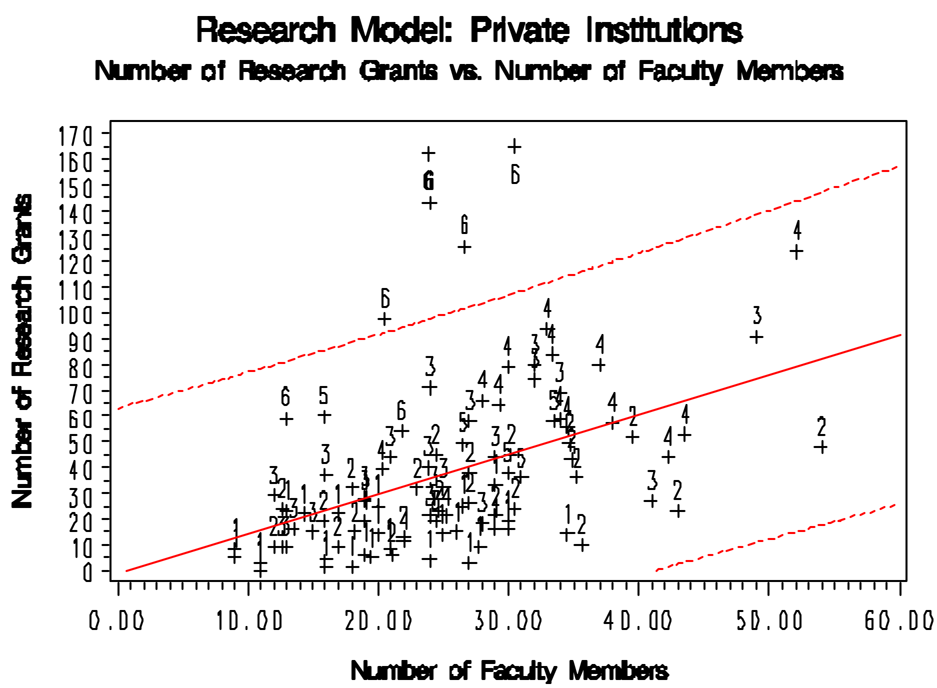


Figure 6.96

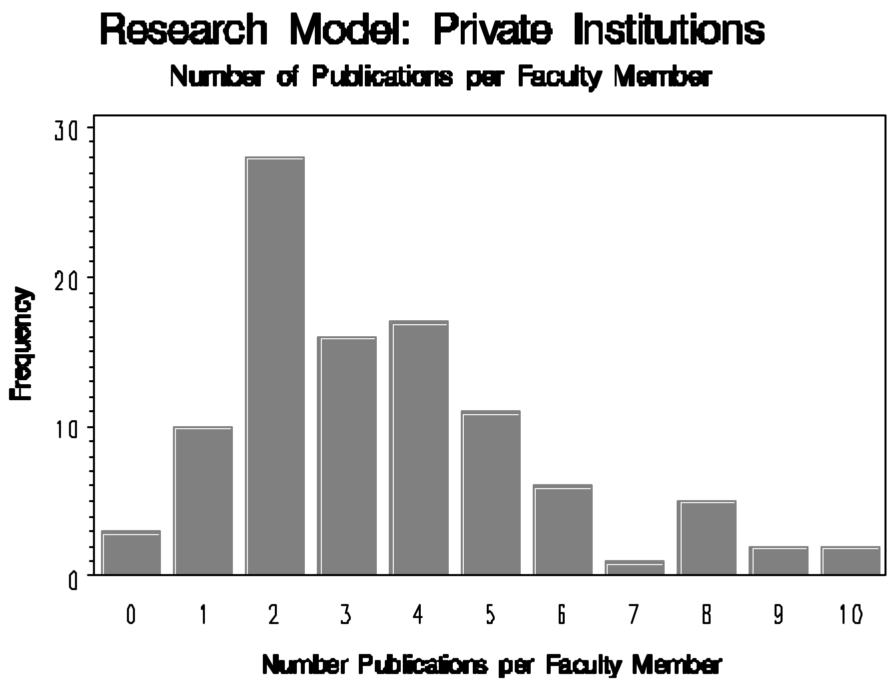


Figure 6.62

Research Model: Private Institutions

Average Number of Publications per Faculty Member - by cluster

Cluster Number	No. of Schools in Cluster	Number of Publications per Faculty Member
1	29	1.79
2	23	2.97
3	23	3.37
4	15	5.05
5	5	5.54
6	7	8.77

Figure 6.97

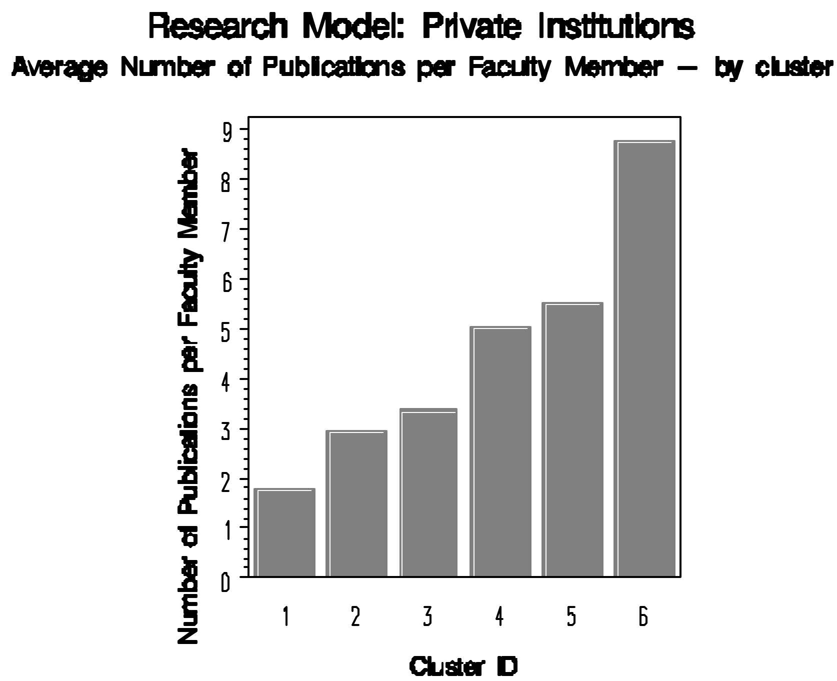


Figure 6.98

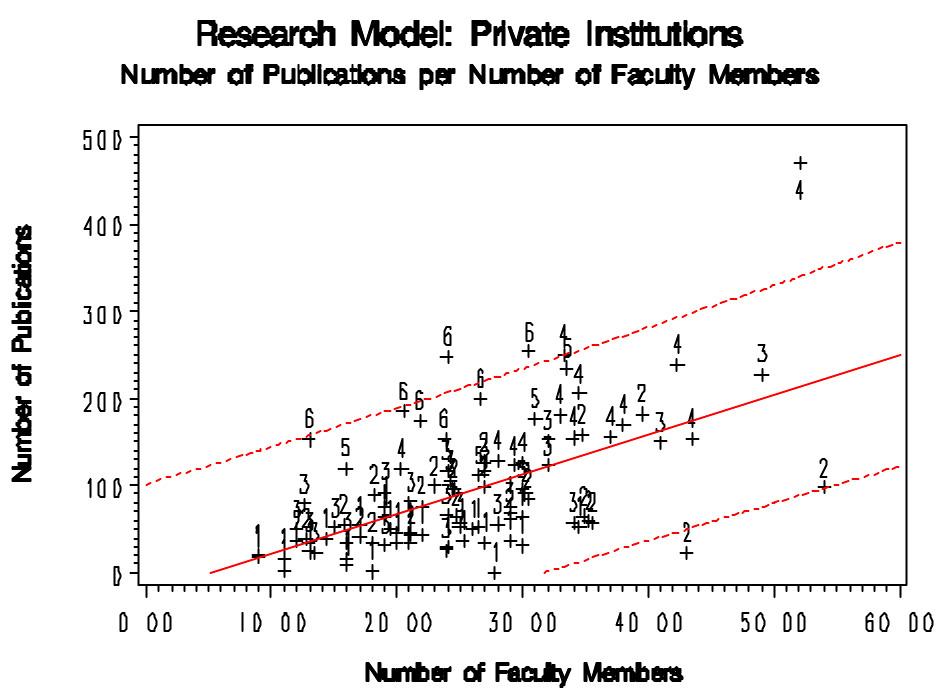


Figure 6.99

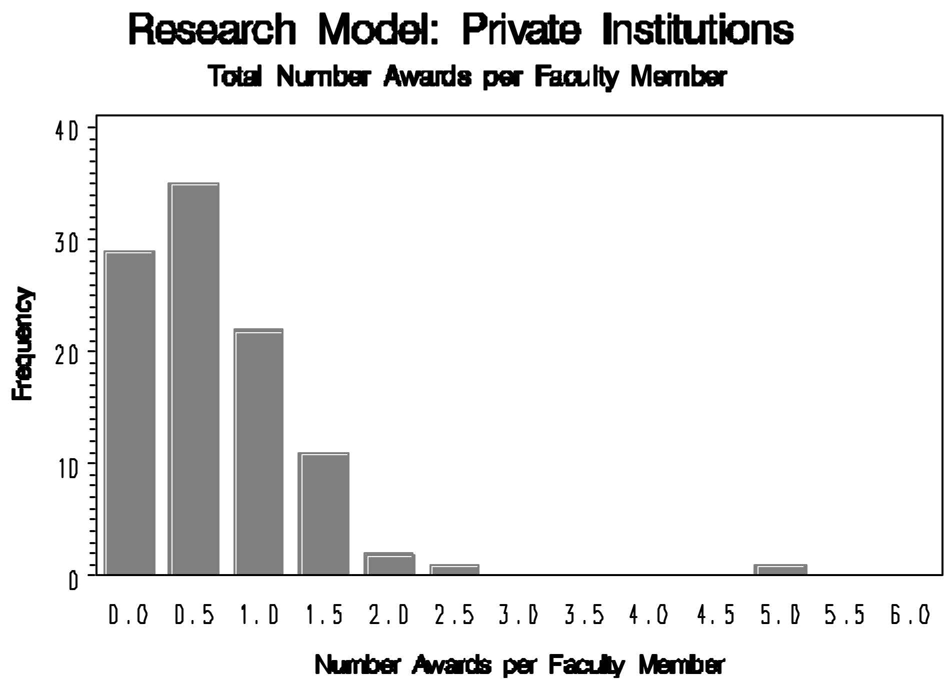


Figure 6.63

Research Model: Private Institutions

Average Number Awards per Faculty Member - by cluster

Cluster Number	No. of Schools in Cluster	Total Number of Awards per Faculty Member
1	29	0.20
2	23	0.68
3	23	0.52
4	15	0.94
5	5	1.50
6	7	1.94

Figure 6.100

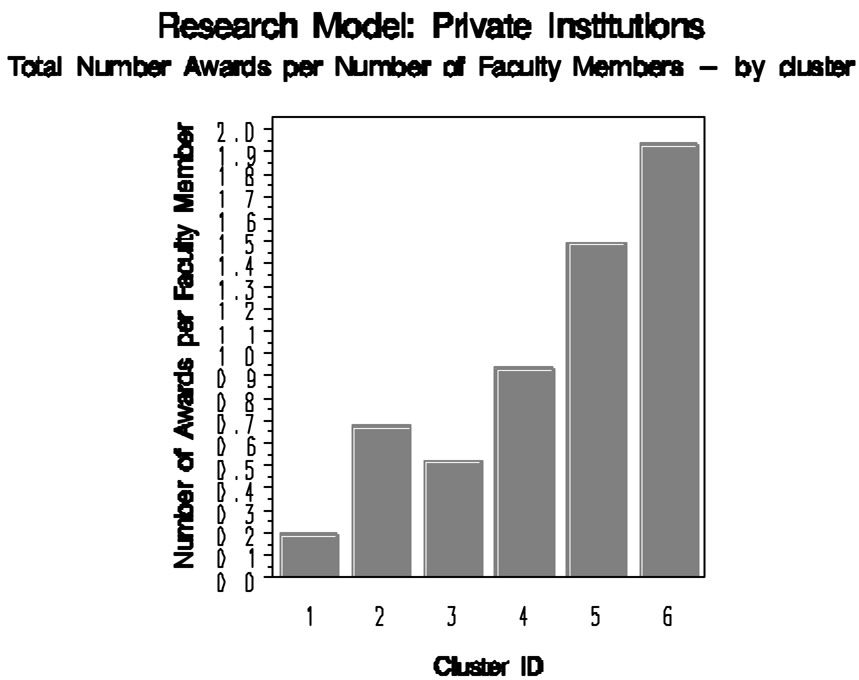


Figure 6. 101

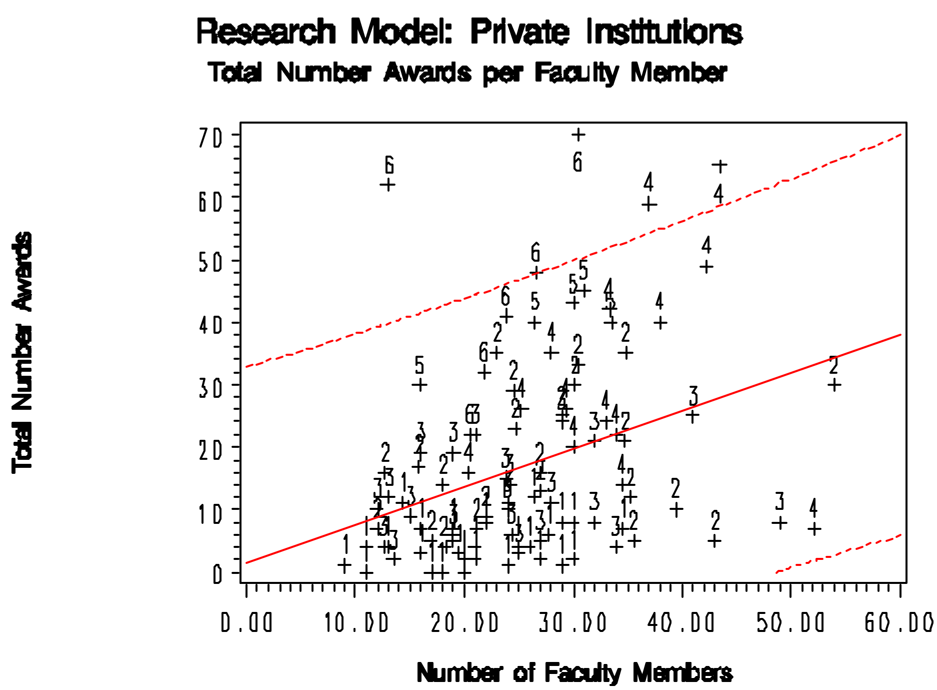


Figure 6.102

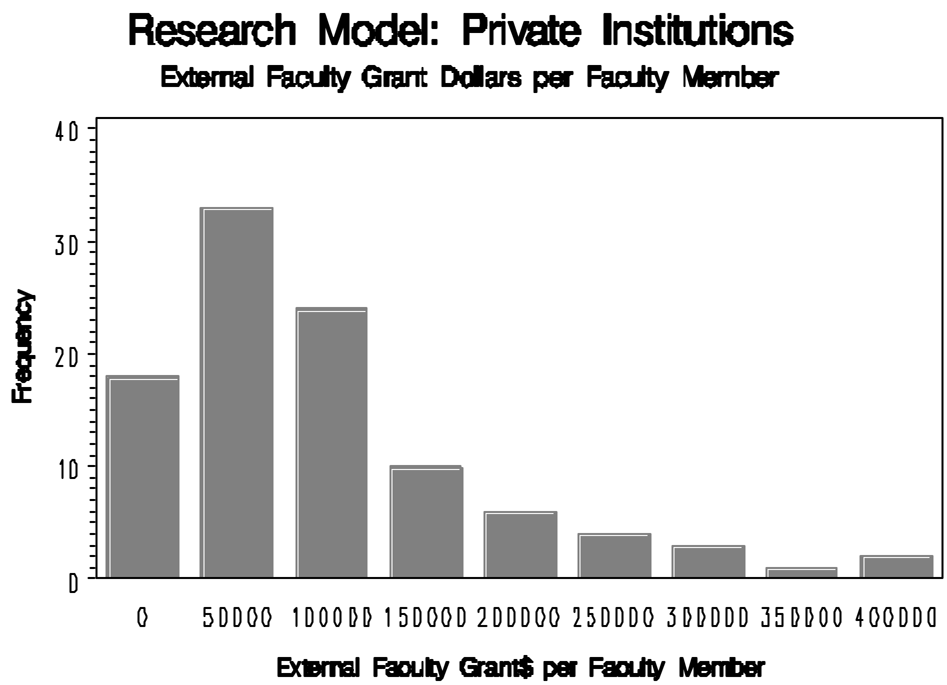


Table 6.64

Research Model: Private Institutions

Average External Faculty Grant Dollars per Faculty Member - by cluster

Cluster Number	No. of Schools in Cluster	External Faculty Grant Dollars per Faculty Member
1	29	33511.44
2	23	73342.66
3	23	99854.58
4	15	154905.66
5	5	161417.14
6	7	299213.37

Figure 6.103

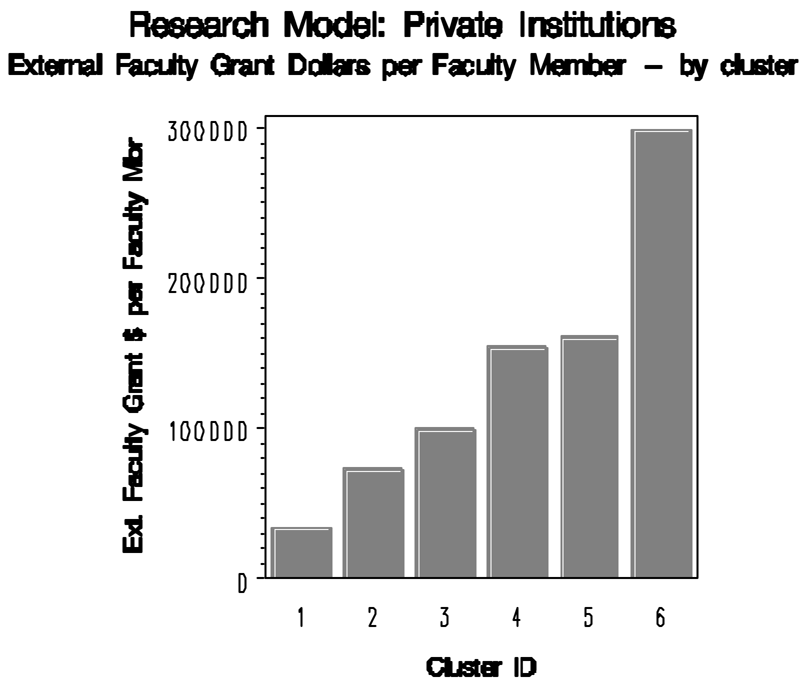


Figure 6.104

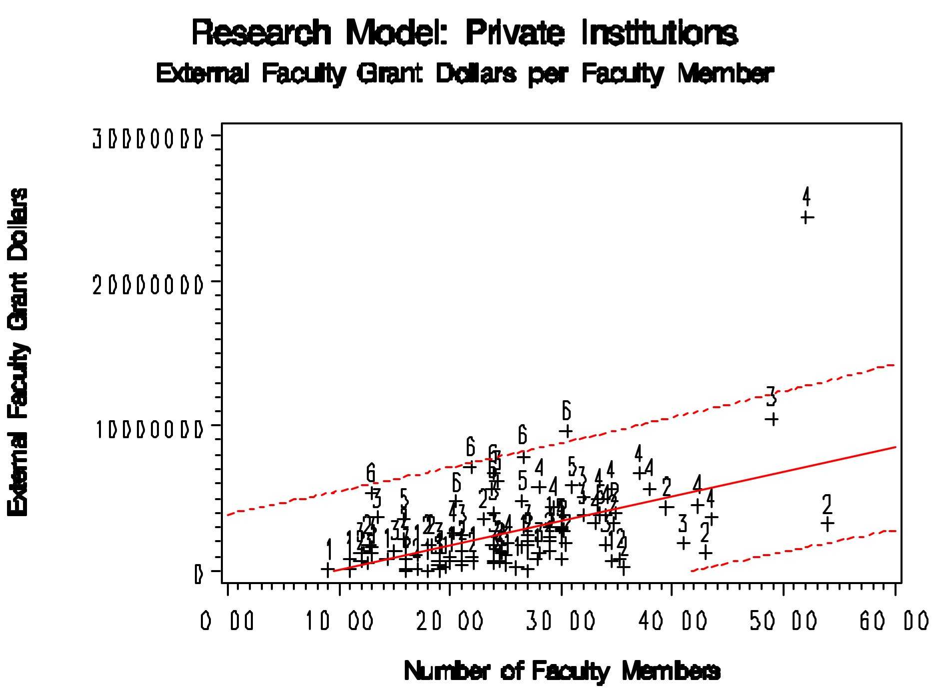


Figure 6.105

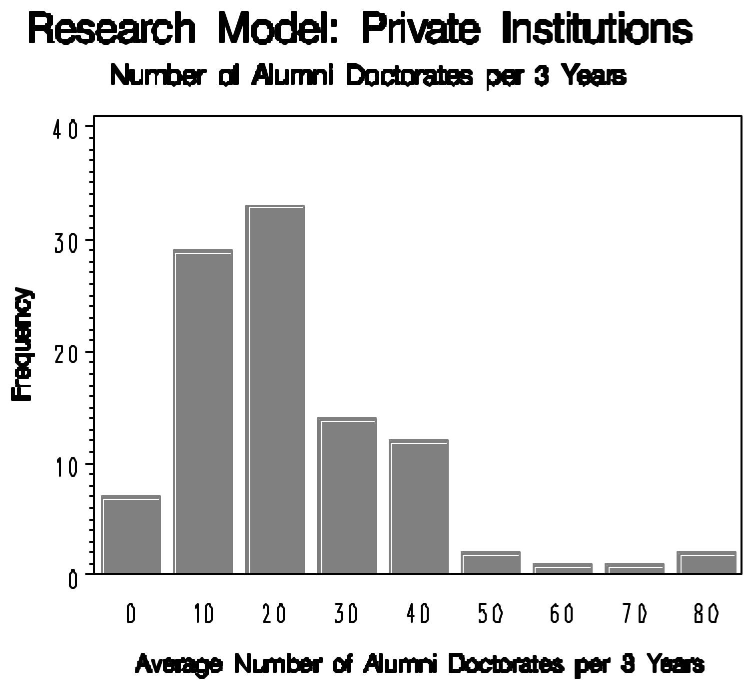


Table 6.65

Research Model: Private Institutions

Average Number of Alumni Doctorates per 3 Years - by cluster

Cluster Number	No. of Schools in Cluster	Number of Alumni Doctorates per 3 Years
1	29	9.39
2	23	26.45
3	23	14.14
4	15	32.45
5	5	70.20
6	7	29.05

Figure 6.106

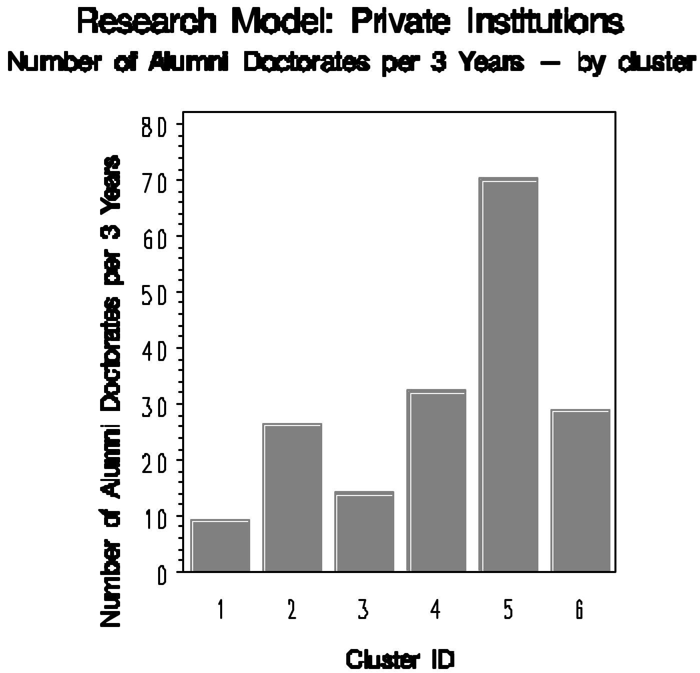

Research Model: Private Institutions
Number of Alumni Doctorates per 3 Years — by cluster
Number of Alumni Doctorates per 3 Years
80
70
60
50
40
30
20
10
0
1
2
3
4
5
6
Cluster ID

Figure 6.107

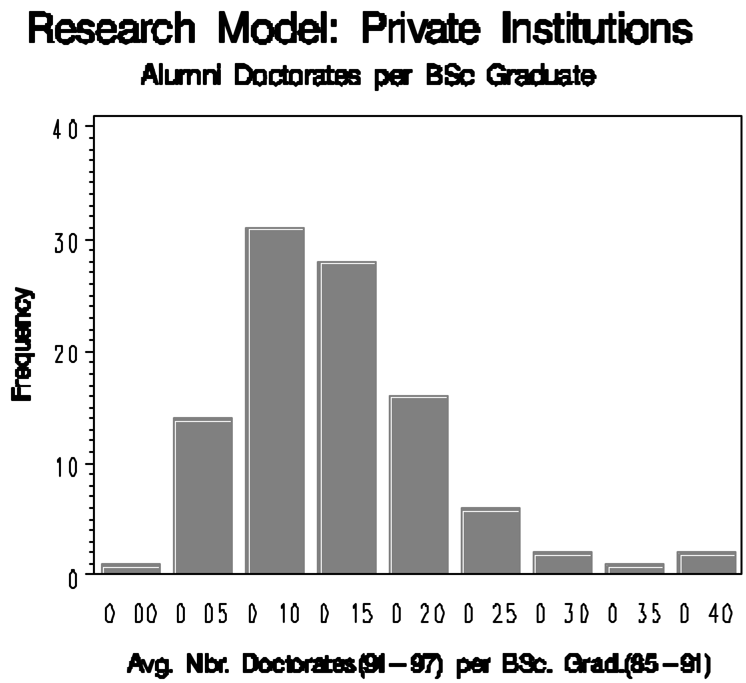


Table 6.66

Research Model: Private Institutions
Average Alumni Doctorates per BSc Graduate - by cluster

Cluster Number	No. of Schools in Cluster	Alumni Doctorates per BSc Graduate
1	29	0.10
2	23	0.18
3	23	0.10
4	15	0.18
5	5	0.37
6	7	0.17

Figure 6.108

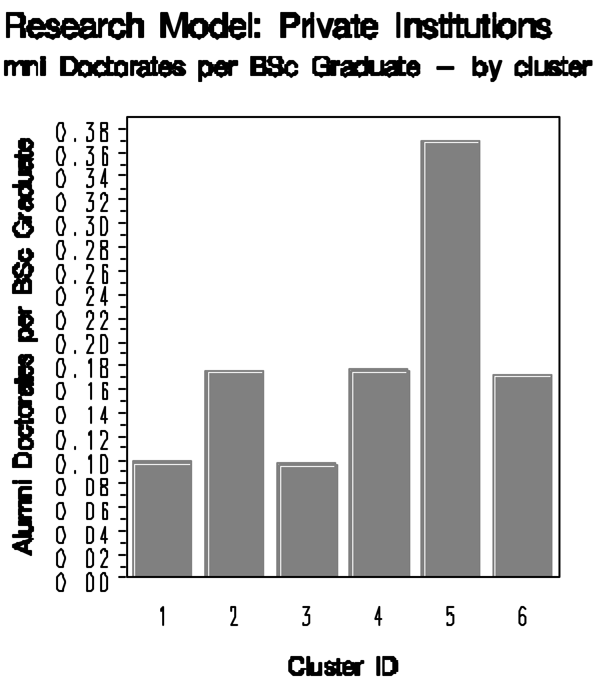


Figure 6.109

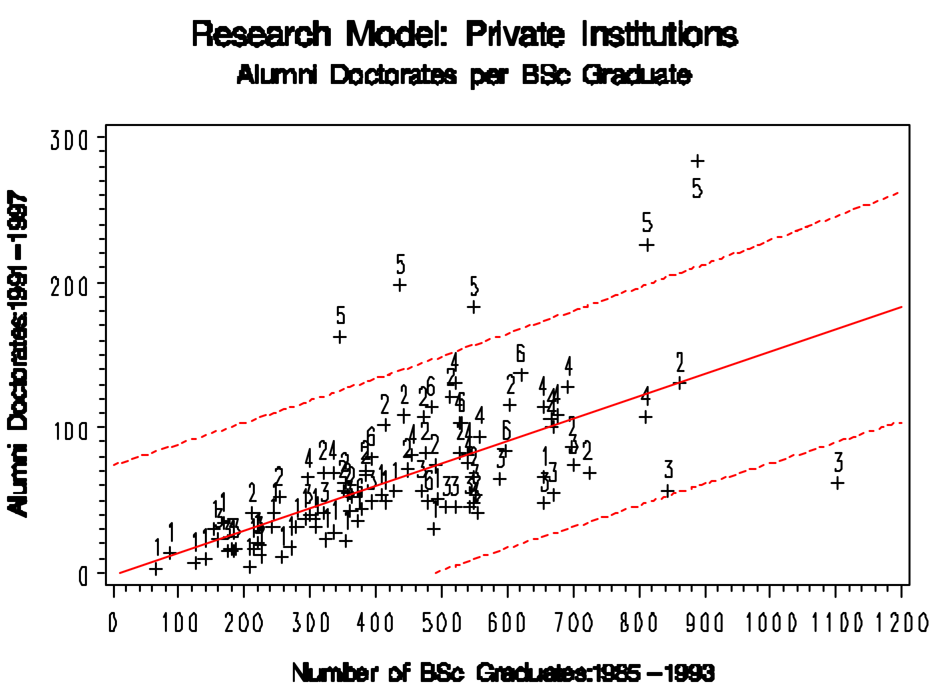


Table 6.67. Research Model Profile for Public Study Institutions

Cluster	#	# grants per fac	res grants per fac	ttl amt per fac	# fac pubs per fac	total awd per fac	# doc by alum 91-93	# doc by alum 94-96	# doc by alum 97-99	doc 91-93 per bsc 85-87	doc 94-96 per bsc 88-90	doc 97-99 per bsc 91-93
1	17	2.45	2.06	90,253	2.52	0.32	14.59	17.18	20.59	0.06	0.07	0.09
2	5	2.03	1.44	74,798	1.32	0.19	6.20	6.20	5.60	0.03	0.03	0.04
3	5	2.87	2.54	110,650	1.53	0.20	29.00	31.60	36.20	0.09	0.11	0.12
4	4	8.82	8.18	490,157	7.03	0.68	32.00	41.75	49.50	0.07	0.10	0.14

KEY

1. **# grnts per fac -** # of External Faculty Grants per # Regular Faculty(from Institution Survey personnel section)
2. **Res grants per fac -** # of External Faculty Research Grants per # Regular Faculty (from Institution Survey personnel section)
3. **Ttl amt per fac –** Total $ of External Faculty Research Grants per # Regular Faculty (from Institution Survey personnel section)
4. **# fac pub per fac –** Number of Faculty Publications per # Regular Faculty (from Institution Survey personnel section)
5. **total awd per fac –** Total # Awards per # Regular Faculty (from Institution Survey personnel section)
6. **# doc by alum 91-93, # doc per alum 94-96, # doc by alum 97-99 –** number of doctorates by alumni; (3 different time periods, **3** cluster variables)
7. **doc 91-93 per bsc 85-87, doc 94-96 per bsc 88-90, doc 97-99 per bsc91-93 -** number of doctorates by alumni per Bachelors of Science; (3 different time periods, **3** cluster variables)

Figure 6.110

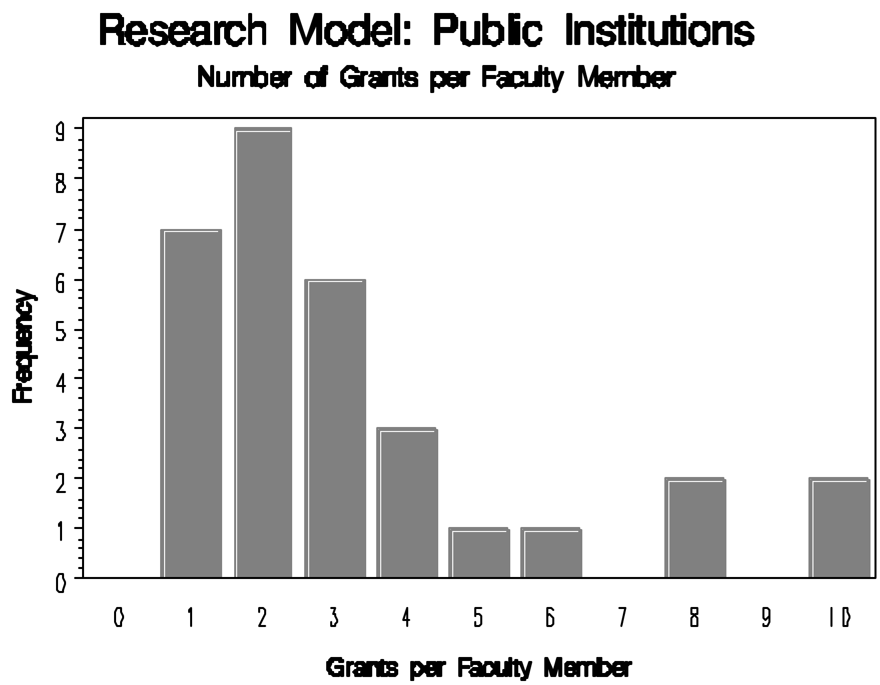


Table 6.68

Research Model: Public Institutions

Average Number Grants per Faculty Member - by cluster

Cluster Number	No. of Schools in Cluster	Number of Grants per Faculty Member
1	17	2.45
2	5	2.03
3	5	2.87
4	4	8.82

Figure 6.111

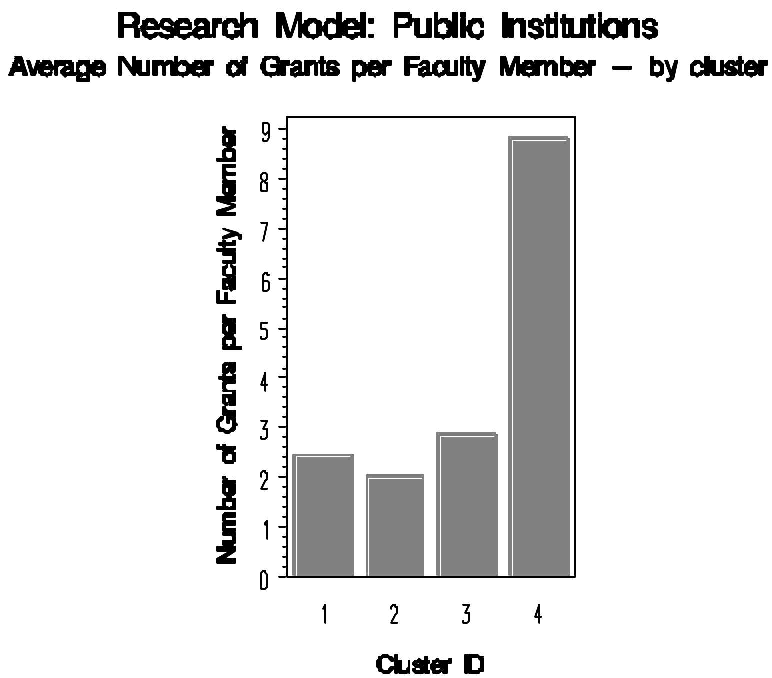


Figure 6.112

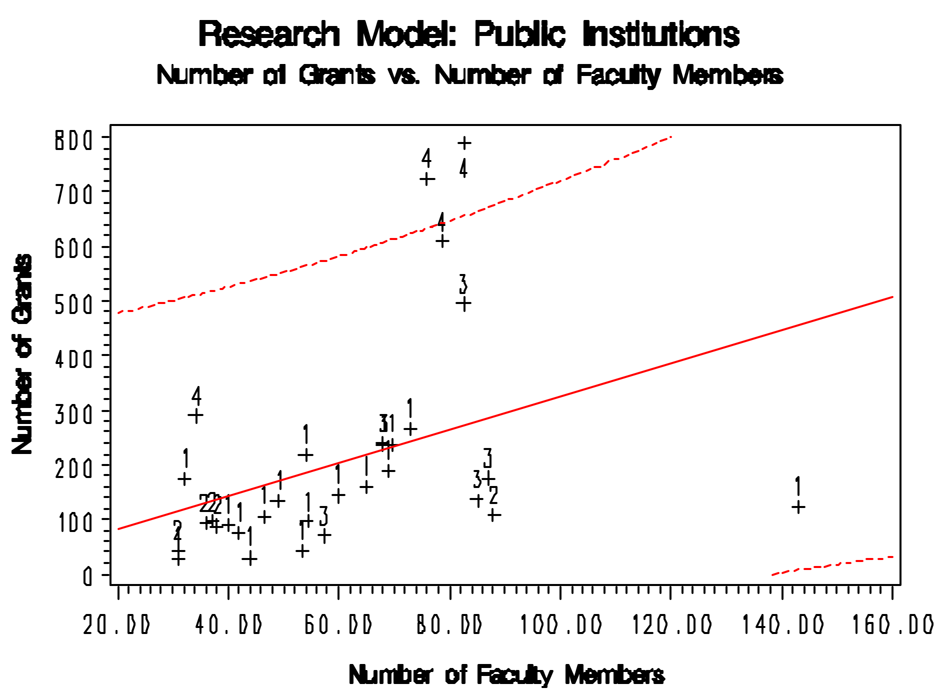


Figure 6.113

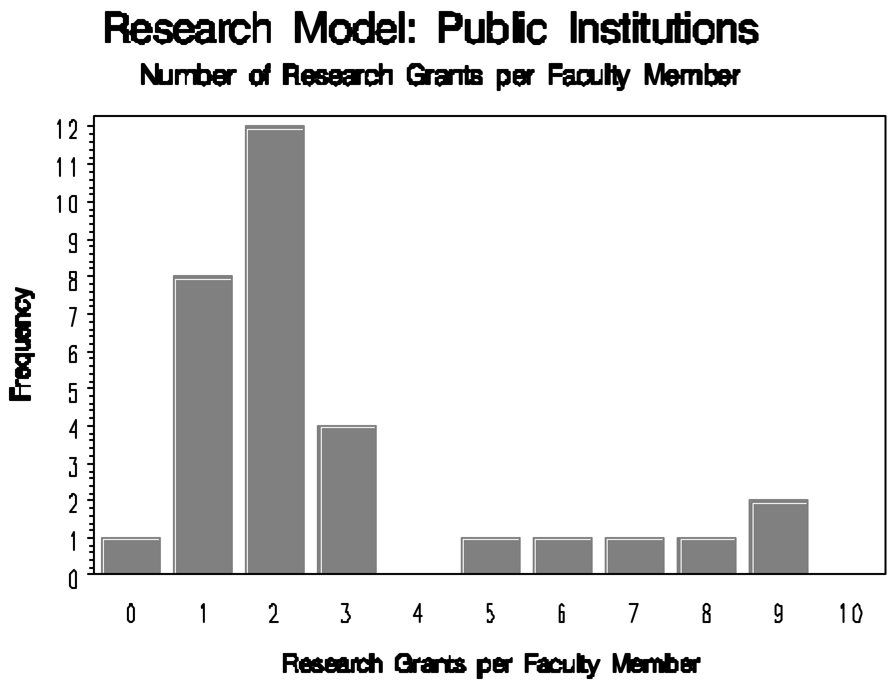


Table 6.69

Research Model: Public Institutions

Average Number Research Grants per Faculty Member - by cluster

Cluster Number	No. of Schools in Cluster	Number of Research Grants per Faculty Member
1	17	2.06
2	5	1.44
3	5	2.54
4	4	8.18

Figure 6.114

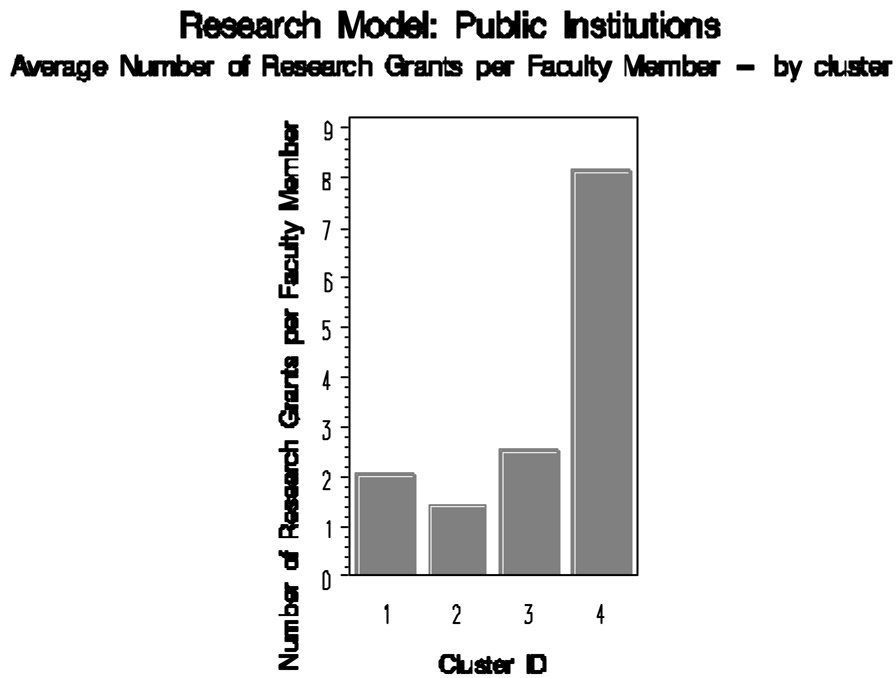


Figure 6.115

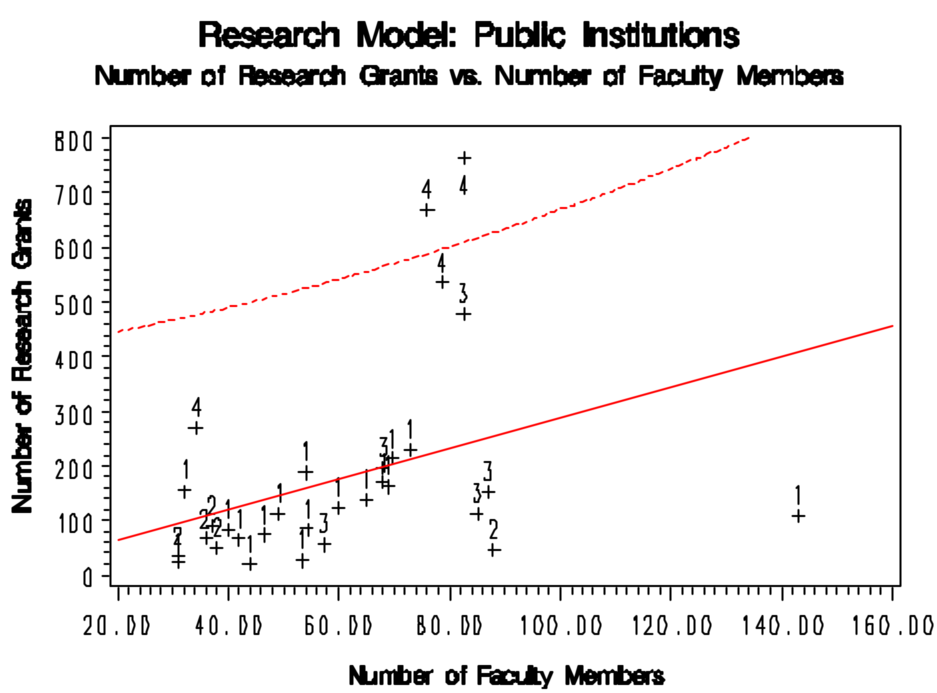


Figure 6.116

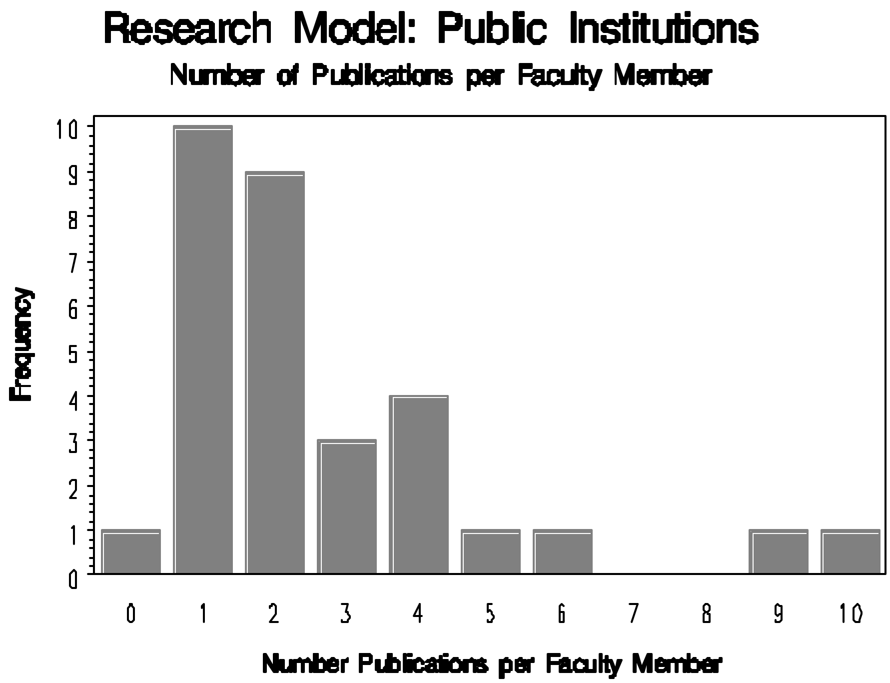


Table 6.70

Research Model: Public Institutions

Average Number of Publications per Faculty Member - by cluster

Cluster Number	No. of Schools in Cluster	Number of Publications per Faculty Member
1	17	2.52
2	5	1.32
3	5	1.53
4	4	7.03

Figure 6.117

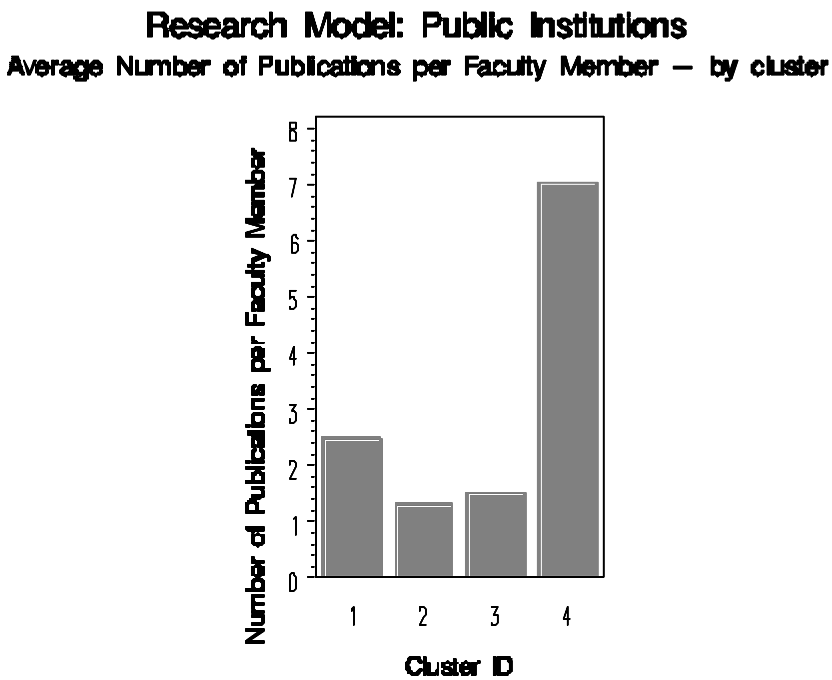


Figure 6.118

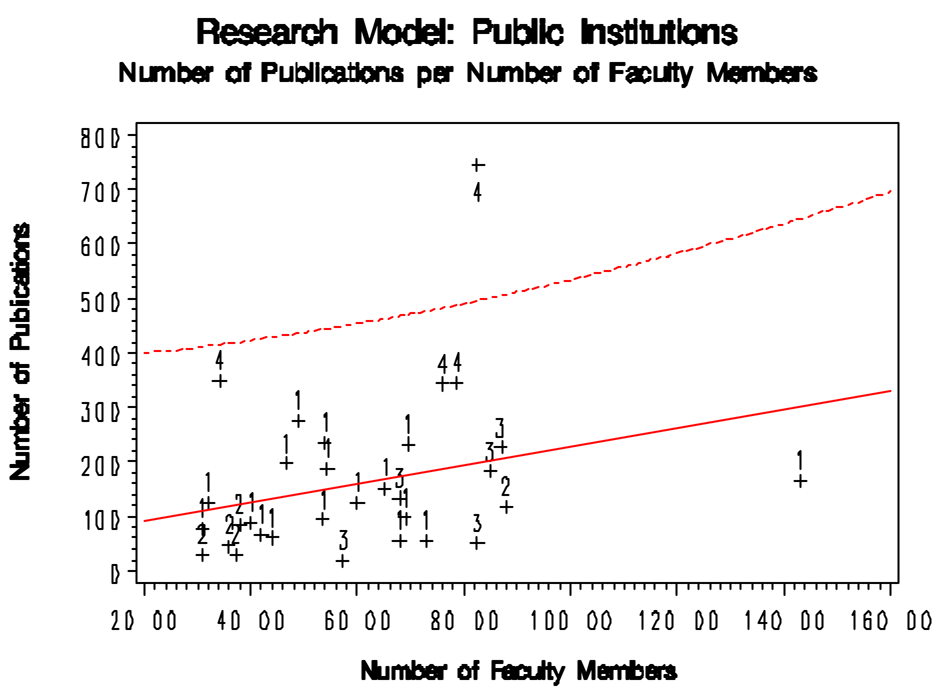


Figure 6.119

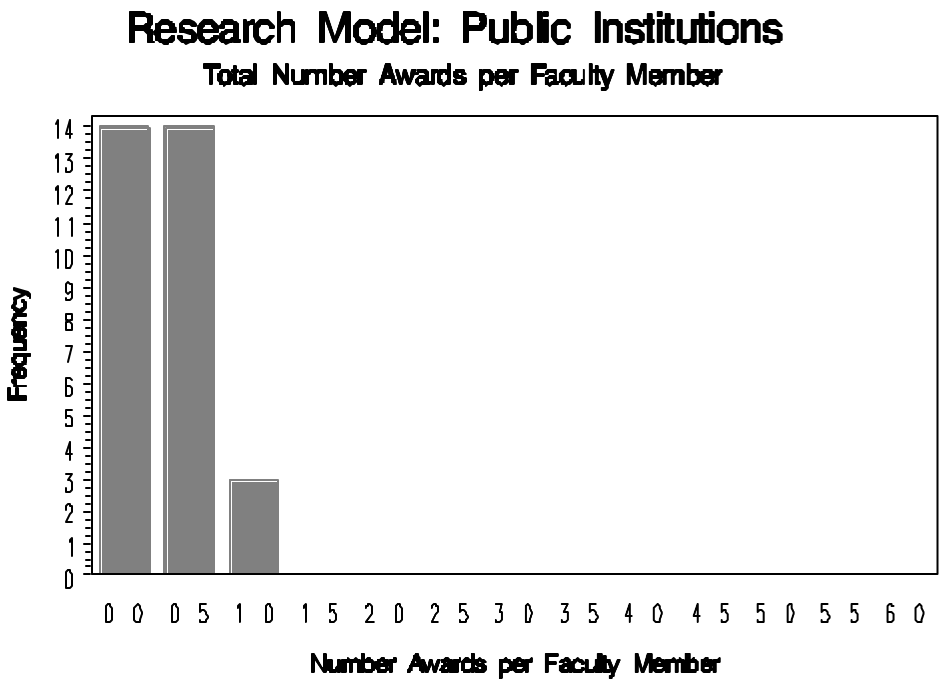


Table 6.71

Research Model: Public Institutions

Average Number Awards per Faculty Member - by cluster

Cluster Number	No.of Schools in Cluster	Total Number of Awards per Faculty Member
1	17	0.32
2	5	0.19
3	5	0.20
4	4	0.68

Figure 6.120

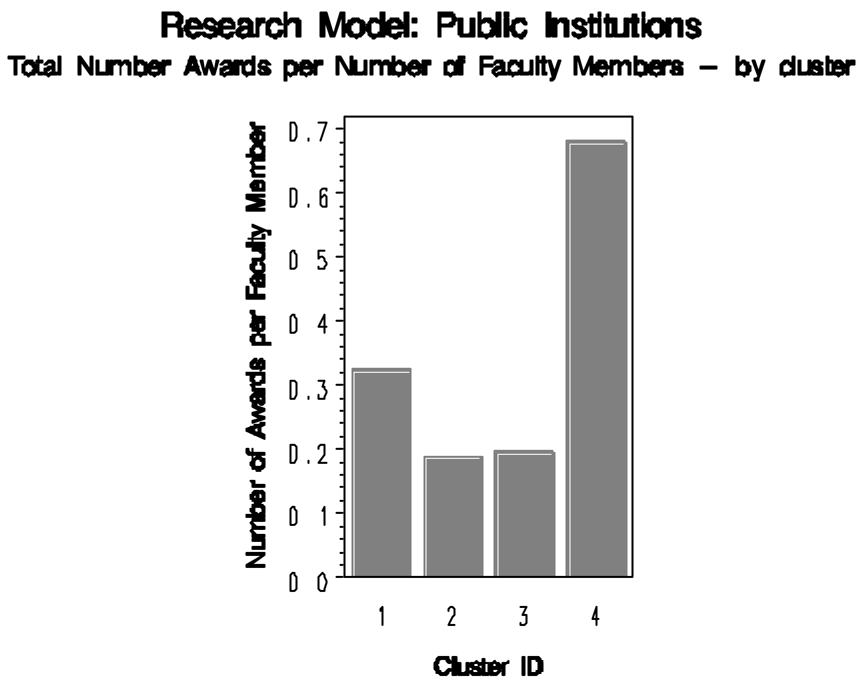


Figure 6.121

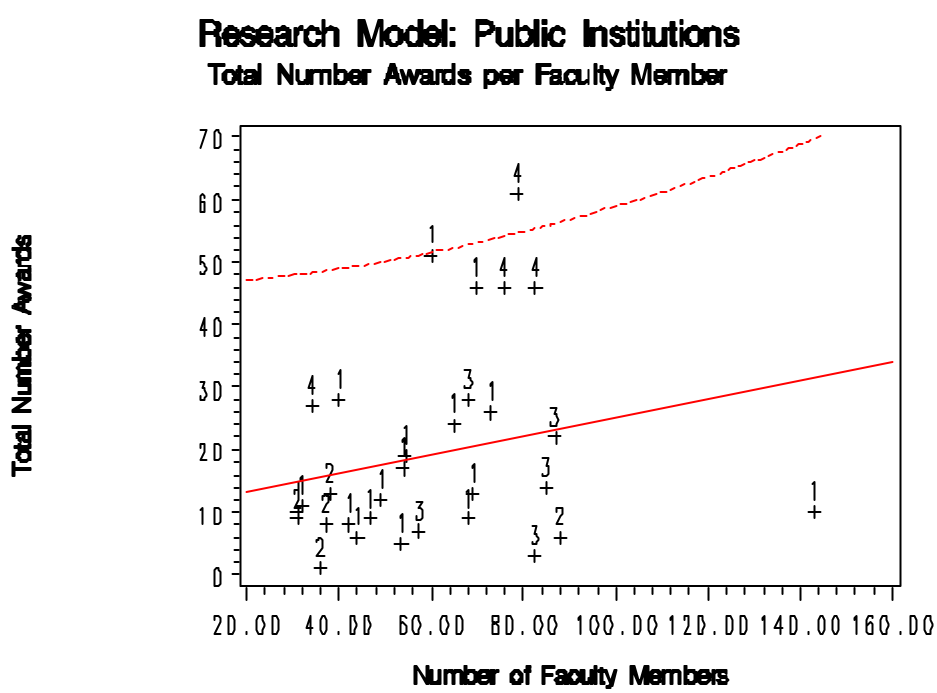


Figure 6.122

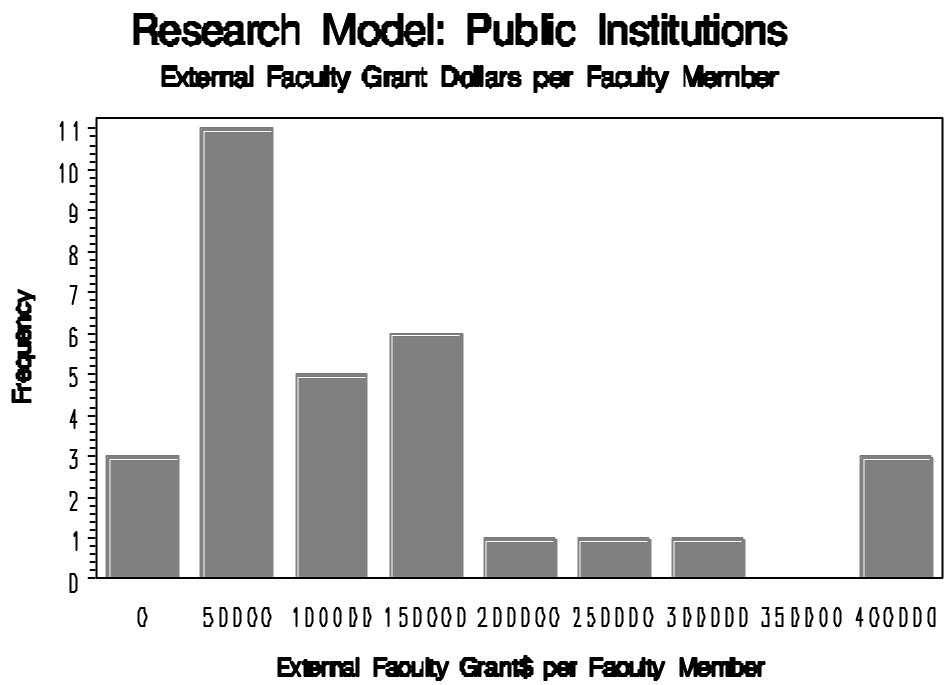


Table 6.72

Research Model: Public Institutions

Average External Faculty Grant Dollars per Faculty Member - by cluster

Cluster Number	No. of Schools in Cluster	External Faculty Grant Dollars per Faculty Member
1	17	90252.98
2	5	74797.93
3	5	110650.04
4	4	490157.17

Figure 6.123

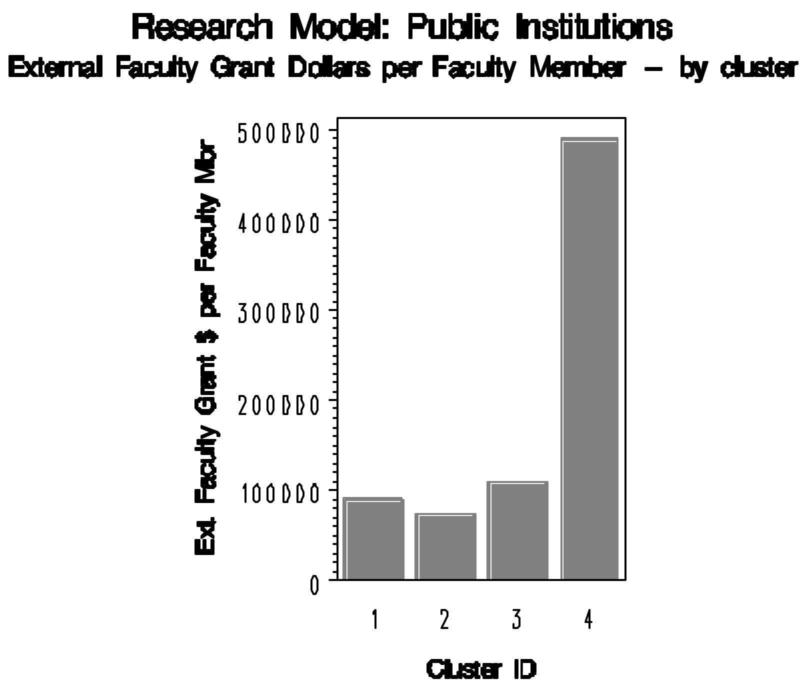


Figure 6.124

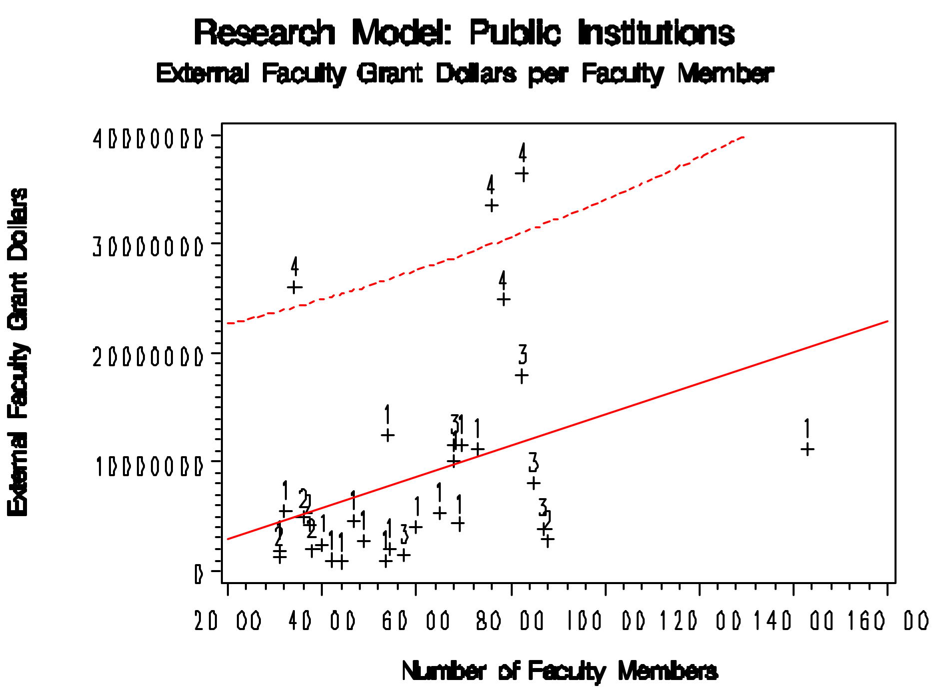


Figure 6.125

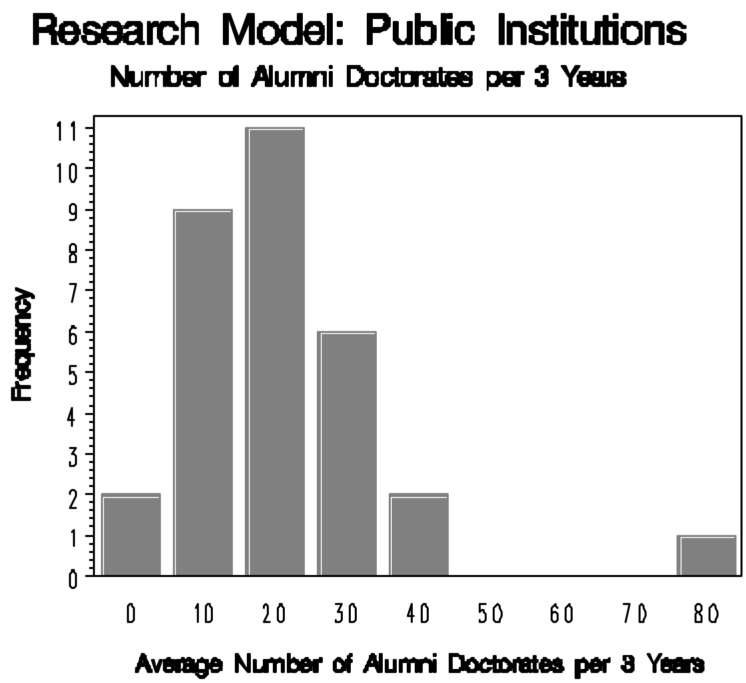


Table 6.73

Research Model: Public Institutions

Average Number of Alumni Doctorates per 3 Years - by cluster

Cluster Number	No. of Schools in Cluster	Number of Alumni Doctorates per 3 Years
1	17	17.45
2	5	6.00
3	5	32.27
4	4	41.08

Figure 6.126

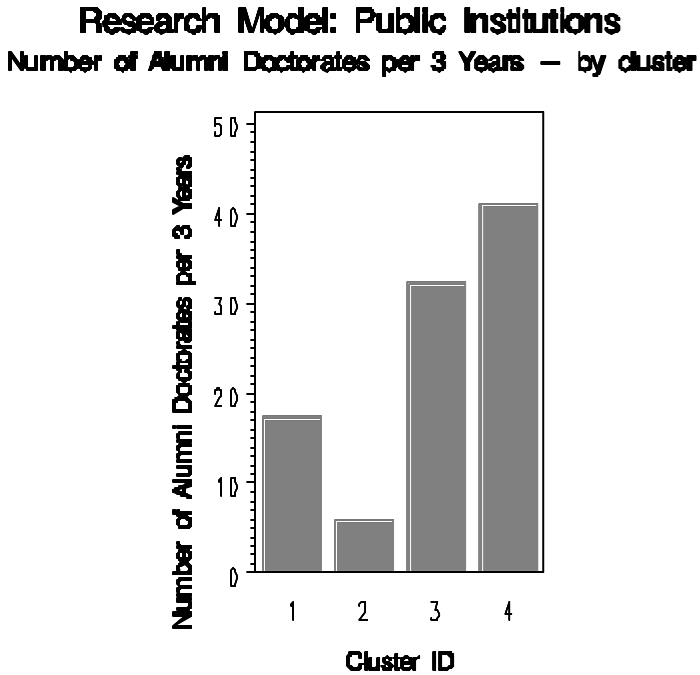

Research Model: Public Institutions
Number of Alumni Doctorates per 3 Years — by cluster
Number of Alumni Doctorates per 3 Years
50
40
30
20
10
0
1
2
3
4
Cluster ID

Figure 6.127

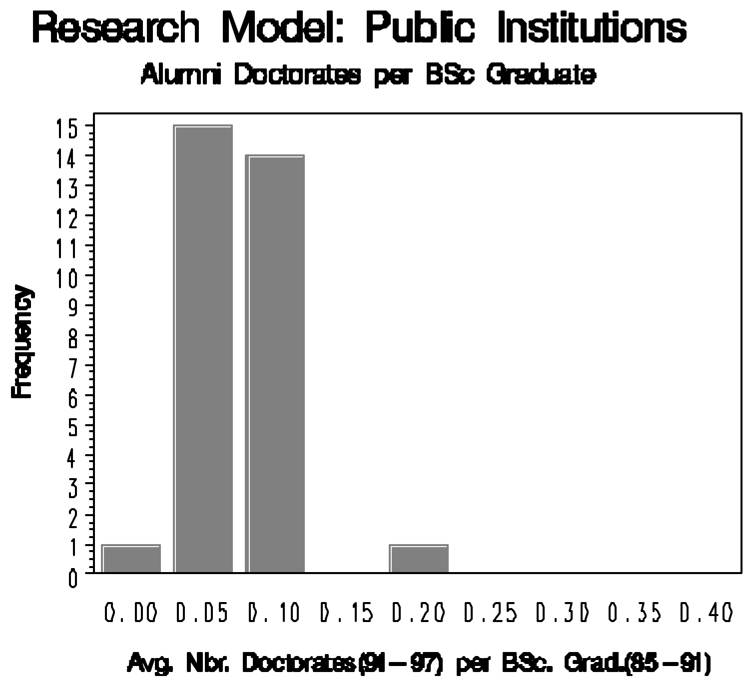


Table 6.74

Research Model: Public Institutions

Average Alumni Doctorates per BSc Graduate - by cluster

Cluster Number	No.of Schools in Cluster	Alumni Doctorates per B.Sc. Graduate
1	17	0.08
2	5	0.04
3	5	0.11
4	4	0.10

Figure 6.128

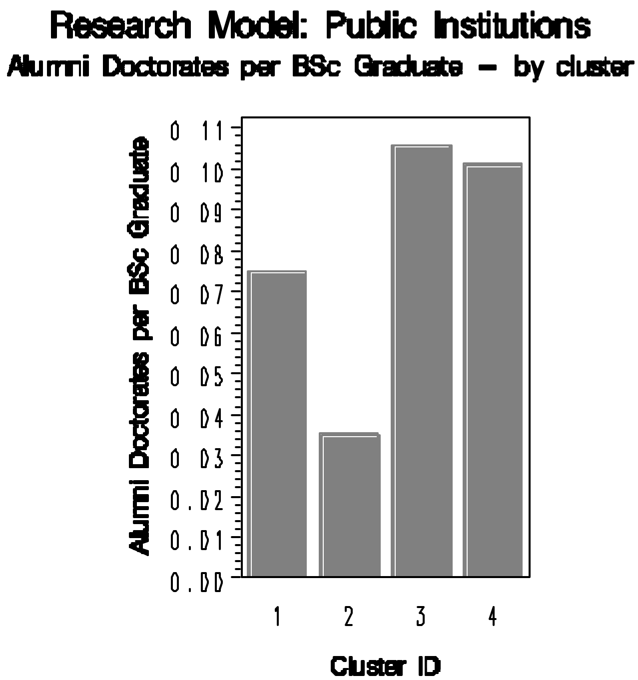


Figure 6.129

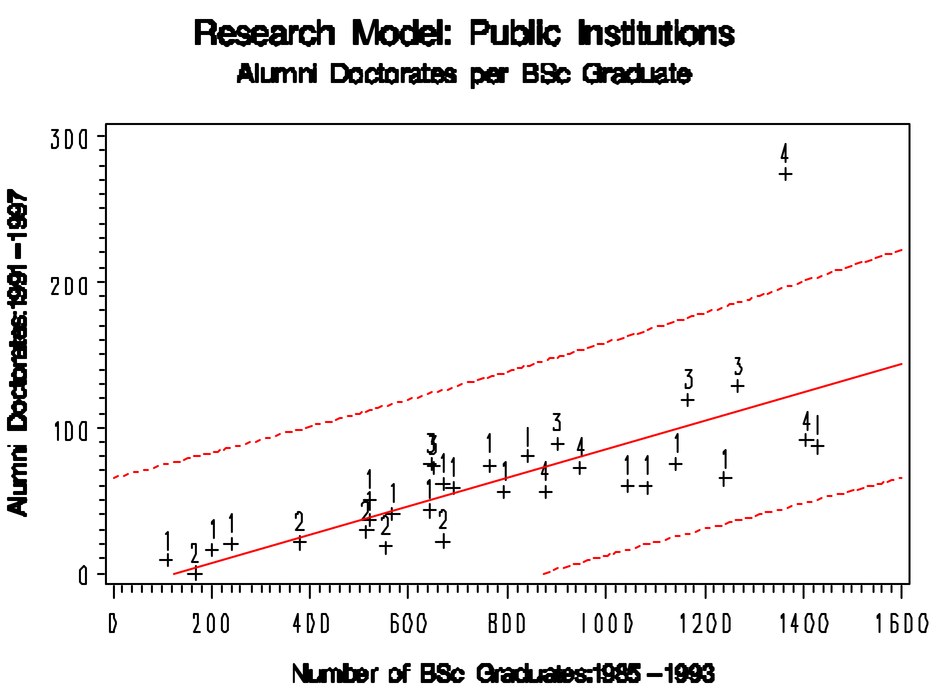


Table 6.75. Research Model Profile for Bachelor's Degree Study Institutions

Cluster	#	# grants per fac	res grants per fac	ttl amt per fac	# fac pubs per fac	total awd per fac	# doc by alum 91-93	# doc by alum 94-96	# doc by alum 97-99	doc 91-93 per bsc 85-87	doc 94-96 per bsc 88-90	doc 97-99 per bsc 91-93
1	29	0.81	0.64	30,850	2.20	0.26	16.17	16.34	18.00	0.12	0.13	0.14
2	16	1.37	0.96	71,295	1.69	0.20	4.56	4.13	5.50	0.06	0.05	0.07
3	22	1.67	1.40	91,700	3.66	0.75	15.91	17.50	17.86	0.11	0.12	0.13
4	16	1.94	1.70	145,631	4.47	1.02	33.94	32.25	33.75	0.19	0.19	0.21
5	5	2.37	1.96	161,417	5.54	1.50	71.20	67.60	71.80	0.36	0.36	0.39
6	7	5.34	4.79	283,545	7.85	1.92	24.71	24.71	28.71	0.14	0.16	0.18

KEY

1. **# grnts per fac -** # of External Faculty Grants per # Regular Faculty(from Institution Survey personnel section)
2. **Res grants per fac -** # of External Faculty Research Grants per # Regular Faculty (from Institution Survey personnel section)
3. **Ttl amt per fac –** Total $ of External Faculty Research Grants per # Regular Faculty (from Institution Survey personnel section)
4. **# fac pub per fac –** Number of Faculty Publications per # Regular Faculty (from Institution Survey personnel section)
5. **total awd per fac –** Total # Awards per # Regular Faculty (from Institution Survey personnel section)
6. **# doc by alum 91-93, # doc per alum 94-96, # doc by alum 97-99 –** number of doctorates by alumni; (3 different time periods, **3** cluster variables)
7. **doc 91-93 per bsc 85-87, doc 94-96 per bsc 88-90, doc 97-99 per bsc91-93 -** number of doctorates by alumni per Bachelors of Science; (3 different time periods, **3** cluster variables)

Figure 6.130

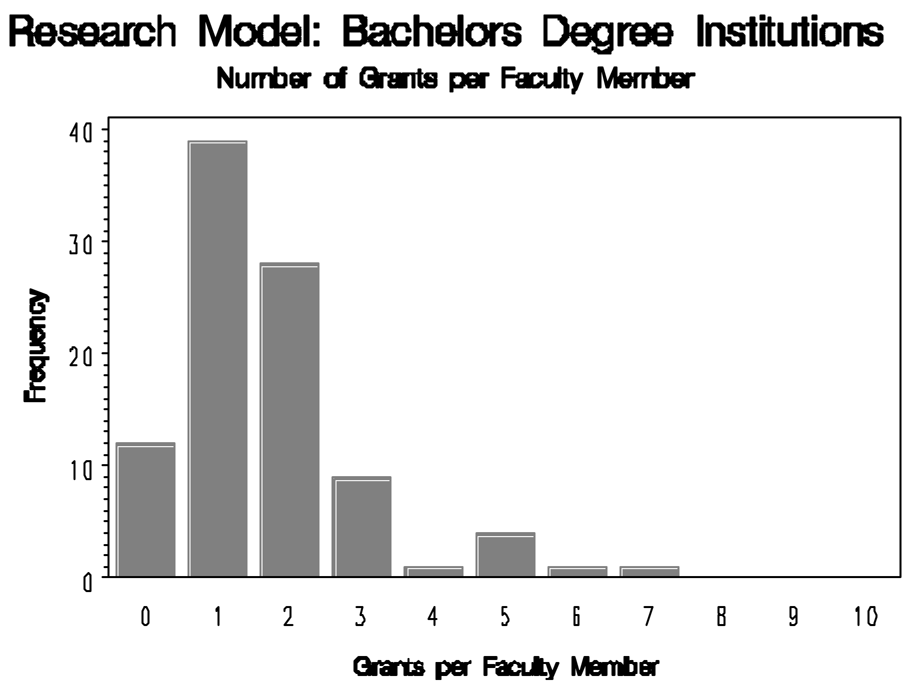


Table 6.76

Research Model: Bachelors Degree Institutions

Average Number Grants per Faculty Member - by cluster

Cluster Number	No. of Schools in Cluster	Number of Grants per Faculty Member
1	29	0.81
2	16	1.37
3	22	1.67
4	17	1.94
5	5	2.37
6	7	5.34

Figure 6.131

Research Model: Bachelors Degree Institutions
Average Number of Grants per Faculty Member — by cluster

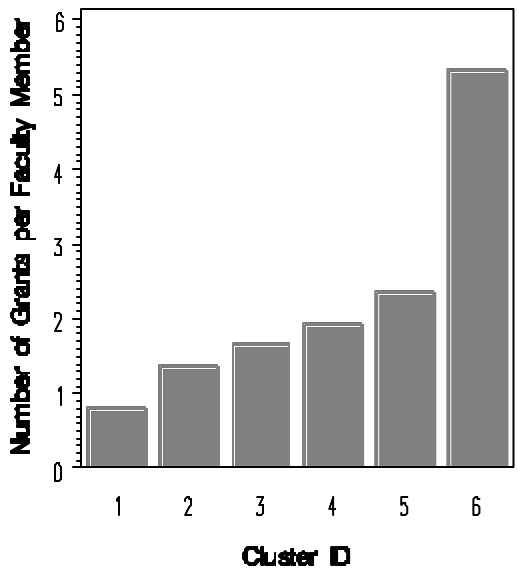


Figure 6.132

Research Model: Bachelors Degree Institutions
Number of Grants vs. Number of Faculty Members

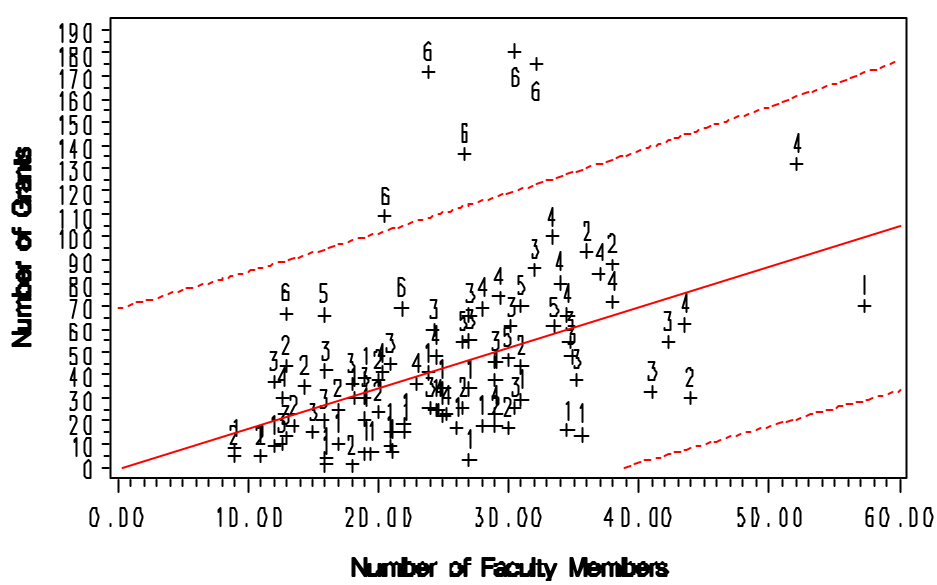


Figure 6.133

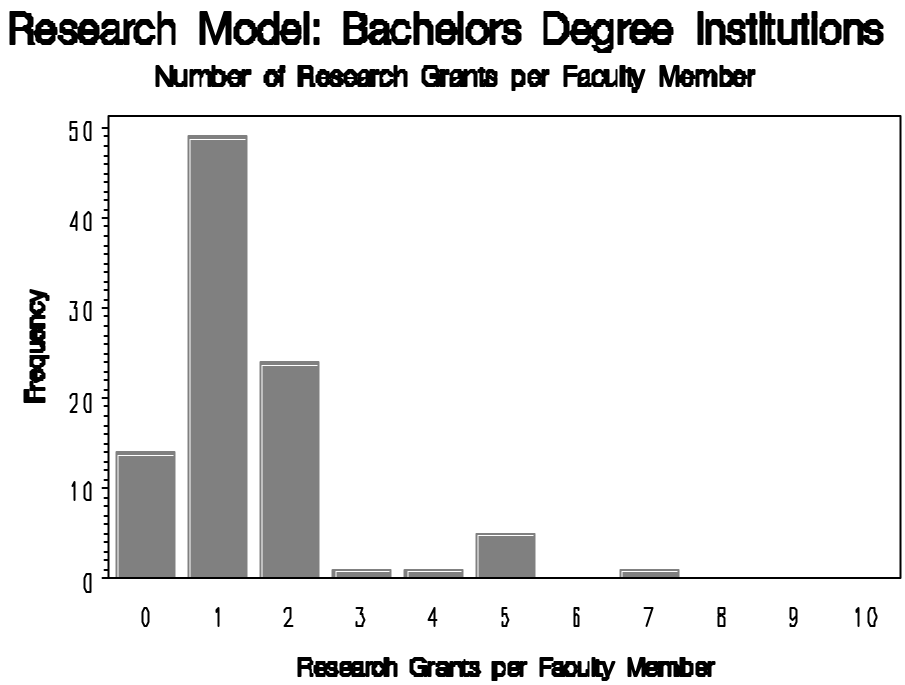


Table 6.77

Research Model: Bachelors Degree Institutions

Average Number Research Grants per Faculty Member - by cluster

Cluster Number	No. of Schools in Cluster	Number of Research Grants per Faculty Member
1	29	0.64
2	16	0.96
3	22	1.40
4	17	1.70
5	5	1.96
6	7	4.79

Figure 6.134

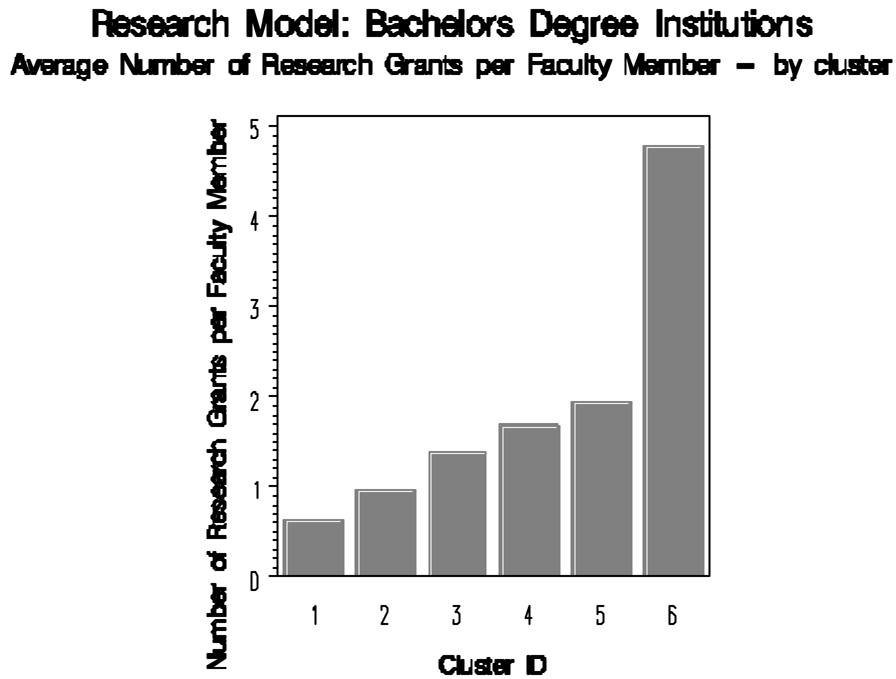
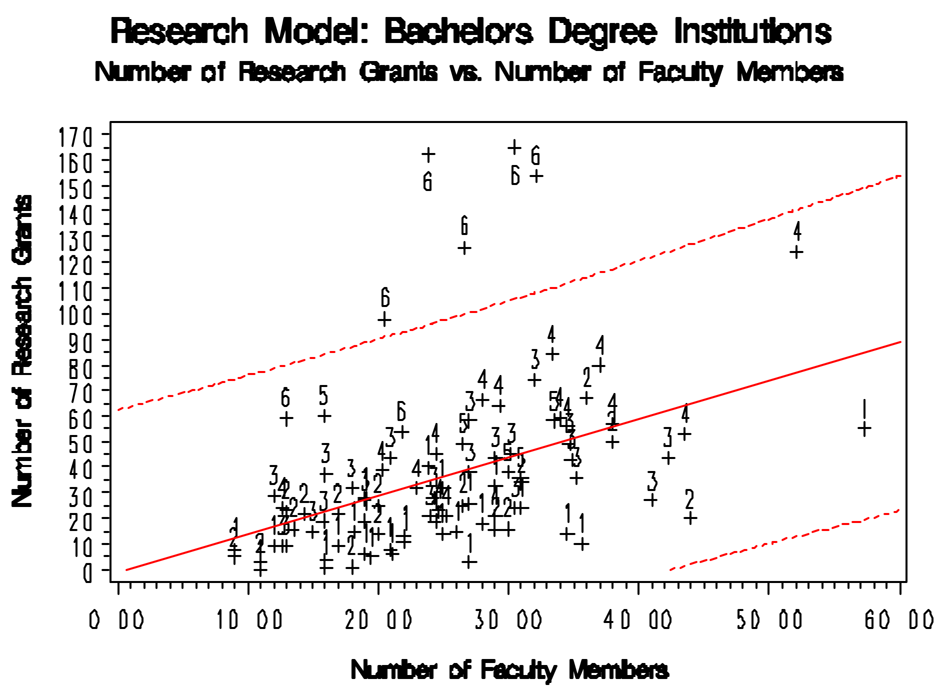


Figure 6.135



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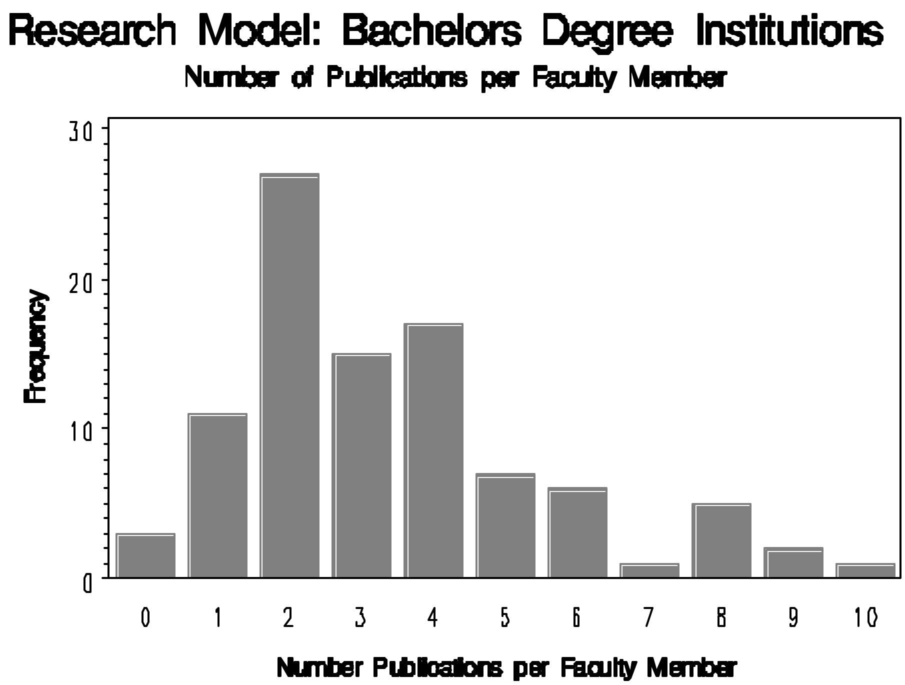


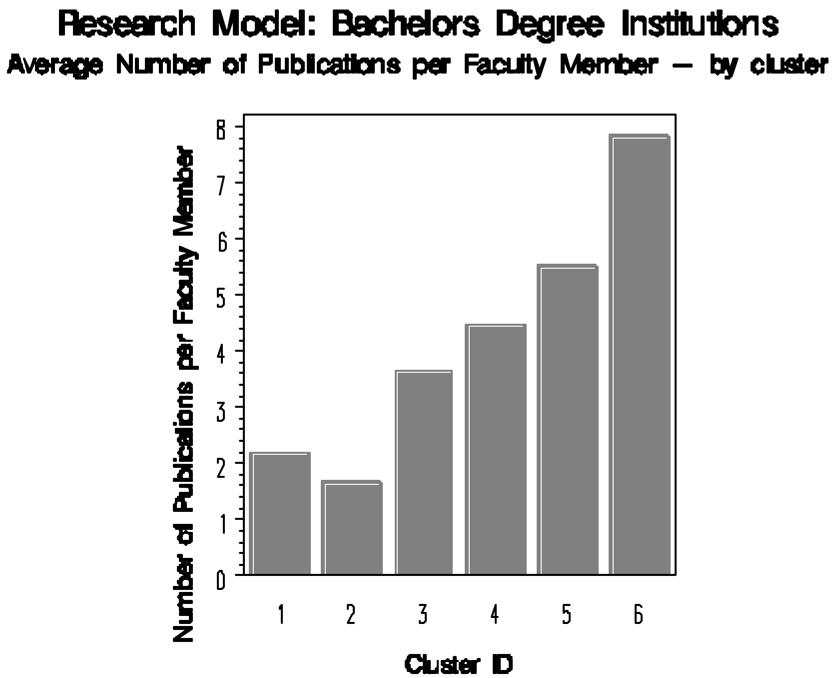
Table 6.78

Research Model: Bachelors Degree Institutions

Average Number of Publications per Faculty Member - by cluster

Cluster Number	No. of Schools in Cluster	Number of Publications per Faculty Member
1	29	2.20
2	16	1.69
3	22	3.66
4	17	4.47
5	5	5.54
6	7	7.85

Figure 6.137



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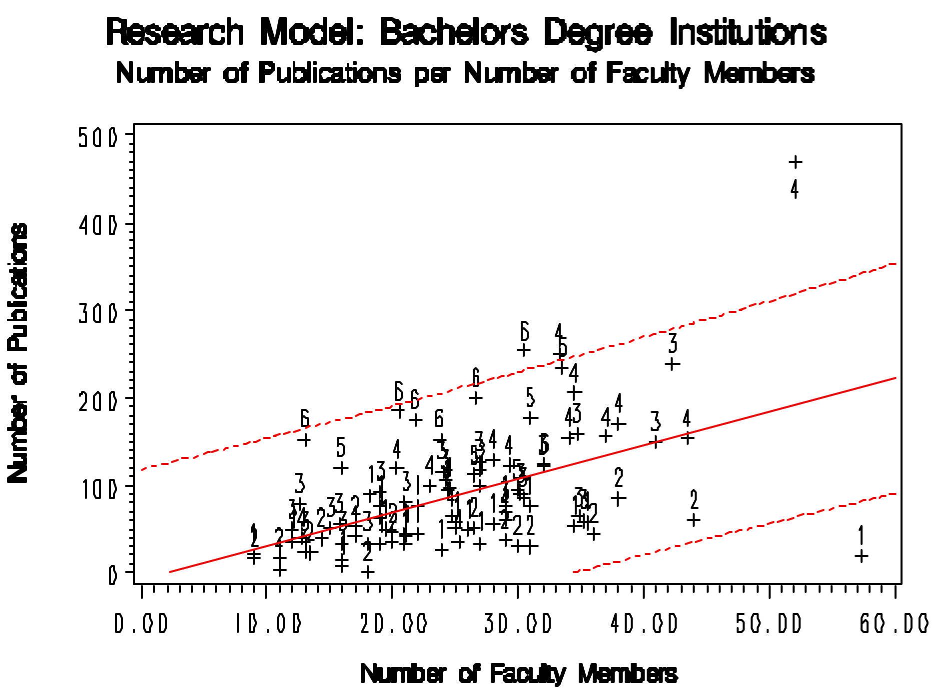


Figure 6.139

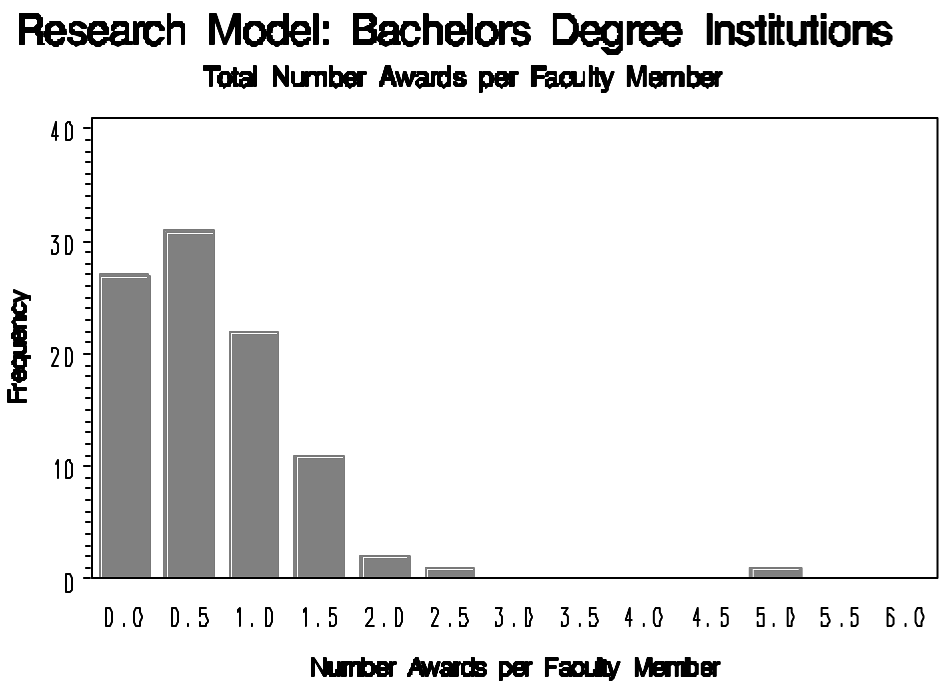


Table 6.79

Research Model: Bachelors Degree Institutions

Average Number Awards per Faculty Member - by cluster

Cluster Number	No. of Schools in Cluster	Total Number of Awards per Faculty Member
1	29	0.26
2	16	0.20
3	22	0.75
4	17	1.02
5	5	1.50
6	7	1.92

Figure 6.140

Research Model: Bachelors Degree Institutions

Total Number Awards per Number of Faculty Members – by cluster

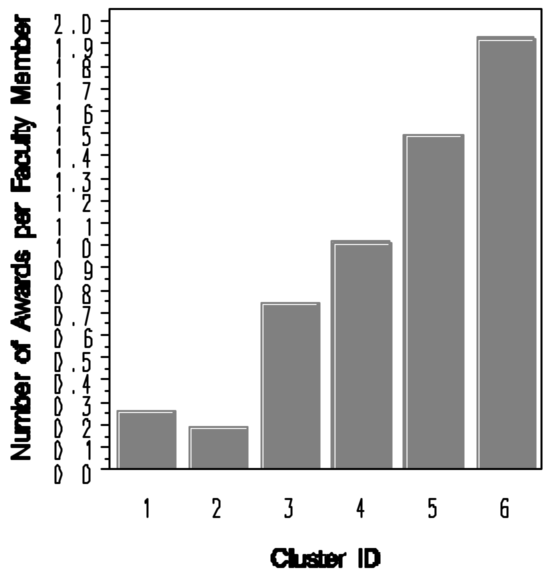


Figure 6.141

Research Model: Bachelors Degree Institutions

Total Number Awards per Faculty Member

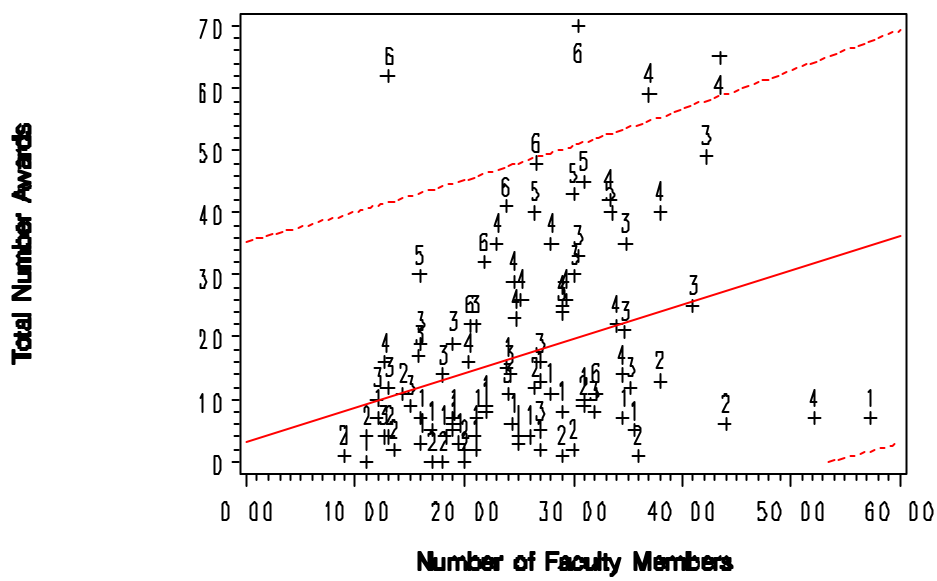


Figure 6.142

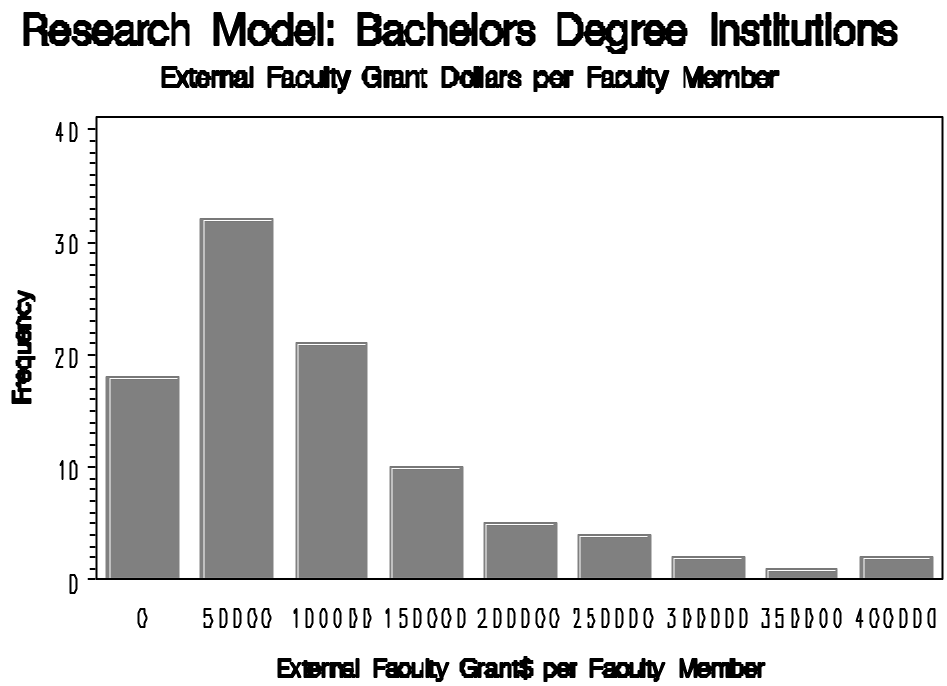


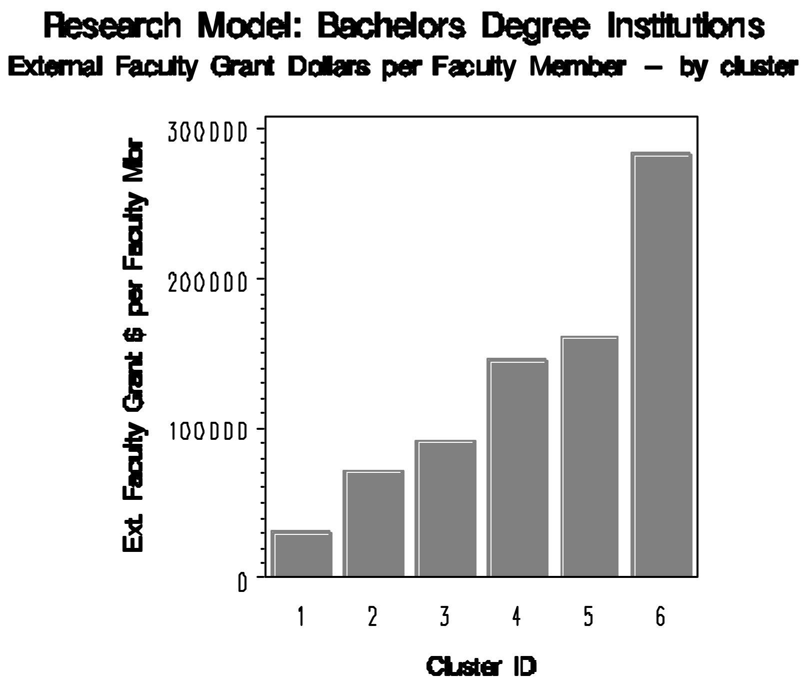
Table 6.80

Research Model: Bachelors Degree Institutions

Average External Faculty Grant Dollars per Faculty Member - by cluster

Cluster Number	No. of Schools in Cluster	External Faculty Grant Dollars per Faculty Member
1	29	30,849.53
2	16	71,295.35
3	22	91,699.87
4	17	145,630.65
5	5	161,417.14
6	7	283,544.87

Figure 6.143



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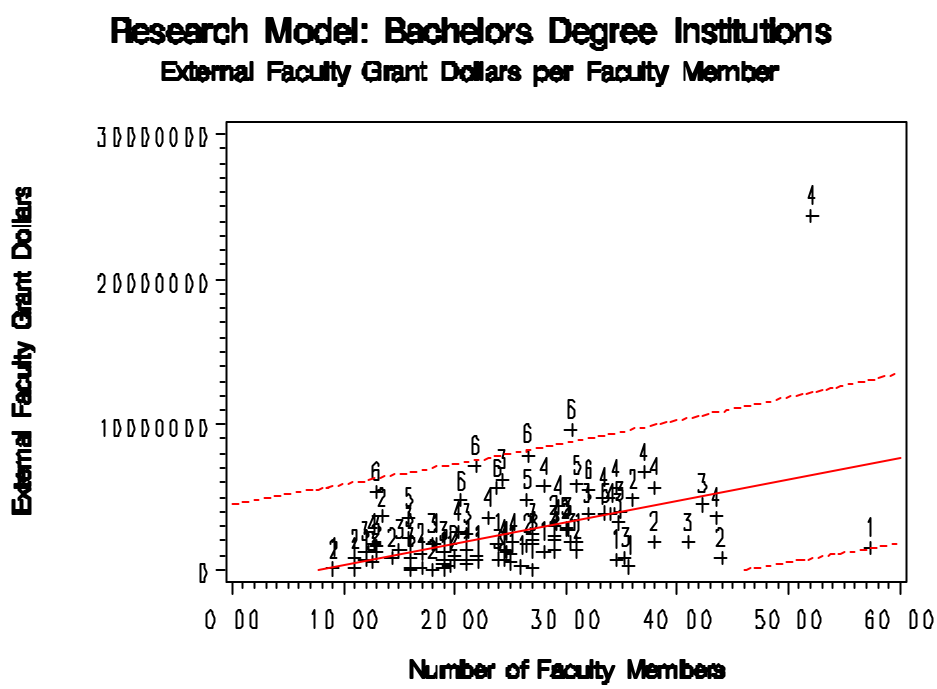


Figure 6.145

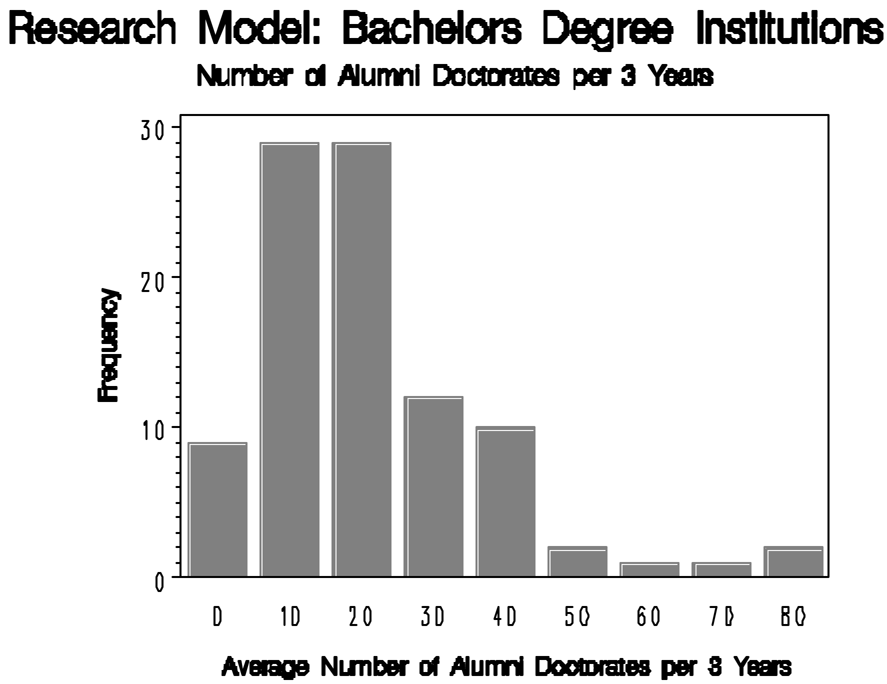


Table 6.81

Research Model: Bachelors Degree Institutions

Average Number of Alumni Doctorates per 3 Years - by cluster

Cluster Number	No. of Schools in Cluster	Number of Alumni Doctorates per 3 Years
1	29	16.84
2	16	4.73
3	22	17.09
4	17	33.31
5	5	70.20
6	7	26.05

Figure 6.146

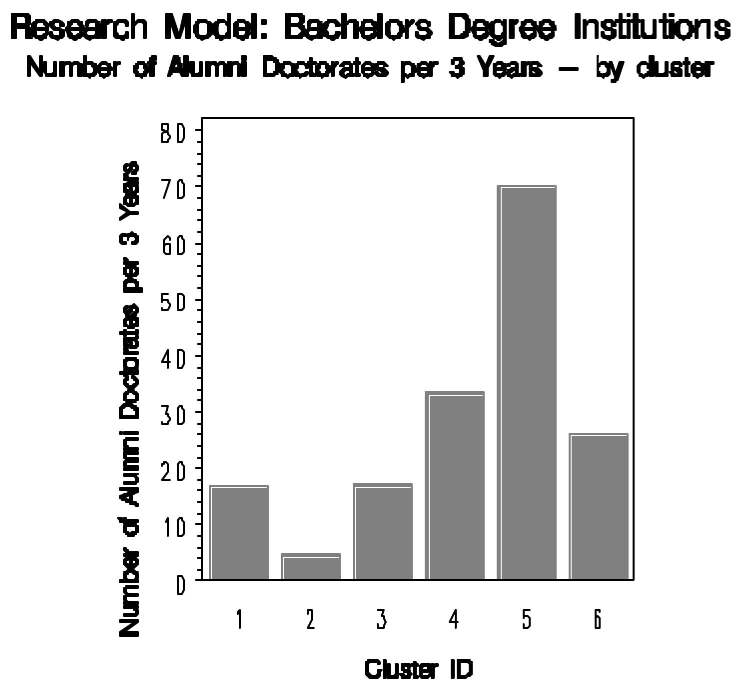

Research Model: Bachelors Degree Institutions
Number of Alumni Doctorates per 3 Years -- by cluster
Number of Alumni Doctorates per 3 Years
80
70
60
50
40
30
20
10
0
1
2
3
4
5
6
Cluster ID

Figure 6.147

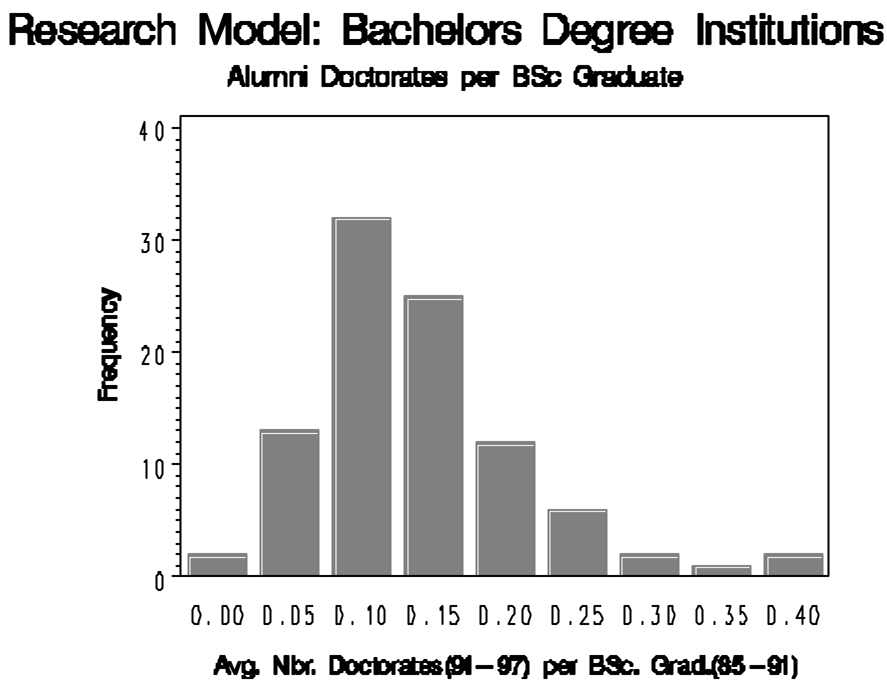


Table 6.82

Research Model: Bachelors Degree Institutions

Average Alumni Doctorates per BSc Graduate - by cluster

Cluster Number	No. of Schools in Cluster	Alumni Doctorates per B.Sc. Graduate
1	29	0.13
2	16	0.06
3	22	0.12
4	17	0.20
5	5	0.37
6	7	0.16

Figure 6.149

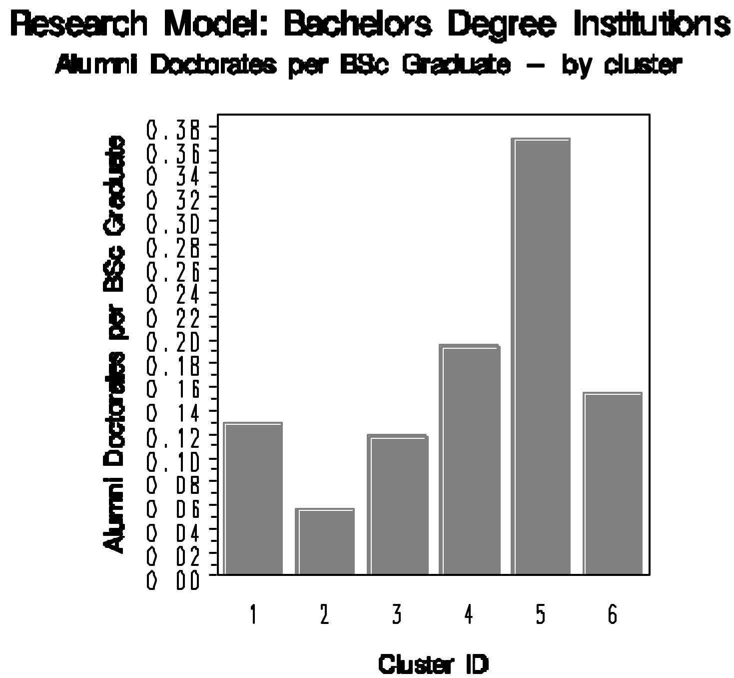


Figure 6.150

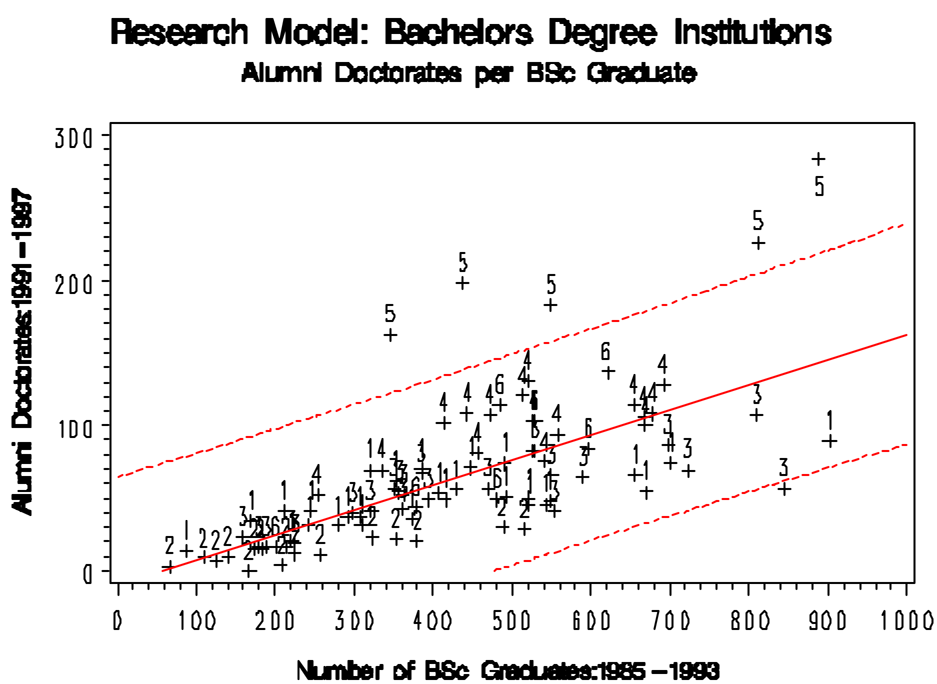


Table 6.83. Research Model Profile for Advanced Degree Study Institutions

Cluster	#	# grants per fac	res grants per fac	ttl amt per fac	# fac pubs per fac	total awd per fac	# doc by alum 91-93	# doc by alum 94-96	# doc by alum 97-99	doc 91-93 per bsc 85-87	doc 94-96 per bsc 88-90	doc 97-99 per bsc 91-93
1	19	2.69	2.31	113,356	2.93	0.38	18.37	21.11	23.26	0.07	0.08	0.09
2	6	1.38	0.99	41,101	1.26	0.17	7.17	8.67	8.50	0.05	0.06	0.07
3	4	8.82	8.18	490,157	7.03	0.68	32.00	41.75	49.50	0.07	0.10	0.14
4	8	2.47	2.33	114,005	3.19	0.28	24.38	31.50	38.00	0.11	0.17	0.22

KEY

1. **# grnts per fac -** # of External Faculty Grants per # Regular Faculty(from Institution Survey personnel section)
2. **Res grants per fac -** # of External Faculty Research Grants per # Regular Faculty (from Institution Survey personnel section)
3. **Ttl amt per fac –** Total $ of External Faculty Research Grants per # Regular Faculty (from Institution Survey personnel section)
4. **# fac pub per fac –** Number of Faculty Publications per # Regular Faculty (from Institution Survey personnel section)
5. **total awd per fac –** Total # Awards per # Regular Faculty (from Institution Survey personnel section)
6. **# doc by alum 91-93, # doc per alum 94-96, # doc by alum 97-99 –** number of doctorates by alumni; (3 different time periods, **3** cluster variables)
7. **doc 91-93 per bsc 85-87, doc 94-96 per bsc 88-90, doc 97-99 per bsc91-93 -** number of doctorates by alumni per Bachelors of Science; (3 different time periods, **3** cluster variables)

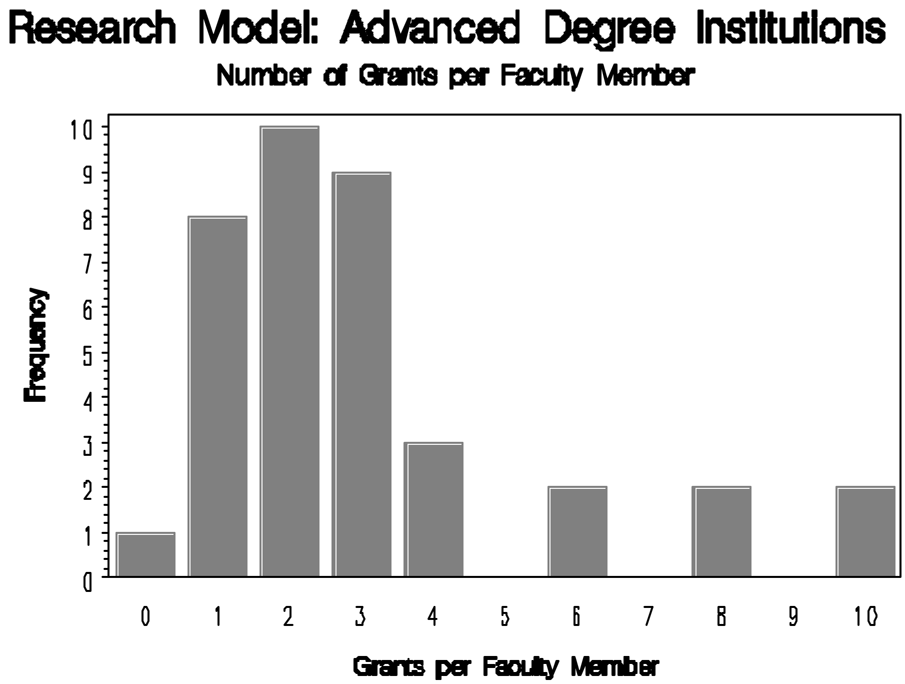


Table 6.84

Research Model: Advanced Degree Institutions
Average Number Grants per Faculty Member - by cluster

Cluster Number	No. of Schools in Cluster	Number of Grants perFaculty Member
1	19	2.69
2	6	1.38
3	4	8.82
4	8	2.47

Figure 6.152

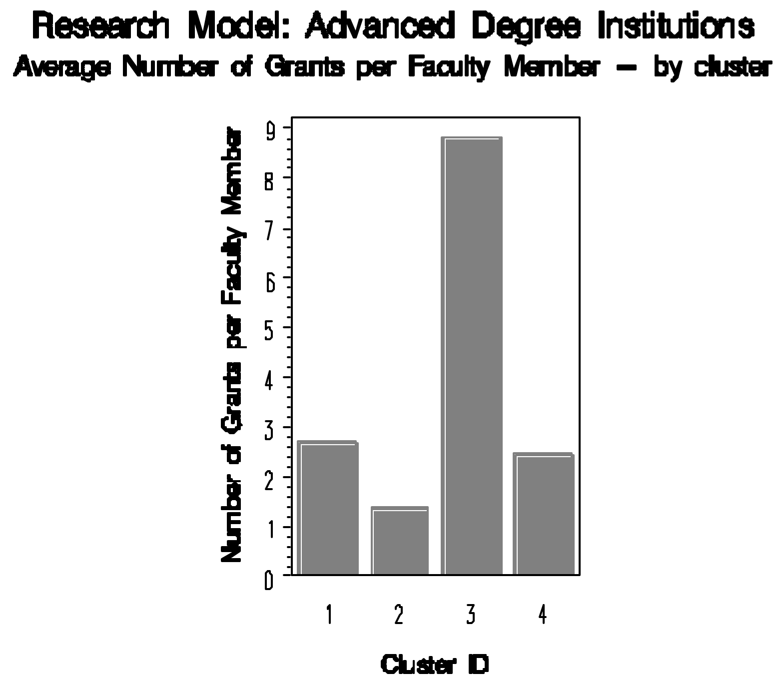


Figure 6.153

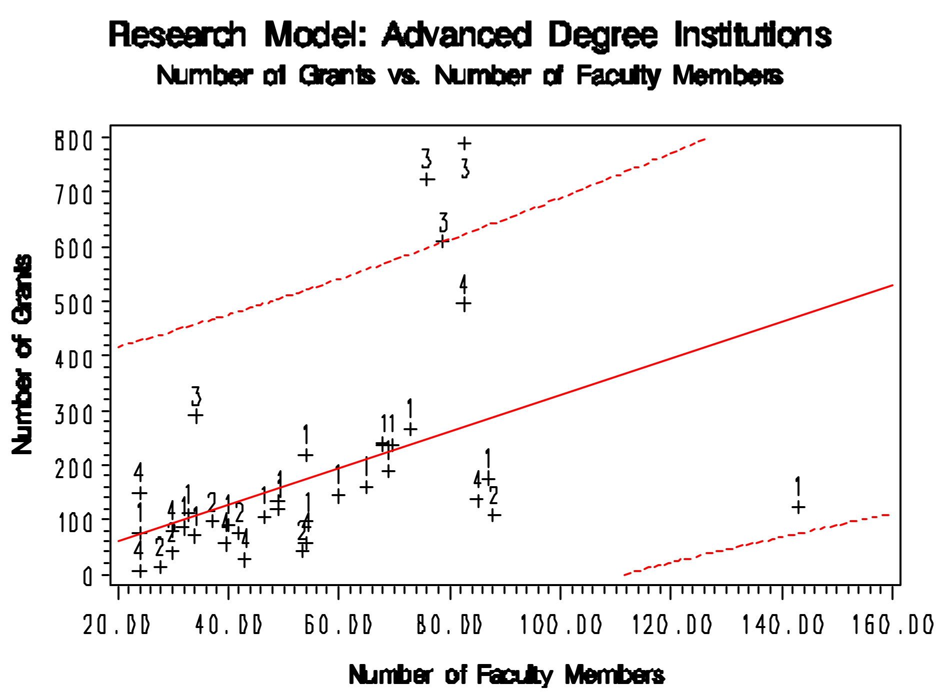


Figure 6.154

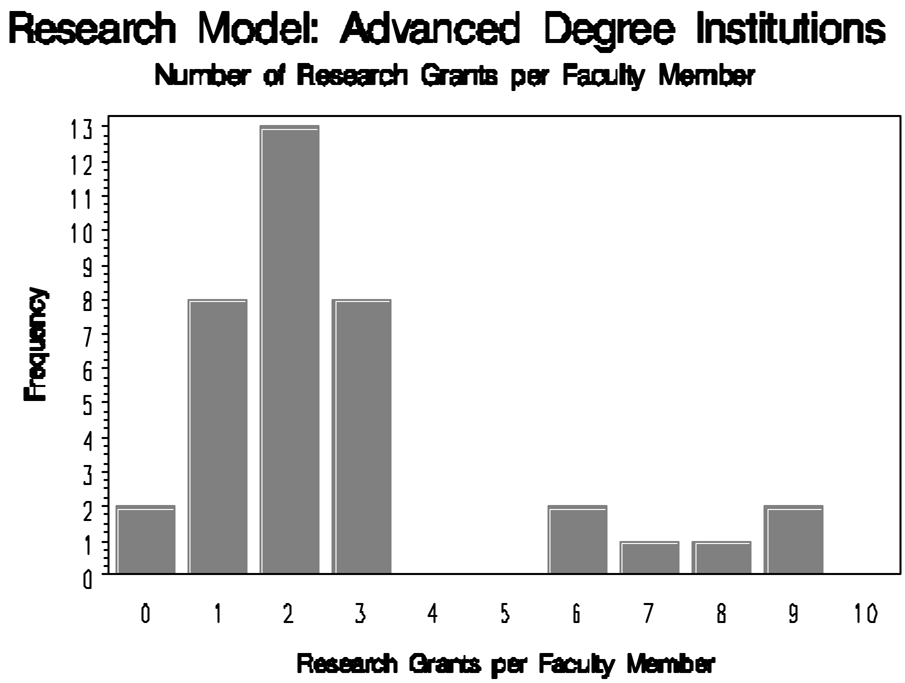


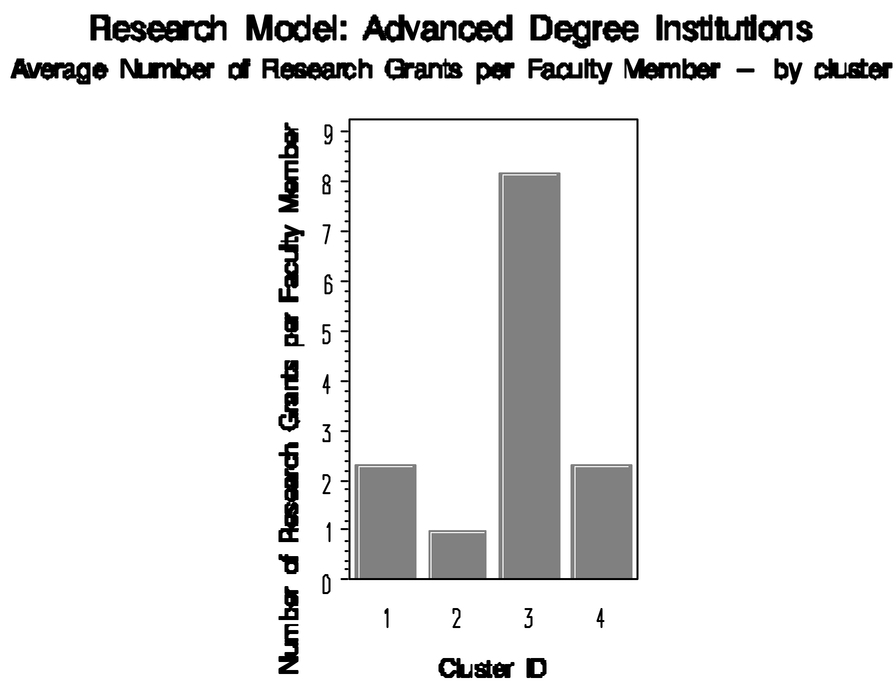
Table 6.85

Research Model: Advanced Degree Institutions

Average Number Research Grants per Faculty Member - by cluster

Cluster Number	No. of Schools in Cluster	Number of Research Grants per Faculty Member
1	19	2.31
2	6	0.99
3	4	8.18
4	8	2.33

Figure 6.155



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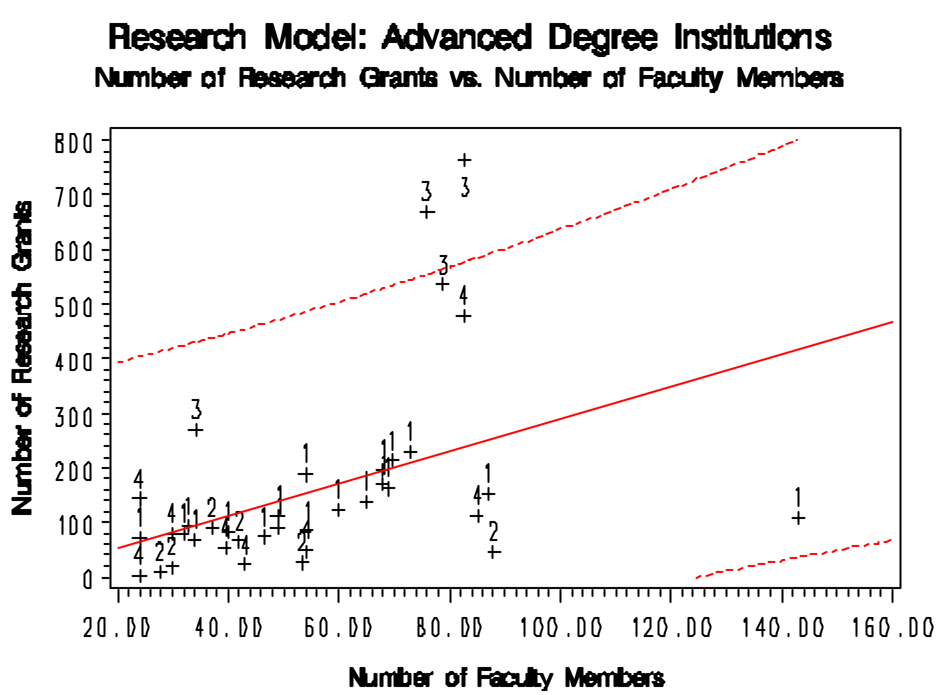


Figure 6.157

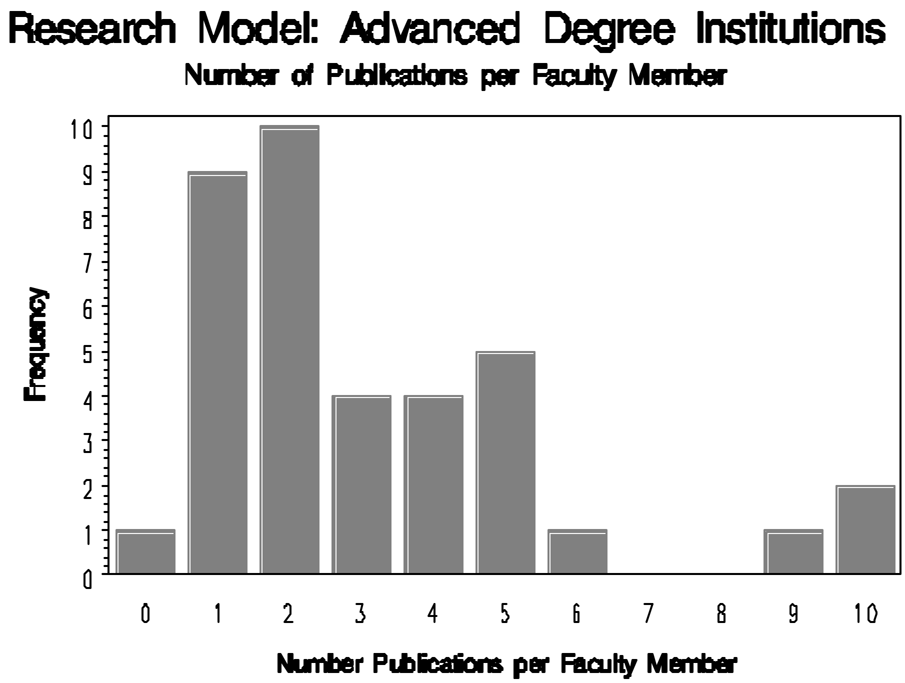


Table 6.86

Research Model: Advanced Degree Institutions

Average Number of Publications per Faculty Member - by cluster

Cluster Number	No. of Schools in Cluster	Number of Publications per Faculty Member
1	19	2.93
2	6	1.26
3	4	7.03
4	8	3.19

Figure 6.158

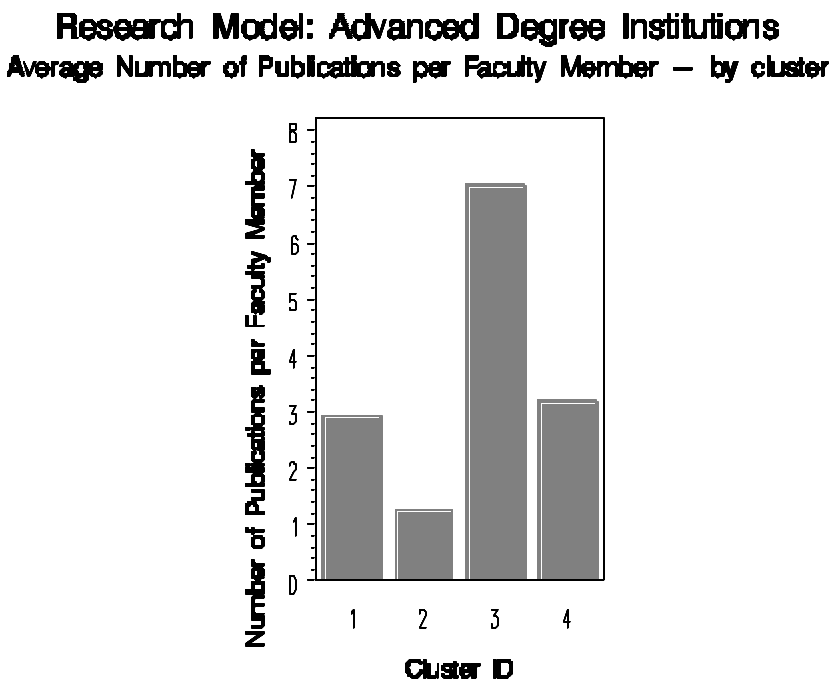


Figure 6.159

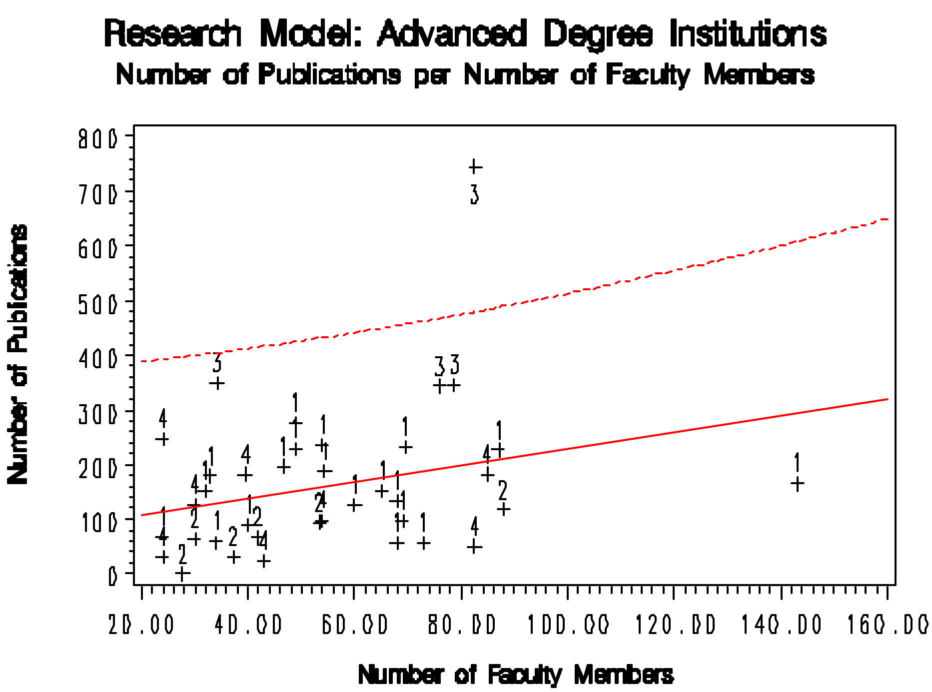


Figure 6.160

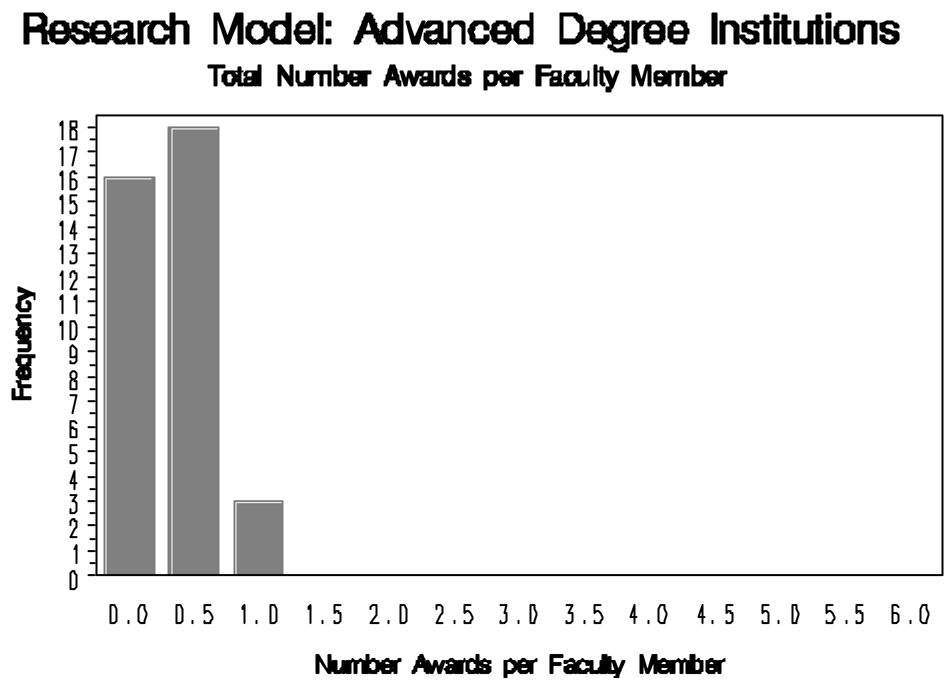


Table 6.87

Research Model: Advanced Degree Institutions
Average Number Awards per Faculty Member - by cluster

Cluster Number	No. of Schools in Cluster	Total Number of Awards per Faculty Member
1	19	0.38
2	6	0.17
3	4	0.68
4	8	0.28

Figure 6.163

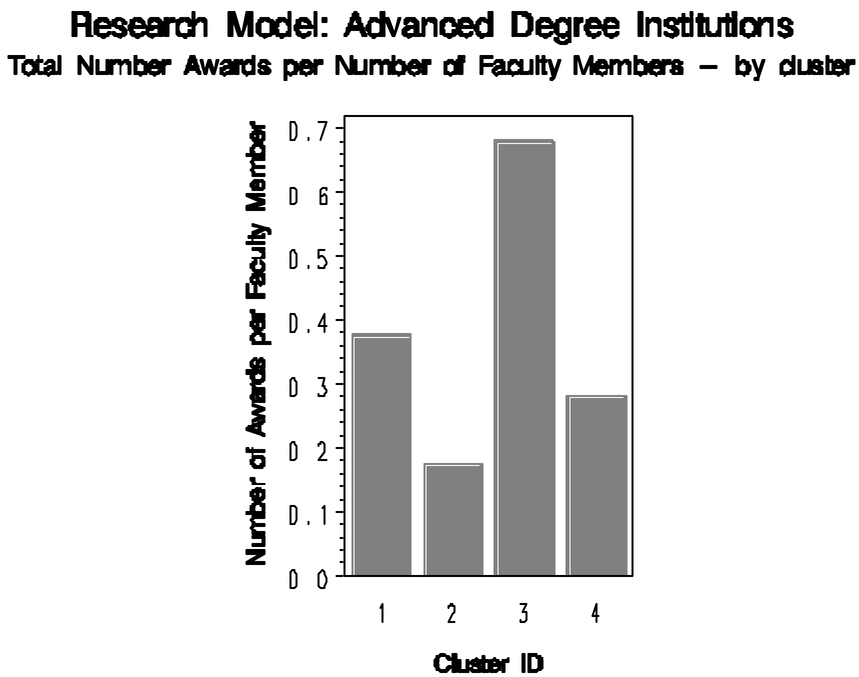


Figure 6.164

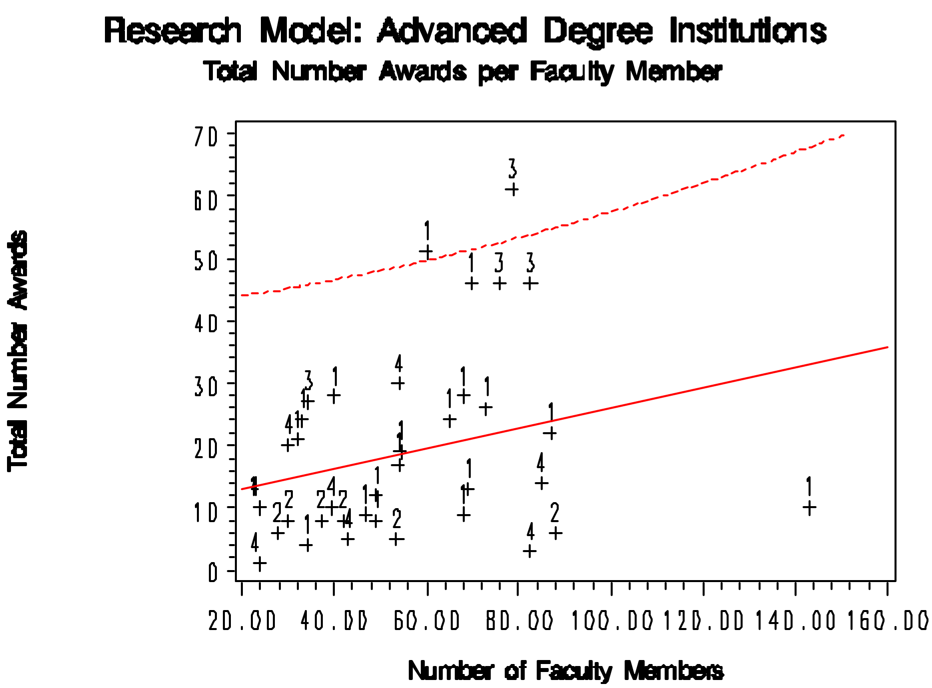


Figure 6.165

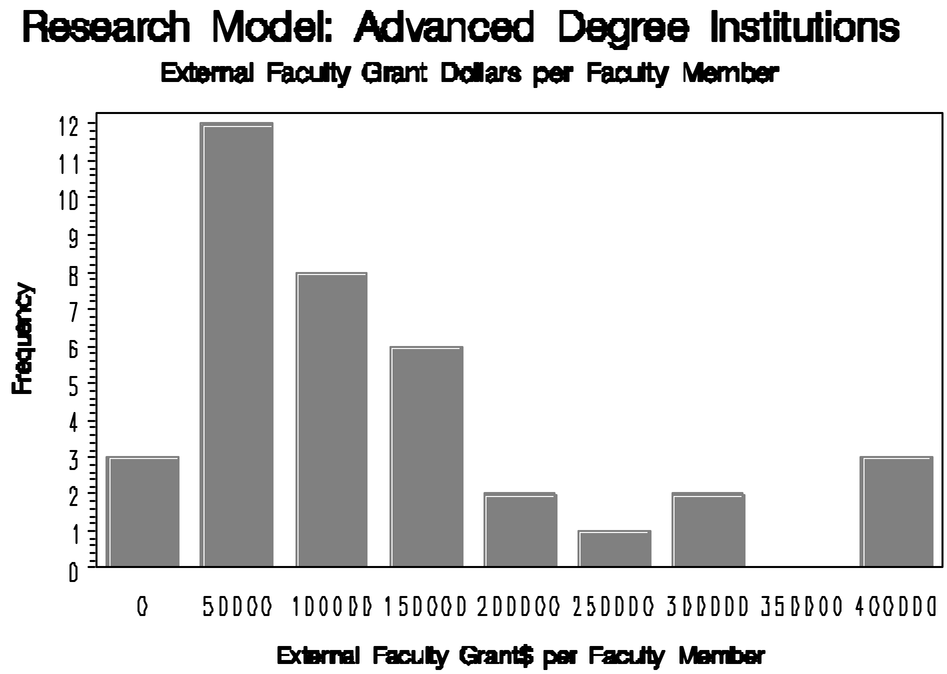


Table 6.88

Research Model: Advanced Degree Institutions

Average External Faculty Grant Dollars per Faculty Member - by cluster

Cluster Number	No. of Schools in Cluster	External Faculty Grant Dollars per Faculty Member
1	19	113,356.26
2	6	41,101.09
3	4	490,157.17
4	8	114,005.32

Figure 6.166

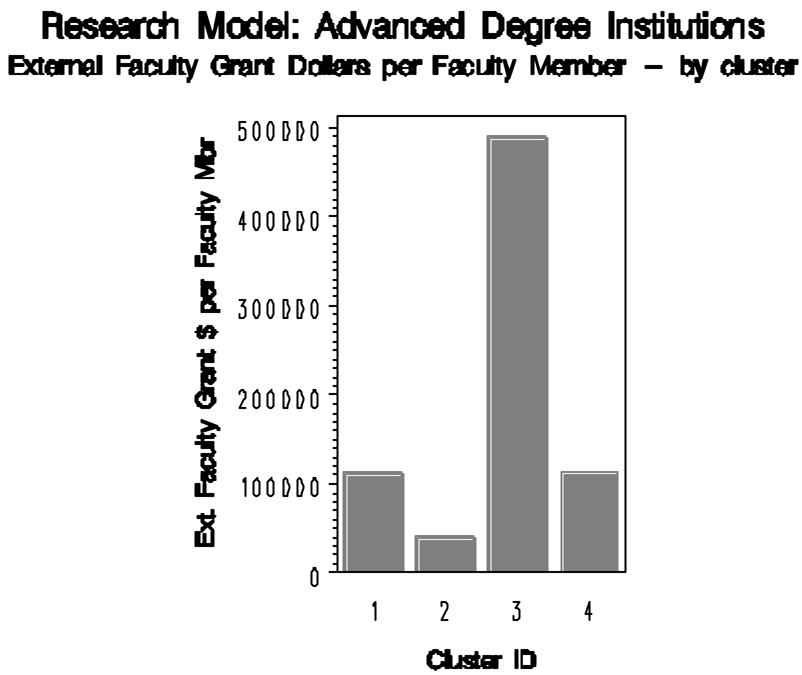


Figure 6.167

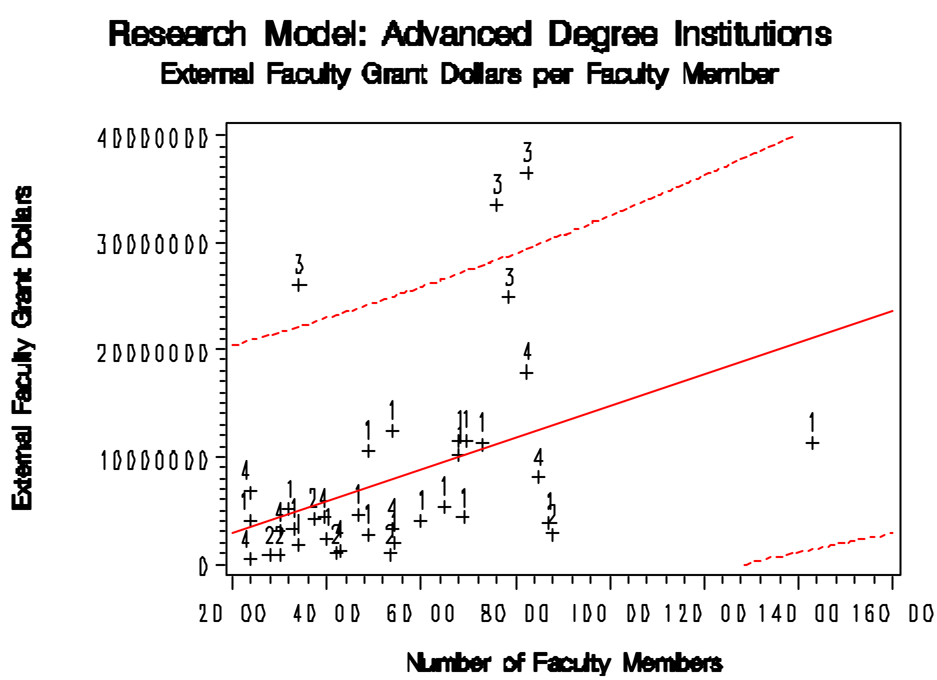


Figure 6.168

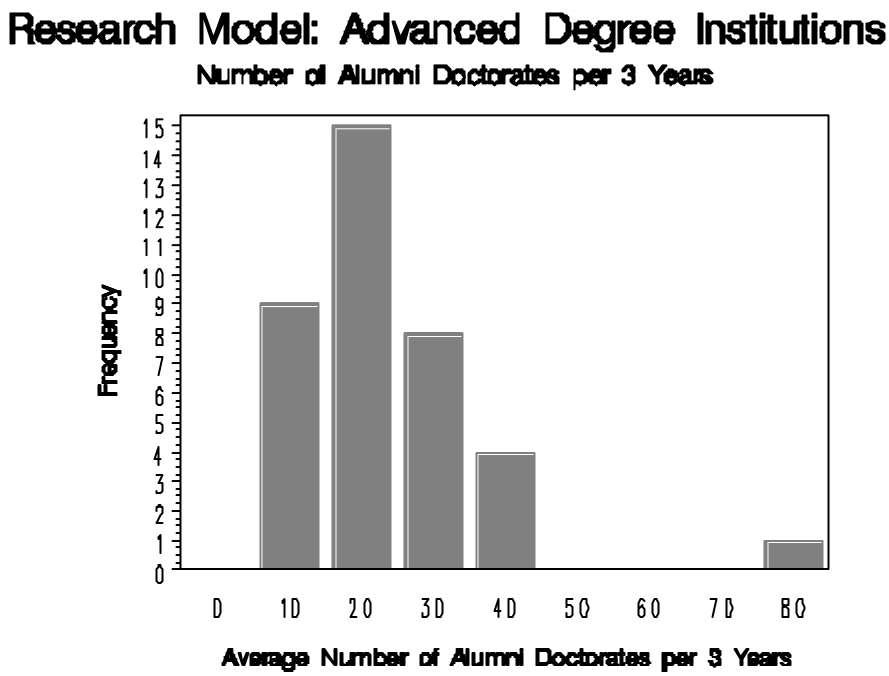


Table 6.89

Research Model: Advanced Degree Institutions

Average Number of Alumni Doctorates per 3 Years - by cluster

Cluster Number	No. of Schools in Cluster	Number of Alumni Doctorates per 3 Years
1	19	20.91
2	6	8.11
3	4	41.08
4	8	31.29

Figure 6.169

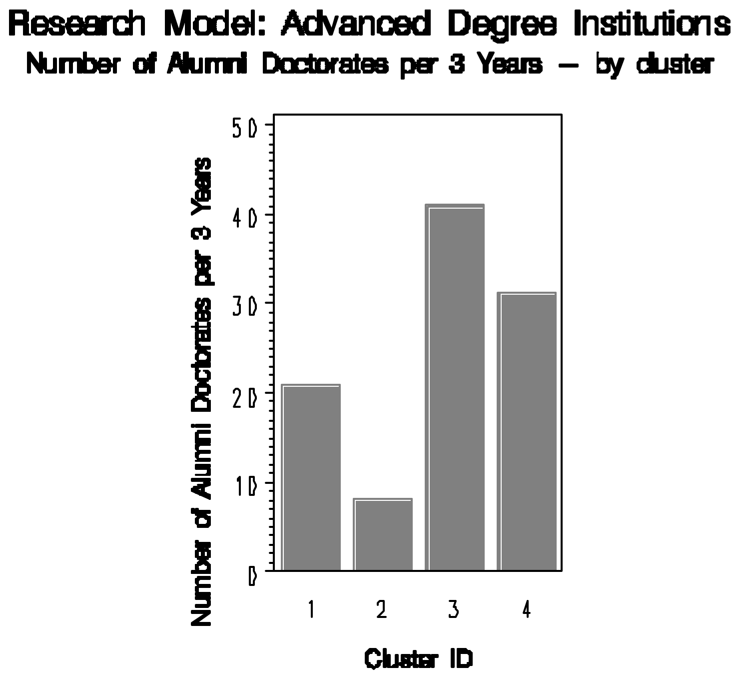

Research Model: Advanced Degree Institutions
Number of Alumni Doctorates per 3 Years -- by cluster
Number of Alumni Doctorates per 3 Years
50
40
30
20
10
0
1
2
3
4
Cluster ID

Figure 6.170

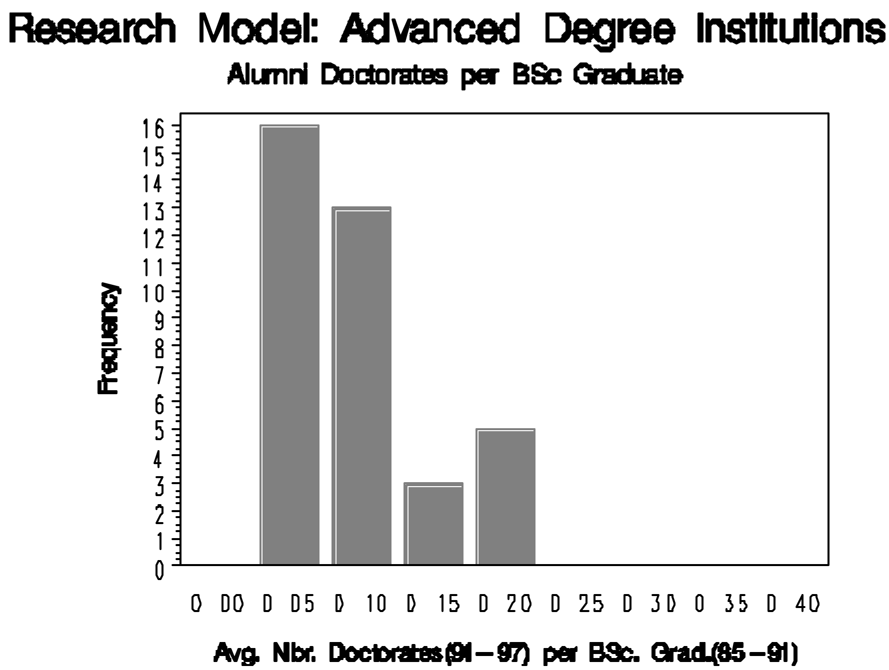


Table 6.90

Research Model: Advanced Degree Institutions

Average Alumni Doctorates per BSc Graduate - by cluster

Cluster Number	No. of Schools in Cluster	Alumni Doctorates per B.Sc. Graduate
1	19	0.08
2	6	0.06
3	4	0.10
4	8	0.17

Figure 6.171

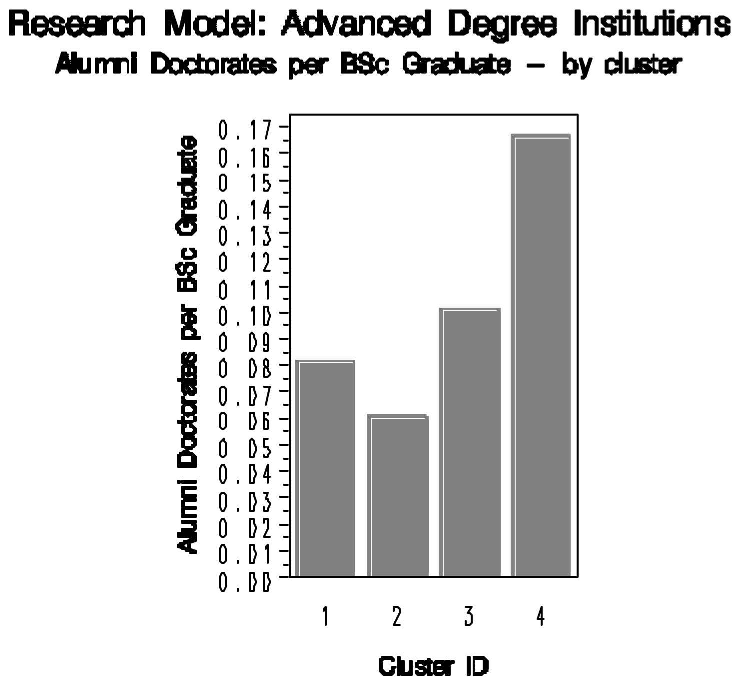
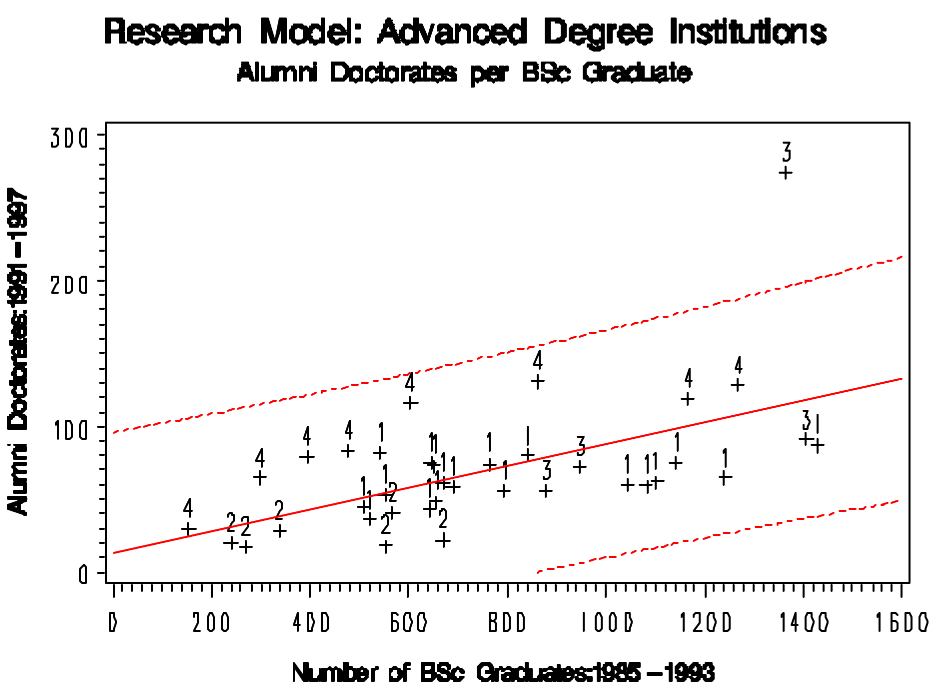


Figure 6.172



SECTION 7:

INSTITUTIONAL COMMENTARY

Narrative Institutional Perspective on Resource Allocation Trends and Needs

Raymond Kellman, Senior Associate, Research Corporation

As part of the Institutional Survey, Study participants were invited to address recent trends and needs in the physical and life sciences at their own institutions. Each was asked to comment on policies and strategies that effectively strengthened science teaching and research, and on the barriers to research at their institutions. Institutional representatives were encouraged to report on how allocations of faculty time and institutional financial resources might be used to enhance teaching and research on their own campuses. Finally, institutional comments on how private and public funding sources might adjust programs to stimulate research were solicited.

The response was a collection of wide-ranging narratives that were carefully scrutinized and taken through several iterations by the Study coordinators, first to identify each specific issue addressed, and then to determine the frequency with which each was raised. Whether the responses represented an institutional or individual's view could not be discerned. Narratives were received from 111 or 82% of the 136 participating institutions, and they addressed topics or issues that were identified and placed into eighteen separate categories. Excerpts are included that accurately reflect salient points made in each of the eighteen categories. These were edited only for length and clarity, and to preserve institutional anonymity.

The number of comments in each category reflects the frequency with which that issue was addressed by responding institutions. For example, 90 institutions addressed "Faculty Time" and 87 addressed "Foundation Support" whereas only seven and three of the commentaries discussed "Postdoctoral Associates" and "Faculty Publications," respectively. Finally, in an effort to communicate accurately, excerpts in bolded text within each category were selected to reflect the tenor and balance of the overall view of the entire study group. They are not intended to express the philosophy or views of the foundations conducting the Study. Finally, time constraints did not allow us to analyze and present here the narratives provided in the Faculty Perspectives Survey.

PROMOTION AND TENURE—RECENT TRENDS

What policies have been particularly effective in strengthening research? What are major barriers?

The institution has been intentional in its efforts to support faculty research and has created an expectation for scholarship; faculty can't receive tenure without scholarly productivity.

The seniority pattern of our faculty demonstrates hiring over several decades. Some of the faculty hired here in previous decades have not been motivated to do research in their prime and do not support research agendas for faculty to the degree currently expected. The junior faculty are hired with expectations that they conduct research and establish achievable research agendas early.

Over the twenty years that I have been associated with this institution, the emphasis on research and publishing has increased significantly. . . . Our emphasis was primarily on teaching. It still is. However, our expectations for grant writing and publishing have risen significantly. We have very few institutional resources to support this change in expectations.

Faculty . . . focus heavily on teaching and advising. In addition, they carry heavy committee responsibilities. A large portion of the science curriculum . . . is devoted to providing service to professional programs and for general education. Such classroom settings allow only limited opportunities for linking scholarship and teaching. It is not surprising, then, that research has not been a high priority here and only recently has it received recognition or been required for tenure and promotion.

Over the past 15 years, most tenure track science faculty in Biology, Chemistry, and Physics have been hired with the expectation that the faculty person will conduct an active research program with undergraduate students in these departments.

Expectations of evident research activity on the part of faculty members have grown in recent years as the actual performance of faculty, especially younger faculty, have demonstrated that serious research leading to publication is entirely consistent with excellent performance as a teacher and student mentor.

The requirement of discipline inquiry (publication, creative activity, etc.) is a requirement for promotion and tenure.

[There has been] a needed change in culture placing a high value on research as well as on quality instruction where it is not always appreciated or recognized.

The past decade, the greatest change in the physical science programs . . . has been the increased emphasis on faculty research. Whereas the granting of tenure was once based almost exclusively on the teaching performance of a candidate, performance of scholarly activity has become a stated requirement of continuance at the university.

Faculty are required to carry out a research program involving undergraduates, and in some departments, graduate students. Further, these new faculty are expected to obtain extramural funding to support that research.

The tenure and promotion criteria have shifted to place more weight on teaching and research and less on campus service.

Faculty must contribute to each area of teaching, (publishable) research, and service to gain tenure, promotions, and/or annual awards.

Our faculty are strongly encouraged to involve students in their research projects, to co-author papers with their students, and to take students to professional meetings to present their work. . . . This aspect of a faculty member's performance plays a significant role in the annual review process.

Little faculty recruitment was conducted during the first half of the '90s because of the severe budget cuts we experienced. Over the past five years there has been a concerted effort to recruit faculty at the junior rank, with particular attention paid to teaching ability. Teaching effectiveness is an important factor in determining tenure.

[There is a] greater emphasis on scholarly and creative accomplishment in outcomes for tenure and promotion.

[We have] a campus culture that does not universally value the role of research in the life of a highly select, private liberal arts college.

At [our college] the general perception is that performance expectations (in terms of scholarly publications) are very high; these expectations might consciously need to be moderated in light of the present situation. When faculty make private decisions about scaling back or putting on hold their research efforts, as they try to accommodate multiple competing demands on their time, such decisions can create dissonance that is counter-productive.

[The tenure and promotion criteria] call for excellent teaching and strong scholarship. Faculty in general perceive that the standards for scholarship have been raised substantially in the last decade or so. The university also conveys the demand for excellence in teaching and scholarship to new hires, and creates a high profile for faculty who excel in these areas.

Despite changes at the institutional level, where research is counted significantly in promotion, reappointment, and tenure, neither the institution, nor the departments, clearly recognize that research takes real time, and that time should not be considered "extra" or "add-on."

Institutional policies have been modified to some degree over the last decade, in ways that have enjoined greater emphasis on research and fostered greater flexibility in the assignment and accounting of teaching and research efforts. Promotion and tenure guidelines have reflected an increased emphasis on research, but some of the culture of the university still reflects old models when it comes to the interpretation and application of those guidelines.

After a change in presidential leadership . . . [at our institution] it was no longer possible to be tenured and/or promoted in the sciences . . . unless one published in refereed journals, and established oneself as an independent investigator.

In recent years, [the college] has expected that new faculty in the natural and life sciences be committed to pursuing independent research with meaningful involvement of undergraduate students and to seeking external funding to support research activities.

There are a number of institutional policies that strengthen and support science teaching and research . . . . Foremost perhaps is a faculty-approved document that gives equal weight in tenure decisions to teaching and scholarly excellence. This sends a clear message the college values faculty who are both effective teachers and active researchers.

PROMOTION AND TENURE

[We have] inclusion of student-faculty research as an important part of the promotion and tenure decision [and] inclusion of outstanding teaching as a necessary part of the promotion and tenure decision.

[We have] higher expectations for faculty research in hiring and promotion;

[The college] has used both policies and incentives to elevate the quality and increase the amount of faculty scientific research including collaborative research with students. The first and most basic move has been the raising of standards for research in tenure and promotion decisions . . . . Among the majority of the recently hired science faculty . . . all have a strong and active research program, and blend its activities well with the teaching of bright undergraduates.

Another clear trend is the increased emphasis on faculty-student research in the tenure and promotion process.

We . . . have very few "carrots" to offer faculty who make special efforts in areas of science, teaching, and research. We do not have a merit pay system. Furthermore, the Faculty Handbook guidelines regarding promotion and tenure do not recognize or "count" special initiatives such as institutional grant writing and grant administration, assessment undertakings, and forms of applied research that double as public service.

Departmental applications of criteria for promotion and tenure have begun to be modified in the college departments. In these documents service has taken a lesser position.

The dearth of "time" and "money" loom as significant challenges for faculty as we seek to raise our research prominence in the sciences. Particularly in an institution where teaching is assigned the highest priority, faculty can occasionally feel what may seem to be inconsistent pressures—to continue to hone their classroom skills and to do "more research."

Dramatic increase in scholarly expectations over the last ten years, [are] a result of heightened expectations by the administration and by the peer pressure of new faculty who bring very active research programs.

We have adopted guidelines for promotion and tenure that specify excellence in teaching and scholarly activity as necessary for long-term success.

In promotion and tenure considerations, research efforts in the area of discipline education are treated with parity to basic research in the discipline.

The major barrier to the performance of research is lack of a clear institutional expectation of scholarship. Teaching is valued above all else with research playing a minor role in the retention and promotion process. Each department devises its own criteria for promotion, tenure and retention. Some departments have very strong expectations with regard to research, while others have none.

The Faculty Personnel Committee sees scholarly activity as an important element in the evaluation of college teachers at every level of review, from hiring decisions to senior level reviews. The administration supports this stance by the distribution of merit pay.

Faculty receive greater recognition for doing research and there is a higher expectation when faculty are considered for advancement.

Another key strategy for strengthening research at this university is the hiring of new faculty from research universities with the expectation that they will teach, perform research and involve both undergraduate and graduate students in their research programs.

. . . .

Of the 26 full time, tenure-track faculty members in the physical and life science departments, 15 (58%) have joined the faculty since 1990. All of these faculty members were hired with the clear expectation that a research program involving our students was a requirement for success.

PRETENURE LEAVES/SABBATICALS

What incentives have been particularly effective in strengthening teaching and research on your campus?

We have . . . just instituted a junior leave program which will give an untenured faculty member a one-term leave before the tenure decision. Tenured faculty are eligible for a one term leave at full pay or full year leave at half pay every five years.

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Our single semester leave program is supported by full pay and is available for up to a maximum of 4% of faculty per year. The sabbatical program is available at one-half pay for one year. An option exists to grant three-quarters pay for approximately six faculty per year.

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[We provide] Junior Sabbaticals after tenure-track faculty pass third year review.

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Our academic leave program allows faculty to apply for leave every five years instead of the usual seven.

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[The college] provides pre-tenure sabbatical leaves, which all tenure track faculty may take in their fourth or fifth year of service to the college, so they can pursue research and scholarship for a semester or for a year.

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Faculty can apply for sabbatical once every seven years, receiving 75 percent of their regular salary (the first sabbatical may be granted after seven years). In the Natural Sciences Division, every request for sabbatical has been granted.

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[We have] good sabbatical leave policy (a pre-tenure one semester sabbatical leave at 100% of salary in fourth year and thereafter, a semester at 80% salary after every six semesters of teaching), and a willingness on part of administration to facilitate longer leaves by combining one semester sabbatical leaves with leave without pay for research purposes.

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Existing incentives that help strengthen science teaching and research . . . include the junior leave program, whereby faculty in their fourth year are freed for a full year's research activities; this program is fully funded . . . . The ordinary sabbatical leave program is also generous (one semester after every six semesters of teaching or one year after six years of teaching, at 50% pay and funded up to 80% if applications for outside funding are made).

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All faculty are guaranteed a leave after 5 years of teaching and they are paid at 80% salary if they apply for 3 grants to support their leave (they don't need to get the grants funded, they just must apply for them).

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At present our sabbaticals are funded through replacing faculty 2/3rds with adjunct and 1/3 by not offering courses that would be schedule were the faculty member not on sabbatical.

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Junior faculty are eligible for a fully-funded release from teaching for one academic quarter to complete a major research project before the tenure decision. The college covers two-thirds of salary during sabbatical years and offers one-quarter academic leaves through its faculty development program.

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The internal funding of…Fellowships for faculty leave increased dramatically (one semester off at full salary or two semesters off at half-salary; note: [the university] does not have an "automatic" sabbatical program).

. . . .

The university's Educational Leave Program is an important incentive. This important opportunity for professional development should be made available to a greater number of faculty as they complete their probationary period.

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[We have] support through the various programs of the Faculty Development Program, especially the provision of regular sabbatical leaves, the more recent Center for Faculty Research and Development, and summer research grants.

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[We have] a regularized leave program for tenured faculty, fully implemented about 10 years ago; fourth-year faculty course reduction program for junior faculty….

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We instituted a junior faculty sabbatical program which enables those faculty who have undergone a successful preliminary tenure review (usually in their third year of service) to take a semester at full pay or a year at half pay to devote entirely to their research.

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Pre-tenure leaves are now offered as well a regular sabbaticals.

. . . .

Usually, two science faculty members per year are on sabbatical leave either for one or two semesters. Beyond this, we have invested in our faculty through (a) a fourth-year pre-tenure leave option that is taken by almost all junior faculty, (b) two special competitive research awards (with reduced teaching loads) available to senior-level faculty, (c) new release-time awards for faculty to refine and incorporate the use of IT in their teaching . . . .

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Junior faculty receive start-up funding, a course reduction in the first year of teaching, entitlement funding for travel to professional meetings and for research assistance, a special assistant professor leave following a third-year departmental review, and two further course reductions in the fourth and fifth year of their pre-tenure appointment.

CHANGES IN INSTRUCTION

What changes have occurred in allocations of faculty time to teaching and research?

Over the past decade, two major programmatic changes strengthened science teaching and research. First, we saw a greater emphasis on student/faculty collaborative research, throughout the university but especially in the science division, and second, there was a college-wide effort to hire new faculty with an established research program, who would expect to pursue research throughout their tenure.

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At the center of these efforts is the need to reduce faculty course loads. Our goal here is not to have faculty teach less but instead to give faculty credit for providing more intensive, research-orientated experiences with smaller numbers of students.

. . . .

[Our] faculty, to a degree that makes the institution distinct from many others supporting student research, have been committed to a framework that makes student efforts to define and develop research projects in collaboration with faculty an important part of their training. Although some students may work as research assistants on projects of faculty members, most students . . . are expected to identify and design appropriate research projects of their own with faculty advice and support.

. . . .

A major focus of undergraduate curricular improvements in the sciences during the 1990s was the shared participation of the biology, geology, chemistry and physics departments in redesigning our non-science major general education science courses.

. . . .

Our students were graduating with very good content knowledge, but [with] inadequate skills and habits of mind required of a scientist. Supported by the university and a number of National Science Foundation grants, new directed-inquiry laboratories have been implemented in several departments to address these shortcomings.

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[We have] support and mentoring programs for students who have initial difficulties in a science major . . . . [We also have] review and reform efforts in lower science and mathematics courses to enhance retention and strengthen instruction.

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Students . . . are choosing in increasingly large numbers to major in fields that cross traditional disciplinary boundaries....

. . . .

Encouraged the faculty to adopt a required senior experience for all students so that research would be a part of the curriculum for every science and mathematics major.

. . . .

Our Integrated Science Education Initiative . . . involves faculty from biology, chemistry, physics, geology, environmental studies, psychology and mathematics in the creation of a field laboratory on . . . campus wetlands . . . . It has fostered a level of interdisciplinary collaboration in teaching and research heretofore unimaginable . . . .

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One of the biggest problems faced by physical science, and to a lesser degree, life science programs, is the balance between their own majors and their "service" component.

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The increase in the number of students selecting health-related majors has resulted in a significant increase in the demand for physical and life science courses. The demand has created the heaviest load on entry-level courses in these fields . . . .

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A growing number of departments are shifting teaching strategies from lecture to discovery as a means of learning.

. . . .

[Our] faculty in the natural and life sciences have joined colleagues across the nation to become more involved in "active learning." Nearly all science courses . . . have a required laboratory component.

. . . .

Active learning requires a radically different use of physical space and a radically different organization of instructional format with a major increase in student-faculty interaction . . . . Student-faculty ratio is obviously an important element in this new equation for successful learning and one that has significant budgetary implications for the college.

. . . .

Faculty in the sciences are collegial and invigorated by cross-disciplinary work with their colleagues; but the collaborative nature of some research has not had a corresponding impact on the teaching of science. The scholar/research model, and the "disciplinary" character of faculty research and publication work against collaboration in science education.

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CHANGES IN INSTRUCTION

As a result of the improved science program [the college] is experiencing a surge in the number of students with an interest in the sciences. The biology and chemistry departments have increased numbers of majors over the last decade, with the most dramatic increase occurring in biology.

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There is a greater focus on experiential learning including: research conducted jointly with faculty; research led by students; and multiple internships.

. . . .

[We have] recognition and support of a basic "science is a hands-on activity" philosophy in the natural science departments that includes collaborative student/faculty research as an important part of the hands-on curriculum.

. . . .

First, faculty-student research has increased dramatically in comparison with decades ago. For the past 10 years, [the college] has required every senior to complete a senior project, and for science majors this has meant a significant empirical investigation culminating in a written thesis and oral presentation . . . . A second fundamental change in the liberal arts environment concerns the use of investigative and hands-on experiences for students of science.

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[We have] support for interdisciplinary programs such as biochemistry and environmental studies.

. . . .

[There has been] a pedagogical shift to integration of research into teaching.

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About the same time, a number of faculty members began to think about changing the curricula and pedagogies in introductory courses to better reflect the way scientists do science, rather then a focus primarily upon lecture and content coverage.

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Historically, this institution's resources have been primarily directed to teaching enterprises and not towards research. Such emphasis will most probably not change in the current political climate [in our state]. The ongoing and recent negative spotlight on major research universities (e.g., the actual time faculty spend in the classroom, etc.) has given the term "research" some negative connotations within the state assembly and in the public's perceptions. Such erroneous misconceptions of the value of the student research experience do trickle down to the PUIs [primarily undergraduate institutions] and impact our modus operandi. Any negative publicity of major research institutions mandates that we approach our efforts to increase the research productivity of our institution cautiously and with great aforethought.

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Faculty today are expected to think seriously about curriculum, pedagogy, and learning outcomes. They are asked to take on new roles as coaches who must now orchestrate teams of problem-solving students. They also spend long hours mastering new technologies. Outside the classroom, faculty mentor students in research and in community outreach. Instead of pure specialized research, faculty are moving to applied research, frequently focused on community needs and practical issues. Likewise, service is breaking the bounds of faculty governance and moving into new terrain–admissions, marketing, designing new facilities, institutional grant writing and involvement in the larger community.

Doctoral programs are being planned and launched. There will be a commensurate increase in expenditures on some research programs in a few academic units.

Since 1995, we have completely revamped our undergraduate science program, particularly for non-majors. The sequence culminates in a required "Science Research" course in which all students conceptualize, design, execute, and present their own research projects. In effect, students do not simply read about scientific knowledge; in small, yet important ways, they help create it.

The focus of our curriculum has since shifted from a traditional lecture-based model to a model that emphasizes hands-on, lab-based approaches at the introductory level while at the same time devoting additional resources to faculty development and research opportunities for faculty and students. Curriculum development efforts have been supported . . . by substantial grants . . . from several major foundations and government agencies.

Major barriers to the performance of research at our institution: pressure to provide projects for all students . . . ; pressure to provide projects at first-year level . . . ; pressure to give students control over project design and topic selection which dilutes faculty members' energies from pursuing their own scholarly interests; off-campus internships drain juniors from participation in summer and academic year projects on-campus . . . ; insufficient "teaching credit" for research/thesis supervision during the academic year; insufficient supplemental salary for expected summer research (with students).

While the new one-on-one and small-group pedagogies are also strength, they consume a great amount more time and increase the frequency of contact hours outside of the classroom, since expectations are ratcheted up.

[We have recently implemented] a new general education curriculum . . . that continues the institution's long-standing commitment to laboratory science as a component of our general education requirements. In addition, that same curricular reform requires of all students a freshman seminar, many of which are offered by science departments. The curriculum also sets the goal of all . . . graduates having an "upper-level independent learning experience" which translates, in the sciences, into independent research. Finally, the new general education curriculum places freshman writing in the freshman seminar and adds a concentration-based writing requirement. This latter practice requires science faculty to be skilled and effective in teaching writing.

The college's teaching approach emphasizes interdisciplinary study and experiential learning, and small class size provide students with hands-on research experiences and the development of close relationships with faculty. In addition, all . . . undergraduates, including science majors, are required to research, write and defend a senior tutorial (research project) in order to graduate.

. . . .

Ironically, one the newer pressures on faculty time comes in the form of the new pedagogy that emphasizes project-based learning. This pedagogy is much more time (and equipment) intensive for faculty and calls for intensive interaction with students outside of as well as inside of the classroom. In part, the newer pedagogy is driven intrinsically by the faculty themselves, who are interested in having their teaching evolve in imaginative ways. However, part of the pressure to develop such pedagogy comes from funding agencies and foundations that are emphasizing the integration of research into education. In some cases, faculty are able to blend the increased project activity by students with their own research programs so as to simultaneously make progress on both counts. It is more common for there to be conflicts between the time pressures that arise from a faculty member's own research program and need to publish original research and the time pressures that arise in developing and managing project-based courses across one's full teaching repertoire. Moreover, not all faculty embrace the newer emphasis on project-based learning, and wedges can be driven between faculty using different pedagogical techniques within a given department.

. . . .

The shared biology-chemistry teaching laboratory is allowing for cross-disciplinary instructions, and the shared stockrooms, inventories, faculty office suites, and work/study rooms are contributing to a sense of the sciences as one united division rather than several small discipline-based departments for both students and faculty.

. . . .

The most important policy strengthening science teaching and research on campus was imposed on itself by the science faculty. They embraced the discovery learning mode and insisted that all members of the science faculty attend some type of workshop on this method. . . . Virtually all of our science courses now operate in the discovery learning mode.

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To be a premier undergraduate institution today, we need to be participants and innovative leaders in developing appropriate pedagogies and approaches for the effective use of educational technology.

. . . .

A new general education program…raised the number of required courses in science and mathematics to three (two of which must be courses with laboratories). The science requirement was raised because few students outside the division of natural sciences and mathematics were taking more than the previous requirement of two courses. In addition, the current general education requirements include a course . . . that often is satisfied with a science course.

. . . .

Science departments have not, for the most part, paid as much attention to improving disciplinary courses for non-majors as to their courses for majors.

. . . .

There is a sense on campus that the time has come to revisit our curriculum, both for science and mathematics majors and in thinking about courses and laboratory experiences for non-scientists.

. . . .

Over the past decade the conjunction of all this activity focused on teaching and learning science and mathematics has transformed the traditionally strong science and mathematics program…into one of national prominence in science education reform. . . . This transition was facilitated by a long-standing agreement among faculty and administration that the "scholarship of teaching" is valued . . . on a par with traditional laboratory or field research for the purpose of promotion and tenure.

In direct response to funding agency initiatives, we have experienced a tremendous increase in collaborative activities across institutions and, in some cases, across disciplines.

[We are exploring] two alternatives to the traditional research thesis for biology majors: The first, a service-learning course, is aimed at majors inclined to pursue teaching careers rather than further study in the sciences. The second alternative, the learning associate, will be a new category of persons in the instructional mix . . . . They will participate in the instructional process with the faculty . . . .

Most introductory courses focus on building a foundation for the science curriculum and do not serve well the needs of the general student. We have plans to develop courses which focus on a contemporary issue . . . .

Another barrier in terms of science education is that there is still a prejudice among senior scientists that those who are science educators are not "real" scientists. That is, they don't do the original inquiry in the laboratory or the field that defines "real" scientists. For this reason it is sometimes hard to budge science faculty to think really creatively about the classroom.

All third year science majors take a junior seminar that is designed to complete the transition from book learning about what scientists already know to investigative learning and immersion in the process of science.

We believe that students learn science best by *doing* science. This places heavy demands on faculty time, quickly empties the research consumable supplies budgets, and results in extra wear and tear on equipment. If we continue to emphasize collaborative research between faculty and students as well as hands-on teaching and learning, we must be able to support the costs of such an approach—an approach that we believe is the best foundation for our students.

The institution has committed to hiring capable junior faculty who are highly motivated to conduct scholarly work within the sciences.

We are more intentional in hiring natural science faculty who are well credentialed and who have research agendas that are reasonable within the liberal arts context.

Our current fiscal state does not allow for change in structure. The solution at our institution revolves around finding additional resources to support research, increasing the expectation for research, mentoring faculty, etc.

It seems that emphasis should be placed on enhancement of interdisciplinary activities that appear at the interface between the disciplines.

[The college] has made a greater commitment to increasing the number of students in the life and physical sciences who attend graduate school. Critical to achieving this goal is providing students with greater opportunities to do research. The college is attempting to address this issue by recruiting young faculty members who have a strong commitment to research and by providing a more supportive environment for all faculty to engage in scholarly work . . . . The recent creation of a Division of Science and Mathematics . . . is already proving of value . . . .

We adopted the position that science teaching and research would have a very high priority in terms of fund-raising and in terms of new construction and renovations using a combination of outside and internal funding. . . . A committee of science faculty under the leadership of the dean of faculty wrote the "Plan for the Sciences for the 1990s," which emphasized project-based learning (education through research) . . . . In the wake of this report, we considered each and every teaching and research space in the natural sciences.

. . . .

There are plans to increase the size of the science faculty in support of developing courses as part of general education and of increasing the opportunity for students to engage in collaborative research.

. . . .

It would also be good if we had . . . a pedagogy expert in all of our science areas. This would be the person who keeps up with the literature on the teaching and learning process, who spearheads change, who manages faculty professional development.

. . . .

[We provide:] Release time from teaching to create new courses and programs, including term-abroad programs; . . . funding to establish teaching collaborations with other institutions.

. . . .

A reduction in teaching loads [is] recognition that research is required.

ENDOWMENT

What is needed/exists to support science teaching and research?

It has been clear to us for some time that a larger institutional endowment of perhaps twice the size of the current endowment would provide much more budgetary leeway. In this respect, it would be helpful if the major national foundations and even federal agencies would consider making grants to endowed purposes: endowments for faculty research, student research, and equipment.

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Additional sources of funding are being sought for the long term by the institution to establish additional endowed chairs which will serve to provide some release time for faculty who are demonstrating excellence in research and teaching.

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Endowment funds are difficult to raise; nevertheless, we would like to raise endowment funds for maintenance of science facilities. As we anticipate renovating our science facilities, we face the hurdle of having to raise the endowment funds for their maintenance since our board of trustees requires, for the sake of good fiscal management, such stable support.

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Our chemistry department has an endowment . . . . These funds are to support student and faculty research, purchase and service scientific equipment, and provide scholarship and professorship stipends . . . . Income from our endowment . . . is used to support a variety of research, faculty-development, and curriculum-development efforts; . . . to provide start-up funds for new academic programs; . . . [and] used to purchase computers for new faculty.

. . . .

An endowment gift . . . has made available to faculty by application the opportunity for summer support as well as for additional senior and junior sabbaticals in support of the extension of professional abilities and the pursuit of research programs.

A summer research grant program for students in the sciences . . . was sustained and expanded after the end of external funding and has recently been further secured with the establishment of a one million dollar endowment in support of student summer research. Perhaps these summer grants and the program of grants for faculty have been the most important incentives in strengthening science research and the training of students.

We are raising an endowment to support science equipment.

The creation of the Chancellor's Small Grant program that aids faculty in teaching or research. $100,000 is available annually in competitive process; the maximum grant is $750.

The college established . . . an endowed professorship designed to attract women scientists . . . . Over time, other faculty, one at a time, teaching in other science departments will become the [endowed] professor.

[The] Board of Regents has allocated funds for innovative teaching or research projects. Over the past 11 years, 17 natural sciences faculty have received these awards, which are currently about $3,500 each.

[We have established] an endowment . . . to provide summer research grants for students has supported the involvement of students in the summer.

In the early 1990s the college received two grants from [a private foundation] to promote summer student-faculty undergraduate research. The grants obliged the college to institutionalize the program, and an endowed $1.5+ million . . . fund ensures the future viability of that program, which supports about 20 students in faculty/student research teams each summer.

Our most effective strategy for strengthening science teaching and research has been to establish a collaborative research endowment . . . .

[We received] a Science Initiative Challenge Grant from the Kresge Foundation to purchase new equipment for the chemistry and physics departments and to maintain and upgrade . . . instruments . . . . The matching funds [raised by the university] were used to satisfy a commitment of the university to build a permanent endowment for about $1 million to sustain repair and replacement. The endowment goal was achieved.

[We have] internal grant programs supporting student-faculty research;

A major incentive in improving our science programs...was support from [a private foundation]. We received an award...in 1991 that supported faculty and students summer research stipends, equipment acquisition, and a new faculty position in biology. This was followed by an additional [award] in 1996 to continue with what is now called our "College Science Research Program." The university has continued to support this program with internal funding. Included in our initial proposal . . . was the condition that the university commit to the establishment of a $1.5 million endowment, the income of which would eventually be used to continue the program long-term.

A bequest of [more than] $500,000 (now almost $1,000,000) in the late 1980s to be used in support of student scholarship has attracted more undergraduates into faculty research activities.

Another important incentive that has strengthened science teaching and research was the establishment of an endowed fund for science equipment. Within a year of receiving the grant that seeded the endowment, the science chairs began to meet

monthly to develop criteria for prioritizing science equipment purchases.

[We need:] endowment to provide a stable, reliable source of funds for the purchase of equipment and for research; increased funding for equipment.

An endowment fund of $1.5 to 2 million is needed to maintain financial stability for the undergraduate research program. The university has committed to establishing this fund, and to raising the first $600,000 within the next two years.

SCIENCE FACILITIES

What is needed/exists to support science teaching and research?

In a major bricks-and-mortar development, the construction of the . . . science center . . . was the culmination of a 15-year effort to secure [major external private support for a] building on campus. At the same time, the renovation of the existing science building gave two well-equipped, spacious buildings for teaching and research. For the first time the science departments were all located in one area of the campus.

The institution has supported the natural sciences in renovating existing facilities to create laboratory and research space within the limitations of the footprint and structure of the building.

The institution has maintained a bona fide field station . . . (since the 1930s) where astronomy, biology, environmental chemistry, geology, meteorology are taught each summer and where research projects are also conducted . . . .

Our natural science facilities were designed for a previous generation of scientists. Currently we lack adequate space in general, and especially dedicated lab space, for specialized instruction and research with sophisticated research equipment. Our institution is looking at this issue seriously and will, in the near future, plan to remedy these problems as they seek help from foundations and other donors to increase our space dedicated to teaching and researching in natural science.

The decaying of the infrastructure/facilities is a problem, particularly in the chemistry, biology, and molecular biology and biochemistry departments.

Plans to build a new science building as part of the current comprehensive fund-raising campaign will improve infrastructure and facilities, as well as provide new, technology-rich teaching spaces.

Over the past decade [our instutution] has invested a great deal of money in the sciences with regard to facilities and instrumentation.

Over the past few years, a building program has given us three new science buildings. . . . This has provided more laboratory space and some equipment for teaching and research. A fourth building is in the planning stages . . . .

[The science departments] struggle in older space. Recent growth in enrollments [in the sciences] . . . have made their facilities inadequate . . . . While the University has plans to address these problems, they are long term goals, while these needs are immediate.

We have constructed no new science facilities for over twenty years, nor have we

been able to refurbish or remodel existing space during this period. One of our chief institutional priorities for the next decade will be the updating of science laboratories, classrooms and offices.

. . . .

Laboratory and office space for the natural sciences is too small and its configuration outdated.

. . . .

One big reason for the documented recent growth in science education at [our institution] . . . is the completion of new construction consisting of two buildings that currently house the science, mathematics and engineering programs.

. . . .

The rapid growth of the science programs over the past four years has now given rise to new challenges. Increased enrollments have necessitated increases in the number of faculty. The problem is that there is no more room to house new faculty in office space. There is no additional room to support research interests of new faculty.

. . . .

Over the past 15 years the institution has provided substantially increased financial resources to support a rapid growth of facilities and faculty in the natural sciences. The outcome of this support is clear. Enrollment in science courses have been growing, the number of students graduating with degrees in science is on the rise, and the number of students involved in undergraduate research is growing.

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Our facilities, in spite of renovations, are not up to the requirements of our programs. However, this will be addressed in the near future with the construction of a new science facility.

. . . .

Although we have been effective in providing timely preventative maintenance and upgrading of the building's infrastructure as well as remodeling laboratories on an as-needed basis, we will not meet our goals of improving science education . . . unless we complete a significant remodeling and expansion of the faculty.

. . . .

[Our institution], as so many colleges have recently done, is beginning to plan for a new science building particularly to house labs for biology and chemistry. Our greatest challenge will be gathering resources sufficient to remove physical obstacles to further development in science teaching and research.

. . . .

We have obtained significant support from individuals donors, corporations, family trusts and bequests. These were obtained primarily through the work of our development office. Those gifts have allowed us to build a new science building, with only $2 million of the funding coming from foundation grants.

. . . .

Until last year, we did not have adequate facilities on our campus for research. Many of our faculty members collaborated with faculty at research institutions to gain access to the necessary equipment.

. . . .

Additional laboratory remodeling is planned for our old science building to make it more functional.

. . . .

We do not have the facilities to provide research space for all our science faculty and some of our teaching facilities are out-of-date. We are a public institution and we must depend on state bond referendums to provide new physical facilities.

. . . .

The physical and life sciences on our campus are housed in two 40-year-old buildings . . . . By 1988, the teaching and research functions of these departments had clearly outstripped their aging and non-climate-controlled facilities . . . . Each year since 1996 the university has initiated and executed a plan to renovate and update the infrastructure of specific areas of our science building during summer term . . . . The university facilities management director estimates that the university has spent about $9M on these renovations since 1990.

Current construction plans include a new, technologically up-to-date classroom building in the next 5–7 years. While this is a much-needed facility, it will not relieve the space limitations that must be recognized as a looming barrier to the performance of research. Not only do we face a serious space shortage as both our enrollments and the number of faculty involved in research increase, but we also have the problem that the infrastructure, laboratory facilities and much of the equipment and instrumentation is also 25 years old. The low level of state funding not only precludes the replacement of aging instruments, but in some cases, their maintenance as well.

Although there may be adequate space available for the general academic programs in the sciences . . . , the science building is over 30 years old, suffers from deferred maintenance and is in need of renovation, with due attention to evolution of the functionality of areas currently devoted to labs.

SCIENCE FACILITIES

Over the past few years, one of the major barriers to the performance of research has been the inadequacy of physical facilities.

The primary barrier to performing research on this campus is a severe shortage of space. We were strapped for space prior to the research emphasis. Now that we have that emphasis for our faculty, trying to find research space for them is a real adventure every year . . . .

The most obvious recent incentive to strengthening research…has been the addition of a new wing to the 1950s-era science building. The new wing contains approximately one million dollars worth of new equipment . . . for research in biology and chemistry.

We are trying to deal with the lack of adequate research space by an expanded building program, but this is future space and will most likely be inadequate by the time it comes online.

The university is seeking funding from the state's Capital Development Board to build an addition to the science building and to renovate the existing building, which is about 35 years old.

The university has identified our biochemistry and molecular biology programs for enhancement, and over the past three years approximately $500K has been earmarked to renovate these facilities and to upgrade and/or acquire equipment used largely for faculty research and our graduate programs in these areas.

Science facilities have received essentially no attention since the early 1970s . . . . Planning and fund raising for roughly $40 million in facilities improvements is under way.

Even with a new addition to our building, research laboratory space is full. As a new faculty are hired, who desire and are increasingly expected to do research, we are finding great difficulty in providing adequate facilities.

Chief among the problems the college faces in this regard is the outdated nature and over crowdedness of its science facilities . . . . Consequently, this situation has lead the institution into a planning process to expand and renovate our existing science facilities. The $35 million project responds to increased enrollment in the sciences, the impact of technology in the teaching of science, the increased interest in faculty/student research opportunities and other related issues.

The university is currently building a $38 million dollar facility for sciences.

. . . .

Since we have recently modernized our labs and updated equipment these are not critical needs for us at this time.

. . . .

[We have a] 12-person technical support staff for science building and faculty which includes [an] animal care technician, instrument repair technicians, greenhouse technicians, and [a] machinist.

. . . .

The major barrier to...being able to offer significant undergraduate research opportunities to more students and to students earlier in their undergraduate careers is our current science facility . . . .

. . . .

There are two major barriers to research . . . at the present time. One, aging science facilities, is institutional, and two, a dearth of time for research, seems more or less universal. The college's science facilities, built in the 1970s, are aging and were built when the science faculty was less research active, and when teaching was more traditional. Thus there is inadequate laboratory space for student-faculty research groups, and teaching labs are poorly designed to promote open-ended, investigative experiments.

. . . .

There is a deplorable space and instrumentation shortage, particularly in the hard science areas which exacerbates the problems faced by new faculty seeking to integrate their research enthusiasm and teaching passion with a culture in the process of change, while maintaining credibility in their discipline.

. . . .

Research facilities have been substantially improved as the result of the construction of our new science building, and will be further strengthened by extensive renovations to the existing . . . hall.

. . . .

Until recently, facilities have been a significant impediment to our science teaching and research. Much of this need has been met by the opening of our . . . science center for chemistry and physics . . . . Our biology facilities have also undergone recent renovations.

. . . .

[The college] has done much to strengthen teaching and research in the sciences with comprehensive modernization of its science facilities and curriculum in the 1990s.

. . . .

In October 1999 the college received a [multimillion dollar] gift for the sciences. . . . [Most of the funds were] allocated toward the construction of the . . . Center for Science. An unprecedented 17% of the space within the building will be devoted to student research.

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I believe we are poised for growth and there is promise for much success. A younger faculty and the continued support of the university administration are two important reasons. Another significant factor is a new science and technology building which will soon be under construction.

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The context in which our local institutional resource allocation trends and needs must be viewed is the completion . . . of a $25 million science facility. This new building provides our life and physical sciences with a state-of-the-art facility in which to teach and do research. A total of $1.2 million in project costs was devoted to scientific equipment.

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On the basis of careful consideration by the faculty of their curricular and pedagogical goals, we designed new facilities for the departments of biology, chemistry, mathematics and computer science, physics, and psychology. As a result of a successful . . . capital campaign, by January 2001 the college will complete construction on three new or renovated buildings housing the classrooms, offices, and laboratories of all five departments.

Although we occupy a building just five years old, we have added so many faculty since the building was programmed in the early nineties that we are now pressed again for space and facilities.

To relieve some of this pressure that time squeezes on busy professional lives, the college over the last couple of years has taken two significant steps: (1) implementation of a new sabbatical policy with more frequent scholarly leaves; and (2) construction of a new building that integrates all the experimental sciences together.

In order to support the effective infrastructure for science education and research at the college, the . . . board of trustees has approved a . . . project to renovate and expand the science facilities . . . . The new facilities will allow the department of chemistry to be located in close proximity to the other science departments, and the whole complex will highlight the interactions between disciplines illustrated in our interdisciplinary concentrations and programs.

SCIENCE FACILITIES

[The university] is committed to a 2/3 addition and renovation of [a facility] that currently houses the biology and chemistry departments. Completion of this project would greatly improve teaching and research facilities for our students and faculty. Most of the equipment used in teaching labs and for research has been obtained by individual faculty through external funding sources (NSF and foundations) with a matching portion from the university. The university needs to maintain a line in the annual budget for equipment acquisition as well as for equipment maintenance and repair.

Important new equipment has been added, and new facilities for the sciences (the largest construction project in the college's history) are now under construction. A strong feature of the design of these facilities is the inclusion of collaborative and specialized research facilities for the faculty and students.

Our biggest challenge has been modernizing pre-existing facilities. We renovated our physical sciences building in the late 1990s at considerable expense...and we are in the process of making a similar plan for the life sciences....

The common consensus concerning recent trends in undergraduate science education recognizes that interdisciplinary research with inter-institutional collaboration is critical for the future success of any science department. This major trend presents both a promise and a challenge for [our institution], for our major impediment against increased research productivity is the fact that, with very few exceptions, our laboratory facilities and their state of equipment are woefully inadequate to today's needs. Thus, while our excellent faculty researchers have much to offer by the way of developing collaborative efforts with outside institutions, the state of our onsite facilities available to conduct such research mitigates against any meaningful collaboration. In fact, most of our faculty have to go elsewhere to rent suitable laboratory space, frequently with little or no university support to cover these basic expenses.

We began to plan an addition to a science building constructed in the 1960s . . . . Our goal was to design an addition that would meet the projected needs of science education and research for the coming decades–based solidly in the vision that we agreed to. Opening this fall, it will provide laboratories with space for lectures and small group work; multiple Internet connections for integrating information technology; individual research space to house joint faculty-student research; media-rich classrooms; and three interdisciplinary teaching [or] research spaces.

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Our science facilities are undergoing major improvements both through renovation and new construction. The new chemistry hall opens in the winter 2000 and the architect for our new biology facility has recently been selected. These projects are part of the institution's master plan in which all-major science facilities will be upgraded the year the year 2004. The current construction and renovations have been primarily funded by the state but have included funds from the National Science Foundation and the Howard Hughes Medical Institute.

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The new initiative to upgrade lab facilities is by far the most significant commitment the university can make and has made to education in the hard sciences. Representatives from chemistry, physics, biology and the administration have been meeting with architects to plan for future needs. Major funding will come from the science priority incorporated into the new capital campaign, which is currently in its silent phase.

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This month [the] university broke ground for a $13.6 million expansion of its science facility. The new facility has been carefully designed by the science faculty to house new teaching laboratories as well as faculty-student research laboratories that conform to current thinking about teaching and research.

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We defined the building of a new, state of the art, science center as our most important institutional objective. Our institutional mission and pedagogical commitments guided the design of the facility. . . . When completed, the new science center will represent the single largest capital project in our . . . history.

. . . .

We now have excellent, state-of-the art teaching and research facilities for biology and psychology [in one building] . . . and for biology and physics [in another]. These new facilities contain excellent teaching laboratories that are fully computerized for those courses lending themselves to this pedagogy.

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In addition to pressures on faculty time, we continue to grapple with space limitations . . . .

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As a campus that has limited space, a delicate balance must be struck between teaching classrooms as well as adequate lab facilities for faculty and students.

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We do not have an up-to-date science facility for our science students and faculty.

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As larger and larger portions of institutional budgets go to financial aid while colleges are simultaneously impaired from passing the true cost of education along to their customers, funding for equipment, library acquisitions, etc. will be reduced . . . . Beyond that problem, the most pressing need in the sciences in higher education in the U.S. at the present time is the fact that their facilities are worn out. Most colleges and universities, including this once built their current facilities in the 1950s to early 1970s.

. . . .

Like many universities, we are witnessing the impact of an aging science infrastructure. . . . In addition to the expected depreciation and deterioration of this infrastructure over thirty to forty years, we see a profound change in the nature of space needs. A biology program that thirty years ago may have had less than five faculty

with lab-intensive research programs now has no faculty without these needs.

We have a total of approximate 200,000 square feet dedicated to the physical and life sciences, which includes a recent building and renovation . . . .

Space formulas . . . do not address faculty research and do not recognize undergraduate research unless it is taken as a regularly scheduled laboratory class . . . .

In order to maintain our current national leadership role in undergraduate science and mathematics education—as well as to continue to recruit and retain the kinds and numbers of science students and faculty that we desire—we must also address this substantial facilities renovation need.

More modernized spaces and equipment are still necessary for laboratory research.

The key design feature of these new buildings was to create adjacencies among faculty offices, faculty research labs and student research labs that facilitate close interactions and collaborative research (senior projects, summer research) between students and faculty.

INTERNAL FUNDS/MATCHING FUNDS/TRAVEL FUNDS

What incentives have been particularly effective in strengthening science teaching and research?

Last year the College of Science and Mathematics established an Undergraduate Research Committee which awards research funds to undergraduates on a competitive basis. The committee also helps support student travel to meetings at which they can present their work.

The dean also agreed to provide matching funds for those federal grants that required a 50/50 match.

Faculty want to conduct research during the summer months, and our institution has been unable to identify internal funds for stipends for summer faculty research or release time during the year.

The university has a small research grants program and a separate fund for travel that provides up to $1200 per year to attend conferences.

Faculty have been very successful at instrumentation awards and we sometimes have to call a "moratorium" on grant applications that require matches because we lack the funds to meet the match.

[We provide:] Faculty Research Grants for up to $3000/year; internal Educational Fund of $100,000 for faculty course and program development and student research; Faculty Travel Fund for up to $1600/year for conference; funding to send research students to NCUR Conference . . . .

One of the most effective incentives that have been put in place in the physical and life science is the commitment of a significant pool of money earmarked for matching funds on grants and contracts. We are in the final stages of formulating a redistribution of the indirect costs (overhead) that the university receives such that the principal investigator and the academic department share in the distribution.

For every grant proposal of over $20,000

that was submitted to an outside granting agency, we gave the director(s) (up to 2) an additional $400 for travel to meetings.

. . . .

Faculty are required to establish viable externally funded research programs. The college is providing an increasing amount of start-up funding to new faculty, especially in those hired in biology and chemistry, and significant release time (3 to 6 WTU) from teaching is given during the first three years in residence.

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[We] support student travel to academic conferences to present results of their work.

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There are two funding sources in the college to support faculty development efforts, a Dean's Summer Fellowship, and a Project Initiation Grant. Based on short faculty proposals, these are awarded annually by a committee of peers. These primarily provide salary and release time for research and proposal writing

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Although only about $500 per year is allocated to each faculty member for travel, in reality a faculty member can spend up to about $1,500 per year to attend conferences, because not all faculty access the fund each year.

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[We have a] faculty professional development fund to travel to conferences, $1900 per faculty per year.

. . . .

Awards (not to exceed $400) are made to students for research projects of unusual rigor or sophistication, or conference travel to present such research. The annual budget for honors projects is $7,000.

. . . .

We have increased funds for curricular development and travel to conferences and workshops on best teaching practices. We have substantially increase funds for faculty to attend conferences to present posters and papers.

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The university lacks budget planning mechanisms or an endowment fund to meet commitments made for the provision of matching funds on grants.

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We have several hundred students on-campus in the summer conducting research and probably fifty or more off-campus doing research at other universities, industry or government labs, and in the field. We have become, as a consequence, aggressive in seeking internal (mostly private and endowment support) and external funding . . . in support of undergraduate research. The college also has committed to providing free summer housing for as many as 175 summer research students (not exclusively in the sciences).

. . . .

[There is a] substantial pool of funding for each faculty member to draw for professional travel [of] $2200/3 years, plus significant per-diem supplements for conferences at which presentations are made . . . . [Also created were:] 36 faculty fellowships (3-year awards of one course released time per year, $5000/yr salary supplement, and $2000/yr project budget) for research, scholarly projects, or curriculum development projects . . . [and] 18 multi-year (six 2-year and twelve 4-year) professorships (salary supplement of $5000 or $8000, released time of one course per year, professional expense budget of $1000/year) for sustained excellence in teaching and service, or teaching, service and scholarship, respectively.

INTERNAL FUNDS
MATCHING FUNDS
TRAVEL FUNDS

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We have discovered is that when support is available, student and faculty interest more than meets available resources. What we have not been able to do is identify consistent resources to sustain the level of activity of which we are capable.

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We have a large centralized fund to support applied faculty research; we have another centralized funding source that supports faculty travel and "seed" monies associated with research; and we have a third source of funding on campus to support pedagogical activities. In addition, we have "research professor" positions to support faculty that are not teaching for periods that are a semester in length.

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Our five-year strategic financial plan . . . included separate reserves for computer technology, capital equipment including scientific equipment, and upkeep of facilities. . . . These reserves guarantee steady funding for upgrade of office computers, research computers, computer teaching facilities, scientific equipment, and maintenance of facilities.

. . . .

As more of our faculty have become active in publishing articles and presenting at professional meetings, however, the pool of money to support travel costs and page charges has not grown. The per person allocation has, in effect, declined at a time when faculty activity justifies an enhancement to the current pool of funding.

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INTERNAL FUNDS
MATCHING FUNDS
TRAVEL FUNDS

In regard to research, the reduction in teaching load and "in-house" grant and release time programs have been useful.

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In addition to the grant monies, summer research assistantships are funded through the college's work-study programs. Such funding is especially important for faculty who are between grants or in the process of establishing the necessary background or preliminary data for grant writing. Such funding is also available through small seed grants.

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The advancement of the sciences is going to require a significant institutional investments and necessitate making very challenging choices about resource allocation.

. . . .

We have experienced a very slow increase in resources available to the College of Science over the last 10 years. As our university has moved from a totally undergraduate institution to one that is developing an increasing number of selective masters degree programs, an ever-increasing percentage of those resources are being committed to research.

. . . .

More institutional funding is needed to provide faculty with sufficient time to maintain currency in the curriculum, to develop new pedagogies and to engage in research. The mandated teaching load is too high.

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A major barrier that prevents the enhancement of current levels of research performance . . . is the lack of increased support for research in terms of physical space, the lack of new monies to increase the number of graduate assistantships, the lack of necessary "seed monies" to facilitate intramural research activity, increased funding for the purchase of large capital equipment items required for research. At the present time, there is too great a dependence on the use of state dollars rather than 'indirect costs pools" to fund "intramural" research for both new and continuing faculty.

DEPARTMENT BUDGETS/SUPPORT PERSONNEL

What has been provided and what more is needed?

Equipment and Supplies: The state budget is not sufficient to cover traditional laboratory instruction, much less specialized research activities.

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The institution has provided support for natural science departments in terms of lab associates who process all orders, hire and organize TAs for courses and tutoring, and who teach some introductory labs.

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Operational budgets for all departments in the college . . . have been tight; the university experienced three budget reductions in the decade of the 1990's. The number of faculty positions were reduced at the beginning of the period and operational funds were cut. There has only recently been an effort to restore what was lost and this restoration is not complete. Since the first priority for operational expenses is for classroom use, research has not received the support it might have otherwise expected from departmental budgets.

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The addition of an Arts and Sciences computer technician has been helpful, but we continue to lack adequate technical support staff, especially in computers and electronics.

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Departmental operating budgets have declined rather than increased in recent years.

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Both capital budgets and supply budgets are too small. The example above of still being unable to keep students from doubling up on microscopes is typical of the problem we have with equipment

. . . .

One other resource in short supply is any kind of support for undergraduates doing research in the summer. There has been talk about giving them reduced housing rates: tuition breaks; etc., but little concrete has been done.

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The most important change needed in institutional resources is a larger personnel budget for the laboratory sciences.

. . . .

Technical support has been a chronic issue and a problem for those without significant external funding.

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The college funds a full time science shop supervisor who is skilled at constructing apparatus for teaching and research and a half-time electronics technician who can both build and repair equipment.

. . . .

There have been NO "policies, strategies, incentives" for strengthening science teaching on this campus. The only incentives have been negative: get your FTE up or your budget/staffing/equipment allocations will be reduced. The institution's . . . objectives seem to be to get more "teaching" (really throughput) with less expenditure. Over the 20 years I have been at [this university] . . . I have seen our job get harder and harder, having to do more and more with consistently less and less, especially in the way of equipment and help.

. . . .

While the workload has increased, the resources to accomplish our mission have effectively diminished. Keeping current with technical advances consumes an increasing portion of our limited resources, but is necessary to satisfactorily prepare our graduates for the job market. This leaves fewer funds for other resources needs.

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If the attitude of the administration is to see how few resources the faculty can get by with and still do their jobs, then morale and motivation decline, and the quality of the educational experience for the students deteriorates, as does the quantity and quality of faculty research undertaken. University faculty exhibit an amazing degree of resilience and dedication, even in the face of declining resources availability, but eventually a threshold is reached, beyond which the quality of the endeavor suffers.

Major barriers include . . . lack of supplemental funding to support summer faculty/ student research, e.g., when a faculty member does not have an external grant.

Major barriers include . . . limiting funding for strategic new faculty positions to reduce large introductory course enrollments and to alleviate time constraints of current faculty to engage in research.

While we have made some improvements in support staff, we still lack a position for instrumentation repair and clerical support is inadequate (1.5 FTE supporting 23 faculty in five departments).

There is not a single laboratory technician in the department of biology; consequently, faculty must mange every aspect of a research program (safety, ordering of supplies, inventory of supplies, supervision of student time and effort, equipment maintenance, etc.) in addition to performing normal teaching and service responsibilities.

University matching support has been and is exceptionally strong. Various amounts of matching are provided even when not absolutely required in order to strengthen grant requests. A weakness is the low and nearly stagnant annual operating budgets for the academic departments.

Our institutional goal has historically been to be low-cost to our students. Thus, after paying salaries and keeping the campus open, there is little money available for G.A. stipends, equipment, library resources, lab resources, startup funds for recruiting new faculty, faculty travel, support services, etc.

[Our] approach will be to alter departmental funding (beyond the necessary funds to operate) by allocating a certain percentage of operating funds to departments based on their research productivity.

FOUNDATION SUPPORT

How could external public and private funding sources best structure their programs to adjust to recent trends and evident needs?

For instance, the Kresge Science Equipment Initiative . . . provided the basis for an endowed equipment fund, which offsets the high costs associated with science instrumentation.

[Our institution] received funds [from a private foundation] to start a summer science research program for exceptional students in the departments of biology, chemistry, earth and environmental science, and physics. Each year, an average of 15 students spend two months of the summer working on a supervised research project of their own design. Research begun during the summer often continues into the academic year, with the result that a student culture of "doing science" year-round has developed.

Continue to fund "pure science'" as well as applied science projects. Endeavor to enhance the creative spirit and tenacious resolve as we train scientists.

Provide more cooperative and collaborative opportunities for consortia of liberal arts institutions to form stable research teams for sustained periods of time (3–5 years); such strategy will yield a longer lasting impact on the science programs and their students at these liberal arts schools....

We have to raise brick and mortar costs and funds for endowing the costs of maintenance; these are hard monies for us to raise.

Perhaps the primary structure that external agencies could provide an institution like ours would be equipment-funding programs so that we can periodically update equipment for research and teaching.

Outside funding sources could help [to:] support renovation and new building in the sciences; support program-based equipment for teaching labs and faculty research; provide funding for mid-career faculty to change direction in their research; encourage multi-disciplinary approaches within the sciences and bridging to fields outside the sciences

External agencies need to offer more programs for "re-entry" of faculty who are changing fields or who went through a funding lull.

The single-most helpful thing that private funding sources could do to help us along would be to invite us to meet them or come to meet us. There is nothing like face-to-face contact to create trust, collaboration and mutually satisfying future relationships.

We would suggest that funding agencies help fledgling departments who desperately want to increase research productivity, but lack facilities to do so. Perhaps "starter" grants might be the appropriate vehicle in such settings.

Our principal concern is that granting agencies continue to define programs so that we can be competitive with major research universities.

External public and private funding sources could enhance programs by supporting enhanced classroom learning environments, including new technologies and classroom structures. This would require funding for facilities and pedagogy development to develop team teaching and team learning communities. Also, funding for student and faculty stipends for research and an increase in funding for equipment and travel would enhance the research environment.

External funding sources are most helpful at providing the facilities and equipment needed for research to flourish. Science places unusual demands on buildings and tends to call for building replacement or renovation all too frequently. Providing support for this necessary construction or reconstruction should remain a priority for external funding agencies.

External sources might best assist in strengthening undergraduate science programs by directing support to the facilities and equipment costs incurred in maintaining strong science programs.

The national statement that research is an important part of an undergraduate science education had a major impact.

We need seed money to support faculty research. That funding needs to include summer salaries for faculty members, students, and support staff as well as supply and equipment money. Challenge grants for facilities, equipment, and endowment provide the incentive for development offices to seek additional funding from private donors and needs to be continued to assist us.

Funding agencies should recognize that faculty at undergraduate institutions who spend much of their time teaching can and do produce good, solid scientific research. Funding agencies should provide support for emerging institutions that are ramping-up undergraduate student-faculty research in the sciences.

Faculty from small institutions have difficulty competing with faculty from large institutions in securing research funding in an open and competitive process because proposals from small institutions are often judged less likely to succeed because of critical mass issues.

There must be a conscious decision made that funding good science research at small institutions will strengthen the quality of the science graduate, increase the number of students who remain interested in science careers, as well as produce good scientific results.

FOUNDATION SUPPORT

Institutions which are primarily undergraduate are having a very difficult time finding funding for the infrastructure needs for modern scientific labs, and for the rate of turnover necessary to keep computer-run equipment up to date.

Block grants to institutions to strengthen science teaching and research are very effective. Greater acknowledgement on the part of funding agencies that funding research at a small to mid-size institution produces both cutting-edge science as well as large number of scientists for the future would be helpful. The emphasis should be on providing undergraduate research opportunities. Fundamental to this is the provision of equipment, supplies and expense funds for departments to enhance their research.

Grants to institutions to allow faculty to spend time away from the institutions at major universities or industrial labs are critical to maintaining their skill level in a rapidly changing environment.

Private and public funding sources could establish programs to supplement institutional funds for sabbatical leaves by science faculty.

Perhaps some foundations could take over the publications of some of the major scientific journals and publish them on a nonprofit basis, or even publish them at a loss. This would benefit thousands of library budgets and tens of thousands of scholars. I know this idea is rather "outside the box."

Could external funding agencies measure internal university support for research by a broader yardstick than matching funds on a single grant application?

External public and private funding sources need to be more aware of the kinds of changes that are happening at [our university] . . . and her peer institutions. It is often the case that we can compete successfully for curriculum development grants . . . but are not considered worthy of research funding.

[Our college] is a "heavy user" of Research Corporation, PRF-ACS, NSF-RUI, and NIH-AREA programs which are very well tailored to our undergraduate research mission.

The provision of simple equipment grants to new assistant professors would help. Equipment grants could also be particularly important in areas of interdisciplinary researcher in cases where a more senior person wishes to enter a different research field.

Private sources might wish to "endow" a laboratory or a particular item which needs frequent updating by making a grant–very tightly tied to maintenance of a laboratory or equipment–to the institution's endowment fund.

External public and private funding sources could greatly facilitate the research efforts in the physical and life sciences by . . . allowing more of the grant funds to be spent on release time for faculty "buyout of workload" . . . .

Lack of adequate sources of external funding to support the integration of teaching and research. Most funding programs are not explicitly targeted to such efforts. Moreover, most external funding agencies seem to favor research universities and universities with doctoral programs, rather than universities which focus on undergraduate education.

While there are funding programs that respond to the needs of faculty and students at liberal arts colleges, . . . there is a perception . . . among some of our science faculty, that the university definition of research shapes the agendas of funding agencies and deflects the agencies from more substantive support of collaborative research at liberal arts colleges.

These problems could be mitigated significantly if external funding agencies would support: increased funding for faculty release time for research, summer salary for faculty with active research programs, funding of student research stipends that include general support as well as that for traveling to professional conferences and meetings, funding to support postdoctoral positions. These items are allowed in the NIH-MBRS program, and the research programs of . . . faculty who have been awarded MBRS grants generally have thrived.

Provide institutional support, rather than (or in addition to) support to individual faculty members, upon presentation of a thoughtful institutional plan and strategy for science and mathematics educational improvement.

External funding agencies can help by recognizing the value of research in departments that have no graduate programs.

(1) Reward institutions that have a proven record of success and a clear vision of their futures supporting undergraduate education. (2) Create mechanisms for smaller institutions to pool their science resources in purchasing and upgrading equipment. (3) Invest in a future faculties program which cultivates generations of teacher-scholars.

Perhaps the best thing granting agencies could do is to make funds more available to those doing research at smaller private liberal arts colleges. The NSF-RUI grants are a great idea, more programs like this would be very helpful.

Although funds for equipment and travel are needed, released time (or support of special leave) would be very helpful, as well. Support should [also] be provided for successful standard methods of education, as well as for the "innovative" projects favored by most granting organizations . . . . A simplified application process would help, since time is very tight for faculty. Perhaps some components of proposals and reports could be standardized among various granting organizations, and current technology could be utilized more fully for forms and submission . . . . Granting agencies, especially public ones, should be careful about using grants to push social agendas. It is already a very hefty job just to teach our college students.

We are generally very satisfied with the scope and nature of the funding sources we have utilized in the past 10 years.

. . . .

External private and public funding sources could best structure their programs to permit grant requests for large pieces of capital equipment, increased allocations for graduate assistantships, as well as funding those proposals which have demonstrated and facilitated a "true" interdisciplinary research effort amongst faculty from various physical and life sciences.

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Funding agencies need to establish review boards that are made up of at least 75% faculty from undergraduate institutions.

. . . .

Funding agencies can target proposals to address science trends and problems being faced by undergraduate institutions in developing our future scientists. Grant proposal applications can be simplified and made less burdensome for undergraduate institutions where faculty wear many hats and grant writing is an added burden to an already very full schedule and the institutional pressure is on teaching. Funding could address faculty needs to remain current in new technologies through special workshop participation. More funding is needed for new technology both in the way of equipment and faculty training.

FOUNDATION SUPPORT

. . . .

There is a need to provide financial and material support to faculty involved in working with undergraduate researchers. Currently, most foundations provide student stipends, but no supplies, equipment, or stipends to faculty. Thus, this reduces the incentive for faculty to participate. [Funding sources should:] consider supporting technicians or research/teaching post-docs to help spread the work-load on over-stretched faculty; support should be long-term (3–5 years), not annual or 2-year, since liberal-arts college faculty are somewhat slower in overall research productivity (due to balancing act of teaching/research/governance); consider direct endowment building targeted at science/research infrastructure and personnel at liberal-arts colleges; . . . We do a better job at supporting researchers than we do at supporting mid-career and older faculty members . . . . It would be nice to have programs that allowed senior faculty to re-tool in more recent areas.

. . . .

Science teaching reform has been driven primarily by grants from funding agencies, such as the Howard Hughes Medical Institute. However, the decision made by the administration to operate according to an assessment-based learning paradigm, should in the near future have a large impact on instruction.

. . . .

In regard to research, funding sources should be more sensitive to the constraints on faculty members at predominantly teaching institutions. Publications should be weighed less heavily and the nature of the mentoring experience valued more highly. . . . Funding institutions, particularly private ones, should establish collaborative agreements rather than simply award grants, in order to assist institutions in transitioning to a more research-active position.

. . . .

External funding from private foundations and the National Science Foundation (NSF) should make more funds available for the renovation and equipping of science laboratories so that undergraduate and research might be enhanced.

. . . .

One means of adjusting funding programs to support recent trends and evident needs is to alter funding strategies. Institutions attempting to transition from professor-centered teaching environment to a student-centered learning environment require significant additional resources . . . . Funding agencies should seek ways to foster or precipitate change that joins research and learning in a seamless educational fabric that results in graduates that can think their way through any problems, whether familiar or foreign.

[Funding sources should] continue and expand programs aimed at undergraduate research both during the academic year and summer. We need a program that allows for instrument purchases that don't require a lot of curricular development and dissemination. Bricks and mortar grants are especially helpful.

While other types of support are important for the long-term health of undergraduate science programs, the direct support of excellent summer research programs for undergraduates remains the most important force shaping the quality of . . . science departments nationally.

Continuous and longer term support options would greatly facilitate project progress, since upperclassman could mentor new recruits. In addition, external public and private funding sources are needed to address important safety issues, e.g., air handling systems, hazardous waste disposal and chemical storage.

What would be quite useful in my view would be facilities planning grants, that are sufficiently large to permit colleges to hire professional consultants to help with planning new or renovated facilities. A more modest facilities renovation program with a maximum award of $500,000 or less would nevertheless be useful to such smaller institutions.

One possibility for a grants program that might help address this issue would be to encourage and support consortial sharing of staff. For example, probably no small college uses enough radioactive materials to justify a full-time radiation safety staff, but most require that expertise periodically. Perhaps a grant could be made to several institutions in one locale to hire a joint radiation safety officer who might be paid through one but is beholden to all.

Teaching/research postdoctoral fellows, such as those supported by the Camille and Henry Dreyfus Foundation in chemistry, provided needed teaching release and research assistance for research-active faculty members at the same time they give young scientists valuable experience in working in a primarily undergraduate setting.

More and more research seems to be "interdisciplinary" in some sense. To the extent that this continues to be the case or increases, funding agencies and or organizations should recognize that and be flexible so that their programs aren't so rigidly discipline-specific that good science falls into gaps between program guidelines.

We would be helped if funders provided clearer guidelines for what is likely to be funded. We have a number of persons who have had conflicting information provided them in this regard.

Our college would benefit from external funds made available to explore and adopt innovative programs from other institutions.

One way funding organizations could alter their programs to improve the research climate . . . would be to increase funding opportunities for postdocs working at predominately undergraduate institutions.

Programs that help institutions to increase the support of their faculty are most needed. A program of support for teaching postdocs at primarily undergraduate institutions, for example, would be very helpful.

. . . .

[We need] streamlining the application process for grants and for an absolute minimum of administration in managing the grants. Using standard reporting forms and administrations forms could be encouraged.

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Most graduate students and professionals come from primarily undergraduate institutions and, therefore, more funding opportunities should be provided to these institutions.

. . . .

[We need] funding which is longer term - to help establish and sustain student/faculty research beyond the initial startup period. (More programs, such as NSF's RUI which supports research in a teaching environment.) Funding for programs rather than just a specific research project. More opportunities for small grants (less than $5000) for supply money. More support for release time for faculty at undergraduate institutions. Somewhat less emphasis on publications . . . .

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FOUNDATION SUPPORT

Since in the main our faculty can't compete with the major research universities, we rely for external research funding almost exclusively on programs designed to support research at undergraduate institutions. Competition for this funding is keen, and continuing availability of this source of support is absolutely essential to our continued success.

. . . .

Monies provided by agencies that support small-grant research by faculty are instrumental to the success of PUIs [primarily undergraduate institutions], but we at the institutions must work with faculty on the leverage effect once a grant is received.

. . . .

The college was awarded a . . . development grant . . . for the departments of chemistry and physics. While also providing important leverage with potential funding agencies and donors in the building campaign, the . . . grant enabled the college to add faculty and technical support in the targeted departments, enhance their curricular offerings through better instrumentation and greater emphasis on research-based instruction, reduce teaching loads, and accelerate faculty development to sustain these programs through a cycle of grant writing, funding, research, and publication in peer reviewed journals. This effort has been an unqualified success.

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External public and private funding agencies can best assist the college in the sciences by providing access to funds for laboratory equipment and the support of faculty and students for summer research.

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Investigator-initiated project grants are the bedrock of scientific research and should be considered the highest single priority. Interdisciplinary research that connects, links, and intersects the traditional disciplines is where many of the most important new discoveries are occurring and can be expected in the future . . . . [The following activities/areas are important:] Provision of support for faculty release time and summer salaries; support for laboratory personnel at all levels from technicians to postdoctoral fellows; grants for shared equipment; regular funding to replace aging equipment, the repair and upkeep of which eats away valuable time for teaching; funding for consortial equipment grants for very large and expensive instruments

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If funding agencies wanted to assist a college . . . perhaps grants to purchase slightly-used equipment from cutting edge sources would help.

. . . .

Funding sources for faculty research will continue to be critically important for both faculty development and for student education. Funds to purchase equipment, to support student research efforts by making grants available for supplies, equipment, and travel to conferences, to facilitate interdisciplinary interactions by facilitating conferences, visiting scholars, and program development, to provide technical assistance for faculty research programs are all needed.

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Support NSF Research Opportunities Awards-type programs that encourage faculty to work at university laboratories; funding for interdisciplinary programs, both within a department and across disciplines, on-or off-campus, as one mechanism to encourage collaboration and overcome isolation; supplemental support for year-long sabbaticals; less funder emphasis on new programs and more support for ongoing programs; private granting agency support of indirect cost recovery; support for faculty changing the focus of their research efforts, particularly at mid-career; funding for faculty with a limited record of research or no recent external grants; more support for programs at colleges and universities that are making credible efforts to move to the next logical step in their development rather than focusing on already-strong science programs.

. . . .

In terms of grant programs, I think that the ones with which I am most familiar (PRF-B and -AC and Research Corporation Cottrell [College Science Awards]) are excellent. Most faculty members need support at the level of $10,000–25,000 per year . . . . I believe that it is too bad that grant programs in life sciences in this range are not really available (outside NIH-AREA, which has a rather different mission, but in its new incarnation may be of better assistance.)

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What appear to be absent are opportunities for an entire science division to seek support that will address those needs that are common to all the departments or disciplines in that division.

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Possibilities need to be explored to free up faculty for research activities during the school year. This could be accomplished in part by incentives initiated by external funding agencies. One possibility might be the establishment of programs directed at the establishment of endowed research positions at undergraduate institutions on a matching basis. Another might be to support teaching fellows in undergraduate science programs, similar to the Dreyfus Fellowship Program that is restricted to chemistry.

. . . .

Private funding agencies could increase the number of their programs focusing solely upon funding the purchase of instrumentation. Even small grants (<$10K) in this area are helpful, perhaps even some limited to undergraduate institutions or programs that would provide seed money to cover student summer salaries and supply costs incurred in the initial stages of a research project. Access to capital for such equipment acquisition is essential if an institution is to remain competitive in scientific research.

FOUNDATION SUPPORT

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External funding should also support those programs that are "tried and proven." There has been such an emphasis on "new" initiatives that formulas for proven success have been under-emphasized by foundation sponsors. Postdoctoral support for scientists in undergraduate colleges is definitely needed. A major shortfall in equipment support for undergraduate colleges has resulted from the drastic changes in NSF's ILI program. Private foundations need to take a close look at equipment programs given the ill-advised ILI changes. Foundations should encourage, challenge and reward science programs for their efforts in acquiring alumni and corporate support for undergraduate research programs.

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The funding agencies would be wise to focus on faculty reward structures and allocation of faculty time through conferences (including conferences for university presidents). . . . The fund[ing] agencies might encourage partnerships between (1) universities and science- related corporations and (2) universities and community-based government agencies and nonprofit organizations that address science-related issues. . . . Finally, to support the development of science-based businesses (especially in depressed urban and rural settings), funding agencies could invite proposals for the purchase of equipment for research that would be shared by both sectors.

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FOUNDATION SUPPORT

Often researchers at major universities are major players in the determination of funding priorities and the use of funds. This approach often decreases the probability of funding for less well-known and well-connected researchers. In other words, huge inequities exist not just in the dollars received between “research” and “comprehensive” universities, but also between the probabilities that a scientist will be funded at these two types of institutions.

. . . .

External sources are needed to provide continuing support for the equipment that is essential for both teaching and research. Teacher training programs in both the sciences and education need to be modified to include research components. . . . Resources are needed for revitalizing and upgrading decaying science facilities. Also needed are resources which are structured to provide incentives for new and innovative ways to teach sciences courses and laboratories. Faculties in comprehensive institutions have heavy teaching loads and need opportunities during the summer sessions where they can be funded to examine and change their teaching techniques or complete research projects from the academic year.

. . . .

The main challenges we face are in financing science education. Specifically: we welcome continued and increased support for big ticket items such as NMRs, SEMs; we would welcome support to help with the upkeep of some of the big machines—service contracts, especially; we need increasing help funding students to do summer research.

. . . .

We urge a greater willingness by agencies to fund smaller, start-up projects. Aligning funding priority categories with the Carnegie Foundation’s four-fold conception of scholarship would serve this end. Additionally, we would urge a willingness to fund the implementation and/or adaptation of other successful programs and reforms in new environments.

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Period of major institutional block grants . . . provided substantial internal funds reducing the marginal benefit of seeking external funds.

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One way to address the time issue would be for outside funding agencies to make specific funds available so that faculty could take more frequent and longer sabbatical leaves, for example a full year at 75% salary, and to generally be more generous with funds allocated for faculty time-related issues.

. . . .

Asking faculty from both [research and teaching] institutions to compete head-to-head for the same funds is unfair. A more equitable approach, taken by some funding agencies, is to make the distinction between the two types of facilities, and allocate funds accordingly, so competition is on a more even ground.

. . . .

Although there have been numerous public and private programs to provide research funds for undergraduate faculty, a majority of such funds have been tied to science education and curriculum development. These have been quite successful in the integration of research with education, . . . but it is much more difficult for the undergraduate faculty member to maintain research funds for research interests in their discipline.

Grants should be awarded to institutions that have expressed and exhibited interest in the campus-wide integration of education and research. These grants should be controlled by senior administrators (principal investigators, program director) so that the focus is on the entire academic community.

Undergraduate institutions are facing a decrease in available funds from public and private funding agencies for "brick and mortar" projects.

There are a lot of strings attached to money we receive from state and federal sources and private donors often stipulate stringent demands on gifts.

Science teaching and research have been strengthened by funds from HHMI and the college itself to support undergraduate student research salaries.

External funding is crucial for laboratory renovation, modern instrumentation, and additional research support that gives the faculty the time needed for research.

FACULTY TIME

What are the major barriers to the performance of research at your institution? What strategies have been particularly effective in strengthening science teaching and research on your campus?

The two major barriers to the performance of research by the science faculty (or any other faculty in the College of Liberal Arts) are what one might expect in the setting of the small liberal arts college: time and money. As a hard-working college administrator once noted, "Small schools do everything that big schools do; they just do it with fewer people."

Coupled with a heavy teaching load, administrative responsibilities place extra burdens on many faculty, especially on department chairs and directors of student research programs. True, department chairs may receive a course release, but even one course release does not necessarily lead to more time for research: it may leave more time for administration!

In our liberal arts setting, a substantial commitment has been to sustain excellent instruction. Our faculty typically have a 12 credit teaching load and they have limited time to initiate, pursue and sustain their research during the academic year. Although some of them conduct research with students during the year, most faculty use summer months to pursue research interests. Some faculty buy out time with grants or support to reduce their teaching load and allow for time for research during the academic year.

The major barrier to research . . . is that, given our mission, we have fairly high teaching load with increasing numbers of students.

Participation in faculty governance is encouraged, however the administrative tasks associated with these positions are time-consuming and take away from time faculty have to pursue their research. The nature of a residential liberal art university requires the availability of faculty to interact with students outside the classroom. These commitments compete for time devoted to research.

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Faculty research time has been reduced by an increasing burden of paperwork; much of it connected with a broad range of demands for assessment.

. . . .

One strategy that has been particularly effective in strengthening science teaching and research . . . has been the administration's support of granting "course reassignment" to science faculty.

. . . .

The barriers to the performance of research are identified in a consistent pattern by all three departments. It is the scarcity of faculty time that is the greatest single obstacle to greater research productivity. All three departments cite the need for a dedicated professional staff member to attend to instrument maintenance and repair.

. . . .

FACULTY TIME

The decrease in teaching load was minimal—from 24 to 21 units annually—but it was perceptible in the way people allocated their time. Unfortunately, it was not enough time to contribute to the blocks of time needed to do certain experiments or to write up results. But the increased availability of released time in the form of Faculty Research Grants . . . helped here. . . . For the past two years, there has been an attempt to award some supply/etc. money in addition to released time. That has been a big improvement.

. . . .

There is a tendency among at least some faculty to be reluctant to recognize individual differences in teaching and research productivity and to support differential rewards for the more productive faculty member. . . .

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We might make our departments more efficient by improving personal infrastructure through the hiring of more support staff. These individuals could be instrumental in allowing faculty to maximize their teaching and research time by providing faculty with "turn-key operations" for their teaching and research laboratories.

. . . .

The barrier of time is one closely related to the level of investment a faculty member can make in a single student. That is, close supervision of student research makes a considerable claim on a faculty member's time and limits the number of student projects a faculty member can undertake. Summer grants, equipment, supplies, and space can not erase this barrier.

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We do not have adequate support staff for teaching or research. We are still setting up labs and making solutions the most expensive way, with full-time faculty members' time.

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Faculty time for students' research projects, both at the undergraduate and masters levels, is limited. A true accounting of the time it takes to supervise research students would show many faculty heavily involved in research whom are vastly overworked.

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For most science faculty, the teaching loads remain approximately 3 courses per term (9–12 contact hours). Opportunity for research during the academic year is often minimal, especially in the geology and chemistry departments without the presence of graduate students.

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At a comprehensive university with a significant undergraduate teaching mission, research inevitably takes second seat to the teaching function; that's normal.

. . . .

Faculty members who are research mentors do not regularly receive released time to do so. This creates a personal and professional burden on these faculty members who must conduct such undergraduate research on an overload basis.

. . . .

A major impediment to performing quality research still exists—lack of time. As an institution whose primary mission is teaching, faculty course loads routinely run more than 12 contact hours per week, and in fact, the department of physics and astronomy has recently set a goal of 14 hours. In addition to regular course work, faculty are heavily involved in advising and mentoring of undergraduates, and service activities have increased as well over the past decade . . . faculty must spend more time in *all* areas as compared to a decade ago.

. . . .

We need to reduce the teaching load of the faculty so that they will have time to plan and execute research projects with our undergraduates. A first goal of the administration is to reduce our faculty's teaching commitment from the current 4-4 to a 4-3 load.

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Our state-mandated student to faculty ratio is 19:1 and this is the greatest barrier to increased research productivity at our college. Most of the progress in science research is made during the summer when faculty and students have significant uninterrupted blocks of time. Therefore, our efforts are directed to assisting faculty researchers accomplish a much as possible during their summers.

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The major barrier to research performance . . . is the generally heavy teaching load carried by faculty in the sciences, even relative to faculty in other divisions.

. . . .

The major barrier to the performance of research on our campus is the high teaching load the faculty must carry . . . . Our best teachers and researchers have significant teaching assignments. We are attempting to alleviate to some extent the high teaching load by making more funds available to hiring high quality part time faculty to allow more release time to the research involved faculty.

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Standard teaching loads in the College of Arts and Sciences consist of three three-credit courses per semester or the equivalent. This is considered a good balance which allows time for research, particularly research which involves students.

. . . .

With the general acceptance of the student/faculty research model as a successful teaching method, the number of individualized student contact hours has grown significantly. This has brought into sharp focus the demands on faculty time, including course loads, committee work, departmental obligations, and service activities. In recognition of the phenomenon, and as a reaffirmation of . . . commitment to quality teaching, the college adopted a *2-2 course load* . . . .

. . . .

The instructions of this survey to sustain average ratings of "3" in assessing trends for allocation of time and developing challenges suggest that the designers of the survey thought that the time and effort required to teach science, do research, and meet the related challenges remained constant during the last ten years. Many of our science faculty challenge this premise. While expectations of faculty research have increased in the last ten years, expectations of teaching have also risen as students often arrive less well prepared to understand the abstractions and the operations of scientific work.

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Laboratory research is time intensive, and is being hindered by the relatively high . . . teaching load mandated . . . . Furthermore, demands on faculty time for activities such as department/college/university governance, personnel evaluations, student advising, curriculum development and assessment, special projects (e.g., outreach, student recruitment), various campus . . . initiatives, and professional commitments appear to be increasing steadily over the past few decades . . . . This problem is exacerbated by the very high cost of living, which is now severely limiting our ability to recruit new probationary or temporary faculty to meet our enrollment demands, which, in turn, determine our funding allocations.

In the College of Science, there are two major barriers to the performance of research. One is cultural, namely, the value placed on doing research and how much support, especially in terms of time, is given to those who want to pursue it. The perception, and some reality, is that research is done in addition to normal full teaching and service loads.

FACULTY TIME

Many would insist that the major obstacle to research is lack of time. I'm not persuaded. To be sure, life at a private liberal arts college requires balancing teaching, research and college service, and it can be very strenuous. However, doing research usually arises from a passion for it and thrives off a psychology that finds it rewarding. There are a thousand reasons not to do it. But those reasons often apply equally to those who do and those who don't.

In most departments, the teaching load, because many courses have lab components, is heavy. Moreover, other kinds of student involvement (advising, writing letters of recommendations, keeping track of graduates' whereabouts, supervising senior theses and independent studies) sap faculty time. Faculty are also increasingly involved in faculty governance . . . although faculty generally want to be involved in administering departments, in making tenure decisions, in developing the curriculum, in approving new positions, in writing new policy, in helping regulate student affairs, there is definitely a cost in time and energy attendant on this level of involvement . . . . Overall, the more different ways that faculty time is spent, the less likelihood there is of finding the sustained periods of time that are necessary for keeping a research program running . . . .

The barrier can be summed up in one phrase: lack of time.... The fixed work load of a faculty member is three 4-credit courses per semester . . . . Beyond preparation, grading , and office hours, extra duties include advising students, supervising senior projects, doing committee work, attending meetings of various sorts, providing paper work such as evaluations, and participating in the faculty hiring and student recruiting process. In addition, any available time is fragmented, because of frequent interruptions. Since meaningful research requires a big chunk of time for thinking and trying, it is almost impossible to do it during the semester. Lack of time also makes it difficult to acquire and utilize equipment for research. Both writing proposals and learning about new equipment and software take time.

Although released time is probably precluded, it may be desirable for the faculty to agree that those who are committed to research will have first choice of courses to teach and time slots available.

The university has a heavy teaching load. Many times when tenure-track faculty members are given reassigned time for research, part-time instructors are hired to assume the teaching responsibilities. The quality of part-time instruction is uneven.

An increase in the utilization of graduate teaching assistance in…time-intensive laboratory courses is planned to further increase the time allocated to faculty for research and scholarly activities, including grant writing.

. . . .

The major barriers to research on our campus center on the following: a need for more space, sufficient release time (faculty wear many hats at a small institution), student time or stipends for research….

. . . .

The counter-incentive to actually doing these things is the growing amount of administrative activity effectively demanded by the institution . . . . While "assessment" is important, and deserves its place, the growing amount of time required to satisfy self-study requirements is itself (as in the quantum model) affecting (=deteriorating) the quality of education. At present, budget matters are disconnected from assessment so it is not clear how resources would be re-allocated even if the problems revealed in assessment or self-study received a fair hearing.

. . . .

It is very difficult for most faculty to be active in the lab during the academic year. Most of the research that goes on is with undergraduate students and this is very time consuming for faculty because they must constantly be training new students who then almost immediately leave (graduate). We are implementing a new teaching load formula which will recognize the time that faculty spend teaching laboratory sections.

. . . .

Many of the barriers relate to mindset and traditions, funding, and legislative misconceptions…but the single greatest barrier for accomplishing what is needed is TIME…. [The] average undergraduate teaching load is twelve semester hours *each* semester. Some have fifteen to eighteen hours! No reasonable expectation can be placed upon an individual to maintain scholarly competency with such teaching loads.

. . . .

We all wish we had more time to spend in teaching and research, and yet, we spend countless hours on "service"—on such vital activities as advising, writing letters of recommendation, participating in the faculty governance, bringing speakers to campus, etc. With help from the Mellon Foundation, we hope to look at this service component and weed out as many non-essential tasks as possible, thus allowing faculty to focus more coherently on teaching and research.

. . . .

Major barriers to research are the time-intensive, person-intensive nature of education at a liberal arts college. Our students have high expectations for quality student-faculty interaction, and these expectations consume a lot of resources.

. . . .

The other major barrier to research is faculty time, a lament I hear wherever I meet science faculty from undergraduate institutions, . . . It seems I spend more time now dealing with regulatory issues . . . than was true when I started. Further, the increased public demand for accountability means that more time is also spent on documentation and assessment of programs than ever before.

FACULTY TIME

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I think it would be worthwhile to reconsider the definition of faculty workload in a way that encompasses advising and supervising research students as a valid and valuable teaching activity; to date such activities are not factored into the algebra of "teaching load."

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Like most institutions, over the last 15 years we have raised the expectations for faculty scholarship while maintaining our high standards for teaching. Faculty are also being asked to engage in variety of pedagogies to recognize that students learn in different ways. Both of these has put a significant strain on the one resource that faculty can not change—time.

Despite efforts to strengthen science research over the last several years, the primary barrier to research continues to be the heavy teaching load carried by faculty as well as the large amounts of time devoted to meeting with students outside of class . . . . Faculty are also required to commit a considerable amount of time to activities outside of their departments . . . . But these non-teaching and non-research responsibilities make it difficult for senior faculty to mentor their newer colleagues.

The major barrier to research at our institution has been the relatively large teaching and advising load of the faculty. Funding which would enable us to increase the size of the faculty, i.e., reduce the student-faculty ratio, would . . . allow us to spread the teaching and load over more people to allow more individual time for research.

FACULTY TIME

In my opinion, at the present time the major barriers to the performance of research in the science departments are insufficient time to do research and everything else that faculty are expected do and a non-uniform attitude and motivation for faculty to be research-active.

There has been a gradual improvement in teaching loads over the past ten years. If the university wishes to continue expanding the research efforts of the faculty, emphasizing the involvement of undergraduates, provisions to decrease the loads further are needed.

Lack of time is the primary barrier to the performance of research; an increase in the average amount of what might be called administrative responsibilities expected of faculty at the expense of classroom and laboratory teaching time, basic/applied research time, and pedagogical research and curriculum development time. Committee work, paperwork, and correspondence are the major factors cited, with a small number of faculty members citing the college's teaching load as a major barrier to research.

The faculty tend to see the academic year as so controlled by teaching responsibilities that there is little time for anything else. Consequently, serious research is largely relegated to summers. However, in the absence of research funding with support for students, student research participation is much more likely here during the academic year. Thus, the issue of time interlocks with the issue of money.

Our institution has added many faculty over the past ten years: the life and physical sciences tenure-track faculty has increased 50% over that period . . . . Nonetheless, we continue to hear proposals for increasing faculty (thus decreasing class size) . . . . Some of these complaints might be marked off to routine discontent with the faculty role, but it also does seem that faculty work has changed over the past decade, in ways that do create increased demands on faculty time.

The irony of IT's promise is that this "labor-saving device" increases work rather than decreasing it. For example a faculty member who creates a website for a class and maintains it properly may be rewarded by enhancements in student engagement with learning, but will be roundly punished by finding the large amount of time required to develop and maintain the website.

As a private liberal arts institution, we find that our students select us over larger institutions so as "not to be treated as a number"—in order to get to know the faculty rather than graduate assistants, to be advised by a faculty member instead of a professional advisor, to be able to pursue undergraduate research, not as an exception but almost as an expectation. This trend seems to be increasing. Students take more individual faculty time these days.

. . . .

The institutional practice that has provided the most benefit in helping the faculty to be more productive, both in teaching and research, is the provision of technical help and laboratory and instructional assistants. In our institution, we have, in large part, avoided the trap of using graduates assistants to teach our courses. However, the time demands on the faculty member can be greatly reduced, and the efficiency of use of high-priced faculty time improved by providing technicians and assistants.

. . . .

We have managed to keep focused on the intentionally of faculty-student research partnerships as the center of our activities. Nevertheless, this has come at important cost to faculty as time-demands increase from teaching and general institutional responsibilities.

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The faculty's teaching load will be reduced from the equivalent of seven to six courses per year. (In the sciences, two three-hour laboratories are considered the equivalent of one course. Faculty in chemistry and physics are given additional credit for ongoing research.)

. . . .

For college and university science faculty (indeed, for faculty in all disciplines) the essential resource is time–time to accomplish the many demanding and overlapping goals in research, teaching, and community service. Because the latter two are often likely to provide immediate pressures, research may inadvertently suffer. The members of the faculty . . . are extraordinarily committed to not allowing this to happen because they recognize the high value to themselves, to students, and to society that research offers.

. . . .

But there are two main barriers to performance of research . . . . First, our faculty carry a heavy teaching load. We have a calendar that spans a total of 34 weeks, including a January term—thereby shortening the time for research in the summer months. A typical faculty member's load is 7 units, where a science lecture and one lab would "count" as 1.5 units.

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Over a decade ago, the teaching load at this institution was reduced from 6 to 5 courses per year to give faculty more time for scholarly work. Demands on time from a variety of directions, however, have been significant. Science education has become more complex, and faculty time is in short supply. . . . The trends above regarding the increase in student-faculty research and investigative work in courses have led to demands that have accelerated over the years.

. . . .

Major barriers include . . . lack of time for faculty with heavy teaching assignments.

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We recently initiated on a pilot basis a program to provide released time (a reduced teaching load) for those faculty supervising substantial numbers of student independent research projects during the academic year.

FACULTY TIME

. . . .

Faculty have a fairly heavy teaching load, nine classroom/lab contact hours per semester, little recognition . . . for . . . the supervision of student independent research projects during the academic year, and a somewhat burdensome faculty governance structure that results in considerable committee work. Faculty are also increasingly expected to participate in on-campus recruiting activities.

. . . .

Time! The demands on faculty at undergraduate institutions are considerable. Teaching and advising loads are quite heavy, in addition to other faculty responsibilities, leaving little time for research. This is especially true during the academic year. Another potential long-term problem is that as faculty advance in rank and age, these is less incentive for some senior faculty to remain committed to maintaining a research program with undergraduates. . . . The administration has to be made aware of the place and importance of research in an undergraduate institution. In this regard then, research by faculty during the academic year has to be included in their overall academic load and not just in addition to everything else that they do.

. . . .

The fragmentation of faculty time into a wide range of duties unrelated to those required for traditional academic advancement in his [or] her field of study is a concern. Talented scholars are hired who are exuberant experts in their field, but then they are encouraged (or allowed) to get involved in all those university duties for which they are not trained. The American corporate system would not be competitive if such a mismatch of skills with duties was the norm.

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FACULTY TIME

Barriers include: heavy teaching load (3/3) with concomitant expectation of research productivity and active grantsmanship, reliance upon student workers and graduate assistants to perform some of the technical chores in the running of the department or the setting up of courses.

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Within the chemistry department, we have been able to develop and utilize a formula for awarding instructional release time to those faculty who are heavily involved in advising undergraduate and graduate research students. . . . Higher-than-average teaching loads yield little time for research during the academic year.

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Department chairs are adjusting workloads to best suit the interests of their faculty. Faculty with active research agendas are being given lighter teaching loads to provide needed reassigned time for research, while faculty who are focusing on teaching or service activities are receiving heavier teaching loads and reduced research expectations.

. . . .

During the academic year, the teaching load of 12–13 hours and two courses per semester, along with the accompanying responsibilities of advising and committee work, makes productive scholarship during the academic year more difficult for faculty in liberal arts colleges. Time is paramount in maintaining an active and successful research program . . . . Active research scientists teaching in quality liberal arts colleges are called on to perform other duties for the college . . . . The juggling act is a difficult one.

. . . .

Faculty in the sciences…are stretched by the ordinary demands of teaching, advising, and committee work. Often professional activity and on-going professional development gets supplanted by these other time-critical demands on the faculty. We need to try to be more imaginative and generous in our support of faculty release time, including the prospect of some fully funded, yearlong sabbaticals. We need to see that our faculty have access to workshops that teach the latest information technology and use of instrumentation.

. . . .

A widespread concern among our faculty is the sense of there being too many obligations and too little time. Faculty feel harried by administrative requirements and the multiple demands of teaching, research and service. The easiest but most damaging thing to sacrifice is intellectual conversation with colleagues, especially across disciplines.

. . . .

[Our] science faculty find themselves increasingly pulled by growing competing demands on time. The difference in access to resources and support systems between a college like ours with heavy teaching loads and an explicit mission to provide an undergraduate science education of the highest quality, a college where undergraduate students work side by side with nationally known scientists and a large research university with graduate students, post-doctoral fellows, and research faculty is significant. Yet, our faculty can and do compete successfully for grants. But they do this a great cost to their time and energy. I fear that this is unsupportable and unsustainable in the long- term.

. . . .

Starting next academic year (2001-2002) faculty teaching loads will be dropped by one course per year. This time for faculty will allow them to participate in their own research activities and allow them to give special, out-of-class attention to their laboratory students. We value faculty and students researching together.

. . . .

The main issue that has surfaced from all the faculty input seems to be time—or more precisely, a lack thereof. Over the past decade, the amount of time spent on teaching, advising, and basic research has been eroded because of the demands of more and more administrative responsibilities. In addition, more time is needed now than in the past to keep abreast of advances and changes in existing technologies, as well as to learn and implement new technologies. These include new instrumentation, new laboratory techniques, and new information and instructional technologies.

. . . .

One of the main barriers to research at our institution is the amount of time and effort that goes into teaching and advising during the academic year. Most faculty have good lab space and equipment, but cite time constraints as the key limiting factor. . . . Most faculty complain that they simply do not have sufficient blocks of undisturbed time to dedicate to thinking about or doing science during the academic year, and that there is never enough time in the summer to make up for the constraints that are present when they are actively teaching. (Our annual teaching load is 5 courses—or approximately 3 courses plus labs in the sciences.) Course release would help here, and some faculty do buy out of courses with grant funds. However, buying out of courses runs counter to our mission as a small undergraduate liberal arts college, and removes faculty from their primary duty to be teachers.

. . . .

The major barriers to the performance of research at an institution of our type and size would be teaching load as well as equipment funding. Currently, there is a dean's ad hoc committee working on reducing our teaching load from seven preparations to six . . . .

. . . .

The major barriers to more student-faculty research on our campus are time, space and equipment. Most faculty and students feel pressed for the time required to become involved in research projects; and in a few departments, it is difficult to find research space.

FACULTY TIME

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The teaching loads are too large and the college does not have the financial wherewithal at this time to reduce them to allow more time for research.

. . . .

Directing undergraduate research is extremely time consuming, usually requiring extensive one-on-one time. Also major funders (NSF and NIH) are always expecting faculty to get reduced teaching loads as a condition of grant awards and as a sign of institutional commitment. But these forces conflict with the primary need of the college to have science faculty in class and teaching the large numbers of students who support the college with tuition. The solution to this is more full-time faculty with lighter loads, but these slots are justified primarily by course and section loads, not by individual student research.

. . . .

The percent of time spent on classroom/lab instruction has probably changed from around 80% with the faculty hired in the 1970's to 60% with the new generation.

. . . .

There has been a large increase in time commitment to pedagogy and curriculum development, say from maybe 3–4% to 10% or more, sometimes much more. . . . We postulate that the newer faculty do not spend any fewer hours on teaching than the previous generation. Instead the junior faculty have probably increased their overall time commitment so they can meet expectations on undergraduate research and other professional development activities, develop skills and methods in educational technology, and still excel in the actual practice of teaching.

. . . .

FACULTY TIME

Time: This is the most critical barrier. Heavy teaching loads, the need to incorporate technology into instructional approaches, and the campus value of fostering close interactions between our students and faculty result in the faculty spending the vast majority of their time in classroom/laboratory teaching.

. . . .

Another consideration which must be addressed is the demographic changes that have take place in the typical college student for which no recognition is accorded in the way we matriculate students. TIME is a factor not only for professors but also for today's student. It is impossible for learning to occur as effectively as in the past when students were full-time in school when students today are full-time employed AND trying to go to school full time.

. . . .

Faculty feel pressed for time to do research during the academic year due to teaching loads (9–12 credits/semester).

. . . .

Our teaching load is heavier than at some institutions (three courses or the equivalent, with a lab counting as one-half course, each semester). However most scientists are able to count some types of student research in their teaching load, and most have fewer different preparations each semester than faculty in the divisions of the humanities and social sciences.

. . . .

The major barrier most mentioned is the lack of time. It would be good to lessen the time commitments to areas other than teaching and research. A difficulty in a small liberal arts college with a strong tradition of shared governance follows from the time required for the faculty to participate in governance. More support would be welcome for computer support and equipment repair. More staff support for ongoing research would also be welcome.

. . . .

One of the major barriers to research . . . is the scarcity of our most precious commodity, faculty time. In spite of a reasonable teaching load (the equivalent of four courses/year), the capacity of our faculty to carve out time for writing research proposals, doing research with students, writing and reviewing papers, renewing grants, etc. is significantly diminished by time spent on the sorts of activities carried out by Ph.D. students, postdoctoral fellows, and technicians at research universities.

. . . .

While science faculty . . . have impressive research credentials and a solid history of attracting support for their work, lack of time is perhaps the greatest impediment to the conducting of research . . . .

. . . .

More time for research: faculty carry a heavy course load-lab teaching load in advanced courses [which] limits the time available for faculty research. Limited time and space for research is further exacerbated by a much lower tenure rate than most of our peers that results in a major time commitment among tenured faculty to administrative and governance responsibilities.

Our current teaching load (two lectures and two labs per semester) makes it difficult to find the time to carry out research projects with several students.

Heavy enrollments in the introductory courses, coupled with the intensive, individual work our faculty do with students in the third and fourth years, make workload a primary concern.

As undergraduate institutions acquire an array of more sophisticated equipment, heavier demands are made on faculty (often younger, untenured faculty who have pushed for acquiring the equipment in order to launch their teaching and research careers) to service and maintain equipment.

The highest priority for support staff include more lab managers, an instrument repair technician/operator, a shop director, and an electronics technician. These individuals would handle repetitive technical tasks, assist in training students, and complete equipment repair and maintenance.

FACULTY-STUDENT RESEARCH

What are existing incentives and barriers?

The institution has provided for practice of science through direct funds given for support of collaborative student-faculty research (student stipends and equipment/expendables) during the summers ($35,000/summer for the last two years).

We are a comprehensive regional university and as such our primary mission is to educate the students of our region. That is, our focus must be on teaching rather than research per se. Nonetheless [our university] places high value on research in the physical and life sciences and strongly encourages its faculty to participate at all levels. Further, since we are primarily a teaching institution, we strive actively to involve our students in faculty research.

Currently accepted models of research have not credited pedagogical and field studies adequately. While our faculty have engaged in these activities in order to strengthen their teaching, they have only recently begun to receive recognition from the university and their colleagues.

The limited definition of research and limited university support for these initiatives has made it difficult to make the case to external agencies that our faculty have been sufficiently productive to merit further grant or fellowship support.

There have been departmentally-based undergraduate research programs for many years. However, they have not been institutionally organized and supported.

Students are filling the laboratories especially during the summer, and work is being done. Of course, what is needed to sustain all this activity is continued funding.

Our undergraduate science majors have enjoyed considerable success in their research collaborations with faculty. In support of these student efforts, we have a fairly well funded undergraduate research program that supports student research, travel, and summer fellowships.

. . . .

Undergraduate institutions . . . need help in providing faculty with more time for doing research with students who are taking their first steps toward scientific careers and for offering these students intensive learning opportunities that involve active engagement with open-ended questions.

. . . .

The formal commitment and recognition that teaching can and does take place outside of a formal classroom . . . . [Our institution] is committed to the use of faculty reassigned time devoted to the teaching of students using a research environment.

. . . .

FACULTY-STUDENT RESEARCH

Encouragement of and partial or full funding for travel by student researchers and their faculty mentors to present the results of their research at NCUR and a disciplinary meetings such as the American Chemical Society, or the American Geophysical Union. We have 10–25 students do this every year.

. . . .

Available support funds for carrying out research is limited.

. . . .

All departments do a very good job at engaging undergraduate students in research activities; however, in general the major time for this activity comes during the summer term when fewer students are present and faculty may not always be compensated (without grant funds or teaching). We have focused our attention on publication with undergraduate students, and we recognize that this takes careful planning and execution on the part of individual faculty members.

. . . .

The clear trend, certainly for the past 10 years if not longer, is toward more research by faculty, and a great deal more student research. Not too many years ago the idea of any sort of serious research by students was an object of derision. But the pendulum has swung so far in the opposite direction that faculty members have asserted every undergraduate major in natural science program should, by the time of graduation, have at least one referred publication!

. . . .

There is a pressing need for more funds to support student research. Even the best and most highly motivated student will not give up a summer of travel, or a well paying job, in order to spend the summer doing research.

. . . .

[The] Faculty Research Committee makes an annual competitive selection of applications in four research programs—Research Leaves, Three-Year Research Expense Grants, One-Year Research Expense Grants, and Student Research Assistantships.

. . . .

At [our university], as for many primarily undergraduate institutions, it is pointless to distinguish between teaching and research in the sciences. Faculty routinely involve students in research as part of the teaching [and] learning experience. In both biology and chemistry, there is growing expectancy that research will be conducted by students as part of the requirements for the majors.

. . . .

For the past decade, substantial numbers of science students have conducted internships with local industrial labs, and a positive relationship exists with these organizations.

. . . .

If one reads our mission statement, our charter, and practically any descriptive piece that we have written about ourselves one will see that we are not, have never been, and don't aspire to be a research institution. We are a university engaged in teaching undergraduates. That is our mission. Well-educated graduates are our products. Which is not to say that we lack an understanding of the importance of research in the scientific, intellectual, and economic life of America. However, if one understands that we are about teaching then it is not surprising that the research that the institution funds and supports is expected to serve the undergraduate student.

. . . .

Summer student research with faculty . . . utilizes several endowed funds . . . for student research assistants.

. . . .

The college began funding of faculty/student teams (stipends for faculty and students, room and board for students for ten weeks) to do collaborative research in the summer, a program paid for by endowment funds . . . . This program continues and regularly supports five to six teams doing scientific research in the summer of each year.

. . . .

The definition of research is itself a local dilemma. Faculty personnel policy has "raised the bar" on what constitutes research with peer-reviewed publications assuming the sine qua non evidence of scholarly accomplishment. . . . Our science faculty understand that there are many experimental activities . . . that reveal new understanding and teach students much about research but which do not lead to publication in peer-reviewed journals. Local recognition of this work is limited at best . . . .

. . . .

Our faculty also believe that funding agencies should consider supporting collaborative research with students over intervals of four to ten weeks in the summer, a contrasted with awards that require faculty spend a full ten weeks on summer projects. This model for support of summer work would encourage more faculty to work with students in the summer because it would not require the faculty to devote nearly the entire summer to research at a time when there are many other professional demands competing for faculty attention.

. . . .

No science or mathematics faculty member has been hired since 1996 without a research program that can include students.

. . . .

Until recently,[there has been] lack of consensus among faculty and between faculty and administration that faculty research that includes students is a critical feature of the best undergraduate science and mathematics programs.

. . . .

Research is another matter. The desire to do it comes largely with individual faculty as they are hired. It is difficult to motivate senior faculty who do not naturally do research.

. . . .

Additional internal and/or external resources could be devoted to undergraduate research during the academic-year resources are needed in the form of student stipends and money for lab supplies. If such support were more consistently available during the school year and the summer, then our best students would be attracted to work with our faculty on a long term basis (say, sophomore through senior years). The quality of their senior research projects would no doubt increase and lead more often to co-authored, published work, benefiting both faculty and students.

. . . .

For a number of years now we have required a four-unit course in research to graduate with a science degree. This includes one unit of research readings and three units (three semesters) of active research under the same faculty research mentor.

. . . .

[We have] institutional support for summer research and teaching involving undergraduates, through cost-sharing of student housing, faculty stipends for involvement.

. . . .

Although research, particularly involving students with faculty mentors, is strongly encouraged by the administration, it remains limited because the faculty teaching loads are high and release time is rarely provided for faculty to direct students in research.

. . . .

[The university] has limited internal funding to seed research activities that will lead potentially to external funding. There is also limited support for 30–40 faculty to conduct research in the summers through competitive proposals for the equivalent of one month's salary. With out these, the research climate would be very dire indeed.

. . . .

While the . . . science faculty are aggressive in seeking outside funding, the integrated teaching-research environment requires a base of ongoing, reliable funding through institutional support. At [our institution] even the most inspired research program is primarily about the education of young scientists and secondarily about the creation of knowledge.

. . . .

FACULTY-STUDENT RESEARCH

Some faculty in the past have been able to "buy down" their course loads by hiring replacement faculty off grant funds. While this is an attractive option for the faculty member, we have found that students are frequently not well-served by this approach . . . . Clearly, we have to stop buying an excellent research experience for advanced students at the expense of faculty engagement in the mainline curriculum and advising program.

. . . .

Summer Student-Faculty Collaborative Research Grants: . . . A maximum of 12 awards are made annually. Each student receives a stipend of $2,500 plus on-campus summer housing; faculty receive a $500 stipend and up to $500 in project expenses.

. . . .

There is definitely an increased emphasis in the science departments…on doing research with undergraduates.

. . . .

[We have] recruitment of a faculty that believes in the viability and importance of undergraduate research.

. . . .

[We have] recognition of student/faculty research as part of the regular academic load of faculty members. Student/faculty research is part of the load, not an unrewarded expectation.

. . . .

[We have] budget and grant support specifically earmarked for student/faculty research, including work study and summer stipends for students.

. . . .

As faculty grow older, some of them develop other interests or have a reduced interest in traditional academic research. This reality is exacerbated by the perception that after promotion and tenure decisions have been made there are not clear rewards for continued research activities (nor clear penalties for the lack of such activity).

. . . .

In our department, we are of the opinion that undergraduate teaching is paramount and an emphasis on research nearly always detracts from the teaching mission. Your question, above, implies the desirability of increasing research which in our opinion is a self-serving desire. Some faculty want the institution to support their research because they want to do it, not because it will contribute to the quality of the undergraduate experience.

. . . .

Our institution does not directly support research as part of the workload of the faculty. It is expected that faculty will conduct research and publish results in addition to a full workload in teaching. In general, some level of research accomplished in that way has been possible, especially when coupled with graduate student thesis projects. However, the trend has been to expect more and more from faculty members, while providing fewer resources to accomplish the task. This makes maintaining a reasonably productive research program increasingly difficult for the faculty.

. . . .

My sense is that research at PUIs [primarily undergraduate institutions] has been more limited in recent years (as compared with perhaps 10–15 years ago) when one considers major research programs and grants, but has been occurring with smaller research efforts and internal monies at many institutions. Reasons for this change in culture are varied, but perhaps are the result of major changes in the philosophy of teaching (more hands-on, more invasive teaching, more time-on-task teaching), significant increases in individual institutional abilities to support small research programs (HHMI awards, NSF institutional awards, endowment growth), and a changing set of institutional expectations on what constitutes faculty scholarship.

. . . .

As a faculty we must understand that we cannot do everything and that what we may give up in a given pedagogical innovation in class is compensated for in many ways by what occurs in the research arena between faculty and students.

. . . .

In the last of the '80s and '90s the tide began to turn, and faculty in all departments began to involve students in research and to publish with students. More faculty wrote proposals to external agencies, and some received funding. The college began to pursue institutional funding of student-faculty research and to provide internal funding as well.

. . . .

Now faculty routinely receive substantial start up funds, nearly all have access to dedicated research space, and the college supports student-faculty research by providing student stipends, support for supplies, and counting supervising student research in teaching loads. Faculty members routinely receive full funding for attending one professional meeting per year, and many receive college funding to attend one or two additional meetings. Publications rates are good. Not everyone publishes work with students, but there are more publications from faculty (with and without student coauthors) than there were 20 years ago.

. . . .

Funds for professional travel have increased. Endowment funds to support student research and research assistance have been acquired.

. . . .

Over the past ten years undergraduate research . . . has received increased emphasis through a presidential strategic initiative . . . . The university supports 40 summer student stipends annually in response to faculty requests in one component of this initiative . . . . Approximately 250 students in all disciplines participate on an annual basis.

. . . .

We have found enormous benefit in our academic year, to work with three or four or five students who receive credit for the experience. We can usually fund these projects for around $10,000, including replacement of the faculty member for the course. These projects, during the academic year, are efficient because the students get credit rather than requiring summer stipends, they already have housing, etc. But we have too little money to do nearly as much of this as we would like to do.

. . . .

A major development planned is the articu-

lation of a clearer vision for the sciences that specifies (though not in quantitative terms) the strong expectation that faculty maintain active lines of scholarship. This scholarship certainly includes, but is not limited traditional discovery based research. We also value, e.g., the scholarship of teaching, application, integration, etc.

A Science Research Fellows program (an honors program for 20 science majors in each graduating class) [was instituted] which includes a year-long rotation among 4-week research project internships on campus in the first year, summer on-campus research internships after the first year, an off-campus research internship industrial, government, or university laboratories for a semester in the junior year, and a senior research thesis project. Though launched with external funding, this has become established as a program of institutionally sponsored stipends for students and faculty members for summer research. [Also created were] up to 20 student-faculty collaborative summer research grants (mainly student and faculty stipends) which have been awarded by competitive review of proposals based on applications predominantly in the sciences for work of students on campus after their sophomore and junior years.

FACULTY-STUDENT RESEARCH

[There has been] dramatic increase in the number of science students fully supported to work with faculty during the summer . . . .

We have been successful in increasing student research opportunities by emphasizing to our new junior faculty our expectations in this regard. We also have increased via our summer study and research funds . . . .

As currently configured, most summer programs embody both research and teaching, and involve a tremendous commitment of time and energy from faculty. Yet they generally are not compensated or recognized. Outside funding agencies could help advance this issue by making funds available to faculty to compensate for the extra time, and to develop ways by which the goals of the summer programs could be better integrated into the regular academic-year programs.

The college provides line item funding for student assistants during the academic year as well as during the summer.

The college also has a long-standing policy of encouraging faculty and undergraduate research by allowing professors ho have been awarded internal grants to include students as part of their summer research team and allowing the students free room and, in some cases, a free course credit.

A "Valuing Undergraduate Research" program rewards faculty with reassigned or summer support for activities with undergraduates which lead to presentations or publications with undergraduates as coauthors.

The . . . tutorial is a capstone research project required of all students in their senior year. The tutorial must be researched, written and defended before a panel of faculty advisors in order for students to graduate. . . . It has been effective in ensuring that all students, especially those majoring in science, take part in extended research projects . . . . The science faculty have developed short lists of possible projects that are appropriate to study by seniors, are within the area of faculty expertise, and are worthwhile enough to be of potential interest to others . . . . By encouraging students to select their projects from their lists, we hope to establish groups of undergraduates devoted to one or a few topics, leading to greater interaction among the students.

The direct involvement of prepared stu-

dents with talented scientists in pursuit of original contribution to scientific understanding is education of the first order. Because of the intensity of the academic terms, we find that the summer months allow the best opportunity for intense engagement necessary for successful collaborations.

[The] proportion of time on research has probably increased from 10% to 30%.

At our institution, it is important to consider undergraduate research as a special type of teaching with the potential to accomplish two important purposes. First, it provides our students the opportunity to exercise their curiosity, imagination, creativity, and critical thinking abilities in a more flexible and independent environment than the traditional classroom. Second, undergraduate research activities can support the professional development agendas of our faculty if pursued in student-faculty partnerships.

The institution provides summer housing without cost for students doing research over the summer, and an undergraduate research program awards stipends to many students each summer.

It is helpful for funding sources to recognize the pressures on faculty time in institutions in which excellent teaching is expected as well as research productivity. It also is important to recognize that our science departments consider the purpose of faculty research to be not only advancing science but also involving undergraduates in research.

The opportunity for students to do intensive, individual work with faculty is embedded in the curricular structure. A critical incentive for science faculty has been foundation support for scholarly work, much of which is conducted with students.

Liberal arts faculty research, while certainly contributing to the body of scientific knowledge and understanding, could also be considered productive when it helps keep faculty members enthusiastic for their discipline and abreast of current developments, and particularly when it involves students, and through that involvement strengthens their critical thinking skills and increases their understanding and appreciation of scientific inquiry.

The basic issue of who ought to help maintain the basic infrastructure for research at undergraduate institutions. . . . Too much of this burden is supported by the efforts of individual faculty.

The availability of institutional funding . . . has allowed a growing number of students to benefit from the experience of firsthand research.

Research internships for our undergraduate majors are a priority and extensive opportunities for such experience both on- and off-campus are available throughout the sciences.

We will have to increase the size of the science faculty to increase student participation in research.

I cannot overstate the importance of engaging undergraduate students in research with faculty. . . . There is a difference in the kinds of experiments that can be conducted by undergraduate and graduate students.

The infrastructure and support staff for research is limited.

In biology, where enrollments are largest, we converted two senior-level positions vacated by retiring faculty into four new hires

at the assistant level. Those new hires—who arrived within three years of each other—had a transformative and energizing impact on science education: curriculum, pedagogy, student research, grants, etc. In physics, a strategic decision was made to hire an associate professor who, while distinguished as a researcher and scholar, is dedicated to undergraduate education and the mentoring of students. In all, 38% of the faculty examined in this survey joined our faculty within the last decade—and all have a strong commitment to mentoring undergraduate students.

[Our] college, like other high-quality liberal arts institutions, needs to be more successful in showing prospective students, faculty, donors, and granting agencies that "excellent, cutting-edge" scientific research is being pursued on undergraduate campuses.

GRANTS OFFICE

What incentives or barriers exist? What changes are planned or needed to support research?

The institution has established a grants and foundations office which, in addition to its commitment to other campus projects, aids in writing grants for brick and mortar, equipment and other infrastructure needs of the natural scientists.

We have an excellent campus grants office and a program of providing faculty with reassigned time that can be devoted to grant writing.

A Sponsored Programs Office was created to aid faculty in the development of grant proposals.

Our development office has added a person whose job is to track funding sources, and there are now ongoing discussions about adding a full time person whose job will be to assist faculty in securing external funds.

[We have] special assistance for individual students in locating summer research opportunities, internships and enrichment programs in science and mathematics….

In 1996, the college established within the Dean of Faculty office, a position to support faculty development and sponsored research activities, and this arrangement aids, among others, science faculty as they seek and manage external funding.

At the institute level, an office of grants and contracts was established to help faculty identify funding sources, prepare proposals for research funding, and administer grants received. Within the College of Science, a procedure with timelines and internal review and approvals has been used for a number of years to assist faculty in grant writing.

Significant early in the period was the commitment of the university to creating a new Office of Sponsored Programs. This served to raise the level of awareness of funding opportunities and facilitated both new and extant grant activities.

A recently established office of sponsored research has been helpful in providing information on possible funding opportunities and in assisting faculty members in preparing grants.

We hired a full-time staff person to assist faculty in developing proposals for foundation or external grant support.

External funding is hampered by the lack of an institutional office of sponsored research.

The planned consolidation and expansion of the Office of Research . . . will do much to underscore and emphasize the university's commitment to science education on all levels, and the current search for a new Coordinator of Research has resulted in candidates with Ph.D. degrees in a scientific field and proven research productivity . . . thus addressing one of the needs identified by the faculty: namely, the lack of "hard" scientists in the administration.

When compared to the research offices at large state and private universities, our support is meager. It was only two years ago that our grant support staff grew from two to three . . . . Given this limited staff, funding opportunities are frequently missed because they are not identified and brought to the attention of the appropriate individuals and departments or because no one is free to pursue them.

Incentives, which have been in place for many years, include a supportive sponsored research office, which provides assistance in the development of grant proposals.

Despite a steady and increasing number of research initiatives underway on campus, the college does not have an office of sponsored research to assist faculty in seeking, monitoring and reporting on external grants.

The development office has supported faculty grant writing more enthusiastically and now initiates many of the efforts.

The individual who first filled this position successfully cultivated foundations that support science teaching and research.

There are many student summer stipends that result from both internal and external faculty grants that are highly decentralized and not tracked in a systematic way. This survey compels us to begin doing so in the future.

[An important development has been] the establishment of an Office for Institutional Research. Prior to 1995, as reflected in the data presented in the preceding tables [of the survey], accurate historical information regarding the details of budgets, levels of external funding, enrollments in courses, numbers of majors, etc. has been difficult to retrieve.

GRANTS OFFICE

FACULTY PUBLICATIONS

What are the expectations for faculty?

Faculty must work towards a proven record of accomplishment as evidenced by a publication record. It goes without saying that we assume external public and private funding sources will continue to provide opportunities for faculty at predominantly undergraduate institutions to obtain financial support for their research programs.

Those evaluating proposals from faculty at primarily undergraduate institutions must recognize that our faculty members have a smaller number of publications because of involving undergraduates in their research and the larger teaching load. But, these same faculty members are publishing in prestigious journals and include undergraduate co-authors.

Without publication as a goal, the faculty could spend many hours mentoring students in the "art" of research without a suitable outcome for themselves. Integrating this activity into the mix of teaching and research continues to be a challenge. Increased funds to support undergraduate learning through research have come through some recent gifts, but longer-term coverage needs to be acknowledged.

EXTERNAL PROPOSALS FROM FACULTY FOR RESEARCH

What are the expectations for faculty?

The expense of maintaining an up-to-date lab with modern equipment is difficult at a small institute and requires faculty to spend significant time seeking external funding.

Problem areas are funds to purchase capital equipment for teaching and research and funds to provide faculty with summer salary support. Over the longer haul more faculty are going to have to be more successful in attracting external funding.

As willing as our institution is to direct extensive resources to the science programs, our science faculty also need to seek and obtain outside funding. Often undergraduate faculty are disadvantaged as their research programs compete with efforts at major research universities where teaching is less valued and the support of graduate students and postdoctoral fellows is abundant.

Since 1995, there has been a category of competitive internal grants specifically designed for new faculty as "seed grants." As faculty receive these grants and internal monies, concomitantly, we expect them to develop better quality and better funded research programs.

My impression is that the natural science faculty . . . are much more entrepreneurial than average in seeking extramural support to upgrade facilities and obtain state-of-the

art equipment and instrumentation for research and teaching. Like many state-funded schools, [our institution] does not have the resources to achieve these goals on its own.

Our faculty . . . are very active in producing grants. But even this (highly desirable) activity carries costs and creates needs . . . . And I, at least, am convinced there is need for a grant officer who takes faculty ideas and turns those ideas into grant proposals.

It will be necessary in the sciences, where technology is both necessary and expensive, to secure external funding for most research projects and indeed even for teaching equipment that is seldom used directly for research.

Modern instrumentation, supplies, and equipment are expensive, they sometimes become rapidly obsolete, and are increasingly difficult to support by local staff and by maintenance agreements. These factors limit research, and we will depend increasingly upon science faculty to seek external funding to support their research.

The college returns 10% of indirect costs on major external grants to faculty as a "research incentive fund." These funds can be used to purchase small equipment and supplies that often are used in student/faculty projects. (We should note that the availability of restricted funds for research can actually weaken research—when such funds are available some faculty are less likely to apply for external funds, avoiding the rigorous but invigorating process of grant-writing and external review.)

Throughout the 1990s . . . science faculty aggressively sought and obtained outside funding from a wide variety of governmental, private and corporate sources to support their research with undergraduates.

[The adminsitration should] try, through institutional fund raising, to allow faculty to spend time on teaching and research and not on grant seeking.

Faculty were encouraged to seek external grant support for their research with reasonable matching funds to be provided as necessary.

It is . . . not apparent to me that there is any loss of enthusiasm for competing for outside grants. Indeed, the vetting of one's ideas and directions in the peer-review grant process is one of the most important ways that science is validated.

I believe that external support for research in the sciences (particularly student-faculty research) is essential for the health of the enterprise. Writing a grant proposal forces one to organize ones idea and plans . . . . The opportunity for peer review . . . is essential. It provides validation for clearly thought out and valuable plans, and corrections for difficulties. If the grant is funded, pressure is on to carry out the proposed project and to produce results, which must make it through another peer review process. I would say that these factors are almost more important than the funding that grants bring.

I am concerned as is this group about lower grant proposal pressure from faculty from private liberal arts colleges. I think that there may well be several sources of that lower pressure. First, there is more support on an institutional grant basis for undergraduate research . . . . Second, many institutions have provided support for undergraduate research from their base budgets and from designated endowments. These two factors are not negatives, but are real positives, in that they indicate that agencies and institutions have committed themselves to undergraduate research being an essential element of an undergraduate education. This is evidence that the effort to advocate for undergraduate research as an excellent mode of education with benefits for faculty, students, and the body of knowledge of science has been a successful one. A major task now in from of us is to persuade faculty members of the value of preparing and submitting grant proposals to external agencies. Finally, I believe that the recovery of faculty salaries after years of erosion by inflation has had an effect. Many faculty members are receiving salaries that allow them a lifestyle that is appropriate, and are not as motivated as they once were. I do not advocate starvation as an inducement to write proposals again, but think that more competitive salaries has made an impact here.

External grants continue to be an enormous importance; small internal grants have increased.

With regard to individual grant proposals, our junior faculty have not been successful in their efforts to get federal funding (e.g. NSF, NIH); they have been more successful with proposals submitted to foundations and corporations.

GRANTS OFFICE

A new COS grant program was piloted recently. The grant program is designed to provide salary support to faculty to enable them to write grant proposals during a time when there were no teaching obligations. The pilot was successful and will become part of the regular grant offerings. In addition to the college grant programs, the university's Council on Faculty Research offers grant opportunities for the academic year (about $40,000 total) and for the summer (about $50,000 total).

Major grants from many national funding agencies are much larger than needed to sustain faculty research for many of our scientists.

The required "graduation" by most funding agencies from small starter grants to sustaining grants is generally unrealistic given the scope of much of the research effort by our scientists.

Faculty-initiated external grants in the early years of the decade averaged over $600,000 total per year, the result of a success rate of 70% and a funding rate (amount awarded as a percentage of amount requested in all proposals) of 48%. In the middle years of the decade, 1994–1997, the success rate dropped to 42% and the funding rate dropped to 18%; total funding averaged only $265,000 per year. The averages since 1997–98 have been better (23% funding rate, averaging $600,000 per year, and success rates climbing), but external funding has not returned to the levels seen at the beginning of the decade. These variations are due, in part, to a generational shift in our science departments during the 1990s, when a large proportion of our science faculty reached retirement age.

We need to focus the research interests of the faculty so that they can take advantage of the limited resources of the college, and find funds to enable faculty to establish ongoing research projects.

The college has also urged the faculty to seek outside support for curricular and research innovations. . . . The Faculty Personnel Committee recognize the value of securing outside funding and note these achievements on reviews and merit pay decisions.

Effective opportunities include:(1) Grants that buy time for the faculty. (2) Focused,

sponsored projects from industry provide support and a special excitement and sense of purpose. (3) Equipment and supply grants. (4) Grants that financially support students so they can be employed doing research rather than in non-professional off-campus jobs.

The institution has been very supportive of grant applications to external funding sources to build summer undergraduate research programs involving both…students and also students from other institutions.

[Our institution] has provided, for example, administrator's stipends as well as free summer housing to students participating in these programs. These types of programs raise the awareness of the excellent science faculty and facilities to prospective students as well as the larger science community.

We have developed web pages to guide faculty members through the practical aspects of submitting proposals; these will be improved each year.

Today, nearly every faculty member in the science departments either has a grant that supports collaborative research with students or has a grant proposal under consideration. This has changed the culture of those departments.

ROLE OF POSTDOCTORAL ASSOCIATES

What initiatives have been (would be) particularly effective in strengthening science teaching and research?

The main way we could use additional funding would be to allow departments to hire postdoctoral research associates to keep the research going while the faculty member is out of the lab. I realize that this would be expensive, but in the absence of graduate students I know of no other way to improve our research output.

[An option would be to] reassess the value of postdoctoral fellows at undergraduate institutions . . . .The benefit to the faculty and students is the expertise and continuity post-doctoral fellows bring to faculty laboratories and the new opportunities that fellows can offer to undergraduates completing research. At the same time, the fellows profit as they expand their expertise in both teaching and research, and undergraduate science programs across the country benefit as the pool of talented young teacher-scholars who are committed to undergraduate instruction is strengthened.

One of the most important [initiatives] was the selection of [our university] for participation in the Camille and Henry Dreyfus Scholar/Fellow Program . . . . The addition of this full-time fellow made it possible for many students to be involved in research, and the synergy between the fellow, . . . faculty and the students established a momentum that has been maintained for several years.

We have also increased the number of professional (Ph.D. degree holders) laboratory teaching assistants so that tenure track faculty can spend more time on lectures, discussions and research with students.

The college has already had successes with teaching postdocs, an attractive position for new Ph.D.s who want to experience a small liberal arts college environment. Having more postdocs in our laboratories would allow additional mentoring and research instruction for our students and would contribute to research becoming a year-round effort rather than a primarily summer activity

Encourage more programs to support science graduate students doing teaching/research postdocs in liberal arts colleges.

Another approach might be to set up a fund, perhaps endowed, for postdocs of a sort that would complement the role of a faculty member. That is, the faculty member could, from time to time, apply for funds to support a postdoc who would help the faculty member with research and at the same time be mentored by the faculty member in teaching.

DEPARTMENT DIVERSITY

What is the current status/need?

Of eleven new permanent faculty with a natural science background . . . we have hired four females . . . .

We should continue to take advantage of opportunities to increase the number of science faculty from demographically under-represented populations on campus, as well as to attract more science majors from these groups.

EQUIPMENT

What are the major barriers, incentives or needs?

Another ongoing factor that affects [our insitution] and many other small schools is the high cost of research: science instrumentation is expensive at the outset, and it must be maintained and/or replaced . . . . The institutional endowment . . . is not sufficient to cover all costs for new or replaced equipment.

A second barrier is in availability of large equipment budgets to purchase big-ticket equipment items for state-of-the-art science in some areas.

The need for new equipment has increased dramatically in the last decade. While science faculty has benefited from agreements to share equipment between professional and liberal arts units, technology has moved faster than departmental budgets and joint agreements. . . . Biological sciences and chemistry have benefited from an endowment fund that provides limited funds for equipment.

We are . . . struggling, like many universities, with the extraordinary escalation of equipment costs occasioned by the computer revolution of the past decade.

Emphasis on state-of-the art experiences for our students places our faculty and administration in the constant role of identifying funding to provide and maintain cutting edge technology and equipment; although we have some very good equipment, our equipment needs are immense. Costs surrounding the use of equipment are reflected in the initial purchase of equipment, but also in direct costs of repair or maintenance contracts on large pieces of equipment. Funds for maintenance of equipment (maintenance contracts and other) and for replacement of obsolete equipment are hard to identify.

. . . .

Through a variety of sources, we have invested heavily in computer equipment, but have no consistent funding for other types of scientific equipment.

. . . .

The university is developing a technology plan that we hope will make possible a more systematic approach to equipment purchasing.

. . . .

Much sophisticated equipment can be found on our campus today, a major improvement over the way things were just a decade ago. But unless there is even more of a commitment to equipment, those advances will soon become background noise.

. . . .

A need exists . . . to assist undergraduate institutions in maintaining access to cutting-edge equipment. Often times there are grant opportunities for new equipment associated with new curricular programs, but there is also a need to replace increasingly costly fundamental equipment associated with existing curricular programming.

. . . .

The cycle of equipment replacement or upgrading [is] an unusually demanding one in the sciences. Both the costs of the equipment and its useful life may bring special financial burdens that are only increased by the rapid turnover in technologies tied to computers. Assistance with the costs of purchasing and replacing equipment remain important points of support.

. . . .

The lack of sufficient funds for the acquisition, replacement and maintenance of science equipment used for teaching and research.

. . . .

Most available dollars have gone to technology upgrades leaving traditional laboratory equipment upgrade or replacement unfunded.

. . . .

One prevailing problem . . . is that inadequate funds are available for maintenance and replacement of equipment. Also, inadequate funds have been available to upgrade computers at an appropriate rate.

. . . .

[One barrier is the] lack of administration backing of a coherent plan for the purchase, maintenance, and replacement of major laboratory instruments.

. . . .

[We need] additional funds for laboratory equipment and supplies. The college's budget for these items is inadequate to properly equip our laboratories.

. . . .

As technology continues to rapidly evolve [the college] is committed to providing ongoing replacement and upgrading of the instrumentation required for teaching and conducting contemporary scientific investigations.

. . . .

The college exhibits a history of sound, timely maintenance for laboratory instrumentation and has responded effectively to requests for new instrumentation when our scientists make clear the need for replacement of equipment that no longer serves effective teaching or research.

. . . .

The university has been under funded for

many years, making it almost impossible to maintain and replace obsolete scientific equipment and provide appropriate new equipment.

[We have] institutional commitment to new facilities (new science complex) and to matching equipment grants.

[We have a] 10-year replacement plan for major instrumentation partially endowed, $150–250K per year, budget line for instrumentation repair, $40K per year.

A second major barrier is the scramble to keep our equipment updated and in good order. We have not succeeded in budgeting for capital acquisitions and very much dependent on grants.

[We have] capital support in good, modern instrumentation and upgrade, "smart technology" classrooms.

Several of the major equipment items that are needed at the undergraduate level come with a price tag in the six-figure range. Innumerable equipment items cost five figures. Not only must this equipment be purchased, it must also be maintained, and eventually replaced . . . .

EQUIPMENT

As instruction becomes more interactive and research-based, greater emphasis will be placed on laboratory instrumentation and computing technology which require both internal and external funds.

The second main issue for us is the cost of equipment for research. Small colleges with smallish endowments simply do not have enough money to provide the kind of research equipment that many faculty need for research. We have had to make hard choices, and we generally focus on equipment that is also beneficial to student's education.

[We have] institutional cost sharing of externally funded projects, particularly those supporting instrumentation purchases . . . .

Major barriers include . . . lack of adequate funding for upgrading and replacing equipment to initiate and participate in basic research;

Finally, instructional technology support is marginally adequate and equipment funds are adequate but not robust.

Equipping these facilities with modern instrumentation will remain an ongoing challenge and will primarily be the responsibility of the science faculty to secure external grants.

These barriers include: outdated equipment and labs, total lack of adequate labs at the . . . home base of the Department of Natural Sciences.

We lack several fundamental pieces of equipment for research expected at an undergraduate university such as [ours].

Instructional equipment initiative in the late 1980s and early 1990s gave us a huge infusion of instructional equipment. Much of the analytical instrumentation was utilized by research students as well.

Modern scientific research equipment and dedicated research space is difficult to obtain. Aging facilities are inadequate in many cases to safely support modern scientific research. The university's budgetary support for equipment is highly variable and rarely adequate.

The costs of equipment, state-of-the-art computer hardware and software, and computer service personnel are a challenge to the budget.

We have been able to equip our new facilities with needed scientific instrumentation and computers through the generosity of several foundations . . . .

We need to confront the costs of providing updated and new scientific equipment for the nearly thirty . . . faculty working in laboratory settings. Such equipment is needed for classroom/laboratory instruction and joint faculty-student research projects. . . . We also have to provide competitive start-up funds that could approach $50,000 or more per faculty member.

Furthermore, the half-life of modern analytical and other equipment is far shorter than was once the case. . . . Unlike research universities, we do not have the critical mass of research faculty and postdoctoral fellows, the graduate student population, and the mission to allow us to use most laboratory equipment for contracted research in a way that would allow us to create cost-center models for major scientific equipment. The result is that we must use existing resources to create recapitalization pools for equipment or suffer heavy maintenance and repair costs. This is not aided by the inability to provide sufficient technical support for many labs either due to unwieldy state restrictions on non-teaching positions or competition with the private sector for skilled technicians. The result is that faculty often spend far too much time acting as technicians with a resulting loss in productivity and increasing sense of frustration.

Contemporary science is done with expensive sophisticated instrumentation that requires regular maintenance from technically skilled personnel. Without this personnel, our faculty are drawn from teaching and scholarly activities to maintaining laboratory equipment. Our long-term goal should be the provision of adequate professional support staff . . . .

Modern scientific equipment places demands on building infrastructure that often is unmet in older buildings—power, water pressure, HVAC, cabling, etc.

Our budget includes hard dollars and endowment for a good quality and quantity of scientific equipment. We have a policy that equipment doesn't belong to an individual faculty member nor is it for faculty use only, therefore we get more from an equipment dollar.

The college was also awarded a $100,000 grant from [a private foundation] to establish a science equipment fund. This fund provides matching grants for faculty members who obtain equipment grants. The fund makes it easier to support equipment purchases and provides an incentive for faculty members to seek outside funding for equipment.

We just raised the funds for a fluorescence spectrophotometer, but our list of needed equipment still has a total price tag of well over $1 million.

State-of-the-art computers and other information technology equipment are readily available due in large part to a student technology fee; and , in addition, the faculty have been successful in obtaining NSF-ILI grants for equipment over the past 15 years.

All faculty and students have need of sophisticated equipment to conduct research; and such equipment is difficult to obtain in an environment where no regular equipment budgets exist.

Faculty are expected to acquire major equipment primarily through grants rather than regular budgets.

[Faculty are encumbered by] a lack of modern major equipment. Such equipment includes, but is not limited to, mass specs, cell sorters/counters, automated plate washers, epifluorescence microscopes with digital imaging capabilities, thermocyclers, incubators, and environmental chambers.

Although we have a steady flow of funds for supplying scientific equipment, six-figure items are very difficult for us to purchase without outside funding, which is not as predictable as our internal funds.

An ongoing concern for teaching and research . . . is our ability to systematically replace aging equipment. Recent initiatives . . . tend to link grants for equipment to curriculum development. This is fine for justifying the acquisition of sophisticated instrumentation . . . the first time around, but often seems to present an artificial barrier when faculty seek support for the replacement of this equipment.

We have also had for some years an endowed fund for instrumentation and equipment purchases. Recently we banished all applications for computers and software from this fund and put them in the queue managed by the Information Technology Services on campus. That has taken a lot of pressure off the science instrumentation and equipment fund.

We [recently] dedicated a new science building. . . . We may have the space now . . . but we still need instrumentation. Faculty claim they still can not do their work nor do faculty/student research because we come up short on the lab infrastructure. There may be a psychological dimension to this—we have a glorious building and the shortfall on the equipment side just seems to be more conspicuous than when our scientists were housed in a 1950s yellow-brick relic.

As faculty research increases in the natural sciences, the need for scientific equipment increases; and some equipment costs are nearly astronomical. It is obvious that only the very wealthiest college or university can shoulder the total cost of scientific equipment.

The annual cost of needed equipment replacement and new purchases is always more than our budget can support.

START-UP COSTS

What are the current allocations and needs?

In 1995, the dean of the College of Liberal Arts offered laboratory start-up funds in the amount of $30,000 to new, tenure-track faculty hired in the science division;

Costs in meeting start up requisites for research by new junior faculty are soaring and exceed our institution's ability to meet these needs. We seek some of these funds through foundational support of such efforts, but "productivity track record" requirements complicate this search for support.

Incoming faculty are offered start-up and renovation money for their laboratories.

Our start-up funds are twenty times what they were twenty years ago and teaching loads are much less. This gives our faculty a better chance at being competitive. Also important are mentor relationships, better support from institutions research office.

Beyond the computer purchases . . . we

have no regular program of start-up funds for new faculty, though it has been possible to provide funds for a few science faculty on an ad hoc basis.

Substantial sums of financial resources have been provided as "start-up" for the faculty person to equip a research laboratory.

We have a long history of providing significant start-up funds for new hires in the sciences (typically $50,000–$75,000).

Attracting replacement faculty with great research potential requires large start-up packages for equipment, S & E, and laboratory modification. We are at a very exciting time as retirements are plentiful, but replacement costs are difficult to provide . . . .

In recent years [our university] has provided start-up funds to help new faculty establish their research laboratories. The university also has supported grant application activities by providing stipends to support faculty who are writing proposals during the summer and it has been generous in its contribution of matching funds in support of those proposals.

Recent faculty hires in biology and chemistry includes research-oriented young faculty; start-up funding has been available for equipment. Major barriers include lack of start up stipend-support for young faculty and relatively high teaching loads, in terms of contact hours, expected for all faculty.

We recruit new faculty who have a real interest in involving undergraduates in their research. These faculty are supported with start-up funds, computers, and summer research fellowships. Efforts to obtain external grants are encouraged, supported and rewarded through personnel decisions as well as proposal awards and indirect cost return programs.

The new facility will improve the college's ability to replenish its ranks by attracting new, high quality scholar-teachers. However, this brings an additional challenge in the provision of start-up funds for new faculty research programs.

The college has consistently provided start-up funds for new science faculty. These funds support the basic research programs and collaborative work with students that new science faculty launch on our campus.

Provide adequate lab and equipment start-up funds for all new science and mathematics faculty members.

New faculty members get start-up funds of about $8000 over two years.

[We have] start-up funds for all tenure-track faculty ranging from $5K (for language and international studies faculty) to $80K for laboratory science faculty.

In the last decade start-up funds for new science faculty from the college have averaged nearly $50,000.

An unhealthy proportion of grant matches and start-up funds come from the college's annual operating budget. The few endowments we have which are dedicated to start-up and/or match in the sciences are woefully inadequate to the level of activity–and excellence–represented by the faculty.

START-UP COSTS

In the biology, chemistry, and physics departments . . . (1) an average of $18,000 was provided to each of 10 new faculty hires in these departments during the last decade and (2) each research active faculty member receives an average of $4,000 each year to budget for "supplies."

An increase in start-up funding is needed in order to attract and support the highest quality faculty to departments in the college.

[We have] insufficient in-house funding for research and relatively low start-up funds for new faculty.

Start-up funds for new tenure-track faculty have greatly increased.

[We have] expanded start-up funding for new laboratory scientists (which has risen over four years from $8000 to $50,000 with built in incentives for grant proposal writing ($20,000 on arrival, $10,000–$20,000 on submission of first grant proposal, $10,000–$20,000 initially reserved for matching but released for unrestricted use after rewriting of a rejected grant proposal if it is still not funded). All new tenure-track faculty members receive a reduced teaching load in the first year and a pre-tenure leave in the fourth year after a satisfactory interim review.

With a faculty that is increasingly active in seeking external grants, we need to fund more carefully and deliberately within our budget process the institutional matching contributions and cost-shares that often expected by these agencies.

[The] demand factor that strains resources is provision of adequate start-up funding, matching funds, and resources for regular replacement of laboratory equipment.

There has been a trend in the physical and life sciences . . . to hire faculty with well-defined research agendas. To support these faculty [the university] has started to provide start-up money for faculty hires that would allow them to get their research underway as quickly as possible after arrival on campus.

(1) Start-up funds; ours are modest, $10–15K per new tenure-track faculty member. (2) Reduced teaching loads for new faculty the first year (25%, 12 decreased to 9 units). (3) Extra pay the first or second summer for new faculty to write a grant proposal or set up research lab. (4) Assigned time to prepare research grants. (5) Special attention to scheduling undergraduate research group work and meetings to conserve time.

Since 1990, we have added to the total size of the faculty: four biologists, . . . two chemists, three geologists, one physical geographer, and one physics position in astronomy . . . . All new tenure-track faculty, whether new or replacement positions, are guaranteed two summers of support at the level of $4000, and the institution meets the highest priority equipment needs for new tenure-track faculty in the sciences.

Administrative support for faculty-student research includes start-up funds for new faculty and a course release during the first year to facilitate the initiation of a research program. New faculty have no committee or advising responsibilities during the first year, and following a successful fourth-year review.

We have managed to double our recently established New Faculty Research Fund. These monies are available to new faculty during their first three years with us. Faculty can repeat applications in each of these first three years.

FACULTY DEVELOPMENT

What policies, strategies and incentives have been particularly effective?

With assistance from several private foundations, we hope to create a science curriculum that is more streamlined, more educationally sound, more fundamentally investigative and more truly interdisciplinary. We also hope to customize workloads within (or across) departments, allowing people to make disproportionate contributions in their areas of strength and interest, thus producing a more efficient and energized faculty work group.

. . . .

The turnover has resulted in a general increase in the research activity of these departments because of the emphasis we and the institution have placed on hiring people with promise for both strong teaching and active interest in research.

. . . .

[Our department] has been very effective in promoting a scholar/teacher model among the faculty, and an active learner/researcher model among students. Institutional grants . . . have been very helpful in this regard.

. . . .

Departments have been encouraged to reconfigure workloads so that, in the context of circular needs and expectations, individual faculty strengths and interests might coincide more closely with institutional needs.

. . . .

[Barriers include] persistence of many faculty members who are not research-active because they were hired at a time when research was not expected. These older faculty members can serve as counter-role models for newer faculty (if increased research is a goal).

. . . .

As mentioned in the previous section, there needs to be an institutional recognition that research is an important part of the educational mission. Recognition entails providing resources and policies that better support research as part of the faculty workload assignments. It also requires that equipment budgets be established and stabilized in recognition that teaching science is a research/equipment intensive enterprise.

. . . .

We are a teaching institution. Faculty engaged in research activities are valuable to us because they are better teachers and they are more able to mentor students' research projects. . . . Our strategic plan, which is our key to decision-making about resources, includes a statement that we want to expand opportunities for student research/experiential learning. I see this as tied to faculty opportunities, too.

. . . .

The institution has committed financial and other resources to enabling teachers, especially junior teachers, to improve their pedagogy through participation in yearlong seminars (with reduced teaching loads).

. . . .

A faculty research support-funding program . . . also provides impetus for faculty to conduct research and to apply for external funding. These programs provide all new faculty with a $5,000.00 research stipend for their first summer at the university in order to free them from teaching so they can concentrate on development of their research program. Subsequently, they can apply for varying amounts of funding to support both ongoing programs . . . and for release time from teaching to pursue development of large-scale external funding proposals. (Of course the availability of this is somewhat limited.)

. . . .

Lack of resources make it difficult for mid-level or senior faculty to retool or shift research emphasis.

. . . .

FACULTY DEVELOPMENT

At institutions like [ours] where teaching is prized, research may best be stimulated by encouraging undergraduate research and weighing faculty workload assignments appropriately.

In effect the science faculty have been given time to develop and support their individual research programs. In return, the administration expects to document the number of science undergraduates participating in summer research programs and independent study/research courses during the academic year.

Along with start-up funding, we have a substantial program in place for faculty to seek internal support for travel, research, and summer fellowships. We have recently funded a new internal grant category that expressly supports collaborative student-faculty research during the summer (stipends for all participants, research allowance, housing allowance for students, and travel support for both faculty and students to attend a conference at which they would present their work). In addition, each department has a generous travel fund to support faculty professional development.

Each new faculty is guaranteed two summers of research support, a research sabbatical after successful completion of the third year review, and course release during the first year to allow for participation in a new, year-long teaching and research seminar which is expressly designed to promote the professional development of new faculty.

[Our institution] needs to reward successful researchers with additional reassigned time, decreased committee assignments or salary compensation to encourage and foster an environment conducive to research.

The program of summer stipends has been beneficial; and faculty may apply for these stipends every other year. A fairly recent program is the program of Junior Faculty Fellowships. Some (sadly not all) junior faculty are guaranteed summer stipends for their first three summers at [our institution].

Faculty mentors also are assigned to junior faculty, and both the college and the [university] foundation provide resources and assistance for all faculty to develop and/or improve their grant writing skills.

Granting new faculty two years of reduced teaching load in order to start up their research study, apply for grant support and once grant funded, facilitate release-time for research has assisted in stabilizing this research component.

[We have] strong institutional support for grant seeking activities: faculty get a lot of encouragement and mentoring to submit research and curricular grants.

Many faculty, especially junior faculty, are torn between self-inflicted pressures to do externally-rewarded competitive research and departmental/institutional structures that have not responded to such demands with a better balance between teaching and research.

Increasingly, young faculty are sought who have strong research credentials and interests. With strong financial and emotional backing, there remains the risk of disillusionment when they encounter the reality of heavy teaching loads, inadequate research space and minimal internal support, (e.g., lack of start-up funds).

Our challenge is come up with resources for faculty development that matches our collaborative research resources.

The college offers generous sabbatical and travel policies-all faculty are entitled to sup-

port to attend at least one scientific conference annually.

Finding the necessary faculty time required to pursue research and the outside funding for both departmental equipment and individual research grants remains our goal. Faculty and student research is a relatively new initiative at [our institution], and we are experiencing the challenge that accompany change. We continue to find ways to redistribute institutional resources for start-up costs of new faculty, to renew and encourage an emphasis on external grant writing, and to find ways to make our classroom and laboratory experiences efficient and productive so as to provide both faculty and students the time to engage in research.

The Faculty Research Grant program continues to be useful in providing seed money to help faculty develop projects that are meant to lead, and have led, to funding by external granting agencies. Modest allocations for publication costs, small travel grants and faculty fellowships (for a semester, a summer or an academic year), in addition to ad hoc course release for active investigators, round out the administration's current efforts to financially support an active research agenda among all its faculty.

Three steps were initiated during the last 10 years to help improve the instructional and research environment in . . . biology. First, the provision of modest start-up funds ($15,000) helped new faculty initiate their research and teaching endeavors. Second, the department used more flexibility in providing release-time credit for faculty actively involved in research . . . . Third, classroom space was converted into research laboratory space for active faculty.

Our faculty and their professional development, our facilities and our institutional coffers are important to our ongoing mission of graduating learned and prepared students in the sciences.

Applications to internal "seed-grant" programs (three different opportunities) give preference to proposals that actively involve undergraduates and that demonstrate competitive potential for external funding.

A "post-tenure review" process, with significant financial incentive, was developed by the faculty . . . and adopted by the university's administration. Review occurs each sixth year following the awarding of tenure or a promotion in rank. An "exceptional" rating (open only to faculty holding the rank of professor) is defined as "Evidence of continuing strong, effective, dedicated teaching and outstanding, sustained contributions to the discipline via research/scholarship/creative activity."

The new chair of our science division has been charged with formalizing undergraduate research at the college and needs access to funds to support faculty development projects and establish ongoing faculty/students research.

Several years ago . . . [the] president and the board of trustees demonstrated their commitment to faculty development by establishing a faculty development fund. . . . One collaboration . . . resulted in the identification of three previously unknown plant proteins. Their findings were published in the *American Journal of Botany*. . . . While the original faculty development fund has been exhausted, the college is working through its current campaign to raise additional funds to support faculty-students research.

An additional area of demand is the growth of interdisciplinary science. Our experience with the explosion in inter-

est in cell and molecular biology which required massive retooling of faculty and labs a decade or more ago is now being repeated in such fields as biomathematics, neurobiology and biological psychology, environmental science, biophysics, and earth system science. In each of these areas, we must maintain critical disciplinary strength while recruiting new faculty and developing curricular and research expertise in new sub- and cross-disciplines. Such initiatives require aggressive efforts to identify new funding for faculty lines and support for research. We must develop new curricular options in these important fields. At the same time, we are seeing more students double majoring in several sciences or in science and other field . . . . This means, in a sense, that one student requires twice the level of support in science courses.

. . . .

The sponsored research office offers several internal programs that provide both seed money and research leave time that allow faculty to develop or expand their research. In the past, we have offered faculty development funding to improve the academic curriculum or teaching, but that program has been discontinued.

FACULTY DEVELOPMENT

. . . .

New faculty are essentially "required" to have reduced teaching assignments to enable them to establish a research agenda. In recent years, we have made substantial progress in funding start-up costs and have also expanded institutional support for summer research fellowships for undergraduate students.

. . . .

[The university] instituted systematic funding of undergraduate research in 1990. The science departments have access to approximately $250,000 annually to support students and faculty. These monies underwrite a variety of programs, including an 8-week summer research experience for students, expendables and small equipment for faculty, student and faculty travel to national meetings, and very modest summer stipends for faculty engaged in the summer research institute.

. . . .

The Faculty Development Committee oversees programs that provide summer stipends for either research or curricular development, a course release program for special projects, a program providing a paid leave in the third or fourth year, and the sabbatical program. Although most of these programs are not unique to the sciences, scientists benefit disproportionately from some of them.

SECTION 8:
GLOBAL DATA

George Rubottom, Coordinator, Academic Excellence Study

In order to give the Study a more meaningful scope, the Study institutions were placed into the context of the broader PUI community. Toward this end, public data were assembled that have relevance to both enrollment and graduation statistics. Funding patterns from major providers were also studied. The sources of the data, along with pertinent restrictions to the data, are noted as follows:

ENROLLMENT, DEGREE AND GRADUATION DATA

The source for all enrollment, degree and graduation data, summarized in Tables 8.1–8.8, was the National Science Foundation WebCASPAR database; counts were derived from the Integrated Postsecondary Education System (IPEDS) Completions Report contained therein. WebCASPAR can be accessed through the NSF home page at http://www.nsf.gov by clicking on "Science Statistics." Dr. Richard S. Myers, Associate Provost for Budget and Institutional Research at Williams College, provided these data for the Study.

Some specific comments regarding the data are as follows: Full Time Undergraduate Enrollments, from 1985–1986 to 1997–1998, based on opening Fall enrollment were used. Science Baccalaureates from 1984–1985 to 1996–1997 were included. Double majors were assigned one major in all these counts due to the form of the Completions Report. Counts of Science degrees were limited to a selected group of fields that included *astronomy, chemistry, physics, geosciences and biological sciences.* It is important to note that *mathematics, engineering, computer-related areas, agricultural areas and fields related directly to medicine were not included.* Lists of "leading producers" were arbitrarily truncated at 150 when appropriate, but when "ties" occurred at the lower limit, all institutions having equal numbers of graduates were included.

FUNDING DATA

The focus on much of this data is to gain an understanding of the role, over time, of several *programs tailored to meet the needs of individual researchers* at predominantly undergraduate institutions. For this reason, the National Institutes of Health (NIH) Academic Research Enhancement Award (AREA) Program, the National Sciences Foundation (NSF) Research in Undergraduate Institutions (RUI)-Research Program, the American Chemical Society Petroleum Research Fund (ACS-PRF) Type B Program, the Research Corporation Cottrell College Science Award (CCSA) Program were chosen. Award data for the Camille and Henry Dreyfus Foundation, for the Howard Hughes Medical Institute, and for the U.S. Department of Energy (DOE) R&D Assistance Awards are also presented. Further, several programs stressing instrumentation were included. These were the NSF RUI-Instrumentation Program, the NSF Instrumentation and Laboratory Improvement (ILI) Program and the NSF Major Research Instrumentation (MRI) Program. No attempt was made to survey

NSF “mainstream” awards or NIH R01 type awards although these are acknowledged as sources of individual investigator support.

All Carnegie Classifications were obtained from the *2000 Higher Education Directory*, Mary Pat Rodenhouse, Editor, Higher Education Publications, Inc., Falls Church, Va.

THE NIH AREA PROGRAM

Funding data for 1986–2000 was found by a search for the AREA Program on the NIH Office of Extramural Research home page. *All dollar and award values presented refer to totals from the NIH AREA Program.* These data are used in Figure 8.2, “Research Corp (CSSA), PRF (Type B), NSF (RUI Research) and NIH (AREA) Combined Activity 1986 – 2000”, Figure 8.3,“Research Corp (CSSA), PRF (Type B), NSF (RUI Research) and NIH (AREA) Combined Funding 1986 –2000,” Figure 8.5,“NIH R-15 (AREA) Activity 1986 – 2000” and Figure 8.6, “NIH R-15 (AREA) Funding 1986–2000.” All other NIH AREA presentations use the list of institutions described below.

For the institutional studies, a more proscribed group was determined. Ms. Christina Zimmerman, Program Analyst, NIGMS provided a list of all NIH R15 awards from 1985–1999 based on the institution and departmental designation. From this list of 2,308 entries, 1,359 awards from 379 institutions were found to originate from departments of Biochemistry, Biological Sciences, Chemistry, Physics and “Generic Science”. Medical institutions (23) and departments (224) that were not related to the Natural Sciences were excluded along with 195 institutions that did not identify a department. In all, this process excluded 949 awards. The resulting data were used in producing Table 8.9, Table 8.10, Figure 8.1, Figure 8.4 and Figure 8.7.

NSF RUI RESEARCH AND NSF INSTRUMENTATION PROGRAMS

NSF-RUI Research and NSF-RUI Instrumentation data regarding funding, awards and numbers of proposals, obtained from the NSF proposal and awards databases, were furnished by Mr. Paul G. Spyropoulos, Computer Specialist in the Division of Chemistry at NSF. *The data cited for both programs derived from counts from the Divisions of Astronomical Sciences, Chemistry, Materials Research and Physics in the Directorate for Mathematics and Physical Sciences; the Directorate of Geosciences; the Directorate for Biosciences; and the Office of Polar Programs.* This portion of the study focused on individual investigators and, therefore, funding and frequency data exclude awards made to groups of more than two investigators. Award data refers to reviewed proposals only, while funding data refers to all expenditures for RUI activities for the particular year. Table 8.11, Table 8.12 and Figures 8.8 -8.21 summarize activities in the physical sciences, geosciences and the Office of Polar Programs. Table 8.13, Table 8.14 and Figures 8.22–8.24 summarize activities in the biosciences.

RESEARCH CORPORATION CCSA PROGRAM

Research Corporation CCSA data were obtained from Research Corporation annual reports. These data are shown in Table 8.15 and Figures 8.25 - 8.29.

ACS-PRF TYPE B PROGRAM

PRF Type B data for years 1986 – 1999 were obtained from the corresponding PRF Annual Reports and 2000 data were kindly provided by Dr. Lawrence A. Funke, Program Administrator, PRF. Determinations of institutions, funding levels, disciplines and public or private status of institutions were made directly from the awards lists. Table 8.16 and Figures 8.30–8.34 present these data.

CAMILLE AND HENRY DREYFUS FOUNDATION AWARDS

Mr. Gerard L. Brandenstein, Associate Director, The Camille and Henry Dreyfus Foundation, Inc. furnished the data for the Dreyfus Foundation awards for the period 1990–2000. Table 8.17, Table 8.18 and Figures 8.35–8.37 summarize these findings.

HOWARD HUGHES MEDICAL INSTITUTE (HHMI) AWARDS

Data for the HHMI awards for Undergraduate Biological Sciences Education, Colleges shown in Table 8.19 were obtained from the HHMI Web Site and include all awards made from 6/30/1988 to 8/15/2000.

DEPARTMENT OF ENERGY (DOE) R&D FINANCIAL ASSISTANCE AWARDS

The data for the non-Ph.D. granting institutions given in Table 8.20 and Figure 8.38 were extracted from the 2,138 award entries obtained from the DOE Procurement and Assistance Data System by searching “New R&D Financial Assistance Awards since 1994 for CFDAs 81.022, 81.049, 81.077, 81.112, 81.114 and 81.115, program–D0420.S400. STD99.DATA (T000913).” Ms. Nancy Canody, Procurement Analyst, U.S. Department of Energy and Mr. Michael Sanders, Senior Programmer, Dyncorp, Gaithersburg, Md., are acknowledged for providing the data set.

NSF-ILI PROGRAM

Data for the ILI Program shown in Figures 8.39–8.43 were obtained from 1989–1998 Division of Undergraduate Education Annual reports furnished by Dr. James H. Lightbourne, III, Senior Science Advisor of the Division of Undergraduate Education, NSF.

NSF-MRI PROGRAM

Data for the MRI Program presented in Table 8.21, Figure 8.44 and Figure 8.45 were kindly provided by Mr. Joseph F. Burt, Staff Associate of the Office of the Director/Office of Integrative Activities, NSF.

Table 8.1. Leading Producers of Science Baccalaureate Degrees from 1115 Predominantly Undergraduate Institutions 1985–1997

Study (*)	Academic Institution	Astronomy	Chemistry	Physics	GeoSciences	BioSciences	Total
	San Diego State University	27	230	210	374	1,775	2,616
*	College of William and Mary	0	585	220	175	1,403	2,383
*	California State Poly U-San Luis Obispo	0	164	145	0	1,968	2,277
	California State University-Northridge	0	199	205	208	1,583	2,195
*	University of PR Mayaguez Campus	0	361	87	66	1,558	2,072
*	California State University-Long Beach	0	292	101	90	1,481	1,964
*	San Jose State University	0	374	251	213	1,126	1,964
	Inter American U of PR San German	0	254	0	0	1,704	1,958
	Illinois State University	0	496	147	160	1,086	1,889
	San Francisco State University	0	136	122	79	1,525	1,862
*	College of Charleston	0	209	95	131	1,389	1,824
	University of North Carolina at Wilmington	0	236	64	152	1,351	1,803
*	Central Michigan University	2	221	27	458	1,094	1,802
*	Humboldt State University	0	76	66	414	1,181	1,737
	University of Texas at San Antonio	0	105	44	70	1,496	1,715
	California State University-Fullerton	0	194	110	147	1,215	1,666
	St Olaf College	0	511	145	0	974	1,630
*	University of Wisconsin-Stevens Point	0	199	30	0	1,401	1,630
	George Mason University	0	164	95	144	1,205	1,608
	California State University-Sacramento	0	219	79	174	1,131	1,603
*	Eastern Michigan University	0	212	101	333	957	1,603
	California State Poly University Pomona	0	212	160	76	1,152	1,600
*	Northern Arizona University	1	264	55	275	977	1,572
*	Eastern Illinois University	0	137	75	176	1,182	1,570
*	University of Scranton	0	270	47	0	1,245	1,562
	The Pontificial Catholic Univ. of PR	0	309	9	0	1,168	1,486
	Millersville University of Pennsylvania	0	162	131	260	918	1,471
	Stephen F Austin State University	0	91	75	261	1,043	1,470
*	Bucknell University	0	225	56	78	1,086	1,445
*	James Madison University	0	204	80	164	981	1,429
*	University of Wisconsin-Eau Claire	0	297	126	109	884	1,416
*	University of Minnesota - Duluth	0	269	41	220	877	1,407
	Inter American U of PR Metropolitan	0	182	0	0	1,220	1,402
	Xavier University of Louisiana	0	488	87	0	821	1,396
	Richard Stockton College of New Jersey	0	170	66	79	1,080	1,395
	St Cloud State University	0	173	67	121	1,032	1,393
*	Wake Forest University	0	271	108	0	1,013	1,392
*	Creighton University	0	303	65	80	936	1,384
	East Carolina University	0	175	73	135	997	1,380
	University of PR Cayey University College	0	274	0	0	1,102	1,376
	University of North Carolina at Charlotte	0	207	53	315	798	1,373
	University of Central Florida	0	166	77	0	1,100	1,343
*	Oberlin College	0	183	111	81	965	1,340
	SUNY College at Oswego	0	238	98	194	802	1,332
	Western Michigan University	0	239	35	312	746	1,332
*	SUNY College at Geneseo	0	118	204	106	895	1,323
*	Carleton College	0	334	227	252	505	1,318
*	Southwest Missouri State University	0	218	60	139	857	1,274
*	Western Washington University	1	165	115	256	718	1,255
*	University of Northern Iowa	0	258	83	130	766	1,237

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Table 8.1. Leading Producers of Science Baccalaureate Degrees from 1115 Predominantly Undergraduate Institutions 1985–1997

Study (*)	Academic Institution	Astronomy	Chemistry	Physics	GeoSciences	BioSciences	Total
	California State University-Fresno	0	254	75	100	792	1,221
*	Colgate University	4	163	89	305	655	1,216
	Truman State University	0	170	84	0	959	1,213
*	Augustana College (Rock Island, IL)	0	107	90	57	903	1,157
	Wright State University, All Campuses	0	254	40	174	689	1,157
*	Western Kentucky University	0	186	108	125	728	1,147
*	Gustavus Adolphus College	0	198	153	71	719	1,141
*	Colorado College	0	140	115	166	715	1,136
	California State University-Hayward	0	220	52	93	768	1,133
*	Towson State University	0	102	104	0	910	1,116
	Idaho State University	0	99	92	90	821	1,102
	Eastern Washington University	0	175	67	95	759	1,096
*	Middle Tennessee State University	0	247	36	115	694	1,092
	Sonoma State University	0	170	153	158	600	1,081
*	Southwest Texas State University	0	163	113	0	804	1,080
*	Rochester Institute of Technology	0	329	97	0	646	1,072
*	Hope College	0	360	75	62	573	1,070
*	St Lawrence University	0	116	44	129	777	1,066
	Indiana University of PA, All Campuses	0	170	94	133	665	1,062
*	Smith College	7	99	58	129	765	1,058
	Metropolitan State College of Denver	0	281	37	107	627	1,052
	University of Northern Colorado	0	141	74	294	540	1,049
*	Mount Holyoke College	7	114	72	62	793	1,048
	Ball State University	0	217	61	101	668	1,047
*	Williams College	26	325	97	123	474	1,045
	East Stroudsburg U of Pennsylvania	0	88	59	36	859	1,042
*	Furman University	0	263	76	83	601	1,023
*	Southern Illinois University at Edwardsville	0	248	59	59	656	1,022
	SUNY College at Brockport	0	105	54	326	529	1,014
	Youngstown State University	0	325	25	90	573	1,013
	Loma Linda University	0	32	15	17	944	1,008
*	College of the Holy Cross	0	318	152	0	531	1,001
	University of Nebraska at Omaha	0	99	50	56	782	987
	California State University-Chico	0	148	42	171	624	985
*	Franklin and Marshall College	0	208	118	163	483	972
	Gannon University	0	328	12	15	615	970
*	Occidental College	0	111	143	60	638	952
*	Bowdoin College	0	150	101	35	663	949
	Marshall University	0	285	22	65	569	941
*	Luther College	0	83	77	0	780	940
	University of Massachusetts at Boston	0	178	55	78	628	939
	Villanova University	19	120	38	0	752	929
	Appalachian State University	0	142	110	66	595	913
	SUNY College at Plattsburgh	0	139	95	49	628	911
	University of Wisconsin-Oshkosh	0	128	47	161	573	909
	Ursinus College	0	193	49	0	663	905
	University of Texas at El Paso	0	104	70	98	632	904
*	John Carroll University	0	239	97	0	567	903
	Montclair State University	0	162	27	41	671	901
*	Allegheny College	0	196	99	54	551	900

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Table 8.1. Leading Producers of Science Baccalaureate Degrees from 1115 Predominantly Undergraduate Institutions 1985–1997

Study (*)	Academic Institution	Astronomy	Chemistry	Physics	GeoSciences	BioSciences	Total
*	Wellesley College	25	159	58	54	604	900
	Hampton University	0	105	32	0	760	897
	SUNY College at Buffalo	0	127	85	264	418	894
*	Fairfield University	0	89	55	0	749	893
	Western Illinois University	0	85	64	119	622	890
*	Colby College	0	112	56	89	631	888
*	Central Washington University	0	75	54	76	677	882
*	Middlebury College	0	147	109	100	523	879
	Concordia College-Moorhead	0	78	67	0	731	876
	University of Colorado at Denver	0	143	36	134	562	875
	SUNY College at Fredonia	0	148	159	128	438	873
	Shippensburg University of Pennsylvania	0	154	83	151	484	872
	University of Wisconsin-La Crosse	0	191	21	0	660	872
	Oakland University	0	94	55	0	720	869
*	University of Tennessee at Chattanooga	0	348	81	42	398	869
*	University of Richmond	0	215	31	0	611	857
	Mary Washington College	0	122	115	41	577	855
	The College of New Jersey	0	177	44	0	633	854
*	Union College (Schenectady, NY)	0	131	49	33	641	854
*	Pacific Lutheran University	0	117	51	54	630	852
	University of North Carolina at Greensboro	0	177	40	0	634	851
*	Bates College	0	117	128	66	537	848
	Siena College (Loudonville, NY)	0	90	52	0	702	844
*	College of St Benedict / St John's U.	0	189	83	0	567	839
	Bloomsburg University of Pennsylvania	0	89	50	155	542	836
*	Lafayette College	0	136	36	55	602	829
	Houston Baptist University	0	266	2	0	560	828
	St John's University (Jamaica, NY)	0	67	37	0	723	827
	SUNY College at Potsdam	0	108	150	119	447	824
	University of South Dakota	0	129	12	38	633	812
	Murray State University	0	170	30	85	526	811
	Northern Michigan University	0	73	31	64	642	810
*	Reed College	0	172	204	0	433	809
	Muhlenberg College	0	137	38	0	629	804
	University of PR Humacao	0	330	48	0	424	802
	Wittenberg University	0	107	72	57	565	801
	Albion College	0	158	53	65	522	798
*	Wesleyan University	30	122	126	0	518	796
	Georgia Southern University	0	104	72	61	558	795
	Pittsburg State University	0	65	44	0	686	795
*	Fort Lewis College	0	173	47	161	413	794
	St Mary's University	0	52	3	31	705	791
	Francis Marion University	0	72	70	0	641	783
*	Trinity University	0	97	50	78	554	779
	Adelphi University	0	38	48	19	670	775
	Salisbury State University	0	84	48	0	643	775
	Weber State University	0	122	71	84	497	774
*	Grinnell College	0	225	135	0	413	773
	Loyola Marymount University	0	57	21	0	691	769
*	Fordham University	0	128	67	0	570	765

Table 8.2. Leading Producers of Astronomy Baccalaureate Degrees from 1115 Predominantly Undergraduate Institutions 1985–1997

Study (*)	Academic Institution	Astronomy Degrees
*	Wesleyan University	30
	San Diego State University	27
*	Williams College	26
	Vassar College	25
*	Wellesley College	25
*	Haverford College	23
	Villanova University	19
*	Swarthmore College	18
	Agnes Scott College	13
	Lycoming College	13
	Mankato State University	13
	Benedictine College	11
*	Bryn Mawr College	11
	Amherst College	8
*	Mount Holyoke College	7
*	Smith College	7
	Valdosta State University	6
*	Barnard College	5
*	Colgate University	4
	Radcliffe College	3
*	Central Michigan University	2
*	Connecticut College	2
	Pacific Union College	2
	Wheaton College (Norton, MA)	2
*	Whitman College	2
*	Northern Arizona University	1
*	Ohio Wesleyan University	1
*	Western Washington University	1

Table 8.3. Leading Producers of Chemistry Baccalaureate Degrees from 1115 Predominantly Undergraduate Institutions 1985–1997

Study (*)	Academic Institution	Chemistry Degrees
*	College of William and Mary	585
	St Olaf College	511
	Illinois State University	496
	Xavier University of Louisiana	488
*	San Jose State University	374
*	University of PR Mayaguez Campus	361
*	Hope College	360
*	University of Tennessee at Chattanooga	348
*	Carleton College	334
	University of PR Humacao	330
*	Rochester Institute of Technology	329
	Gannon University	328
*	Williams College	325
	Youngstown State University	325
*	College of the Holy Cross	318
	The Pontificial Catholic Univ. of PR	309
*	Creighton University	303
*	University of Wisconsin-Eau Claire	297
*	California State University-Long Beach	292
	Marshall University	285
	Metropolitan State College of Denver	281
	University of PR Cayey University College	274
*	Wake Forest University	271
*	College of Wooster	270
*	University of Scranton	270
*	University of Minnesota - Duluth	269
	Houston Baptist University	266
*	Northern Arizona University	264
*	Furman University	263
*	University of Northern Iowa	258
	California State University-Fresno	254
	Inter American U of PR San German	254
	Wright State University, All Campuses	254
*	Southern Illinois University at Edwardsville	248
*	Middle Tennessee State University	247
	Washington and Jefferson College	244
*	John Carroll University	239
	Western Michigan University	239
	SUNY College at Oswego	238
	University of North Carolina at Wilmington	236
	San Diego State University	230
	Valparaiso University	229
	St Joseph's University	227
*	Bucknell University	225
*	Grinnell College	225
	Cameron University	222
*	Central Michigan University	221
	California State University-Hayward	220
	California State University-Sacramento	219
*	Southwest Missouri State University	218

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Table 8.3. Leading Producers of Chemistry Baccalaureate Degrees from 1115 Predominantly Undergraduate Institutions 1985–1997

Study (*)	Academic Institution	Chemistry Degrees
	Ball State University	217
*	University of Richmond	215
	California State Poly University Pomona	212
*	Eastern Michigan University	212
	Armstrong Atlantic State University	210
*	College of Charleston	209
*	Franklin and Marshall College	208
*	Harvey Mudd College	208
	University of North Carolina at Charlotte	207
*	James Madison University	204
	University of Wisconsin-River Falls	204
	Southeastern Oklahoma State University	200
	California State University-Northridge	199
*	University of Wisconsin-Stevens Point	199
*	Gustavus Adolphus College	198
*	Allegheny College	196
	California State University-Fullerton	194
	Ursinus College	193
	Eastern Kentucky University	192
*	Spelman College	191
	University of Wisconsin-La Crosse	191
*	College of St Benedict / St John's U.	189
*	Kalamazoo College	187
*	University of Dayton	186
*	Western Kentucky University	186
*	Bryn Mawr College	184
*	Oberlin College	183
*	Wheaton College (Wheaton, IL)	183
	Inter American U of PR Metropolitan	182
*	Knox College	180
	University of Massachusetts at Boston	178
	The College of New Jersey	177
	University of North Carolina at Greensboro	177
	Millsaps College	176
	East Carolina University	175
	Eastern Washington University	175
*	Fort Lewis College	173
	St Cloud State University	173
*	Reed College	172
	University of Minnesota - Morris	172
	Indiana University of PA, All Campuses	170
	Murray State University	170
	Richard Stockton College of New Jersey	170
	Sonoma State University	170
	Truman State University	170
	University of Central Florida	166
	SUNY College of Environ Sci & Forestry	165
*	Western Washington University	165
*	California State Poly U-San Luis Obispo	164
*	DePauw University	164
	George Mason University	164

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Table 8.3. Leading Producers of Chemistry Baccalaureate Degrees from 1115 Predominantly Undergraduate Institutions 1985–1997

Study (*)	Academic Institution	Chemistry Degrees
*	Butler University	163
*	Colgate University	163
*	Southwest Texas State University	163
	Millersville University of Pennsylvania	162
	Montclair State University	162
	University of Central Oklahoma	159
*	Wellesley College	159
	Albion College	158
*	Haverford College	158
*	Washington and Lee University	156
	Baldwin-Wallace College	155
*	Juniata College	155
	Shippensburg University of Pennsylvania	154
*	Bowdoin College	150
	East Tennessee State University	150
	Saginaw Valley State University	149
	SUNY College at Oneonta	149
	California State University-Chico	148
	Kenyon College	148
	SUNY College at Fredonia	148
*	Wabash College	148
*	Middlebury College	147
	Elmhurst College	146
	Oral Roberts University	146
	Delta State University	145
*	Canisius College	144
	Bradley University	143
	Northeastern Illinois University	143
	University of Colorado at Denver	143
	Amherst College	142
	Appalachian State University	142
	University of Northern Colorado	141
*	University of San Diego	141
*	Colorado College	140
	Kean College of New Jersey	140
	Radford University	139
	SUNY College at Plattsburgh	139
	Austin Peay State University	138
*	Calvin College	138
	Tennessee State University	138
*	Eastern Illinois University	137
	Muhlenberg College	137
*	Lafayette College	136
	San Francisco State University	136
	St Norbert College	136
*	Pomona College	135
	Northeastern State University	134
	Wofford College	134
	Morgan State University	133
	North Georgia College	133
	University of Massachusetts at Dartmouth	133

Table 8.4. Leading Producers of Physics Baccalaureate Degrees from 1115 Predominantly Undergraduate Institutions 1985–1997

Study (*)	Academic Institution	Physics Degrees
*	Harvey Mudd College	319
*	San Jose State University	251
*	Carleton College	227
*	College of William and Mary	220
	San Diego State University	210
	California State University-Northridge	205
*	Reed College	204
*	SUNY College at Geneseo	204
	University of Massachusetts Lowell	196
	California State Poly University Pomona	160
	SUNY College at Fredonia	159
*	Gustavus Adolphus College	153
	Sonoma State University	153
*	College of the Holy Cross	152
	SUNY College at Potsdam	150
	Jacksonville University	148
*	Rose-Hulman Institute of Technology	148
	Illinois State University	147
*	California State Poly U-San Luis Obispo	145
	St Olaf College	145
*	Occidental College	143
*	Whitman College	141
*	University of Puget Sound	136
*	Grinnell College	135
	Longwood College	131
	Millersville University of Pennsylvania	131
*	Bates College	128
*	University of Wisconsin-Eau Claire	126
*	Wesleyan University	126
	Hamline University	123
	San Francisco State University	122
*	Pomona College	120
*	Franklin and Marshall College	118
*	Colorado College	115
	Mary Washington College	115
*	Western Washington University	115
	Rutgers the State Univ of NJ Camden	114
*	Southwest Texas State University	113
	University of Alabama in Huntsville	113
*	Oberlin College	111
	Appalachian State University	110
	California State University-Fullerton	110
	North Georgia College	110
*	Middlebury College	109
	University of Central Oklahoma	109
	University of Wisconsin-River Falls	108
*	Wake Forest University	108
*	Western Kentucky University	108
*	Haverford College	107
*	Kalamazoo College	106

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Table 8.4. Leading Producers of Physics Baccalaureate Degrees from 1115 Predominantly Undergraduate Institutions 1985–1997

Study (*)	Academic Institution	Physics Degrees
*	Towson State University	104
	Angelo State University	103
	Frostburg State University	102
*	Bowdoin College	101
*	California State University-Long Beach	101
*	Eastern Michigan University	101
	Eastern Kentucky University	100
*	Allegheny College	99
	SUNY College at Oswego	98
*	Swarthmore College	98
*	John Carroll University	97
*	Rochester Institute of Technology	97
*	Williams College	97
*	College of Charleston	95
	George Mason University	95
*	Lawrence University	95
*	Northern Kentucky University	95
	Sam Houston State University	95
	SUNY College at Plattsburgh	95
	Indiana University of PA, All Campuses	94
*	Dickinson College	93
	Winona State University	93
	Idaho State University	92
*	Bryn Mawr College	91
*	Illinois Wesleyan University	91
*	Augustana College (Rock Island, IL)	90
*	Colgate University	89
	Kenyon College	89
*	Morehouse College	89
	Edinboro University of Pennsylvania	88
	Southwestern Oklahoma State University	88
	SUNY College at Oneonta	88
	University of Nebraska at Kearney	87
*	University of PR Mayaguez Campus	87
	Xavier University of Louisiana	87
	SUNY College at Buffalo	85
	Truman State University	84
	Amherst College	83
*	College of St Benedict / St John's U.	83
	Shippensburg University of Pennsylvania	83
*	University of Northern Iowa	83
*	University of Tennessee at Chattanooga	81
*	Hendrix College	80
*	James Madison University	80
	California State University-Sacramento	79
	SUNY College at Cortland	79
	Lincoln University (Lincoln Univ, PA)	77
*	Luther College	77
	University of Central Florida	77
*	College of Wooster	76

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Table 8.4. Leading Producers of Physics Baccalaureate Degrees from 1115 Predominantly Undergraduate Institutions 1985–1997

Study (*)	Academic Institution	Physics Degrees
*	Furman University	76
	California State University-Fresno	75
*	Eastern Illinois University	75
*	Hope College	75
	Stephen F Austin State University	75
	Xavier University	75
*	Ithaca College	74
	University of Northern Colorado	74
	East Carolina University	73
	Georgia Southern University	72
*	Mount Holyoke College	72
	Wittenberg University	72
	Alma College	71
	Weber State University	71
	Francis Marion University	70
	University of Texas at El Paso	70
	Vassar College	70
*	Davidson College	68
*	Hamilton College	68
	Southern University A&M Col at Baton Rouge	68
	Concordia College-Moorhead	67
	Eastern Washington University	67
*	Fordham University	67
	Lamar University-Beaumont	67
	Southern Connecticut State University	67
	St Cloud State University	67
*	Centre College	66
	Citadel Military College of South Carolina	66
	Clarion University of PA, All Campuses	66
*	Humboldt State University	66
	Richard Stockton College of New Jersey	66
	Tuskegee University	66
*	Creighton University	65
	Hastings College	65
*	Linfield College	65
	University of Colorado at Colorado Springs	65
	University of the South	65
	De Paul University	64
	University of North Carolina at Wilmington	64
	Western Illinois University	64
*	Denison University	63
	Mansfield University of Pennsylvania	63
	State University of New York at New Platz	63
*	Wheaton College (Wheaton, IL)	63
	Bethel College and Seminary, All Campuses	62
	Ball State University	61
*	DePauw University	61
	Kutztown University of Pennsylvania	61
	University of Dallas	61
	West Chester University of Pennsylvania	61

Table 8.5. Leading Producers of GeoSciences Baccalaureate Degrees from 1115 Predominantly Undergraduate Institutions 1985–1997

Study (*)	Academic Institution	GeoSciences Degrees
*	Central Michigan University	458
*	Humboldt State University	414
	San Diego State University	374
*	Eastern Michigan University	333
	SUNY College at Brockport	326
	University of North Carolina at Charlotte	315
	Western Michigan University	312
*	Colgate University	305
	University of Northern Colorado	294
*	Northern Arizona University	275
	SUNY College at Buffalo	264
	Stephen F Austin State University	261
	Millersville University of Pennsylvania	260
*	Western Washington University	256
*	Carleton College	252
	SUNY College at Oneonta	232
*	University of Minnesota - Duluth	220
*	San Jose State University	213
	Clarion University of PA, All Campuses	211
	California State University-Northridge	208
	SUNY College at Oswego	194
	Edinboro University of Pennsylvania	190
	Sam Houston State University	189
*	Eastern Illinois University	176
	Northeast Louisiana University	176
*	College of William and Mary	175
	California State University-Sacramento	174
	Wright State University, All Campuses	174
	California State University-Chico	171
*	Colorado College	166
*	James Madison University	164
*	Franklin and Marshall College	163
	Lyndon State College	163
*	Fort Lewis College	161
	University of Wisconsin-Oshkosh	161
	Wilkes University	161
	Illinois State University	160
	Sonoma State University	158
	Bloomsburg University of Pennsylvania	155
	University of North Carolina at Wilmington	152
	Shippensburg University of Pennsylvania	151
	University of South Alabama	150
	California State University-Fullerton	147
*	Whitman College	146
	George Mason University	144
	West Chester University of Pennsylvania	141
*	Southwest Missouri State University	139
	East Carolina University	135
	Lamar University-Beaumont	134
	University of Colorado at Denver	134
	Indiana University of PA, All Campuses	133

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Table 8.5. Leading Producers of GeoSciences Baccalaureate Degrees from 1115 Predominantly Undergraduate Institutions 1985–1997

Study (*)	Academic Institution	GeoSciences Degrees
	Kutztown University of Pennsylvania	132
*	College of Charleston	131
	Kean College of New Jersey	130
*	University of Northern Iowa	130
*	Smith College	129
*	St Lawrence University	129
	University of Southwestern Louisiana	129
	SUNY College at Fredonia	128
	SUNY College at Cortland	126
*	Western Kentucky University	125
	Western State College Colorado	125
*	Hamilton College	123
	Radford University	123
*	Williams College	123
*	College of Wooster	121
	St Cloud State University	121
	SUNY College at Potsdam	119
	Western Illinois University	119
	Boise State University	117
	Lake Superior State University	116
*	Middle Tennessee State University	115
	Slippery Rock University of Pennsylvania	115
*	University of North Carolina at Asheville	113
	State University of New York at New Platz	112
	University of Massachusetts Lowell	111
*	Centenary College of Louisiana	110
*	University of Wisconsin-Eau Claire	109
	Metropolitan State College of Denver	107
	University of Nevada-Las Vegas	107
*	SUNY College at Geneseo	106
	California University of Pennsylvania	104
	Ball State University	101
	California State University-Bakersfield	101
	Amherst College	100
	California State University-Fresno	100
*	Middlebury College	100
	Southeast Missouri State University	100
*	Denison University	98
	University of Texas at El Paso	98
	Louisiana Tech University	97
	Fort Hays State University	96
	University of Wisconsin-River Falls	96
	Eastern Washington University	95
*	Juniata College	94
	California State University-Hayward	93
*	Washington and Lee University	93
*	Macalester College	92
	Sul Ross State University	92
	Grand Valley State University	91
	State University of West Georgia	91
*	California State University-Long Beach	90

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Table 8.5. Leading Producers of GeoSciences Baccalaureate Degrees from 1115 Predominantly Undergraduate Institutions 1985–1997

Study (*)	Academic Institution	GeoSciences Degrees
	Idaho State University	90
	Midwestern State University	90
	Youngstown State University	90
*	Colby College	89
	Bridgewater State College	88
	Arkansas Tech University	86
	Millsaps College	86
	University of Minnesota - Morris	86
	Murray State University	85
	Northwest Missouri State University	85
	Salem State College	85
	Weber State University	84
*	Furman University	83
	West Texas A&M University	83
	Eastern Kentucky University	81
*	Oberlin College	81
	University of Tulsa	81
*	Creighton University	80
	Morehead State University	79
	Richard Stockton College of New Jersey	79
	San Francisco State University	79
*	Bucknell University	78
*	Trinity University	78
	University of Massachusetts at Boston	78
	Minot State University	77
	California State Poly University Pomona	76
*	Central Washington University	76
	Jersey City State College	76
	Texas A&M University Kingsville	76
	Texas A&M University-Commerce	75
*	Hartwick College	74
	Western Connecticut State University	73
	Tarleton State University	72
	California State University-Los Angeles	71
*	Gustavus Adolphus College	71
	Northeastern Illinois University	71
	Austin Peay State University	70
	University of Texas at San Antonio	70
	Winona State University	70
*	Calvin College	69
	Alfred University, Main Campus	67
*	Beloit College	67
*	Dickinson College	67
	Appalachian State University	66
*	Bates College	66
*	University of PR Mayaguez Campus	66
	University of Texas at Permian Basin	66
	Albion College	65
*	Lawrence University	65
	Marshall University	65

Table 8.6. Leading Producers of BioSciences Baccalaureate Degrees from 1115 Predominantly Undergraduate Institutions 1985–1997

Study (*)	Academic Institution	BioSciences Degrees
*	California State Poly U-San Luis Obispo	1,968
	San Diego State University	1,775
	Inter American U of PR San German	1,704
	California State University-Northridge	1,583
*	University of PR Mayaguez Campus	1,558
	San Francisco State University	1,525
	University of Texas at San Antonio	1,496
*	California State University-Long Beach	1,481
*	College of William and Mary	1,403
*	University of Wisconsin-Stevens Point	1,401
*	College of Charleston	1,389
	University of North Carolina at Wilmington	1,351
*	University of Scranton	1,245
	Inter American U of PR Metropolitan	1,220
	California State University-Fullerton	1,215
	George Mason University	1,205
*	Eastern Illinois University	1,182
*	Humboldt State University	1,181
	The Pontificial Catholic Univ. of PR	1,168
	California State Poly University Pomona	1,152
	California State University-Sacramento	1,131
*	San Jose State University	1,126
	University of PR Cayey University College	1,102
	University of Central Florida	1,100
*	Central Michigan University	1,094
*	Bucknell University	1,086
	Illinois State University	1,086
	Richard Stockton College of New Jersey	1,080
	Stephen F Austin State University	1,043
	St Cloud State University	1,032
*	Wake Forest University	1,013
	East Carolina University	997
*	James Madison University	981
*	Northern Arizona University	977
	St Olaf College	974
*	Oberlin College	965
	Truman State University	959
*	Eastern Michigan University	957
	Loma Linda University	944
*	Creighton University	936
	Millersville University of Pennsylvania	918
*	Towson State University	910
*	Augustana College (Rock Island, IL)	903
*	SUNY College at Geneseo	895
*	University of Wisconsin-Eau Claire	884
*	University of Minnesota - Duluth	877
	East Stroudsburg U of Pennsylvania	859
*	Southwest Missouri State University	857
	Idaho State University	821
	Xavier University of Louisiana	821
*	Southwest Texas State University	804

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Table 8.6. Leading Producers of BioSciences Baccalaureate Degrees from 1115 Predominantly Undergraduate Institutions 1985–1997

Study (*)	Academic Institution	BioSciences Degrees
	University of North Carolina at Charlotte	798
*	Mount Holyoke College	793
	California State University-Fresno	792
	University of Nebraska at Omaha	782
*	Luther College	780
*	St Lawrence University	777
	California State University-Hayward	768
*	University of Northern Iowa	766
*	Smith College	765
	Hampton University	760
	Eastern Washington University	759
	Villanova University	752
*	Fairfield University	749
	Western Michigan University	746
	Concordia College-Moorhead	731
*	Western Kentucky University	728
	St John's University (Jamaica, NY)	723
	Oakland University	720
*	Gustavus Adolphus College	719
*	Western Washington University	718
*	Colorado College	715
	St Mary's University	705
	Siena College (Loudonville, NY)	702
*	Middle Tennessee State University	694
	Loyola Marymount University	691
	Wright State University, All Campuses	689
	Pittsburg State University	686
	Texas A&M University at Galveston	679
*	Central Washington University	677
	Montclair State University	671
	Adelphi University	670
	Ball State University	668
	Indiana University of PA, All Campuses	665
	University of Texas - Pan American	664
*	Bowdoin College	663
	Ursinus College	663
	University of Wisconsin-La Crosse	660
*	Southern Illinois University at Edwardsville	656
*	Colgate University	655
*	Rochester Institute of Technology	646
	Salisbury State University	643
	Northern Michigan University	642
	Francis Marion University	641
	Hofstra University	641
*	Union College (Schenectady, NY)	641
*	Occidental College	638
	University of North Carolina at Greensboro	634
	The College of New Jersey	633
	University of South Dakota	633

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Table 8.6. Leading Producers of BioSciences Baccalaureate Degrees from 1115 Predominantly Undergraduate Institutions 1985–1997

Study (*)	Academic Institution	BioSciences Degrees
	University of Texas at El Paso	632
*	Colby College	631
*	Pacific Lutheran University	630
	Muhlenberg College	629
	SUNY College at Plattsburgh	628
	University of Massachusetts at Boston	628
	Metropolitan State College of Denver	627
	California State University-Chico	624
	Western Illinois University	622
	Albright College	616
	Radcliffe College	616
	Gannon University	615
*	University of Richmond	611
*	Wellesley College	604
*	Lafayette College	602
*	Furman University	601
	Sonoma State University	600
	Appalachian State University	595
	La Salle University	592
	Long Island University Southampton Campus	586
	Mary Washington College	577
*	Hope College	573
	University of Wisconsin-Oshkosh	573
	Youngstown State University	573
	Barry University	571
*	Fordham University	570
	University of Pittsburgh Johnstown Campus	570
	Marshall University	569
	Texas Woman's University	568
*	College of St Benedict / St John's U.	567
*	John Carroll University	567
	University of Michigan at Dearborn	566
	Wittenberg University	565
	Jackson State University	564
	University of Colorado at Denver	562
	Houston Baptist University	560
	Georgia Southern University	558
*	Trinity University	554
	Andrews University	553
*	Allegheny College	551
	Drake University	548
	Bloomsburg University of Pennsylvania	542
	University of Nebraska at Kearney	541
	University of Northern Colorado	540
*	Barnard College	539
*	Bates College	537
	California State University-Los Angeles	536
	Inter American U of PR Arecibo Campus	532
*	College of the Holy Cross	531
*	Santa Clara University	531

Table 8.7. Leading Producers of Science Baccalaureate Degrees from 1115 Predominantly Undergraduate Institutions Based on the Percentage of Science Degrees to Total Degrees 1985–1997

Study (*)	Academic Institution	Total Degrees	Science Degrees	% Science Degrees
	Texas A&M University at Galveston	1,717	679	39.5%
*	Harvey Mudd College	1,684	606	36.0%
	Xavier University of Louisiana	4,282	1,396	32.6%
	Northland College	1,501	453	30.2%
	University of PR Cayey University College	5,166	1,376	26.6%
*	Reed College	3,145	809	25.7%
	Long Island University Southampton Campus	2,586	650	25.1%
*	Hendrix College	2,656	621	23.4%
	Fisk University	1,525	354	23.2%
	Ursinus College	3,922	905	23.1%
*	Juniata College	3,216	741	23.0%
*	Carleton College	5,759	1,318	22.9%
	Washington and Jefferson College	3,295	741	22.5%
	Talladega College	1,240	276	22.3%
	Tougaloo College	1,382	300	21.7%
	Millsaps College	3,212	690	21.5%
*	Wabash College	2,252	479	21.3%
	Wofford College	3,268	684	20.9%
*	Earlham College	2,998	621	20.7%
	University of Dallas	2,674	553	20.7%
*	Centre College	2,430	499	20.5%
*	Haverford College	3,556	730	20.5%
*	Kalamazoo College	3,225	646	20.0%
*	Bowdoin College	4,797	949	19.8%
*	Occidental College	4,840	952	19.7%
	Alma College	3,243	625	19.3%
*	Knox College	2,778	534	19.2%
*	Augustana College (Rock Island, IL)	6,026	1,157	19.2%
*	Lawrence University	3,270	627	19.2%
	Albertson College	1,573	301	19.1%
*	Grinnell College	4,096	773	18.9%
	Erskine College	1,384	253	18.3%
	St Olaf College	8,935	1,630	18.2%
	Oakwood College	2,146	391	18.2%
*	Colorado College	6,259	1,136	18.1%
*	Whitman College	3,646	657	18.0%
*	Centenary College of Louisiana	2,096	377	18.0%
	Albright College	3,901	694	17.8%
	Transylvania University	2,396	423	17.7%
	Rhodes College	3,590	620	17.3%
	Albion College	4,648	798	17.2%
	Nebraska Wesleyan University	3,502	598	17.1%
*	Allegheny College	5,318	900	16.9%
*	Franklin and Marshall College	5,780	972	16.8%
	Loma Linda University	6,051	1,008	16.7%
*	St Lawrence University	6,434	1,066	16.6%
*	Bryn Mawr College	3,658	601	16.4%
*	Bates College	5,197	848	16.3%
*	Beloit College	2,834	455	16.1%
	University of PR Humacao University College	4,999	802	16.0%

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Table 8.7. Leading Producers of Science Baccalaureate Degrees from 1115 Predominantly Undergraduate Institutions Based on the Percentage of Science Degrees to Total Degrees 1985–1997

Study (*)	Academic Institution	Total Degrees	Science Degrees	% Science Degrees
*	Austin College	3,398	542	16.0%
*	Mount Holyoke College	6,573	1,048	15.9%
*	Hope College	6,743	1,070	15.9%
*	Williams College	6,611	1,045	15.8%
	University of Minnesota - Morris	4,048	634	15.7%
	King College	1,188	186	15.7%
	Muhlenberg College	5,153	804	15.6%
	Judson College (Marion, AL)	741	114	15.4%
	Lincoln University (Lincoln Univ, PA)	2,448	370	15.1%
*	Luther College	6,239	940	15.1%
*	Oberlin College	8,929	1,340	15.0%
*	Ripon College	2,027	304	15.0%
*	College of Wooster	4,935	739	15.0%
*	Pomona College	4,562	681	14.9%
*	Swarthmore College	4,720	704	14.9%
*	Colby College	5,961	888	14.9%
	Hiram College	3,392	504	14.9%
*	College of William and Mary	16,074	2,383	14.8%
	Houston Baptist University	5,647	828	14.7%
	Georgetown College	2,227	323	14.5%
	Hampden-Sydney College	2,348	340	14.5%
	Rust College	1,659	237	14.3%
	Harding University, All Campuses	3,235	460	14.2%
*	Colgate University	8,572	1,216	14.2%
	Andrews University	4,499	637	14.2%
	Inter American U of PR San German Campus	13,965	1,958	14.0%
	Gannon University	6,932	970	14.0%
*	Gustavus Adolphus College	8,175	1,141	14.0%
	Wilson College	654	91	13.9%
*	College of Charleston	13,136	1,824	13.9%
*	Bucknell University	10,412	1,445	13.9%
	Lebanon Valley College	2,779	385	13.9%
*	Furman University	7,394	1,023	13.8%
*	Davidson College	4,650	639	13.7%
	Amherst College	5,337	732	13.7%
*	Creighton University	10,110	1,384	13.7%
	Radcliffe College	5,528	755	13.7%
*	University of Scranton	11,439	1,562	13.7%
	Hanover College	2,739	374	13.7%
	Agnes Scott College	1,451	198	13.6%
	Chestnut Hill College	1,694	231	13.6%
	Southwestern College (Winfield, KS)	1,895	258	13.6%
	St Mary's University	5,811	791	13.6%
	Cornell College	2,971	404	13.6%
	University of Pittsburgh at Bradford	1,486	202	13.6%
	Wartburg College	3,590	487	13.6%
	Benedictine University	3,896	527	13.5%
	Presbyterian College	2,951	399	13.5%
*	Spelman College	4,543	612	13.5%
*	Wake Forest University	10,377	1,392	13.4%

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Table 8.7. Leading Producers of Science Baccalaureate Degrees from 1115 Predominantly Undergraduate Institutions Based on the Percentage of Science Degrees to Total Degrees 1985–1997

Study (*)	Academic Institution	Total Degrees	Science Degrees	% Science Degrees
	Hastings College	2,082	279	13.4%
	Adrian College	2,545	341	13.4%
	Francis Marion University	5,846	783	13.4%
*	Illinois Wesleyan University	4,861	645	13.3%
*	Southwestern University	3,093	409	13.2%
*	Washington and Lee University	4,633	610	13.2%
	Lyon College	1,219	160	13.1%
	St Mary's College of Maryland	3,723	483	13.0%
	Wittenberg University	6,231	801	12.9%
	St Vincent College and Seminary	2,962	379	12.8%
	Delaware Valley College	3,369	430	12.8%
	Bennett College (Greensboro, NC)	1,027	131	12.8%
	Bridgewater College	2,322	296	12.7%
	Blackburn College	1,083	137	12.7%
*	Union College (Schenectady, NY)	6,766	854	12.6%
*	Middlebury College	7,012	879	12.5%
	Lycoming College	3,223	403	12.5%
	Selma University	104	13	12.5%
*	Lafayette College	6,678	829	12.4%
	Stillman College	1,632	202	12.4%
*	University of PR Mayaguez Campus	16,877	2,072	12.3%
	Whittier College	2,826	346	12.2%
	Beaver College	2,969	363	12.2%
	Greenville College	1,914	234	12.2%
*	Dillard University	2,567	312	12.2%
	Randolph-Macon Woman's College	2,098	254	12.1%
*	Trinity University	6,450	779	12.1%
*	Humboldt State University	14,406	1,737	12.1%
*	College of the Holy Cross	8,315	1,001	12.0%
	Jacksonville University	5,071	608	12.0%
*	Wellesley College	7,529	900	12.0%
	Monmouth College	1,756	209	11.9%
*	Fort Lewis College	6,675	794	11.9%
	Franklin College Indiana	1,732	204	11.8%
	University of North Carolina at Wilmington	15,336	1,803	11.8%
	Benedictine College	1,904	223	11.7%
	Eckerd College	4,842	567	11.7%
	North Georgia College	5,367	625	11.6%
	Alice Lloyd College	834	97	11.6%
	Concordia College-Moorhead	7,561	876	11.6%
	Kenyon College	4,832	556	11.5%
*	Smith College	9,215	1,058	11.5%
*	DePauw University	6,554	748	11.4%
	Inter American U of PR Arecibo Campus	5,381	611	11.4%
*	Macalester College	4,828	546	11.3%
	St Andrews Presbyterian College	1,878	212	11.3%
	Lees-Mcrae College	515	58	11.3%
	Marlboro College	570	64	11.2%
	Pacific Union College	2,886	322	11.2%
*	Willamette University	4,295	479	11.2%

Table 8.8. Leading Producers of Science Baccalaureate Degrees from 1115 Predominantly Undergraduate Institutions Based on the Percentage of Science Degrees to Full-Time Undergraduate Enrollment 1985–1997

Study (*)	Academic Institution	Full-Time Undergraduates	Science Degrees	% Science Degrees
*	Harvey Mudd College	7,744	606	7.8%
	Ursinus College	15,056	905	6.0%
	Fairleigh Dickinson U Teaneck-Hackensack	2,191	130	5.9%
	Texas A&M University at Galveston	11,761	679	5.8%
*	Carleton College	24,281	1,318	5.4%
*	Juniata College	13,932	741	5.3%
*	Reed College	15,575	809	5.2%
	Northland College	8,807	453	5.1%
	Washington and Jefferson College	14,730	741	5.0%
*	Bowdoin College	18,887	949	5.0%
*	Haverford College	14,591	730	5.0%
	Wofford College	13,911	684	4.9%
*	Hendrix College	12,802	621	4.9%
	Radcliffe College	15,881	755	4.8%
	Houston Baptist University	17,494	828	4.7%
	Millsaps College	14,696	690	4.7%
*	Grinnell College	16,628	773	4.6%
	Albright College	15,092	694	4.6%
*	Occidental College	20,751	952	4.6%
*	Colorado College	25,102	1,136	4.5%
*	Wabash College	10,618	479	4.5%
*	Earlham College	13,784	621	4.5%
	Long Island University Southampton Campus	14,533	650	4.5%
	Xavier University of Louisiana	31,317	1,396	4.5%
*	Centre College	11,446	499	4.4%
*	Lawrence University	14,455	627	4.3%
*	Mount Holyoke College	24,395	1,048	4.3%
	University of Dallas	12,893	553	4.3%
	St Olaf College	38,316	1,630	4.3%
*	St Lawrence University	25,262	1,066	4.2%
*	Augustana College (Rock Island, IL)	27,478	1,157	4.2%
	Loma Linda University	24,210	1,008	4.2%
*	Bates College	20,392	848	4.2%
*	Franklin and Marshall College	23,641	972	4.1%
*	Knox College	13,020	534	4.1%
*	Whitman College	16,197	657	4.1%
*	Williams College	25,790	1,045	4.1%
*	Kalamazoo College	15,994	646	4.0%
	Hiram College	12,637	504	4.0%
*	Swarthmore College	17,689	704	4.0%
*	Colby College	22,443	888	4.0%
	Erskine College	6,407	253	3.9%
	Albion College	20,215	798	3.9%
	Alma College	15,845	625	3.9%
*	Centenary College of Louisiana	9,663	377	3.9%
*	Bryn Mawr College	15,715	601	3.8%
*	Gustavus Adolphus College	29,847	1,141	3.8%
	Chestnut Hill College	6,094	231	3.8%
*	Allegheny College	23,782	900	3.8%
*	Oberlin College	35,731	1,340	3.8%

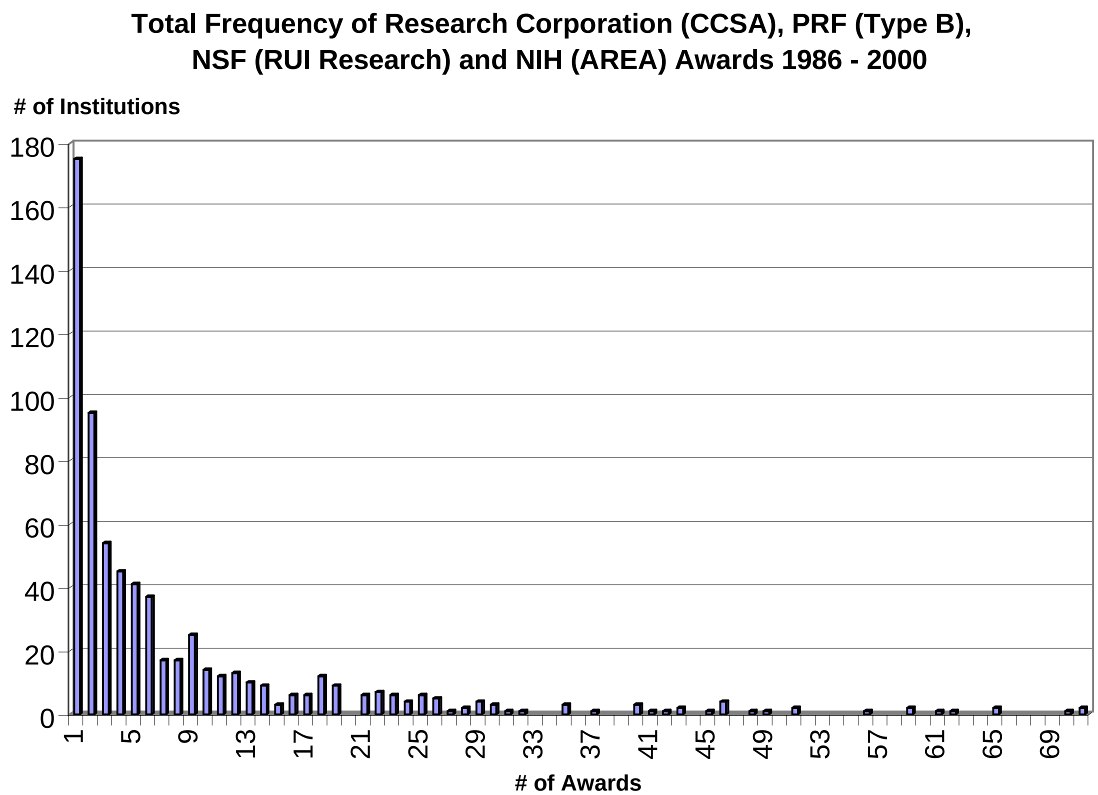
Table 8.8. Leading Producers of Science Baccalaureate Degrees from 1115 Predominantly Undergraduate Institutions Based on the Percentage of Science Degrees to Full-Time Undergraduate Enrollment 1985–1997

Study (*)	Academic Institution	Full-Time Undergraduates	Science Degrees	% Science Degrees
	Muhlenberg College	21,439	804	3.8%
	Southwestern College (Winfield, KS)	6,886	258	3.7%
	Benedictine University	14,240	527	3.7%
*	Austin College	14,744	542	3.7%
	Fisk University	9,669	354	3.7%
	Rhodes College	17,107	620	3.6%
*	Pomona College	18,876	681	3.6%
	Albertson College	8,401	301	3.6%
	Transylvania University	11,877	423	3.6%
	Amherst College	20,675	732	3.5%
*	College of William and Mary	67,491	2,383	3.5%
	Hood College	9,859	347	3.5%
	Nebraska Wesleyan University	17,200	598	3.5%
*	Colgate University	35,335	1,216	3.4%
	Eckerd College	16,564	567	3.4%
	University of PR Cayey University College	40,308	1,376	3.4%
*	Furman University	29,982	1,023	3.4%
*	Bucknell University	42,637	1,445	3.4%
	SUNY College of Environmental Sci & Forestry	12,188	407	3.3%
*	Luther College	28,379	940	3.3%
*	Middlebury College	26,560	879	3.3%
*	Hope College	32,384	1,070	3.3%
	Beaver College	11,061	363	3.3%
*	Davidson College	19,618	639	3.3%
*	Union College (Schenectady, NY)	26,346	854	3.2%
*	Wellesley College	27,833	900	3.2%
	Talladega College	8,537	276	3.2%
*	University of Scranton	48,337	1,562	3.2%
	Lebanon Valley College	11,961	385	3.2%
*	College of Wooster	22,968	739	3.2%
*	Beloit College	14,165	455	3.2%
*	Smith College	33,035	1,058	3.2%
*	Lafayette College	26,173	829	3.2%
	Wilson College	2,893	91	3.1%
	Judson College (Marion, AL)	3,648	114	3.1%
*	Creighton University	44,443	1,384	3.1%
	Andrews University	21,040	637	3.0%
*	Ripon College	10,080	304	3.0%
*	Wake Forest University	46,158	1,392	3.0%
*	Washington and Lee University	20,524	610	3.0%
	Wittenberg University	26,994	801	3.0%
	Wilkes University	23,196	677	2.9%
	St Mary's University	27,279	791	2.9%
	University of Texas at Permian Basin	9,806	284	2.9%
	Agnes Scott College	6,842	198	2.9%
	Randolph-Macon Woman's College	8,815	254	2.9%
	Wartburg College	16,937	487	2.9%
	St Vincent College and Seminary	13,194	379	2.9%
*	College of the Holy Cross	34,881	1,001	2.9%
	Presbyterian College	13,991	399	2.9%

Table 8.8. Leading Producers of Science Baccalaureate Degrees from 1115 Predominantly Undergraduate Institutions Based on the Percentage of Science Degrees to Full-Time Undergraduate Enrollment 1985–1997

Study (*)	Academic Institution	Full-Time Undergraduates	Science Degrees	% Science Degrees
	St Mary's College of Maryland	16,986	483	2.8%
	King College	6,544	186	2.8%
	Kenyon College	19,672	556	2.8%
	Hampden-Sydney College	12,071	340	2.8%
	Barry University	21,166	596	2.8%
	Gannon University	34,571	970	2.8%
*	Illinois Wesleyan University	23,133	645	2.8%
	Delaware Valley College	15,439	430	2.8%
	Jacksonville University	21,842	608	2.8%
	Cornell College	14,590	404	2.8%
*	Trinity University	28,161	779	2.8%
	St Mary's College (Orchard Lake, MI)	1,920	53	2.8%
	Hanover College	13,653	374	2.7%
*	Southwestern University	14,966	409	2.7%
	Moravian College	15,985	435	2.7%
*	Spelman College	22,600	612	2.7%
	Goshen College	12,326	331	2.7%
	Drew University	17,484	466	2.7%
	University of Houston-Clear Lake	19,173	511	2.7%
*	Denison University	25,567	678	2.7%
	University of Minnesota - Morris	23,971	634	2.6%
	Thomas More College	9,319	245	2.6%
*	DePauw University	28,664	748	2.6%
	Eastern Mennonite University	11,355	296	2.6%
*	Connecticut College	21,698	565	2.6%
	Tougaloo College	11,692	300	2.6%
	Lyon College	6,270	160	2.6%
	Adrian College	13,384	341	2.5%
	Bridgewater College	11,659	296	2.5%
*	Trinity College (Hartford, CT)	22,941	582	2.5%
	St Andrews Presbyterian College	8,411	212	2.5%
*	Chatham College	5,704	143	2.5%
	Lycoming College	16,137	403	2.5%
	Richard Stockton College of New Jersey	56,005	1,395	2.5%
	Le Moyne College	23,698	589	2.5%
	Guilford College	17,369	430	2.5%
	Wells College	4,893	121	2.5%
*	Macalester College	22,114	546	2.5%
	Pacific University	11,841	292	2.5%
*	Dickinson College	24,643	607	2.5%
*	Humboldt State University	70,573	1,737	2.5%
	North Georgia College	25,399	625	2.5%
	Oakwood College	15,980	391	2.4%
	Lake Erie College	4,257	104	2.4%
	Birmingham Southern College	18,632	455	2.4%
	Lincoln University (Lincoln Univ, PA)	15,186	370	2.4%
	Concordia College-Moorhead	35,965	876	2.4%
	Alfred University, Main Campus	15,286	372	2.4%
	Rockhurst College	15,733	382	2.4%
	Whittier College	14,262	346	2.4%

Figure 8.1


Total Frequency of Research Corporation (CCSA), PRF (Type B),
NSF (RUI Research) and NIH (AREA) Awards 1986 - 2000
# of Institutions
180
160
140
120
100
80
60
40
20
0
1
5
9
13
17
21
25
29
33
37
41
45
49
53
57
61
65
69
# of Awards

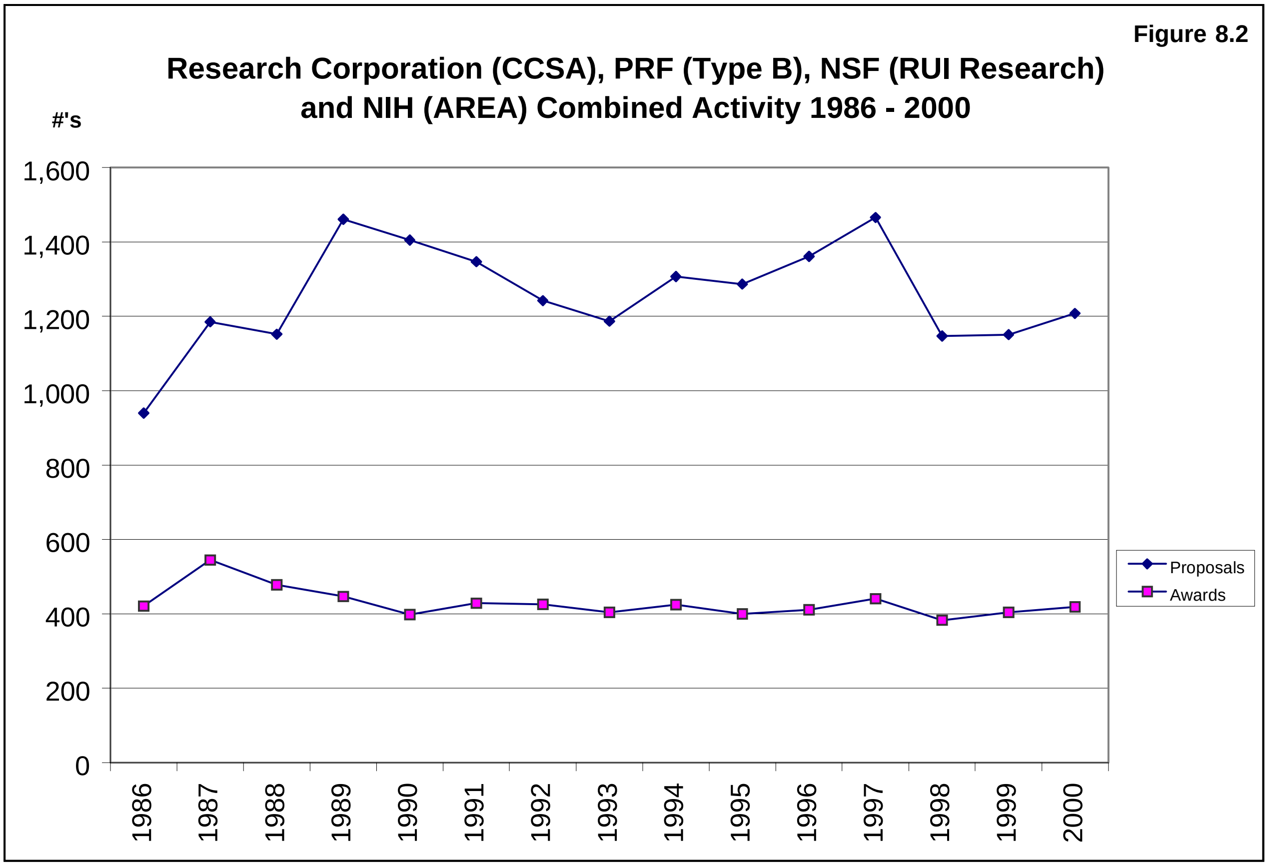


Figure 8.2
Research Corporation (CCSA), PRF (Type B), NSF (RUI Research) and NIH (AREA) Combined Activity 1986 - 2000
#'s
1,600
1,400
1,200
1,000
800
600
400
200
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
Proposals
Awards

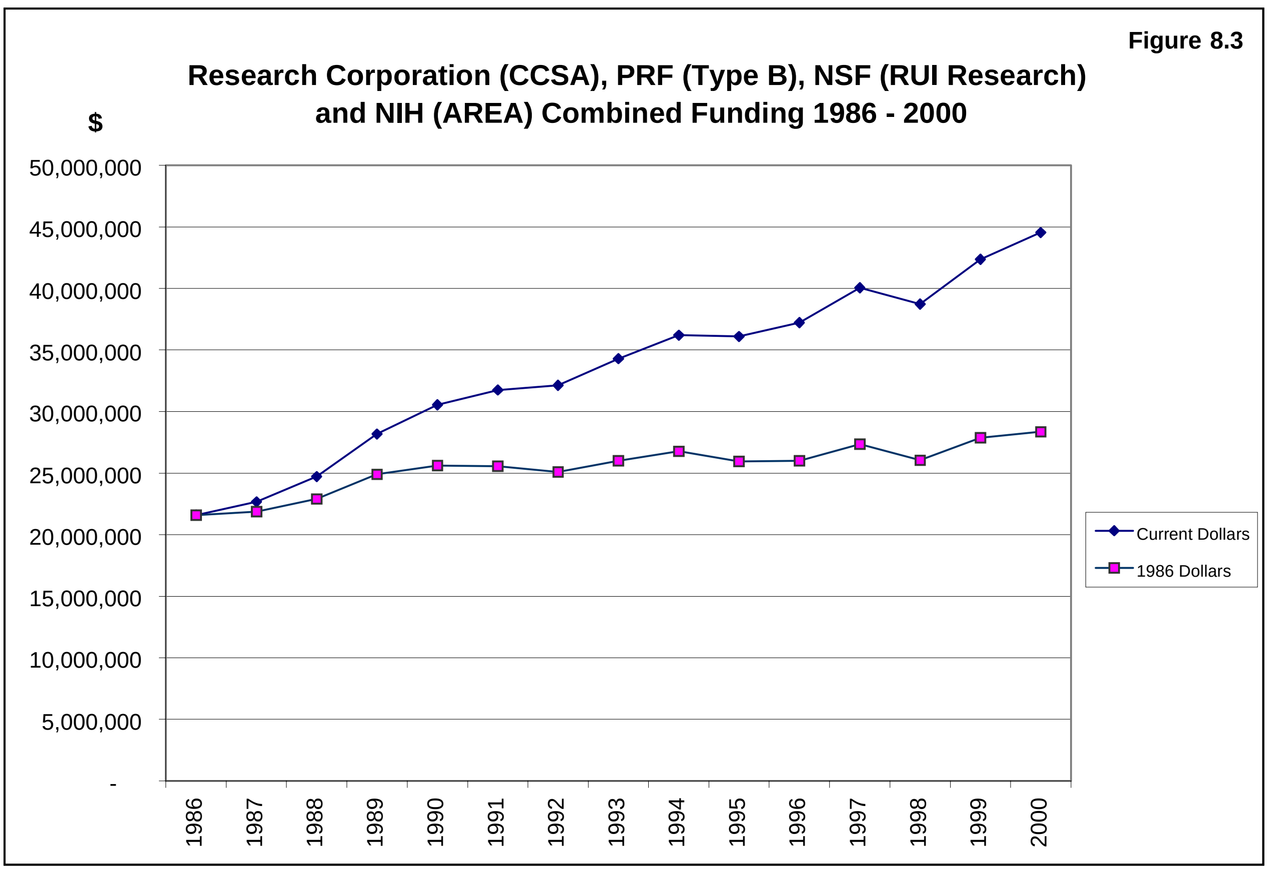


Figure 8.3
Research Corporation (CCSA), PRF (Type B), NSF (RUI Research) and NIH (AREA) Combined Funding 1986 - 2000
$
50,000,000
45,000,000
40,000,000
35,000,000
30,000,000
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
-
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
Current Dollars
1986 Dollars

Table 8.9. NIH R-15 (AREA) Awards 1985–1999

Carnegie Class	Type	Study	Academic Institution	Total Awards
D1	S		Miami University - Oxford	56
D1	S		Illinois State University	27
D2	P		Clark University	22
M1	S		San Francisco State University	21
D1	S		University of Akron	21
D2	S		University of New Hampshire	21
D1	P		Marquette University	19
D1	S		University of Memphis	19
R2	S		University of Wisconsin - Milwaukee	19
M1	S		California State University - Los Angeles	18
D1	S		Northern Illinois University	17
M1	S	*	California State University - Long Beach	16
D1	P		St. John's University (NY)	15
D2	P		Duquesne University	14
B1	P	*	Middlebury College	14
D2	S		University of Alabama - Huntsville	14
M1	S		California State University - Northridge	12
M1	S		East Tennessee State University	12
B1	P	*	Mount Holyoke College	12
B1	P		Amherst College	11
D1	S		Ball State University	11
D1	P		American University	10
R2	S		Auburn University - Auburn	10
B1	P	*	Carleton College	10
R2	S		Mississippi State University	10
M1	S	*	San Jose State University	10
B1	P	*	Bryn Mawr College	9
B1	P	*	Hamilton College	9
D2	S		Indiana State University	9
R2	S		Kent State University	9
B1	P	*	Occidental College	9
M1	P		Rider University	9
B1	P	*	Smith College	9
D1	S		University of Missouri - Kansas City	9
D1	S		University of Texas - Arlington	9
B1	P	*	Barnard College	8
D1	S		Bowling Green University	8
M1	S		Central Connecticut State University	8
R2	P		Lehigh University	8
M1	S		Murray State University	8
D2	S		University of Montana	8
B2	S		University of Puerto Rico - Humacao	8
M1	S		California State University - Fullerton	7
R2	S		Clemson University	7
D1	S	*	College of William and Mary	7

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Table 8.9. NIH R-15 (AREA) Awards 1985–1999

Carnegie Class	Type	Study	Academic Institution	Total Awards
D2	S		Indiana University - Purdue University at Indianapolis	7
M1	S		University of North Carolina - Charlotte	7
D1	S		University of South Dakota	7
M1	P		Villanova University	7
D2	P	*	Wake Forest University	7
B1	P	*	Wellesley College	7
D2	P		Baylor University	6
D1	P		Catholic University of America	6
B1	P	*	Haverford College	6
B1	P	*	Hope College	6
D1	S	*	Northern Arizona University	6
M1	S	*	Southern Illinois University at Edwardsville	6
B2	P		Susquehanna University	6
B1	P	*	Swarthmore College	6
R2	S		University of Arkansas at Fayetteville	6
D1	P		University of Denver	6
R2	S		University of Idaho	6
D2	S		University of Maine	6
M1	S		University of Texas - El Paso	6
D2	P		University of Tulsa	6
M1	S		California State University - San Bernardino	5
B1	P	*	Colby College	5
D2	S		Idaho State University	5
D2	S		North Dakota State University	5
M1	S	*	Northern Kentucky University	5
B1	P	*	Oberlin College	5
D2	P		Seton Hall University	5
M1	P		St. Joseph's University	5
R2	S		Texas Technical University	5
B1	P	*	Trinity College	5
D2	S		Wichita State University	5
B1	P	*	Williams College	5
D2	P		Worcester Polytechnic Institute	5
B2	P		York College	5
B1	P	*	Allegheny College	4
B1	P	*	Bates College	4
R2	P		Brigham Young University	4
B1	P	*	Colgate University	4
B1	P	*	College of the Holy Cross	4
B1	P	*	Connecticut College	4
B1	P	*	Davidson College	4
B1	P	*	Knox College	4
M1	S		Mankato State University	4
M1	S		Moorhead State University	4
M1	P		Regis University	4

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Table 8.9. NIH R-15 (AREA) Awards 1985–1999

Carnegie Class	Type	Study	Academic Institution	Total Awards
M1	S		South Dakota State University	4
R2	S		Southern Illinois University - Carbondale	4
M1	S	*	Southwest Texas State University	4
D2	P		Stevens Institute of Technology	4
M1	S	*	SUNY College at Geneseo	4
D1	S		Texas Woman's University	4
M1	P	*	Trinity University	4
M1	S		University of Arkansas - Little Rock	4
M1	S		University of Massachusetts - Dartmouth	4
D2	S		University of North Dakota	4
M1	P	*	University of Richmond	4
D1	S		University of Southern Mississippi	4
M1	P		University of the Incarnate Word	4
D1	S		University of Toledo	4
M1	S	*	University of Wisconsin - Eau Claire	4
B1	P		Vassar College	4
B1	P	*	Wesleyan University	4
M1	S		West Chester University of Pennsylvania	4
D1	S		Western Michigan University	4
M1	S	*	Western Washington University	4
M1	S		William Paterson University	4
B1	P	*	Bowdoin College	3
B1	P	*	Bucknell University	3
M1	S		California State Poly University - Pomona	3
M1	S		California State University - Fresno	3
M2	P	*	Calvin College	3
M1	P	*	Canisius College	3
M1	S	*	Central Washington University	3
M1	S	*	College of Charleston	3
M1	S		CUNY College of Staten Island	3
B1	P	*	Denison University	3
B1	P	*	Dickinson College	3
B1	P		Drew University	3
M2	P	*	Drury College	3
M1	S	*	Eastern Illinois University	3
M2	S		Ferris State University	3
B1	P	*	Furman University	3
M1	P	*	Gonzaga University	3
B1	P	*	Grinnel College	3
ENG	P	*	Harvey Mudd College	3
M1	S		Jackson State University	3
M1	S		Jacksonville State University	3
B1	P	*	Juniata College	3
B1	P		Kenyon College	3
B1	P	*	Lawrence University	3

Table 8.9. NIH R-15 (AREA) Awards 1985–1999

Carnegie Class	Type	Study	Academic Institution	Total Awards
R2	S		Oklahoma State University - Stillwater	3
D1	S		Old Dominion University	3
B1	P	*	Pomona College	3
D2	S		Portland State University	3
B1	P	*	Reed College	3
B1	P		Rhodes College	3
M1	P	*	Rochester Institute of Technology	3
B1	P		St. Olaf College	3
D1	S		SUNY - Binghamton	3
D1	S		University of Alabama - Tuscaloosa	3
D2	S		University of Colorado - Denver	3
M1	S		University of Michigan - Dearborn	3
D1	S		University of Missouri - Rolla	3
D2	S		University of Missouri - St. Louis	3
M1	S		University of Nebraska - Omaha	3
M1	S		University of Nevada - Las Vegas	3
D1	S		University of Northern Colorado	3
M1	S	*	University of Northern Iowa	3
M1	P	*	University of Scranton	3
M1	S		University of South Alabama	3
D2	S		University of Southwestern Louisiana	3
M1	P	*	University of St. Thomas	3
OMED	P		University of the Sciences - Philadelphia	3
M1	S		University of Wisconsin - La Crosse	3
M1	S		University of Wisconsin - Oshkosh	3
M2	S		University of Wisconsin - Parkside	3
M1	S		Western Carolina University	3
M1	P		Xavier University of Louisiana	3
M1	S		Youngstown State University	3
B2	P		Alverno College	2
M1	P		Ashland University	2
B1	P	*	Augustana College (IL)	2
B2	P		Augustana College (SD)	2
B2	P		Benedict College	2
B1	P		Birmingham Southern College	2
M1	S		California State University - Chico	2
M1	S		California State University - Hayward	2
D2	P		Clarkson University	2
D2	S		Cleveland State University	2
M1	P		College of Mount St. Joseph on the Ohio	2
B2	P		College of Our Lady of the Elms	2
M1	S		CUNY Herbert H. Lehman College	2
M1	S	*	Eastern Michigan University	2
D1	P	*	Fordham University	2
B1	P	*	Franklin and Marshall College	2

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Table 8.9. NIH R-15 (AREA) Awards 1985–1999

Carnegie Class	Type	Study	Academic Institution	Total Awards
B1	P	*	Lewis and Clark College	2
B2	P		Loras College	2
M1	P		Manhattan College	2
B2	P		Mars Hill College	2
M1	P		Mercer University - Macon	2
B2	P		Merrimack College	2
M1	S		Millersville University of Pennsylvania	2
B1	P		Mills College	2
B1	P		Millsaps College	2
M1	S		Montclair State University	2
M1	S		North Carolina Central University	2
R2	S		Ohio University - Athens	2
M2	P		Point Loma Nazarene College	2
B2	P		Roberts Wesleyan College	2
M1	S		Rutgers University - Camden	2
M1	P	*	Santa Clara University	2
B1	P	*	Skidmore College	2
M1	S	*	Southwest Missouri State University	2
B1	P		St. John's University	2
R2	P		St. Louis University	2
M1	S		State University of West Georgia	2
B2	P		Syracuse University - Utica College	2
B2	P		Tougaloo College	2
M1	P		Tuskegee University	2
M1	S		University of Alaska - Anchorage	2
D2	S		University of Alaska - Fairbanks	2
M1	S	*	University of Central Arkansas	2
M1	P	*	University of Dayton	2
D2	P		University of Detroit Mercy	2
R2	S		University of Massachusetts - Boston	2
R1	S		University of Michigan - Ann Arbor	2
M1	S	*	University of Minnesota - Duluth	2
M1	S		University of North Carolina - Wilmington	2
D1	S		University of North Texas	2
R2	S		University of South Florida	2
M1	S		University of Texas - Pan American	2
M1	S	*	University of Wisconsin - Stevens Point	2
M1	S	*	Western Kentucky University	2
B1	P	*	Wheaton College (IL)	2
-	-	23	Institutions with one (1) award	153

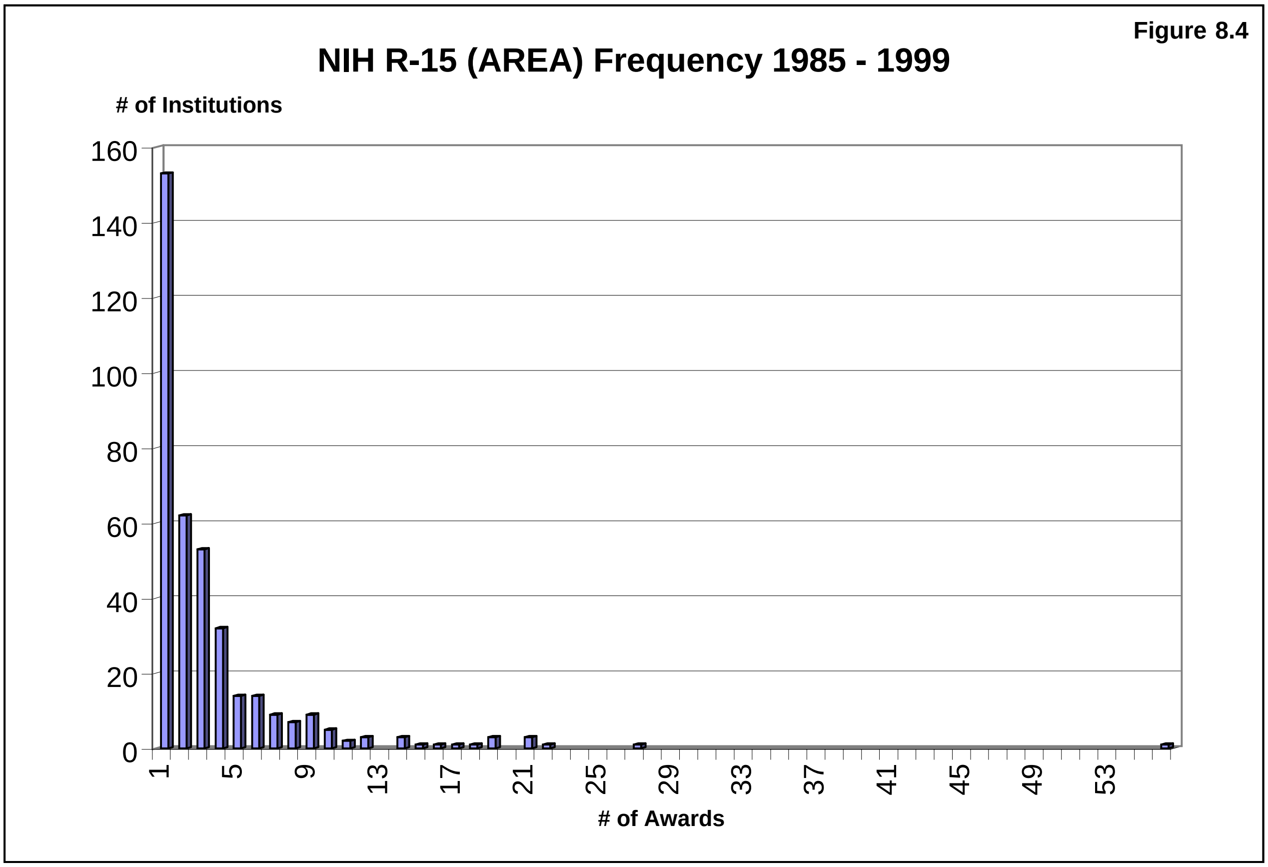

Table 8.10. NIH R-15 (AREA) Awards Public vs. Private 1985 -1999

Institution Type	Institutions	% Institutions	Awards	% Awards
Private	178	47.0%	567	41.7%
Public	201	53.0%	792	58.3%
Total	379		1359	

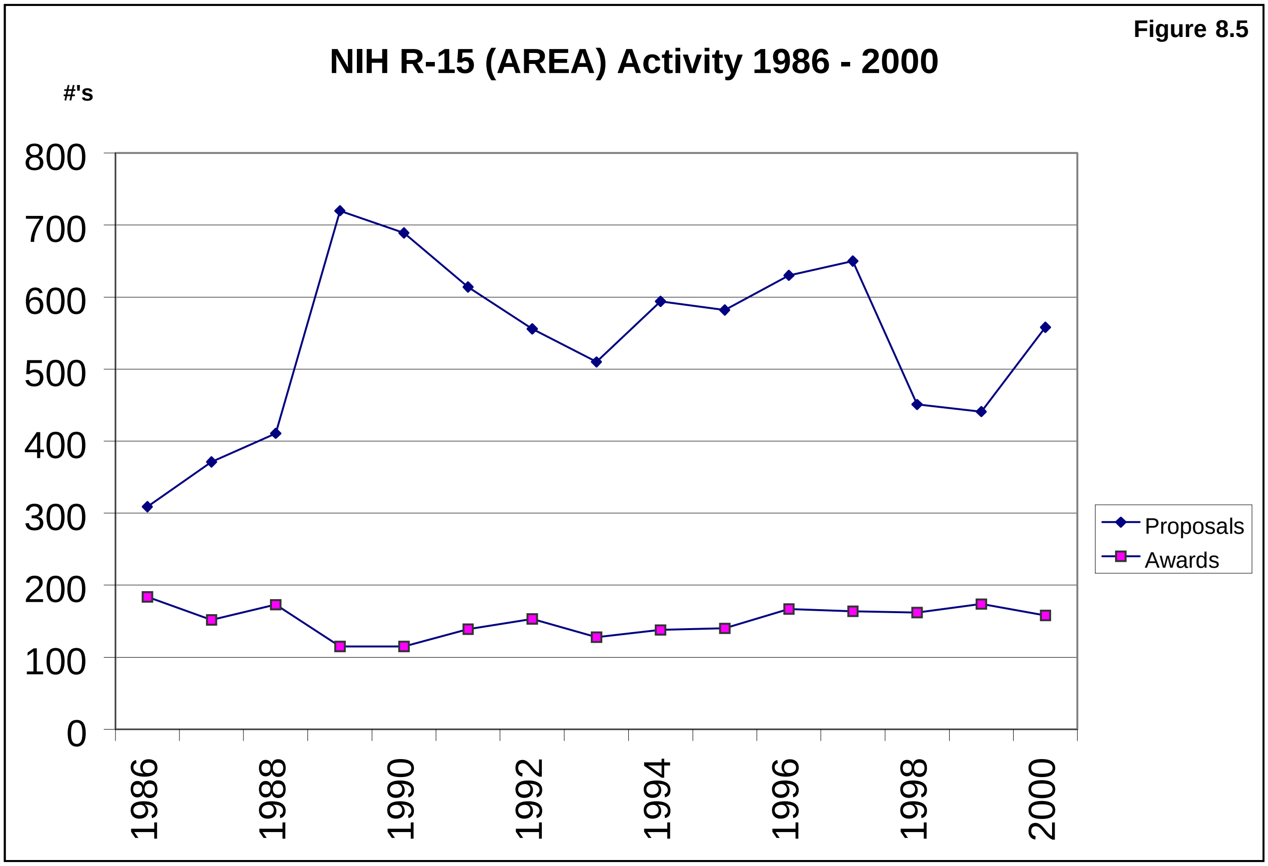
Figure 8.5
NIH R-15 (AREA) Activity 1986 - 2000
#'s
800
700
600
500
400
300
200
100
0
1986
1988
1990
1992
1994
1996
1998
2000
Proposals
Awards

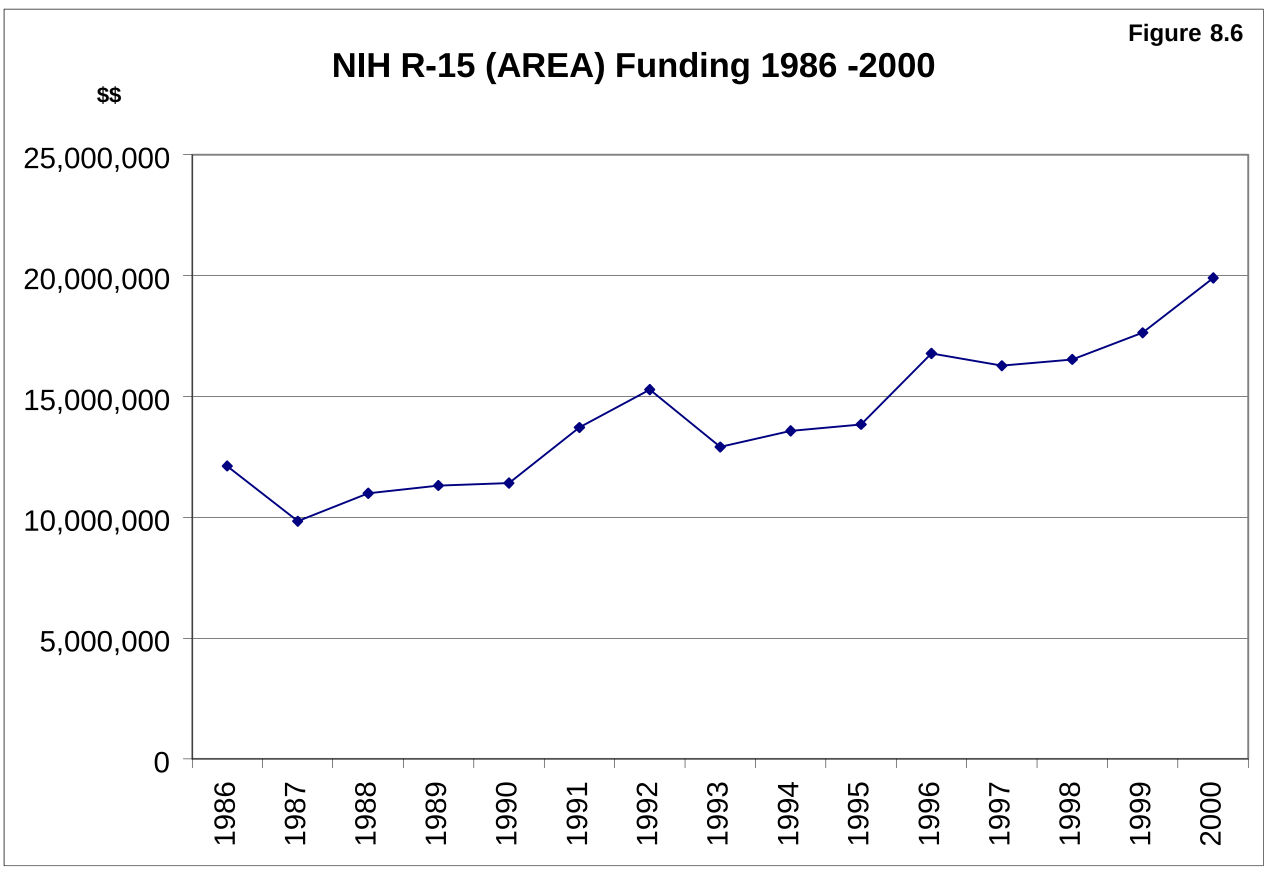
Figure 8.6
NIH R-15 (AREA) Funding 1986 -2000
$$
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000

Figure 8.7

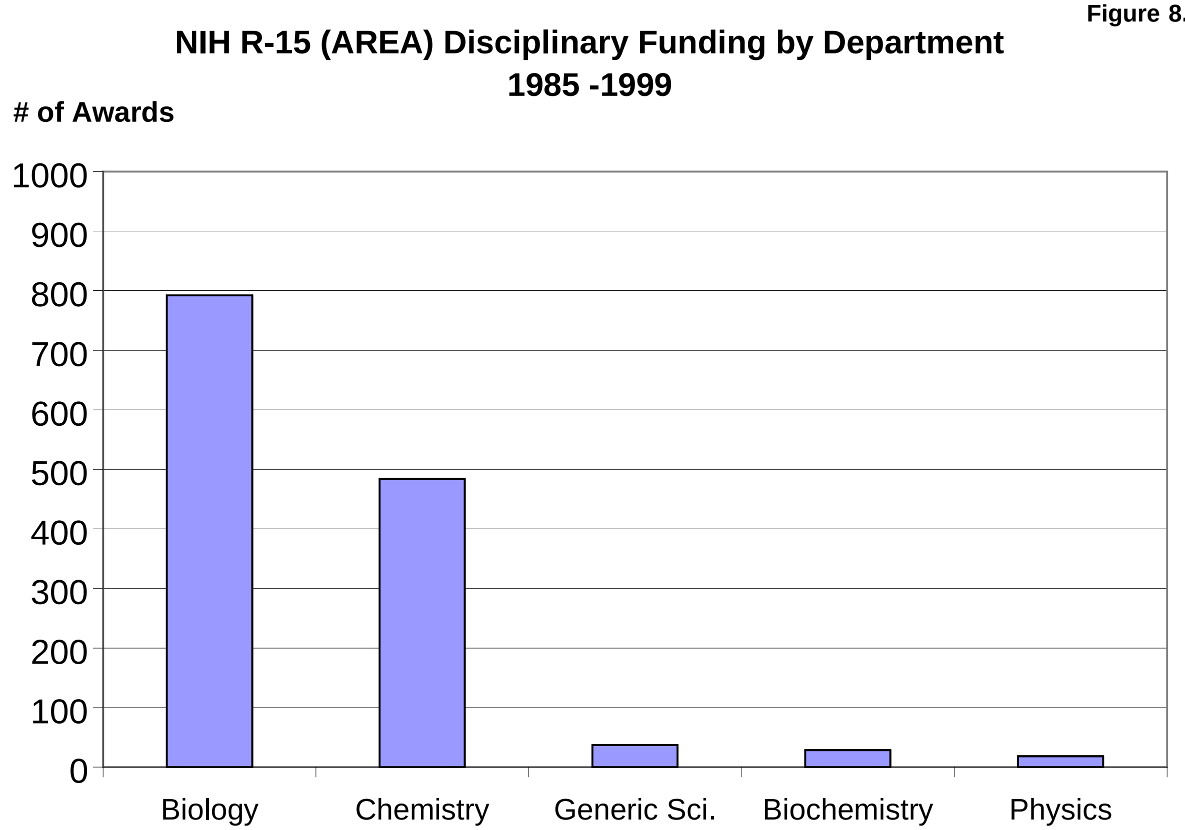
NIH R-15 (AREA) Disciplinary Funding by Department
1985 -1999
# of Awards
1000
900
800
700
600
500
400
300
200
100
0
Biology
Chemistry
Generic Sci.
Biochemistry
Physics

Table 8.11. NSF-RUI Research Awards in Physical Sciences and GeoSciences 1986–2000

Carnegie Class	Type	Study	Academic Institution	Total Awards
M1	S	*	San Jose State University	36
D2	S		San Diego State University	35
B1	P	*	Franklin and Marshall College	30
B1	P	*	Haverford College	21
D1	S	*	Northern Arizona University	19
B1	P	*	Occidental College	19
B1	P	*	Williams College	18
D2	S		Florida International University	17
M1	S		San Francisco State University	17
M2	P	*	Calvin College	16
B1	P	*	Colgate University	16
B1	P	*	Hope College	15
M1	S		California State University - Los Angeles	14
M1	S		California State University - Northridge	14
D1	S	*	College of William and Mary	13
B1	P	*	Swarthmore College	13
D1	S		Illinois State University	12
M1	S		University of Nevada Las Vegas	12
M1	S	*	University of Wisconsin - Eau Claire	12
M1	S		California State University - Fullerton	11
B1	P	*	Lafayette College	11
M1	P	*	Trinity University	11
M1	S	*	California State University - Long Beach	10
M1	S		Oakland University	10
B1	P	*	Oberlin College	10
B1	P		Vassar College	10
M1	S	*	Western Washington University	10
B1	P		Amherst College	9
B1	P	*	Augustana College	9
M1	S		Boise State University	9
M1	S	*	Cal Poly State University - San Luis Obispo	9
M1	S	*	College of Charleston	9
ENG	P	*	Harvey Mudd College	9
B1	P	*	Middlebury College	9
OS	S		US Naval Academy	9
B1	P		Westmont College	9
B1	P	*	Bates College	8
B1	P	*	Carleton College	8
M1	S	*	James Madison University	8
B1	P		Saint Olaf College	8
M1	P	*	Santa Clara University	8
M1	S		University of Massachusetts - Dartmouth	8
D2	P		Wake Forest University	8
B1	P	*	Wellesley College	8
D1	S		Ball State University	7
B1	P	*	College of Wooster	7
B1	P	*	Hamilton College	7
B1	P	*	Lewis and Clark College	7

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Table 8.11. NSF-RUI Research Awards in Physical Sciences and GeoSciences 1986–2000

Carnegie Class	Type	Study	Academic Institution	Total Awards
ENG	S		South Dakota School of Mines and Technology	7
M1	S	*	SUNY College at Geneseo	7
D2	S		University of Colorado Denver	7
D2	S		University of Missouri - St Louis	7
M1	S		University of Wisconsin - Oshkosh	7
B1	P	*	Union College	7
M1	S		Appalachian State University	6
B1	P	*	Coe College	6
D1	P		Florida Institute of Technology	6
D1	S		Georgia State University	6
B1	P		Hampshire College	6
B1	P	*	Macalester College	6
B	S		Pennsylvania State University - Berks-Lehigh Valley	6
M1	S	*	Southern Illinois University at Edwardsville	6
B1	P	*	Barnard College	5
M1	S	*	Central Michigan University	5
B1	P	*	Colorado College	5
M1	P	*	Gonzaga University	5
B1	P	*	Grinnell College	5
D2	S		Indiana State University	5
M1	P	*	John Carroll University	5
B1	P	*	Mount Holyoke College	5
M2	P		Point Loma Nazarene College	5
B1	P	*	Smith College	5
M1	S		St Cloud State University	5
M1	S		University of North Carolina - Charlotte	5
M1	S		University of North Carolina - Wilmington	5
B2	S		University of Puerto Rico - Humacao University	5
M1	P		Villanova University	5
B1	S		Virginia Military Institute	5
B1	P		Western Maryland College	5
B2	P		Augsburg College	4
B1	P	*	Bucknell University	4
M1	P		Embry Riddle Aero University	4
M1	S		Georgia Southern University	4
B1	P	*	Gustavus Adolphus College	4
B1	P		Hobart and William Smith College	4
D1	S		Indiana University of Pennsylvania	4
M1	S		Marshall University	4
ENG	S		Southern Polytechnic State University	4
M1	S	*	Southwest Missouri State University	4
M1	P		St Joseph's University	4
M1	S		SUNY - Brockport	4
M1	S		Truman State University	4
D2	S		University of Alaska Fairbanks	4
M1	S		University of Arkansas Little Rock	4
B1	P		University of Dallas	4
M2	S		University of Guam	4
M1	S	*	University of Minnesota - Duluth	4

Table 8.11. NSF-RUI Research Awards in Physical Sciences and GeoSciences 1986–2000

Carnegie Class	Type	Study	Academic Institution	Total Awards
B1	S	*	University of North Carolina - Asheville	4
M1	S		University of South Alabama	4
M2	S		University of Wisconsin - Parkside	4
M1	P		Valparaiso University	4
M1	P		Alfred University	3
M1	S		California State University - Bakersfield	3
M1	S		California State University - Sacramento	3
M1	S		California State University - San Bernardino	3
B1	P	*	College of the Holy Cross	3
M1	S		CUNY - Baruch College	3
M1	S		CUNY - H H Lehman College	3
M1	S		East Carolina University	3
M1	S	*	Eastern Illinois University	3
M1	S	*	Eastern Michigan University	3
B1	P	*	Furman University	3
B1	P	*	Hendrix College	3
B1	P	*	Juniata College	3
B1	P		Kenyon College	3
B1	P	*	Knox College	3
D2	S		Louisiana Tech University	3
ENG	S		New Mexico Institute of Mining and Technology	3
M1	S	*	Northern Kentucky University	3
M1	P		Norwich University	3
M1	P		Providence College	3
M1	P		Rider University	3
M1	S		Rutgers University - Camden	3
B1	P	*	Southwestern University	3
M1	P		St Mary's College	3
B2	S		SUNY - Old Westbury	3
B1	P	*	Trinity College	3
D2	S		University of Alabama - Huntsville	3
B2	S		University of Houston - Downtown	3
R1	S		University of Maryland - College Park	3
M1	S		University of Michigan - Dearborn	3
D2	P		University of San Francisco	3
D1	S		University of South Dakota	3
M1	S		University of Texas - San Antonio	3
M2	S		Weber State University	3
M1	S		West Chester University of Pennsylvania	3
M1	S	*	Western Kentucky University	3
D1	S		Western Michigan University	3
D2	S		Wright State University	3
B1	P	*	Allegheny College	2
D1	P		Andrews University	2
B1	P	*	Austin College	2
B2	P		Berea College	2
M1	S		Bloomsburg University of Pennsylvania	2
M1	S		California State University - Dominguez Hills	2
M1	P	*	Centenary College	2

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Table 8.11. NSF-RUI Research Awards in Physical Sciences and GeoSciences 1986–2000

Carnegie Class	Type	Study	Academic Institution	Total Awards
M1	S	*	Central Washington University	2
B2	S		Christopher Newport University	2
B1	P	*	Colby College	2
B1	P	*	Davidson College	2
M1	S		Delaware State University	2
D2	P		DePaul University	2
M1	S		Eastern Washington University	2
B1	P		Eckerd College	2
B2	S		Evergreen State College	2
M1	P	*	Fairfield University	2
M1	P		Fairleigh Dickinson, West Indies	2
D2	S		Idaho State University	2
D2	S		Indiana - Purdue University at Indianapolis	2
M1	P	*	Ithaca College	2
B1	P	*	Lawrence University	2
M1	P		Long Island University Brooklyn	2
M1	P		Loyola College in Maryland	2
B2	P		Lyon College	2
M1	S		Millersville University	2
D1	S		Northern Illinois University	2
B2	P		Otterbein College	2
M2	S		Pennsylvania State University - Erie-Behrend	2
M1	P	*	Pacific Lutheran University	2
R2	P		Parks College - St Louis University	2
B1	P	*	Pomona College	2
D2	S		Portland State University	2
B1	P		Rhodes College	2
B1	P		Simon's Rock of Bard College	2
M1	S		Southern Oregon University	2
M1	S		Southern University	2
M2	P		St. John Fisher College	2
M1	S		SUNY - Fredonia	2
B1	P		Sweet Briar College	2
M1	S		Tennessee Technological University	2
M1	S		University of the Ditrict of Columbia	2
B2	S		University of Hawaii - Hilo	2
M1	S		University of Michigan - Flint	2
D2	S		University of New Orleans	2
M1	S	*	University of North Florida	2
M1	S	*	University of Puerto Rico - Mayaguez	2
M1	P	*	University of Richmond	2
D2	P	*	University of San Diego	2
M1	S		University of Texas El Paso	2
M1	S		University of Wisconsin - La Crosse	2
M1	S		Valdosta State University	2
B1	P	*	Whitman College	2
M1	P		Whitworth College	2
D2	P		Worcester Polytechnic Institute	2
-	-	24	Institutions with one (1) award	112

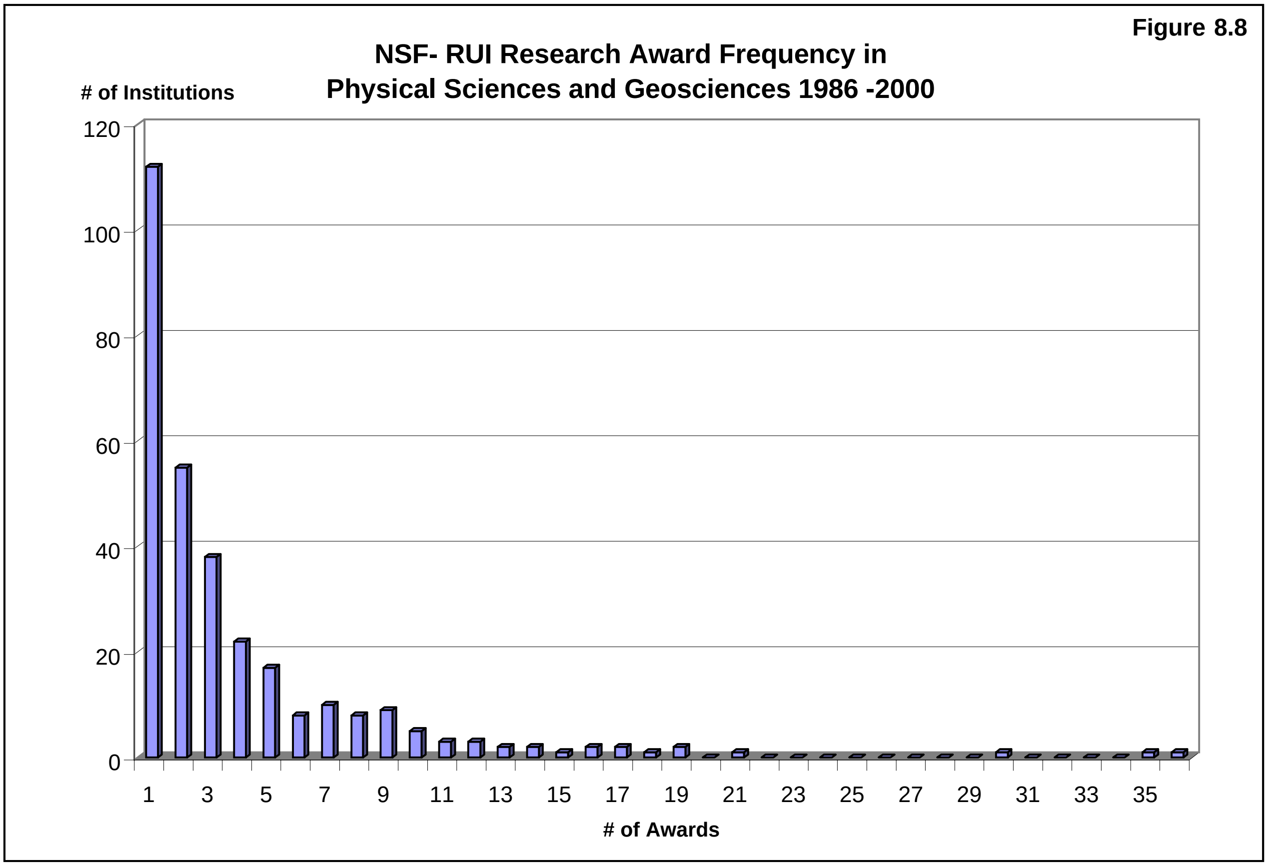

Table 8.12. NSF-RUI Research in Physical Sciences and GeoSciences Public vs. Private 1986 - 2000

Institution Type	Institutions	% Institutions	Awards	% Awards
Private	140	45.8%	565	46.9%
Public	166	54.2%	639	53.1%
Total	306		1204	

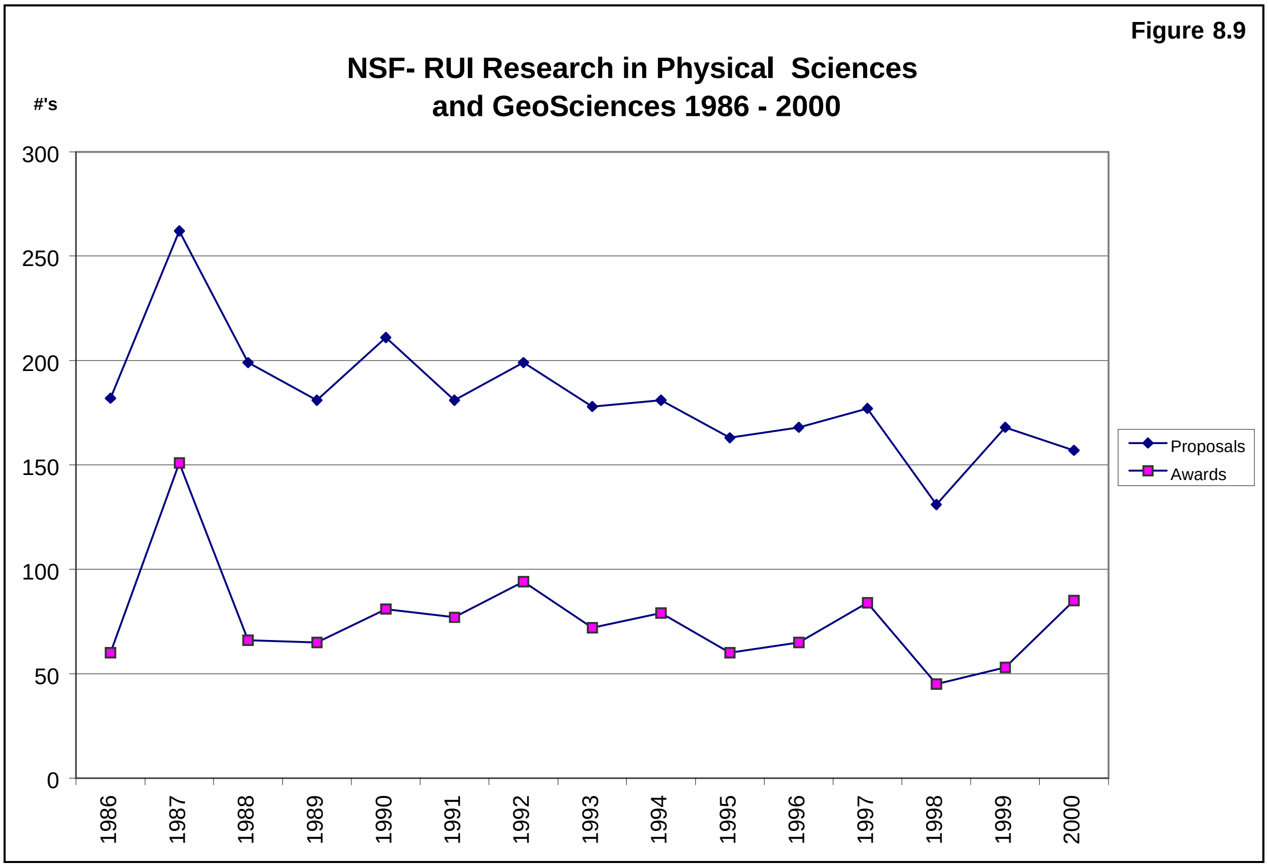
Figure 8.9
NSF- RUI Research in Physical Sciences and GeoSciences 1986 - 2000
#'s
300
250
200
150
100
50
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
Proposals
Awards

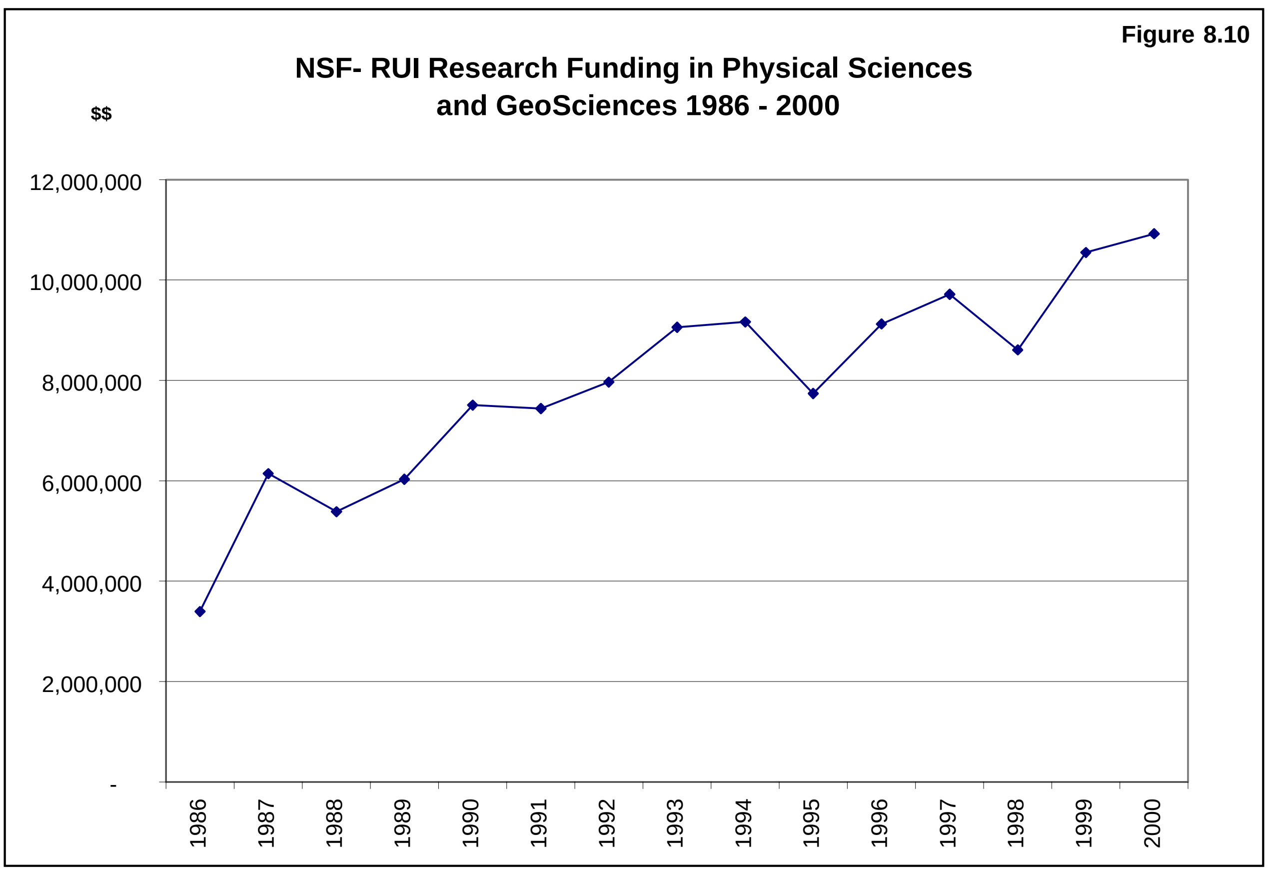
Figure 8.10
NSF- RUI Research Funding in Physical Sciences and GeoSciences 1986 - 2000
$$
12,000,000
10,000,000
8,000,000
6,000,000
4,000,000
2,000,000
-
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000

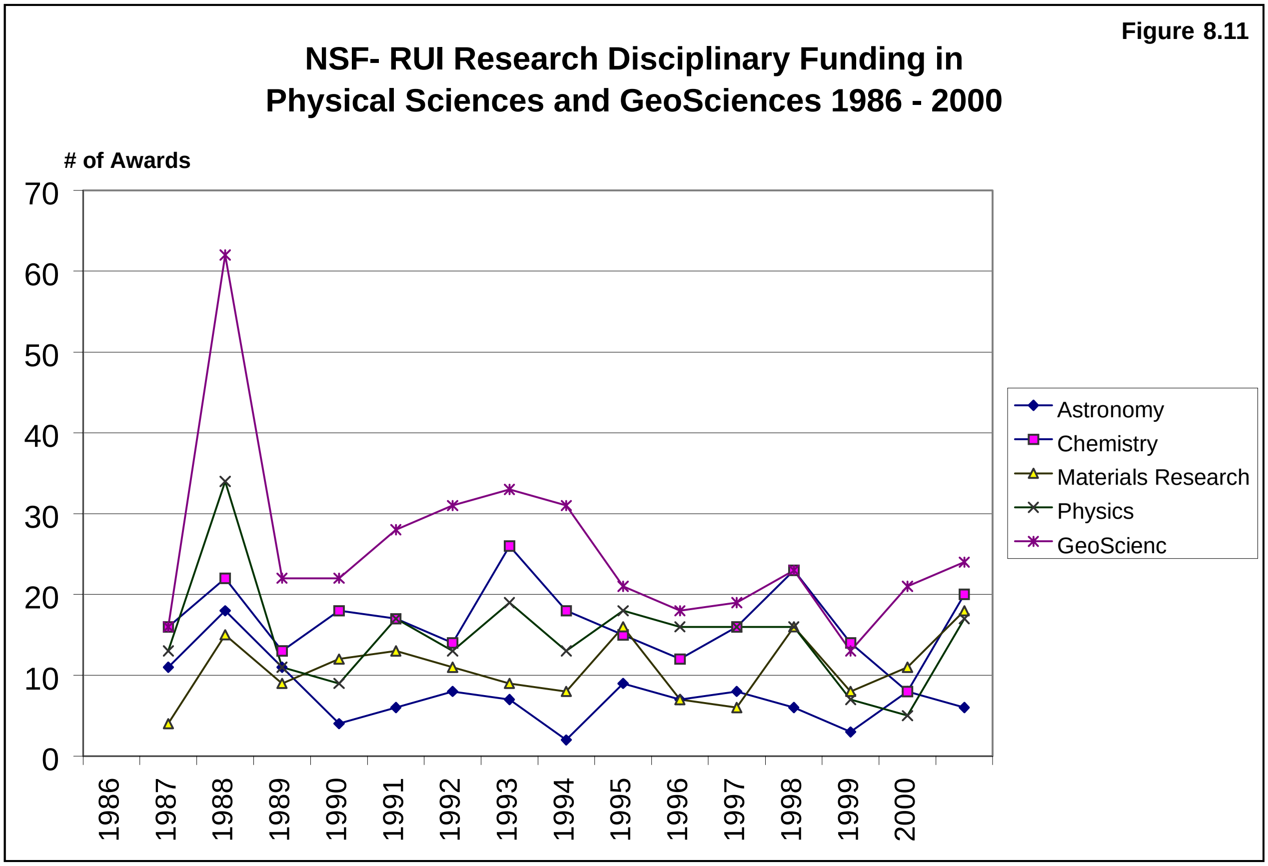

Figure 8.11
NSF- RUI Research Disciplinary Funding in
Physical Sciences and GeoSciences 1986 - 2000
# of Awards
70
60
50
40
30
20
10
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
Astronomy
Chemistry
Materials Research
Physics
GeoScienc

Figure 8.12

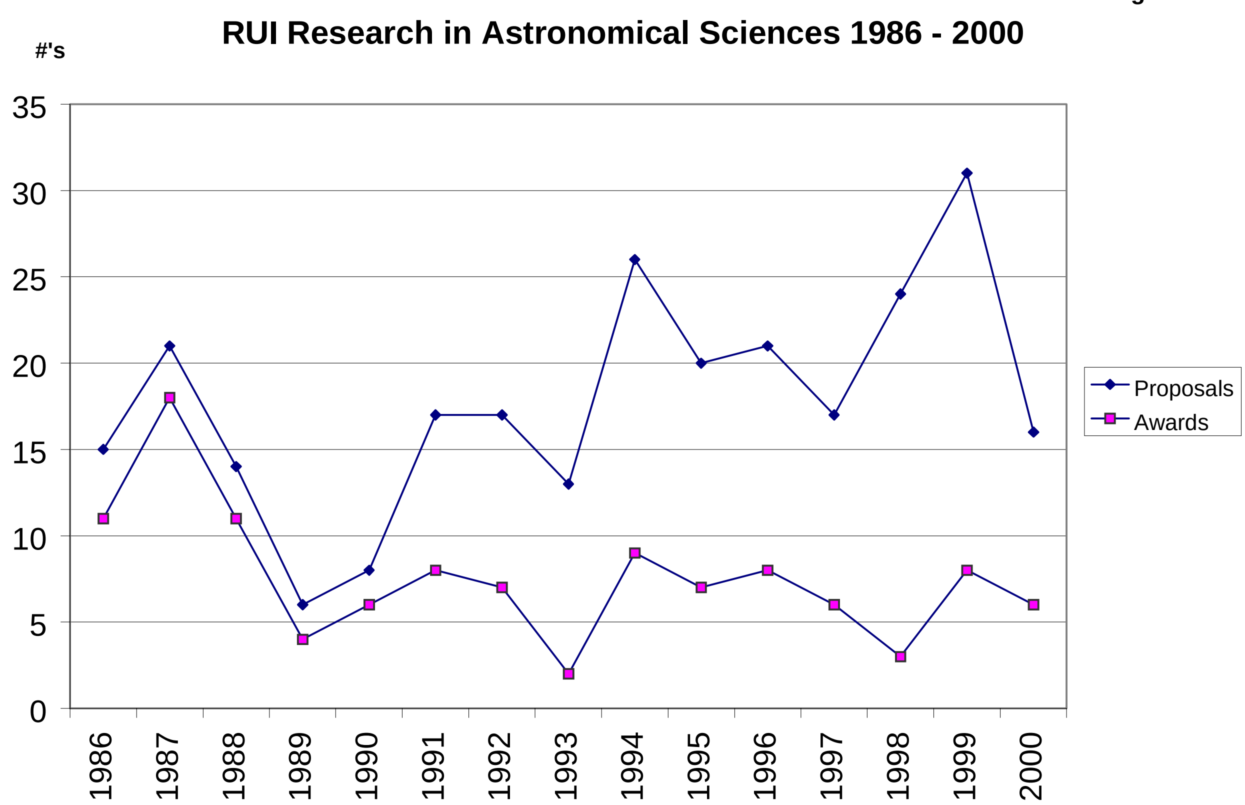

Figure 8.13

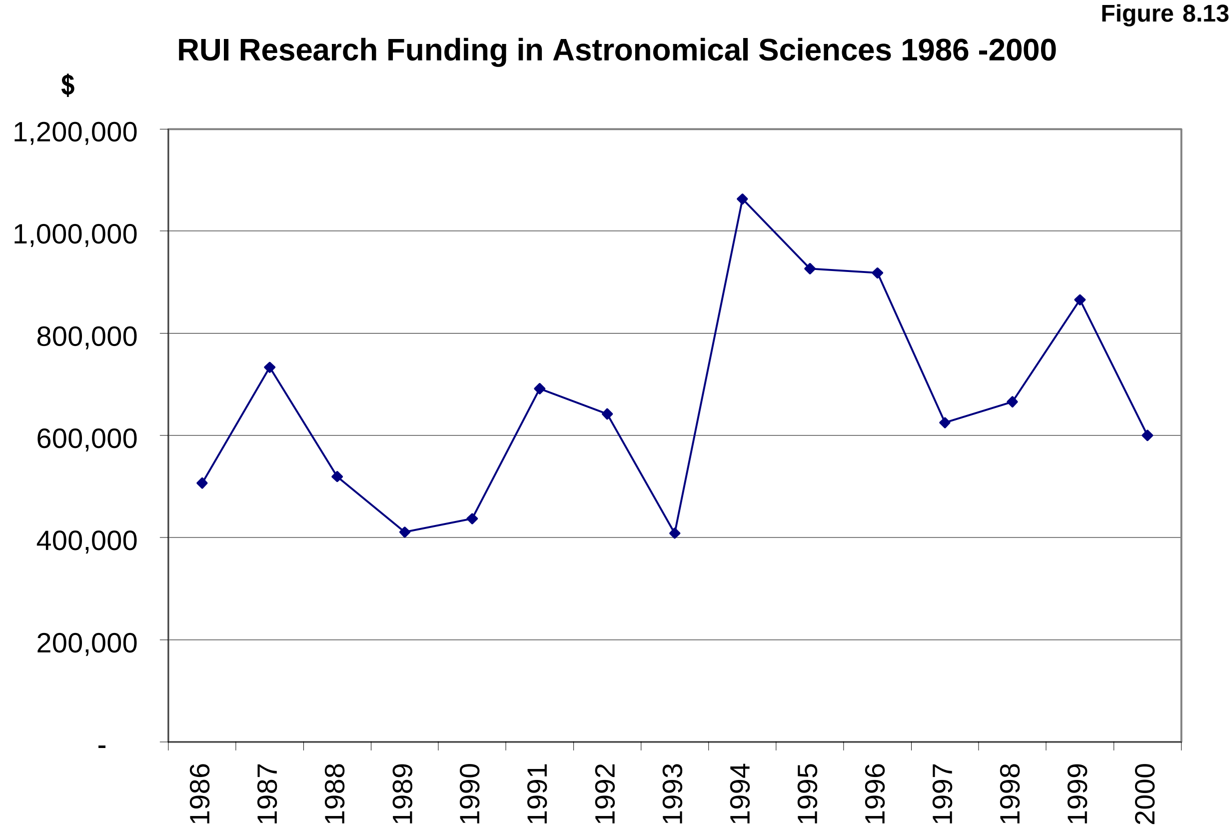

Figure 8.14

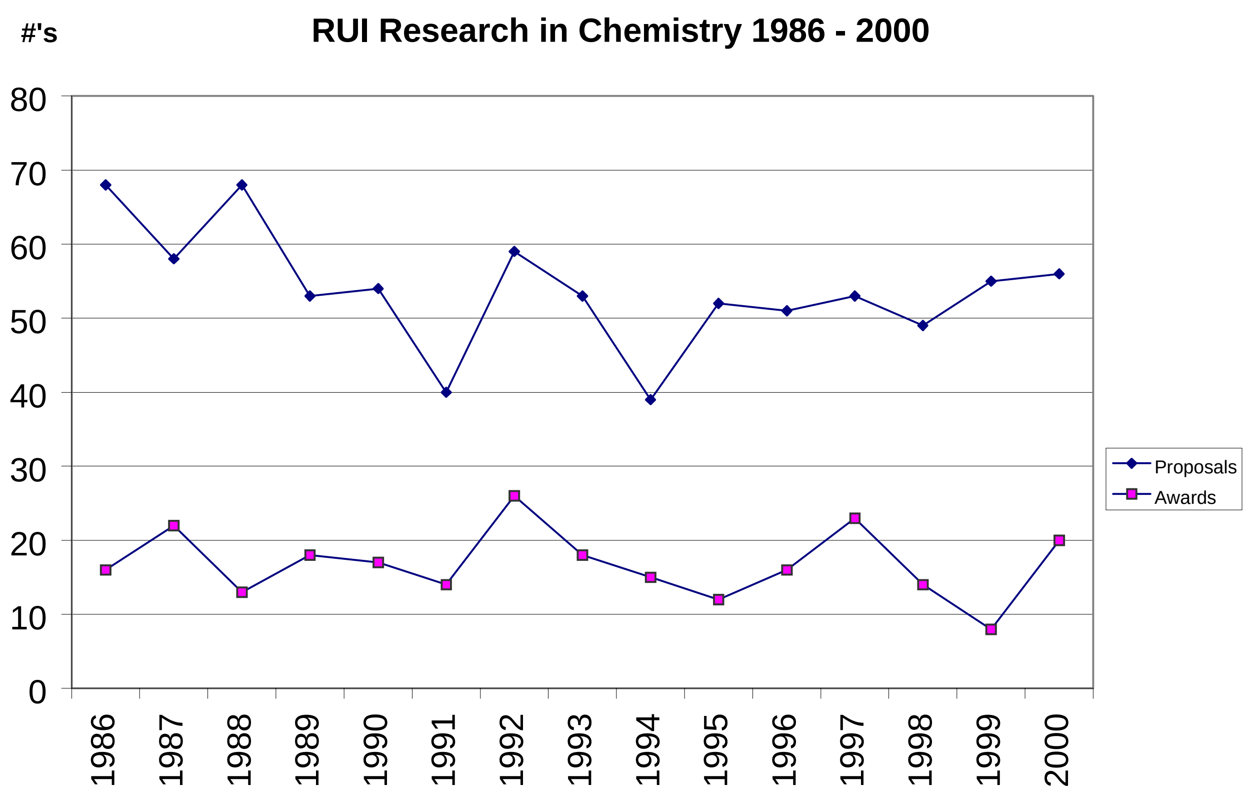

Figure 8.15

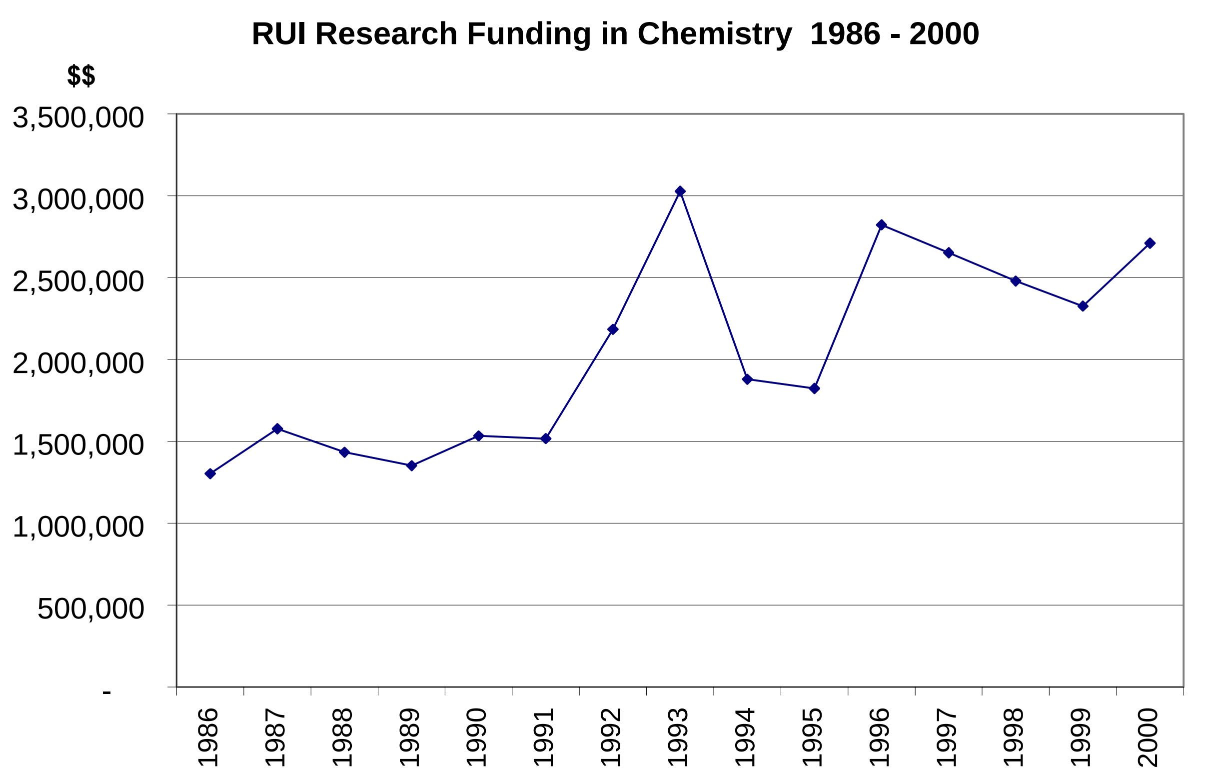

Figure 8.16

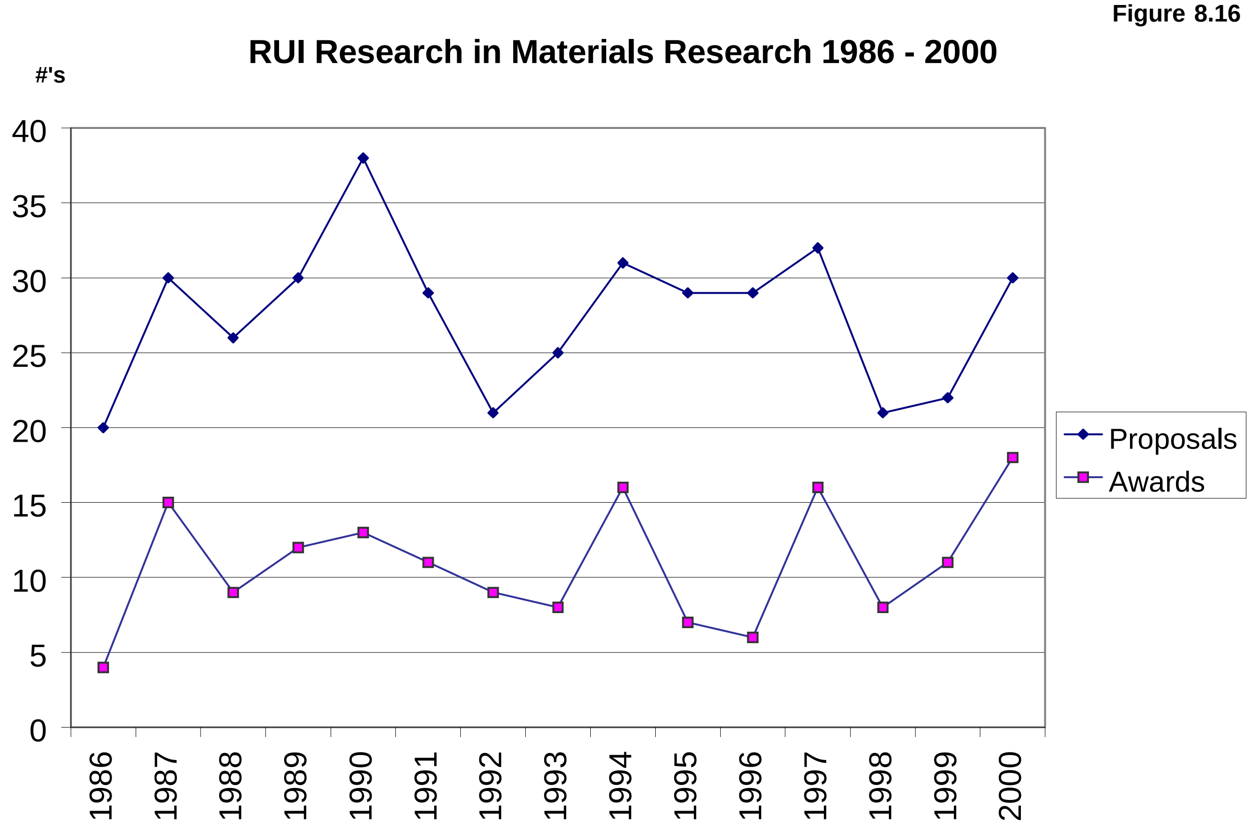

Figure 8.17

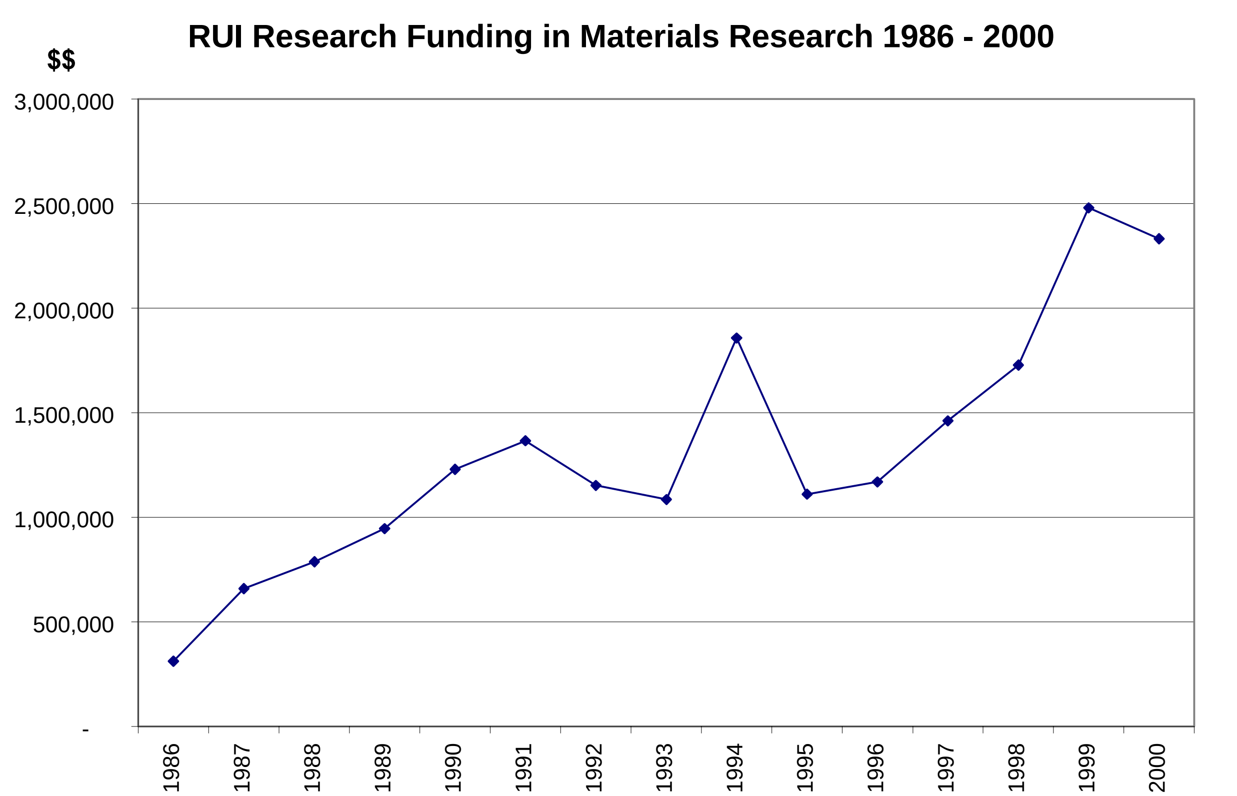

Figure 8.18

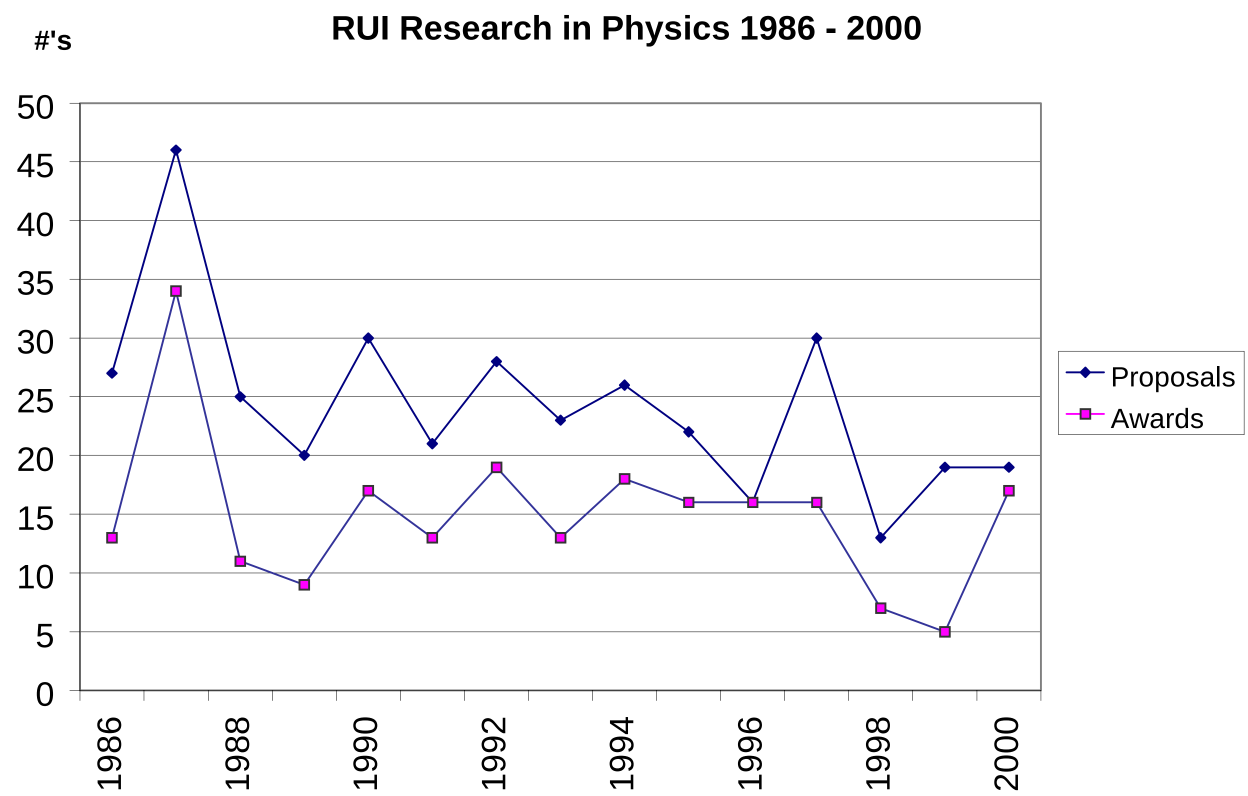

Figure 8.19

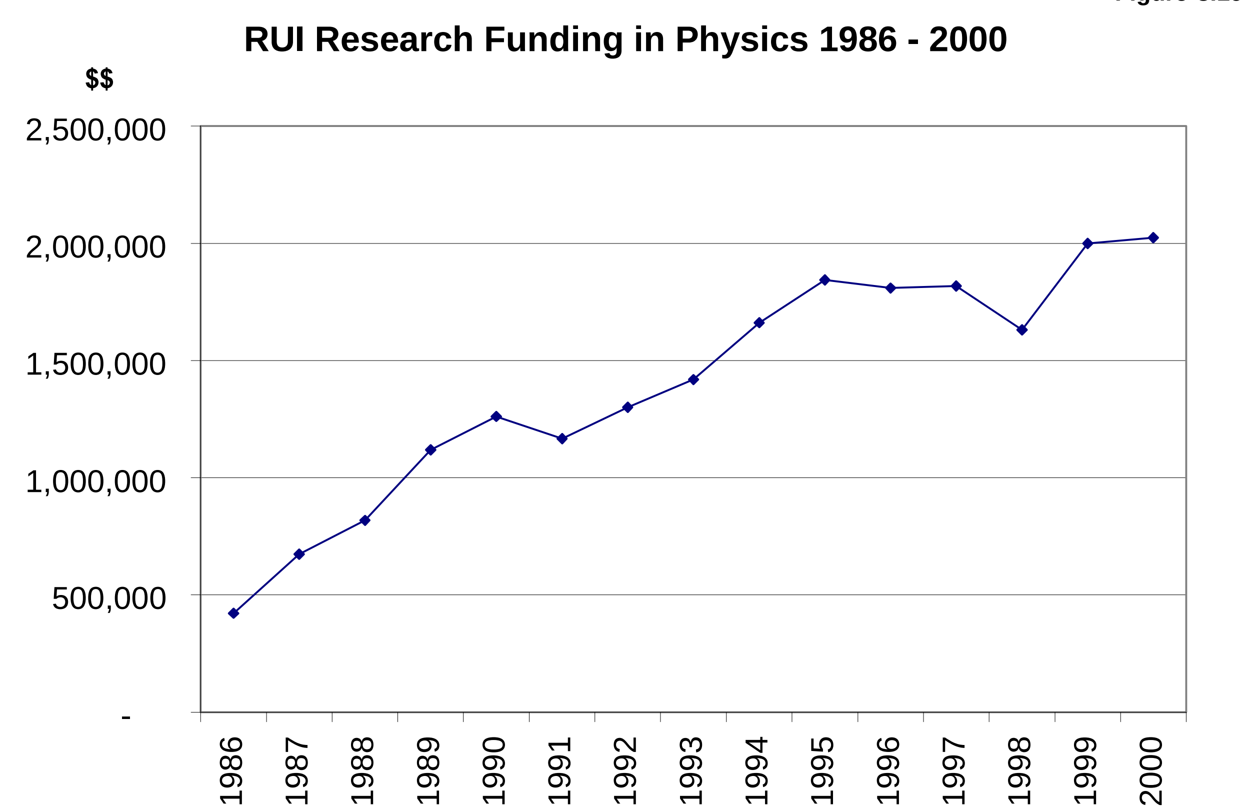

Figure 8.20

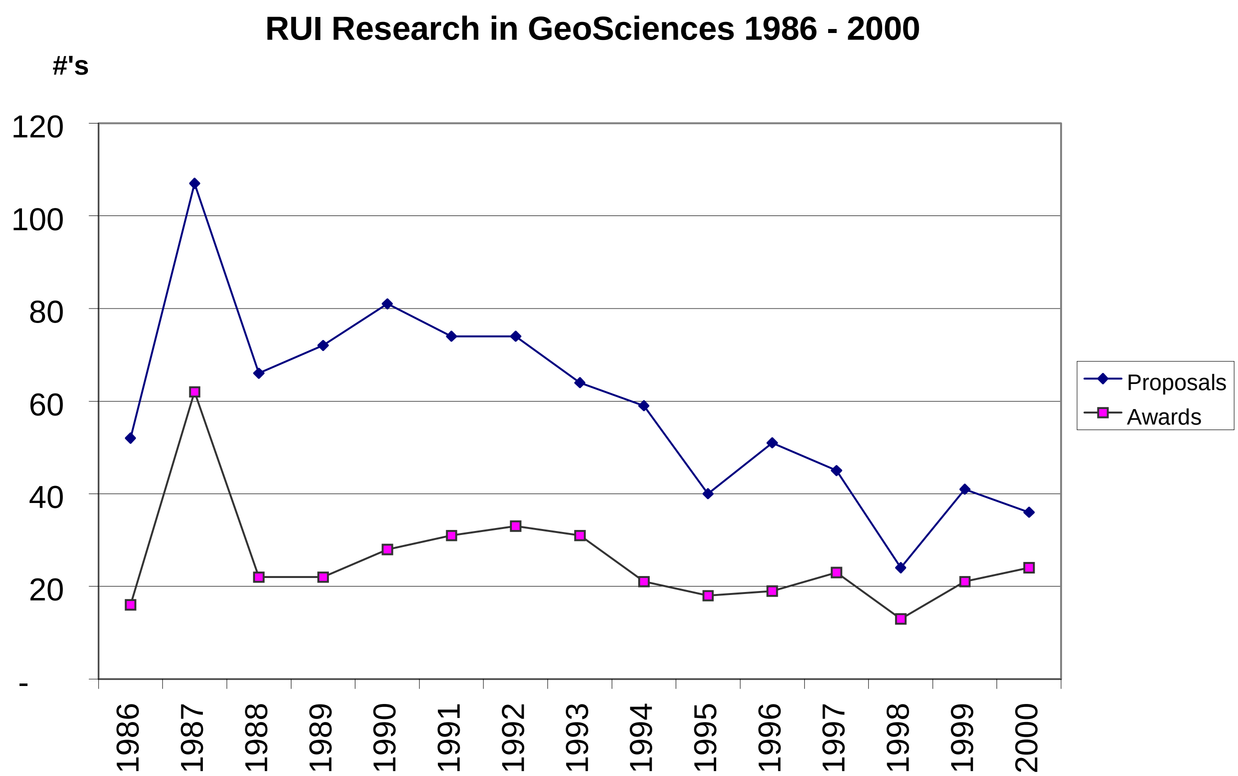

Figure 8.21

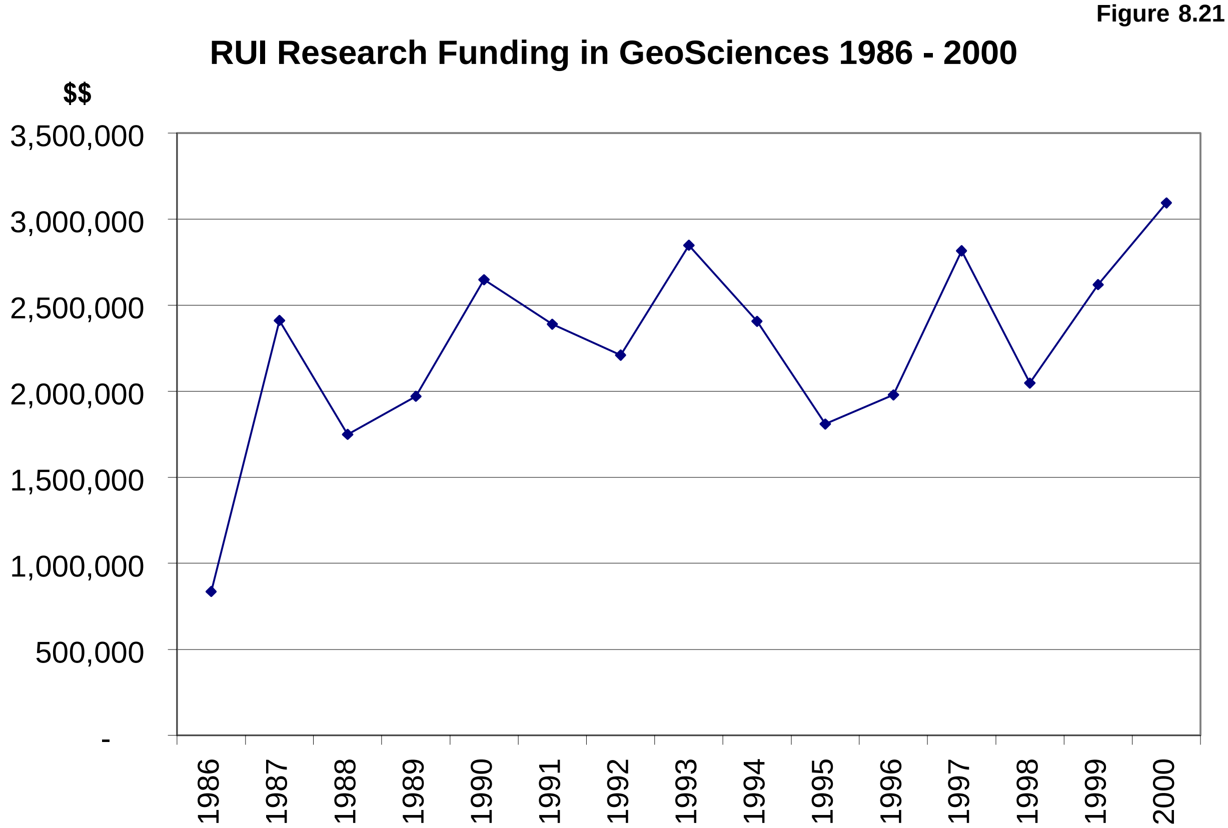

Table 8.13. NSF-RUI Research Awards in Biological Sciences 1986–2000

Carnegie Class	Type	Study	Academic Institution	Total Awards
B1	P	*	Haverford College	21
B1	P		Amherst College	17
B1	P	*	Wellesley College	16
B1	P	*	Williams College	16
M1	S		San Francisco State University	14
R2	S		University of Massachusetts - Boston	13
B1	P	*	Barnard College	11
M1	S	*	California State University - Long Beach	11
B1	P	*	Colgate University	11
B1	P	*	Oberlin College	11
B1	P	*	Reed College	11
M1	S		California State University- Los Angeles	10
M1	P	*	Ithaca College	10
M1	S		Oakland University	10
B1	P	*	Pomona College	10
B1	P	*	Swarthmore College	10
B1	P	*	Allegheny College	9
B1	P	*	Mount Holyoke College	9
D2	S		University of Colorado Denver	9
M1	S	*	James Madison University	8
B1	P	*	Occidental College	8
B1	P	*	Union College	8
M1	S		California State University- Fullerton	7
D2	P		Duquesne University	7
B2	S		Evergreen State College	7
B1	P	*	Franklin and Marshall College	7
B1	P		Siena College	7
D1	S		University of North Carolina - Greensboro	7
M1	P	*	University of Richmond	7
M1	S	*	University of Wisconsin - Eau Claire	7
B1	P		Vassar College	7
D2	S		Wright State University	7
B1	P	*	Davidson College	6
B1	P	*	Hamilton College	6
B1	P		Kenyon College	6
B1	P		Saint Olaf College	6
M1	S		SUNY - Cortland	6
M1	P	*	Trinity University	6
B1	P	*	Bowdoin College	5
M1	S		California State University - Hayward	5
B1	P	*	Connecticut College	5
M1	P		DePaul University	5
M1	P	*	Gonzaga University	5
M1	S		Rutgers University - Camden	5
M1	P	*	Santa Clara University	5
M1	S	*	Southwest Missouri State University	5
D2	S		University of New Orleans	5
D1	S		University of Northern Colorado	5
M1	P		Villanova University	5
M1	S		Western Carolina University	5

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Table 8.13. NSF-RUI Research Awards in Biological Sciences 1986–2000

Carnegie Class	Type	Study	Academic Institution	Total Awards
B1	P	*	Bucknell University	4
B1	P	*	Carleton College	4
B1	P	*	College of the Holy Cross	4
D1	S	*	College of William and Mary	4
M1	S	*	Eastern Michigan University	4
M1	S		Georgia Southern University	4
B1	P	*	Goucher College	4
M1	S		Indiana - Purdue University at Ft. Wayne	4
B1	P	*	Knox College	4
B1	P	*	Lafayette College	4
B1	P	*	Lake Forest College	4
D2	P		Pepperdine University	4
D2	S		San Diego State University	4
M1	S		Southern Oregon University	4
AA	S		Allegany Community College	3
B1	P		Alma College	3
D1	P		Andrews University	3
B1	P	*	Bates College	3
B1	P	*	Beloit College	3
B1	P	*	Dickinson College	3
M1	S		East Carolina University	3
B2	S		Fairmont State College	3
B2	P		Loras College	3
B1	P	*	Macalester College	3
D1	S		Miami University	3
M2	P	*	Mount Saint Mary's College	3
B1	P	*	Ripon College	3
M1	S		Sonoma State University	3
M1	S		Southeast Missouri State University	3
M1	S	*	Southern Illinois University at Edwardsville	3
M1	S	*	Southwest Texas State University	3
M1	S		Tennessee Technological University	3
M1	S		Truman State University	3
D2	S		University of Alaska - Fairbanks	3
D2	S		University of Central Florida	3
M2	S		University of Massachusetts - Dartmouth	3
M1	S	*	University of Minnesota - Duluth	3
D2	S		University of Missouri - Saint Louis	3
M1	S		University of North Carolina - Wilmington	3
D2	P	*	University of San Diego	3
M1	S		University of South Alabama	3
D2	P	*	University of the Pacific	3
M1	S		University of Wisconsin - Oshkosh	3
D2	P	*	Wake Forest University	3
B1	P	*	Washington and Lee University	3
M1	S		Winona State University	3
D1	P		Adelphi University	2
B1	P		Agnes Scott College	2
M1	S		Auburn University - Montgomery	2
B1	P		Birmingham Southern College	2

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Table 8.13. NSF-RUI Research Awards in Biological Sciences 1986–2000

Carnegie Class	Type	Study	Academic Institution	Total Awards
M1	S		Boise State University	2
M1	S		California State Poly University - Pomona	2
M1	S		California State University - Chico	2
M1	S		California State University - Dominguez Hills	2
M1	S		Central Missouri State University	2
B1	P	*	Colby College	2
M1	S	*	College of Charleston	2
B1	P		College of Our Lady of the Elms	2
B1	P	*	College of Wooster	2
M1	P	*	Creighton University	2
M1	S		Francis Marion University	2
B1	P	*	Gettysburg College	2
B1	P	*	Grinnell College	2
M1	P		Hood College	2
B1	P	*	Kalamazoo College	2
M1	S		Kutztown University	2
B1	P	*	Lawrence University	2
M2	P		Loyola Univ New Orleans	2
B1	P	*	Middlebury College	2
M1	P	*	Mississippi College	2
B1	P		Muhlenberg College	2
D1	S	*	Northern Arizona University	2
M2	S		Pennsyylvania State University - Erie-Behrend	2
B2	S		Peru State College	2
M1	P		Regis University	2
B2	P		Seton Hill College	2
M1	P		Simmons College	2
M1	S		South Carolina State College	2
B2	P		St Mary's College (IN)	2
B1	P		St Mary's College of Maryland	2
M1	S	*	SUNY College at Geneseo	2
M1	S		SUNY Plattsburgh	2
B2	S		SUNY Purchase	2
M1	S		University of Houston - Clear Lake	2
B1	S	*	University of North Carolina - Asheville	2
B1	P		University of Puget Sound	2
M1	P	*	University of Scranton	2
M1	S		University of Southern Maine	2
M1	S	*	University of Wisconsin - Stevens Point	2
M1	S		West Chester University of Pennsylvania	2
M1	S	*	Western Washington University	2
B1	P	*	Willamette University	2
-	-	23	Institutions with one (1) award	119

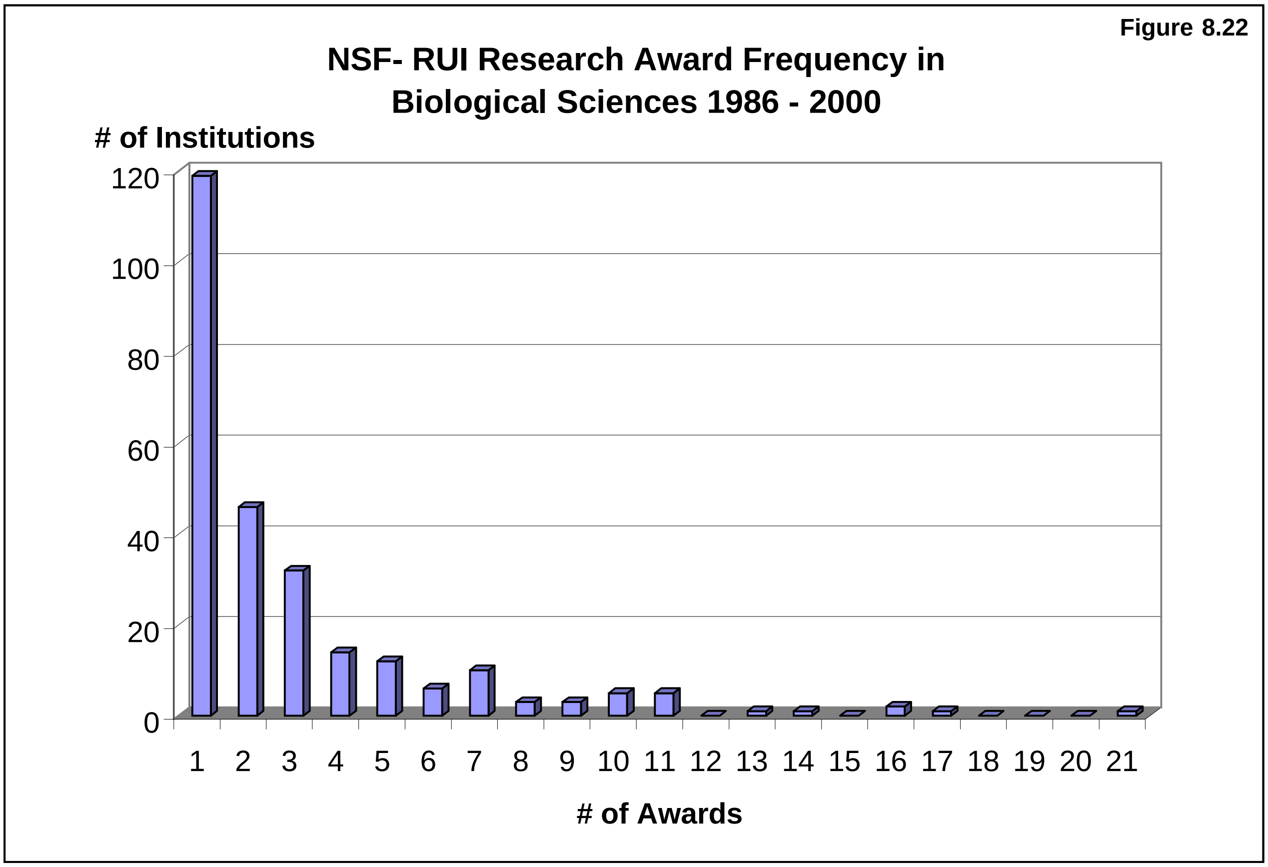

Table 8.14. NSF-RUI Research in Biological Sciences Public vs. Private 1986 - 2000

Institution Type	Institutions	% Institutions	Awards	% Awards
Private	140	53.6%	456	58.3%
Public	121	46.4%	326	41.7%
Total	261		782	

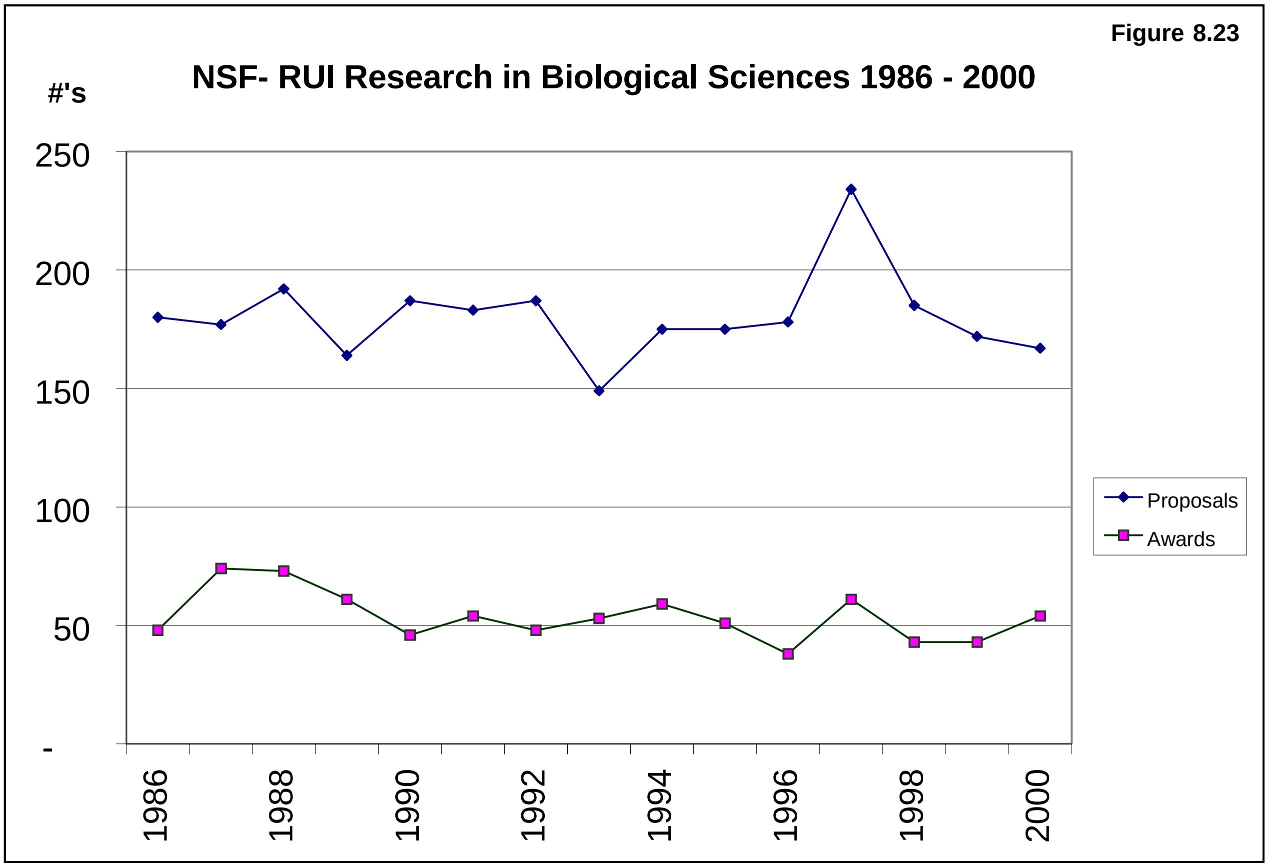
Figure 8.23
NSF- RUI Research in Biological Sciences 1986 - 2000
#'s
250
200
150
100
50
-
1986
1988
1990
1992
1994
1996
1998
2000
Proposals
Awards

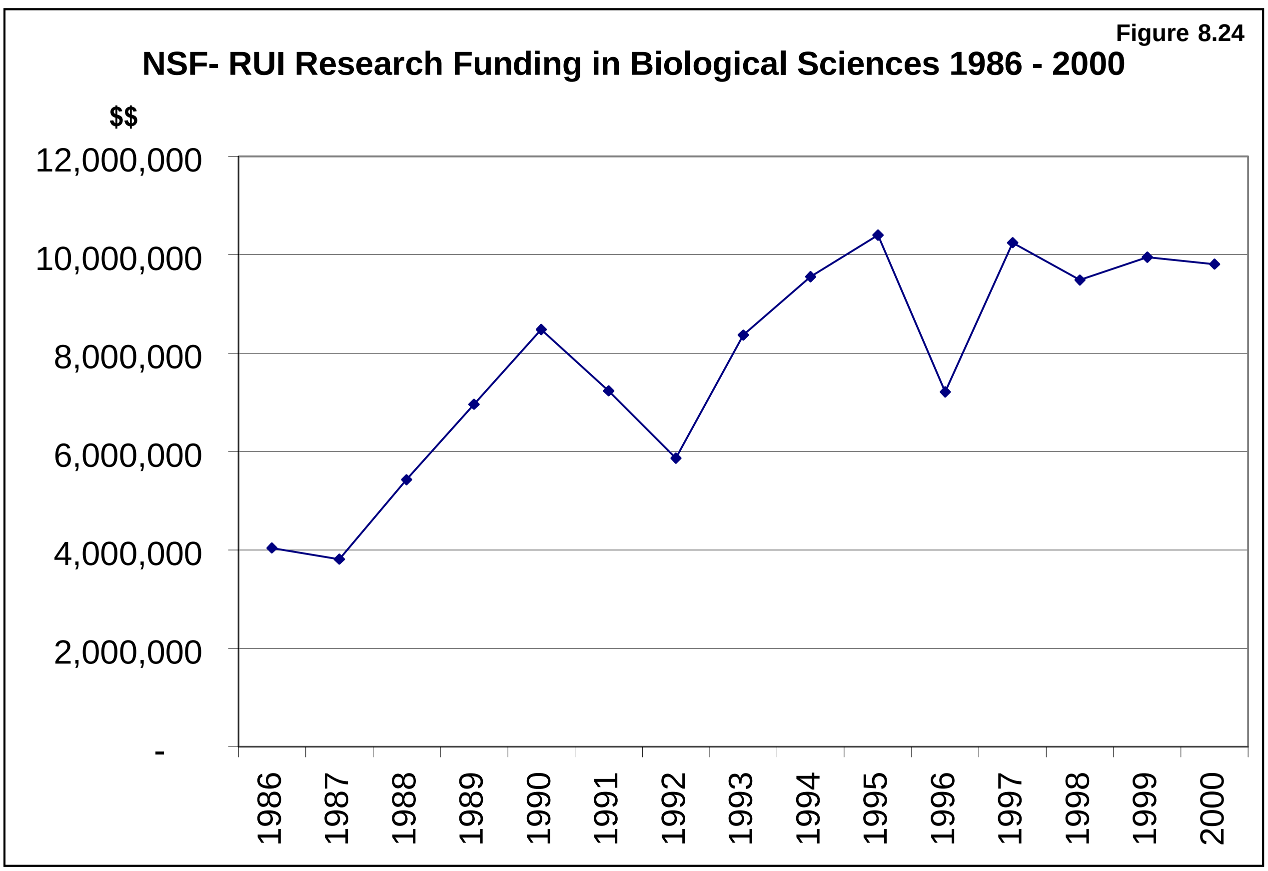
Figure 8.24
NSF- RUI Research Funding in Biological Sciences 1986 - 2000
$$
12,000,000
10,000,000
8,000,000
6,000,000
4,000,000
2,000,000
-
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000

Table 8.15. Research Corporation CCSA Awards 1986–2000

Carnegie Class	Type	Study	Academic Institution	Total Awards
M1	S		California State University - Fullerton	19
B1	P	*	Williams College	19
D1	S		Illinois State University	18
M1	S	*	University of Wisconsin - Eau Claire	16
B1	P	*	Wellesley College	14
B1	P	*	Colgate University	13
B1	P	*	Carleton College	12
B1	P	*	Haverford College	12
M1	S	*	San Jose State University	12
B1	P	*	Swarthmore College	12
B1	P	*	Furman University	11
B1	P	*	Grinnell College	11
ENG	P	*	Harvey Mudd College	11
B1	P	*	Hendrix College	11
B1	P	*	Hope College	11
B1	P	*	Lewis and Clark College	11
B1	P	*	Middlebury College	11
B1	P	*	Reed College	11
M1	S		University of North Carolina - Charlotte	11
M2	P	*	Calvin College	10
B1	P	*	Mount Holyoke College	10
D1	S	*	Northern Arizona University	10
B1	P	*	Occidental College	10
M1	S		University of South Alabama	10
B1	P		Amherst College	9
B1	P	*	Bates College	9
B1	P	*	Connecticut College	9
B1	P	*	Davidson College	9
B1	P	*	Gustavus Adolphus College	9
B1	P	*	Hamilton College	9
M1	P		Loyola College in Maryland	9
M1	S		Oakland University	9
M1	P	*	Santa Clara University	9
M1	S		California State University - San Bernardino	8
B1	P	*	College of the Holy Cross	8
B1	P	*	Denison University	8
B1	P	*	Franklin and Marshall College	8
B1	P		Saint Olaf College	8
M1	S		Sam Houston State University	8
B1	P	*	Union College	8
D2	S		University of Central Florida	8
D2	P	*	University of San Diego	8
B1	P	*	Bucknell University	7
M1	S		California State University - Fresno	7
M1	S	*	California State University - Long Beach	7
M1	S		California State University - Los Angeles	7
M1	S		California State University - Northridge	7
B1	P	*	Colby College	7
D1	S	*	College of William and Mary	7
B1	P	*	Dickinson College	7

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Table 8.15. Research Corporation CCSA Awards 1986–2000

Carnegie Class	Type	Study	Academic Institution	Total Awards
M1	P	*	Ithaca College	7
B1	P	*	Lafayette College	7
B1	P	*	Lake Forest College	7
M2	P		Point Loma Nazarene College	7
M1	S		San Francisco State University	7
M1	S	*	Southwest Texas State University	7
M1	P	*	Trinity University	7
M1	S	*	University of Puerto Rico - Mayaguez	7
M1	P	*	University of Richmond	7
M1	S		University of Wisconsin - Oshkosh	7
B1	P		Vassar College	7
M1	S	*	Western Washington University	7
B1	P	*	Barnard College	6
D1	S		Bowling Green State University	6
B1	P	*	College of Wooster	6
B1	P	*	Colorado College	6
M1	S		East Carolina University	6
M1	S	*	Eastern Illinois University	6
D1	S		Indiana University of Pennsylvania	6
B1	P	*	Lawrence University	6
R2	P		Saint Louis University	6
M1	S		Southeast Missouri State University	6
M1	S	*	Southwest Missouri State University	6
M1	S		SUNY College at Fredonia	6
M1	S		University of Colorado - Colorado Springs	6
D2	S		University of Colorado - Denver	6
D1	S		University of Southern Mississippi	6
D1	S		Western Michigan University	6
B1	P	*	Allegheny College	5
M1	S	*	Central Michigan University	5
M1	S	*	College of Charleston	5
M1	P		Drake University	5
D2	S		Florida International University	5
D1	P	*	Fordham University	5
B2	S	*	Fort Lewis College	5
B1	P	*	Knox College	5
B1	P	*	Macalester College	5
D2	S	*	Middle Tennessee State University	5
B1	P	*	Oberlin College	5
B1	P	*	Pomona College	5
M1	S		Rowan University	5
B1	P	*	Skidmore College	5
M1	S	*	Southern Illinois University at Edwardsville	5
M1	S	*	University of Minnesota – Duluth	5
M1	S		University of Nebraska – Omaha	5
M1	S		University of Nevada – Las Vegas	5
D1	S		University of North Carolina – Greensboro	5
M1	S	*	University of Northern Iowa	5
M1	P		University of Redlands	5

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Table 8.15. Research Corporation CCSA Awards 1986–2000

Carnegie Class	Type	Study	Academic Institution	Total Awards
M1	P	*	University of Saint Thomas	5
D2	P		University of San Francisco	5
M1	S		University of Texas at San Antonio	5
M1	P		Villanova University	5
R1	S		Virginia Commonwealth University	5
M1	S		Western Carolina University	5
B1	P		Western Maryland College	5
B1	P	*	Whitman College	5
M1	S		Youngstown State University	5
B1	P		Alma College	4
D1	S		Ball State University	4
B2	P	*	Berea College	4
M1	P		Brock University	4
M1	S	*	California Polytechnic State University - San Luis Obispo	4
M1	P	*	Creighton University	4
D2	P		DePaul University	4
B1	P		Eckerd College	4
D2	S		Florida Atlantic University	4
B1	P	*	Gettysburg College	4
M1	P	*	Gonzaga University	4
B1	P	*	Goucher College	4
M1	S		Indiana University - Purdue University at Fort Wayne	4
M1	P	*	John Carroll University	4
B1	P		Kenyon College	4
B2	P		Lyon College	4
M2	S		Pennsylvania State University - Erie-Behrend College	4
M1	S		Rutgers University - Camden	4
B1	P	*	Smith College	4
M1	S		State University of West Georgia	4
M1	S	*	SUNY College at Geneseo	4
M1	S		SUNY College at Potsdam	4
M1	S	*	Towson University	4
B1	P	*	Trinity College	4
M1	P	*	University of Dayton	4
B1	P	*	University of Puget Sound	4
D1	S		University of South Dakota	4
M1	S	*	University of Tennessee - Chattanooga	4
M1	P		Valparaiso University	4
B1	P		Westmont College	4
D2	S		Wichita State University	4
B1	P		Agnes Scott College	3
M1	S		Austin Peay State University	3
M1	S		Boise State University	3
B1	P	*	Bowdoin College	3
M1	P	*	Butler University	3
M1	S		California State University - Bakersfield	3
B2	P		Carroll College	3
B1	P	*	Coe College	3
M1	S		College of New Jersey	3

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Table 8.15. Research Corporation CCSA Awards 1986–2000

Carnegie Class	Type	Study	Academic Institution	Total Awards
B1	P	*	College of Saint Benedict/ Saint John's	3
M2	P		College of Saint Catherine	3
M1	S		East Tennessee State University	3
M1	S	*	Eastern Michigan University	3
B1	P		Erskine College	3
M1	P	*	Fairfield University	3
M1	S	*	James Madison University	3
M1	P		Loyola University	3
B1	P	*	Luther College	3
D1	P		Marquette University	3
B1	P		Mills College	3
B1	P		Moravian College	3
D2	S		New Jersey Institute of Technology	3
M1	S	*	Northern Kentucky University	3
B2	P		Northwest Nazarene University	3
D1	P		Saint John’s University	3
M1	P		Seattle University	3
M1	P		Simmons College	3
M1	S		SUNY College at Buffalo	3
OS	S		United States Naval Academy	3
D1	S		University of Akron	3
M1	S	*	University of Central Arkansas	3
D1	S		University of Missouri – Kansas City	3
M1	S		University of North Carolina – Wilmington	3
D1	S		University of Northern Colorado	3
D2	P		University of Tulsa	3
M1	S		University of Wisconsin - River Falls	3
M1	S		Western Illinois University	3
M1	S	*	Western Kentucky University	3
B1	P		Whittier College	3
B1	P		Wittenberg University	3
M1	P		Abilene Christian University	2
M1	S		Appalachian State University	2
M1	S		Arkansas State University	2
B2	P		Augustana College	2
B1	P		Bard College	2
M1	P		Beaver College	2
M1	P		California Lutheran University	2
M1	S		California State University - Sacramento	2
M1	P	*	Canisius College	2
M1	P	*	Centenary College of Louisiana	2
B1	P	*	Centre College	2
B1	P	*	DePauw University	2
M1	S		Eastern Washington University	2
M1	S		Edinboro University of Pennsylvania	2
M1	S		Florida A & M University	2
M1	S		Francis Marion University	2
M1	P		Georgian Court College	2
B1	P		Goshen College	2

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Table 8.15. Research Corporation CCSA Awards 1986–2000

Carnegie Class	Type	Study	Academic Institution	Total Awards
B1	P		Hamline University	2
B1	P		Hobart and William Smith Colleges	2
B1	P	*	Kalamazoo College	2
B2	P		Lebanon Valley College	2
M1	P		Loyola Marymount University	2
M1	P		Manhattan College	2
D1	S		Miami University	2
B1	P		Millsaps College	2
M1	S		Murray State University	2
B1	P		Nebraska Wesleyan University	2
B2	P		Otterbein College	2
M1	P	*	Pacific Lutheran University	2
M2	P		Pacific University	2
M1	S		Radford University	2
M1	P		Regis University	2
B1	P		Rhodes College	2
B1	S		Richard Stockton College of New Jersey	2
B1	P	*	Ripon College	2
B2	P		Saint Anselm College	2
M1	P		Saint Joseph’s University	2
B2	P		Saint Mary’s College	2
M1	P		Saint Mary’s College of California	2
B2	P		Saint Vincent College & Seminary	2
D2	S		San Diego State University	2
M1	S		South Dakota State University	2
D1	P		Southern Methodist University	2
M1	P		Stetson University	2
B2	P		Susquehanna University	2
M1	S		Tennessee Technological University	2
D1	S		Texas A & M University – Commerce	2
D1	S		Texas Woman’s University	2
M1	S		Truman State University	2
M1	S		University of Arkansas - Little Rock	2
M1	P		University of Hartford	2
R2	S		University of Louisville	2
M1	S		University of Massachusetts - Dartmouth	2
B1	S		University of Minnesota - Morris	2
D2	S		University of New Orleans	2
B1	S	*	University of North Carolina - Asheville	2
M1	S	*	University of North Florida	2
B2	S		University of Pittsburgh - Bradford	2
D2	P	*	University of the Pacific	2
M1	S	*	University of Wisconsin - Stevens Point	2
B1	P		Ursinus College	2
B1	P	*	Washington and Lee University	2
B1	P		Washington College	2
B1	P		Westminster College	2
M1	P		Xavier University of Louisiana	2
-	-	*4	Institutions with one (1) award	145

Figure 8.25

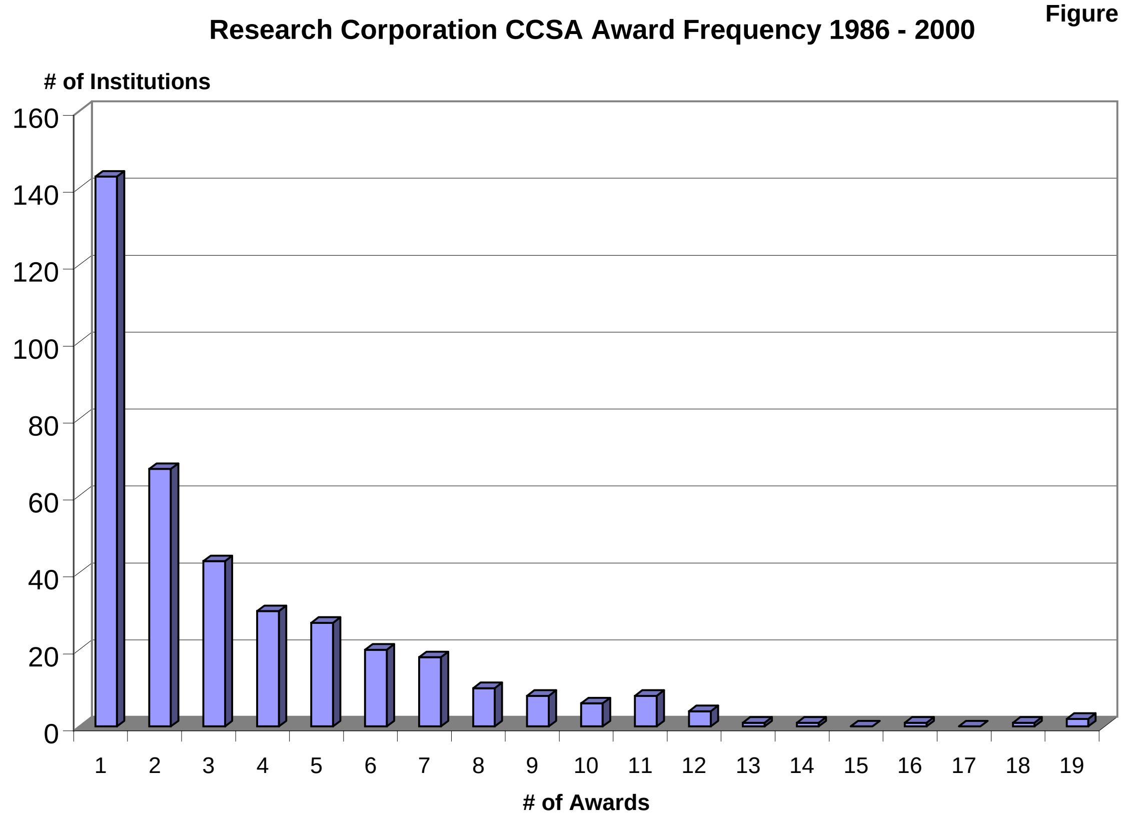


Figure 8.26

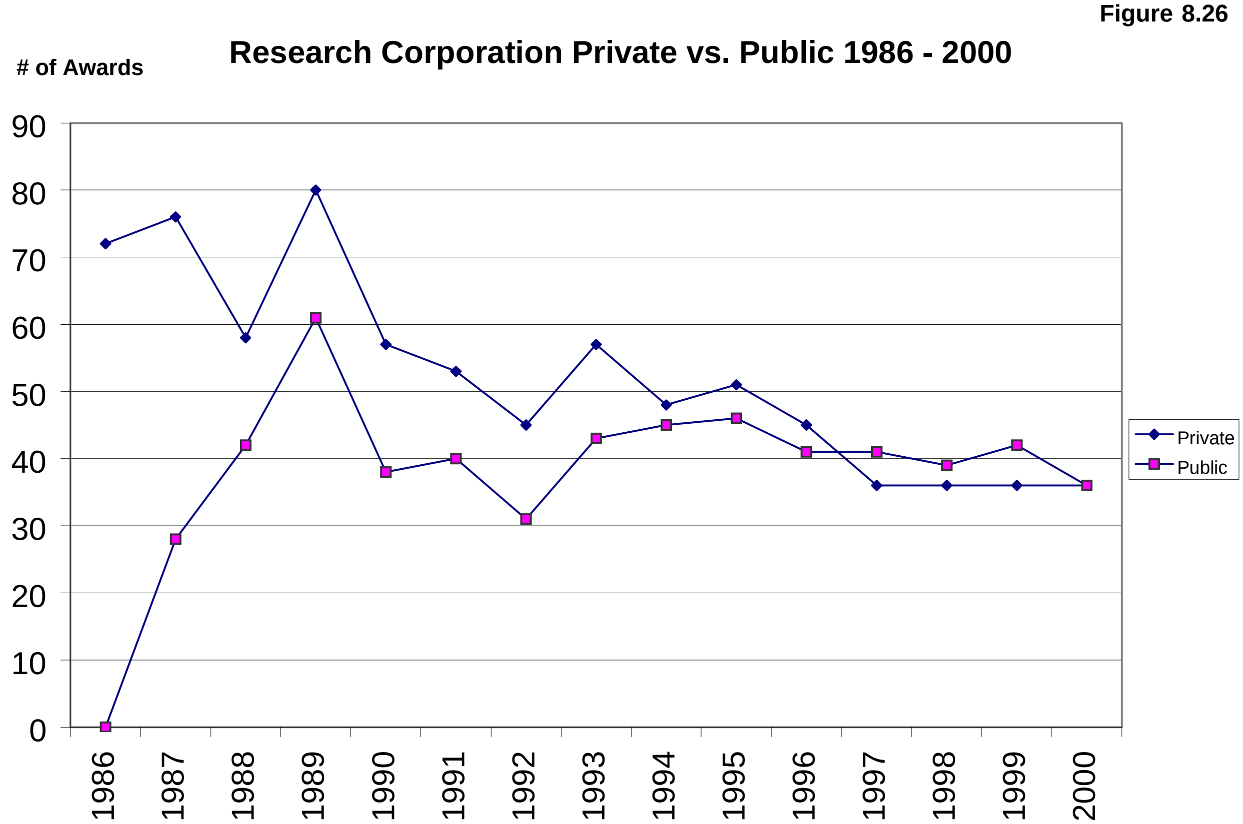


Figure 8.27

Research Corporation CCSA Activity 1986 - 2000

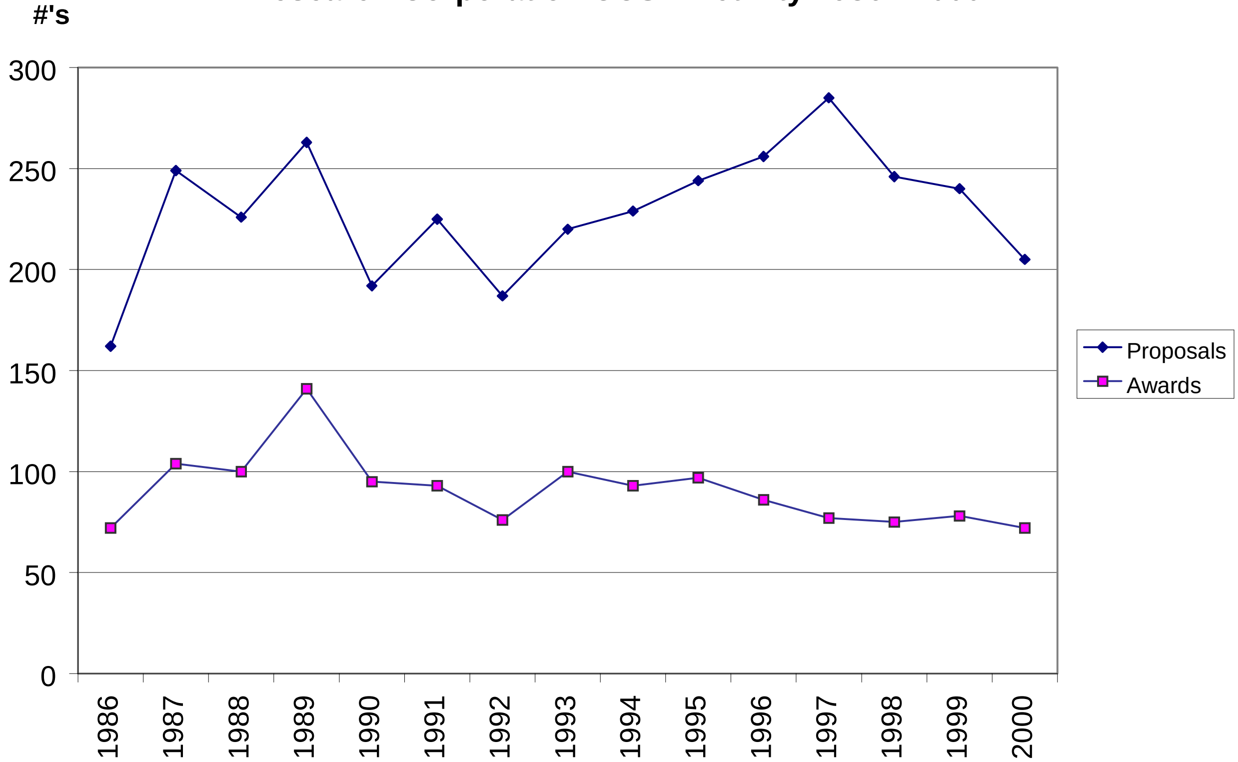


Figure 8.28

Research Corporation CCSA Funding 1986 - 2000

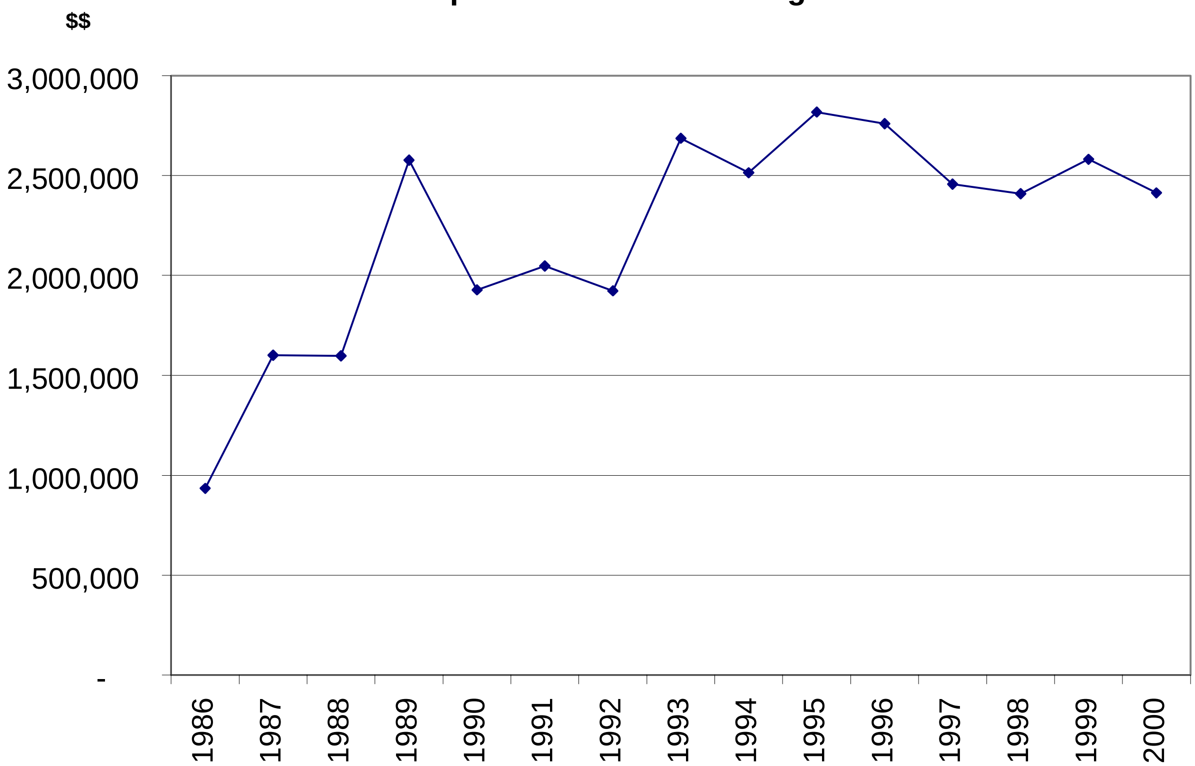
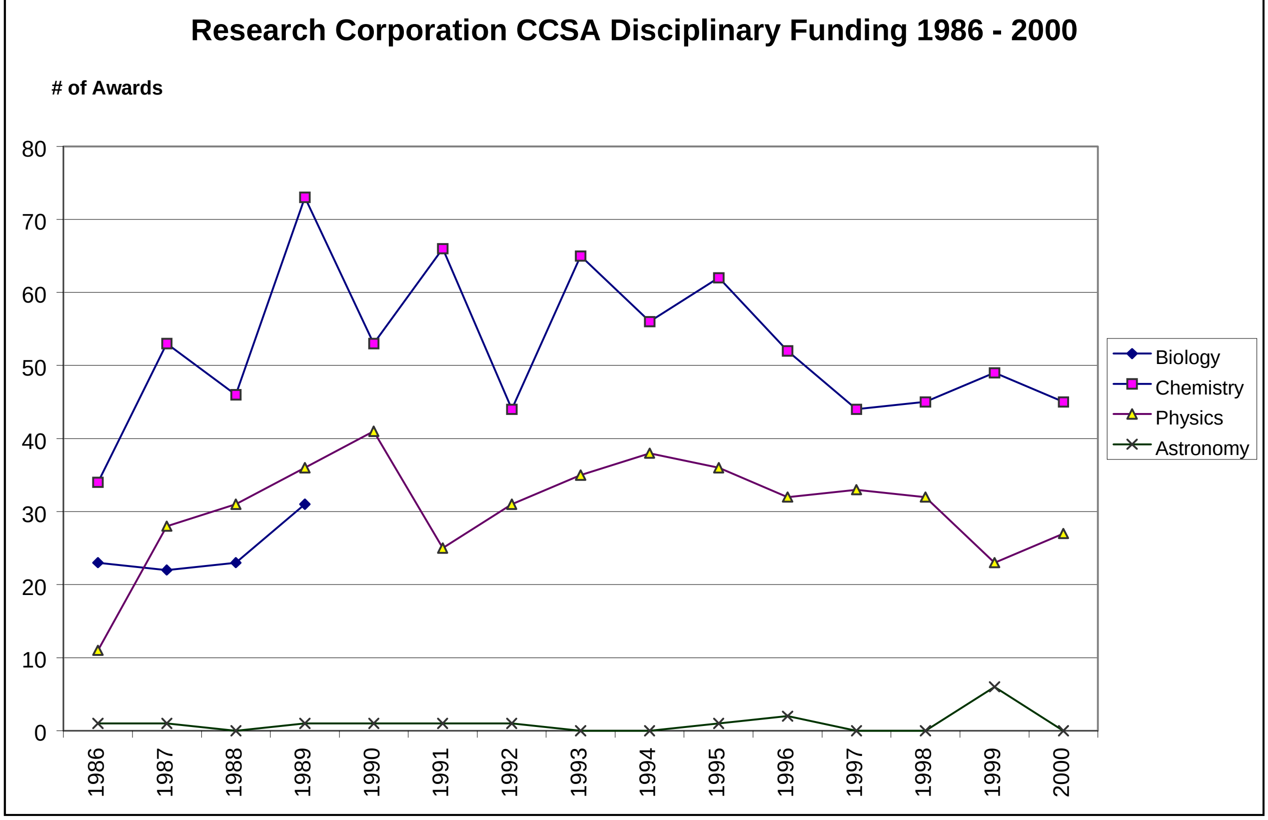


Figure 8.29



Research Corporation CCSA Disciplinary Funding 1986 - 2000
# of Awards
80
70
60
50
40
30
20
10
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
Biology
Chemistry
Physics
Astronomy

Table 8.16. Petroleum Research Fund (PRF) Type B Awards 1986–2000

Carnegie Class	Type	Study	Academic Institution	Total Awards
D1	P		Southern Methodist University	27
M1	S		Indiana University-Purdue University - Fort Wayne	19
B1	P	*	Franklin and Marshall College	18
D1	S		Georgia State University	16
ENG	P	*	Harvey Mudd College	16
D1	S	*	College of William and Mary	15
D1	S		Illinois State University	14
D2	S		Indiana University-Purdue University - Indianapolis	13
B1	P	*	Occidental College	13
M1	S	*	San Jose State University	13
M1	S	*	University of Minnesota - Duluth	13
B1	P	*	Bucknell University	12
M1	S		California State University - Fullerton	12
M1	S	*	University of Wisconsin - Eau Claire	12
B1	P	*	Williams College	12
M1	S		California State University - Los Angeles	10
B1	P	*	Bowdoin College	9
M1	S		California State University - Northridge	9
B1	P	*	Carleton College	9
B1	P	*	Davidson College	9
B1	P	*	Hope College	9
B1	P	*	Kalamazoo College	9
D1	S	*	Northern Arizona University	9
B1	P	*	Oberlin College	9
B1	P	*	Grinnell College	8
M1	S		Oakland University	8
M1	S		SUNY College at Buffalo	8
D1	S		Ball State University	7
M1	S	*	College of Charleston	7
B1	P	*	College of Wooster	7
M2	P	*	Drury University	7
M1	S	*	Eastern Illinois University	7
B1	P	*	Furman University	7
M1	S		Tennessee Technological University	7
M1	P	*	Trinity University	7
D2	S		Wright State University	7
M2	P	*	Calvin College	6
M1	S		East Carolina University	6
M1	S		George Mason University	6
M1	S		San Francisco State University	6
M1	S	*	SUNY College at Geneseo	6
D2	S		University of Central Florida	6
D1	S		University of North Carolina - Greensboro	6
B1	P		Amherst College	5
B1	P	*	Colgate University	5
B2	P		Elizabethtown College	5
D1	S		Indiana University of Pennsylvania	5
B2	P		Lycoming College	5
M1	S		Marshall University	5
B1	P	*	Middlebury College	5

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Table 8.16. Petroleum Research Fund (PRF) Type B Awards 1986–2000

Carnegie Class	Type	Study	Academic Institution	Total Awards
B1	P	*	Pomona College	5
D2	S		San Diego State University	5
M1	S	*	Southern Illinois University at Edwardsville	5
M1	S		SUNY College at Potsdam	5
M1	S		University of North Carolina - Charlotte	5
M1	S		University of South Alabama	5
M1	S		University of Wisconsin - Oshkosh	5
M1	S	*	Western Washington University	5
R2	S		Auburn University at Auburn	4
B2	S	*	Fort Lewis College	4
B1	P	*	Gettysburg College	4
B1	P	*	Hamilton College	4
M1	S		Montclair State University	4
B1	P	*	Mount Holyoke College	4
R1	S		New Mexico State University	4
B1	P	*	Reed College	4
M1	S	*	Southwest Texas State University	4
M1	S		State University of West Georgia	4
M1	S		SUNY College at Fredonia	4
B1	P	*	Swarthmore College	4
M1	S		University of Colorado - Colorado Springs	4
M1	S		University of Nevada - Las Vegas	4
D2	P	*	University of San Diego	4
CAN	S		University of Winnipeg	4
M2	S		University of Wisconsin - Parkside	4
D1	S		Western Michigan University	4
B1	P		Westmont College	4
B1	P	*	Connecticut College	3
B1	P		Eckerd College	3
D2	S		Florida Atlantic University	3
B1	P	*	Hendrix College	3
D2	S		Indiana State University	3
M1	P	*	Ithaca College	3
M1	S	*	James Madison University	3
M1	S		Keene State College	3
B1	P	*	Lafayette College	3
B1	P		Manhattanville College	3
M2	P		Point Loma Nazarene College	3
M1	S		Rutgers University - Camden	3
M1	S		Southeast Missouri State University	3
R2	S		Southern Illinois University at Carbondale	3
M1	S		SUNY College at Cortland	3
M1	S		SUNY College at Plattsburgh	3
M1	S		Truman State University	3
M1	P		University of Dayton	3
M1	S		University of North Carolina - Wilmington	3
B2	S		University of Pittsburgh - Johnstown	3
D2	P		University of San Francisco	3
D1	S		University of Southern Mississippi	3
M1	S	*	University of Tennessee - Chattanooga	3

Table 8.16. Petroleum Research Fund (PRF) Type B Awards 1986–2000

Carnegie Class	Type	Study	Academic Institution	Total Awards
B1	P		Ursinus College	3
B1	P	*	Wabash College	3
B1	P	*	Wellesley College	3
B1	P	*	Allegheny College	2
M1	S		Appalachian State University	2
B1	P	*	Barnard College	2
B1	P	*	Bates College	2
D1	P		Boston College	2
D1	S		Bowling Green State University	2
M1	S	*	California State University - Long Beach	2
M1	S		California State University - San Bernardino	2
B1	P	*	College of the Holy Cross	2
B1	P		Drew University	2
M1	S		East Tennessee State University	2
M1	P	*	Gonzaga University	2
B1	P	*	Haverford College	2
B1	P	*	Lewis and Clark College	2
M1	P		Long Island University at Brooklyn Campus	2
M1	P		Manhattan College	2
R2	S		Mississippi State University	2
M1	S		Montana State University - Billings	2
M1	S		Murray State University	2
D2	S		New Jersey Institute of Technology	2
M1	S		Northeast Louisiana University	2
M1	P		Saint Joseph’s University	2
M1	P		Saint Mary's University	2
M1	P		Seattle University	2
B1	P	*	Skidmore College	2
B1	P	*	Smith College	2
M1	S		Southern University and A & M College - Baton Rouge	2
D1	S		Texas Woman’s University	2
B1	P	*	Union College	2
OS	S		United States Naval Academy	2
D1	S		University of Akron	2
M1	S	*	University of Central Arkansas	2
B1	P		University of Dallas	2
M1	S		University of Massachusetts - Dartmouth	2
R2	S		University of Massachusetts - Boston	2
D1	S		University of Memphis	2
B1	S	*	University of North Carolina - Asheville	2
M1	S		University of North Carolina - Pembroke	2
D1	S		University of Northern Colorado	2
D1	S		University of South Dakota	2
D2	S		University of Southwestern Louisiana	2
M1	S		University of Texas at San Antonio	2
M1	P		Valparaiso University	2
M1	P		Xavier University of Louisiana	2
-	-	32	Institutions with one (1) award	114

Figure 8.30

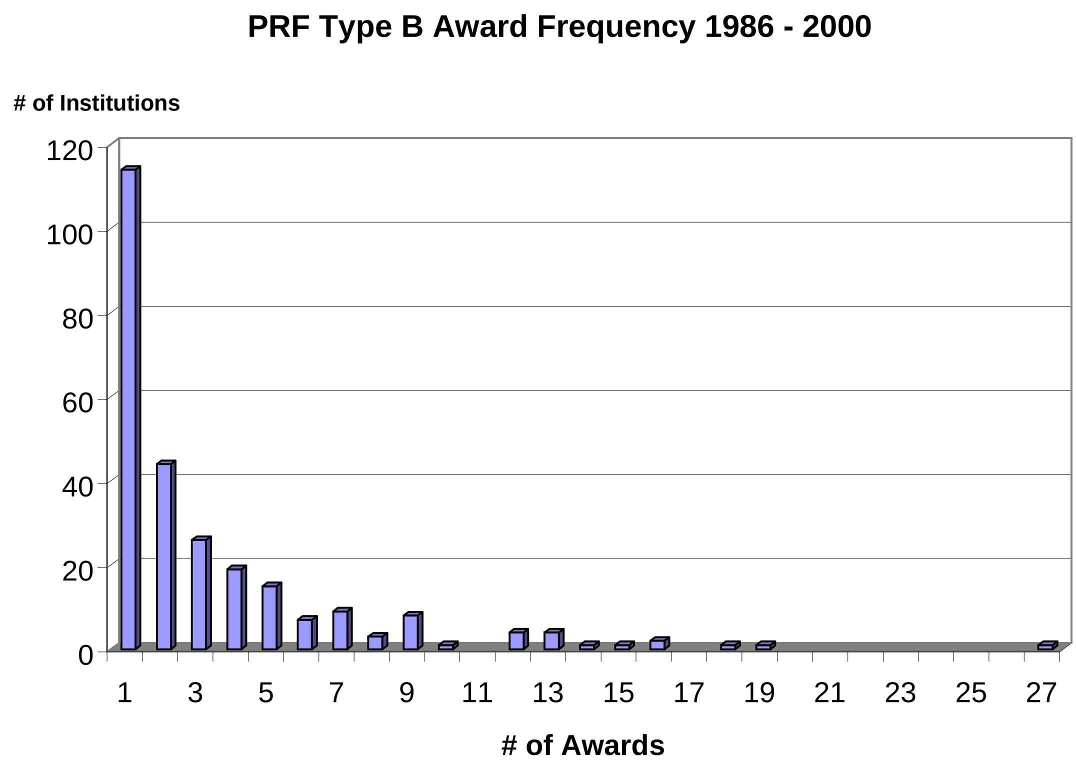

Figure 8.31

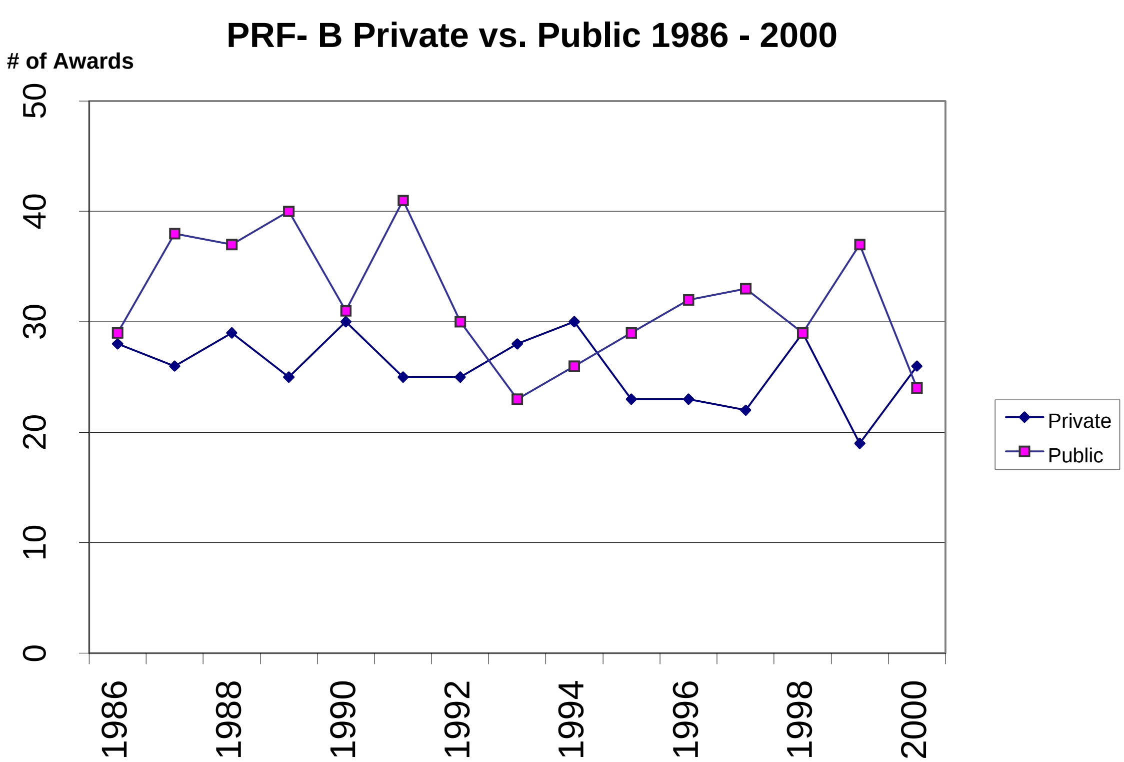

Figure 8.32

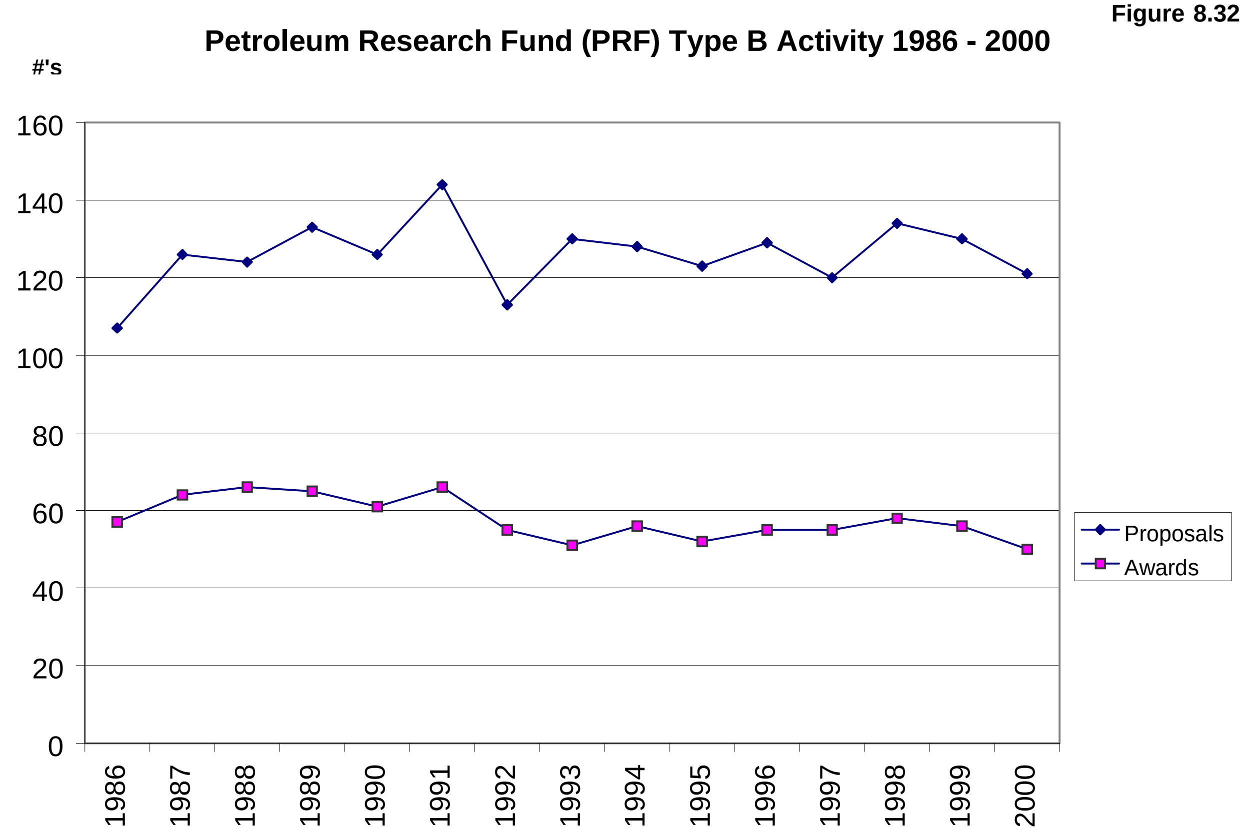

Figure 8.33

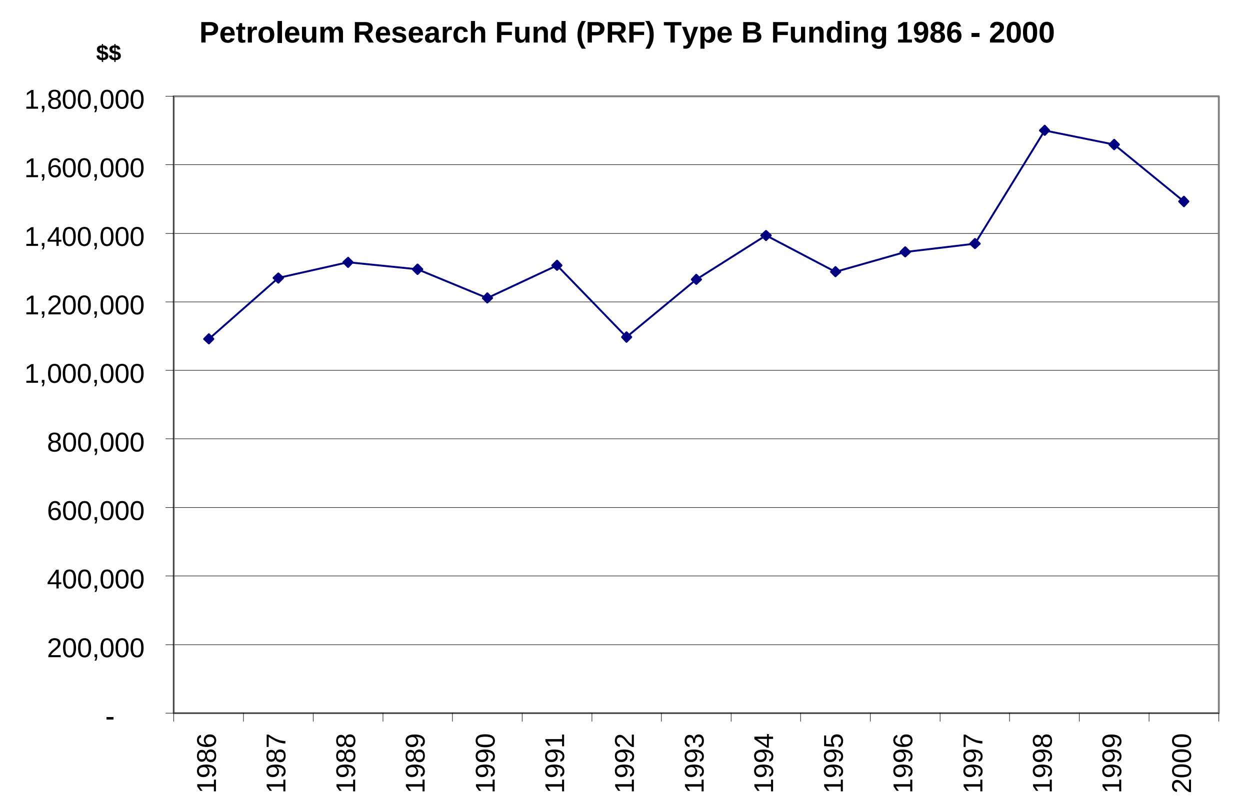

Figure 8.34

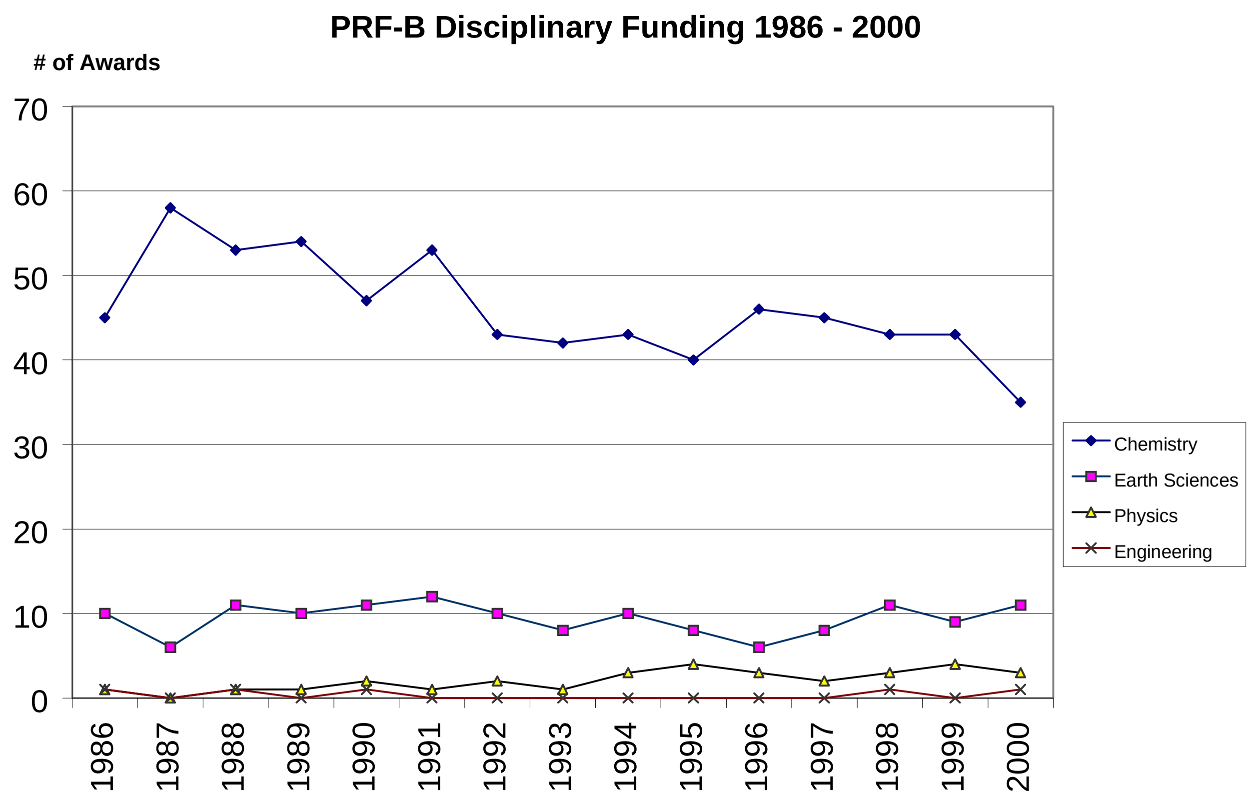
PRF-B Disciplinary Funding 1986 - 2000
# of Awards
70
60
50
40
30
20
10
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
Chemistry
Earth Sciences
Physics
Engineering

Table 8.17. Camille and Henry Dreyfus Foundation Awards 1990 -2000

Carnegie Class	Type	Study	Institution	Awards
B1	P	*	Furman University	11
B1	P	*	Mount Holyoke College	10
M1	S	*	San Jose State University	9
M1	P	*	Trinity University	9
B1	P	*	Bucknell University	8
M1	S		California State University - Fullerton	8
ENG	P	*	Harvey Mudd College	8
B1	P	*	Hope College	8
D1	S		Illinois State University	7
B1	P	*	Occidental College	7
B1	P		Amherst College	6
M1	S	*	Eastern Illinois University	6
B1	P	*	Swarthmore College	6
M1	S		University of Massachusetts at Dartmouth	6
M1	S	*	Western Washington University	6
B1	P	*	College of the Holy Cross	5
B1	P	*	Franklin and Marshall College	5
B1	P	*	Union College	5
B1	P	*	Wellesley College	5
M1	S		California State University - Los Angeles	4
B1	P	*	College of Wooster	4
B1	P	*	Denison University	4
B1	P	*	Gustavus Adolphus College	4
B1	P	*	Hendrix College	4
M1	S	*	Northern Kentucky University	4
B1	P		Saint Olaf College	4
M1	P	*	Santa Clara University	4
ENG	S		South Dakota School of Mines and Technology	4
D1	P		Southern Methodist University	4
D1	S	*	The College of William and Mary	4
M1	S		The University of Tennessee at Chattanooga	4
M1	S	*	University of Puerto Rico-Mayaguez Campus	4
M1	S		University of South Alabama	4
M1	S	*	University of Wisconsin-Eau Claire	4
B1	P	*	Williams College	4
B1	P	*	Bowdoin College	3
M1	S		California State University - San Bernardino	3
M2	P	*	Calvin College	3
B1	P	*	Carleton College	3
B1	P	*	Davidson College	3
B2	S	*	Fort Lewis College	3
B1	P	*	Goucher College	3
M1	S		Grand Valley State University	3
B1	P	*	Grinnell College	3
B1	P	*	Haverford College	3
B1	P	*	Middlebury College	3
D1	S	*	Northern Arizona University	3
B1	P	*	Randolph-Macon College	3
M1	P	*	Rochester Institute of Technology	3
M1	S		Rutgers, The State University of New Jersey, Camden	3

Table 8.17. Camille and Henry Dreyfus Foundation Awards 1990 -2000

Carnegie Class	Type	Study	Institution	Total Awards
M1	S		San Francisco State University	3
B1	P	*	Smith College	3
M1	P	*	Texas Wesleyan University	3
B1	P	*	Trinity College	3
D2	S		University of Colorado at Denver	3
M1	S		University of Michigan-Dearborn	3
M1	S		University of North Carolina at Charlotte	3
D1	S		University of South Dakota	3
B1	P		Vassar College	3
B1	P		Albright College	2
B1	P	*	Austin College	2
B1	P	*	Barnard College	2
B1	P	*	Bates College	2
B1	P		Claremont McKenna College	2
B1	P	*	Colby College	2
B1	P	*	Connecticut College	2
M2	P	*	Drury University	2
D2	S		Florida Atlantic University	2
D1	P	*	Fordham University	2
M1	P	*	Gonzaga University	2
B1	P	*	Hamilton College	2
B1	P		Hobart and William Smith Colleges	2
M1	P		Hood College	2
D2	S		Indiana University-Purdue University at Indianapolis	2
M1	P	*	Ithaca College	2
B2	P		Lebanon Valley College	2
M1	S		Louisiana State University in Shreveport	2
B1	P	*	Luther College	2
B2	P		Lyon College	2
B1	P	*	Macalester College	2
B1	S		New College of the University of South Florida	2
B1	P	*	Oberlin College	2
B1	P	*	Ohio Wesleyan University	2
D2	P		Pace University	2
B1	P	*	Pomona College	2
B1	P	*	Ripon College	2
B2	P		Saint Anselm College	2
M1	S	*	Southwest Texas State University	2
M1	S	*	SUNY at Geneseo	2
M1	S		Tennessee Technological University	2
M1	S		Truman State University	2
OS	S		United States Naval Academy	2
M1	S	*	University of Minnesota, Duluth	2
D1	S		University of North Carolina at Greensboro	2
M1	S		University of North Carolina at Wilmington	2
M1	P	*	University of Richmond	2
D2	P		University of Tulsa	2
B1	S		Virginia Military Institute	2
M1	S		Western Carolina University	2
B1	P	*	Wheaton College (IL)	2
		37	Institutions with one (1) award	120

Figure 8.35

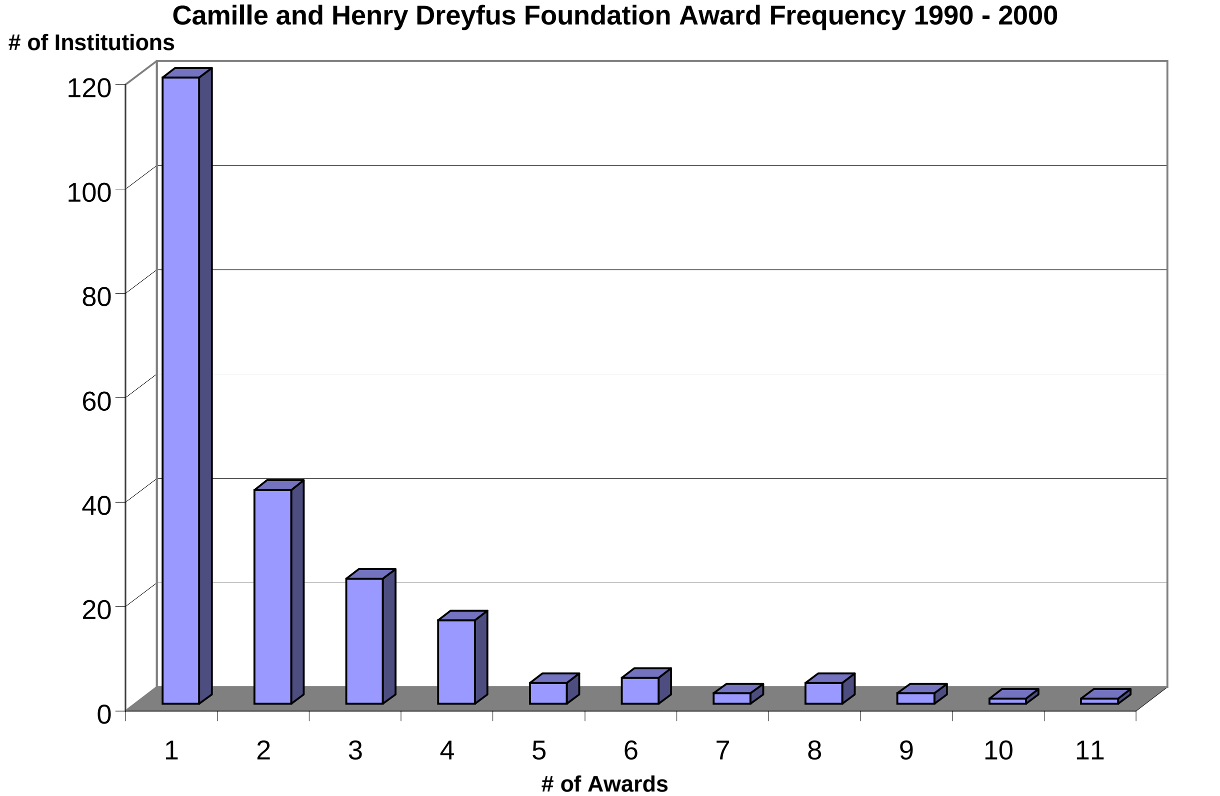

Table 8.18. Camille and Henry Dreyfus Foundation Public vs. Private 1990 - 2000

Institution Type	Institutions	% Institutions	Awards	% Awards
Private	126	57.3%	285	60.3%
Public	94	42.7%	188	39.7%
Total	220		473	

Figure 8.36

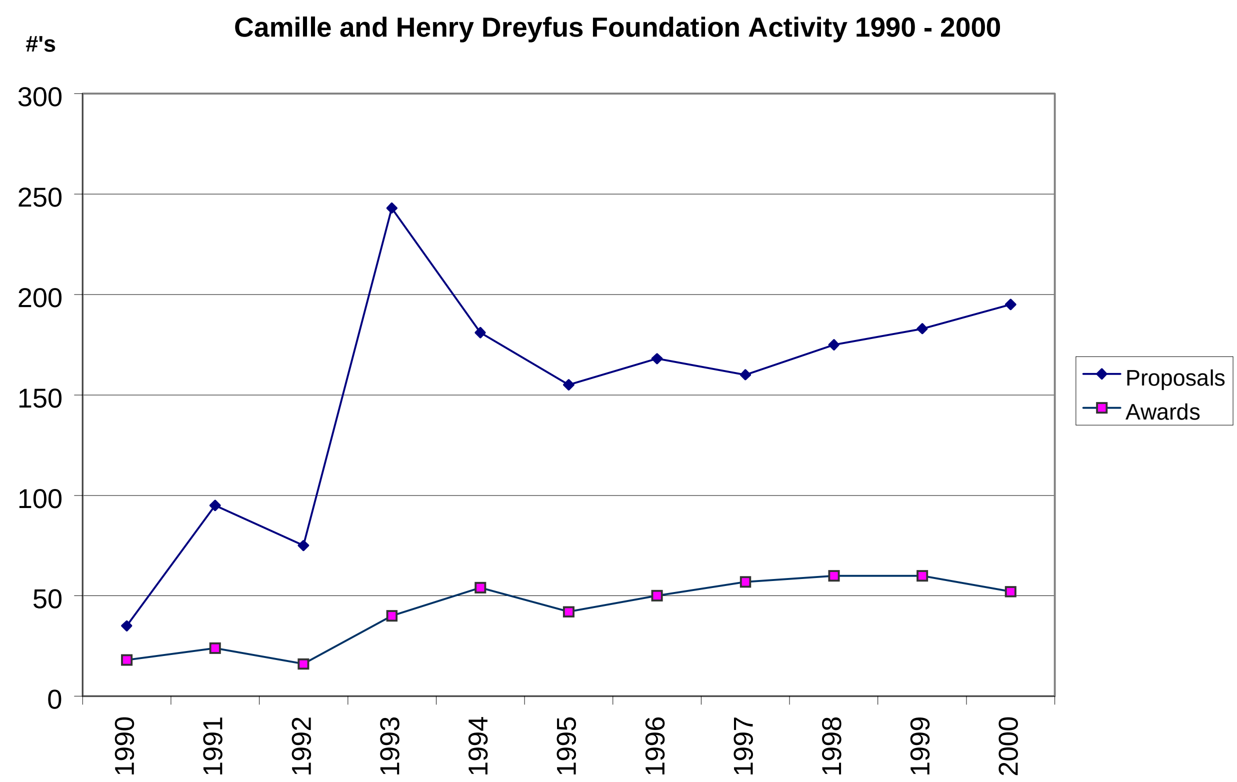

Figure 8.37

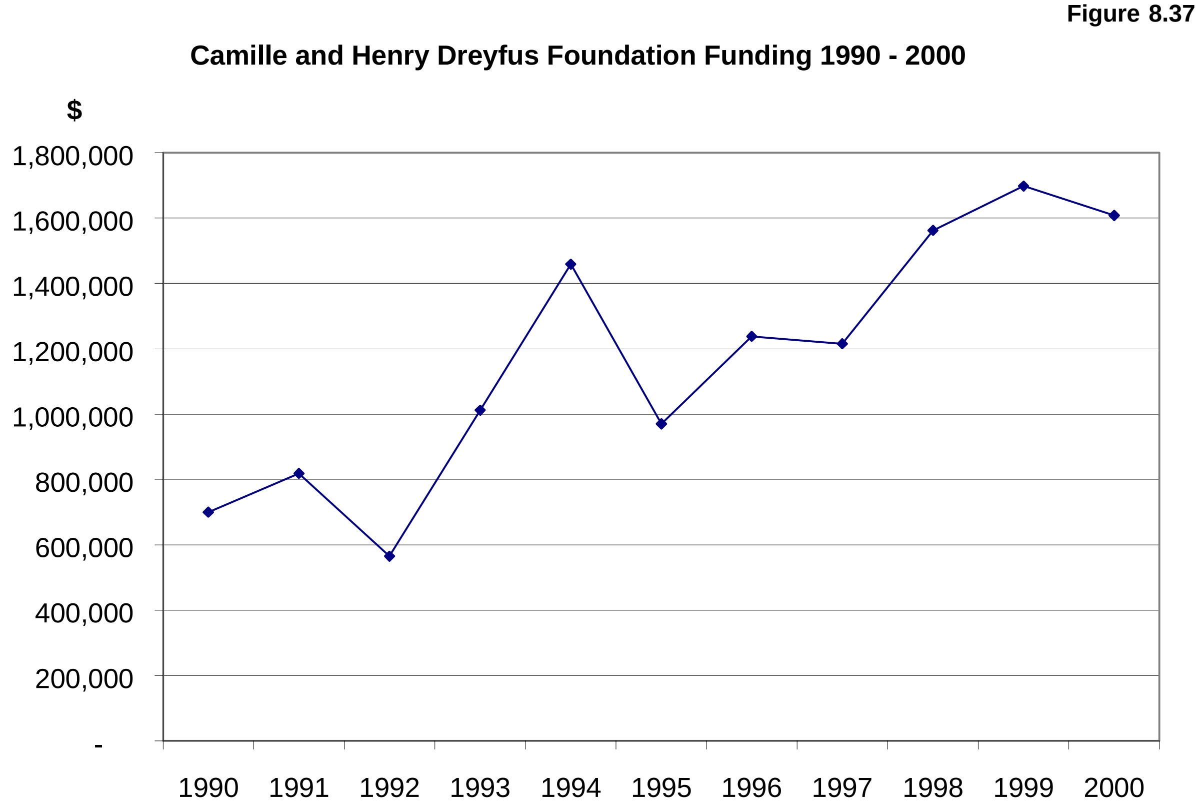

Table 8.19. Howard Hughes Medical Institute Awards for Undergraduate Biological Sciences Education, Colleges 1988–2000

Carnegie Class	Type	Study	Academic Institution	Awards	Dollars
M1	P		Xavier University of Louisiana	4	6,300,000
B1	P	*	Haverford College	4	4,250,000
B1	P	*	Wellesley College	4	4,000,000
B1	P	*	Swarthmore College	4	3,450,000
B1	P	*	Smith College	4	3,400,000
B1	P	*	Wesleyan University	4	3,350,000
B1	P	*	Bates College	4	3,300,000
B1	P	*	Carleton College	4	3,200,000
B1	P	*	Colorado College	4	3,200,000
B1	P	*	Barnard College	3	3,100,000
B1	P		Saint Olaf College	4	3,100,000
B1	P	*	Williams College	4	3,100,000
B1	P	*	Beloit College	3	2,850,000
B1	P	*	Colby College	3	2,800,000
B1	P		Nebraska Wesleyan University	3	2,800,000
B1	P		Hampshire College	3	2,700,000
B1	P		Kenyon College	3	2,700,000
B1	P	*	Reed College	3	2,700,000
B1	P	*	Spelman College	3	2,700,000
M1	P		Tuskegee University	4	2,700,000
D1	S	*	College of William and Mary	2	2,600,000
B1	P	*	Macalester College	3	2,600,000
B1	P	*	Earlham College	3	2,450,000
B1	P	*	Bryn Mawr College	3	2,400,000
M1	S		CUNY - Brooklyn College	2	2,400,000
M1	S	*	California State University - Long Beach	2	2,350,000
B1	P	*	Mount Holyoke College	3	2,300,000
M1	P	*	Canisius College	3	2,250,000
B1	P	*	Colgate University	3	2,250,000
B1	P	*	College of the Holy Cross	3	2,250,000
M1	P		Villanova University	2	2,250,000
B1	P	*	Occidental College	3	2,200,000
M1	S	*	Humboldt State University	3	2,150,000
B1	P	*	Morehouse College	3	2,100,000
M1	P		Benedictine University	3	2,000,000
ENG	P	*	Harvey Mudd College	2	2,000,000
B1	P	*	Oberlin College	3	2,000,000
B1	P		Vassar College	2	2,000,000
M1	S		CUNY - Hunter College	2	1,950,000
M1	S	*	University of Puerto Rico - Mayaguez	3	1,900,000
B1	P	*	Ohio Wesleyan University	3	1,850,000

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Table 8.19. Howard Hughes Medical Institute Awards for Undergraduate Biological Sciences Education, Colleges 1988–2000

Carnegie Class	Type	Study	Academic Institution	Awards	Dollars
B1	P		St. John's College (Maryland)	2	1,800,000
B1	P		Ursinus College	3	1,800,000
B1	P		Amherst College	3	1,700,000
M1	S		CUNY - Queens College	2	1,700,000
D2	S		San Diego State University	2	1,700,000
B1	P	*	Allegheny College	2	1,500,000
B1	P	*	Lawrence University	2	1,500,000
M1	S		Murray State University	1	1,500,000
M1	S		University of Louisiana at Monroe	1	1,500,000
M1	S		California State University - Los Angeles	2	1,450,000
B1	P	*	Hope College	2	1,450,000
M1	S		Florida A & M University	2	1,400,000
M1	P		Manhattan College	2	1,400,000
B1	P	*	Pomona College	2	1,400,000
B1	P	*	Union College	2	1,400,000
M1	S		University of Texas at San Antonio	2	1,400,000
B1	P	*	Bowdoin College	2	1,350,000
B1	P	*	Davidson College	2	1,350,000
B1	P	*	Gettysburg College	2	1,350,000
B2	S	*	Fort Lewis College	2	1,300,000
B1	P	*	Grinnell College	2	1,300,000
B1	P		Washington and Jefferson College	2	1,300,000
D1	P		Clark Atlanta University	2	1,250,000
B2	P		Fisk University	2	1,250,000
M1	P		St. Mary's University (Texas)	2	1,250,000
M2	P	*	Calvin College	2	1,200,000
D1	S	*	Northern Arizona University	1	1,200,000
B1	P		University of the South	2	1,200,000
B1	P		Western Maryland College	2	1,200,000
B1	P	*	Connecticut College	1	1,100,000
B1	P	*	Franklin and Marshall College	2	1,100,000
M1	P		Hampton University	2	1,100,000
R1	P		Howard University	1	1,080,000
B1	P	*	Middlebury College	2	1,050,000
B1	P	*	College of Wooster	1	1,000,000
B1	P	*	Knox College	2	1,000,000
M1	P	*	Mississippi College	1	1,000,000
B1	P	*	Whitman College	2	1,000,000
B1	P	*	Dickinson College	1	900,000
B1	P	*	Juniata College	1	900,000
B1	P	*	Wabash College	1	900,000

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Table 8.19. Howard Hughes Medical Institute Awards for Undergraduate Biological Sciences Education, Colleges 1988–2000

Carnegie Class	Type	Study	Academic Institution	Awards	Dollars
M1	S		University of Texas at El Paso	1	850,000
B1	P	*	Kalamazoo College	1	800,000
M1	P	*	Santa Clara University	1	800,000
D2	P	*	Wake Forest University	1	800,000
ENG	P		Cooper Union	1	750,000
M2	P		Point Loma Nazarene University	1	750,000
B1	P	*	Bucknell University	1	700,000
M1	S		California State University - Northridge	1	700,000
B1	P	*	Denison University	1	700,000
M1	S		East Tennessee State	1	700,000
B1	P	*	Hamilton College	1	700,000
B1	P		Hiram College	1	700,000
M1	S		Jackson State University	1	700,000
M2	P		Lincoln University	1	700,000
B1	P		Rhodes College	1	700,000
M1	S		Southern U. A & M College at Baton Rouge	1	700,000
M1	P	*	University of Scranton	1	700,000
B1	P		Wofford College	1	700,000
M1	S		CUNY - City College	1	650,000
B1	P		Antioch University	1	600,000
B1	P		Bard College	1	600,000
M1	P	*	Centenary College of Louisiana	1	600,000
B1	P	*	DePauw University	1	600,000
B1	P	*	Lafayette College	1	600,000
B1	P		Millsaps College	1	600,000
M1	S		Oakland University	1	600,000
B1	S		University of Puerto Rico - Cayey U. College	1	600,000
B1	P		Concordia College - Moorhead	1	550,000
B1	P		Eckard College	1	550,000
B1	P		Hobart and William Smith Colleges	1	550,000
B1	P	*	Wheaton College	1	550,000
B1	P	*	Centre College	1	500,000
M1	S		CUNY - Herbert H. Lehman College	1	500,000
B1	P	*	Goucher College	1	500,000
B2	P		King College	1	500,000
M1	P		Saint Joseph's University	1	500,000
B2	P		Tougaloo	1	500,000
D2	S		University of Puerto Rico - Rio Piedras	1	500,000
B2	P	*	Dillard University	1	400,000
B1	P		Marlboro College	1	400,000
M1	S		Morgan State University	1	400,000
B2	P		Oakwood College	1	400,000

Table 8.20. Department of Energy (DOE) New R & D Financial Assistance Awards to Predominantly Undergraduate Institutions 1994–2000

Study	Academic Institution	Awards	Total $
	Florida A&M	4	11,696,151
	Hampton University	6	3,363,144
	Southern Methodist University	1	2,712,000
	San Franciso State University	1	2,297,046
	Western Michigan University	3	1,984,015
	Southern University	6	1,802,491
	University of Nevada, Las Vegas	6	1,404,790
	Xavier of Louisiana	3	1,345,179
*	Northern Arizona University	4	1,334,678
	Clark Atlanta	2	1,101,248
	Abilene Christian	1	1,095,000
	Creighton University	1	910,900
	University of Texas of the Permian Basin	1	910,000
*	University of Richmond	2	870,814
*	Swarthmore College	3	825,370
	Fisk University	3	729,335
	Universidad del Turabo	1	650,000
	University of New Orleans	3	549,795
	North Georgia College	2	417,052
	Alabama A&M	1	361,788
*	University of Puerto Rico, Mayaguez	2	347,000
	George Mason	2	346,912
	Tuskegee University	2	340,439
	Idaho State	3	334,315
	University of South Alabama	1	328,900
	Langston University	1	315,000
	South Carolina State University	1	306,040
	Rollins College	1	273,393
*	Western Washington University	1	255,418
*	Lawrence Universtiy	1	225,327
	California State University, Northridge	1	224,000
	Fayetteville State University	2	214,437
	Loyola College	1	201,000
	Morehouse College	1	178,946
*	Occidental College	1	165,231
*	SUNY, Geneseo	6	125,837
	Jackson State	1	122,985
*	University of San Diego	1	113,052
*	Furman	1	112,000
*	University of Minnesota, Duluth	1	88,000
	Roosevelt University	1	80,000
	Hiram College	1	78,000
*	Reed College	3	72,910
	Lincoln University	1	65,549
	Ilinois State University, Normal	3	60,221
	University of Wisconsin-Superior	1	36,449
	Manhattan College	1	19,370
	University of Texas, San Antonio	2	17,782

Figure 8.38

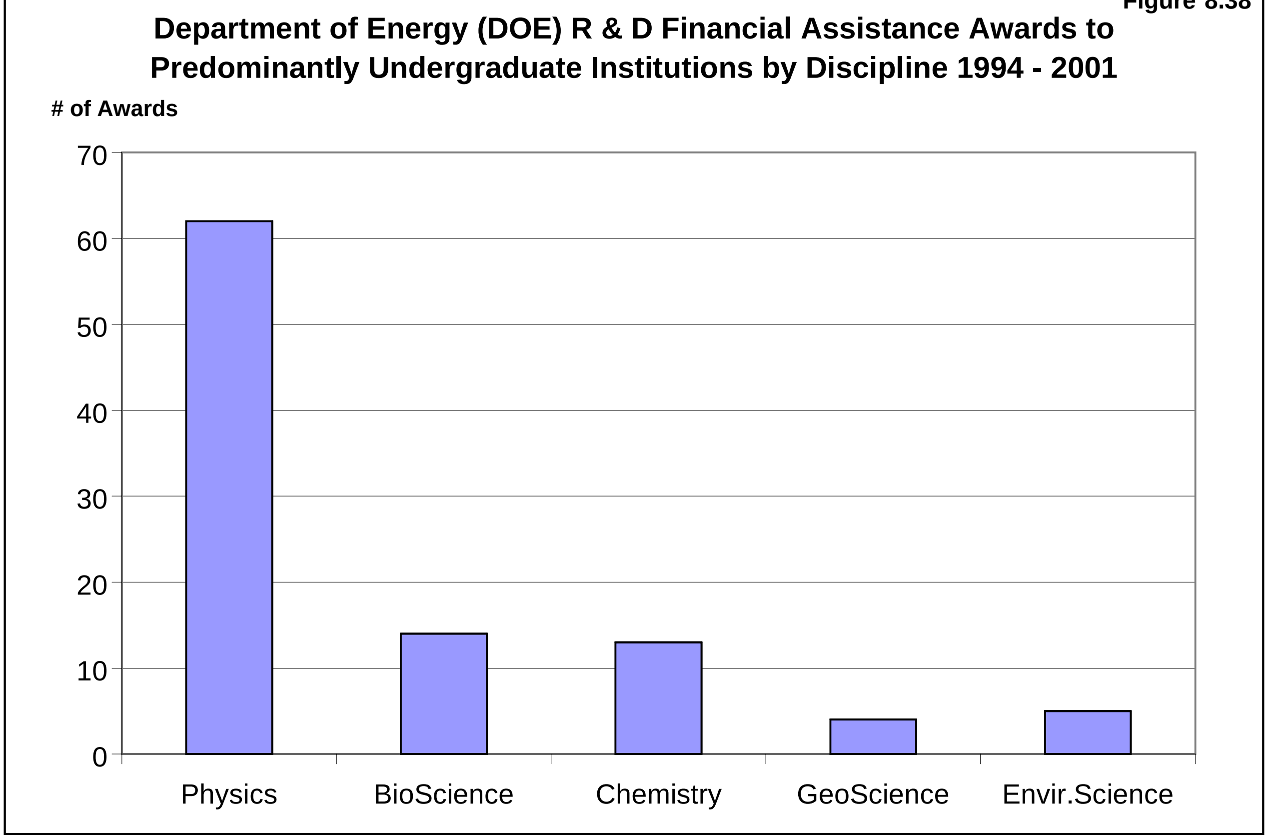
Department of Energy (DOE) R & D Financial Assistance Awards to
Predominantly Undergraduate Institutions by Discipline 1994 - 2001
# of Awards
70
60
50
40
30
20
10
0
Physics
BioScience
Chemistry
GeoScience
Envir.Science

Figure 8.39

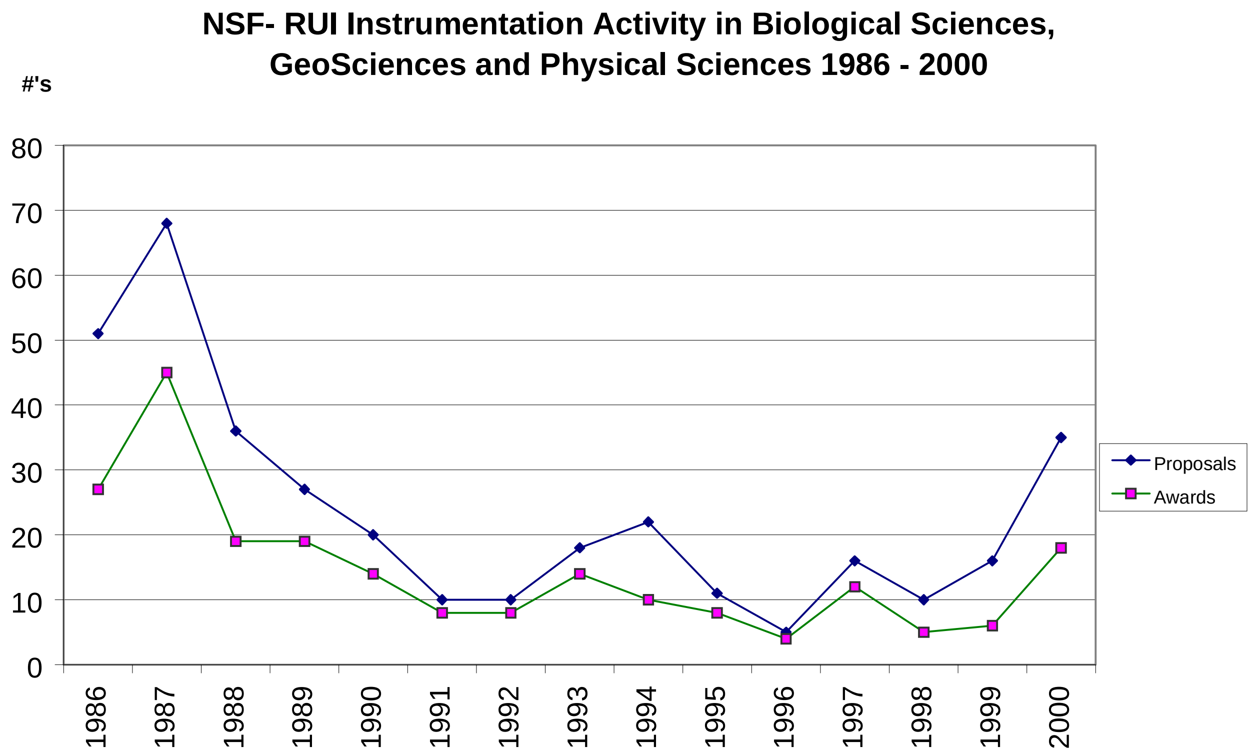

Figure 8.40

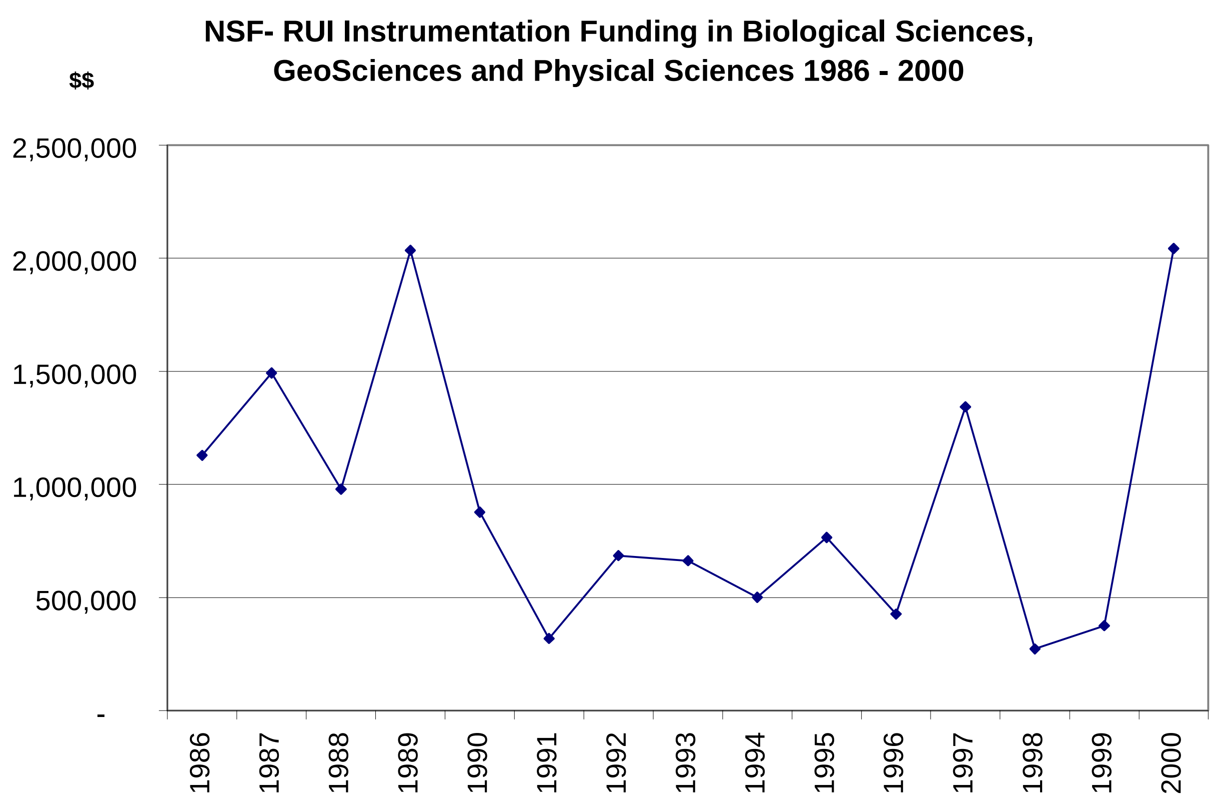

Figure 8.41

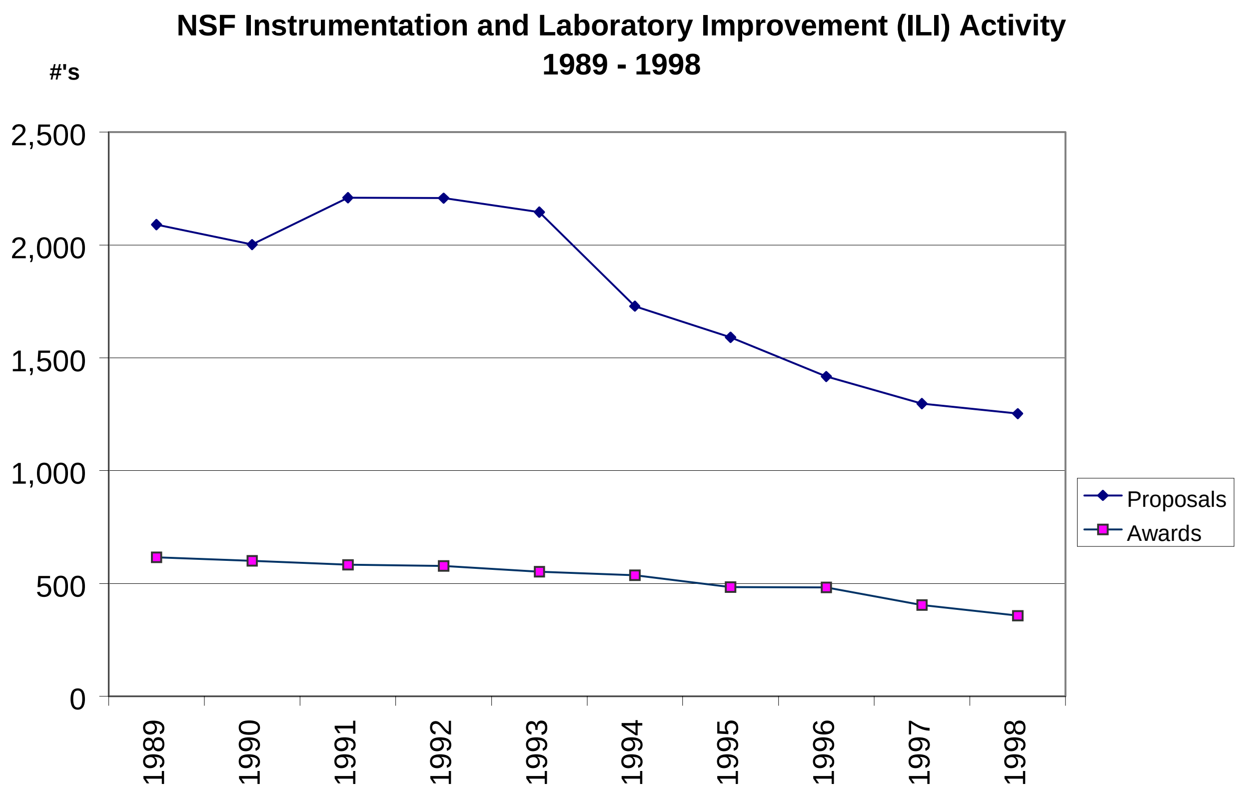

Figure 8.42

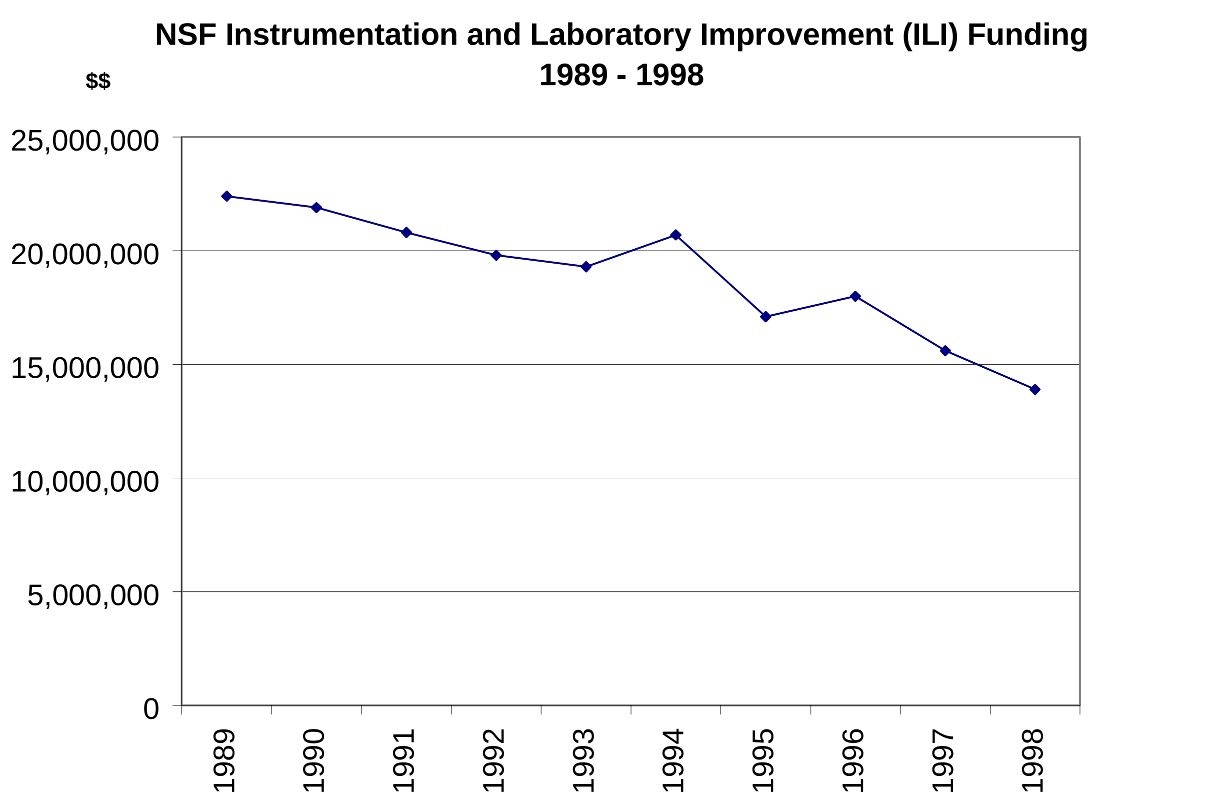

Figure 8.43

NSF Instrumentation and Laboratory Improvement (ILI) and Leadership in Laboratory Development (LLD) Disciplinary Funding 1989 - 1998

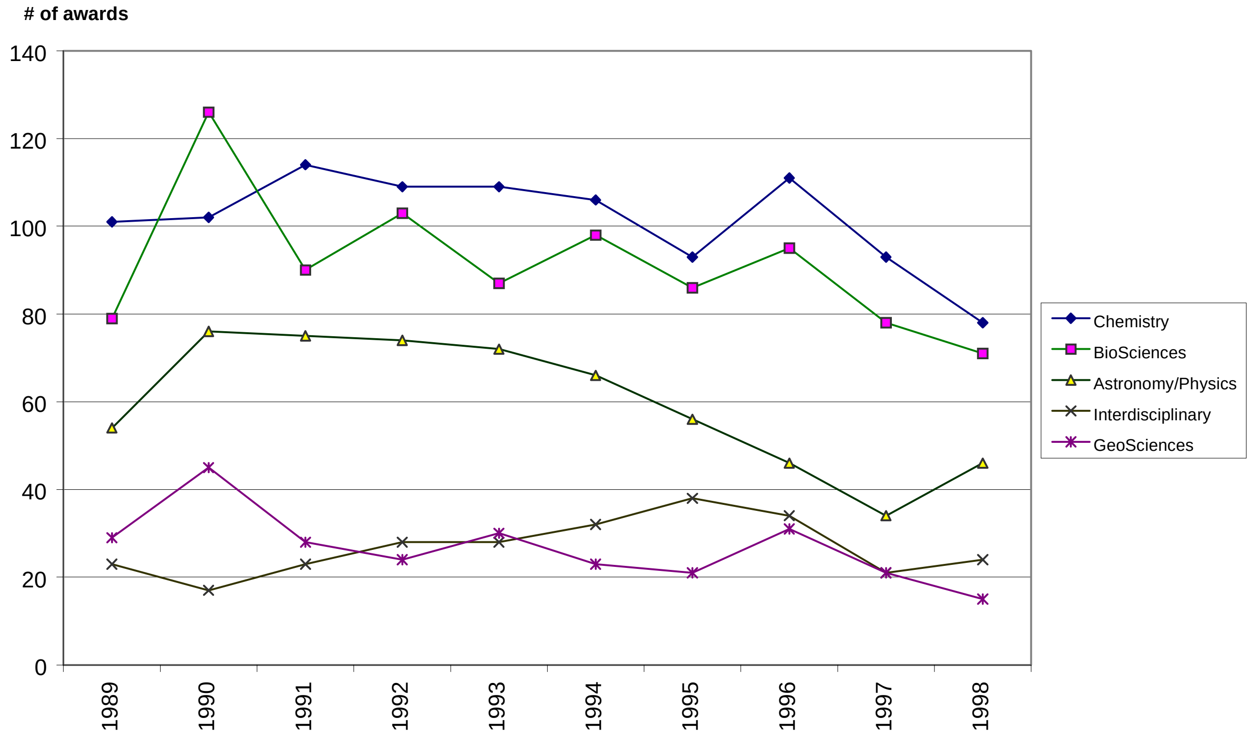

Table 8.21. NSF-Major Research Instrumentation Program (MRI) 1996-2000

Fiscal Year	**1996**	**1997**	**1998**	**1999**	**2000**	**Totals**
Total # of MRI proposals	423	503	479	472	476	**2353**
Proposals from non-Ph.D. granting institutions *	53	31	12	6	29	**131**
% Proposals from non-Ph.D. granting institutions	13%	6%	3%	1%	6%	**6%**
Total # of MRI awards	188	164	165	166	156	**839**
Awards to non-Ph.D. granting institutions	23	18	4	6	17	**68**
% Awards to non-Ph.D. granting institutions	12%	11%	2%	4%	11%	**8%**
Success rate for Ph.D. granting institutions	45%	31%	34%	34%	31%	**35%**
Success rate for non-Ph.D. granting institutions	43%	58%	33%	100%	59%	**52%**
Total MRI Funding **	52.9	59.2	56.3	56.7	53.1	278.2
MRI Funding to non-Ph.D. granting institutions	2.5	1.5	0.2	0.2	1.9	6.3

* Non-Ph.D. granting institutions are defined as those two- and four-year colleges and universities that have produced fewer than 20 Ph.D's or D. Sci's in all NSF-supported disciplines during the two previous academic years.

** In Millions of $

Figure 8.44

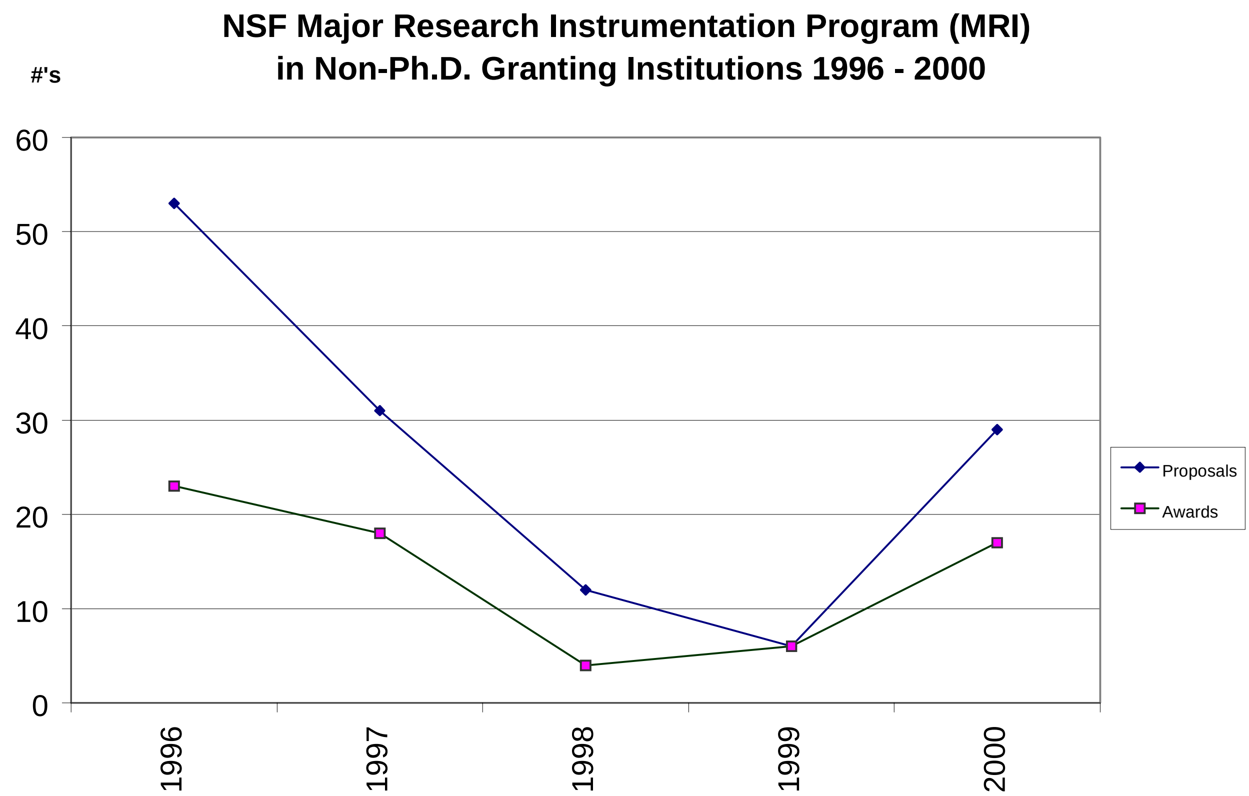

Figure 8.45