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ABSTRACT

One of the working papers in the final report of the Arizona Board of Regents' Task Force on Excellence, Efficiency and Competitiveness, this document presents statistical data on the transition of Arizona's universities, consolidating many ad hoc analyses. It lists selected data that helped identify and develop Task Force issues and describes the transition of the universities over the past three decades. Institutional histories are presented for Northern Arizona University, Arizona State University, the University of Arizona, and Arizona community colleges. Faculty and student trends (e.g., overall enrollment changes, instructional distribution by colleges within the university, and distribution of degrees by subject area) are discussed. Research related data include sponsored projects listed by Arizona budget category and research activities by National Science Foundation categories. Budget distribution, capital construction, and program changes as indicators of university emphasis are noted. Data are summarized by such topics as external trends as indicators of internal shifts, degrees awarded as indicator of student interest, research funds received as indicator of research effort, and enrollment patterns as indicator of student trends. Ten conclusions include: Arizona's universities will probably continue in a transition state for the next decade; each university has a different mix of degrees awarded by type of degree; and research growth by the universities as a percentage of national research and development funds varies among the universities. Trend data tables are appended. (SM)

ARIZONA'S UNIVERSITIES IN TRANSITION

ROGER L. CALDWELL

PREFACE

This working paper was prepared near the end of the Task Force year. It consolidates a number of ad hoc analyses done over that period and presents them in a single document. In most cases, the data are presented with little commentary. These data can serve as additional components for analyzing the internal and external environment for strategic planning and mission statement development. In addition, the working paper discusses some of the "transition" times experienced by the Arizona universities.

The information presented here in most cases does not duplicate the contents of the "fact books" published annually by each university and the Board of Regents. While specific data are presented in the other working papers, there are four that contain a significant amount of data of the type presented here and therefore are these data are not duplicated in this paper (although portions of summaries are listed when necessary to provide a complete picture). These are:

1. Arizona Environmental Scan Study.
2. The Arizona Universities: A 25 Year State Funding, Productivity, and Performance Outputs History.
3. Arizona Universities Program Changes Nine Year Summary: FY 1981-1989.
4. Enrollment at Arizona Universities: Forecasts to 2000.
5. Future Changes: Implications for Arizona's Universities.

INTRODUCTION

PURPOSE

The purpose of this working paper is twofold:

1. to list selected data, not generally available, that were found useful in identifying and developing Task Force issues; and
2. to provide a brief description of the "transition" of the Arizona universities over the last three decades to become much different institutions. The data in this working paper can be used especially for additional background information relating to the identification of university missions and programmatic focal areas.

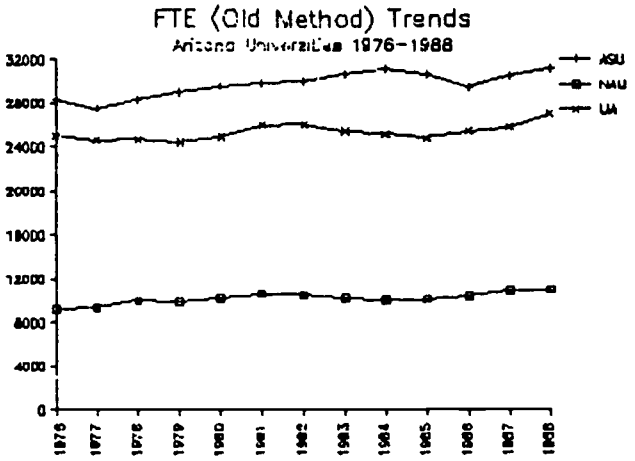
Roger L. Caldwell has been a member of the University of Arizona for 20 years, where he is a Professor of Soil and Water Science. He has served in several administrative positions relating to general environment, energy conservation, computing and information services, and academic planning. He has taught in the fields of plant diseases and pesticides, environment, alternative futures, and scientific communication methods. He has served on several state and local governmental committees relating to economic development, transportation and environmental concerns.

While these data will not allow determination of the "vision" of the university, used in conjunction with other Task Force working papers they provide some assistance in identifying the "current and historic status" of the universities. In addition, these data provide a baseline for future assessments related to which programs are selected for continued focus and which areas can be maintained "as is" while emphases are shifted to new areas.

By looking at types of degrees, the distribution of degree production, the location within the university of research funding, and the comparison of each of these components among the universities in Arizona and the nation, a pattern begins to emerge that provides a snapshot of the overall university. These patterns suggest that the three universities are at different stages of development and have different focal areas; accordingly, they have different needs and products. However, the data presented here are not comprehensive and overall conclusions should not be reached by just this information.

The Arizona universities have undergone a period of relatively rapid enrollment growth, followed by a consolidation period, moved to a present growth period, to be followed by some variation (possible loss followed by rapid gain) in enrollment.[1] Specifically, these universities had relatively rapid growth, as did much of higher education, for the 20 year period from about 1955 to about 1975. For the decade from 1975 to about 1984, enrollment was relatively static, and in the last 3 years enrollment has increased (Figure 1); a complete set of the data for these trends is found in Table A1.

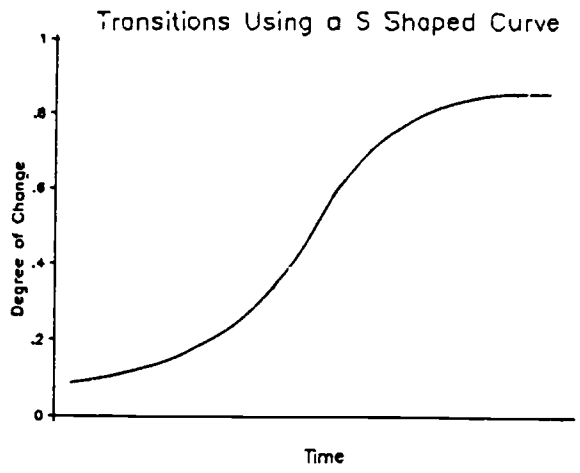
Figure 1. Full Time Equivalent Enrollments at Arizona Universities



CHANGING TIMES

The maturation of an organization can be described by an "S" shaped curve (Figure 2) or by a series of such curves as different levels of maturity or major change occur.[2] As change perturbs equilibrium in the organization, growth (or decline) occurs and a new equilibrium state is reached. Generally, these changes occur continually to varying degrees and the overall analysis is complex. Different parts of an institution are at different stages of change, and will be at different places along a series of "S" curves. In addition, certain changes are more easily recognized, causing less visible, but perhaps more important, changes to be obscured. As we monitor progress of the universities, it is important to know which variables are the relevant choices when there are so many from which to choose.

Figure 2. The S Shaped Curve.



Examples of easily identifiable changes in universities include student headcount and FTE enrollments, degrees produced by discipline, state budget, and externally funded projects for research and other sponsored projects. The less observed changes that occur include administrative restructuring, administrative and academic computing support needs that often change with technological innovation and university growth, ease of communication among participants in the institution, institutional focus shifts, and general hard-to-see support level activities for the more visible, major activities.

Some universities in the United States, while having nearly the same age as some of the Arizona universities, have been in the "major university" class for a number of years. Examples include University of California at Berkeley, University of Wisconsin, University of Illinois, MIT, Harvard University, University of Michigan, and University of Washington. Others have undergone major transitions in the last several decades; these include Stanford University, University of California at Davis, University of California at Los Angeles, and University of California at San Diego. Such transitions require major efforts in human and financial resources, time, and vision. The Arizona universities have begun these major transitions more recently (perhaps in the last 20 years).

The change of a university over time also relates to alternatives in the surrounding area and in the type of company it keeps; the local conditions include nearby educational institutions for student competition, the role of the university as a state resource, and the availability of specialty institutions that can offer degrees in areas of professional interest (e.g., education, business, engineering). In some cases the non-existence of geographically close alternatives may require the institution to appear to have duplication of effort with other institutions. Other major considerations in evaluating these changes are the internal conditions of the university, historic university activities and inertia of organizations due to inside practices and external demands. Again, the Arizona universities are at different stages along their individual maturity curves, and their needs and products differ. This is an important consideration that is often obscured with the simple evaluation of numerical trends of selected variables.

SOME CAUTIONS

The data presented here are taken from different sources. In general, the definitions used by the various sources are in close agreement, but caution should be taken in detailed analyses. For example, the definition of a full time student (FTE) is now markedly different in Arizona than in other states. The classification of degrees awarded can depend on which part of the institution the particular student was enrolled and the types of organizations that existed at

that location. The amount of sponsored research funding is dependent not only on the quality and number of faculty and specialties of the university, but also on the type of university (e.g., medical school, land grant status) and the type of sponsored projects funding attracted (basic research, technical support, public service, student scholarships). When comparing these factors among institutions, such qualifications need be kept in mind.[3]

INSTITUTIONAL HISTORIES

The Arizona legislature in 1945 created a single governing board (Board of Regents) for the three institutions, whereas only the University of Arizona had been under control of the previous constitutionally created governing board. In 1966, when all three institutions were designated as universities, the legislature changed the name of the governing board to the Arizona Board of Regents.

The major organizational changes in Arizona higher education have occurred during the last 30 or so years. The University of Arizona was established in 1885 with special land grant status, focusing on research and broad range of subjects; the designation of an education college did not occur until 1922. On the other hand, Arizona State University did not become a university until 1958, and consisted only of an education college until 1945. Northern Arizona University became a university in 1966 and had its first non-education college in 1958. The community colleges of Arizona grew rapidly with the formation of a statewide system in 1960.

This varied history of Arizona higher education causes continuing and profound impacts on the Arizona universities as they adapt to the changing needs of the state, which have also undergone major shifts in the last 30 years. Understanding the institutional histories, along with the changes in the external environment, brings about recognition of how the universities are changing relative to one another. It further helps us to better understand the different needs of each university, the progress of each university in changing its areas of emphasis, and the challenges confronting a rapidly growing state and its educational institutions.

ARIZONA STATE UNIVERSITY HISTORY

ASU was established in 1886 as Territorial Normal School of Arizona and the name was changed to Tempe State Teachers College at Tempe in 1925. It was then designated Arizona State Teachers and the first multidiscipline curriculum (other than education) added in 1945. Again renamed Arizona State Teachers College at Tempe in 1945, and in 1954 was permitted to establish four colleges. However, it was not designated Arizona State University until 1958, as a result of a state referendum. A research park was created in 1984, international programs began in 1986. The ASU West campus concept was initiated by a citizens group in 1972 and was formally established as a campus by legislation in 1984.

NORTHERN ARIZONA UNIVERSITY HISTORY

NAU was established in 1889 as Northern Arizona Normal School and the name was changed to Northern Arizona State Teachers College in 1925. The name was again changed to Arizona State College at Flagstaff in 1945, and finally designated Northern Arizona University in 1966. The first non-

education degree was added in 1958 (forestry). The first graduate program was begun in 1937, with the first doctoral student graduated in 1973. The Ralph M. Bilby Research Center, a multidisciplinary research facility, was dedicated in 1981.

UNIVERSITY OF ARIZONA HISTORY

The UA was established in 1885 as the land grant university under the Morrill Act, thus enabling federal funds to assist the two initial Colleges of Agriculture and Mines. The College of Education was added in 1922. By 1949, there were eight colleges, in addition to the Graduate College established in 1934. The Agricultural Experiment Station was established in 1890, the Arizona State Museum in 1893, the Cooperative Extension Service in 1914, and the Engineering Experiment Station in 1941. The name University of Arizona has been in existence since its establishment.

ARIZONA COMMUNITY COLLEGES HISTORY

The first community college in Arizona was Eastern Arizona College in Thatcher. It was established as St Joseph Stake Academy in 1888 and also provided high school education. It became non-sectarian in 1933, and was designated Eastern Arizona College in 1920. The second community college was established as Phoenix Junior College in 1920, and renamed Phoenix College in 1939. In 1960, the Arizona Legislature passed a law establishing a community college system for Arizona, and established the Arizona Junior College Board. The governing board was changed to the State Board of Directors for Arizona Community Colleges in 1972. Community colleges in Arizona now comprise nine districts with 15 individual campuses.

FACULTY RELATED TRENDS

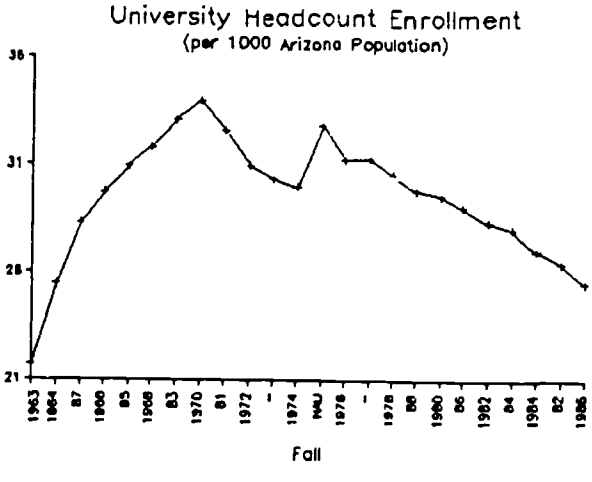
Nationally, higher education began to grow rapidly in the mid 1950s. With a typical 40-year career, expectations are that we will see sizable retirements of faculty in the mid 1990s. However, these faculty age distributions will vary by the institution, and are related to the type of institution, the rate of institutional change, and the type of faculty being attracted or lost to other universities. Here too, the Arizona universities differ (Figures A1, A2, A3). The University of Arizona has a more even distribution of faculty age, and a higher proportion of over 65 than the other two universities. Most faculty at UA are in the age range 33 to 61, at NAU and ASU they are in the range 38 to 57.

STUDENT RELATED TRENDS

OVERALL ENROLLMENT CHANGES

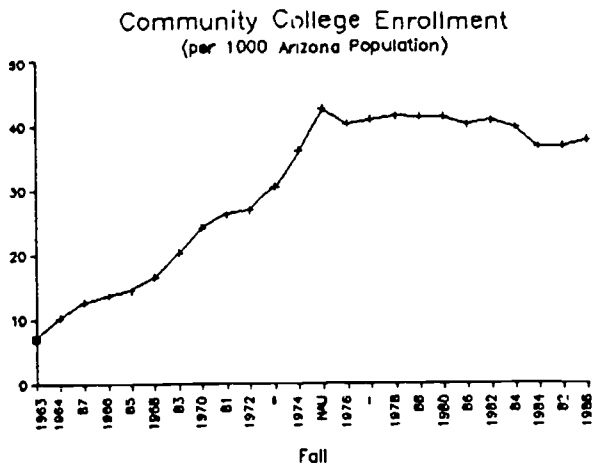
The per capital enrollment of the Arizona universities increased until about 1970, declined until a short lived increase around 1975, and has declined over the last decade (Figure 3).

Figure 3.Arizona Universities Enrollment per Capita population



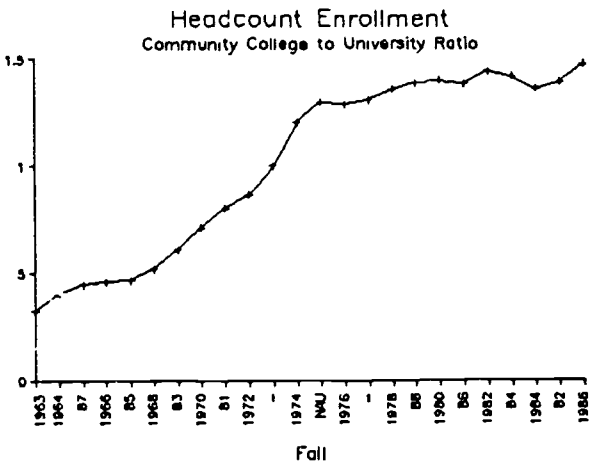
A similar change in enrollment per capita was seen in the growth of community colleges in Arizona, with an increase until about 1975, and a relatively no change in the last decade (Figure 4).

Figure 4. Arizona Community Colleges Enrollment per Capita



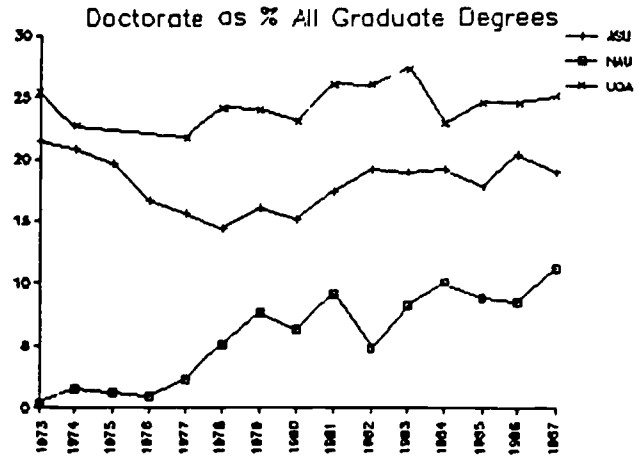
The effect of the community colleges on university enrollments and the significance of the mid 1970s time period can be seen in Figure 5. The ratio of community college enrollments to university enrollments increased until about 1975 and has remained relatively constant in the last decade.

Figure 5.Community College to University Enrollment Ratio



The changing research emphasis can also be seen with the relative amount of doctoral degrees as a percent of all graduate degrees granted by each Arizona university. Over the last 15 years, the overall graduate degree ratio has been about the same (except for NAU where increase has been significant, and includes increases in the number of part-time, off-campus graduate students). However, during this period there have been shifts in the ratio (Figure 6).

Figure 6. Doctorate as Percent of All Graduate Degrees



STUDENT GROWTH RATES BY TYPE OF STUDENT

University enrollments are defined by on- and off-campus, full- and part-time, graduate and undergraduate, upper and lower division, and resident or non-resident students. The Arizona universities differ in the manner in which some of these data are defined, so exact comparison of trends among institutions not simple. However, in general, ASU has grown more rapidly (passing UA in total headcount enrollment in FY 1968-69, and NAU has grown more rapidly in graduate enrollment (mostly off-campus). During the 20-year period 1955 to 1975 the Arizona universities had continuing growth, but in the decade 1975 to 1984 the enrollment and credit hours were essentially stable. It is only in the last three years (1984 to 1987) that enrollment began to increase rapidly, and then only for ASU and UA, primarily from increases in non-resident students (Tables 1-4).

Table 1. Arizona State University Enrollment Trends

Year (Fall)	1980	1981	1982	1983	1984	1985	1986	1987
Resident								
UG	15331	16127	17971	18998	18937	18625	18819	20044
GR	1872	1872	1967	1956	1847	1851	1936	5603
Total	17203	17999	19938	20954	20784	20476	20755	25647
Non-Resident								
UG	8155	7613	6798	6819	6915	7073	7433	8984
GR	1138	1289	1288	1322	1306	1316	1476	2967
Total	9293	8902	8086	8141	8221	8389	8909	11951
Unclassified								
UG	a263	4461	4579	4438	5776	41aa	4831	702
GR	7069	7228	6716	6706	8028	7579	7045	2758
Total	11332	11689	11295	11144	,3804	11723	11876	3460
Overall Total								
UG	27749	28201	29348	30255	31628	29842	31083	29730
GR	10079	10389	9971	9984	11181	10746	10457	11328
Total	37828	38590	39319	40239	42809	40588	41540	41058
Percentages trends:								
FT NonRes	35.1	33.1	28.9	28 0	28.3	29 1	30.0	31 8
Unclass	30.0	30 3	28.7	27.7	32.2	28 9	28 6	8.4
Tot Grad	26 6	26 9	25 4	24.8	26.1	26 5	25.2	27 6
FT Grad	11.4	11.8	11.6	11 3	10 9	11.0	11 5	22 8

FT NonRes is proportion of full time students that are non-resident; Unclass is percent of unclassified students of all students and is based on Headcount; definitions by tuition and fees. Unclassified = unknown residency or less than 7 units. Source: Arizona Board of Regents

Table 2. Northern Arizona University Enrollment Trends

Year (Fall)	1980	1981	1982	1983	1984	1985	1986	1987
Resident								
UG	8083	7770	7555	7303	7017	7231	7382	7487
GR	462	416	561	787	891	1050	384	514
Total	8545	8186	8116	8090	7908	8281	7766	8001
Non-Resident								
UG	1607	1524	1403	1531	1736	1757	1939	1919
GR	68	204	203	228	275	236	215	237
Total	1675	1728	1606	1759	2011	1993	2154	2156
Unclassified								
UG	740	1021	791	718	750	864	1205	1000
GR	1114	1188	1152	934	1157	1477	2083	2288
Total	1854	2209	1943	1652	1907	2341	3288	3288
Overall Total								
UG	10430	10315	9749	9552	9503	9852	10526	10406
GR	1644	1808	1916	1949	2323	2763	2682	3039
Total	12074	12123	11665	11501	11826	12615	13208	13445
Percentage trends:								
FT NonRes	16.4	17 4	16 5	17.9	20.3	19 4	21 7	21.2
Unclass	15.4	18.2	16.7	14.4	16 1	18 6	24 9	24 5
Tot Grad	13.6	14.9	16 4	16.9	19 6	21 9	20.3	22 6
FT Grad	5.2	6.?	7 9	10.3	11.8	12.5	6.0	7.4

FT NonRes is proportion of full time students that are non-resident; Unclass is percent of unclassified students of all students and is based on Headcount; definitions by tuition and fees. Unclassified = unknown residency or less than 7 units. Source: Arizona Board of Regents

Table 3. University of Arizona Enrollment Trends

Year (Fall)	1980	1981	1982	1983	1984	1985	1986	1987
Resident								
UG	16049	16481	16594	16621	16325	16407	14758	17013
GR	3661	3725	3941	3828	3841	3772	1584	3505
Total	19710	20206	20535	20449	20166	20179	16342	20518
Non-Resident								
UG	5759	5439	5036	4757	4700	5102	6296	6430
GR	1536	1493	1453	1377	1547	1586	1753	1438
Total	7295	6932	6489	6134	6247	6688	8049	7868
Unclassified								
UG	1533	1731	1585	1577	1561	1602	2889	1711
GR	1903	1917	1683	1826	1753	1905	3799	2408
Total	3436	3648	3268	3403	3314	3507	6688	4119
Overall Total								
UG	23341	23651	23215	22955	22586	23111	23943	25154
GR	7100	7135	7077	7031	7141	7263	7136	7351
Total	30441	30786	30292	29986	29727	30374	31079	32505
Percentage trends:								
FT NonRes	27 0	25.5	24 0	23 1	23.7	24.9	33.0	27.7
Unclass	11.3	11.8	10 8	11.3	11.1	11.5	21.5	12 7
Tot Grad	23.3	23.2	23 4	23.4	24.0	23.9	23 0	22 6
FT Grad	19 2	19.2	20.0	19.6	20.4	19.9	13 7	17 4

FT NonRes is proportion of full time students that are non-resident; Unclass is percent of unclassified students of all students and is based on Headcount; definitions by tuition and fees. Unclassified = unknown residency or less than 7 units. Source: Arizona Board of Regents

The non-resident enrollment varies among the universities and by class within the university. Those non-residents taking less than seven units are non classified as non-resident, as the definition is based on tuition payments. The most recent distribution of non-residents is listed in Table 4.

Table 4. Arizona Universities Non-Resident Enrollment for Fall 1987

Type	ASU(%)	NAU(%)	UA(%)
Undergraduate			
Freshman	47	22	42
Sophomore	36	23	36
Junior	24	24	26
Senior	17	17	20
Subtotal	30	20	32
Graduate	44	32	53
Overall	31	21	35

All FULL TIME students (7 or greater units) for tuition purposes. Non-resident includes foreign students. Class breakout was first available in Fall 1986.
Source: Arizona Board of Regents

INSTRUCTIONAL DISTRIBUTION BY COLLEGES WITHIN UNIVERSITY

There are two ways to take a "snapshot" of the university, and both will be presented. First, looking at the distribution of activities based on the structure of the university, and second by comparing the activities by subject area and comparing to national averages. This section presents the analysis by organization within the Arizona universities. In Tables 5-7 below, SCH is student credit hours (the number of students taking specific units loads), UG is undergraduate, GR is graduate, BS is all bachelor degrees, MS is all masters degrees, and PhD is all doctoral degrees (except medicine). The number of faculty is the headcount of tenure/tenure-track faculty and research funds are non-budgeted (non-state) sponsored projects funding of all types. All entries are in percent distribution within the university, except for the Total line.

Table 5. Arizona State University Comparative College Data

College	% UG SCH	% GR SCH	% BS	% MS	% PhD	% Faculty	% Research
Arch/Env Design	2.5	2.0	2 6	2.9	-	2 9	.1
Business	16 6	11.8	33.5	19.2	13.7	13 7	1 1
Education	4.1	21.7	9.6	24 0	32.2	6 6	7 9
Eng/App Sci	9.3	18.2	14.9	18.5	14 4	17.1	28 9
Fine Arts	7.2	5 6	4.5	7.1	4.1	8 9	8
Law	-	11.7	-	-	-	1 7	.2
Lib Arts/Sci	51.7	18.4	22.5	14.4	33.6	40.5	37 8
Nursing	1 0	1.6	2.9	2.5	-	3 1	1 5
Public Programs	7.2	3 4	9.5	4.7	1 4	4 7	.1
Social Work	.4	5.5	9	6.7	.7	1 5	2
Other	-	-	-	-	-	-	21 4
Total	395286	57734	5276	1115	146	1755	39220

SCH FY 88 degrees and research FY87. Dollars in thousands. Education degrees in a discipline are counted in education.
Source: Arizona State University

Table 6. Northern Arizona University Comparative College Data

College	% UG SCH	% GR SCH	% BS	% MS	% PhD	% Faculty	% Research
Arts/Science	34.6	19.9	16.7	15.6	17.7	37.8	12.7
Business Admin	12.7	3.1	22.0	6 6	-	10 3	.1
Ctr Excel Educa	6.6	59.2	9 0	60.1	82.3	9.7	11 6
Cre Comm Arts	18.0	3 9	13.3	7 0	-	14.2	5.1
Design/Tech	-	-	6.1	6 8	-	-	.3
Engin/Tech	5.8	-	11.3	-	-	6.2	1 4
Forestry	.8	1.6	2.2	.9	-	3.3	5.7
Health Prof	5.2	2.0	11.7	4 8	-	6.2	.2
Hotel Mgmt	1.5	-	3.0	-	-	1.2	-
Inst Human Dev	-		-	-	-	-	20.6
Soc Behav Sci	14 60	10.30	10.80	5.70	-	11.30	5.90
Spon Research	-		-	-	-	-	1 1
Other	.3	-	-	-	-	-	13 9
Total	14401?	14234	1438	456	62	487	8520

Includes on and off-campus instruction. Faculty and SCH data FY 88 other data FY 87. Dollars in thousands.
Source: Northern Arizona University

Table 7. University of Arizona Comparative College Data

College	% UG SCH	% GR SCH	% BS	% MS	% PhD	% Faculty	% Research
Agriculture	4.3	7.2	7 5	10 9	17 6	5 5	8 5
Architecture	1.4	.4	2.1	.1	-	1 8	.1
Education	3.6	10.4	5.9	18 0	16 9	6 4	2.8
BPA	13.7	10.3	26.5	10 4	3.8	9 6	2 3
Engineer/Mines	7.5	11.0	15.3	16.6	10.3	12 9	11.2
Fine Arts	7.2	4.0	6.9	4.4	.3	7.8	.3
Humanities	16.5	4 3	4.1	2.7	2.1	10 ?	7
Sciences	20.6	14.9	7.9	12 0	23 8	20 4	40 3
Soc Behav Sci	20.9	11.9	14 0	14.7	12 8	17.2	2 4
Nursing	.9	1.9	2 6	2.2	2 4	3.8	1.2
Pharmacy	8	1.8	1.4	1.5	3 8	2 4	3 3
Sch Health RP	2.2	1.8	1.7	2.1	-	2.5	6
Other Res Units	-	4.0	-	2.6	4.1	-	11 9
Other units							14 4
Total	341892	41978	3570	1209	290	1211	97810

Medicine not included. SCH and faculty data for FY87; Research/degrees FY 87 FY 88. University departments reported in Science (Biochemistry, Molecular and Cellular Biology, Microbiology and Immunology). 154 professional degrees not listed (132 in Law). Cooperative Extension and farms not included. Other Research Units are Arizona Research Laboratories Environmental Research Laboratory, and Optical Sciences. Source: University of Arizona.

DISTRIBUTION OF GRADUATE DEGREES BY ORGANIZATION

Trend comparisons for sponsored research funding and graduate degrees are shown for two years by organizational units in Tables 8-10. Differences in units that have large amounts of sponsored funding and low numbers of graduates indicate contract oriented research, rather than research for direct graduate training.

Table 8. Arizona State University Graduate Degrees

Department/Unit	FY87 Funds	FY86 Funds	FY 87 PhD	FY86 PhD	FY87 MS	FY86 MS	Total All Degs
Arch Env Design	55	113	0	0	32	23	55
Business	419	289	20	17	214	258	509
Education	3097	2675	47	67	278	274	666
Engineering	11341	14065	21	13	206	207	447
Fine Arts	309	2	6	6	79	76	167
Liberal Arts/Sciences	14813	12762	49	50	161	138	398
Nursing	581	55?	0	0	28	26	54
Public Programs	51	623	2	3	52	56	113
Social Work	70	66	1	0	75	59	135
Other	8411	2590					0
							0
Total	39147	33438	146	156	1125	1117	254?

Note: College of Law not included. Other category is administrative and non listed units. FY 87 funds "other" inculdes $5 million for planning and construction. Source: Arizona State University.

Table 9. Northern Arizona University Graduate Degrees

Department/Unit	FY87 Res	FY86 Res	FY 87 PhD	FY86 PhD	FY87 MS	FY86 MS	Total All Degs
Ctr Excell Educ	1205	931	51	34	274	256	615
Arts and Sciences	2906	1085	11	7	71	72	161
Business Admin	2	?	0	0	30	27	57
Design Tech	20	27	0	0	31	24	55
Social Behav Sciences	313	501	0	0	23	25	48
Creat/Comm Arts	24	439	0	0	32	14	46
Health Professions	440	15	0	0	22	17	39
Forestry	569	485	0	0	4	4	8
AZ CTR Vocational Ed	2355	1811					0
Inst for Human Devel	2310	1758					0
Sponsored Research	601	96					0
Admin and Finance	298	561					0
Engineer Tech	170	120					0
Other	1	622					0
Total	11214	8520	62	41	487	439	1029

Note: Office of President; research funds rounded to nearest 1000 Sort: By total MS and PhD degrees for two years, followed by FY 87 Research Percent of two year research in non degree areas as percent of total (FY 87 and FY 86 is 54.2%). Source: Northern Arizona University

Table 10. University of Arizona Graduate Degrees

Department/Unit	FY 87 Funds	FY 86 Funds	FY 87 PhD	FY86 PhD	FY87 MS	FY86 MS	Total All Degs
Agriculture	8305	8842	51	45	132	217	445
Architecture	25	6	0	0	1	9	10
Business/Public Adm	2768	3607	11	9	158	126	304
Education	2780	2129	49	41	224	199	513
Engineering/Mines	10919	10655	30	24	201	174	429
Fine Arts	332	31	1	1	68	57	127
Health Rel Profs	566	479	0	0	25	62	87
Humanities	728	245	6	4	33	52	95
Nursing	1176	850	7	7	27	44	85
Pharmacy	3197	4698	11	8	18	12	49
Sciences	39453	23908	69	51	145	137	402
Social Behav Sci	2441	1710	37	32	178	161	408
Sponsored Research	11593	12343	0	0	0	0	0
Administrative							
Total			272	222	1210	1250	2954

Does not include Colleges of Medicine or Law; Professional degrees included in Masters (Education, Nursing). Some research units award degrees through other academic depts (e.g., Optical Science through Engineering); some research units are effectively joint with academic units (e g., Arizona Research Laboratories). Source: University of Arizona.

DISTRIBUTION OF DEGREES BY SUBJECT AREA

This comparison is by HEGIS[4] classification code, for comparison to national averages. The degree comparisons in Tables 11-13 include a two year summary distribution of the Arizona universities (FY 86 and FY 87) with national distribution for FY 85. Those categories where the Arizona university is less than one third the national average are indicated by a L and those where the Arizona university is greater by one third of the national average are indicated by a G.

Table 11. Bachelor's Degrees: Arizona vs National Distribution

Category	National %	ASU	NAU	UA
Agriculture/Renewable Nat Resources	1.85	I		G
Architecture/Environ Design	.95	G	L	G
Area and Ethnic Studies	29	L	L	G
Business and Management	23.82			
Communications	4.30	G	L	
Computer/Information Sciences	3 97		G	L
Education	9.00		G	
Engineering	7 88		L	G
Engineering/Related Technologies	1 93	G	G	L
Foreign Languages	1 02	G	L	G
Health Sciences	6 59			
Home Economics	1 59			G
Letters	3 48	L		
Life Sciences	3 93	L		
Mathematics	1 55	L		G
Multi/Interdisciplinary	1 61	L	G	G
Parks and Recreation	47	G	G	L
Philosophy and Religion	65	L	L	
Physical Sciences	2 42	L	G	
Psychology	4 06		L	
Protective Services	1.28	G	G	L
Public Affairs	1 41		L	L
Social Sciences	9 34		L	
Visual/Performing Arts	3.87			

Arizona is total of 2-yr of Bachelor's Degrees (FY 86 and FY 87), National FY 85 (some categories combined) where classification changes were made. Less (L) or Greater (G) is the Arizona university is outside of +/- 33% of national average.

Table 12. Master's Degrees: Arizona vs National Distribution

Category	National %	ASU	NAU	UA
Agriculture/Nat Resources	1.37		L	G
Architecture/Environ Design	1.14	G	L	
Area and Ethnic Studies	.31	L	L	G
Business and Management	23.59		L	
Communications	1 28		L	
Communications Tech	.07	G	L	L
Computer/Information Sciences	2 48		L	
Education	26.50		G	
Engineering	7.31	G	L	G
Engineering/Related Technologies	.22	G	L	L
Foreign Languages	60		L	G
Health Sciences	6 07	G	L	
Home Economics	83	L	L	G
Letters	2 07	L	G	G
Library	1 36	L	L	G
Life Sciences	1.77	L	G	G
Mathematics	1.01	L	G	
Multi/Interdisciplinary	1 11		L	L
Parks and Recreation	19		L	L
Philosophy and Religion	.41	L	L	
Physical Sciences	2 02		G	G
Protective Services	.43	G	G	L
Psychology	2 94	L	L	L
Public Affairs	5 61	G	L	L
Social Sciences	3.63		G	
Visual/Performing Arts	3 04	G	G	

Arizona is total of 2-yr of Master's Degrees (FY 86 and FY 87); National is FY 85 (some categories combined) where classification changes were made. Less (L) or Greater (G) is the Arizona university is outside of +/- 33% of national average.

Table 13. Doctoral Degrees: Arizona vs National Distribution

Category	National %	ASU	NAU	UA
Agriculture/Natural Resources	3.68	L	L	G
Architecture/Environ Design	.27	L	L	L
Area and Ethnic Studies	42	L	L	G
Business and Management	2.63	G	L	
Communications	69	L	L	L
Communications Tech	.02	G	L	L
Computer/Information Sciences	.75	L	L	
Education	21.71	G	G	
Engineering	9 78		L	
Foreign Languages	1 33	L	L	L
Health Sciences	3 64	L	L	G
Home Economics	84	L	L	L
Letters	3 76		L	
Library Science	26	L	L	L
Life Sciences	10 42	L		G
Mathematics	2 12	L	L	G
Multi/Interdisciplinary	87	L	L	G
Parks and Recreation	.11	L	L	L
Philosophy and Religion	1 42	L	L	L
Physical Sciences	10 33	L	L	G
Protective Services	10	L	L	L
Psychology	8 83	L	L	L
Public Affairs	1.31	G	L	L
Social Sciences	8 66	G		L
Visual/Performing Arts	2.10	G	L	G

Arizona is total of 2-yr of Doctoral Degrees (FY 86 and FY 87); National is FY 85 (some categories combined) where classification changes were made. Less (L) or Greater (G) is the Arizona university is outside of +/- 33% of national average.

A full listing of the actual number of degrees awarded and their percentage distribution for each Arizona University is found in Tables A2-A4, at the end of this report.

RESEARCH RELATED DATA

Sponsored Projects funding provided by external agencies is also an indicator of university activities in the research area. Sponsored projects include all funds that are not state budgeted and are provided by external organizations (including State of Arizona through means other than university budget processes). The sponsored projects categories are shown in Table 14.

SPONSORED PROJECTS BY ARIZONA BUDGET CATEGORY

Table 14. Sponsored Projects at Arizona Universities (FY 87 Awards

	- Thousands Dollars -			---- Percentage ----		
Category	ASU	NAU	UA	ASU	NAU	UA
Instruction	2113	2072	4857	5 4	15.7	3.5
Research	23105	2094	118010	58.9	15.9	84.2
Public Service	4790	3247	6079	12.2	24.6	4.3
Academic Support	1680	82	2905	4.3	.6	2.1
Student Support	204	385	1571	.5	2.9	1.1
Financial Aid	358	5245	6352	.9	39 8	4.5
Institutional Support	6970	67	372	17 9	5	.3
Total	39220	13192	140146			

Note: For NAU, $33,000 maintenance is included in institutional support; For ASU, $1,680,000 equipment is included in academic support. Source: Arizona State University, Northern Arizona University.

RESEARCH ACTIVITIES BY NSF CATEGORIES

The National Science Foundation analyzes a number of aspects of graduate education, but several subject fields are not included in their analyses. These do not include education as a category (this impacts greatest on NAU in the listings below); see Tables 15-18.

Table 15. Arizona State University Research Distribution

NSF summary Dollars in Thousands

FY 86 Category	PartTime Grad Std	FullTime Grad Std	% Std FullTime	Post Docs	Capital	R&D Fed	R&D Total	% Fed R&D
Engineering	423	603	58.77	9	2599	3546	12109	29.28
Phys Sci	6	174	96.67	47	178	4450	8932	49 82
Environ Sci	14	51	78.46	8	0	1823	3064	59.50
Math/Comp Sci	131	135	50.75	0	0	291	586	49 66
Life Sci	207	193	48.25	0	0	1815	3286	55 23
Psychology	0	96	100.00	1	0	891	1098	81.15
Social Sci	326	370	53.16	4	0	725	2579	28.11
Other	0	0	.00	0	0	0	1926	.00
Total	1107	1622	59.44	69	2777	13541	33580	40 32

Source: National Science Foundation

Table 16. Northern Arizona University Research Distribution

FY 86 Category	PartTime Grad Std	FullTime Grad Std	% Std FullTime	Post Docs	Capital	R&D Fed	R&D Total	% Fed R&D
Engineering	0	0	.00	0	0	17	70	24 29
Phys Sci	1	5	83 33	0	0	6	121	4 96
Environ Sci	20	51	71 83	0	0	35	245	14 29
Math/Comp Sci	2	16	88 89	0	0	0	53	.00
Life Sci	25	101	80.16	1	0	725	1333	54 39
Psychology	204	100	32.89	0	0	299	343	87 17
Social Sci	49	38	43 68	0	0	16	100	16 00
Other	0	0	.00	0	0	3	3	100 00
Total	301	311	50 82	1	0	1101	2268	48 54

Note: NSF categories do not include "education" and this impacts NAU to a greater degree than the other universities; it also causes different figures for NSF summaries and university summaries of the same types of data (Tables 5-10). Source: National Science Foundation

Table 17. University of Arizona Research Distribution

FY 86 Category	PartTime Grad Std	FullTime Grad Std	% Std FullTime	Post Docs	Capital	R&D Fed	R&D Total	% Fed R&D
Engineering	221	640	74.33	3	8053	4925	10249	48.05
Phys Sci	26	446	94.49	82	1502	19842	32927	60.26
Environ Sci	96	407	80.91	1	564	3864	14835	26.05
Math/Comp Sci	78	335	81.11	4	190	2641	2897	91 16
Life Sci	143	888	86.13	139	17016	28447	56594	50.27
Psychology	0	68	100.00	1	16	53	147	36.05
Social Sci	93	392	80.82	0	332	2201	6923	31.79
Other	0	0	.00	0	3464	0	218	.00
Total	657	3176	82.86	230	31137	61973	124790	49 66

Source: National Science Foundation

Table 18. Arizona Universities Research Distribution

ALL 3 UNIVERSITIES TOTAL: FY 86

Category	PartTime Grad Std	FullTime Grad Std	% Std FullTime	Post Docs	Capital	R&D Fed	R&D Total	% Fed R&D
Engineering	644	1243	65.87	12	10652	8488	22428	37 85
Phys Sci	33	625	94.98	129	1680	24298	41980	57 88
Environ Sci	130	509	79 66	9	564	5722	18144	31.54
Math/Comp Sci	211	486	69.73	4	190	2932	3536	82 92
Life Sci	375	1182	75 92	140	17016	30987	61213	50 62
Psychology	204	267	56.41	2	16	1243	1588	78 27
Social Sci	468	800	63.09	4	332	2942	9602	30 64
Other	0	0	00	0	3464	3	2147	14
Total	2065	5109	71 22	300	33914	76615	160638	47 69

Source: National Science Foundation

The information on research and development expenditures categorized by the National Science Foundation are also useful to track the rates of change of all sponsored project activities, in either absolute dollar amounts or ratios of the Arizona institutions to all institutions. These trends are summarized in Tables 19-21.

Teble 19. Arizona State University: NSF R&D Trends

Category	Fiscal Years 82	83	84	85	86
Engineering	3113	7142	7424	10906	12109
Phys Sci	3693	5586	5279	7287	8932
Environ Sci	1035	2408	2424	2416	3064
Math/Comp Sci	437	380	306	446	586
Life Sci	1137	1925	1556	2508	3286
Psychology	380	640	496	1032	1098
Social Sci	1716	2599	2734	2711	2579
Other	0	1614	1830	1647	1926
Total ASU	11511	22294	22049	28953	33580
Total NSF	7266	7798	8508	9524	10718
ASU/NSF	1 58	2.86	2 59	3.04	3 13

ASU/NSF ratio times 1000; NSF total in thousands, ASU entries in actual funding.
Source: National Science Foundation

Table 20. Northern Arizona University NSF R&D Trends

Category	Fiscal years 82	83	84	85	86
Engineering	129	135	178	211	70
Phys Sci	84	43	61	59	121
Environ Sci	77	89	96	239	245
Math/Comp Sci	18	11	21	0	93
Life Sci	623	669	998	1227	1333
Psychology	9	0	5	0	343
Social Sci	377	204	276	67	100
Other	0	23	189	314	3
Total NAU	1317	1174	1824	2117	2208
Total NSF	7266	7798	8508	9524	10718
NAU/NSF	.18	.15	.21	22	22

NAU/NSF ratio times 1000; NSF total in thousands, NAU entries in actual funding.
Source. National Science Foundation

Table 21. University of Arizona: NSF R&D
Fiscal Years

Category	82	83	84	85	86
Engineering	6440	6287	7020	7864	10249
Phys Sci	18332	20212	24338	26117	32927
Environ Sci	14581	13148	12269	14043	14835
Math/Comp Sci	1174	984	1092	2174	2897
Life Sci	41637	42105	43146	48508	56594
Psychology	769	863	823	210	147
Social Sci	4890	5402	6258	6783	6923
Other	0	23	189	314	3
Total UA	87023	89024	95135	106019	124575
Total NSF	7266	7798	8508	9524	10718
UA/NSF	12.09	11 42	11.18	11.13	11.62

ASU/NSF ratio times 1000; NSF total in thousands, ASU entries in actual funding.
Source: National Science Foundation

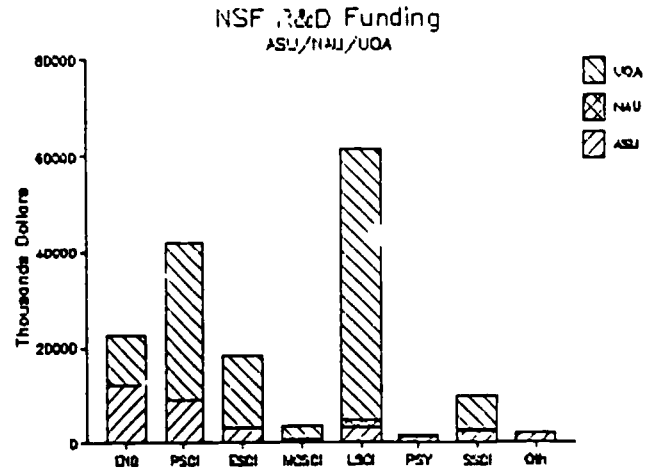
The National Science Foundation summaries can also show the changing emphases of the Arizona universities relative to concentration of sponsored projects funding (as reported by NSF) by subject area. The total for all Arizona universities in shown in Figure 7 (the categories are the same as those listed in Table 22).

Table 22. Relative Portion of National Research by Arizona Universities

NSF R&D BY Category FY 86 Category	National Total	UA	ASU	NAU	Ratio UA/ASU	UA+ASU % Total
Total	10,718,402	124,790	33,580	2,308	3 7	1.5
Engineering	1,609,093	10,249	12,109	70	.8	1 4
Physical Sci	1,261,376	32,927	8,932	121	3.7	3 3
Environ Sci	774,177	14,835	3,064	245	4 8	2 3
Math/Computer Sci	467,564	2,897	586	93	4.9	7
Life Sci	5,746,125	56,594	3,286	1,333	17.2	1 0
Psychology	180,453	147	1,098	343	.1	.7
Social Sci	459,303	6,923	2,579	100	2.7	2.1
Other	220,311	218	1,926	3	.1	1 0

Source: National Science Foundation

Figure 7. Total National Science Foundation R&D for Arizona Universities



It is more important to look at trends than absolute levels of research funding, as the relative size of the funding pool varies greatly among the various categories (e.g., in FY 86, Life Sciences accounted for 53.5%, Engineering 15.0%, and Social Sciences 4.3%). The five year trend from FY 82 through FY 86 for each university is shown in Figures 8-10.

Figure 8. ASU R&D Funding Trends

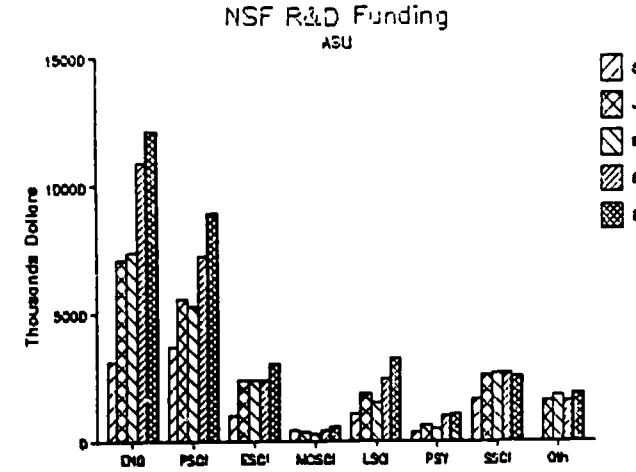


Figure 9. NAU R&D Funding Trends

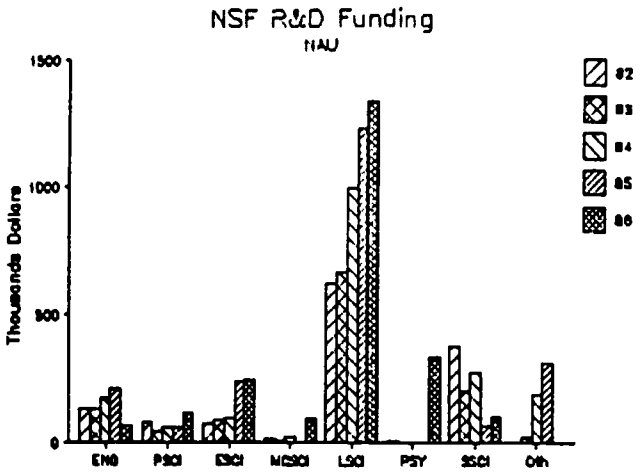
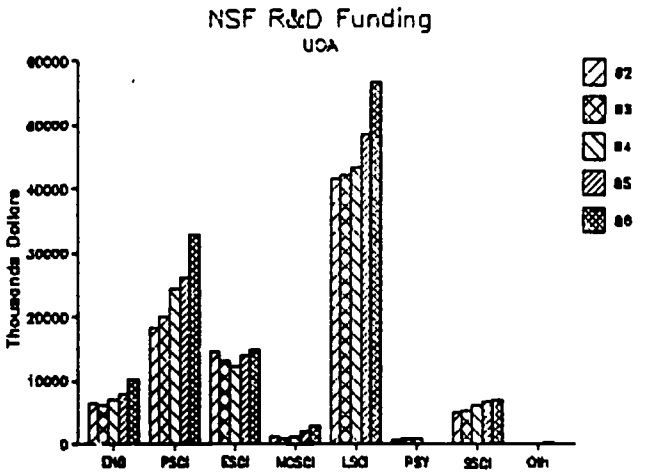


Figure 10. UA R&D Funding Trends



BUDGET DISTRIBUTION

The proportion of the state budget devoted to higher education has been declining in recent years. This is partly reflected in new needs competing for state funding, partly due to the population to university enrollment trends, and partly due to new financing of capital (see below). In the 25-year period 1963 to 1988, the overall university budgets grew an average of 1.5% annually after enrollment growth and inflation correction.[5]

CAPITAL CONSTRUCTION

In the last decade, there has been a slow shift for capital construction and acquisition from state funding to university bonding. This trend has accelerated in the last few years (Table 23).

Table 23. State Appropriations vs Bonding for Capital (Millions of Dollars)

Years	Bonding	State Capital Appropriations
FY 68-73	6.4	62.0
FY 74-78	18.0	44.0
FY 79-83	142.0	51.0
FY 84-88	229.0	39.0
FY 89-93*	553.9	

*Planned expenditures via bonding authority.
Source: Arizona Board of Regents

PROGRAM EFFORTS

PROGRAM CHANGES AS INDICATORS OF UNIVERSITY EMPHASIS

The mechanism for developing the university state budgets for new programs is the "program change" process. The major focal areas of the universities, as identified by program change requests over the nine-year period FY 1981-FY 1989 are:[6]

ASU Three subject areas account for 41 percent of all university requests: academic staff, engineering, and administrative staff.

ASU West ASU West began as a separate budget in FY 85; all university requests consist of infrastructure subjects (academic and administrative staff, building support, and computing).

NAU Three subject areas account for 46 percent of all university requests: academic staff, computing, and general undergraduate.

UA Three subject areas account for 58 percent of all university requests: biological sciences, physical sciences, and engineering.

SUMMARY

There is a great deal of information that can be collected to help assess the degree to which the Arizona universities are in transition. This working paper collected a portion of that available information to identify some of the historical changes that have taken place. Rather than make a detailed summary of the differences or similarities of each institution, a series of tables and figures was presented to allow the reader to synthesize the type of analysis desired. While the types of information listed in this working paper can be used to identify historical shifts among the universities, it can also be used to identify to some degree the future directions that might be included for developing "focused excellence" within the institutions.

EXTERNAL TRENDS AS INDICATORS OF INTERNAL SHIFTS

The "Arizona Environmental Scan Study" and "Future Changes: Implications for Arizona's Universities" working papers catalog some anticipated changes in the state and nation that will impact the universities. As these changes occur, the universities will have to adjust their activities and areas of emphasis to remain competitive within their peer groups and to provide the higher educational needs for a growing state.

PERSPECTIVES GAINED IN PERSONAL INTERVIEWS

During our interviews with representatives of the three universities we found recognition of the types of transitions suggested in this working paper. The faculty and administrators of each of the campuses recognize the change related issues and resulting pressures on the institutions, but have different perceptions as to causes and responses. The internal trauma among university personnel due to these "transitions" should not be underestimated.

DEGREES AWARDED AS INDICATOR OF STUDENT INTEREST

There are several subjects areas where the Arizona universities differ from national averages in the types of degrees awarded. In addition, the individual universities have different histories and have significantly different areas of emphasis as defined by student degree distribution.

RESEARCH FUNDS RECEIVED AS INDICATOR OF RESEARCH EFFORT

The types of sponsored projects funds (all external monies received by the universities) as well as that portion designated "research" directly indicate the interests of the faculty, which indirectly indicate focal areas of the universities. By following the degree of change in various research categories, areas of research emphasis can be determined.

PROGRAM CHANGES REQUESTS AS INDICATOR OF PRIORITIES

Program Change requests is the mechanism used by the universities to make major changes to existing programs or to add new programs. The reasons could be to move in new directions, enhance existing programs, or address needs created by growth or other non-programmatic changes. By looking at the relative degree of emphasis in specific academic fields over time, the institutional focal areas can be identified indirectly.

ENROLLMENT PATTERNS AS INDICATOR OF STUDENT TRENDS

The Arizona universities have begun to grow in the last three years after about a decade of general stability in enrollments. The growth differs among the three universities, but generally is in off-campus and out-of-state students. The proportion due to graduate education generally has remained constant, except for increases in part-time, off-campus students.

CONCLUSIONS

There are clear areas of institutional emphasis which differ by university, within the Arizona universities. These differences are identifiable by the types of degrees awarded within various subjects, and the relative distribution of externally generated research funds. These areas of emphasis are strongly influenced by the historical relationships and the geographical locations of the universities. Each university is in a "transition", but the degrees of change and the types of transition differ by each university. Some specific conclusions are:

1. The University of Arizona has a much longer history and of research and program diversity. This is reflected in the types of degrees offered and the types and amount of external research funding received. UA became a university in 1885 (103 years ago).

2. Arizona State University has undergone a greater degree of change than the other two universities in the last 30 years. This is reflected in its relative growth rate and the types of requests for new programs. ASU became a university in 1958 (30 years ago).

3. Northern Arizona University has begun to increase its research activities and relative graduate enrollment in the last decade. During this period the ASU and UA relative graduate enrollments remained stable or decreased slightly. NAU became a university in 1966 (22 years ago).

4. The University of Arizona is a more mature as reflected in the types of program change requests and longevity as a university. However, it is still developing in relation to and infrastructure and support services needs.

5. Arizona State University is in a major transition period. It must satisfy the desires and needs of a research university and also those of an urban university. This transformation is complicated by its rapid rate of change in the last 30 years in organization and program emphasis, the development of multiple campus centers or branch campuses, and its overall enrollment size.

6. Northern Arizona University is nearing a major crossroads in its development. The university is approaching a size and a stage of research emphasis where institutional character changes. The choices are to remain below this threshold and maintain much of its traditional character, or to pass through this threshold and become an entirely different institution.

7. Research growth by Arizona universities as a percentage of national research and development funds varies among the universities. Over the period FY 82 to FY 86, the University of Arizona is relatively constant, Northern Arizona University is increasing slowly, and Arizona State University is increasingly more rapidly. These rates of change reflect the size of the research effort (the larger the program size the slower the rate of change) and the developmental stage of the institution.

8. The distribution of each degree type (e.g., BS, MS, PhD) in each subject classification and the classifications of external research funding provide significant guidance in defining the current mission orientation of the Arizona universities. This guidance is further aided by comparing the distribution of degrees by subject matter for each Arizona university to the national averages for those subjects.

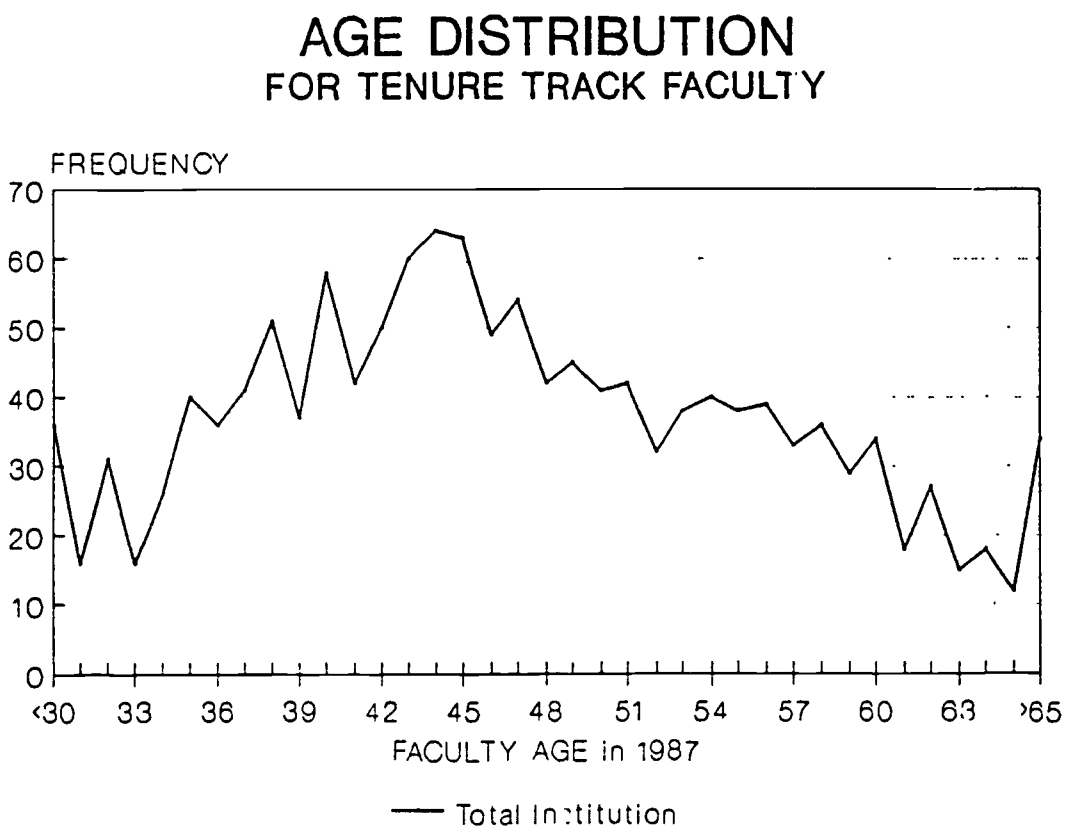
9. Each university has a different mix of degrees awarded by type of degree. The subject areas of undergraduate and graduate enrollment and research funding also is different for each university. This historical mix cannot be changed easily or rapidly and will impact the institutional movement to its vision of the campus of the future.

10. The Arizona universities likely will continue in a "transition" state over the next decade, so extrapolations of trends will be risky. The results of changing enrollment patterns over the last 20 years provides some indication of the importance of this observation. The shifts in demographic trends and changing type and rate of growth for Arizona in the next decade could have similar effects on such simple trend extraplations.

APPENDIX A

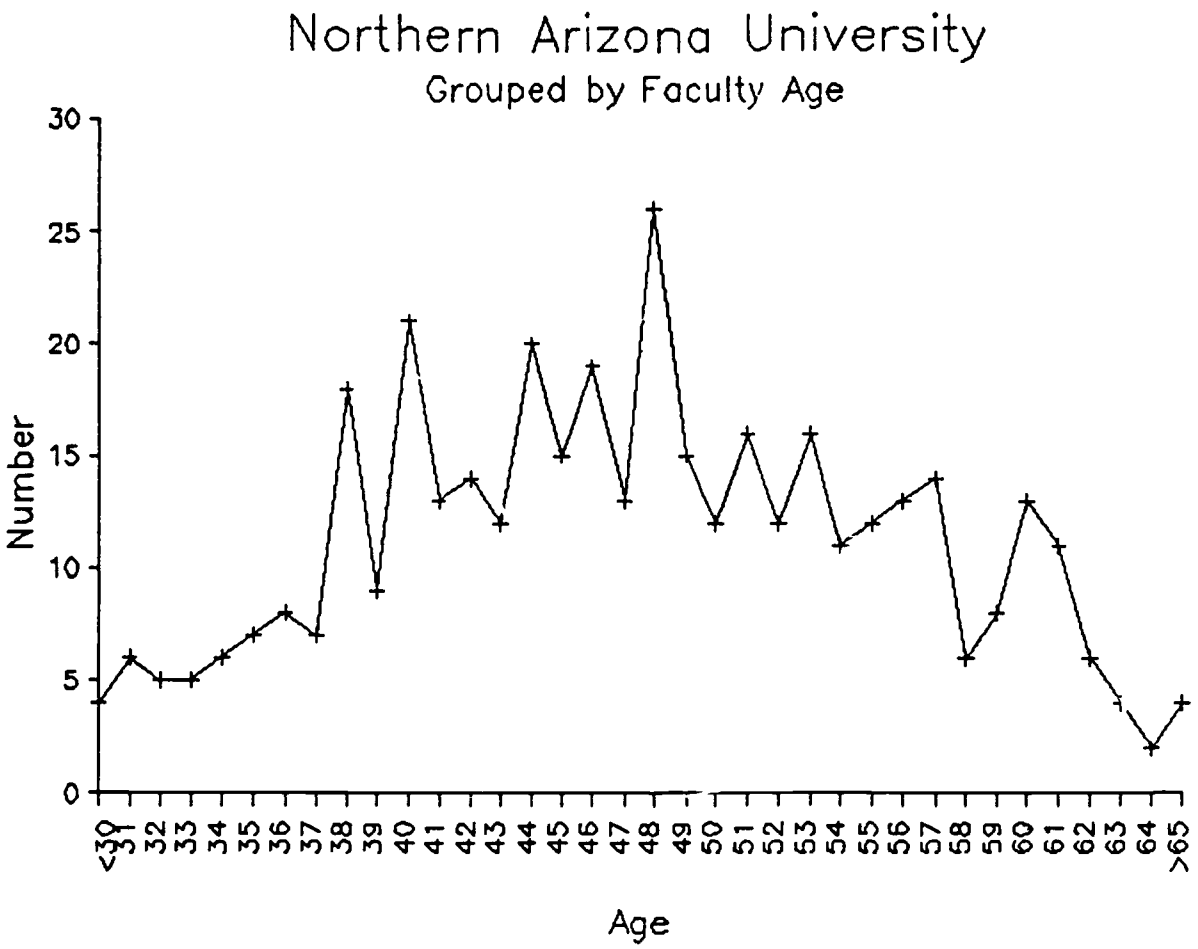
LARGE FIGURES AND TABLES

A1.ARIZONA STATE UNIVERSITY FACULTY AGE DISTRIBUTION

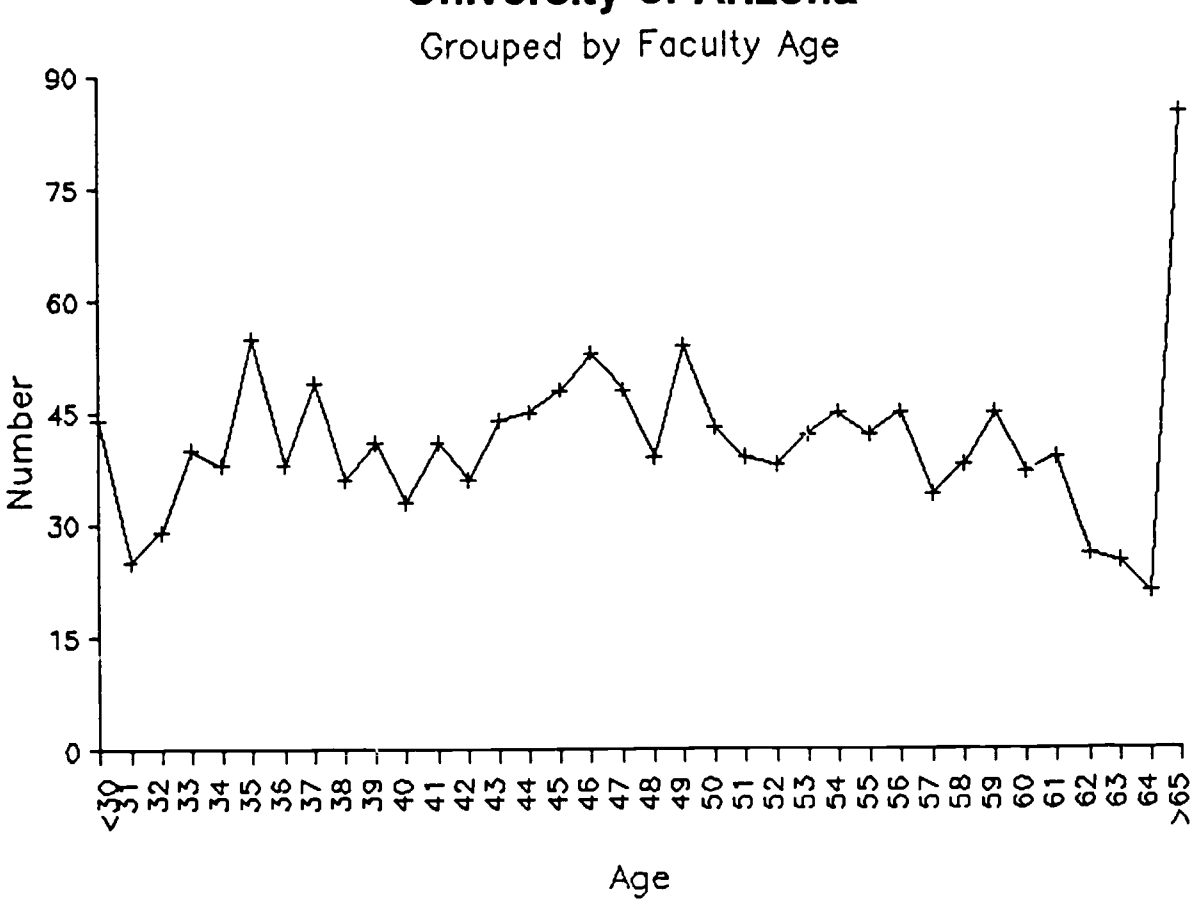


ASU Office of Institutional Analysis

A2.NORTHERN ARIZONA UNIVERSITY FACULTY
AGE DISTRIBUTION



A3.UNIVERSITY OF ARIZONA FACULTY AGE DISTRIBUTION



A4.ARIZONA UNIVERSITIES FTE TRENDS (OLD METHOD)

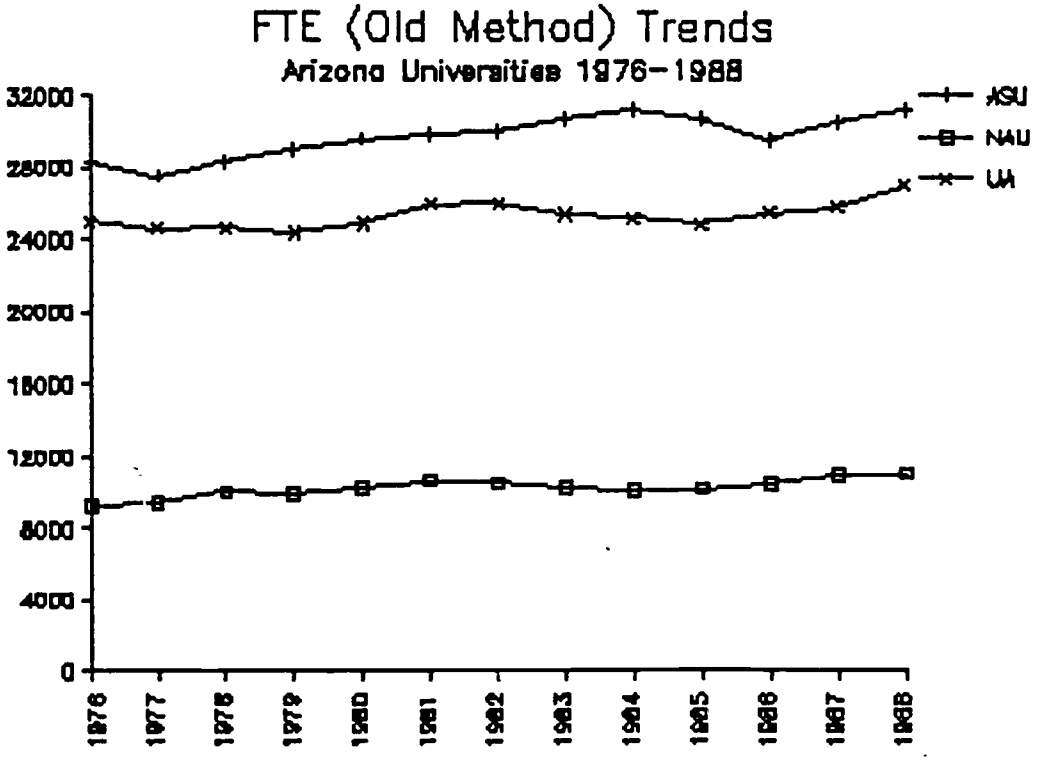


Table A1. Arizona Universities FTE Trends (Old Method)

Institution	1976	1977	1978	1979	1980	1981	1982
ASU	28260	27541	28321	28989	29581	29783	29984
NAU	9267	9417	10022	9868	10239	10675	10525
UA	25050	24607	24665	24386	24902	25959	26058
Total	62577	61565	63008	63243	64722	66417	66567

Institution	1983	1984	1985	1986	1987	1988
ASU	30629	31165	30703	29555	30474	31159
NAU	10220	10140	10158	10392	10973	11011
UA	25406	25184	24845	25438	25798	26976
Total	66255	66489	65706	65385	67245	69146

* Old FTE method is Student Credit Hours divided by 15 for undergraduate and 10 for graduate students.
Source: Arizona Board of Regents

Table A2. Distribution of Bachelor's Degrees: All Universities

Category	Total of FY 86 and FY 87 BA/BS ASU #	NAU #	UOA #	ASU %	NAU %	UOA %	Total %	National %
Business and Management	3112	583	1801	30.28	19.07	25.39	26.91	23.82
Engineering	854	148	1061	8.31	4.84	14.96	10.10	7.88
Education	1107	416	514	10.77	13.61	7.25	9.97	9.00
Social Sciences	736	190	485	7.16	6.22	6.84	6.91	9.34
Communications	795	202	266	7.74	6.61	3.75	6.18	4.30
Health Sciences	419	130	346	4.08	4.25	4.88	4.38	6.59
Visual/Performing Arts	479	101	285	4.66	3.30	4.02	4.24	3.87
Life Sciences	193	101	340	1.88	3.30	4.79	3.10	3.93
Psychology	269	76	248	2.62	2.49	3.50	2.90	4.06
Computer/Information Sciences	363	163	0	3.53	5.33	.00	2.58	3.97
Letters	149	102	235	1.45	3.34	3.31	2.38	3.48
Multi/Interdisciplinary	13	138	305	.13	4.51	4.30	2.23	1.61
Engineering/Related Technologi	346	99	0	3.37	3.24	.00	2.18	1.93
Architecture/Environ Design	235	0	184	2.29	.00	2.59	2.05	.95
Physical Sciences	108	124	174	1.05	4.06	2.45	1.99	2.42
Home Economics	217	54	106	2.11	1.77	1.49	1.85	1.59
Protective Services	232	87	35	2.26	2.85	.49	1.73	1.28
Foreign Languages	143	11	141	1.39	.36	1.99	1.44	1.02
Allied Health	42	119	78	.41	3.89	1.10	1.17	.00
Agricultural Sciences	0	0	167	.00	.00	2.35	.82	.00
Voc Home Economics	0	37	121	.00	1.21	1.71	.77	.00
Mathematics	40	47	45	.39	1.54	.63	.65	1.55
Public Affairs	98	13	20	.95	.43	.28	.64	1.41
Parks and Recreation	71	51	4	.69	1.67	.06	.62	.47
Renewable Natural Resources	32	60	21	.31	1.96	.30	.55	.00
Industrial Arts	105	0	0	1.02	.00	.00	.51	.00
Agribusiness/Agri Production	64	0	22	.62	.00	.31	.42	1.85
Philosophy and Religion	20	5	35	.19	.16	.49	.29	.65
Area and Ethnic Studies	0	0	53	.00	.00	.75	.26	.29
Business and Office	34	0	0	.33	.00	.00	.17	.00
Total (2-yr of Bachelor Degree	10276	3057	7092	100.00	100.00	100.00	100.00	

National is FY 85 (some categories combined).
Source: UA Department of Education, Arizona Board of Regents.

Table A3. Distribution of Master's Degrees: All Universities

Category	Total of FY 86 and FY 87 Masters ASU #	NAU #	UA #	ASU %	NAU %	UA %	Total %	National %
Education	523	448	654	22.03	60.38	25.31	28.51	26.60
Business and Management	425	57	255	17.90	7.68	9.87	12.93	23.59
Engineering	268	0	345	11.29	.00	13.35	10.75	7.31
Health Sciences	232	22	128	9.77	2.96	4.95	6.70	6.07
Visual/Performing Arts	166	33	96	6.99	4.45	3.72	5.18	3.04
Physical Sciences	34	30	203	1.43	4.04	7.86	4.68	2.02
Letters	76	45	102	3.20	6.06	3.95	3.91	2.07
Public Affairs	194	8	15	8.17	1.08	.58	3.81	5.61
Social Sciences	69	40	107	2.91	5.39	4.14	3.79	3.63
Life Sciences	23	25	99	.97	3.37	3.83	2.58	1.77
Library	3	0	126	.13	.00	5.31	2.26	1.36
Computer/Information Sciences	69	0	55	2.91	.00	2.13	2.18	2.48
Agricultural Sciences	0	0	86	.00	.00	3.33	1.51	1.37
Architecture/Environ Design	55	0	26	2.32	.00	1.01	1.42	1.14
Communications	28	0	41	1.18	.00	1.59	1.21	1.28
Engineering/Related Technologies	55	0	0	2.32	.00	.00	.96	.22
Foreign Languages	17	0	36	.72	.00	1.39	.93	.60
Home Economics	11	0	41	.46	.00	1.59	.91	.83
Psychology	25	7	18	1.05	.94	.70	.88	2.94
Renewable Natural Resources	12	4	24	.51	.54	.93	.70	.00
Mathematics	4	14	22	.17	1.89	.85	.70	1.01
Allied Health	0	0	38	.00	.00	1.47	.67	.00
Agribusiness/Agri Production	11	0	24	.46	.00	.93	.61	.00
Area and Ethnic Studies	0	0	29	.00	.00	1.12	.51	.31
Multi/Interdisciplinary	27	0	2	1.14	.00	.08	.51	1.11
Communications Tech	26	0	0	1.10	.00	.00	.46	.07
Protective Services	15	9	0	.63	1.21	.00	.42	.43
Philosophy and Religion	1	0	12	.04	.00	.46	.23	.41
Parks and Recreation	5	0	0	.21	.00	.00	.09	.19
Business and Office	0	0	0	.00	.00	.00	.00	.00
Voc Home Economics		0	0	.00	.00	.00	.00	.00
Industrial Arts		0	0	.00	.00	.00	.00	.00
Total (2-yr of Master's Degrees)	2374	742	2584	100.00	100.00	100.43	100.00	

National FY 85; some categories combined
Source: US Department of Education, Arizona Board of Regents

Table A4. Distribution of Doctoral Degrees: All Universities

Category	Total of FY 86 and FY 87 Doctor ASU #	NAU #	UA #	ASU %	NAU %	UA %	Total %	National %
Education	109	85	91	40.37	82.52	16.37	30.68	21.71
Physical Sciences	14	0	96	5.19	.00	17.27	11.84	10.33
Life Sciences	11	10	72	4.07	9.71	12.95	10.01	10.42
Engineering	28	0	44	10.37	.00	7.91	7.75	9.78
Social Sciences	29	8	28	10.74	7.77	5.04	7.00	8.66
Business and Management	31	0	16	11.48	.00	2.88	5.06	2.63
Health Sciences	0	0	46	.00	.00	8.27	4.95	3.64
Agricultural Sciences	0	0	37	.00	.00	6.65	3.98	3.68
Psychology	15	0	22	5.56	.00	3.96	3.98	8.83
Letters	10	0	18	3.70	.00	3.24	3.01	5.76
Visual/Performing Arts	10	0	17	3.70	.00	3.06	2.91	2.10
Mathematics	0	0	16	.00	.00	2.88	1.72	2.12
Renewable Natural Resources	0	0	15	.00	.00	2.70	1.61	.00
Multi/Interdisciplinary	0	0	14	.00	.00	2.52	1.51	.87
Public Affairs	7	0	0	2.59	.00	.00	.75	1.31
Communications Tech	5	0	0	1.85	.00	.00	.69	.02
Allied Health	0	0	6	.00	.00	1.08	.65	.00
Area and Ethnic Studies	0	0	5	.00	.00	.90	.54	.42
Foreign Languages	1	0	4	.37	.00	.72	.54	1.33
Philosophy and Religion	0	0	5	.00	.00	.90	.54	1.42
Communications	0	0	2	.00	.00	.36	.22	.69
Computer/Information Sciences	0	0	2	.00	.00	.36	.22	.75
Agribusiness/Agri Production	0	0	0	.00	.00	.00	.00	.00
Architecture/Environ Design	0	0	0	.00	.00	.00	.00	.27
Business and Office	0	0	0	.00	.00	.00	.00	.00
Engineering/Related Technologies	0	0	0	.00	.00	.00	.00	.00
Home Economics	0	0	0	.00	.00	.00	.00	.84
Voc Home Economics	0	0	0	.00	.00	.00	.00	.00
Industrial Arts	0	0	0	.00	.00	.00	.00	.00
Library Science	0	0	0	.00	.00	.00	.00	.26
Parks and Recreation	0	0	0	.00	.00	.00	.00	.11
Protective Services	0	0	0	.00	.00	.00	.00	.10
Total (2-yr of Doctoral Degrees)	270	103	556	100.00	100.00	100.00	100.15	

National FY 85; some categories combined

Source: US Department of Education, Arizona Board of Regents

ENDNOTES

1. See the working paper on "Enrollment at Arizona Universities: Forecasts to the Year 2000" for a detailed discussion of likely future enrollment trends.

2. This S shaped curve actually becomes a series of curves, each beginning new as a previous level becomes mature. It can be thought of as a "staircase" where there is change, then stability, followed by change.

3. Some of the data presented here gives the appearance of wide swings from year to year. There was no attempt to identify reasons for these variations, but they reflect in part the variation in some definitions or reporting procedures of the individual universities. All enrollment data was derived from the Board of Regents audited figures, not the original university submissions.

4. HEGIS is the Higher Education General Information System.

5. For a complete review of state budget trends, see the Working Paper on "The Arizona Universities: A 25 Year State Funding , Productivity, and Performance Outputs History."

6. For a detailed discussion of this area see the Task Force Working Paper "Nine Year History of Program Changes".