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ABSTRACT

In its phase one report, MGT of America, Inc., a management research and consulting firm, recommended several improvements in the funding model used by the North Carolina State Board of Community Colleges. In addition to an overall call for a simplified approach to presenting the financial needs of the 58 colleges, the report identified several aspects of the current funding model that required further review, two of which were the sliding scale for curriculum instruction (SSCI) and the base staffing/base funding provision for instructional and administrative support (BSBF). Each issue attempts to address the concept of "economy of scale," a business term that, when applied to higher education, implies that per-student cost is expected to be lower at a larger college than at a smaller college. The existence of this economy of scale phenomenon presents a special challenge to the NCCCS. The state operates an unusually high proportion of colleges in the smaller enrollment categories--29% of the state's community colleges enroll fewer than 1,000 full-time equivalent students, compared with only 21% regionally, and 15% nationally. This report describes the current funding formula for SSCI and BSBF, discussing their rationale, fiscal impact, evidence of economy of scale in other states, trends, and recommendations. The report ends with a "Next Steps" section, which outlines general areas for further review. Appended are selected excerpts from the MGT report. (EMH)

ECONOMY OF SCALE SUPPLEMENTAL REPORT:

ASSESSMENT OF THE FUNDING FORMULA USED BY THE NORTH CAROLINA COMMUNITY COLLEGE SYSTEM

SUBMITTED TO:

STATE BOARD OF COMMUNITY COLLEGES
200 WEST JONES STREET
RALEIGH, NORTH CAROLINA 27603

SUBMITTED BY:

MGT OF AMERICA, INC.
2425 TORREYA DRIVE
TALLAHASSEE, FLORIDA 32303

APRIL 18, 1997

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1.0 BACKGROUND

1.0 BACKGROUND

In its phase one report entitled "Assessment of the Funding Formula Used by the North Carolina Community College System," MGT recommended several improvements in the funding model used by the State Board of Community Colleges. In addition to an overall call for a simplified approach to presenting the financial needs of the 58 colleges, the report recommended parity in funding for occupational extension instruction and basic skills/literacy instruction with curriculum instruction programs. Appendix A contains a summary of those recommendations that were approved by the State Board of Community Colleges on January 17, 1997, for immediate implementation.

The MGT report also identified several aspects of the current funding model that required further review. The two issues that perhaps had the highest priority for immediate attention were:

- the sliding scale for curriculum instruction
- the base staffing / base funding provision for instructional and administrative support.

Each of these features of the current funding formula attempted to address in its own way the concept of "economy of scale."

1.1 Economy of Scale

The concept of economy of scale refers to the phenomenon whereby the unit cost of producing a good or service decreases as the number of units produced (i.e., the scale of the operation) increases. This relationship has been established over the years in a variety of private- and public-sector settings. As applied to higher education, the economy of scale concept implies that the per-student cost would be expected to be lower at a larger college than at a smaller college.

In 1986, Brinkman and Leslie ("Economies of Scale in Higher Education: Sixty Years of Research," *The Review of Higher Education*, vol. 10, no. 1) reported on their summary analysis of numerous articles related to economy of scale for colleges and universities. They found that the authors of the other studies "seem to agree that the largest portion of any size-related economies of E&G expenditures at two-year colleges is typically realized by the time institutional enrollment is in the range of 1,000 to 1,500 FTE students" (p.13). After finding that the data for institutions with larger enrollments was inconclusive, Brinkman and Leslie conclude that "(o)nly small institutions seem to need to be concerned with possible effects of overall institutional effects of size on per-student costs" (p. 23).

The existence of the economy of scale phenomenon presents a special challenge to the North Carolina Community College System. As noted in our Phase 1 report, the State operates an unusually high proportion of colleges in the smaller enrollment categories. Exhibit 1-1 shows that 29 percent of the State's community colleges enroll fewer than 1,000 full-time-equivalent (FTE) students, compared to only 21 percent regionally, and 15 percent nationally.

EXHIBIT 1-1
COUNT OF TWO YEAR PUBLIC INSTITUTIONS BY FTE RANGE
NORTH CAROLINA, SREB, AND U.S.

FTE Range	North Carolina			SREB excl. NC			US excl. NC		
	Count	% of Total	Cum. %	Count	% of Total	Cum. %	Count	% of Total	Cum. %
- - 500	2	3.4%	3.4%	17	5.2%	5.2%	29	3.7%	3.7%
501 - 600	3	5.2%	8.6%	6	1.8%	7.1%	9	1.2%	4.9%
601 - 700	2	3.4%	12.1%	13	4.0%	11.0%	20	2.6%	7.5%
701 - 800	4	6.9%	19.0%	9	2.8%	13.8%	20	2.6%	10.1%
801 - 900	0	0.0%	19.0%	12	3.7%	17.5%	18	2.3%	12.4%
901 - 1,000	6	10.3%	29.3%	10	3.1%	20.6%	22	2.8%	15.2%
1,001 - 1,100	3	5.2%	34.5%	10	3.1%	23.6%	15	1.9%	17.1%
1,101 - 1,200	6	10.3%	44.8%	10	3.1%	26.7%	17	2.2%	19.3%
1,201 - 1,300	1	1.7%	46.6%	11	3.4%	30.1%	22	2.8%	22.2%
1,301 - 1,400	2	3.4%	50.0%	10	3.1%	33.1%	20	2.6%	24.7%
1,401 - 1,500	2	3.4%	53.4%	11	3.4%	36.5%	19	2.4%	27.2%
1,501 - 1,750	6	10.3%	63.8%	20	6.1%	42.6%	47	6.1%	33.2%
1,751 - 2,000	3	5.2%	69.0%	27	8.3%	50.9%	57	7.3%	40.6%
2,001 - 2,250	5	8.6%	77.6%	23	7.1%	58.0%	48	6.2%	46.8%
2,251 - 2,500	3	5.2%	82.8%	18	5.5%	63.5%	38	4.9%	51.7%
2,501 - 2,750	1	1.7%	84.5%	7	2.1%	65.6%	29	3.7%	55.4%
2,751 - 3,000	2	3.4%	87.9%	8	2.5%	68.1%	24	3.1%	58.5%
3,001 - 5,000	5	8.6%	96.6%	47	14.4%	82.5%	148	19.1%	77.6%
> 5,000	2	3.4%	100.0%	57	17.5%	100.0%	174	22.4%	100.0%
Total	**58**	**100.0%**		**326**	**100.0%**		**776**	**100.0%**	

Note: Does not include Kentucky 2-year public institutions - data not available.
Source: NCES 1994-95 IPEDS.

1.2 Approach for Consideration of Economy of Scale

As it reviewed the issues related to recognition of economy of scale in the funding formulas used by the North Carolina Community College System (NCCCS), the consulting team and the Funding Study Advisory Committee discussed five sets of questions in sequential order. The questions, and the consensus response to each, are listed below.

1. Does the economy of scale phenomenon occur in community colleges within the enrollment range found in the NCCCS? What is acceptable evidence of existence or non-existence (e.g., national averages, detailed analysis of service delivery in selected NCCCS institutions, etc.)?

   Based on our review of the research literature and our examination of more recent expenditure data, we conclude that many colleges in the NCCCS are likely to experience difficulty in achieving economy of scale at their current enrollment levels.

2. If economy of scale exists in the NCCCS, should it be the policy of the State to provide recognition of lack of economy of scale in its funding model? What is the rationale?

   The State has a long-standing policy to provide convenient geographic access for its citizens to community college programs. Although some have questioned the need for 58 colleges from time to time, the State's access policy has always been reaffirmed. Therefore, this funding study accepts as a "given" that all 58 colleges will continue to exist. Since the smaller colleges do not enjoy the benefits of economy of scale, the constituents of these colleges are at risk of reduced and/or lower quality programming unless the formula provides appropriate recognition.

3. If economy of scale exists and is to be recognized, does it occur in the instructional area, the support area, or both? Should it be recognized in each place it occurs or in a single, composite calculation?

   Our analyses confirm the findings in the research literature that economy of scale exists in both the instructional and support areas, although its impact is much greater in the support area.

4. If economy of scale exists and is to be recognized, what is an appropriate range of supplemental funding amounts? What is acceptable evidence that the amounts are appropriate?

   Our analyses focused on current expenditure patterns in the national population of community colleges to provide the basis for determining the amount of supplemental funding that may be needed.

5. Once a decision has been made to provide funding for lack of economy of scale and the general range of dollar amounts is known, what is the best formula format to use?

   The response to this question will be guided by the overall goal of achieving as simple a formula presentation as possible.

The remaining two sections of this supplemental report will focus first on provisions for recognizing economy of scale in the instruction area, and then will consider support programs.

2.0 SLIDING SCALE TREATMENT FOR INSTRUCTION

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2.1 Description of Current Formula for Curriculum Instruction

The current formula for curriculum instruction is based on the construct of the "instructional unit." Although in many ways an instructional unit is essentially the same as a regular teaching position, resources available for instructional units can also be used for part-time and temporary personnel as well as for other purposes. The four major steps in the curriculum instruction formula are as follows:

1. determination of the number of budgeted FTE students,
2. derivation of the number of instructional units by dividing the count of budgeted FTE students by a sliding scale of student:faculty ratios,
3. calculation of instructional personnel dollars required by multiplying the appropriated unit value times the number of instructional units, and
4. calculation of other cost (classroom support) dollars required by multiplying the count of budgeted FTE students times the appropriated other cost rate.

The rates used in the System's 1996-97 appropriation for curriculum instruction are shown in Exhibit 2-1.

2.2 Rationale for Current Treatment

The sliding scale of student:faculty ratios was first implemented with the 1995-96 allocation. The sliding scale has its origin in a 1994-95 program cost study, and the several tiers of student:faculty ratios were intended to recognize the smaller class sizes that are required by all colleges to offer certain instructional programs. The conclusion from that study, in effect, was that smaller colleges were forced to operate a higher proportion of their classes with smaller classes due to an insufficient number of students to permit large class sections.

EXHIBIT 2-1
DESIGN OF THE FUNDING MODEL FOR
CURRICULUM INSTRUCTIONAL PROGRAMS
1996-97

■ Instructional Units (Sliding Scale Factor)	
One Unit per 17 FTE Students for First 250 Students One Unit per 18 FTE Students for Next 125 Students One Unit per 19.5 FTE Students for Next 125 Students One Unit per 21.55 FTE Students in Excess of 500 Students	
■ Appropriated Value of Instructional Unit	$40,119
■ Employee Benefits	
Based on Appropriated Levels	
Social Security/Retirement	18.48%
Hospitalization (per position)	$1,735
■ Other Costs	
Rate Per Curriculum FTE Student Based on Appropriated Enrollment Levels	$105

It is important to note that the sliding scale recommendation from the 1994-95 study has yet to be fully implemented. As originally envisioned, the student:faculty ratios were to be as follows:

FTE Enrollment Range	Student: Faculty Ratio
0-1,000	17:1
1,001-1,500	18:1
1,501-2,000	19.5:1
Above 2,000	21:1

Had these ratios been funded, a larger proportion of students in the middle- and larger-sized colleges would have been funded for smaller class sizes.

2.3 *Fiscal Impact of Sliding Scale*

Although much of the discussion concerning the sliding scale and its impact has been expressed in terms of how much it has "cost" the large institutions, the implementation of the lower student:faculty ratios was funded with an additional

appropriation to the System for this specific purpose. Since the staffing ratio for the highest size category (now at 21.55:1) is lower than the previous uniform ratio for all size categories (then at 21.6:1), each college actually experienced an increase in funding from the adoption of the sliding scale. It is unclear whether these new monies would have been appropriated to the System without the recommendation for the sliding scale.

The debate, then, really concerns the equity of how the new monies for lower student:faculty ratios are allocated. As shown in Exhibit 2-2, a relatively small proportion of total instructional dollars are shifted from one institution to another due to the sliding scale. Generally, the shifts permit a significant increase in the budgets of the smallest colleges, with the colleges that have enrollments greater than 2,000 FTE forfeiting only 1-2 percent of their potential allocations for curriculum instruction. Overall, 21 large colleges shift just under $3.5 million to the smaller schools through the sliding scale.

2.4 Evidence of Economy of Scale in Other States

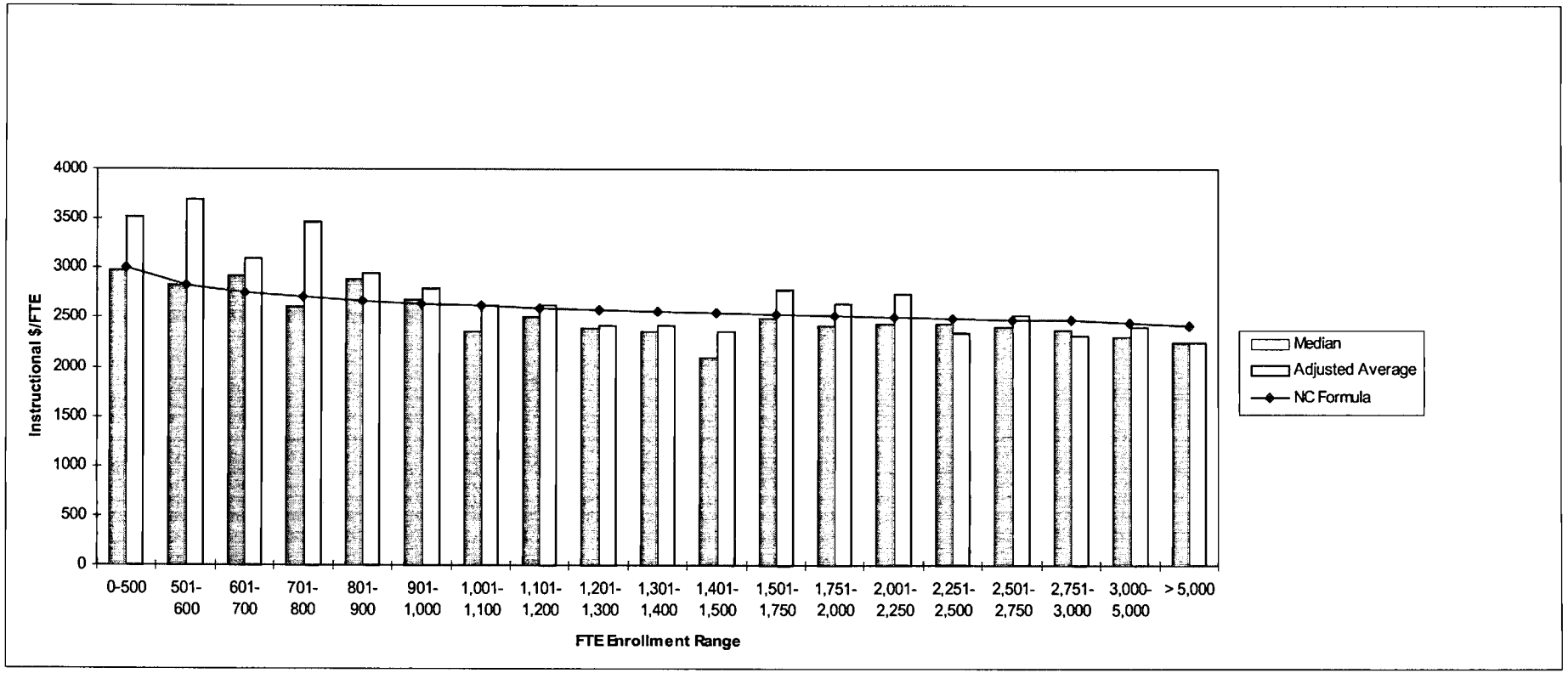
In an effort to determine whether the differences in funding rates for small and large colleges is appropriate, we examined per-student instructional costs in other states. Given the results of 60 years of research described above, the not-surprising finding is that expenditures per student in 1994-95 decreased as the size of the college increased. The findings from this analysis of approximately 800 colleges in the other 49 states is shown graphically in Exhibit 2-3.

EXHIBIT 2-2
ANALYSIS OF FISCAL IMPACT OF SLIDING SCALE FOR CURRICULUM INSTRUCTION PROGRAMS

College	Instruction $			
	Budgeted Curriculum FTE	Current "Sliding Scale" Budget	Equal Rate per Curriculum FTE	Amount Shifted
Pamlico CC	148	444,173	375,198	68,975
Tri-County CC	553	1,560,745	1,393,233	167,512
Montgomery CC	568	1,596,808	1,429,296	167,512
Mayland CC	622	1,725,648	1,567,990	157,658
Bladen CC	644	1,777,226	1,624,495	152,731
Martin CC	652	1,797,774	1,645,042	152,731
Brunswick CC	676	1,854,489	1,701,757	152,731
McDowell TCC	712	1,942,024	1,794,220	147,805
Roanoke-Chowan CC	738	2,003,876	1,860,999	142,878
Anson CC	822	2,204,842	2,071,818	133,024
Sampson CC	882	2,349,093	2,220,996	128,097
James Sprunt CC	918	2,436,629	2,313,459	123,170
Richmond CC	933	2,472,692	2,349,521	123,170
Piedmont CC	936	2,477,934	2,359,690	118,244
Wilson TCC	975	2,570,711	2,457,395	113,317
Beaufort County CC	1,049	2,745,993	2,642,530	103,463
Cleveland CC	1,058	2,771,572	2,668,109	103,463
Blue Ridge CC	1,109	2,890,244	2,796,635	93,610
Randolph CC	1,118	2,910,896	2,817,287	93,610
Mitchell CC	1,124	2,926,307	2,832,697	93,610
Carteret CC	1,141	2,967,506	2,873,897	93,610
Nash CC	1,173	3,044,769	2,956,086	88,683
Haywood CC	1,212	3,137,546	3,053,791	83,756
Stanly CC	1,233	3,189,020	3,105,264	83,756
Halifax CC	1,238	3,199,398	3,120,569	78,829
Isothermal CC	1,256	3,240,703	3,166,801	73,902
Southwestern CC	1,280	3,302,345	3,223,516	78,829
Robeson CC	1,289	3,322,997	3,249,095	73,902
Wilkes CC	1,380	3,539,478	3,480,357	59,122
College of Albemarle	1,401	3,590,952	3,531,830	59,122
Edgecombe CC	1,413	3,616,846	3,562,651	54,195
Rockingham CC	1,452	3,709,623	3,660,355	49,268
Southeastern CC	1,573	4,003,157	3,963,743	39,415
Western Piedmont CC	1,678	4,250,669	4,230,962	19,707
Lenoir CC	1,771	4,472,288	4,462,434	9,854
Davidson County CC	1,802	4,549,445	4,539,591	9,854
Craven CC	1,841	4,642,223	4,642,223	-
Caldwell CC & TI	2,013	5,054,428	5,074,135	(19,707)
Vance-Granville CC	2,098	5,255,499	5,289,987	(34,488)
Surry CC	2,128	5,327,625	5,362,112	(34,488)
Wayne CC	2,160	5,404,887	5,444,301	(39,415)
Rowan-Cabarrus CC	2,185	5,466,634	5,506,048	(39,415)
Alamance CC	2,236	5,585,306	5,634,574	(49,268)
Sandhills CC	2,345	5,848,018	5,912,067	(64,049)
Catawba Valley College	2,399	5,976,859	6,045,834	(68,975)
Johnston CC	2,414	6,012,922	6,081,897	(68,975)
Central Carolina CC	2,429	6,048,984	6,122,887	(73,902)
Cape Fear CC	2,644	6,564,241	6,662,778	(98,536)
Asheville-Buncombe TCC	2,753	6,822,027	6,940,271	(118,244)
Durham TCC	2,756	6,827,269	6,945,513	(118,244)
Coastal Carolina CC	2,848	7,048,782	7,176,879	(128,097)
Pitt CC	2,966	7,332,147	7,475,025	(142,878)
Forsyth TCC	3,121	7,703,153	7,865,738	(162,585)
Gaston College	3,133	7,729,047	7,896,559	(167,512)
Wake CC	4,398	10,753,915	11,084,012	(330,097)
Guilford TCC	4,813	11,748,366	12,127,731	(379,365)
Fayetteville TCC	5,396	13,144,749	13,598,017	(453,267)
Central Piedmont CC	8,857	21,420,626	22,322,234	(901,608)
Total	**106,462**	**268,314,127**	**268,314,127**	**0**

NOTE: Equal Rate simulations use the system average rate per FTE.

EXHIBIT 2-3
INSTRUCTIONAL EXPENDITURES PER FTE STUDENT BASED ON FTE ENROLLMENT RANGES
MEDIAN, AVERAGE, AND NC FORMULA



Note: Does not Include North Carolina or Kentucky 2 year public schools (data not available for Kentucky).
Adjusted Average corrects for observations in national population with erroneous data.
NC Formula is based on midpoint of range, 7,500 was used for > 5,000 range.
Source: NCES 1994-95 IPEDS.

For each of the 19 college enrollment size categories shown, the instructional expenditures per FTE student in other states is shown in two ways:

- the *median* expenditure per FTE student, where the middle value for all colleges in the size category is shown, and
- the *adjusted average* expenditure per FTE student, where data that is clearly outside a reasonable range (e.g., $3 million per student) was excluded before calculating the average.

Under both methods, a clear downward trend in expenditures per student can be seen as enrollment levels increase.

Superimposed on the bar chart is the plot of a line that represents the treatment in the NCCCS under the current sliding scale formula. The current formula, even though only partially implemented, already appears to recognize economy of scale at about the same rate as the national expenditure data.

2.5 Evidence of Economy of Scale in North Carolina Community Colleges

As stated above, part of the original justification for the sliding scale treatment in the current formula was the belief that certain programs need to be delivered with lower student:faculty ratios than other programs. A further component of this proposition was that nearly all of the programs at the smaller colleges required lower student:faculty ratios due to the lack of students to make up larger classes. To examine the relative degree to which small class size is attributable to the characteristics of some disciplines that may require one-on-one instruction as opposed to institutional size, we examined the variations in average class size for several popular disciplines by college enrollment.

As shown in Exhibits 2-4a through 2-4j, the average class size increases as the size of the college increases for each of the nine selected disciplines as well as for the all discipline average. The slopes of the regression lines are relatively modest for certain technical fields, and much steeper for arts and sciences programs. These

graphs give credence to the propositions on which the sliding scale was based -- namely, that some disciplines require small class sizes regardless of overall enrollment levels at the host institution, while large colleges can realize economy of scale in certain other disciplines.

EXHIBIT 2-4A
AVERAGE CLASS SIZE BY INSTITUTIONAL SIZE

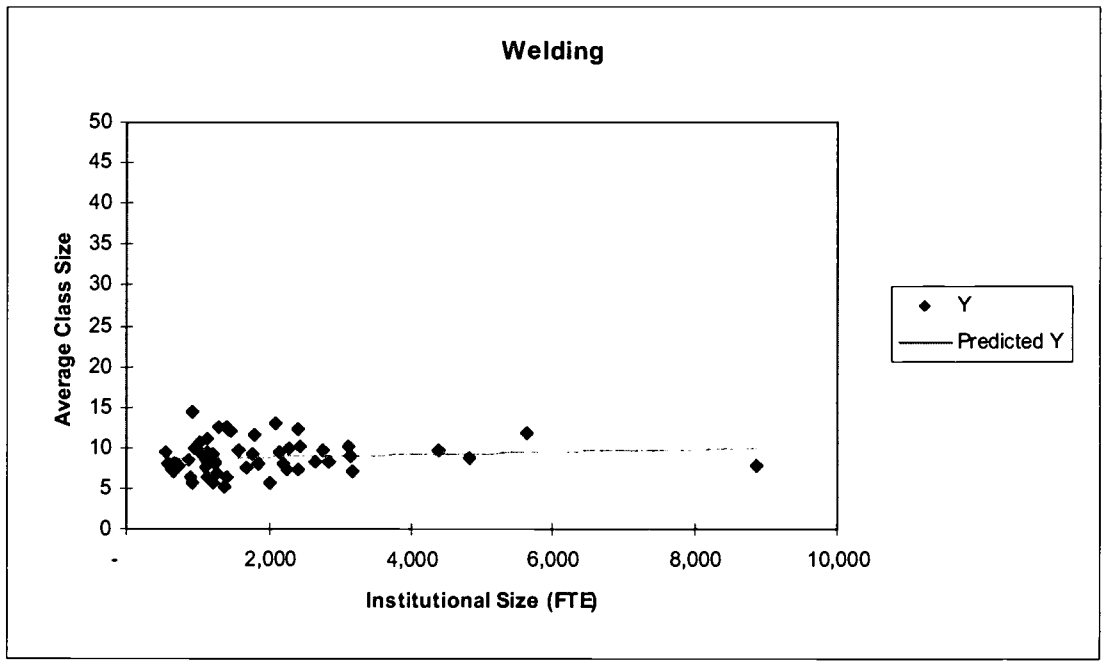


EXHIBIT 2-4B
AVERAGE CLASS SIZE BY INSTITUTIONAL SIZE

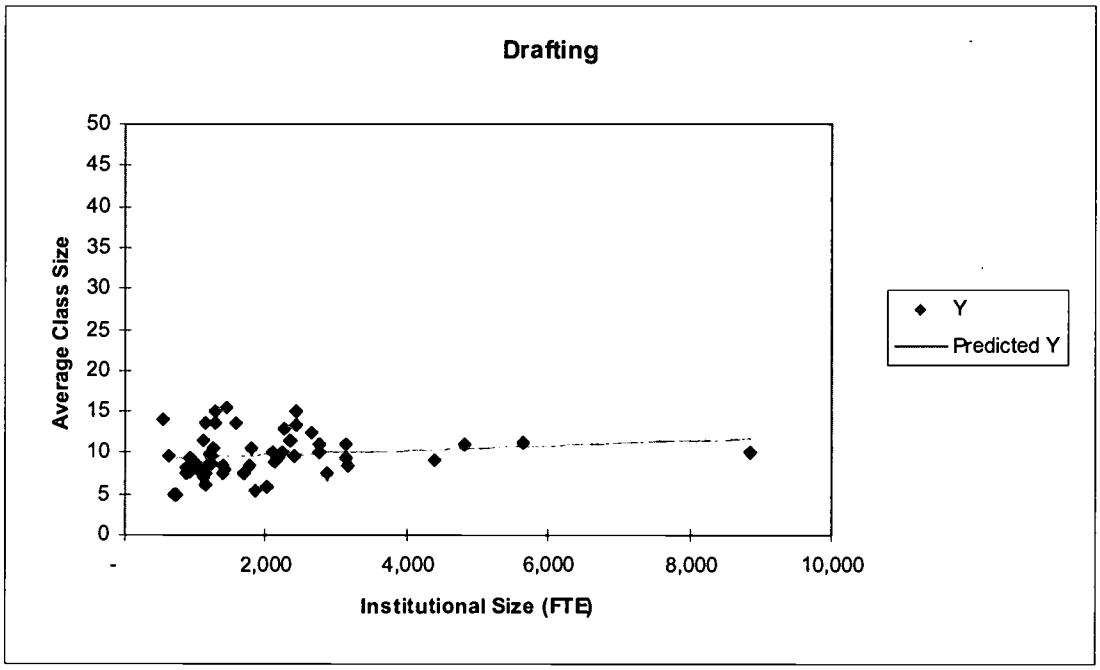


EXHIBIT 2-4C
AVERAGE CLASS SIZE BY INSTITUTIONAL SIZE

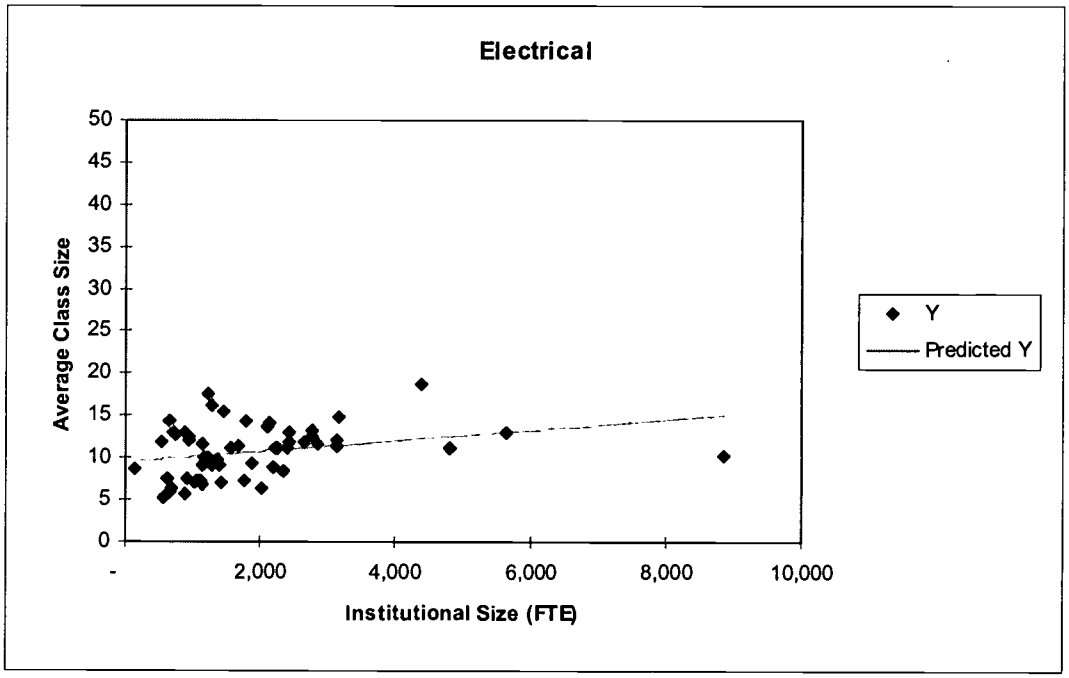


EXHIBIT 2-4D
AVERAGE CLASS SIZE BY INSTITUTIONAL SIZE

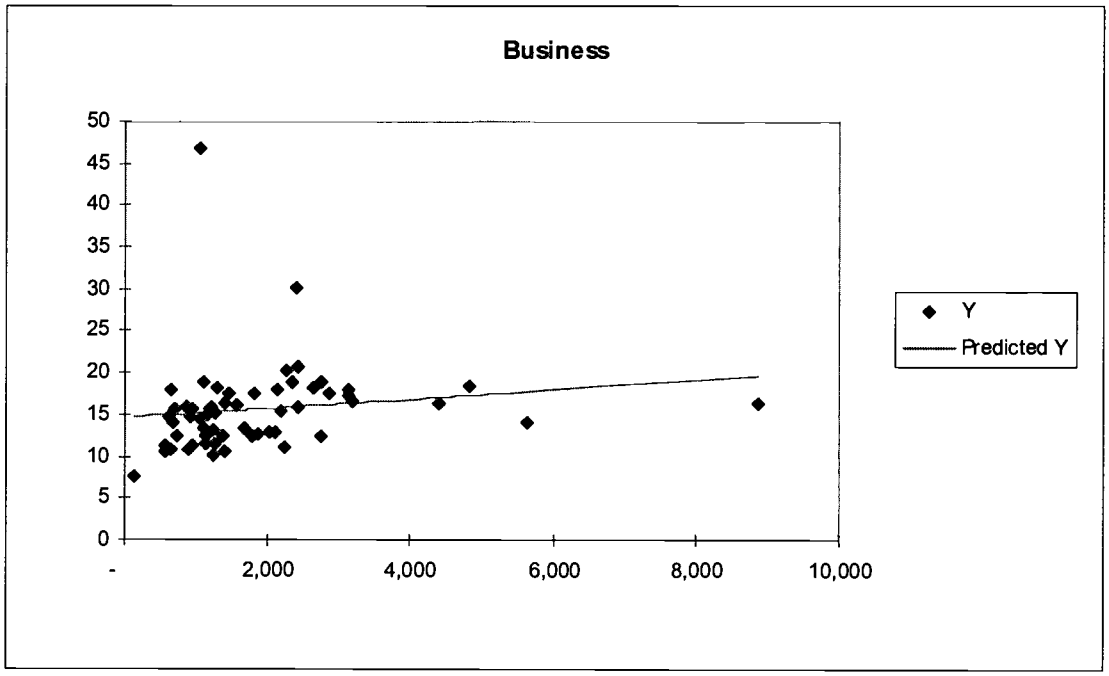


EXHIBIT 2-4E
AVERAGE CLASS SIZE BY INSTITUTIONAL SIZE

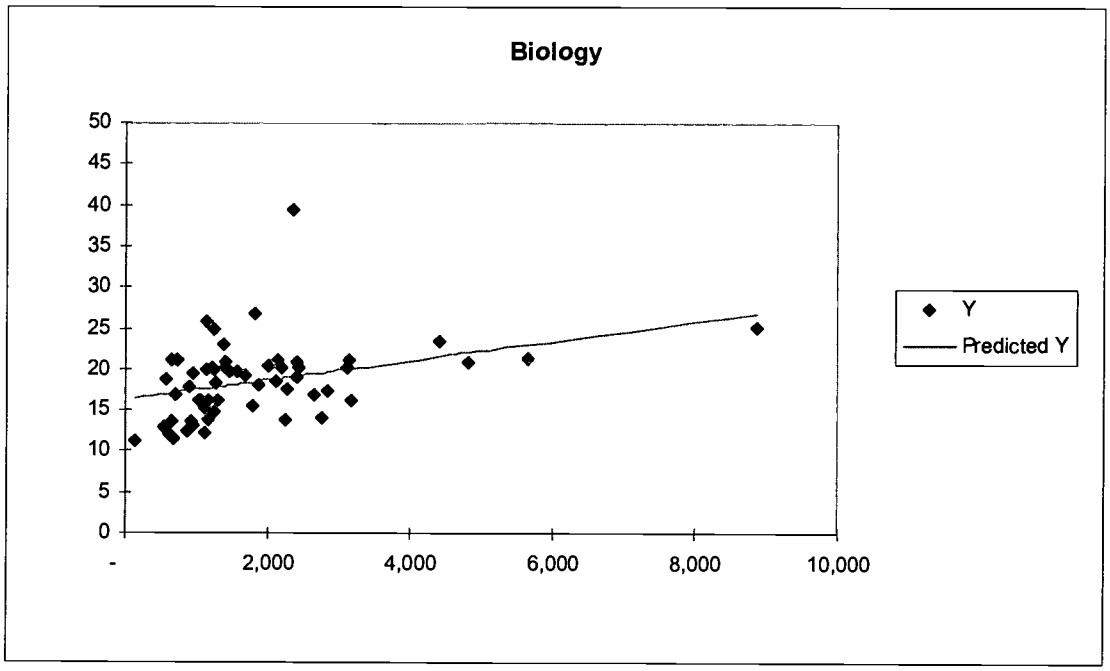


EXHIBIT 2-4F
AVERAGE CLASS SIZE BY INSTITUTIONAL SIZE

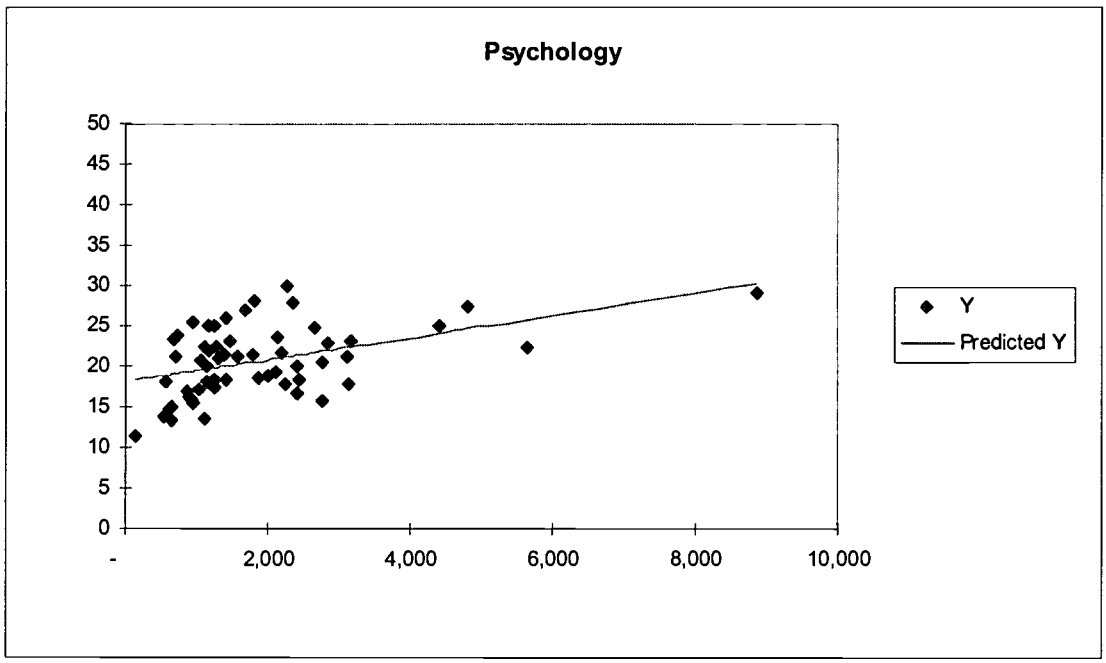


EXHIBIT 2-4G
AVERAGE CLASS SIZE BY INSTITUTIONAL SIZE

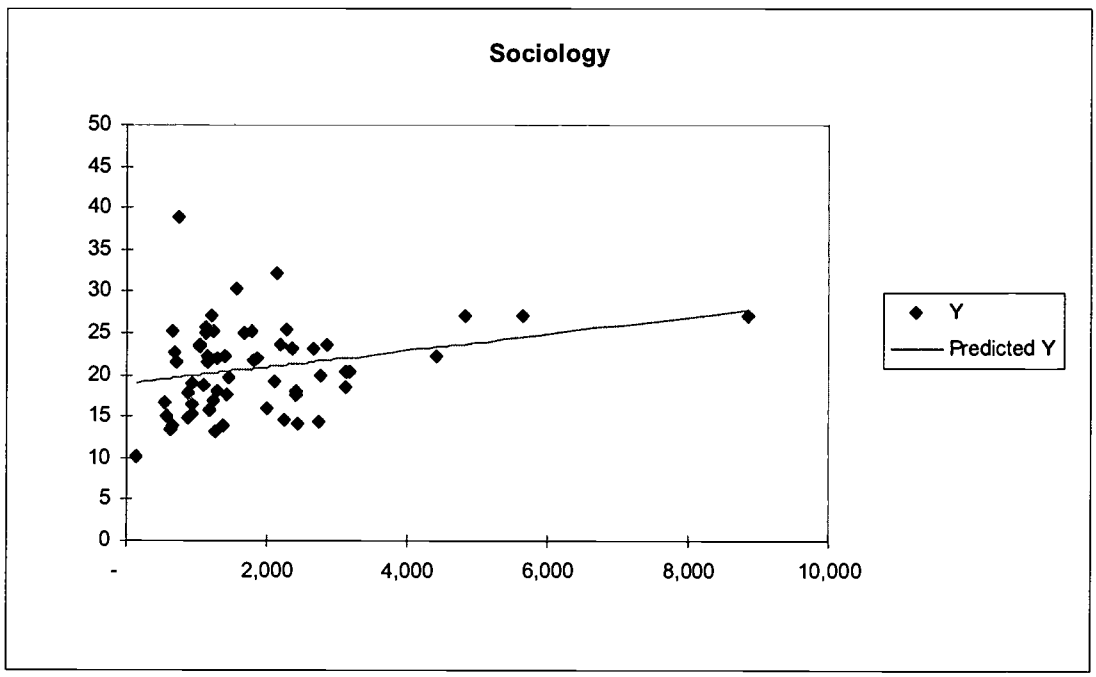


EXHIBIT 2-4H
AVERAGE CLASS SIZE BY INSTITUTIONAL SIZE

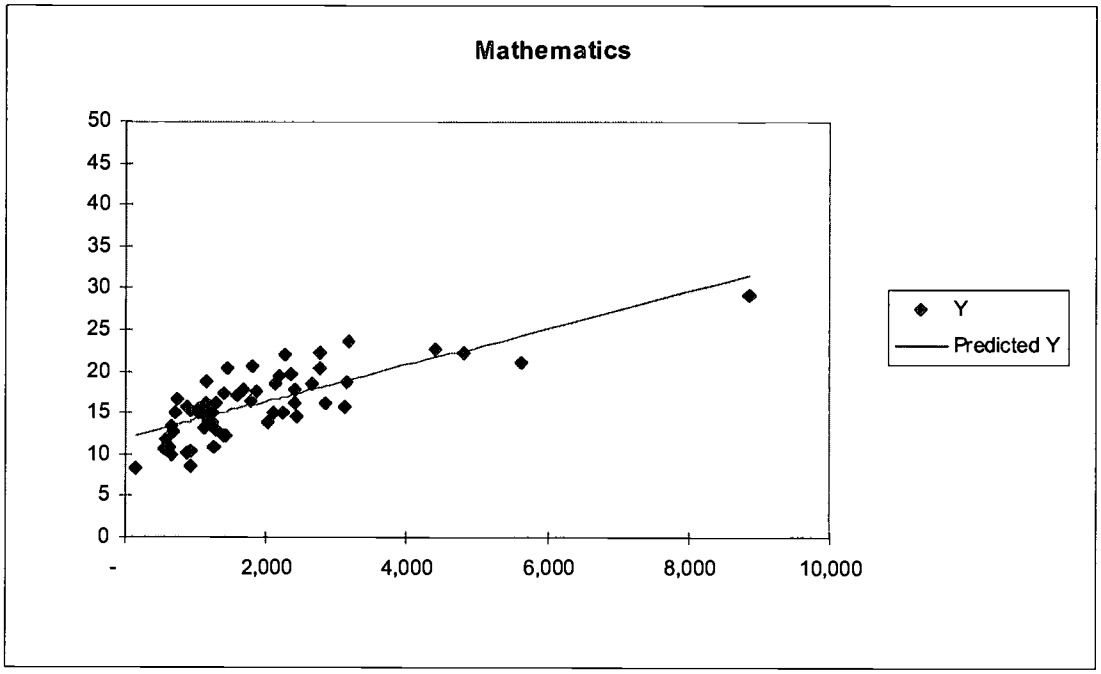


EXHIBIT 2-4I
AVERAGE CLASS SIZE BY INSTITUTIONAL SIZE

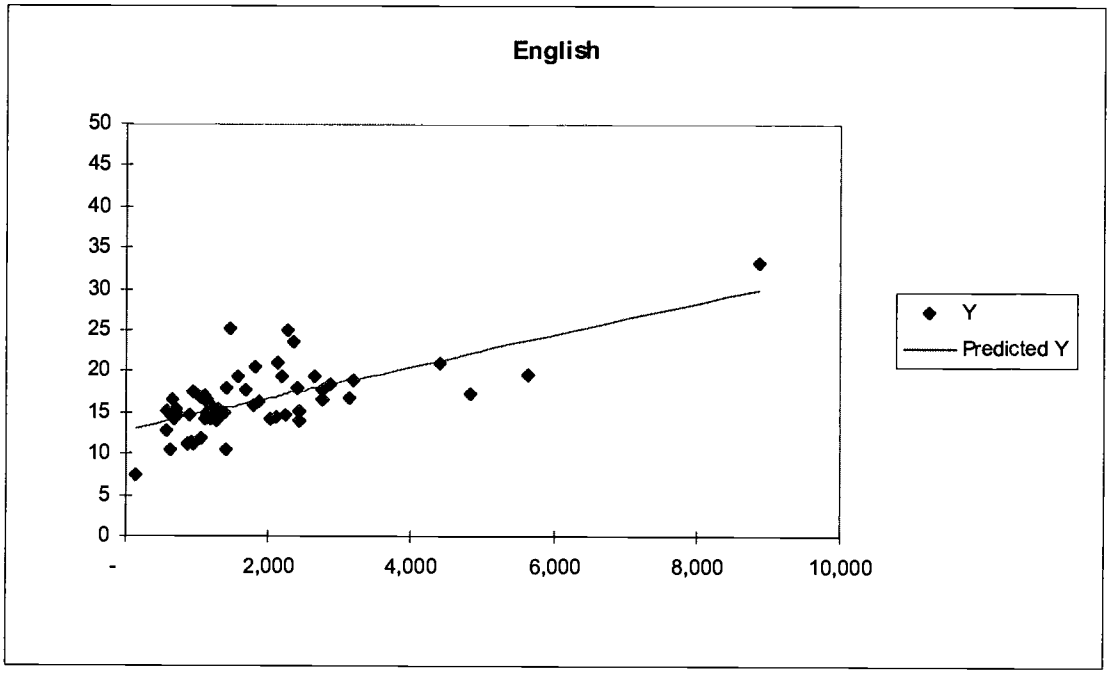
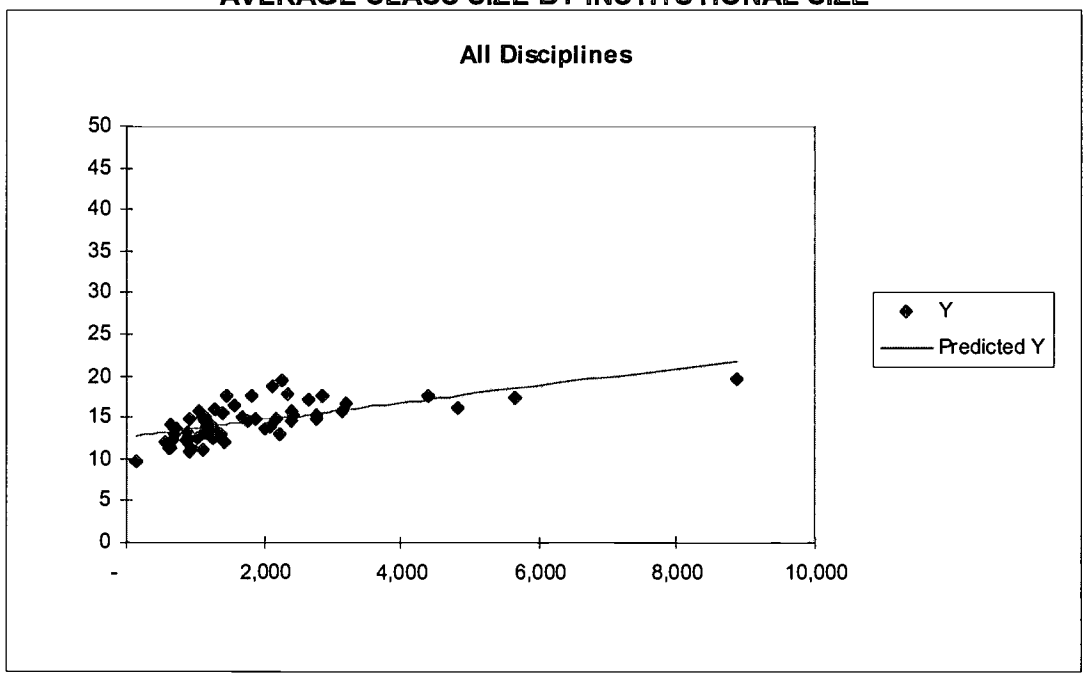


EXHIBIT 2-4J
AVERAGE CLASS SIZE BY INSTITUTIONAL SIZE



2.6 Recommendations

Based on the analyses above, we support the continued use of the current sliding scale of student:faculty ratios for curriculum instruction programs. The economy of scale concept -- which is operationalized by the sliding scale of student:faculty ratios -- is supported by an extensive body of research literature, our analyses of recent national expenditure patterns, and our further analyses of the System's own average class size data. For the same reasons that the sliding scale approach is important for curriculum instruction, we renew our earlier recommendation to extend this approach to the formula for occupational extension.

In our analyses of the sliding scale issue, we noted that the formula appears to be unnecessarily complex through its use of different student:faculty ratios for four different enrollment level categories. Three of the four categories only apply to colleges with

fewer than 500 FTE students, yet just one college currently fails to enroll at least this many students. Since the budget allocation for this smallest college is separately negotiated independent of the formula, the first three steps can be consolidated without mathematical (or fiscal) impact. In order to simplify this aspect of the formula presentation, we recommend that the sliding scale be expressed in two steps as follows:

FTE Enrollment Range	Student: Faculty Ratio
0-500	17.80:1
Above 500	21.55:1

This streamlined two-step calculation will yield the same number of instructional units for each college as the current four-step approach.

3.0 BASE STAFFING/BASE FUNDING FOR INSTRUCTIONAL AND ADMINISTRATIVE SUPPORT

3.0 BASE STAFFING / BASE FUNDING FOR INSTRUCTIONAL AND ADMINISTRATIVE SUPPORT

3.1 Description of Current Formula for Instructional and Administrative Support

The current formula combines a variety of support expenditures under a category known as "instructional and administrative support." Dollars appropriated in this category are used for compensating the president and other campus leaders, counselors, clerical personnel and others.

It is important that this formula component be viewed as more than as a repository for salaries of top college officials. As seen in Exhibit 3-1, only five of the thirty positions funded by the base amount are considered to be "executive management." Nearly two-thirds of these positions are assigned as "instructional support," that is, positions in the library, computing center, student services areas and instructional departments.

EXHIBIT 3-1
DISTRIBUTION OF POSITIONS IN INSTRUCTIONAL AND ADMINISTRATIVE SUPPORT BASE AMOUNT

Position Category	Executive Management	Institutional Support	Instructional Support	Total
Senior Administration	5			5
Supervisor of Programs			2	2
Student Support Services			6	6
General Institution		1	3	4
Technical/Paraprofessional		1	4	5
Clerical		4	4	8
Total	5	6	19	30

The current formulas for this component identify 30 specific positions to be funded at each college and then associate an appropriate salary and benefits rate for each position. Base allowances for "other costs," such as office supplies, printing and distribution of course schedules, etc., are also provided. The formula further includes a

per-student rate for all enrollment in excess of 750 FTE. The rates used in the 1996-97 appropriation are listed in Exhibit 3-2.

EXHIBIT 3-2
COMPONENTS OF THE FUNDING MODEL
FOR SUPPORT PROGRAMS
1996-97

■ President's Allotment	
– Salary based on statewide salary schedule	
– Employee benefits	
Based on appropriated levels	
Social Security/Retirement	18.48%
Hospitalization (per position)	$1,735
■ Administrative and Instructional Support	
– Base allotment per college (based on first 750 FTE)	
* Administrative Support	
◊ Salaries	
Approved positions per college	10 positions
◊ Employee Benefits	
Social Security/Retirement	18.48%
Hospitalization (per position)	$1,735
◊ Other Costs	
Base amount per college	$20,000
* Instructional Support	
◊ Salaries	
Approved positions per college	19 positions
◊ Employee Benefits	
Social Security/Retirement	18.48%
Hospitalization (per position)	$1,735
◊ Other Costs	
Base amount per college	$100,000
– Enrollment allotment per college	
Each FTE in excess of 750 FTE	
Generate additional funds	$889 per FTE

3.2 *Rationale for Current Treatment*

The current formula for instructional and administrative support has been in place since 1994-95, when it replaced a previous formula that shared many of the same

concepts related to economy of scale. The current formula was designed to identify the basic number of positions that would be required to "open the doors" of a college with 750 FTE students in its combined credit and non-credit programs. The 750-student threshold was selected since all but a handful of the colleges at the time had reached this scale of operation.

In a very specific way, the formula recognizes that every college -- regardless of its size -- needs a president, a chief instructional officer, a finance officer, a librarian, a student affairs officer and a small cadre of other staff. The formula further provides resources to employ additional staff to serve the requirements of larger student populations.

Just as with the partially implemented sliding scale for instruction, the base allowance for a president and 29 other positions represents less than full funding of an earlier proposal from the State Board of Community Colleges. When the study was conducted that lead to the current formula, twice as many support positions were specifically identified as being needed to provide a basic level of college support services.

3.3 Fiscal Impact of Base Funding

The 30-position allotment and associated funding provides a significant base of operations for each college. In fact, the majority of colleges in the System receive at least one-half of their support budget through the base funding provision.

As displayed in Exhibit 3-3, the dollar amounts shifted among the colleges to provide the base staffing allowance are significant. As compared to a simulation where each college would receive an equal amount of support dollars per FTE student, many colleges receive several hundred thousand dollars more. Each of the four largest

colleges now receives at least $1 million less than they would under an equal rate approach.

3.4 Evidence of Economy of Scale in Other States

Recognition of the fixed costs of operation in the support areas is a fairly common characteristic of formulas in other states. Exhibit 3-4 summarizes the treatment in the formulas of several other states that belong to the Southern Regional Education Board (SREB).

The approach used for community colleges in Mississippi is similar to the one in North Carolina where a base amount is provided along with a per-student rate. The approaches in four other states rely on the sliding scale technique, where different per-student rates apply to institutions of different enrollment sizes.

EXHIBIT 3-3
ANALYSIS OF FISCAL IMPACT OF BASE STAFFING PROVISIONS
INSTRUCTIONAL AND ADMINISTRATIVE SUPPORT FORMULA

	Support $			
	Budgeted Total FTE	Current "Base Staffing" Budget	Equal Rate per Total FTE	Amount Shifted
Pamlico CC	218	1,435,046	347,212	1,087,834
Tri-County CC	638	1,428,541	836,290	592,251
Montgomery CC	688	1,432,352	899,100	533,253
Bladen CC	746	1,439,098	974,283	464,815
Roanoke-Chowan CC	921	1,588,434	1,178,094	410,341
Mayland CC	923	1,594,256	1,184,497	409,759
McDowell TCC	930	1,600,479	1,192,756	407,722
Martin CC	933	1,595,039	1,188,190	406,849
Brunswick CC	975	1,635,071	1,240,442	394,629
Piedmont CC	1,129	1,778,941	1,429,120	349,821
James Sprunt CC	1,166	1,803,524	1,464,468	339,056
Anson CC	1,172	1,807,510	1,470,201	337,310
Sampson CC	1,284	1,916,736	1,612,014	304,722
Haywood CC	1,385	1,993,056	1,717,721	275,335
Carteret CC	1,421	2,038,529	1,773,668	264,861
Wilson TCC	1,441	2,061,485	1,802,443	259,042
Mitchell CC	1,443	2,053,027	1,794,567	258,460
Richmond CC	1,479	2,092,184	1,844,198	247,985
Cleveland CC	1,512	2,117,232	1,878,848	238,383
Isothermal CC	1,512	2,120,084	1,881,701	238,383
Beaufort County CC	1,529	2,129,481	1,896,044	233,437
Nash CC	1,575	2,180,611	1,960,558	220,053
Stanly CC	1,584	2,174,365	1,956,930	217,434
Blue Ridge CC	1,590	2,193,715	1,978,027	215,689
Halifax CC	1,603	2,198,131	1,986,224	211,906
Randolph CC	1,609	2,203,465	1,993,304	210,160
Southwestern CC	1,629	2,218,381	2,014,040	204,341
Edgecombe CC	1,709	2,288,084	2,107,020	181,064
College of Albemarle	1,725	2,303,725	2,127,316	176,409
Rockingham CC	1,757	2,336,413	2,169,315	167,098
Wilkes CC	1,859	2,418,840	2,281,419	137,420
Southeastern CC	1,904	2,465,720	2,341,392	124,327
Robeson CC	1,977	2,537,758	2,434,671	103,087
Western Piedmont CC	2,198	2,734,458	2,695,673	38,785
Craven CC	2,229	2,751,781	2,722,016	29,765
Davidson County CC	2,335	2,856,251	2,857,328	(1,077)
Lenoir CC	2,379	2,887,995	2,901,873	(13,879)
Caldwell CC & TI	2,533	3,019,188	3,077,875	(58,687)
Vance-Granville CC	2,571	3,066,055	3,135,798	(69,743)
Surry CC	2,574	3,057,069	3,127,685	(70,616)
Alamance CC	2,685	3,167,401	3,270,314	(102,913)
Rowan-Cabarrus CC	2,838	3,310,047	3,457,476	(147,429)
Johnston CC	2,892	3,351,424	3,514,565	(163,141)
Wayne CC	2,898	3,355,508	3,520,395	(164,887)
Sandhills CC	2,949	3,408,726	3,588,452	(179,726)
Catawba Valley College	2,957	3,415,838	3,597,891	(182,054)
Cape Fear CC	3,305	3,723,418	4,006,725	(283,308)
Asheville-Buncombe TCC	3,387	3,787,154	4,094,321	(307,167)
Central Carolina CC	3,403	3,812,082	4,123,904	(311,822)
Durham TCC	3,489	3,888,786	4,225,630	(336,844)
Pitt CC	3,500	3,896,773	4,236,818	(340,045)
Coastal Carolina CC	3,643	4,025,692	4,407,344	(381,652)
Gaston College	3,706	4,069,227	4,469,210	(399,983)
Forsyth TCC	4,164	4,477,907	5,011,150	(533,242)
Wake CC	5,826	5,975,384	6,992,202	(1,016,818)
Guilford TCC	5,857	5,991,044	7,016,882	(1,025,838)
Fayetteville TCC	8,786	8,599,534	10,477,594	(1,878,060)
Central Piedmont CC	10,313	9,969,513	12,291,869	(2,322,355)
Total	**137,383**	**167,777,563**	**167,777,061**	**502**

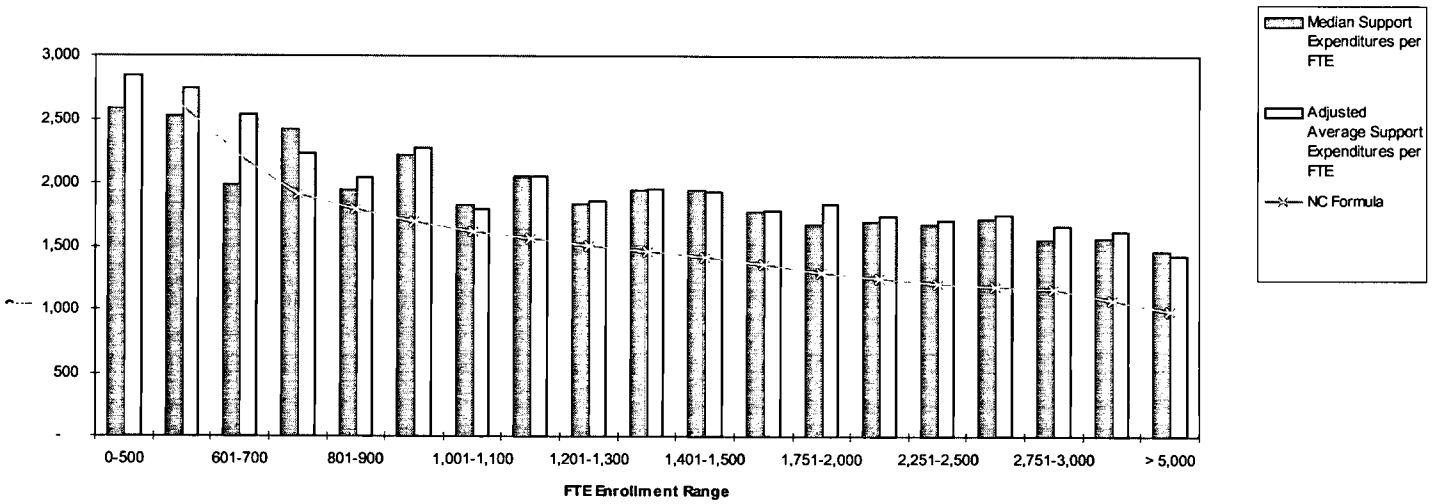
NOTE: Equal Rate simulations use the system average rate per FTE.

EXHIBIT 3-4
ANALYSIS OF ECONOMY OF SCALE FEATURES IN SREB STATE FUNDING FORMULAS FOR GENERAL ADMINISTRATION/STUDENT SERVICES

State	General Administration/Student Services
Alabama	Headcount less than 4,000: 0 - 1,000 @ $654.12 1,000 - 2,500 @ $330.38 2,500 - 4,000 @ $224.86 Headcount greater than 4,000: 0 - 4 ,000 @ $371.88 4,000 - 8,000 @ $278.50 8,000 - up @ $250.50
Arkansas	0 - 1,500 @ $330 1,500 - 5,000 @ $212 5,000 - up @ $131
Kentucky	0 - 4,000 @ $378 4,000 - 8,000 @ $282 8,000 - up @ $255
Mississippi	Base level plus student service rate per headcount and FTE student
South Carolina	0 - 4,000 @ $150 4,000 - 8,000 @ $125 8,000 - 12,000 @ $100 12,000 - up @ $75

We also compared the current North Carolina formula for instructional and administrative support to the actual expenditures in the other 49 states (see Exhibit 3-5). Similar to the exhibit for instructional expenditures in the preceding chapter, both the median and the adjusted average expenditure per FTE student are shown for the other states for the 1994-95 fiscal year. Also illustrated is the plot of the current North Carolina formula as it would apply to institutions at varying enrollment levels. As can be seen in the exhibit, the current formula is reasonably similar to the national pattern for colleges in the 500-900 FTE enrollment range, but provides significantly lower support than the other states for larger institutions.

EXHIBIT 3-5
SUPPORT EXPENDITURES PER FTE BASED ON FTE ENROLLMENT RANGES
MEDIAN, ADJUSTED AVERAGE, AND NC FORMULA



Note: Does not include North Carolina or Kentucky 2 year public schools (data not available for Kentucky).
Adjusted average corrects for observations in national population with erroneous data.
NC Schools less than 500 FTE, support amount is negotiated, not formula driven.
NC Formula is based on midpoint of range, 7,500 was used for > 5,000 range.
NC Formula is a base of $89,981 for president's salary, and $1,345,065 for the first 750 FTE and $889 for each FTE > 750.
Source: NCES 1994-95 IPEDS.

3.5 Trends Affecting Instructional and Administrative Support Workload

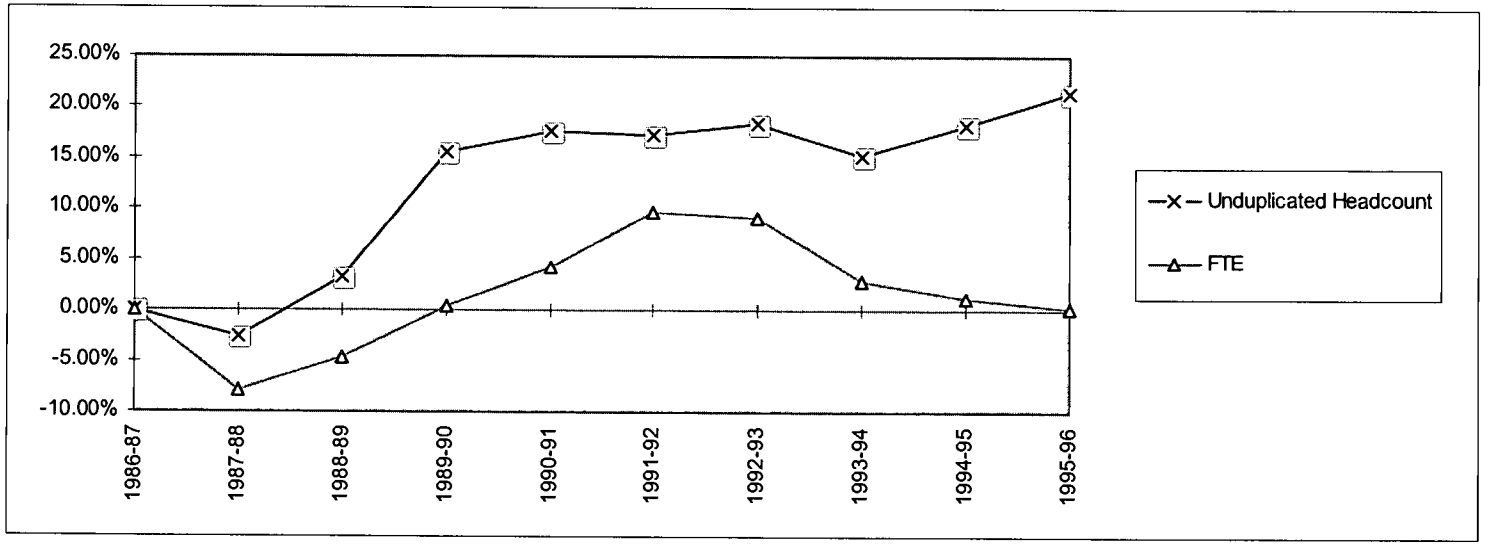
One of the concerns noted in the phase 1 report was that the workload in the instructional and administrative support areas tends to be generated by headcount enrollment (i.e., actual people) as well as FTE enrollment. A part-time student, for instance, can place nearly the same requirements on the registrar as a full-time student.

The importance of this distinction can be appreciated upon review and consideration of Exhibit 3-6. It traces the change in headcount and FTE enrollment levels for the System over the past decade. Although there have been year-to-year fluctuations, the FTE enrollment level in 1995-96 was virtually the same as for 1986-87. Headcount enrollment, on the other hand, has increased by over 21 percent during the same period. That is, the headcount-related workload in the instructional and administrative support area has grown more rapidly than has been recognized by the FTE-driven funding model.

3.6 Recommendation

We recommend that the current rates used in the instructional and administrative support formula be re-calibrated to reflect the national expenditure patterns and the growth in workload. This should be accomplished as shown in Exhibit 3-7, where the line labeled "proposed NC formula" has been created to pattern the economy of scale experience found in the other 49 states. The base point for the proposed formula has been shifted from 750 to 500 FTE students, to conform with the "small college" definition used in the instructional formula.

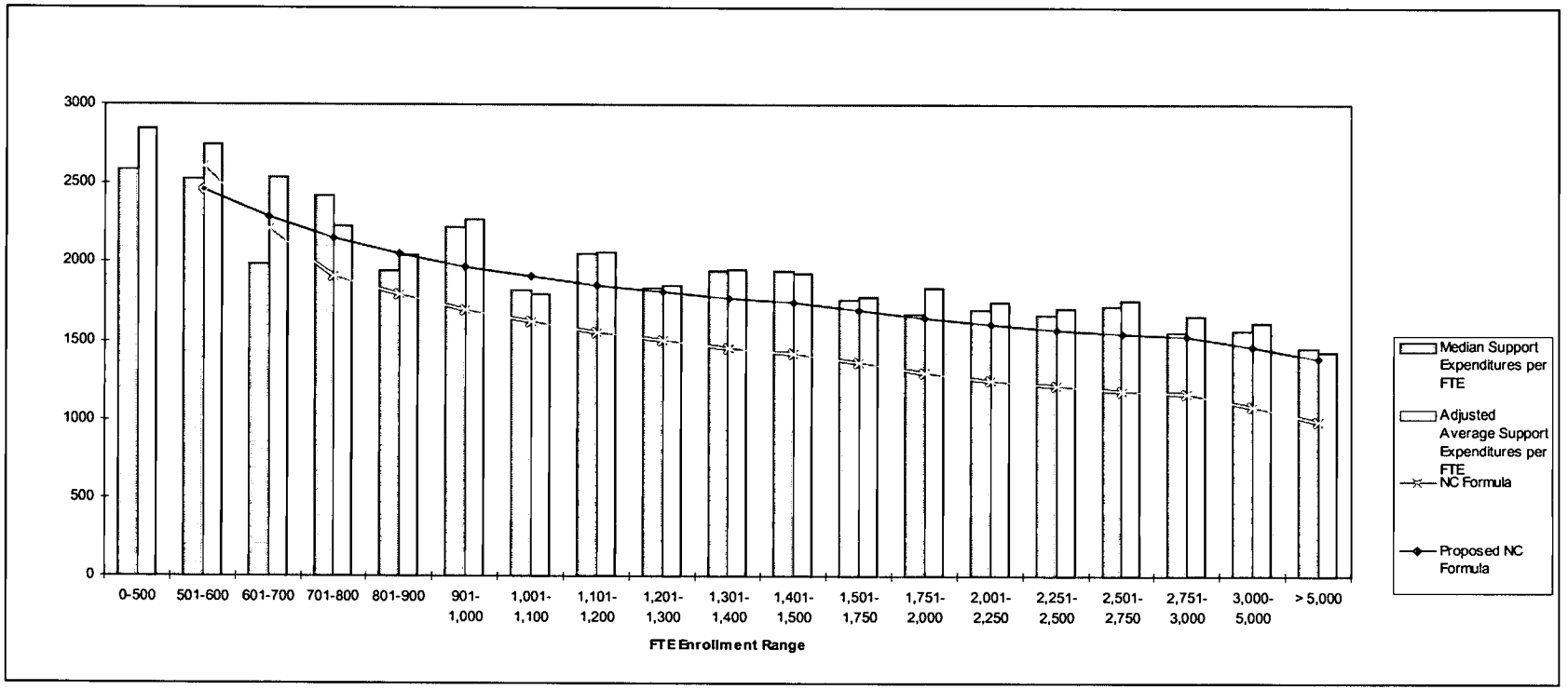
EXHIBIT 3-6
PERCENTAGE CHANGE IN UNDUPLICATED HEADCOUNT AND FTE ENROLLMENT COMPARED TO 1986-87
NORTH CAROLINA COMMUNITY COLLEGE SYSTEM



	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96
Unduplicated Headcount	641,972	624,813	662,255	741,387	754,500	752,477	760,537	739,813	758,545	779,956
Percentage Annual Change	-	-2.67%	5.99%	11.95%	1.77%	-0.27%	1.07%	-2.72%	2.53%	2.82%
Percentage Change from 1986-87		-2.67%	3.16%	15.49%	17.53%	17.21%	18.47%	15.24%	18.16%	21.49%
FTE	126,368	116,289	120,435	126,929	131,597	138,513	137,929	129,877	127,762	126,553
Percentage Annual Change	-	-7.98%	3.57%	5.39%	3.68%	5.26%	-0.42%	-5.84%	-1.63%	-0.95%
Percentage Change from 1986-87		-7.98%	-4.70%	0.44%	4.14%	9.61%	9.15%	2.78%	1.10%	0.15%

Source: Headcount - Table 3 Annual Statistical Report 1995-96 FTE - Table 14 Annual Statistical Report 1995-96

EXHIBIT 3-7
SUPPORT EXPENDITURES PER FTE BASED ON FTE ENROLLMENT RANGES MEDIAN, ADJUSTED AVERAGE, NC FORMULA, AND PROPOSED NC FORMULA



Note: Does not include North Carolina or Kentucky 2 year public schools (data not available for Kentucky).
Adjusted average corrects for observations in national population with erroneous data.
NC Schools less than 500 FTE, support amount is negotiated, not formula driven.
NC Formula is based on midpoint of range, 7,500 was used for > 5,000 range.
NC Formula is a base of $89,981 for president's salary, and $1,345,065 for the first 750 FTE and $889 for each FTE > 750.
NC Adjusted Formula is a base of $89,981 for president's salary and $1,200,000 for the first 500 FTE and $1,300 for each FTE > 500.
Source: NCES 1994-95 IPEDS.

We estimate that this modification could require nearly $50 million to implement. In recognition of the other priorities of the State Board for the System, we recommend that this formula change be phased-in at a rate of approximately $10 million per year over the next 5 years.

4.0 NEXT STEPS

4.0 NEXT STEPS

The Phase 1 report listed a number of issues that were recommended for additional study and consideration by the State Board of Community Colleges as it continues to enhance the funding methods used by the System. This supplemental (or Phase 2) report has addressed only on the economy of scale issues that were known to be of significant concern to state leaders and which might have impact on the 1997-98 appropriation, and has left the remaining issues for later consideration.

The following topics continue to be of potential interest in the ongoing efforts of the Formula Study Advisory Committee as it carries out its responsibilities:

- determination and formula recognition of differences in the costs of delivering different types of curriculum instruction programs,
- evaluation of alternative approaches for providing a balance between budget responsiveness and stability arising from changes in FTE enrollment due to the semester conversion and demographic trends,
- evaluation of the merits of considering headcount as well as FTE enrollment in the formula for instructional and administrative support,
- determination of the unique costs encountered by colleges which offer significant levels of programs at more than one location, and
- development of techniques for justifying the need for and allocating resources for equipment replacement.

Additionally, the Committee should investigate the opportunity to incorporate additional performance or incentive funding concepts in the System's funding models.

APPENDIX:

SELECTED EXCERPTS FROM PHASE I REPORT

(Selected Excerpts From Phase I Report)

6.0 RECOMMENDATIONS

6.1 Priorities

In offering our recommendations for refinement of the current community college funding model, we have elected to focus on a limited number of concerns. The Formula Study Advisory Committee urged, and we concur, that the System's efforts related to refinement of the funding model should address a relatively small number of major issues rather than consider every individual topic that might be of concern to one or more of the stakeholders. The fact that the current model is basically sound supports the decision to focus on a limited number of concerns. Our recommendations address:

- the need for a simplified budget structure,
- the enhancement of funding rates for occupational extension,
- a modification in the approach used to fund basic skills / literacy,

(remainder of this section not included in excerpt)

6.2 Simplified Structure

An overarching general recommendation is to streamline the funding model wherever practicable. We found that participants in our regional meetings frequently mentioned their inability to understand the various components of the current formula. Many felt there would be greater support for the current model if only more college officials understood its workings.

We believe a high priority should be placed on enhancing how the current and revised formulas are displayed. We believe there are many opportunities for changes in the organization of the formula documents, greater use of common terminology, consolidation of categories, and similar techniques that can add to the clarity of the

formula presentation with minimal, if any, unintended impact on how funds are distributed among the colleges. The more specific recommendations that follow will be guided by the goal of adoption of a simplified structure for presenting the financial needs of the System.

6.3 Occupational Extension

The funding model for occupational extension was the specific focus of the special provision calling for the formula study. Given the mission of the colleges related to workforce development and the testimony we heard about the current inadequate funding arrangements, we recommend that occupational extension programs be funded in a manner similar to that used for curriculum instruction programs. In particular, we believe that the formula for occupational extension should include:

- a sliding scale to calculate instructional units required, with:
  - a staffing ratio of 17.8:1 for the first 500 FTE students, and
  - a staffing ratio of 21.55:1 for enrollment beyond 500 FTE
- the same value per instructional unit as curriculum instruction,
- the same treatment of fringe benefits as curriculum instruction, and
- the same rate per FTE student for other costs.

Any subsequent changes in the funding model for curriculum instruction, furthermore, should also apply to occupational extension in order to maintain parity.

Preliminary analyses suggest that the cost of full implementation of this recommendation may require a several year phase-in period. We recommend that the proposed staffing ratios be calibrated during the phase-in period to match funding availability.

We believe that the concern expressed about a potentially disproportionate share of occupational extension funding going to one or more colleges ignores the fact that

these colleges deliver a disproportionate share of the System's extension programming. Implementation of the recommendation for funding parity between curriculum instruction and occupational extension should contribute to the ability of all colleges in the System to assume a more proportionate role in providing this type of service to their local communities.

6.4 Basic Skills/Literacy

We believe that two major changes in the funding model for basic skills/literacy are warranted. First, we recommend that funding for basic skills/literacy also be funded at parity with curriculum instruction. Although the variance in current funding rates between curriculum instruction and basic skills/literacy when compared on a dollars per annual FTE basis, is not as great as that for occupational extension, we suspect that the lower funding rates contribute to the relative lack of emphasis on these programs by some colleges.

Our second recommendation in the basic skills/literacy area is for a streamlined calculation for workload that follows the general format used for the curriculum instruction formula. The current performance incentives for GED and adult high school diploma should be continued as the first step in developing a performance funding component of the overall model. Any subsequent changes in the funding model for curriculum instruction should also apply to the basic skills/literacy formula.

(remainder of chapter not included in this excerpt)

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