FUNDING FORMULA USE IN HIGHER EDUCATION

1.0 Introduction and Overview

State-level funding formulas or guidelines for public higher education have been in use in the United States for over 50 years.[1] Originally envisioned as a means to distribute public funds in a rational and equitable manner, funding formulas have continually evolved since then into often-complex methodologies for determining institutional funding needs and allocating public funds. Perhaps the only constant during this period has been the ongoing controversy among participants in the state budgeting process surrounding the design and usage of these funding mechanisms. Even though the genesis of funding formulas may lie in rational public policy formulation, the outcome may not. Formulas are products of political processes, which implies that formulas result from compromise and that what is acceptable in one political subdivision may not be acceptable in another.

Although the basic purpose of funding formulas remains the rational and equitable allocation of state funds for public higher education, guidelines are designed and utilized for many purposes including the following:

- by the state higher education agency or governing board as a means of recommending resources for each institution to the legislature and governor;
- by the legislative and executive budget offices as a means of evaluating higher education budget requests;
- by the governing or coordinating board and/or legislature as a means of measuring and rewarding productivity; and
- by the state higher education agency as a means to distribute the state's higher education budget allocation to each institution.

[1] The terms "funding formula" and "funding guideline" will be used interchangeably throughout this paper.

Development of an optimal or best formula is complex because there are differences in institutional missions, even within the same system, and in the capacities of institutions to perform their missions. These differences do not negate the value of formulas but suggest that formulas can be used to provide a fiscal base to which (or from which) funding can be added (or subtracted), if justified. Formulas typically are considered enrollment driven because they are based on credit hours, students, or faculty members, which makes it relatively easy to evaluate change. If additional funds are justified, then formulas can provide the basis to target supplemental funding. Because formulas may be enrollment driven, when enrollments are steady or decline, funding may decrease. This aspect of formula use brought formulas under attack in several states when institutions experienced declines in enrollment.

When enrollments decline or remain constant, methods are sought to provide additional resources. Development of new programs and services to meet the varied needs of a changing clientele may require different configurations of resources in addition to different programs. The use of alternative instructional delivery methods, including telecommunications delivery of instruction, may require a shift in the paradigm on funding.

To accomplish the purpose of providing an equitable distribution of available resources, a majority of states and systems have used funding formulas or guidelines in budget development or in resource allocation to higher education institutions. A formula is defined as a mathematical representation of the amount of resources or expenditures for an institution as a whole or for a program at the institution. Programs in this context refer to the categories into which expenditures are placed, as defined by the National Association of College and University Business Officers (NACUBO). The "programs," "functional categories," or "budget areas" commonly used are the following:

Instruction	Institutional Support
Research	Operation and Maintenance of Physical Plant
Public Service	Scholarships and Fellowships
Academic Support	Auxiliary Enterprises
Student Services	Hospitals
Mandatory Transfers	

Many states or systems provide funding based on these functional or budget programs, with the exception of auxiliary enterprises, hospitals, and mandatory transfers. These three areas usually are not funded through state dollars, and hospitals and auxiliary enterprises are not included in Educational and General (E&G) expenditures, which result from the three basic missions of universities: instruction, research, and public service. Funding for the remaining categories may be based on formulas in the determination of the total resource allocation to the institution.

In most states and systems, however, total institutional needs are not determined by a formula mechanism. Additions are made to the amounts determined by formula to recognize special needs or special missions. Similarly, given political structures, competition for funds from other state agencies, and shortfalls in revenue projections, the amount determined by a formula calculation may be reduced to conform to total funds available.

The breadth and coverage of funding formula and guideline usage varies as well among the states. States may use formulas for all public higher education sectors (four- and two-year) or just a particular segment. Further, states may use formulas or guidelines for specific program areas such as instruction and academic support, or they may be all-inclusive. A trend over time has been to have more "non-formula" components in the higher education budget, given the feeling that formulas are not adequate for meeting the funding needs of certain specialized activities (e.g., co-located instruction, public service activities, cooperative extension).

1.1 Development of Funding Formulas

Funding formulas have been considered the offspring of necessity.[2] The development of an objective, systematic method of dealing with the funding of many diverse institutions prompted many states to begin using formulas.[3] Prior to 1946, institutions of higher education served a limited and relatively homogenous clientele. After World War II, enrollments increased dramatically and each state or system had a variety of liberal arts colleges, land-grant colleges, teacher training colleges, and technical schools to meet the needs of its citizens.

As the scope and mission of campuses increased and changed (i.e., teachers' colleges becoming regional universities), so did the complexity of distributing resources equitably among competing campuses. Because state resources did not keep pace with increasing enrollments, the competition for funding became greater. And, because no two campuses are alike, methods were sought to allocate available funds in an objective manner, to provide sufficient justification to the Legislature for additional resources, and to facilitate inter-institutional comparisons.

The desire for equity was a prime factor in the development of funding formulas, but other factors served as catalysts: the desire to determine an "adequate" level of funding; institutional needs to gain stability and predictability in funding levels; and increased professionalism among college and university business officers.[4] The objective of equity in the distribution of state resources is to provide resources to each of the campuses according to its needs. To achieve an equitable distribution of funds required a distribution formula that recognized differences in size, clients, location, and the mission of the college.[5]

The concept of "adequacy" is more difficult to operationalize in the distribution of resources. What might be considered to be adequate for the basic operation of one campus would be considered inadequate for a campus offering similar programs but having a different client base.

Texas was the first state to use funding formulas for higher education. By 1950 California, Indiana, and Oklahoma also were using funding formulas or cost analysis procedures in the budgeting or resource allocation process. [6] In 1964 16 states were identified as using formulas; by 1973, the number had increased to 25 states, and to 33 by 1992.[7]

Formulas evolved over a long period of time and contributed to a series of compromises between institutions, governing or coordinating boards, and state budget officials. For example, institutions sought autonomy while governing or coordinating boards and budget officials sought adequate information to have control over resources. The development of the Texas formulas is an example of the trade-offs between accountability and autonomy.

When sudden enrollment increases in the late 1940s caused confusion in the amounts to be appropriated to Texas public colleges, each institution lobbied the legislature for additional funds. Texas legislators felt that the institutional requests were excessive and that the division of resources among institutions was inequitable. Consequently, the legislature asked for some rational mechanism to distribute funds. In 1951 a teaching salary formula based on workload factors was developed; this formula did not recognize differences among the campuses in roles and missions. By 1957 a series of budget formulas developed by institutional representatives, citizens, and the new Commission on Higher Education was presented to the legislature. These formulas were developed only after completion of a major study of the role and scope of the institutions. The study included an inventory of program offerings and attempted to measure costs by program. After 1958 a cost study committee was established that recommended adoption of five formulas for teaching salaries, general administration, library, building maintenance, and custodial services. In 1961 two formulas for organized research and departmental operating costs were added. By 1996 Texas used 13 separate formula calculations that were developed through complex cost studies of each of the program offerings on the campuses. Texas continues to use advisory committees to revise and improve its formulas to encompass two broad objectives: provide for an equitable distribution of funds among institutions and assist in determining the funding needed for a first-class system of higher education.[8] At each phase of Texas formula development, compromises were reached between the desire for additional data for increased accuracy and for differentiating among the institutions and the cost and burden of providing the data.

The trend in formula development in many states parallels the experience of Texas: refinement of procedures, greater detail and reliability in collection and analysis of information, and improvement in the differentiation between programs and activities. States have used different methods over time to develop their formulas for both four-year and two-year institutions. Some states have developed their methods from the "ground up". Many of these formulas have been based on the statistical analysis of institutional data (i.e., regression modeling) or the determination of an "average cost" among institutions in a state for providing a particular type of service. Others have been based on staffing ratios and external determinations of "standard costs" or workload factors based on national norms. The key to the process seems to be the isolation or identification of variables or factors that are directly related to actual program costs. Isolation of variables that are detailed, reliable, not susceptible to manipulation by a campus, and sufficiently differentiated to recognize differences in institutional role and mission requires the collection of myriad amounts of data. Data must be collected and analyzed in a manner that does not raise questions of preferential treatment for any campus.

Other states have developed their formulas by borrowing existing formulas from other states. For example, Alabama adapted the formulas used by Texas to the particular circumstances of Alabama, and continues to modify the formulas to reflect circumstances specific to Alabama, and to incorporate judicial interventions. Adaptation rather than development of a new formula appears to be the preferred method because of the time and effort required to complete a sound cost study. Accounting procedures are not refined enough in some states or systems to permit the calculation of costs differentiated by academic discipline and level of student, and to separate professorial time into the multiple work products generated by carrying out the three main missions of most institutions of higher education: teaching, research, and service. States continue to adapt formulas from other states because methods that work in one state may work equally well in another at considerable savings of time and resources.

States or systems use funding formulas for a variety of reasons, including the following:

- Formulas provide an objective method to determine institutional needs equitably.
- Formulas reduce political competition and lobbying by the institutions.
- Formulas provide state officials with a reasonably simple and understandable basis for measuring expenditures and revenue needs of campuses and determining the adequacy of support.
- Formulas enable institutions to project needs on a timely basis.
- Formulas represent a reasonable compromise between public accountability and institutional autonomy.
- Formulas ease comparisons between institutions.
- Formulas permit policy makers to focus on basic policy questions.

Funding formulas also can provide for equity among institutions, depending on how the formulas are constructed. Two types of equity are achieved through formula use: horizontal and vertical. Horizontal equity is defined as the equal treatment of equals, and vertical equity is defined as the unequal treatment of unequals. An example of a horizontal equity element is a formula that provides a fixed dollar amount for one credit hour of lower division English instruction, no matter where or how the class is taught. Texas and Alabama use this element in their instruction funding formulas. An example of a vertical equity element in a formula is the allowance of $2.80 per gross square foot (GSF) of space for maintenance of a brick building, but $3.20 per GSF for maintenance of a frame building.

However, formulas do have shortcomings, and there have been many heated debates over whether the advantages of formulas outweigh the downside of use. Some disadvantages of funding formulas are the following:

- Formulas may be used to reduce all academic programs to a common level of mediocrity by funding each one the same because quantitative measures cannot assess the quality of a program.
- Formulas may reduce incentives for institutions to seek outside funding.
- Formulas may perpetuate inequities in funding that existed before the advent of the formula.
- Enrollment-driven formulas may be inadequate to meet the needs of changing client bases or new program initiatives.
- Formulas cannot serve as substitutes for public policy decisions.
- Formulas are only as accurate as the data on which the formula is based.
- Formulas may not provide adequate differentiation among institutions.
- Formulas are linear in nature and may not account for sudden shifts in enrollments and costs.

In any event, guidelines or formulas reflect one of two computational approaches: the all-inclusive approach, where the total allocation for a program area such as Instruction or Academic Support is determined by one calculation; and the itemized approach, where more than one calculation or formula is used in each budget area. Most state funding formulas use the itemized approach.

Three computational methods have been identified under which every formula calculation can be classified:

- Rate per base factor unit (RPBF)
- Percentage of base factor (PBF)
- Base factor/position ratio with salary rates (BF-PR/SR).

The rate per base factor method starts with an estimate of a given base, such as credit hours or full time equivalent students (FTES), and then multiplies the base by a specific unit rate. Unit rates generally have been determined by cost studies and can be differentiated by discipline, level, and type of institution.

The PBF method assumes there is a specific relationship between a certain base factor like faculty salaries and other areas like departmental support services. The PBF method can be differentiated by applying a varying percentage to levels of instruction or type of institution, but this is unusual. Reportedly, the PBF was developed because of the perception that all support services are related to the university's primary mission (instruction).[9]

The BF-PR/SR method is based on a predetermined "optimal" ratio between a base factor and the number of personnel. For example, ratios such as students per faculty member or credit hours per faculty member are used. The resulting number of faculty positions determined at each salary level is then multiplied by the applicable salary rate for that level and the amounts summed to get a total budget requirement.

The BF-PR/SR method also is used commonly in plant maintenance, and is the most complex of the computational methods.

The base factors used in most formulas can be classified into five categories:

- head count
- number of positions
- square footage or acreage
- FTE students or staff
- Credit hours.

Square footage or acreage is used most often in the operation and maintenance of plant, whereas credit hours, FTE students or staff, or positions are the most prevalent bases in the instruction, academic support, and institutional support areas. Head count is used as the base unit most often in student services and the scholarships and fellowships area.

States have also found it necessary to introduce factors that differentiate among institutions in funding formulas because each institution, if examined closely enough, has a different mission and mix of program offerings. Differentiation is used to recognize that there are legitimate reasons for costs to vary; reasons include economies and diseconomies of scale, method of instruction, and class size. Differentiation became more prevalent and more complex as accounting and costing methods improved and reliable cost data became available.

Differentiation is especially commonplace in formulas used to calculate funding requirements for the instruction program area. All of the states using formulas for instruction attempt to differentiate by discipline, institutional type, or level of enrollment. Only a few formulas in other budget areas differentiate by these three types of factors.

Formulas may differentiate among academic disciplines (such as education, sciences, and architecture), levels of enrollment (freshman and sophomore {called lower division}, junior and senior {called upper division}, masters, and doctoral), and types of institutions (community colleges, baccalaureate institutions, and research universities). Recently, some states (e.g., Alabama) have also introduced differentiation for historically black institutions as an institutional type.

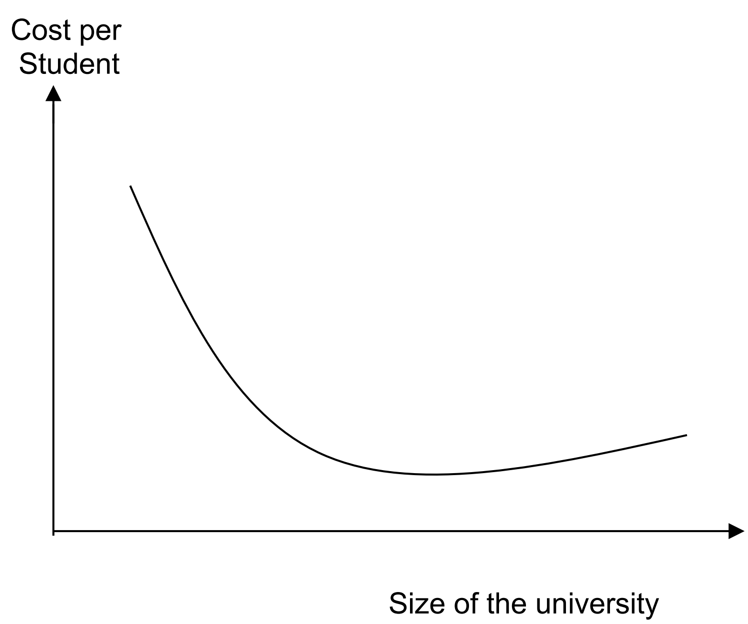
1.2 Economies of Scale and Scope

Formulas also may include factors that consider the size and complexity of the institution so that economies and diseconomies of scale and scope may be recognized. Some higher education institutions long have contended that their small size makes it impossible to take advantage of factors that would reduce unit costs; or conversely, that the institution's large size introduces diseconomies that make unit costs higher. Similarly, institutions have argued that narrowness of offerings, i.e., being a liberal arts college only, results in a reduction of unit costs (because of factors such as less departmental overhead since there are fewer academic departments); while diversity of program offerings, addition of master's and doctoral programs, and diversity of mission cause additional costs, or diseconomies of scope. The economics literature and research provide evidence that not only economies and diseconomies of scale but also economies and diseconomies of scope exist in higher education.

One of the basic principles of economics is that the size or scale of operation is likely to effect the cost of one unit of production. In higher education, an increase in the size of the institution may result in reductions in unit costs, or cost of a full-time equivalent student; this phenomenon is called an *economy of scale*. Similarly, if increases in institutional size result in increases in unit costs or the cost of a full-time equivalent student, the phenomenon is called a *diseconomy of scale*. Formulas may recognize these differences by providing a fixed cost factor such as a minimum guaranteed funding base to ensure that smaller institutions have the necessary resources to offer a basic level of services; or by providing differential amounts for more complex institutions.

A typical relationship between size and cost is shown in Exhibit 1. As institutional size increases, factors that appear to decrease unit cost tend to predominate until a point is reached when factors raising unit costs tend to be predominant. The result is a u-shaped curve where the minimal point on the curve represents the lowest unit cost. In higher education, this lowest point may actually be a range over which the factors that keep costs down and those that drive costs up are in balance.

EXHIBIT 1
HYPOTHETICAL COST CURVE BETWEEN SIZE OF UNIVERSITIES AND COST PER STUDENT



Bowen[10] notes that the primary factors that drive the costs of higher education down is what he calls the “lumpiness” of many of the resources used. For a college or university to operate at all, it must have some faculty, a few administrative officers, some buildings and grounds, books, and equipment whether the college enrolls five students or 5,000. These costs to operate an institution or program no matter how many students are involved are called “fixed costs.” The cost per student for these initial overhead items or fixed costs decreases as the number of students increases, until a point is reached when the staff and facilities are fully employed and an additional student would require additional resources. The costs that are added for additional students or additional outputs are called “variable costs.” “Marginal costs” are defined as those costs associated with the recent addition or deletion of students from a program; the terms “variable” and “marginal” costs are sometimes used interchangeably.

As the institution expands further, more resources would be added in the lumpy fashion, with costs continuing to be spread over additional students, and unit costs again would fall. Large enrollments also increase average class size, resulting in further economies of scale because instructors’ salaries remain the same, but are spread over more students. Bowen also notes that the “lumpiness” of resources gives rise to three different types of diseconomies of scale. One of these diseconomies is the rising cost of institutional coordination of larger and more academic units within the university. While Bowen calls this a diseconomy of scale, other economists label this phenomenon a “*diseconomy of scope*.[11] Economies of scope are defined by Cohn et al as “complementarity between outputs that results in lower per-unit costs when two more outputs are produced simultaneously.”[12] In other words, economies of scope occur when a university produces credit hours at multiple levels and it is cheaper to produce those credit hours at the undergraduate and graduate level together than to produce those credit hours in separate departments. Or economies of scope occur when a university produces multiple products with no increase in cost, as occurs when professors teach and also produce research and public service.

A second diseconomy of scale noted by Bowen is the possible deterioration in quality as the size of the university increases. He calls a deterioration in quality an increase in unit cost because the value of the service decreases. The third diseconomy of scale occurs, according to Bowen, when increasing size results in additional recruitment expenditures and student financial aid, thus increasing unit costs.

Bowen was not the first economist to study economies and diseconomies of scale in higher education. Early studies were completed in the 1920s, but the first studies of note were completed in the 1960s, all showing that certain economies of scale did exist for colleges and universities.[13] In 1972, the Carnegie Commission on Higher Education determined that there was a definite relationship between size of an institution and cost per student. For public comprehensive institutions like the State System universities, cost reductions occurred at the breaking point between 1,000 and 1,300 full-time equivalent students and among research and doctoral granting universities between 5,000 and 5,500 students.[14] Earlier work by the Commission had resulted in these recommendations for optimal college/university size:

	Minimum	Maximum
Doctoral universities	5,000	20,000
Comprehensive universities	5,000	10,000
Liberal arts colleges	1,000	2,500[15]

In his seminal work on university costs, Bowen concluded the following:

- Large institutions spend a substantially smaller percentage of their educational expenditures for institutional support and student services than do small institutions.
- Most large institutions spend relatively less per student for plant operation and maintenance than do small institutions.
- Large institutions spend a greater percentage of their resources for teaching than do comparable small institutions.

- Size appears to have no consistent effect on the percentages spent for scholarships and fellowships and for academic support. However, large institutions spend relatively less on libraries than do small institutions.[16]

Bowen concluded that economies of scale appear to be most pronounced for institutional support, student services, plant, resulting in large institutions being able to devote a larger share of their resources to instruction. As a result, larger institutions were able to pay higher average faculty salaries than smaller institutions could. Similarly, large institutions had less building space per student than smaller institutions and also employed relatively more "other staff" than small institutions.

Paul Brinkman and Larry Leslie completed a meta-analysis on 60 years of research on economies of scale in higher education.[17] The literature in the review included books, dissertations, reports, and journals dating from the 1920s. For four-year institutions, their review of the studies found the following:

- Large economies of scale are found in expenditures for administration and operation and maintenance of plant.
- Total educational and general costs per student decrease as size increases.
- Substantive size-related economies of scale are most likely to occur at the low end of the enrollment range.
- Instructional expenditures have the least reductions in unit costs related to size.
- Evidence was inconclusive on whether large universities experience diseconomies of scale.
- The extent to which a set of institutions (like the State System) experience economies or diseconomies of scale depends on the scope and variety of programs and services offered (i.e., economies and diseconomies of scope), salaries paid, and how resources are used on the campus.
- Institutions with between 1,000 and 2,000 FTE students can experience adverse economies of scale.

In contrast to the meta-analytical results, Broomall et al. examined economies of scale for Virginia institutions using regression analysis and concluded that economies of scale are not a function of the type and size of a university. Moreover, no economies or diseconomies of scale or scope appeared as complexity or size of the institution increased.[18]

Koshal and Koshal examined economies of scale and scope in higher education and concluded the following:

- The marginal cost of graduate education is greater than that of undergraduate education.
- Ray economies of scale (the expansion of all outputs) exist for comprehensive universities. This means that increases in the size of graduate and undergraduate programs and in research and public service programs result in reduced marginal costs.
- Product specific economies of scale for undergraduate and graduate education do exist at all levels of output.
- Global economies of scope (due to complementarity among outputs like research and instruction) exist for all public institutions. For undergraduate and graduate instruction, both product-specific economies and diseconomies of scope exist.
- Comprehensive universities can reap benefits from both economies of scale and of scope. Large comprehensive universities are the more cost-efficient institutions.[19]

Dundar and Lewis examined economies of scale and scope at public universities and concluded that average and marginal costs were highest for research outputs and lowest for undergraduate education. Social sciences have the lowest costs; contrary to conventional wisdom that costs of instruction increase by level, this was not found for all fields, and master's education in the social sciences is more costly than doctoral education. They concluded that the design of funding and tuition policies for universities should consider the joint costs of research and public service and the economies of scope possible with joint production. Most importantly, Dundar and Lewis concluded that economies of scale and scope exist at departmental levels, and differ by discipline but not within the social sciences. [20]

In what has been called "an important advance" [21] in the study of economies of scale and scope in higher education, Cohn, Rhine, and Santos examined three types of economies: ray economies (due to the expansion of all outputs), product-specific economies of scale, and economies of scope. They concluded that there were product-specific economies of scale for undergraduate and graduate enrollment and for sponsored research funding. For institutions engaging in only small amounts of research, like the State System institutions, they found ray economies of scale up to only 5,000 students while institutions with large amounts of research had ray scale economies up to 25,000 students. There also were significant economies of scope among all outputs, but especially for instruction and research. This means that the cost of producing research and instruction together is cheaper than the costs of producing them separately. Cohn et al concluded that the most efficient institutions are major public research universities that have both large enrollments and substantial research enterprises.[22]

Lastly, Brinkman summarized the available information related to costs at comprehensive universities. [23] Studies he reported concluded that total expenditures per student at institutions with 12,000 full-time equivalent students could be expected to be 22 percent lower than cost per student at an institution of 4,000 students. For master's-oriented institutions, economies of scale appear to be maximized at 3,000 to 4,000 students, and that minimum average costs are reached at 5,000 students. Brinkman also reported that direct costs per credit hour for doctoral instruction were, on average, 8 to 9 times as much as lower division undergraduate costs per credit hour; master's level 4 to 5 times as much; and upper division 1.6 to 1.8 times as much. He concluded that factors associated with changes in marginal and average costs were size of institution, scope of services offered, level of instruction or student, and discipline.

2.0 Guiding Principles in Formula/Guideline Usage

Over time, a number of researchers in the area of higher education finance have offered their concepts regarding desired characteristics in state higher education funding formulas. Frequently, what is offered as the "desired characteristic" is in direct response to a perceived shortcoming of a particular state's funding formula or guideline.

Fourteen characteristics, listed and summarized in Exhibit 2 in no particular order of importance from A to N, often tend to be in opposition to one another. For instance, the desire to have a simple-to-understand funding formula may preclude features that might contribute to a greater degree of equity (e.g., more detailed sub-categories to reflect institutional differences). Similarly, a formula that is responsive to changes in enrollment levels may not be able at the same time to provide the desired level of stability. Use of the characteristics provides an objective framework for evaluating funding policy alternatives – both during the phase of review of the current formula and in subsequent years. There will be many alternatives and options for funding formulas – an accepted, pre-established set of guiding principles provides a rationale for narrowing down this list of options.

The State System has adopted a set of 15 guiding principles that encompasses all of the fourteen characteristics listed in the following exhibit except "Balanced" and "Adaptable to Economic Conditions." The three guiding principles that the State System has in addition are "Comprehensive," "Sunset Provisions," and "Performance Funding." In a following component of this study, the characteristics or criteria will be used to evaluate the current SSHE funding formula.

EXHIBIT 2
DESIRED CHARACTERISTICS OF A FUNDING FORMULA OR GUIDELINE

Characteristic	*Summary Description*
A. Equitable	The funding formula should provide both horizontal equity (equal treatment of equals) and vertical equity (unequal treatment of unequals) based on size, mission and growth characteristics of the institutions.
B. Adequacy-Driven	The funding formula should determine the funding level needed by each institution to fulfill its approved mission.
C. Goal-Based	The funding formula should incorporate and reinforce the broad goals of the state for its system of colleges and universities as expressed through approved missions, quality expectations and performance standards.
D. Mission-Sensitive	The funding formula should be based on the recognition that different institutional missions (including differences in degree levels, program offerings, student readiness for college success and geographic location) require different rates of funding.
E. Size-Sensitive	The funding formula should reflect the impact that relative levels of student enrollment have on funding requirements, including economies of scale.
F. Responsive	The funding formula should reflect changes in institutional workloads and missions as well as changing external conditions in measuring the need for resources.
G. Adaptable to Economic Conditions	The funding formula should have the capacity to apply under a variety of economic situations, such as when the state appropriations for higher education are increasing, stable or decreasing.
H. Concerned with Stability	The funding formula should not permit shifts in funding levels to occur more quickly than institutional managers can reasonably be expected to respond.
I. Simple to Understand	The funding formula should effectively communicate to key participants in the state budget process how changes in institutional characteristics and performance and modifications in budget policies will affect funding levels.
J. Adaptable to Special Situations	The funding formula should include provisions for supplemental state funding for unique activities that represent significant financial commitments and that are not common across the institutions.
K. Reliant on Valid & Reliable Data	The funding formula should rely on data that are appropriate for measuring differences in funding requirements and that can be verified by third parties when necessary.
L. Flexible	The funding formula should be used to estimate funding requirements in broad categories; it is not intended for use in creating budget control categories.
M. Incentive-Based	The funding formula should provide incentives for institutional effectiveness and efficiency and should not provide any inappropriate incentives for institutional behavior.
N. Balanced	The funding formula should achieve a reasonable balance among the sometimes competing requirements of each of the criteria listed above.

3.0 Other States' or Systems' Funding Formulas

In 1999, 27 states or systems reported that they were using funding formulas and guidelines in the budget or resource allocation process for public four-year institutions, down from the 30 states or systems reporting formula use in 1996. Twenty states indicated that they were in the process of revising current formulas or adopting new formulas. The number of states or systems employing formulas changes from year to year, since states continually adopt, modify, and drop formulas and since what one person may consider a formula may be called by another name by another person. For example, Louisiana typically is identified as a formula state although the person responding to the survey used to collect these data indicated Louisiana was not using formulas in 1999. States identified as using funding formulas, peers, or performance indicators in 1996 are listed in Exhibit 3.

Although all of the southern except North Carolina have used funding formulas throughout the past twenty years, and have been leaders in formula development and innovation, that picture changed during the last half of the 1990s. Delaware, Kentucky, Mississippi, and Virginia dropped the use of formulas in the resource allocation or budgeting process. Instead, these states focused budget requests and the allocation process on inflationary increases and special initiatives. Most of the other southern states modified their formulas since 1992, and the University of North Carolina System now uses formulas to determine increases or decreases in institutional funding requests based on changes in enrollment. Virginia currently is in the process of developing a new funding formula that will have performance components.

EXHIBIT 3
STATES/SYSTEMS USING FORMULAS, PEERS, AND PERFORMANCE INDICATORS IN 1988, 1992, AND 1996

	Using Funding Formulas			Using Peers			Using Performance Indicators		
STATE	**1984**	**1992**	**1996**	**1984**	**1992**	**1996**	**1984**	**1992**	**1996**
Alabama	X	X	X		X	X			
Alaska		X							
Arizona	X	X	X		X	X			X
Arkansas	X	X			X	X			X
California	X	X	X		X	X			
Colorado	X	X	X						
Connecticut	X	X	X			X	X		X
Delaware									
Florida	X	X	X		X	X	X		X
Georgia	X	X	X			X	X		
Hawaii						X			
Idaho		X	X			X	X		
Illinois	X	X	X	X	X	X			X
Indiana					X	X			
Iowa					X	X			
Kansas	X	X	X		X	X			
Kentucky	X	X	X	X	X	X	X	X	
Louisiana	X	X	X		X	X	X		
Maine						X			X
Maryland	X	X	X				X		
Massachusetts	X							X	
Michigan	X								
Minnesota	X	X	X				X		X
Mississippi	X	X	X		X	X		X	X
Missouri	X	X	X		X		X	X	X
Montana	X	X	X		X	X			
Nebraska					X	X			
Nevada	X	X	X			X	X		
New Hampshire									
New Jersey	X						X	X	
New Mexico	X	X	X			X			
New York	X								
North Carolina					X	X		X	
North Dakota	X	X	X		X	X		X	
Ohio	X	X	X				X	X	X
Oklahoma	X	X	X		X	X			
Oregon	X	X	X		X	X			
Pennsylvania	X		X						
Rhode Island					X	X			X
South Carolina	X	X	X		X	X			
South Dakota	X	X	X						
Tennessee	X	X	X		X	X	X	X	X
Texas	X	X	X		X	X			
Vermont						X			X
Utah		X	X		X	X			
Virginia	X	X			X	X	X	X	X
Washington	X			X	X	X	X		
West Virginia	X	X	X		X	X			
Wisconsin	X				X	X			
Wyoming					X	X			
N	36	32	30	3	28	36	15	10	14

Among the states there is some variety in the type and number of formulas and in the functional or budget areas for which formulas are used. Of the states using formulas in 1996, 22 had only one formula for instruction, while Oregon had four, one for each "cost area" related to instruction. The majority of states applied formulas to all institutions but differentiate among institutional types. Texas used 13 formulas to compute budget requirements for total educational and general expenditures. Pennsylvania would be considered to be using three. In thirteen of the states, more than one computational formula is used to determine academic support needs. Since most states that use formulas or guidelines have a separate method for determining library needs, the academic support area (which includes libraries, academic computing support, and academic administration) usually will have expenditure needs computed by more than one formula. Academic support is an area for which the itemized approach generally has been used. Exhibit 4 provides information on the numbers of formulas used by states/systems in 1996, by functional area.

3.1 Funding Formulas for Two-Year Colleges

In many states, two-year colleges originally were governed under the auspices of state departments of education and/or local school boards. Because of this governance structure, early funding formulas for two-year colleges were patterned off elementary and secondary education funding formulas. Funding generally was calculated at a dollar amount per student, with both the state and the local district contributing to total funding. The level of local funding was based on the district's ability to support the college, which generally was calculated based on an equalization formula using taxable property wealth per full-time equivalent student. Use of ability-to-pay formulas is one method of distributing funds equitably across college districts within a state. Ability-to-pay is similar to the subtraction of different revenue amounts from the "needs" of four-year institutions based on the amount of revenues that the institution can generate.

When governance for two-year colleges was transferred from the local school district board (and the state board of education) to a board for the college (and either a statewide two-year college board or other state higher education board), most funding formulas migrated away from the "ability to pay" formulas used for elementary/secondary education. Several states (Montana, West Virginia) now incorporate funding for two-year colleges within the funding formulas used for all higher education by differentiating by type of institution. Other states (e.g. Texas, Alabama, Arizona) have separate funding formulas for two-year colleges, while some states (e.g., Wyoming) use funding formulas for two-year colleges but not for the four-year segment. The Illinois community college formula continues to use the ability of the local community college district to support the college (as measured by local property wealth) as a formula component. Other states include equity factors in their formulas by recognizing variations in the cost of offering different types of educational programs and services (like South Carolina does) and by recognizing economies of scale (e.g., Arizona, North Carolina).

Several states determine the adequacy of their two-year college funding formula by comparing funding to regional averages or to institutional peer groups. Alabama, Kentucky, and South Carolina compare funding for two-year colleges to the SREB regional average funding for each type of college, as defined in the SREB Data Exchange. Ohio and Oklahoma use national peer group averages to determine the adequacy of institutional funding levels.

EXHIBIT 4
NUMBER OF FORMULAS USED BY STATES/SYSTEMS IN 1996, BY FUNCTIONAL AREA

State	Instruction	Research	Public Service	Academic Support	Student Services	Inst. Support	Scholar. & Fellowships	Plant Operations
Alabama	1	1	1	2	1	1		1
Arizona	*			*	*	*		*
California	*	*	*	*		*		*
Colorado#								
Connecticut	1			3				5
Florida	2	*	*	3	1	1		3
Georgia	1	*		1	*	*		1
Idaho	*							
Illinois	*							
Kansas	*	*	*	*	*	*		*
Kentucky	1	1	1	5	1	1	1	1
Louisiana	*	*		*	*	*		*
Maryland	1	1	1	2	1	1	1	3
Minnesota	*			*	*	*		*
Mississippi	2	1	1	2	1	1	1	1
Missouri	1			2	1	1		1
Montana	2	*	*	*	*	*	1	
Nevada	2			2	1	1		2
New Mexico	1			1	1	1		1
North Dakota	1			2	*	*		2
Ohio	*			*	*	*		1
Oklahoma	*	*	*	*	*	*	*	*
Oregon	4	1		6	1	3		5
Pennsylvania	*	*	*	**	**	**		1
South Carolina	1	1	1	2	1	1		5
South Dakota	1	*		*	*	*		
Tennessee	1		1	2	1	1		1
Texas	2	1		2	2	1		5
Utah	*			*	*	*		*
West Virginia	*	1		*	*	*		*

* or ** indicates more than one functional area combined in one formula.

Colorado distributes by formula funding for productivity, enrollment increases, and adult literacy. These formulas do not correspond to functional area analysis.

3.2 Formulas by NACUBO Classification, including "Best Practices"

Practices in guideline or formula use vary significantly among the states/systems. Formula usage and identification of "best practices" in each area are described below for each of the areas.

3.2.1. Instruction

This category includes all expenditures for credit and non-credit courses; for academic, vocational, technical, and remedial instruction; and for regular, special, and extension sessions. Excluded are expenditures for academic administration when the primary assignment is administration (such as deans). Instruction is the most complex, and most expensive, component of an institution's expenditures. Because of its importance, identification of appropriate cost factors is critical to the validity of the guideline development process.

Since the instruction program is typically the major component of expenditures at institutions of higher education, formulas for this activity are often quite complex. Each of the states using formulas explicitly or implicitly utilizes at least one formula for instruction. States provide differential funding for activities within the instruction program to recognize differences in costs by level of instruction, among academic disciplines, and among institutional roles and missions. Over time, formulas for instruction have become more complex in part because improvements in cost accounting procedures have resulted in more accurate data.

States use both the all-inclusive approach and the itemized approach in the instruction area, but the majority use the itemized. Explicitly, states have attempted to distribute in an equitable manner state funds for the instructional operations of public institutions within the state by recognizing the equality of class credit hours by discipline and level and the differences in institutional roles and missions. Since the formula allocations provide varying amounts based on enrollments by level and discipline, each institution in the state may receive differing amounts for instruction and different amounts per student from the formulas. Some of the states/systems such as Pennsylvania recognize economies of scale in the Instruction formula by using fixed and variable costs. The Appendix includes Exhibit A - 1 that provides information on the computational methodology, base factors, differentiation, and economies of scale factors in instruction formulas used by states or systems.

Examples of two formulas for instruction follow. Student/faculty ratios by level by discipline vary in the first sample formula, while the rate varies by level in the second.

1. *Instruction funding = the sum of (the number of faculty positions per discipline times the average faculty salary for that discipline),*
   where the number of faculty positions is determined by student/faculty ratios and the number of FTE students is determined by credit hours by level.

2. *Instruction funding = Base amount plus the sum of [(a rate times the number of weighted credit hours in Discipline Group 1) , (rate times the number of weighted credit hours in Discipline Group 2) and (rate times the number of weighted credit hours in Discipline Group 3)]*
   where the number of weighted credit hours is the rolling three-year average credit hours, and all academic disciplines are assigned to one of three discipline groupings based on cost factors. A discipline may be in Discipline Group 1 for undergraduate instruction, and in Discipline Group 2 or 3 for Master's or Doctoral instruction.

Each state that uses a formula for instruction utilizes a unique methodology. In fact, no two states rely on the same parameters for determining funding needs for their institutions of higher education.

A common problem faced by those states with large numbers of instructional cost categories in their funding formulas is the need to monitor the appropriateness of the classification of student credit hours by program or discipline. Formulas with too many program levels can create a temptation for institutions to assign their credit hour production to those program categories with the highest rate of reimbursement. The need to audit the correct reporting of student credit hour production exists in any enrollment-driven funding formula. However the problem grows exponentially with the level of differentiation.

In general, too much differentiation within the instructional component creates incentives for "gaming" the formula and leads to extra administrative expense in auditing enrollment reports and projecting future enrollment levels. For these and related reasons, some states (e.g., Florida) have refined their formulas in recent years to rely on a smaller number of cost categories in their instructional formula. Other states also are evaluating the use of simpler formulas.

3.2.2. Research

This category includes expenditures for activities designed to produce research outcomes. Explicitly, or implicitly by inclusion with at least one other functional area, 17 states have a formula that provides funds for the research budget area. Information on the formulas may be found in Exhibit A – 2 in the Appendix.

Florida's formula is complex and involves computations related to the magnitude of research activities at each institution. The number of research positions is calculated based on a ratio by specific department and is then multiplied by a specified salary rate. Kentucky used a formula that calculated a level of support that recognizes differing roles and missions in research among institutions. Because different systems have differing goals, there are no generic "best practice" research formulas. Two sample research formulas follow.

1. *Research amount = 1% of outside funding for research.*
2. *Research amount = 2% of the sum of the formula amounts for instruction and academic support plus 5% of sponsored research*

3.2.3. Public Service

This category includes funds expended for activities that primarily provide non-instructional services to individuals and groups external to the institution. Alabama, Kentucky, Maryland, Tennessee, and South Carolina were the only states who reported using an explicit formula approach for the funding of public service activities in 1996. In Florida, public service positions were generated based on ratios specific to disciplines and then multiplied by a salary amount per position. South Carolina provided 25 percent of prior year sponsored and non-general fund public service expenditures; Alabama's funding formula was 2 percent of the combined allocations for instruction and academic support. Information on public service formulas may be found in Exhibit A – 3 in the Appendix and sample public service formulas are shown below.

1. *Public service amount = 2% of the sum of instruction and academic support*

2. *Public service amount = $75,000 + 1% of instruction, or $150,750 whichever is greater*

3.2.4. Academic Support

The category academic support includes funds expended to provide support services for the institution's primary missions of instruction, research, and public service. The area includes expenditures for libraries, museums, and galleries; demonstration schools; media and technology, including computing support; academic administration including deans; and separately budgeted course and curriculum development. However, costs associated with the office of the chief academic officer of the campus are included in the institutional support category.

To fund the library component of the academic support category in 1996, Alabama, Connecticut, Florida, Georgia, Kentucky, Maryland, Mississippi, Missouri, Nevada, Oregon, South Carolina, Tennessee, and Texas had at least one formula. Texas allocated an amount per credit hour differentiated by level of instruction.

Standards on the size of library collections, number of support personnel, and other factors have been developed by the American Library Association (ALA) and the Association of College Research Libraries (ACRL). Formulas to apply these standards, like the Voight formula and the Clapp-Jordan formula, have been developed so that institutions may determine if their library holdings meet the minimum requirements established by professional librarians. Only three states used a library formula that would permit meeting the ACRL criteria.

However, no formula or standard currently in use accounts for the changes in resource requirements necessitated by increasing use of technology. In fact, the ALA and ACRL standards on size of collection do not consider the use of the "virtual library" where the text of some "books" may be accessed electronically via the Internet. These technological changes in media availability certainly will have profound impacts on library resource needs, but such changes have not yet been reflected in funding formulas. In fact, such changes could actually make the distinction between "libraries" and "academic computing" currently found on most campuses irrelevant in the future. As such, the practice of having separate formulas for libraries could become outdated. An example of a simple and a more complicated academic support formula is shown below.

1. *Academic support funding = 5% of instruction formula calculation*
2. *Academic support funding = $750,000 + 15% of instruction formula calculation + $10 per undergraduate credit hour over 50,000 credit hours = $20 per masters credit hour + $80 per doctoral credit hour + $5 per continuing education hour*

In 1996, Florida, Kentucky, Missouri, South Carolina, and Texas each had at least one formula for other components of the academic support category. South Carolina calculated an amount based on the average expenditure per student by type of institution. Data from the most recent IPEDS surveys were updated using the Higher Education Price Index (HEPI) to arrive at the amount per student. Information on academic support formulas used by states/systems may be found as Exhibit A – 4 in the Appendix.

3.2.5. Student Services

This expenditure category includes funds expended to contribute to a student's emotional and physical well being and intellectual, social and cultural development outside of the formal instruction process. This category includes expenditures for student activities, student organizations, counseling, the registrar's and admissions offices, and student financial aid administration. Information on the student services formulas used by other states/systems may be found in Exhibit A – 5 in the Appendix.

The student services formulas used by Alabama, Kentucky, and Texas provide a different amount per head count or FTE student. As the size of the institution increases, the rate per student decreases to recognize economies of scale. The formula implicitly does this by adding an amount per weighted credit hour to a base. Such a calculation inherently recognizes economies of scale. South Carolina currently uses a flat amount per student, determined as the average IPEDS expenditure, updated by the HEPI. No economy of scale factor is included. Two sample student services formulas follow, both including consideration of economy of scale.

1. *Student services funding = $395 per student for the first 4,000 headcount + $295 per student for the next 4,000 headcount + $265 per student for all students over 8,000 headcount.*
2. *Student services funding = Base funding of $2,345,585 up to 4,000 headcount + $282 per student from 4,001 to 8,000 headcount + $255 per student over 8,000.*

3.2.6. Institutional Support

This category includes expenditures for the central executive level management of a campus, fiscal operations, administrative data processing, employee personnel services, and support services. Information on institutional support formulas may be found in Exhibit A – 6 in the Appendix.

In 1996, Alabama, Mississippi, South Carolina, and Tennessee multiplied a specified percentage by all other E&G expenditures to calculate institutional support needs. Kentucky included some differentiation and a base amount to recognize economies of scale and complexity of operation, and Texas multiplied a specified rate by a measure of enrollment to determine institutional support amounts.

Most institutional support formulas recognized fixed and variable costs by including a base amount and a specified amount per student or percent of base. Examples of "best practices" institutional support formulas are shown below.

1. *Institutional support = base amount + 15% of total E&G budget (excluding institutional support)*

2. *Institutional support = 11% of total E & G formula amount (excluding institutional support) for institutions with more than 8,000 headcount students or 15% of total E & G formula amount (excluding institutional support) for institutions with less than 8,000 headcount students.*

3.3.7. Operation and Maintenance of Physical Plant

This category includes all expenditures for current operations and maintenance of the physical plant, including building maintenance, custodial services, utilities, landscape and grounds, and building repairs. Not included are expenditures made from Plant Fund accounts (for items such as building construction and major renovation, purchase of lands, etc.), or expenditures for operations and maintenance of the physical plant component of hospitals, auxiliary enterprises, or independent operations. Information on the physical plant formulas used by other states/systems may be found in Exhibit A – 7 in the Appendix.

Because the physical facilities of colleges and universities are quite complex, and each is unique, funding formulas for the operation and maintenance of the physical plant may be very complex. All of the states (except Montana) that reported using funding formulas in 1999 provide state resources for plant operations through a formula. Connecticut, Oregon, South Carolina, and Texas use multiple formulas to calculate detailed plant needs. These complicated methods differentiate among types of building construction, usage of space, and size of institution. Differences among buildings on each campus are recognized, and the unequal costs of maintaining, cooling, heating, and lighting each building are built into the formulas.

On the other hand, some states provide a flat dollar amount per gross square foot of building space. A plant formula that uses this rate per base factor method has the advantage of being simple and easy to calculate. However, unless the dollar amount per square foot is differentiated by type of building construction (i.e., one rate for frame buildings, another for brick or masonry, and a third for steel), legitimate differences in maintenance costs are not recognized.

Examples of the more complex formulas for plant operations follow. Although this set of formulas is more detailed than a simple rate per gross square foot, it recognizes that there are important differences in a campus' physical facilities that impact on cost.

1. *Plant funding = the sum of Building Maintenance + Custodial Services +Grounds Maintenance + Utilities*
   Where: Building Maintenance = a maintenance cost factor times the replacement cost of the building, and the maintenance cost factor varies by type of construction and whether or not the building is air-conditioned;
   Custodial services = square footage divided by the average square footage maintained by one person per year times a salary rate; Grounds maintenance = rate times the number of acres maintained; and Utilities = actual prior year expenditures, adjusted for inflation and other cost Increases.

2. *Plant funding = $4.17 times the number of category I GSF space + $3.44 times the number of Category II GSF + $5.54 times the number of health care GSF + utilities + $2,267 per acre maintained + lease costs – 25% of indirect cost recovery funding*

One of the problematic issues in plant funding formulas is the decision related to for which buildings and areas of campus the state should provide funding. Texas, for example, includes within the formula only the square footage and acreage of buildings and grounds that relate to instruction, research, and public service (or E & G buildings). Arizona excludes research buildings constructed with private funds even though those buildings would be considered "E & G" buildings by other states. Some states include buildings and grounds used by intercollegiate athletics, while others exclude these facilities as “auxiliary.”

Another issue related to plant funding is whether to include funding for building renewal within the operating budget formulas. Texas includes an amount equal to a percentage of the replacement cost of the building, where the percentage varies by type of building. On the other hand, Arizona allocates a percentage equal to the replacement cost of the building, but the funding is included in the capital budget appropriation, not the operating appropriation, and is placed in the plant fund portion of the universities’ budgets. From a different perspective, Maryland does not place any funding for building renovation in the college and university budgets but funds all building renovation and major maintenance from the budget of the State Department of Planning and Construction.

3.2.8. Scholarships and Fellowships

This category encompasses all expenditures for scholarships and fellowships, including prizes, awards, federal grants, tuition and fee waivers, and other aid awarded to students for which services to the institution are not required. Information on scholarships and fellowships formulas used in 1996 may be found in Exhibit A – 8 in the Appendix.

Only Kentucky, Maryland, Mississippi, Montana, and Oklahoma calculated an allocation for scholarships and fellowships. In each case except Oklahoma, which calculated the amount as a dollar value times the number of FTE students, the formula amount was calculated as equal to a percentage of tuition revenues. These approaches all provide horizontal equity but fail to provide vertical equity in that neither the cost to the student or the institution nor student’s ability to pay are considered in the formula. Consequently, there really is no “best practices” example of a formula for this program area. Two examples of scholarships and fellowship formulas are given below.

1. *Scholarships and fellowships amount = 10.5% of estimated income from undergraduate student tuition and fees.*
2. *Scholarships and fellowships amount = amount times the number of full-time equivalent students*

3.2.9. Revenue Deduction Components

The majority of the states that use funding formulas in the resource allocation process do not employ a revenue deduction component. In those states, the calculation of the formula funding amounts are intended to reflect only the state share of funding. Where a revenue deduction component is included in the formula, the most common calculation is to deduct a percentage or all of non-resident tuition and fees.

Alabama's revenue deduction was based on the weighted average credit hour charged to full-time students. Each institution charges a different tuition, so the average tuition charge per weighted average credit hour across all campuses was calculated and then multiplied by the number of credit hours. For historically black institutions, the amount deducted was equal to 90 percent of the actual weighted credit hour charges.

Mississippi deducted a percentage of the total calculated by the formula, with the percentage varying by sector. Georgia deducted not only all unrestricted tuition and fee revenues but also certain other unrestricted revenues. Kentucky and Tennessee deducted an amount equal to a tuition rate times enrollment, plus a percentage of investment income. West Virginia deducted only tuition revenues generated by a higher percentage of non-resident students than average for each institution's peer group.

South Carolina deducts an amount equal to non-resident full-time student enrollment times the "cost of education", up to total non-resident tuition and fee revenues received; and resident tuition and fee revenues equivalent to 25 percent of the "cost of education." In this deduction step, a calculation is made to determine undergraduate and graduate "cost of education," defined by a formula unique to South Carolina. State law requires that non-resident students pay at least the full cost of education, which results in the deduction on non-resident fees up to the cost of education. Institutions are permitted to retain any non-resident revenues above the calculated amount to encourage institutions to charge non-residents higher amounts to keep resident tuition and fees as low as possible. For resident students, the Commission on Higher Education has interpreted the state policy of low tuition to mean that state residents pay 25 percent of the cost of education determined separately for undergraduate and graduate students. If total resident tuition revenues exceed 100 percent of the calculated "deduction" amount, then the institution may retain the first 10 percent of the excess, but all amounts over 110 percent of the calculated amount are deducted from the institution's allocation. In South Carolina, institutions charge different tuitions, and have differing costs of education; consequently, the deduct amount must be calculated for each institution. Institutions have been critical of the deduction since the formula has not been fully funded for some time, and tuition has increased to supplant state revenues insufficient to meet the institutions' "needs" as calculated by the funding formula.

3.3 Emerging Trends in Formula Design and Usage

As indicated at the beginning of this section, there has been a constant evolution in both the design and usage of funding formulas and guidelines during the 50+ years that they have been in use. Some of the major trends are listed below:

More Detailed Categories. One long-term trend has been the development of more detailed guideline categories. Within the instruction component, for example, there has been a tendency toward the use of more discipline categories, more levels of instruction, and separate add-on rates for non-personal services expenses. As discussed earlier, however, some states have found that adding more complexity in their formula has had adverse results.

Greater Use of Non-formula Categories. As a result of the increasing scale and complexity of state systems of higher education, there has been a greater use of non-formula categories as a supplement to formula/guideline calculations in recognition of the fact that the formula approach may not be adequate to meet the needs of some programs and activities (e.g., unique or specialized academic and administrative programs).

Increasing Focus on Quality and Performance. In response to growing public concerns over accountability and quality, some states have begun to implement funding mechanisms, either implicitly or explicitly, based on institutional performance. This shifts the focus from equity and adequacy in funding to outcomes achieved with the funding received.

4.0 SSHE's Funding Formula

The basis for the current SSHE funding formula was established in 1991 when the Executive Council of the SSHE discussed concerns about the lack of a formula for use in allocating the state appropriation to the System among the 14 universities. A funding formula was to be used to document System needs to the Board of Governors, the Governor, and the Legislature, as well as allocate the appropriation. An Allocation Formula Committee was appointed to address these issues.

The Allocation Formula Committee agreed on a set of principles, concepts, and objectives to underlay the formula. The formula developed was to be comprehensive, need-based, linked to policy, stable, valid, flexible, related to the missions of the institutions, consider economies of scale, include incentives, and be adequate, equitable, simple, serve dual purposes, and be subject to sunset provisions.

Not all institutional sources of funds were included in the formula process. Only those funds that were available for the general purpose operations of the universities were to be considered. Any "restricted" revenues or revenues earned by auxiliary enterprises were considered to be "special purpose" and were not included in the formula methodology. "Restricted" revenues are those whose purpose has been determined by sources external to the institution: federal grants and student financial aid are examples of restricted revenues.

The funding model established in 1992 had six basic steps. First, the budget needs of each university for the upcoming year were determined, and then an estimate of the ability of each institution to meet its own needs through the base appropriation and tuition is determined. Next, an estimate is made of available revenue, expressed as a percentage of need for each university, and the percentage rates are compared across all fourteen universities to determine relative under/over funding. This calculation provides the parameter through which base funding is adjusted; however, in any one year, base funding cannot be reduced by more than one percent. Finally, tuition and appropriation increases for the new year were allocated across the board to all universities.

The determination of each university's needs is made through three basic calculations for *primary mission needs, support program needs, and plant operations and maintenance needs.* For the **primary mission**, which was defined to be instruction, research, and public service, needs were determined by calculating the number of full-time equivalent students (FTES) at four levels (lower division, upper division, master's, and doctoral). Level is determined by the level of the student rather than the level of the course. The number of credit hours is divided by different divisors to determine FTES at each level. An FTES at the lower or upper division level is determined by dividing the annual student credit hours taken by undergraduate students at the freshman-sophomore or junior-senior levels by 30. Master's and doctoral FTES are determined by dividing annual credit hours taken by graduate students by 24. Primary mission needs are the biggest component of the formula.

For **support programs,** defined as academic support, student services, and institutional support, needs were determined using FTES unadjusted by student level. For **plant operations and maintenance,** needs are based on plant size in gross square feet (GSF) and intensity of use.

Calculations in each of the three basic areas provide a base level funding that includes economies of scale factors. In the primary mission formula, economies of scale are recognized by inclusion of a base level of instructional staffing. Base staffing amounts were determined separately for the lower and upper division instructional levels by regression analysis of actual instructional staffing and enrollment levels in the SSHE over a five-year time period. Base staffing for the master's level used data for only one year. Variable staffing levels are calculated using different student/faculty ratios by level. The combination of base and variable staffing results in a declining level of instructional staffing as enrollments increase. Because data were insufficient to calculate any economies at the doctoral level, base and variable funding for the doctoral level were determined through discussions.

Once the total number of instructional positions was determined by summing the number of base and variable staffing positions, funding requirements are determined by multiplying the total positions by a cost multiplier. The basic multiplier amount provides for faculty salaries, support staff salaries, fringe benefits, equipment, and other departmental expense for instruction, research, and service departments. The rate was determined by dividing total expenditures in 1992-93 for the three functions by the formula-derived number of instructional positions. The multiplier rates in following years were projected using historic rates of inflation for the types of expenditures incurred by academic departments.

The instructional unit multiplier also included a supplemental amount above past spending rates to provide for quality improvement. The supplemental amount was calculated as the amount needed to provide for improvements in computing equipment.

Additionally, funding for special needs such as support of new academic programs was included. Stability was introduced to the formula by including a three-year rolling average FTE enrollment within the primary mission formula. In addition, the three year rolling average lags the current year, so that the average used for fiscal year 2001 allocations was based on the average enrollment by level for 1996-97, 1997-98, and 1998-99.

For the support programs formula, a base level of funding was determined through a regression analysis of 1992-93 expenditures for the support programs and FTE students in the same year. Amounts for years following were adjusted for inflation. The same regression analysis also determined the variable funding rate for support programs. In addition, a component to allow for improvement of the quality of the library was included as an integral piece of the support programs variable component.

For the physical plant formula, the primary driver of the formula was the number of gross square feet of campus space maintained, which is a commonly accepted workload measure for this functional area. Auxiliary enterprise space, such as housing and food service was excluded from the space, and space being renovated was counted only at half value. Leased or rented space was eligible for inclusion, and space occupied for only a portion of the year was prorated.

Because the number of GSF per FTES on each of the campuses varies significantly, an intensity of use factor was included. More crowded campuses, for example, require additional maintenance and utilities. Thus, to determine the formula amount for plant, first the number of “fundable” gross square feet is determined by taking the average between “predicted” and “actual” GSF. “Predicted” GSF are calculated using a regression equation of eligible square feet and number of FTES. The regression provided a means of identifying a base square footage allowance for each university as well as a per-student rate for additional square feet. The predicted square feet was the sum of the base allowance and the product of the variable rate times the number of students. This adjustment served to reduce the number of fundable square feet for those universities with higher than predicted campus sized and to increase the fundable square feet for the universities with more intensely used physical plants.

To include economies of scale, the plant formula provides a base level of funding and a variable level. The variable level and the base were determined through regression analysis. In addition, the formula includes a component for life cycle maintenance of buildings. Previous System studies had determined that major building systems and components should be replaced every 35 years in a least cost, life cycle model. To do this, each university would need to set aside annually an amount equal to 2.5 percent of its total building replacement value. The System maintains data on the replacement value for each campus building which is adjusted based on specific cost factors provided by the R.S. Means Company. The System is unusual in its inclusion of the life cycle cost factor, and is to be commended for its forward thinking in this area.

To determine what local revenues will be considered in the formula allocation, additional calculations are made. The formula assumes that most local revenues are dedicated to special purposes whose needs are not calculated by the formula. However, the ability of each university to collect both resident and non-resident tuition is considered before the amount of the state appropriation allocation is determined. An adjustment also is made to recognize the value of international students in the System. Therefore, the funding model shelters non-resident tuition waivers for international students. Two percent of each university's three-year rolling average of FTE students is multiplied by the differential between the full-time resident undergraduate student tuition rate and the full-time non-resident undergraduate student tuition rate. The product of this calculation is netted against each university's gross tuition revenue prior to determination of each university's overall funding requirement.

The Funding Formula Oversight Committee was established by the Board of Governors in 1994 and receives direction from and reports to the Board and the System Leadership Team. The Funding Formula Oversight Committee is a resource to refine data collection, develop procedures for updating the formula, recalibrating staffing ratios, and enhancing formula design. Membership on the Committee is broadly representative of the types of campuses within the State System, and cross-functional.

The Committee serves to annually update the three broad funding formulas that are based on five-year regression analysis, with inflationary factors. The Committee also was charged to modify the calculation to reflect the need for doctoral programs more accurately. This was done through peer comparisons and through an analysis of Indiana University of Pennsylvania's doctoral cost structure. The modifications for the doctoral programs at IUP were phased in over two years and are reflective of the System's Master Plan for doctoral education.

A Funding Formula Review Committee was established to conduct the formal sunset review of the formula in 1999-2000. The Committee's mission was to assess the funding formula's effectiveness by reviewing its performance in meeting its stated guiding principles, basic concepts, and goals and objectives. The assessment also was to include a review of the funding formula continued relevance to changing constituent expectations, institutional dynamics, and economic circumstances; and to determine if the formula was working as anticipated and met the needs of the System. Working with the Funding Formula Oversight Committee, the Review Committee analyzed the formula's performance over the last five years.

The Funding Formula Review Committee made the following recommendations, after determining that the current formula does not fully meet the needs of the System:

- The System should begin to move toward performance funding with a small percentage of the System's appropriation distributed outside the existing formula.
- Regressions developed in the past few years should not be used, and more detailed review of the need component of the formula should be performed to develop a calculation methodology that adequately addresses economies of scale and changes in workload.

- Further study should be performed on the System's diversity in programmatic costs to determine if, and how, a recognition of high cost programs, possibly to include graduate programs and branch campuses, within the funding formula is necessary to ensure equity.
- A more detailed review of the tuition revenue component of the formula should be performed to develop a calculation methodology that would support pricing flexibility.
- The formula's secondary purpose of identifying the system's financial requirements in support of the system's budget process continues to remain an emphasis of the formula, and its use with the system's stakeholders should be developed.

The Committee further recommended that a task force be established to study other issues and that an external consultant be hired for assisting the task force with its task.

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