REPORT OF THE
COMMISSION ON THE
UNIVERSITY OF THE
21st CENTURY

The Case For Change

TO THE GOVERNOR AND
THE GENERAL ASSEMBLY OF VIRGINIA

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THE CASE FOR CHANGE

Commission on The University of The 21st Century

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A LETTER TO THE GOVERNOR, THE GENERAL ASSEMBLY, AND THE PEOPLE OF VIRGINIA FROM THE COMMISSION ON THE UNIVERSITY OF THE 21ST CENTURY

Ladies and Gentlemen:

Our Commission, created by resolution of the 1988 Session of the General Assembly, has completed its work and submitted its report.

Our major conclusion is that fundamental changes in Virginia's system of higher education are necessary in order to strengthen Virginia's leadership position among the states. The world's social and economic orders are changing at an unprecedented pace. While higher education cannot solve the many problems confronting our nation, it can provide leadership in bringing about the educational reforms required for people to begin working out solutions.

We affirm the value of higher education. With Thomas Jefferson, we believe that "diffusion of knowledge" among the people is the instrument by which we maintain our history and identity, our economic security, and our personal and corporate opportunities for growth.

We thank the Governor, the General Assembly, the faculties and administrations of Virginia's colleges and universities, and the many interested citizens who have contributed to our deliberations. They stimulated us to think about the world in which we would like our children and theirs to live. We believe we have responded to Governor Gerald L. Baliles' request to provide a vision for higher education in the next century. Whatever success we have had is due to the fine cooperation we experienced across the Commonwealth.

Thank you for asking us to undertake this important work.

I. THE CASE FOR CHANGE IN VIRGINIA HIGHER EDUCATION

Concern for how Virginia higher education will absorb substantial growth - up to 24,000 more undergraduates by 2004 - was in large part the reason for creating the Commission. But we have concluded that accommodating growth ought not obscure the compelling reasons why Virginia's colleges and universities --every one of them -- should carefully examine what they teach and how they go about their business. Whether enrollment increases or not, our children and theirs will have to know and be able to do things many of them are not learning in college today.

Economic: Virginia is moving rapidly from an agricultural and smokestack manufacturing economy to one driven by information technology and service industries. Virginia companies will do $7.7 billion in business outside the United States this year. But many students are ill-informed about the customs, economics, and politics of our potential trading partners throughout the world. They are not prepared to deal with conflicts of ideologies and value systems in international affairs.

Not only are Virginians doing business all over the globe, but the world is coming to Virginia. For example, there are 419 foreign-owned businesses in Virginia, employing approximately 30,000 citizens. Thirty-five of these foreign-owned businesses came in 1988 alone.

The Workforce: By the year 2000, only 15 percent of persons entering the national workforce will be Caucasian males. In many parts of the United States the majority of the population will be racial and ethnic "minorities." The graduates of Virginia's colleges and universities will work all over this nation, as well as throughout the world. They will have to be prepared for leadership in far more complex settings than those that exist today.

Technology: It already has changed the work-place. Some colleges and universities are beginning to realize the extent to which technology can change teaching, learning, and research. The changes can make our lives more humane and satisfying, or more impersonal and empty. All students - not just engineering and science majors - need sophisticated knowledge about technology. It is a prerequisite for good citizenship as well as for professional competence.

New Students: The majority of students in Virginia higher education are women, but they are not well represented in a number of disciplines, especially the technical ones. The college-going rate of black high school graduates hasn't changed in ten years. They, too, are not well represented in the technical disciplines.

There are too few women and black faculty members. Their perspectives can help to make our colleges and universities places that recognize a greater range of human experience and that are more able to educate persons whom we badly need as productive citizens.

Colleges and universities have tended to view involvement with the public schools as an ancillary social responsibility. In fact, it is one of the most central responsibilities of higher education.

Literacy: Employers told us that too many young people are not functionally literate. They also told us that, on a higher level, too many lack the ability to think a problem through, develop an answer, and communicate it effectively to others.

Research: It is far more than the engine that drives the economy. It is the wellspring from which America draws most of its new ideas, solutions to problems, and visions of what is possible. This nation's research universities are the envy of the world. But Virginia is not as strong in this area as it should be. It has the 11th largest system of higher education in the nation, but Virginia universities have only the 20th greatest research volume among the states.

Libraries and information: The library is more than a place to store and use books. It is a hub in an extensive electronic information network that includes national data bases (patent data, census data, case law, and so on), indices to the holdings of major research libraries around the world, government records, and other material. We should be looking ahead to libraries from which vast amounts of data are available electronically in our homes, dormitory rooms, or offices.

Rewards and incentives: Many of the most important changes have to occur here. We tend to provide money to institutions based on how big they are rather than how well they perform. We tend to reward success in obtaining research grants more than proficiency in teaching. We provide fewer teachers for young freshmen than we do for seasoned, experienced graduate students. Both on the campus and in the capital, the rewards and incentives now being used do not always yield the behavior we need: experimental, restless, open to change, willing to take risks.

Enrollment growth: It will happen. The students who will graduate from high school in 2004 were born last year. Only major shifts in economic policy will stop people and industries from moving to Virginia.

But accommodating more students is the easy part of the challenge. Twice before in the last 50 years higher education has handled even greater growth: after World War II and when the baby-boom children came of age in the 60's. This time Virginia can use the growth as an occasion for making essential changes. But planning must begin now or Virginians will end up reacting to what happens rather than creating the future we want.

II. THE COMMISSION'S RECOMMENDATIONS

The University of the 21st Century is not just a place. It offers a new way of looking at ourselves, others, and the world in which we live. It also is a network of resources linked together electronically or physically. The resources are people, ideas and information, and equipment.

Curriculum change: The curriculum for undergraduates should be changed so that global perspectives are pervasive in all fields of study and technological competence is taught to all students. The curriculum should recognize that the United States always has been a multi-cultural, multi-racial, and multi-ethnic society--and is becoming even more so.

Advanced graduate education should be re-examined with an eye toward shortening the time required to earn the doctoral degree and teaching potential faculty how to teach. Teaching and learning throughout higher education should be re-examined to ensure that advanced computing and telecommunications equipment is used to increase the learning capacity of students and faculty contact with students rather than to diminish them.

The community colleges should offer more students the first two years of the bachelor's degree. This will help ease enrollment pressures throughout the system of higher education and insure that low cost higher education is available. A strong general education program in all community colleges is a necessary precondition to achieving this goal.

Preparing and supporting faculty: Faculty must have time and resources to develop new skills, courses, programs, and perspectives. There will be no change for the better in Virginia higher education unless the faculty have the resources they need to make it happen.

The reward systems for all faculty need to be changed. There should be more rewards for good teaching and advising, for contributions to curricular reform, for developing new skills and knowledge, and for transmitting to the general public the fruits of basic and applied research. Virginia needs to prepare for a potential shortage of faculty. New faculty ought to be hired in advance of the shortage, beginning in 1992-94, and selected senior faculty who elect to continue working past age 65 should be asked to serve as mentors for junior faculty. Women and men who received doctoral degrees in recent years when there were no jobs available ought to be invited to consider joining the faculties. Students in middle and high school should be introduced to college teaching as an attractive profession.

The number of minority faculty must be increased. Virginia should seek to form a compact with other states that are the prime producers of Ph.D. recipients and employers of faculty to offer minority students expanded opportunities for advanced graduate study.

Providing for research: Virginia should support externally sponsored research based on the amount of it the institutions generate from external sources. Incentives should include additional laboratory space, support for graduate assistants and post doctoral students, and the continued return of all or a portion of the state's share of overhead revenues (a practice begun under the current administration).

Cooperative relationships: Private colleges and universities should be encouraged to expand enrollment, supported by the Tuition Assistance Grant Program and the contract for services program.

Minority enrollment has to be increased. Virginia should provide a clear statement of its intent to meet the needs of students who successfully finish high school and require financial assistance beyond their families' means. Business, higher education, and the public schools should cooperate to ensure that no young person is lost due to neglect, lack of information, financial need, or inadequate preparation.

Special concern for young students who tend to drift first into eduction's and then into society's backwaters is important to ensure that Virginia uses all of its human talent and energy in the years ahead. High school dropouts are a higher education problem.

In general, Virginia's colleges and universities ought to be more involved with the public schools. The gulf that separates K-12 from undergraduate education has to be bridged. The education of teachers is obviously a key responsibility that must be taken even more seriously than it is today. The continuing education of teachers, especially in the subjects they teach, is equally important. Coordination of secondary school and college curricula is particularly important to ensure students a continuous educational experience.

Colleges and universities should provide opportunities for continuing education over a lifetime, as a broadly educated citizenry is central to improving even further the quality of life in Virginia. Adults will seek to continue their educations after years away from schooling, to stay abreast of change in their professional lives, or simply for personal growth.

The traditionally black colleges should be maintained as strong as possible. They still offer opportunities not otherwise available to a substantial number of Virginians and they help to continue a vital Afro-American presence in the nation's culture.

Organizing for change: The current Virginia practice of permitting its colleges and universities to accept substantial numbers of students from other states should be continued, with out-of-state students paying tuitions that are as high as competitively possible. Indeed, we encourage even greater diversity among those who come from outside Virginia: not necessarily more students, but students from more states and other nations. The great colleges and universities of the future will be global in every dimension.

The architecture of new construction and major renovations should reflect such global dimensions through increased use of technology in teaching, research, and learning. Different patterns of space use and design should be developed. Buildings constructed in 1995 will be used at least until 2035. If they are designed for today they will not meet tomorrow's needs. The state system's space planning guidelines should be changed to reflect emerging or desirable patterns of space use.

The state system's operating budget guidelines should be changed to increase the rewards for substantive curricular change, better teaching and increased productivity. There are, at present, too many incentives to grow bigger and too few to grow better.

Guiding growth: Instead of offering a detailed plan for expansion of the Virginia system of higher education, the Commission offers a set of policies on which decisions for programmatic improvements or increased enrollment should be made.

1. Planning ought to be done not only by institutions but among them. We are not calling for sameness but we are calling for cooperation. We support competition among ideas but not for territory.

2. The current policy and practice of keeping Virginia's state-supported universities relatively small in comparison with those in some other states should be continued. Our reasons are simple. Smaller institutions are an attractive and distinctive characteristic of Virginia higher education. Particularly at the undergraduate level, many Virginia colleges and universities have reputations as places in which students receive personal attention. While other states have universities that are twice the size of

Virginia's largest, and while some of them are quite good, Virginia has chosen another approach that has worked well and should be continued.

In addition, Virginia has a coordinated system of colleges and universities whose strengths balance one another. For any of its universities to become massive, multi-campus institutions would upset the delicate political and educational balance upon which the present system depends.

3. Undergraduate growth should occur across an array of institutions that reflects the diversity of Virginia high school graduates. Growth should be approved at highly selective and moderately selective institutions, and at those to which admission is actually or virtually open.

4. Wherever growth occurs, it should be accompanied by curricular improvement. Institutions that propose to offer students new perspectives upon the arts and sciences, technology, and the professions should be the first authorized to accommodate more students if they propose to do so.

5. Funding for growth that takes place along with specific curricular improvement should be greater than that for enrollment growth alone.

6. Proposals for curricular improvement from institutions that choose not to increase their enrollments should be encouraged. Growth is not a prerequisite for change.

7. Proposals to accommodate more students should place special emphasis upon the education of minorities and women, both of whom will become more important participants in our society and the workforce.

8. The enrollment growth should consist primarily of Virginians, especially at colleges and universities that now enroll substantial numbers of out-of-state students. In this way, the percentages of out-of-state students should decrease while their absolute numbers will not.

9. Funding for growth should be separately identified to ensure that it does not occur at the expense of existing students, especially those who are undergraduates. Institutions that propose to grow should be providing adequate services to their present students. The curricular needs of existing students should be kept in mind as institutions consider new curricular approaches designed to accommodate growth.

10. Many adults will need continuing, advanced education

within commuting distance of their workplaces or homes. This education should be provided by faculty on-site and by telecommunications where possible and appropriate. Either electronically or physically, faculty ought go to these students rather than vice versa.

We recommend that each state-supported institution be directed, and each independent institution be requested, to develop a detailed plan in response to this report and about its own view of the future by June 30, 1991, and forward it to the Council of Higher Education.

Finally, we recommend that money be appropriated in the 1990 Session of the General Assembly to permit the Council of Higher Education, in cooperation with the institutions, to plan in response to these policies. Virginia higher education has a momentum that should be maintained. As a system, its colleges and universities are on the verge of being recognized as among the nation's best; individually, some already have achieved that recognition. This is a rare opportunity to assume national leadership.

There is, it seems to us,
At best, only a limited value
In the knowledge derived from experience.
The knowledge imposes a pattern, and falsifies,
For the pattern is new in every moment
And every moment is a new and shocking
Valuation of all we have been.
- T. S. Eliot, "Four Quartets"

THE CASE FOR CHANGE
I. THE NATION AND THE WORLD

We no longer live in the time when some states or even an important group of states could decide everything in the world. Today we need a consensus , an international approach to global problems--not because it is a moral imperative, but for objective reasons, because the world is a single and interdependent whole...
--Eduard Schevardnadze

The Virginia Commission on the University of the 21st Century was created by the 1988 Session of the General Assembly. The Governor charged the Commission to develop a vision of higher education to meet the demands of the next century.

The Commission has reviewed information about changes in Virginia's population and probable growth in enrollments during the next 20 years. It asked for a long-range economic forecast for the state. It has heard about student characteristics, ways in which different students learn, and ways in which the behavior of persons working and studying within colleges and universities create an implicit curriculum -- a set of values and way of looking at the world -- that affects what people learn.

The Commission also requested specific presentations from state officials and college and university presidents. In hearings held across the state, it has been told about needs for additional higher-education services, often closer to homes and places of work.

Science fiction makes people aware that the way things are is not necessarily the way they have to be. The Commission considered and rejected the possibility of taking a highly speculative approach to its work. At the other extreme, we considered and rejected the possibility of preparing a detailed plan for Virginia higher education in the next century. The regular planning processes seem to have worked well and we neither wanted nor had the time and ability to supercede them. Besides, we were asked for a vision, not a plan.

So we have chosen a middle road, trying to be visionary yet pragmatic, imaginative yet grounded in the way things are. We have tried to think like citizens responsible to our colleagues and to succeeding generations. We have tried to write a script for the future that, true to our democratic tradition, will be enacted by many not by few.

In the beginning all the world was America.
--John Locke

From this perspective, the "University of the 21st Century" will be an institution responsible for proposing, evaluating and assimilating new ways of behaving based upon new perceptions and ideas about human beings, knowledge and practice, and the world in which we live. Moreover, it will be not just a place, but a network of resources -- faculty, students, equipment, libraries, classrooms and laboratories -- all linked together electronically as well as physically.

After hearing and reading of many possibilities, the Commission thinks that the basic question with which we are dealing is this: "How can Virginia cause constructive and fundamental change within its colleges and universities so they will be ready to meet the demands of life in the 21st century?" We are looking for ways to encourage risk-taking within institutions that are, like those elsewhere, conservative and cautious about change.

We ask our question with a strong sense of urgency, not just because enrollments will swell, but because the world's social and economic orders are changing at an unprecedented pace that appears to be accelerating. Unfortunately, that pace is also creating a backlash against modernization in certain quarters, causing some to retreat from change or to deny its necessity. Virginia recognizes the responsibilities and possibilities of change and has historically played a vital role in determining the course of humankind.

As we write this report, the United States is struggling with huge debt and trade deficits, rates of productivity that are not competitive with those of several other nations, and the enormous social costs of drug addiction and inadequate schooling for many.

We also face significant changes in our society: an aging population; growing numbers of poor people, especially children; distressingly high rates of functional illiteracy; drug use at an epidemic level; AIDS; the emergence of new patterns of family living. Teaching people to cope with some of these problems and to solve others -- and helping them learn which are which -- are among higher education's major responsibilities.

The world is made of grace, and the important thing is to understand that...we are all struggling between values.
--Carlos Fuentes

Totalitarian governments and state-run economies are being called to account, leading to reform movements worldwide. The European Economic Community is moving toward a consolidation of interests that may make it, after 1992, the greatest concentrated economic power in the world.

These issues are but a handful of the most visible. There also is the dominance of Japan in the world's markets; the rapid emergence of other Pacific rim nations as major producers of goods; and continuing political, economic, and social problems that plague emerging nations on three continents. As a world leader the United States must be concerned with all of this and so must the State of Virginia.

The state of the environment has become an issue of pressing world. Toxic waste, the greenhouse effect, depletion of the ozone layer, acid rain -- these are problems that respect no national borders.

These great global changes come at a time when American education is under as much criticism as it has experienced at any time during the last half of this century. Here are some of the major themes in the chorus of dissatisfaction with education.

** Business leaders, politicians, and educators are saying that our elementary and secondary schools are not performing up to the mark. Although there are methodological difficulties, comparative assessments among industrialized nations seem to confirm the charges.

** While our schools in general are not producing the prepared graduates that we need, we also recognize wide disparities amon schools. Depending upon the will and ability of localities to support their schools, school systems fall along a spectrum from educationally affluent to impoverished.

** The nation's colleges and universities enroll more students than they ever have and afford access to higher education to an extent unparalleled in the world. Our best institutions are the envy of other nations. Each year, more than 350,000 students come here from other countries for their higher education. But again, Americans and their leaders sense that the quality of higher education is very uneven across more than 3,000 institutions, and that equal access for all students remains a problem.

Science fiction is important because it fights the natural notion that there's something permanent about the way things are right now.
--Isaac Asimov

** Vigorous debates are under way about how to make the curriculum reflect global and multi-cultural realities while preserving education in our western heritage; about the proper balance between general and specialized or professional education; about how to encourage greater attention to math and science education; and a variety of other issues.

** Underlying all of this, Americans appear uncertain about the issues of who benefits from higher education (individuals or society), who should pay for it, and how much it should cost. We also are aware of the burden of the federal budget deficit and debt that may damage the systems of public and private higher education as we know them.

While there is confusion and cause for concern, the intensity of public discussion about our nation's educational systems is a hopeful sign: the American people know that the future will be shaped in our schools and colleges as well as in our factories, governments, and other social institutions.

The importance of higher education in this time of rapid and often unpredictable change cannot be overemphasized. Virginia's colleges and universities are a wellspring of new ideas, technologies, and human talent for the state and the nation. They are the places where adolescents enter into young adulthood and where older adults acquire the continuing education that helps them remain useful human beings. They are places where new knowledge is created, both to improve the material conditions of our lives and to enrich our spirits.

At least since the establishment of the land-grant colleges and universities in the last century, America's colleges and universities have provided access and opportunity to ever-greater numbers of students. They have helped to transform the results of laboratory science into better standards of living here and abroad. The have provided the intellectual capital of our democratic government.

As this century draws to a close, we can say that no other nation at any time in human history has extended the educational franchise as broadly as ours. Whatever the shortcomings of the educational systems, those who support them politically and economically are a generous people with implicit faith in the capacity of human beings for self-improvement.

We should continue trying to extend the capacity for self-improvement ever more broadly. For this reason the Commission is committed to the principles of equal educational opportunity, but we want to emphasize the importance of individual initiative in acquiring education. The most important thing we can teach people is that they should want and will need to learn over a lifetime. "If you give a person a fish, you feed him for a day. But if you teach him to fish, you feed him for the rest of his life."

The challenges are changing, and the educational systems must change with them or we shall be left unprepared. Virginia's colleges and universities, which have contributed so much to the development of a modern state in the mainstream of American life, are indispensable as the state undergoes further transformation.

We see Virginia as being in a position to influence educational change nationally, and we judge it worthwhile to try to do so. Quietly, the state's system of higher education has emerged as one of the most highly regarded in the nation. It has been well funded in recent years, and its colleges and universities have been left largely autonomous. Virginia is poised to lead a national movement to change perspectives, curricula, values, and behavior in American higher education.

The Commission offers its thoughts and recommendations for consideration by the people of the Commonwealth and their elected representatives. Looking into the future is a risky business, but we have not so much predicted what will happen as said what we think should happen. We call for a basic transformation in the ways in which Virginia thinks about higher education, colleges and universities think about their responsibilities, and faculties think about knowledge and their disciplines. Some who read our report will think that much of what we envision ought to be going on today in Virginia's colleges and universities. They are right, which is yet another indication of why change is urgent.

THE CASE FOR CHANGE
II. VIRGINIA AND HER PEOPLE

And now...we must again try to discover what sort of world this is, and why we have been sent hither.
--Nathaniel Hawthorne

Profound changes are occurring in Virginia. The Commonwealth is moving rapidly from an agricultural and industrial economy to an economy based upon information and technology. People are moving here because jobs are being created in service and advanced technology industries. These new residents of Virginia live and work mostly in the crescent that extends from northern Virginia to Hampton Roads. They are generally well educated and middle-income. They and the industries in which they work (many of which do business globally) need highly sophisticated services from the state's colleges and universities.

Not only are Virginians doing business all over the globe, but the world is coming to the Commonwealth. For example, there are 419 foreign-owned business facilities in Virginia, employing approximately 30,000 citizens. Thirty-five of these foreign-owned businesses came in 1988 alone. Firms from the United Kingdom head the list of these companies employing the most Virginians and investing the most in the state's economy. In 1985, there were five Japanese manufacturing companies located in the state. Now there are 40, representing an increase in investment from $50 million to $500 million.

Agriculture will continue to be an important aspect of the state's economy. But agriculture itself has come to rely upon advanced scientific and technological developments rather than simply upon human labor. The same point can be made about the state's important coal industry, whose future growth is no longer labor-intensive because of technological advances. Both sectors will continue to rely on university research and educated employees, and our colleges and universities should support them in any way possible.

The changes in Virginia are part of global changes that mark the beginning of an era. In advanced nations, technology no longer simply extends our ability to manipulate an essentially inert universe. Now it helps us to create information; to manage large, complex, and diverse systems without inhibiting their development; and to expand the moral, social, and intellectual universe in which we live.

Although I do not...believe that the human condition will ever advance to such a state of perfection as that there shall no longer be pain or vice in the world, yet I believe it susceptible of much improvement ...and that the diffusion of knowledge among people is to be the instrument by which it is to be effected.
--Thomas Jefferson

As this new era begins, the population of Virginia will increase and so will enrollment in higher education. While long-range forecasts of enrollment are notoriously imprecise (for the past decade or more, they have underestimated the state's population growth), migration into Virginia and the echo effects of the baby boom combine to make an undergraduate enrollment increase of 30 percent by 2005 quite possible. Increases in graduate enrollment are more difficult to forecast but are likely because the industrial development of Virginia seems to be largely in sophisticated services and advanced technologies. More adults will return to higher education in order to continue learning as their work changes.

The increases will be significant, but are manageable if the state begins now to plan for what probably will happen beginning around 1994. The growth will occur after a bottoming-out period during which the number of Virginia high school graduates will decline and undergraduate enrollments should remain relatively stable.

This period, from 1990 to 1994, should be used to prepare for the decade or more of steady growth that will follow. This means that the state's colleges and universities should re-examine their missions, taking care to reallocate their existing resources so they can be used most effectively after 1994. It means that new forms of public-private partnership should be developed so the state can use its resources to provide the greatest possible variety of opportunities for potential students. It means that future growth should be targeted as carefully as possible to take advantage of the existing capacities of Virginia's state-supported and independent colleges and universities.

The opposite of a correct statement is a false statement. But the opposite of a profound truth may well be another profound truth.
--Niels Bohr

As the state's population grows, primarily but not exclusively within the crescent defined by northern Virginia, Richmond, and Hampton Roads, and as new centers of commerce are created, sizeable portions of Virginia and the state's population will not benefit directly from the new wealth and opportunities available. The split between affluent and needy regions of the state could become even greater than it now is. We urge that special attention be given to the needs of persons in geographically disadvantaged regions. Providing access to higher education should continue to be a top priority. This will require different tactics in rural areas than in urban.

We note that young black women and men do not continue their educations at the same rates as their white peers. Virginia's colleges and universities have made great progress in the last 20 years, but they still have not achieved equal participation for all segments of the population. The college-going rate of white high-school graduates has increased by about ten percent in the past ten years, while that of blacks has remained about the same. Even as their numbers have increased in the total population, blacks today represent about the same portion of students in higher education (ten percent) that they represented in 1955. Virginia is not alone among the states in this regard, but substantial numbers of human beings are not developing to their full potential.

The place to begin changing college-going patterns is, of course, in the elementary and secondary schools. It is critically important that people learn to expect that they will continue their educations beyond high school. Early childhood programs and the courses children take throughout elementary and secondary school will determine to a large extent whether they go to college and how well prepared they will be.

Linked to the state's efforts to reduce the number of high school dropouts should be a program that gives young people greater assurance than they have at present that they can go to college whatever their family's ability to pay. The problems of educational disadvantage, social and economic barriers to higher education, and access are complex. We applaud efforts in communities and in elementary schools across the state to address the needs of special groups of students and to counsel them about their educational opportunities. We also applaud colleges and

universities that are working directly with middle and secondary school students to help them prepare for higher education. A coordinated effort from pre-school through higher education is essential to prepare people for learning over a lifetime.

To be realistic, people will stay involved in education only if they perceive that schooling will result in better lives and opportunities. We think it likely that better lives will result from their being able to hold jobs requiring advanced education, either occupational-technical or beyond. Elementary and secondary school students should be aware of career opportunities from the skilled trades to the learned professions. Virginia's colleges and universities should maintain their capacity to prepare students across that range.

Arguably, there are enough students in higher education to fill the best jobs in Virginia's economy. But this argument rests on an assumption we reject: that the major purpose of higher education is to prepare people for jobs. We believe that higher education should help all people develop their capacities to the fullest -- as workers, citizens, members of families and other social institutions, and participants in the global community. A broadly educated citizenry is essential to sustain and improve even further the quality of life in Virginia. Programs that alert children and adults to the benefits of higher education and prepare them for lifetimes of learning should be integral to education at all levels.

Virginia, then, is in the midst of profound and often confusing change. In the context of a generally healthy economy and growing population, circumstances call for new approaches from our educational systems and institutions. The schools, colleges, and universities have improved markedly over the past several years, and now they are called to coordinate their activities better, to introduce new perspectives on their curricula, and to become actively involved in a range of state and global problems that will be with us beyond the turn of the century.

THE CASE FOR CHANGE
III. GLOBAL PERSPECTIVES AND LITERACIES

[W]e have need of critics of science...We need people who can tell us how science is done, down to the finest detail, and also why it is done, how the new maps of knowledge are being drawn, and how to distinguish among good science, bad science, and nonsense.
--Lewis Thomas

Daunting though it may appear, making space for more students in Virginia higher education is not the major problem we face. Higher education has absorbed greater surges of new students at least twice in the last 50 years: under the GI Bill after World War II and as the original "baby boom" surged through the educational systems. We saw at those times that change can occur rapidly when higher education perceives that it is in society's and its own interests to change.

The major challenge is the need to develop new and different perspectives from which the curricula of colleges and universities are taught, and new understandings of higher education's responsibility to the state, its citizens, and the nation.

The need for mathematical, scientific, and technological competence in the 21st century is generally accepted. Yet we are far from achieving literacy in these areas and ought to make more forthright efforts in the curriculum to do so. We need citizens who can understand and question science and technology, and who can make informed judgments about them.

We also should have a curriculum that helps students develop competence in public speaking, writing, listening, and seeing the world around them. The curriculum should, in short, attend to all forms of communication in which we regularly engage.

It seems clear to us that our lives are now inextricably related to those of people living in other nations and different cultures. As our nation becomes more racially and ethnically diverse, the difficulty of seeking a common ground among our own citizens is increasingly linked to our efforts to find a common ground among trading partners and political allies around the world. We can understand our economy only in the context of a global economy, just as we can understand our environment only in the context of the global environment.

Political issues at the national, state, and sometimes the local levels now have global dimensions. Our lives have changed in ways that we have not yet fully comprehended. We need to prepare students for a world in which old rules and assumptions no longer apply. For instance, in the year 2000, only 15 percent of the new workers entering the American job force will be Caucasian men. Our children and grandchildren will encounter vastly different workplaces than those to which many of us are accustomed.

The best response from higher education is to offer students an entirely different perspective -- a global perspective -- on the subjects they choose to study. This goes beyond adding some courses on global issues or starting a few new degree programs. For instance, only two Virginia colleges and universities offer graduate study in foreign languages. Only one offers more than an introduction to Japanese or Chinese and no state-supported institution offers Korean language study. Changing this involves a new perspective on language study: not a general education requirement to get out of the way but a prelude to valuable advanced courses.

We should be careful to distinguish among curricula in determining what "global perspective" means. The phrase suggests an attitude, a way of looking at things, rather than merely a new reading list. We think that substantive change will require reconsideration of teaching and learning across the curricula. While this kind of change rarely if ever occurs overnight, it is important that we begin now to talk about how it should occur.

The graduates of Virginia's colleges and universities should know that the cultures to which human beings belong determine in large part the ways in which they perceive the world, the questions they can ask about it, and what and how they know. They should be aware of and, if possible, experience for themselves the diversity and richness of human experience, a diversity rooted in culture but also in gender and race.

Clearly, this requires more than studying geography or a foreign language, although the study of languages is particularly important because they shape and are shaped by the cultures in which they are rooted. It involves more than a semester abroad, although living in another culture is invaluable as a way of learning the richness of human experience. It involves more than a required course or sequence of courses in general education.

The transformation will have to begin with the faculty because we are suggesting that they see the world and the disciplines in which they specialize in different ways. Only when faculty begin to re-think the premises upon which their teaching and research have been based, and are given the time, resources, and rewards to do so, will it be possible to transform the curricula.

Virginians, and indeed all Americans, need to understand other cultures in order to understand their place in the world. But it is, of course, equally important that they understand their own national heritage. We think we are entering into a period in which there will be a constant interchange between global and national forces that are critical to us and that will continue to define who we are.

Knowing ourselves as Americans involves both knowing the history, language, customs, and ideals of the predominant culture and recognizing the racial, ethnic and cultural diversity of the American people. To deal effectively with the rest of the world we shall have to learn to deal effectively with the differences among ourselves. Indeed many cultural identities can become a national identity.

We favor a curriculum that introduces students to American thought in all its complexity. This means helping students to comprehend the ideals of this nation and the many experiences of Americans that run counter to these ideals. We favor a curriculum that helps students develop the skills of analysis and communication that will make it possible for them to understand the overlapping cultures in which they live and also to shape them. By helping Americans become thoughtful creators of culture, higher education serves not only as an agent of continuity but as an agent of change.

We think that what is required is a thorough review of the entire undergraduate curriculum, both general education and the majors, with this question in mind:

> "To what extent does this part of the curriculum help students to comprehend the variety of human cultures and the wide range of human experience that results from it?"

This inquiry will involve consideration by all institutions of ways of teaching, the content and breadth of present courses, and possibly the development of different curricular offerings. Global differences and similarities in the approach to knowledge are significant and worthy of study in the sciences as well as the social sciences and the humanities.

We further recommend that the colleges and universities undertake a broad review of graduate and professional curricula. We realize that study at this level is more specialized but there may nonetheless be places where new global perspectives should be included.

The Commission notes several areas of scholarship that the colleges and universities might draw upon as they seek to reflect greater diversity in their curricula. Research on women and gender and on the African-American experience, in particular, is enriching our understanding of our own and other cultures. Research on non-western cultures is making similar contributions. An exciting project, "Race and Gender: Programs in Faculty and Curricular Development," at Mary Washington College offers a valuable example of how an entire institution is being influenced by such scholarship.

The focus of this report is on undergraduate and graduate education in the liberal arts and sciences. But some of our observations may apply to professional education (law, medicine, dentistry, and veterinary medicine) as well. Time did not permit a thorough scrutiny of these programs but we did receive comments from faculty, administrators, and interested citizens. We recommend that the State Council of Higher Education be directed to conduct separate studies of selected professional degree programs in the Commonwealth.

We are particularly concerned about the future of medical education. Changes in federal health care programs, in medical practice, and in the health needs of the population make future financial support for medical education and the teaching hospitals usually associated with medical schools a potentially critical issue. Medical education ought to be the first professional program the Council studies.

The role of Virginia's traditionally black colleges and universities deserves special mention. The objectives of increasing the black enrollment at the state's and the nation's traditionally white institutions and of strengthening the traditionally black institutions must be pursued equally.

Also important is preservation and development of an African-American tradition that should be recognized as part of our heritage and of our everyday lives. The traditionally black colleges and universities should continue their efforts to attract more white students so they will have opportunities to explore this rich and important part of American culture.

Virginia also should consider ways to ensure that the large number of persons who enroll in two-year or shorter occupational-technical programs leave higher education with a global perspective. Virginia's community colleges enroll about 40 percent of the students in the state-supported institutions. Fewer than one-fourth of these students are enrolled in programs

How they knew what we
Must know
Without knowing a page
Of it
Themselves
--Alice Walker

aimed at transfer and further study toward a bachelor's degree. In fact, many community college students do not seek degrees at all.

It will not be easy to impart global perspectives through occupational-technical programs that last two years or less. But the women and men enrolled in these programs may be participating in the final formal educational experiences of their lives. The community colleges owe to them the opportunity to comprehend the cultural complexity of the world in which they will live. They will be better and more productive citizens for the experience.

Finally, undergraduate education, both baccalaureate and occupational-technical, should help women and men become more adaptable to changing circumstances. We shall not rehearse predictions about the number of times people will change jobs and careers, but it is clear that a global, liberal education will stand students in good stead.

THE CASE FOR CHANGE
IV. TECHNOLOGY, TEACHING, AND LEARNING

Our existing theories work well, which is certainly a reason to be happy; but we should also be sad because the fact that they work so well is now revealed as very little assurance that any future theory will look at all like them.
--Steven Weinberg

While a great deal has been written during the past few years about the "information age" in which we now are living, there appear to have been few attempts to understand what kinds of changes will occur within colleges and universities as a result of significant advances in computing and communications technology. We have been told only that tomorrow's workforce (and, indeed, today's) will have to be "computer literate" and capable of using sophisticated technology to perform tasks that hitherto have been done either mechanically or not at all.

It clearly is important that our children and theirs be able to work with the most sophisticated technology available to them. Our colleges and universities have a special obligation to ensure that their curricula include instruction in this technology, and Virginia has an obligation to ensure that its system of higher education continues to have access to the equipment needed for excellent instruction, research, and service.

It also is important that our students understand that life in the "information age" involves far more than the convenience of a personal computer in every home, totally portable music systems, and the "call waiting" option on telephones. We have moved from a society and economy in which technology was primarily an extension of human muscle, giving us the strength to manipulate inert materials -- a manufacturing and processing society -- to one in which technology functions to create information. Biotechnology, management systems, processing and manufacturing systems -- all create information from data that heretofore could not be collected, analyzed, or synthesized. The "information age" signifies a new relationship between us and the world in which we live. Comprehending the technology that makes this age possible is important. Comprehending the implications of the changes that have occurred and will occur because of the technology is critical.

Teaching about the technology is the easy task. Learning to ensure that technology is applied wisely is far more difficult. Mastery of technical, professional, and administrative skills is not enough to make life good in the next century. College and university students have to learn how to make technology part of

useful lives. The curriculum should explore technology's possibilities and stress our responsibility to use it well.

The imaginations of those responsible for colleges and universities themselves will be tested by the ways in which the power of advanced technology is incorporated into teaching and learning within the institutions. Used properly, it can improve the quality of instruction and increase the personal contact between faculty and students. Used improperly, it will contribute to the depersonalization of higher education that has been decried at least since jokes about students being treated like punched cards in a computer system ("please don't fold, spindle, or mutilate me!") began making the rounds.

One excellent document about the use of technology in higher education is the "Report of the University Task Force on the Impact of Digital Technology on the Classroom Environment," presented early in 1989 to the community of Virginia Polytechnic Institute and State University. The Commission draws heavily upon it in discussing the subject.

The constraints of space and time will be reduced by thoughtful introduction of telecommunications and computers into the instructional mission of colleges and universities. For centuries, students have earned academic credit for hours spent in contact with an instructor. It was, therefore, essential that they be in the same place at the same time. The Virginia Tech report finds that new digital technology offers the promise of three significant changes in student-faculty contact:

"(1) The nature of formally structured contact will shift.

(2) A larger part of faculty/student contact will be ad hoc and relatively unstructured.

(3) The provision an electronic message system will allow extensive contact without requiring student and teacher to be in the same place."

These changes, the Tech report goes on, will be positive only if the amount of faculty contact with students outside the formal classroom increases as classroom contact itself decreases. But this will require different architectural conceptions that offer faculty and students informal gathering places. The distinctions among classroom and laboratory buildings, libraries, student centers, residence halls, and faculty offices become much less clear than they are today. The new technologies suggest the following types of changes in academic life.

** Students will be attending televised lectures in their residence halls and drawing materials from the library using the computers in their rooms. Future residence halls should be viewed as at least partly instructional space, and students should be encouraged to be actively involved with one another in their own learning. This has implications for

how residence hall construction is financed.

** Faculty will be meeting students informally and doing much of their non-laboratory research in their offices. The size of offices may have to be larger.

** Some instruction will be conducted electronically and some will occur in small informal meetings between faculty and students. The amount of standard classroom space probably can be decreased.

** The advent of advanced technology will enable colleges and universities to integrate many aspects of college life, rather than segregating them into separate buildings. Space for student activities, for instance, can be combined with other kinds of space. (This, too, implies different approaches to financing construction). George Mason University, for instance, is proposing to wrap its new student center around the library.

** Non-residential and commuting students will also be able to attend lectures in convenient locations or at home as well as have access to libraries electronically from multiple locations. Off-campus uses of space and faculty time to accommodate these students as flexibly as possible should be designed.

** Electronic access to library catalogues will eliminate the need for some reference space in libraries but probably will increase the need for computer space. Conversion of large volumes of statistical and other material to electronic media will reduce the need for storage space as the library becomes more an information center and less a warehouse.

We must be clear that, when it comes to atoms, language can be used only as in poetry. The poet, too, is not nearly so concerned with describing facts as with creating images.
--Neils Bohr

We need to reconceive the role of the library as the heart of an academic institution. Our discussions have led us to think that the library of the future will be more than a repository of books, papers, records, and other print material. Primarily it will be a critical node in an information network: a source of information and of help in determining what information is available and how to gain access to it. The role of the reference librarian will be expanded greatly as the range of accessible materials increases.

Again, we have not developed a detailed plan for the academic libraries of Virginia. Much of what is being done in the system of higher education seems to be directed toward the right objectives. We recommend that a detailed plan be developed that includes these elements:

* creation of fully electronic and compatible catalogues of the holdings of every academic library in the state

* creation of a telecommunications network by means of which users can search for materials in every academic library in the state and can have some materials transmitted to them

* linkage of the Virginia library network to all major national and other state networks

* reduction of printed materials, where feasible, legally permissible, and appropriate, to electronic media to reduce storage requirements and permit rapid electronic transmission

* concentration of little-used materials in high-density storage facilities

* preservation of historically important documents and texts

* emphasis upon library services provided by information specialists.

Making the kinds of change envisioned will require access to sophisticated equipment and assurance that equipment can be replaced on a regular schedule. The Higher Education Equipment Trust Fund, a debt-financed program that has provided $85 million for instructional and research equipment, was created with great

foresight and imagination by the Governor and General Assembly in 1986. It continues to have the potential to meet many technological needs of Virginia higher education. It is unique in the nation and has placed Virginia's colleges and universities among only a few in the nation for whom access to instructional and research equipment is not a major problem. If it continues to be supported and employs the most advantageous financing vehicles available, it will help the colleges and universities and their students immeasurably over the next decade or more.

The need for a long-range vision is nowhere so acute as in space planning. Buildings being planned today and constructed in the early 1990's will be used until 2030 or beyond. Campus planners should envision the electronic opportunities that will be available in the coming decades and the changes in teaching and learning that will occur. They and state officials should be open to new partnerships between higher education and private enterprise: common research facilities, electronic classrooms in offices and plants, privately-financed construction of university facilities on state property, to name a few possibilities.

Colleges and universities will also need different kinds of space as the characteristics of their students and staff change. Child care facilities, for instance, are important to married students and workers, and particularly to single parents. Providing convenient space for this service will help to make institutions accessible to much of the population.

But constructing the right physical plant is only part of the challenge. The reward systems that guide behavior of faculty and administrators will have to change as well. Colleges and universities typically do not have ways of counting informal contact between faculty and students -- contact apart from the "credit-for-contact" time spent in classrooms and laboratories -- in making promotion, tenure, salary, and other decisions that reward faculty for work well done. Yet the Virginia Tech report suggests that this informal contact will increase as the faculty-student relationship changes.

In much of American higher education, extensive personal contact between students and faculty is rare. This is especially true in the most popular academic programs and at the freshman and sophomore level. The Virginia Tech report cautions against allowing the new technology to "exacerbate this already serious problem. If we are to see less of our students in the classroom, it becomes important that we see more of them outside it. Such interaction, however, requires both location and motivation, and both are in short supply."

The locations can be provided by building different kinds of space. The motivation comes from the incentive system. Faculty will need released time to develop courses appropriate to electronic delivery. Students will not be well served if the

No, I never was lost.
But I once was bewildered for three days.
--attributed to Daniel Boone

existing courses are simply converted to a new medium. Courses transmitted electronically need not be bound by the traditional academic calendar or by the normal workday, once they have been freed from the standard "credit for contact" mode.

Faculties will have to design new ways to recognize and reward high quality teaching, both in the formal classroom and in unstructured settings. "Perhaps the one essential mission of higher education," the Virginia Tech report states, "one that could be accomplished by no other institution in our society, is that of advanced teaching and learning. Because of this unique mission, colleges and universities must ensure that faculty are recognized and rewarded for quality teaching as well as provided opportunities for improving their teaching."

Our public hearings, reading, and personal experiences convince us that advising students is one of the most neglected aspects of academic life. If the advent of technology implies that advising and informal contact with students become much more important faculty responsibilities, the faculty will have to learn to do them well. We cannot assume that they are easy tasks or naturally performed. No one has difficulty comprehending the need to re-train the workers in an assembly plant when it is automated. We need also to understand that faculty, whose responsibilities are so much more complex and so important, must learn new skills as their workplaces are changed by new technology.

The types of people employed in colleges and universities to offer instruction, the terms and conditions of their employment, and the systems by which they are rewarded for their performance, all will have to change as computer and telecommunications technology permeates higher education. As they propose to install sophisticated technology that will change the nature of teaching and learning, Virginia's colleges and universities should be required to demonstrate that the rewards for faculty encourage good advising and informal contact with students. These activities should become a more important part of collegiate life.

It is not possible to provide an education for the 21st century without the new technology, and the state has an interest in ensuring that it is used well. Planning, funding, and institutional mission decisions should support and encourage adoption of the technology. Assessments of student learning conducted by each college and university should seek to determine the strengths and weaknesses of the technology and the ways it is used.

THE CASE FOR CHANGE
V. THE FACULTY

Any good teacher faces a central dilemma: he or she must pass on a base of knowledge, while simultaneously communicating the idea that knowledge itself is emergent, uncertain, and subject to revision.
--Ursala Wagner

The aging of the faculty is a matter of grave and immediate concern, even though the effect will not be felt for ten to 20 years from now. There is no mandatory retirement age in Virginia, and the largest number of faculty are now between ages 45 and 55, with about one-fifth over age 55. Very sketchy Virginia data indicate that few faculty will opt to continue working beyond the age of 70, even when there is no mandatory retirement age. These data mirror the little national data of which we are aware. We can estimate, therefore, that in the decade from 2000 to 2010 more than half the faculty in Virginia probably will retire. But economic conditions could change the behavior of older faculty, and the state ought to plan ways to take advantage of their talents under any conditions.

There will not be a sufficient number of high-quality faculty available to replace those retiring and to respond to the enrollment growth that is coming. An analysis of national trends in the academic labor market suggests that from 1997-2007 there will be a supply of approximately 62,000 potential new faculty and a demand ranging from 75,000 to 80,000 vacant positions. Clearly this will be an extraordinarily difficult market in which to recruit outstanding candidates. We also know that there will not be sufficient numbers of blacks and women in Virginia's faculties unless something is done to change current trends. (In 1988-89 only six percent of the instructional faculty at public institutions were black and 28 percent were women.) We are, moreover, concerned that departmental structures which support the disciplines may sharply limit higher education's flexibility in a time of rapid and dislocating change.

The potential shortage of highly qualified faculty cannot be dealt with by one state's system of colleges and universities. Nonetheless, there are some actions Virginia can take.

** Virginia should help the major doctoral degree-granting institutions support adequate numbers of the best possible graduate students in the sciences, the arts and letters, and the social sciences. Graduate students in disciplines whose research is sponsored sometimes can receive stipends as part of the research project funding. But those in other disciplines will need graduate fellowships in order to

additional financial support for students pursuing doctoral degrees is an investment that is well worth making.

For their part, the doctoral degree-granting institutions should review their graduate programs carefully to ensure that students can earn doctoral degrees in the shortest possible time. The time required to earn a doctoral degree has increased steadily over the past two decades. In 1967, the average time to earn the degree was 5.4 years. By 1987, it was 6.9.

The doctoral degree-granting institutions also should seek to ensure that graduate students are learning to be good teachers and good faculty members. Preparing graduate teaching assistants for their responsibilities is an obvious place to start. Seminars bringing together experienced faculty and graduate students to discuss teaching and the roles of faculty also might help. Discussion of faculty participation in institutional governance is particularly important.

** The nation's scientific and engineering work force is threatened by retirements and dwindling student interest. This is occurring at a time when 85 percent of new entrants to the labor force between now and 2000 will be minority group members and women -- groups historically underrepresented in science and engineering. The opportunity presented by this situation to increase the numbers of women and minorities in science and engineering is unprecedented.

Virginia should invite the states that produce the largest numbers of potential faculty (those with the major doctoral degree programs) to join with it in a multi-state compact to increase the numbers of blacks and women receiving doctoral degrees in the sciences, social sciences, and humanities. Rather than each attempting to go it alone, participating states could contribute funds to a centrally administered fellowship pool that would solicit applications throughout the nation. Additional support could be sought from major foundations. Students would follow normal admissions procedures and take their fellowships to the institutions (state-supported or independent) of their choice.

It is the theory that decides what we can observe.
--Albert Einstein

We think it likely that a concerted effort would reach more students and attract more non-state support than individual efforts of the states. This is a national problem, not simply Virginia's. An organization like the National Governor's Association might take the lead in developing the compact.

** Virginia's colleges and universities should look to hire new faculty from a pool of women and men who took their doctoral degrees during the past ten to 15 years when there were few faculty jobs available. Many of these persons sought other careers but remain qualified to teach in the nation's colleges and universities. Indeed, the University of Virginia has run a summer program for several years to help doctoral degree recipients prepare for work outside the academy. It may now be time to invite some of them back inside, if they wish to come.

The response is liable to be limited. Many persons, having begun other careers, may not be willing to start on the problematic pursuit of tenure. Many will not have remained current in their academic fields and will not be able to pick up where they left off. Those who choose to return may need help: seminars covering new developments in their disciplines, mentors from among the senior faculty, initially reduced teaching loads.

** Virginia should begin a hiring program by 1992-94 to bring young faculty into the state's colleges and universities. Their presence will be premature as a response to enrollment growth, but not in response to the kinds of curricular change needed. Most important, hiring them in 1992-94 will give Virginia an advantage. Such a program is a way to get the best faculties in place now before recruiting starts in earnest later in the 1990's.

Institutions might ask senior faculty beyond age 70 to become mentors to junior faculty who are beginning their careers in Virginia colleges and universities. Senior faculty also could become mentors to graduate students in the doctoral-degree granting institutions.

** Finally, the need for a new generation of well-educated faculty is national and adequate financial support for graduate students ought to be a federal priority. Virginia and the other states should encourage the federal government to support graduate student assistance and we urge the Governor and General Assembly to communicate this need to Virginia's Congressional delegation.

[T]he years of anxious searching in the dark, with their intense longing, their alterations of confidence and exhaustion, and the final emergence into the light -- only those who have experienced it can understand it.
--Albert Einstein

As global dimensions are added to the curricula, as telecommunications-based instruction becomes more widely used, as increasingly sophisticated student advising evolves, and as other changes occur that we have neither the wisdom nor the information to predict, Virginia's faculties will need more opportunities for professional renewal and development than are now available. In part, this need can be met by individual institutions if they have funding for it -- and this should be a priority item in the next decade -- but Virginia also should consider creating several Faculty Teaching Centers within the system of higher education. Stated broadly, their mission would be to help faculty renew themselves as teachers: to learn new techniques, improve advising skills, master new forms of instruction (such as the use of television), design new courses, take seminars on new developments in their fields, and so on. They need not follow a single model and could be established on the basis of competitive proposals from the institutions.

Individual institutions and groups of institutions should begin faculty seminars as part of the regular activities of the academic year. Faculty could be invited to work together on specific topics, with their work stimulated by guest lecturers and consultants. These seminars -- along with leaves, released time, and Faculty Teaching Centers -- would help faculty prepare themselves to meet the challenges of sweeping curriculum change.

THE CASE FOR CHANGE
VI. THE VALUES OF RESEARCH

[The] new Philosophy calls all in doubt,
The Element of fire is quite put out;
The Sun is lost, and th' earth, and no man's wit
Can well direct him where to look for it
--John Donne

Research and scholarship in the service of Virginia, the nation, and the peoples of the world clearly are important responsibilities of the state's colleges and universities. One of the most important contributions higher education makes to the states is research and scholarship that promote economic development: ideas, new industries, processes, and products that add jobs and wealth to the state's economy.

The mission of the modern research university includes a number of activities that compete for limited resources. While this adds to the complexity of American higher education, we think it is important that research in a democratic society be conducted in institutions committed to unfettered inquiry and academic freedom.

We are impressed by the progress Virginia is making as three of its universities move upward in the ranks of the nation's top 100 research institutions in terms of sponsored research volume and as several others build noteworthy strength in various fields of research. The quality and range of Virginia's growing research ventures are noteworthy as well. We think that this growth should be encouraged, and that the research conducted in Virginia's colleges and universities drives its economic development. At the same time, we note that Virginia has the 11th largest system of higher education in the nation but its universities rank only 20th in total volume of sponsored research. The state should do what it can to encourage an increase in the amount of high calibre scholarship and research performed by the faculties of the colleges and universities.

It is important to recognize that some kinds of scholarship and research are better supported financially by sources outside the university than others. For example, there is less money for research into public policy issues than there is for adhesives and composites, and there is still less for research in literature. Sponsored research tends to generate answers to the questions in which its sponsors are interested.

So the sun Sits as upon a royal throne ruling
his children the planets which circle round him.
--Copernicus

Published research in many disciplines usually is not sponsored, even though it creates new knowledge that helps to shape the disciplines. Much of the research in the humanities, the arts, and the social sciences is not sponsored externally.

Virginia's emphasis on the importance of research in its system of higher education ought to recognize both that which is sponsored and that which is not. Ranking institutions by sponsored research volume distorts the notion of scholarship and provides an incentive to emphasize some disciplines at the expense of others. For our long-range good, we ought to think of research in all the disciplines as an activity that warrants society's support.

All scholarly inquiry, whether sponsored by external sources or not, is central to higher education's role as a primary creator of new knowledge. Virginia should encourage scholarship and research in all fields in which its universities have faculty strength. This will help to ensure that the institutions do not become skewed in one direction or another by the external support they receive for some kinds of research.

At the same time, we recognize that research sponsored by federal agencies and industry generates jobs and wealth in Virginia, as witnessed by the fact that the University of Virginia has been able to construct almost $30 million worth of research space from sponsored research overhead in the last decade. This research is particularly important, and we offer several recommendations, again without having developed a detailed plan.

** Because sponsored research often requires additional support for space, equipment, and staff to accommodate the projects undertaken, Virginia should support externally sponsored research based on the amount the institutions generate from external sources.

** When institutions increase their externally sponsored, peer-reviewed research volume above that of a base year, the state should reward them, primarily by providing additional laboratory space, supporting graduate assistants and post-doctoral students, and continuing to return the state's share of overhead revenues when institutions increase their externally-sponsored, peer-reviewed research volume above that of a base year.

** The cost of research and the complexities of evaluating

proposed research make the role of the state necessarily catalytic and supplemental, rather than the primary source of funding. Virginia should help institutions increase the amounts of sponsored research funding they receive from federal agencies or industry. The incentives suggested above will help, as will matching grants through the Center for Innovative Technology. Continued support for Commonwealth Centers, identified by national peer review as activities that are among the three or four best of their kind in the United States, further adds to research strength.

While acknowledging the great importance of research in Virginia's colleges and universities and the desirability of increasing the amount done, the Commission urges that the relationships between graduate and undergraduate instruction and research be explored.

Research can overshadow teaching, often to the detriment of undergraduate education. In particular, the Commission is concerned that undergraduates may be taught by graduate students who are not prepared to teach, and that the need to support themselves by teaching extends the amount of time graduate students take to complete their doctoral work.

We are persuaded that serious and continuous intellectual activity by members of the faculty -- although not necessarily in all fields the basic research that creates new knowledge -- is a prerequisite of good teaching. But we do not believe it to be self-evident that good research and scholarship lead necessarily to good teaching, either of undergraduates or of graduate students.

None of the concerns we have raised should obscure the basic point we wish to make: the capacity of Virginia's colleges and universities to conduct research and scholarship will help the state develop economically, and can help the institutions become better places to teach and learn. Work being done at Virginia Tech on composite materials and new adhesives, for instance, brought the university over $10 million in research awards last year. Numerous Virginia companies have been assisted by a program of the Center for Innovative Technology that put them in contact with scientists who helped them solve technical problems. Research deserves greater emphasis and support, even as the colleges and universities examine the relationships between research and graduate and undergraduate education.

THE CASE FOR CHANGE
VII. THE UNIVERSITY IN SOCIETY

High intelligence without a high sense of value and integrity is not only less than useful to the country, but also dangerous.
--The Rev. Theodore M. Hesburgh, C.S.C.

The university in the 21st century cannot perceive itself as responding to the needs of the marketplace. Rather, we think that this will be a time when higher education should be prepared to provide strong leadership to our society. We really do not know where we are going in the exciting decades ahead of us and the university that simply signs on for the ride will be defaulting in its critical role. The old descriptions of the university -- "in but not of" the society; the "friendly critic" of the society within which and by whose tolerance it exists -- are necessary, but not sufficient to the kinds of change that are occurring.

Some boundaries, like those between higher education and industry, are breaking down. Others, like those between elementary-secondary schooling and higher education, should break down. The colleges and universities of the 21st century should look forward to much more complex relationships with other social institutions.

We think that colleges and universities should become more involved in the pressing issues of the day. We are concerned that higher education could become merely a support service for industry, economic development, or government. But it is better that the university be engaged than disengaged, better to risk involvement than irrelevance.

The women and men who work in colleges and universities are not uniquely qualified to solve the major social problems of our time. But they do bring to such problems a vast array of knowledge and analytic and technical skills that few others command. They come, moreover, from institutions in which free and ordered competition among ideas is especially valued. Their detachment, and that of the colleges and universities in which they work, assures that problems are looked at from different perspectives.

Because colleges and universities provide opportunities for students to develop values and learn from role models, it is extremely important that they deal with faculty, staff, and students without regard to sex, race, or ethnic origin. It is particularly important that women and minorities hold faculty and administrative positions approximating those of the larger population and that they be rewarded equitably. We realize that this is not an easy goal to achieve, but we urge the strongest possible commitment to doing so. This is not an ancillary social

responsibility of higher education, but a curricular matter, a matter of what and how students learn.

The kinds of higher education we shall need depend upon the kind of human beings we want our children and their children to be. We think they should be analytically skilled but generous thinkers; skeptical but idealistic; committed to teamwork and the common good; possessing technical, professional, or administrative skills, but also broader perspectives on their lives; deeply involved in the institutions of their own culture but also enriched by the endless variety of human culture and experience among the peoples of the world; aware of interrelationships of states, nations, and economies; and able to deal effectively with conflicting ideologies and values. All of this may sound naive or impossible, or both, but we think it is important that our children and their children have opportunities to become better citizens, parents, workers, and companions.

These same characteristics ought to be affirmed by those who teach in and govern our institutions of learning. They should be conveyed to students not only in what is taught but in the behavior manifested within the school, college or university itself. Students learn at least as much from the behavior they observe around them as from their formal lessons, and they often experience a curriculum that is different from the one the faculty thinks it is teaching. Their experiences of the formal curriculum and the settings in which they learn, play, and work need to be better integrated.

Many issues affecting America's colleges and universities today reflect implicit and explicit choices made in the larger society. We have not discussed a number of these issues that are major concerns. One of them is intercollegiate athletics. We are encouraged by the sound perspectives of several Virginia colleges and universities on the role of inter-collegiate athletics, the priority they put upon helping student-athletes receive their degrees, and the recognition that institutions of higher education are primarily places of learning. As a first step, we urge all Virginia colleges and universities to publish the graduation rates of athletes. This may be the best indicator readily available of the extent to which institutions educate their student-athletes without exploiting them.

It is increasingly apparent that students learn from other students, perhaps as much as they learn from the formal curriculum. The students who attend Virginia's institutions contribute greatly to their diversity and to the richness of the educational experiences of all. In a great nation with a mobile population, the notion of distinguishing between residents of Virginia and other states is in some ways anachronistic. At a time when the political and economic barriers among nations are being lowered, higher education in the next century will be poorly served by barriers among states.

A well-ordered humanism does not begin with itself, but puts things back in their place. It puts the world before life, life before man, and the respect of others before love of self.
--Claude Levi-Strauss

The continental nations of the European Economic Community recently took action to make their universities accessible to students from all member nations. In doing so, the president of the University of Bologna remarked, they had made higher education in Europe as accessible as it was 500 years ago.

But within the United States problems abound: unequal quality of institutions and investment in them among the states, great disparity in tuition policy, variations in population forecasts, and others. We think the practice of classifying students as in-state and out-of-state will eventually end, but we do not yet perceive the administrative mechanism that will replace it. Interstate compacts like the Southern Regional Education Board have for some time been helping member states share programs so they can cope with varying student and employer demands and limited resources. These arrangements may someday evolve into the mechanism that we are seeking. Until such a mechanism is available, Virginia should recover in tuition and fees as much of its cost of educating out-of-state students as it can and remain competitive. Its institutions could use some or all of the revenue generated in this way to provide additional financial aid to needy students.

Limiting out-of-state students is not consistent with Virginia's leadership aspirations. Broad accessibility to a range of students is particularly important, for instance, in recruiting faculty to the Commonwealth's colleges and universities. Thus we strongly endorse the current Virginia practice of permitting its colleges and universities to accept substantial numbers of students from other states. Indeed, we encourage the institutions to diversify their student populations even more, including students from states that are not geographically close to Virginia and from other nations. We are not arguing for greater proportions of out-of-state students but for more diversity within the present enrollments. Virginia will be a stronger state in the future if its institutions are permitted to remain open to out-of-state students.

In making this recommendation, we are following the lead of the Higher Education Study Commission that in 1965 recommended many of the changes that have brought Virginia higher education to its strong position today. That Commission endorsed practices in place at the time and recommended that "no arbitrary limitations be imposed on the number or percentage of students to

And what
if the universe
is not about
us? Then what?
What
is it about
And what
about
us?
--May Swensen

be admitted from other States or foreign countries in the state-controlled institutions of Virginia." We think this is a wise policy that Virginia should continue as it shapes the future of its colleges and universities.

THE CASE FOR CHANGE
VIII. THE ACADEMIC ORGANIZATION

Most professors teach most of the time, and large proportions of them teach all the time, but teaching is not the activity most rewarded by the academic profession.
--Burton Clark

The "tyranny of the disciplines" in American higher education is an extremely perplexing problem. We understand this phrase to mean that the academic disciplines and departments that support them define acceptable methods of inquiry and what it means "to know" something about ourselves and about the world. Discipline-based departments set the criteria by which research, scholarship, and teaching are evaluated and, as a result, how rewards are meted out to faculty members (promotion, tenure, salary increases, teaching schedules, research space, and so on). Membership in a discipline and the corresponding department, rather than in a particular college or university community, is the basis for many faculty members' professional lives.

We think that this disciplinary-based system must change. The president of one Virginia university has observed that the fact that much exciting teaching and research is called "interdisciplinary" is really a mark of shame: the present disciplines are no longer adequate to what we know and the problems we must solve. Nevertheless, they exert too much control in our colleges and universities. As a result, the rewards for working outside the established boundaries of the disciplines are limited. For junior faculty, unprotected by tenure, the sanctions often are fatal.

The culture of higher education is broader and stronger than the colleges and universities of Virginia, which cannot change the disciplines by themselves. But Virginia's institutions might be able to ensure that faculty are rewarded differently: that the quality of teaching really does affect tenure decisions; that interdisciplinary research and teaching are recognized and valued, at least in this state, with the coins of the realm; and that the hierarchical systems of faculty rank protect but do not limit free inquiry.

We are aware that Virginia's senior institutions and Richard Bland College have traditional tenure systems while the Virginia Community College System has a system of continuing contracts. We offer no specific recommendations about these systems in themselves, but observe that tenure today may serve more as a personnel management system than as protection for free inquiry.

While freedom of inquiry must be encouraged at all costs, we think it is important to be willing to consider changes in the administrative policies and practices of higher education as the responsibilities of faculty evolve.

We suggest that institutions include in their procedures regularly scheduled performance reviews of all faculty and administrators, regardless of tenure or contract status. We further suggest that institutions review their procedures for awarding salary increases to ensure that genuine merit in a range of responsibilities, including teaching, advising, scholarship, and public service, receives due consideration.

We also suggest that Virginia's colleges and universities consider alterations to an even broader range of practices. Our educational systems and institutions reflect constraints of time and space that, in light of new technologies, may be more imagined that real. Universities and colleges are conceived as assemblages of buildings within which courses are offered at scheduled hours and within which libraries of information are available for access. We and our children "go to college." Accreditation is organized around the "site visit."

We have rarely questioned the adequacy of the nine-month academic calendar, an anachronism that reflects the needs of an agrarian society for labor in the fields during the summer growing season. Neither have we questioned the practice of scheduling classes mostly in the mornings, nor the use of the credit hour, which is a vestige of early production theory.

Some of this is changing - in fact, already has changed. Telephone lines have eliminated space as a barrier to communication. The answering machine and electronic mail have begun to eliminate time as a barrier.

The college or university of the 21st century is a network of resources linked together electronically or physically. The resources are teachers, students, information, and equipment. A good physical plant is important, but there is more to a college or university than its buildings.

More energy should be directed at developing communications networks to link dispersed resources. The need to concentrate research (the Research Triangle, Route 128, Silicon Valley) and instruction has diminished with the advent of high-speed telecommunications. Scientists at Virginia Tech manipulate robots at distant NASA laboratories, just as NASA scientists manipulated the space probe around Neptune, over one billion miles from earth. States that spread their research and instructional capacities broadly will be better suited to capitalize on economic development opportunities because of the continuing technical advances in telecommunications.

No one ought to approach an education or a university in a spirit that is settled or unquestioning or smug or certwain of answers or results.
--A. Bartlett Giamatti

At the same time, the values of personal contact and reasonable concentrations of instruction and research must not be overlooked. There are some kinds of teaching that can best be done with close personal contact between teachers and their students. There are advantages to being able to leave a physics laboratory and walk across the street to talk with chemists about a particularly puzzling problem. But greater dispersion of research and instructional capacity is now both desirable and necessary for the good of the entire state.

We think the state ought to begin planning to do electronically those things that can be done as well and more economically that way, in order to have the resources to ensure personal contact where it is necessary for high-quality instruction and research. This will require possibly difficult choices. One way to create positions for the technicians who will be needed to operate telecommunications networks and to increase the number of teachers and researchers is to reduce the number of non-teaching staff in some areas. The state's revenues are limited, and trade-offs of this sort may be necessary.

Policies, procedures, and mandates originating in Richmond influence how Virginia's colleges and universities conduct their business. The Council of Higher Education and the central agencies of state government should change the way they do business and the way they build higher education budgets. Decentralized, autonomous operations with post-audit accountability, exception reporting, and a clear set of expectations, rewards, and penalties will put administration of higher education firmly in the control of those employed to do it: the presidents and their senior staffs.

THE CASE FOR CHANGE
IX. AUTONOMY, DIVERSITY, AND COOPERATION

For all of us, grave or light, get our thoughts entangled in our metaphors, and act fatally on the strength of them.
--George Eliot

The Commission agrees with numerous persons who appeared before it in public hearings to urge that the hallmarks of Virginia higher education -- autonomy and diversity -- be maintained in the future. While we recognize that there are other ways to organize higher education, we believe that in the long run the strongest institutions are those that enjoy considerable autonomy. This places great responsibility upon governing boards and presidents, who must demonstrate creativity and willingness to take risks, or the system will stagnate.

The formal system of higher education in Virginia includes a great array of institutions: state-supported and independent, two-year and senior, research and highly specialized, traditionally black and single-sex. Opportunities for fundamental change are open to all. But the sea change being felt in Virginia affects the entire system, and we think that Virginia should encourage creativity and discourage complacency by its method of governing higher education and by financial and other rewards.

Institutions that innovate and demonstrate efficient use of the resources available to them should be freed from state regulation to the extent possible. We applaud the current decentralization program to reward institutions in this way and urge that it be extended.

Less of each institution's appropriation should be based upon its size and more based upon the quality of the services it provides to the Commonwealth. Although some special initiatives were funded in the 1988-90 budget, the current operating budget guidelines still provide faculty, administrative, and support positions based upon institutional enrollment. This offers some institutions an almost irresistible temptation to increase enrollments in order to increase funding. It seriously disadvantages those institutions whose governing boards have determined that they ought not grow for qualitative reasons.

The major incentive for change within Virginia higher education is money. The rewards and penalties for certain actions are generally monetary and these have to be changed if there is going to be any substantive change in the behavior of colleges and universities.

The entire budgeting procedure need not be changed. Changing the base funding probably is not possible anyway, as proponents of program budgeting have discovered. The base is a given, with relatively minor adjustments, unless and until the Governor and General Assembly decide simply to cease providing a certain service to the citizens of the state. So instead Virginia should focus on the incremental funding available to higher education in each budget, and devise a way to use that money to leverage the greatest possible change in the directions suggested in this report.[1]

Several approaches are possible. The simplest is for the Governor to request proposals for specific initiatives as the biennial budget is prepared. The Council of Higher Education could evaluate the proposals submitted by the colleges and universities and make recommendations to the Governor and the General Assembly.

A preferable approach may be for the Council of Higher Education to establish a grants committee to evaluate institutional proposals and recommend the allocation of funds. The committee might be composed of senior faculty members representing each senior college and university and the community colleges. Whether they were elected or appointed could be determined by the Council in consultation with the institutions.

A grants committee could make its recommendations to the Council as the Governor prepares the budget. Or the General Assembly could appropriate the incremental funds to the Council, which could allocate them based upon the grants committee's recommendations.

We realize that our proposal is a striking departure from the current system. But we think that the current system, for all its virtues, does not provide sufficient incentives to encourage substantive changes in curricula or management practices.

[1](The definitions of "base" and "incremental funds" are obviously crucial here. We mean to include in the base for a two-year budget the operating budget support in the second year of the previous biennium, adjusted downward (but not upward) for enrollment fluctuations. To that amount should be added salary increases for faculty and other staff, and any state-wide increases for inflation.
The incremental funds, then, are everything else that is now appropriated to the colleges and universities: funds for enrollment growth, new activities, or continuation of activities that are not part of the base.)

We further suggest that the Council be directed, again in cooperation with the institutions, to develop new guidelines for space planning. The new guidelines should take into account the changes in teaching and learning, library material storage and management, telecommunications, and administrative systems that we have identified. They should place less emphasis upon enrollment growth and more upon innovative use of the new technology that is becoming available to colleges and universities. They should reward use of facilities at times when they typically are little-used in residential institutions: in the afternoons and evenings, on weekends, and during the summer. They should reward facilities-sharing, not only within higher education but with other educational systems, businesses, and agencies of government. They should encourage institutions to use alternative forms of capital financing such as those now being studied by a legislative commission.

We are also concerned about the cost of higher education to students and their families and offer several observations and suggestions on this highly important issue.

** Virginia was one of the first states to adopt a budgeting procedure that indexed the tuition and fee revenues an institution must raise to the amount of general fund revenue appropriated to it. Half the Southern Regional Education Board states now use some form of indexing.

In the Virginia system, the more money appropriated to higher education from the general fund, the more must be raised from tuition and fees. Higher costs to students and their families are a sign of strong support from state government rather than the opposite and they represent the Commonwealth's commitment to quality. We are pleased that tuition in the community colleges remains relatively low and urge that this practice be continued.

** The great progress of Virginia's colleges and universities has been achieved with operating budgets whose revenues include an average of about 35 percent from tuition and fees in the senior institutions and about 20 percent in the community colleges. A reduction in cost to students and their families would require hundreds of millions of additional general fund dollars if the institutions were to continue operating at their present levels of service.

Efficiencies are possible, some amenities can be eliminated or made optional, and some services can be provided for a fee as they are needed. Student fees for ancillary and auxiliary activities not directly related to instruction make up a sizable part of the total cost of college to students and their families. These fees should receive at least as much attention as tuition in the state's effort to control costs.

** Application and admission data do not indicate that potential

students are being excluded by high costs. Nonetheless, we recommend that the Council of Higher Education be directed to undertake a comprehensive study of student characteristics, including financial resources, across the entire system of higher education, public and private. To our knowledge, there is not enough information available about who goes to college, where, and why, for anyone to make a good public policy decision about costs to students and their families.

Institutional diversity and autonomy are extremely important to Virginia higher education, but some decisions affecting the entire system must be made, especially in a period of rapid and fundamental change. For instance, Virginia's system, as we understand it, should not be distorted by permitting massive universities to develop within it. Someone must control enrollment growth, just as someone must seek to ensure that the resources available to higher education are allocated equitably and for the greatest possible good. There must be someone with the responsibility of making decisions for the good of the entire system, rather than on behalf of individual institutions. We think that role is best played by the State Council of Higher Education for Virginia as a coordinating agency for the system, subject, of course, to the oversight of the General Assembly.

The independent and state-supported institutions are not in conflict, as they are in some other states, but there could be more active cooperation between them. Several joint projects between independent and state-supported institutions are underway, and we recommend that the Council of Higher Education make a greater effort to bring the two sectors together.

The same is true of relationships between the community colleges and senior institutions. Again, there are some very good joint projects and active relationships between individual institutions. But more should be done to link the sectors of the system together. Most importantly, it should be made as easy as possible for graduates of community colleges to transfer to senior institutions and get full credit for the work they have done. We know this is not a simple issue, but the colleges and universities should deal with the complexities to make it simple for the student.

College and university education builds upon the work done in the elementary and secondary schools. There ought to be a seamless web of relationships connecting elementary, secondary and higher education, and a fundamental integrity to the entire system of education. It follows from this that the new perspectives on the curricula of colleges and universities must be reflected in the curricula of the elementary and secondary schools. Otherwise, we shall subject students to education in two systems that are not complementary.

It also follows that higher education's role in the education of teachers is central to the entire academic enterprise. More well-prepared teachers must be available to teach greater numbers

faculty primarily responsible for teaching and advising prospective teachers should occur on a regular schedule.

The State Board of Education and the Council of Higher Education have a good record of working together over the years. They have encouraged greater cooperation between elementary-secondary and higher education, but they do not appear to have joined together to request funding for special initiatives that are based upon cooperation. Joint Board-Council grants to ensure continuity of curricula from secondary school to college, for instance, would help to increase communication among the various faculties in the schools, colleges, and universities.

The colleges and universities could be asked to bid on contracts to assist school districts or particular schools that are judged by the Board of Education to be performing below standard. Again, the Board and the Council could evaluate institutional proposals, and monitor the progress of the district or school being assisted.

Finally, we think that Virginia higher education should make efforts to be open to, and connected with, other "para-systems" of education throughout the state: adult literacy programs, state humanities and arts councils, apprenticeship programs, cooperative education, alternative schools, industrial training programs, and so on. More of these "para-systems" are developing and it seems to us preferable that they be linked together rather than each operating oblivious to the others.

We cannot place too much emphasis upon the importance of cooperation. Among colleges and universities, between the state-supported and the independent sectors, between two-year and four-year institutions, between higher and elementary-secondary education, between higher education and business, between higher education and government -- all of these relationships should be improved and carefully nurtured to ensure that old barriers do not prevent Virginia from seizing new opportunities.

Neither governance nor administrative systems necessarily need to be changed. We are concerned about something more fundamental. We are asking the persons responsible for Virginia higher education to see things whole: to see that everything relates to everything else, and that behaviors must change in light of that understanding. The health of each college and university depends upon the health of Virginia's schools, businesses, and government. Our report repeats this point often and in different ways because it is central to the vision we are proposing.

THE CASE FOR CHANGE
X. LEADERSHIP OF VIRGINIA HIGHER EDUCATION

We know we have always been in danger
down in our separateness
and now up here together but till now
we had not touched our strength.
--Adrienne Rich

Higher education has responsibilities that override the plans and aspirations of individual colleges and universities. Collectively, the institutions have the ability to affect the social, political, and economic conditions of the states and the nation. The way higher education is organized strongly influences the extent to which its work gets done and the ways in which it can answer to the needs of society. While this is also true of other functions of government, the unique intellectual and moral position occupied by colleges and universities in American culture places special obligations upon them.

Throughout our report we have emphasized our admiration for the way in which Virginia higher education has flourished as a loose system of colleges and universities with coordination by the State Council of Higher Education. In this brief section, we raise what seems to us to be the weakness inherent in this system: no one is in charge.

To some extent this is good, as we have noted. It permits institutions to flourish in their own ways, and fosters a diversity that gives students a wide range of choices among institutions.

It is possible to regulate a system so completely from the top that it has no fluidity. We think Virginia has wisely avoided this approach. But this means that the system of higher education rarely acts in concert and that cooperation is often difficult to achieve. Individuals with unusually strong imaginations and political and rhetorical skills sometimes can help the institutions to act as a system, but only temporarily. The system is inherently fluid.

Under these conditions, the governance of higher education in Virginia requires a kind of social contract: for it to work, the participants must agree to belong to the system. Unfortunately, there is not sufficient incentive to do so.

To be blunt: the present arrangement does not encourage or reward cooperation, risk-taking, or innovation. It tends to equate effective leadership of colleges and universities with acquisition of resources: staff, buildings, and money. The institutions seldom act together because they jockey for competitive advantage among themselves. They tend not to take

chances or innovate, in part because the state's budgeting is based on "steady state" funding for all agencies, and because higher education has come to place a premium upon doing business as usual. In effect, the funding and rewards tend to equate success with acquisition of resources -- as if what is good for each college and university is necessarily good for the people of Virginia.

Not only should higher education act more as a system, it also should consider its responsibilities in the broader society of which it is a part. For example, only slightly more than half the high school graduates in Virginia go on to college. Many young people disappear from the educational system somewhere between ninth grade and high school graduation. Many children enter kindergarten with deficiencies that make it impossible for them to catch up. Twenty percent or more of the adult population may be functionally illiterate. The state will need to build a new prison every year for the next decade to keep up with the current rate of incarceration. The environment, both natural and constructed, is threatened. Health care, especially for children and the elderly, is becoming more expensive but not necessarily better. Employment in traditional Virginia industries is diminishing, and there is fear and want in some regions of the state. The gap between the wealthy and the poor continues to increase.

In a way, colleges and universities have nothing to do with these conditions, except insofar as they provide opportunities for research or teaching. But no one really believes that higher education can or should do its work and acquire its resources oblivious to the broader needs of Virginia or the nation. No one really believes that the colleges and universities should seek appropriations at one another's expense or at the expense of other agencies of state government. But that is how the system works.

If Virginia wants persons in responsible positions to behave differently, as we think they should, these people need to be assured that they are expected to act in the best interests of the state as a whole, and not just for the institutions they represent. They need to be assured that change is necessary and that it is their job to provide leadership that leads to change. At present, they do not seem to have that assurance.

As appointments are made to institutional governing boards the Governor should emphasize that board members are expected to discharge their responsibilities with concern for the well-being of all the colleges and universities and the general public. One criterion for assessing the performance of board members, presidents, and senior staff should be the extent to which their institutions are working with others in the system for the common good.

In any way possible, Governors, the General Assembly, members of college and university governing boards, and the Council of Higher Education should reward behavior that demonstrates institution's concerns for the problems of the broader society of which they are a part and from which they derive their support.

THE CASE FOR CHANGE
XI. MAKING THE RIGHT KINDS OF ROOM

Many things are becoming
possible for us.
We are recalling
forgotten lore;
we are exploring
our own house and garden
--Annie Dillard

The State Council of Higher Education, working with the state's colleges and universities and subject to oversight by the Governor and the General Assembly, is responsible for planning the development of Virginia's system of higher education. To judge by the results achieved in the past 15 years, the planning processes of the Council appear to work well. They are flexible, relatively informal, and able to respond quickly to changed circumstances and new needs. A highly pragmatic, flexible, and continuous approach to planning is what the times require. The era of the thick, long-range master plan has passed.

During the course of its deliberations, the Commission received a number of proposals from Virginia's colleges and universities for change or growth. Instead of offering a detailed plan for expansion of the Virginia system of higher education, which is beyond our charge and would intrude upon regular planning processes that are working well, the Commission offers a set of policies on which decisions about programmatic improvements or increased enrollment should be made. The proposals of Virginia's institutions have been very useful to us in developing the following recommended policies.

1. Planning ought to be done not only by institutions but among them. We are not calling for sameness but we are calling for cooperation. We support competition among ideas but not for territory.

2. The current policy and practice of keeping Virginia's state-supported universities relatively small in comparison with those in some other states should be continued. Our reasons are simple. Smaller institutions are an attractive and distinctive characteristic of Virginia higher education. Particularly at the undergraduate level, many Virginia colleges and universities have reputations as places in which students receive personal attention. While other states have universities that are twice the size of Virginia's largest, and while some of them are quite good, Virginia has chosen another approach that has worked well and should be continued.

In addition, Virginia has a coordinated system of

colleges and universities whose strengths balance one another. For any of its universities to become massive, multi-campus institutions would upset the delicate political and educational balance upon which the present system depends.

3. Undergraduate growth should occur across an array of institutions that reflects the diversity of Virginia high school graduates. Growth should be approved at highly selective and moderately selective institutions, and at those to which admission is actually or virtually open.

4. Wherever growth occurs, it should be accompanied by curricular improvement. Institutions that propose to offer students new perspectives upon the arts and sciences, technology, and the professions should be the first authorized to accommodate more students if they propose to do so.

5. Funding for growth that takes place along with specific curricular improvement should be greater than that for enrollment growth alone.

6. Proposals for curricular improvement from institutions that choose not to increase their enrollments should be encouraged. Growth is not a prerequisite for change.

7. Proposals to accommodate more students should place special emphasis upon the education of minorities and women, both of whom will become more important participants in our society and the workforce.

8. The enrollment growth should consist primarily of Virginians, especially at colleges and universities that now enroll substantial numbers of out-of-state students. In this way, the percentages of out-of-state students should decrease while their absolute numbers will not.

9. Funding for growth should be separately identified to ensure that it does not occur at the expense of existing students, especially those who are undergraduates. Institutions that propose to grow should be providing adequate services to their present students. The curricular needs of existing students should be kept in mind as institutions consider new curricular approaches designed to accommodate growth.

10. Many adults will need continuing, advanced education within commuting distance of their workplaces or homes. This education should be provided by faculty on-site and by telecommunications where possible and appropriate. Either electronically or physically, faculty ought go to these students rather than vice versa.

We recommend that money be appropriated in the 1990 Session of the General Assembly to permit the Council of Higher

Education, in cooperation with the institutions, to plan in response to these policies. Planning money will help to maintain the momentum that has been gained during the life of the Commission, as the state's colleges and universities considered ways in which they want to shape the future. Our work has stimulated a great amount of activity that will prepare Virginia higher education to meet the demands of change and growth in the coming decade and beyond. What is needed now is detailed planning and consideration of alternatives.

Beyond this set of policies, several other considerations should inform planning to accommodate change and growth.

The state's independent colleges and universities should be relied on to the greatest extent possible as enrollment demand grows. The fine Tuition Assistance Grant Program will continue to be an excellent way to assist Virginia residents who want to attend the independent colleges and universities. A need-based component in addition to the basic grant for which all Virginians are eligible would make it even more helpful. This program should continue to receive strong state support.

Virginia should consider expanding its program of contracts between the Commonwealth and selected independent institutions for instructional programs not readily available from state-supported institutions. The contracts might pay the difference between tuitions at the state-supported and independent institutions.

The Council of Higher Education should explore the feasibility of creating a category of "state-assisted colleges and universities," subject to the limits of the Virginia Constitution. Only independent institutions that offer instructional programs not available at state-supported institutions within a reasonable distance should be eligible to participate. They would be more accountable to the state (for instance, their academic programs and expenditure plans might be subject to approval by the Council and their accounts subject to state audit).

It should be easier for students who attend Virginia's community colleges to transfer to the senior colleges and universities. Each senior college and university should adopt a policy assuring that students who are granted admission after earning a community college degree will receive full academic credit for their work. This will, of course, require the community colleges to offer a good general education that is subject to quality assurance by the Virginia Community College System.

It is increasingly clear that the urban universities are facing a substantial demand for residential undergraduate education for traditional college-age students. More young students want to live on or close to campus. Much of the

non-residential, commuter enrollment consists of graduate and professional students, and older adults, including a growing population of single parents, whose special needs must be met.

While large numbers of current undergraduates clearly prefer to live in residences on campus, state and institutional planners should remember that such preferences can change. Less than 20 years ago living on campus was viewed with disdain by many students and there were empty residence halls at some Virginia colleges. Moreover, many students live off-campus, especially those who are older and those who have families. Institutions that are not highly selective should be encouraged to look for alternatives to constructing and operating additional residence halls that could become a financial burden if a future generation of students decides it prefers to live off-campus.

The patterns of enrollment at urban universities can create highly stimulating intellectual environments for all students and faculty. We urge the urban universities to consider their opportunities carefully as they plan curricular and campus development. The mix of women and men of different races, cultures, and ages could make these institutions the most exciting places to be in the 21st century if the universities capitalize on the rich diversity of Virginia's urban areas.

The system should make maximum use of telecommunications to provide interactive televised and computer-assisted instruction from major college and university facilities to distant sites, recognizing that the effectiveness of such instruction depends upon the disciplines being taught, the methods of teaching, and the learning objectives of particular courses.

Virginia should consider creating a single credentialing entity that is responsible for coordinating all long-distance and off-campus instruction and, when several institutions contribute courses to a degree program, conferring degrees. Such an entity would promote instruction that is based upon acquiring and demonstrating competence rather than upon completing a prescribed number of credit-hour courses within the traditional academic calendar.

This new entity would be similar to Empire State College in New York and Thomas Edison College in New Jersey and have something in common with the British Open University. It would assume administrative control of the six regional consortia now operating under the auspices of the Council of Higher Education, the interactive television network that has been developed by the Council and several institutions over the past six years, and any additional telecommunications networks that may be created for instructional purposes in the future. Perhaps most important, it would broker educational services to meet emerging regional needs.

If the General Assembly authorizes the establishment of new campuses or institutions under the control of existing

institutions, we recommend that statutory provision be made for their status to be reviewed every five years. The state should determine whether and under what conditions these new entities should become free-standing colleges and universities.

The growth of Virginia higher education will be coherent only if the state-supported colleges and universities adhere to the enrollment levels approved for them. The 1974 General Assembly Commission on Higher Education was quite explicit that "institutions should be expected to achieve the enrollment projected." But we sense confusion about whether the Council of Higher Education's enrollment projections are objectives to be exceeded if possible, targets to be met, or limits that may not be exceeded.

If planning for the 21st century is to be effective, the approved enrollment projections should determine the number of students each institution should attempt to enroll each year, neither more nor less. We recommend statutory change to make this point clear. The incentives to exceed approved levels are currently too strong, and the penalties for exceeding them too weak. The statute should include stiff penalties for exceeding approved enrollment levels unless the occurrence is beyond institutional control.

PLANNING AND SUPPORTING CHANGE: THOUGHTS FOR THE GENERAL ASSEMBLY

The natural world is all of a piece, we all know this in our bones, but we have a long way to go before we will see how the connections are made.
--Lewis Thomas

If Virginia's response to change and growth in higher education is to be orderly and thoughtful, the General Assembly's support is essential. Concerned legislators established the present coordinated system as a result of the work of the General Assembly Commission on Higher Education, which reported its recommendations to the 1974 Session. During the past 15 years progress has been remarkable. The system has grown by more than 75,000 students and its overall quality has improved. Some Virginia colleges and universities have become known as among the best in the nation.

Progress in funding has been particularly rapid over the past several years. Faculty salary averages, for instance, have increased 64 percent in the past six years. Well over $1 billion has been provided for college and university buildings during the past ten years. Under the unique debt-financed equipment trust fund more than $85 million worth of instructional and research equipment has been provided since 1986, with the possibility of twice that amount being available before 1998.

Grants to Virginians attending the state's independent colleges and universities have increased from $500 in 1978-79 to $1500 in 1989. Financial aid for needy students in the public colleges has grown from $3.8 million to $19.4 million over the same period. The state-wide need-based program for students in public and independent higher education has doubled, and a new work-study program has been started. Funding for Eminent Scholars, a program that matches income from endowment with state money to attract and retain outstanding faculty, has increased from $755,040 in 1979 to $5.6 million in 1989. Overall, state general funds for higher education in Virginia more than doubled in a decade, from $871,065,510 in the 1978-80 budget to $2.128 billion in 1988-90.

Comparisons of support for higher education among the states are difficult because they fund higher education in so many different ways. Some states, particularly in the western part of the United States but also North Carolina, are committed to extremely low tuition as a matter of public philosophy. Others, like Virginia and the coastal states to the north, have relatively high tuitions. Some states (like Virginia) use

tuition to pay for educational services, while others (like West Virginia) use most of it to pay debt service on capital outlay.

Nonetheless, the Commission notes that Virginia currently ranks 10th in per-capita appropriations and 11th in total appropriations for higher education (it is one of 11 states that appropriate more than $1 billion per year for higher education), and 19th in appropriations per $1000 of personal income. This is a good position to be in, but Virginia is behind such states as North Carolina, California, and Minnesota. We also note that Virginia's per capita income has risen at a substantially greater rate than its support of higher education over the past 20 years, and that the state-supported colleges and universities now derive 53 percent of their total operating revenues from sources other than the state's general fund. The people of this state can expect excellent colleges and universities only if they are willing to provide the funds needed to run them. We think it is important to emphasize that higher education will need more money in the decades ahead. We also think it is important to emphasize the importance of a predictable flow of funds to institutions that have to undertake fundamental changes.

While being well funded does not necessarily guarantee high quality results, it clearly helps. In the long run a state can aspire to excellent education only if it is willing to pay for it.

Virginia has experienced several years of exceptional revenue increases and the colleges and universities have been among the beneficiaries. While higher education's share of the state's general fund appropriations has diminished somewhat, from 16.8 to 15.9 percent since 1981, increases in operating budgets for the institutions are among the highest in the nation.

We are aware that increased demands for state services of various kinds, mounting pressure to return more revenue to the localities, and slower rates of revenue growth may make the early years of the next decade difficult. We think that the vision of higher education that we are offering is realistic and necessary for good times or lean.

First of all, the enrollment growth is coming, regardless of the rate at which state revenues increase. Whether additional funding is provided according to plans that combine growth with curricular improvement or simply as more students show up at the gates, the colleges and universities will need more money to serve more people.

...making time out of sheer flux is an act of the mind; to live fruitful and civilized lives in time is an act of the will.
--A. Bartlett Giamatti

Second, the growth will occur at a manageable pace: probably about 3,000 full-time equivalent undergraduate students each year from 1994 until 2005. We recommend that the growth be anticipated and that funds be provided in advance to prepare for it. This is preferable to providing funds after enrollment growth has occurred, which is what has tended to happen in Virginia over the past 25 years.

Third, we have recommended that Virginia maintain its commitment to the Higher Education Equipment Trust Fund and adopt alternative ways of financing some capital outlay for colleges and universities. This will help to relieve some of the pressure for new funds to support both instruction and research.

Fourth, we have recommended ways in which the resources available to higher education can be used more effectively - for examples, greater cooperation among institutions, offering instruction by television and computer, encouraging enrollment in the community colleges for the first two years of undergraduate education, and using the capacities of the independent institutions to the fullest.

Our proposals are not extravagant. We have tried to be realistic while at the same time stressing that changes must occur in Virginia higher education if it is to serve the people well in the next century. This is a vision for good, bad, or average state revenue growth.

The operating budget cost of adding 24,000 full-time equivalent students (a reasonable but conservative projection) to the enrollment of the state's colleges and universities is at least $133 million per year. This estimate assumes that the students will be distributed across the state-supported and independent institutions as they are today, and uses current levels of support per full-time-equivalent student. The capital outlay required to accommodate the same enrollment growth will cost about $500 million, equally divided between educational and auxiliary enterprise space.

Neither the operating nor the capital costs come all at once, of course. The capital investment can be made over a decade, while the operating budgets will gradually increase as the enrollments swell.

Most importantly, these estimates do not include money to

Most importantly, these estimates do not include money to make colleges and universities better, rather than just bigger. If the state accepts our recommendation that higher education's incremental funds be allocated to reward change, then growth and curricular improvement will compete for the same resources. There has to be enough available to make the competition worthwhile.

Planning fundamental change is complex and will be costly. But we think that Virginia's chances of success will be considerably improved if future administrations and legislatures commit themselves to provide a steady stream of funds to support transformation and selective growth within the system of higher education. We also think that it will cost more in the long run just to accommodate enrollment growth with spasmodic funding. Academic, administrative, and capital innovations need systematic support in order to succeed.

Virginia's colleges and universities have flourished because they have been supported by legislators who looked at the needs of higher education as a whole, rather than at the needs of some favorite institution. We urge the General Assembly to reaffirm its commitment to this perspective in its response to our report. Several of our recommendations require such an affirmation, at least implicitly.

New funding guidelines for operating or capital outlay budgets, for instance, can only be effective if they are endorsed by legislative leaders. Decisions about where enrollment growth should occur are useful only if they are one of the bases for allocating money and positions among the institutions, and the legislature rejects all end-runs.

The autonomy of Virginia's state-supported colleges and universities is one of the hallmarks of the state's higher education. Other state systems do not provide for separate governing boards to oversee each institution, and we recognize that several of these systems are very good. But diversity among the states is as important as diversity within them, and we are convinced that Virginia higher education has become what it is because institutional autonomy has been preserved.

The president of one Virginia university commented upon another value that should be preserved: the cordiality that exists between state government and the colleges and universities, and between the state-supported and independent institutions of higher education. We are impressed by this characteristic of Virginia and urge that future actions strengthen rather than weaken the good relationships that now exist.

At the same time, we urge greater active engagement among the various parts of the education enterprise in Virginia. We prize cordiality but we want to see engagement: active, productive working relationships. This is what will really help students, businesses, and the state as a whole.

We assume that a course of action will be determined by the Governor and General Assembly after consideration of the recommendations of the Commission on the University of the 21st Century. As indicated by Governor Baliles in his charge to the Commission, we expect that specific planning will be done subsequently by the Council of Higher Education and the colleges and universities. A commitment to provide steady operating and capital outlay support will help to ensure that higher education serves Virginia and its citizens adequately over the next several decades.

But nothing much will happen without initiatives from those who are responsible for Virginia's colleges and universities. The Commission recommends that each state-supported institution be directed, and each independent institution be requested, to develop a detailed plan in response to this report and about its own view of the future by June 30, 1991 and forward it to the Council of Higher Education.

We do not suppose that everyone will agree with all that we have said. Too much agreement would be a sign that we have taken too few risks. Neither do we suppose that the changes we have recommended can be made quickly. But Virginia's system of higher education enjoys several advantages because it can undertake change at its own initiative rather than responding in a rush to external forces, can plan for growth before it happens, and contains strong colleges and universities whose fortunes are on the rise, along with those of the Commonwealth.

APPENDICES

APPENDIX A

DEMOGRAPHIC PROJECTIONS AND OVERVIEW

COSTS OF ENROLLMENT GROWTH

Appendix

Demographics and Enrollment

Virginia's state-supported institutions of higher education enroll more than 289,000 students. When independent college and university enrollments are included, more than 346,000 students enrolled for college credit in fall 1989. Enrollment could grow by 30 percent or more by 2005, and growth will occur in all segments of the student population -- full-time and part-time undergraduate, graduate, and professional students. Several demographic and social factors will change the face of higher education enrollments over the next fifteen years:

- Virginia is experiencing a "baby boom." The annual number of births in Virginia has grown by 27 percent since 1978.

- The percentage of students graduating from Virginia's high schools continues to increase. The rate at which Virginians graduate from high school has more than doubled since 1950.

- The educational attainment of Virginians continues to rise. In 1980, 19 percent of Virginia adults had four or more years of college -- an increase of seven percentage points since 1970. For those age 25 to 34, nearly one out of two had one or more years of college.

- The increases in the numbers of students and their educational persistence will combine to produce record

numbers of high school graduates. By 2005 the number of public high school graduates could grow by nearly one-third.

- At current rates of college-going in-state, first-time freshmen enrollment at Virginia's state-supported colleges and universities could grow by more then 6,000 by 2005.

The increase in the number of births in Virginia over the past decade is the result of the post-World War II baby boom -- the baby boomers are having babies. When the baby boom ended in 1965, with 96,966 births recorded that year, the number of births in Virginia began to decline, reaching a low of 69,972 by 1976. This was the lowest number of births since World War II. A second baby boom began in 1977 as the number of births began to increase. Unlike the post-World War II boom, this "baby boom echo" is not the result of increases in the number of children per family. The baby boomers are having fewer children than did their parents, but the large number of people in this age group has produced a boom that may rival that created by their parents. The baby boom echo should last at least as long, 18 years, as the original baby boom, but it may last longer because many women appear to be postponing child-bearing. The number of 1988 births in Virginia was 92,816, an increase of 22,844 (33 percent) since 1976.

The children of the baby boom echo will begin graduating from high school in 1995 and will present a challenge and an

opportunity to higher education. Even though the number of births has not reached the peak of the post-World War II baby boom, this group will probably produce record numbers of high school graduates. The number of high school graduates as a proportion of the births eighteen years earlier has steadily increased over the last four decades. The 12,500 public high school graduates in 1950 were 36 percent of the 55,245 births in 1932. This ratio has consistently grown at an average of slightly more than one percent per year over the last 39 years so that the 1988 graduates, 66,731, represented 77 percent of the 86,081 births in 1970.

If this ratio continues to grow at the same rate during the next fifteen years, Virginia could have 75,000 public high school graduates by the year 2000 and 88,000 by 2005. This forecast assumes that movement into the state and the school dropout rate will continue at current rates. Several large school districts are attempting to reduce the number of students who drop out of school. Norfolk, for example, is focusing on this problem in its school system. If dropouts can be reduced, the number of graduates from Norfolk schools will increase during the next 15 years.

More high school graduates probably will apply to colleges and universities. Interest in higher education has grown over the past four decades, and the proportion of graduates planning to attend college continues to increase. In 1974, 48 percent of the

public high school graduates in Virginia indicated they planned to further their education at a college or university. In 1988, 70 percent said the same. Between 1977 and 1985, while Virginia's public high school graduates declined by nearly 10 percent from 67,373 to 60,959, the number of graduates planning to attend a four-year college or university grew from 32,879 to 34,099. Decreases in the number of graduates were offset by increased interest in attending a college or university.

These proportions varied across the state. Those regions with the largest number of graduates also produced the greatest percentage seeking higher education. For example, one out of every six high school graduates comes from the state's largest school system, Fairfax County. More than 80 percent of the nearly 11,000 graduates from Fairfax planned to attend a college or university, and 68 percent planned to attend a four-year institution.

Where once an elementary education was necessary, then high school graduation, now college study is a pre-requisite for entrance into many jobs. This change is reflected in the educational attainment of Virginia's population. The median years of school completed by persons 25 years old and over was 8.5 in 1950. This figure rose to 9.5 years in 1960, 11.7 years in 1970, and 12.4 years in 1980. In 1950, only 29 percent of the adult population had a high school education. By 1980, 62 percent of the adults had graduated from high school. Of

Virginia's population age 25 to 34 in 1980, 85 percent were high school graduates and 26 percent had college degrees.

In 1950, only 14 percent of Virginia adult population had attended college. By 1960, this figure had grown to 17 percent and by 1970 to 23 percent. By 1980, 34 percent of the adults had one or more years of college.

Research shows that there is a greater likelihood for the children of college-educated parents to attend college. The high educational attainment of the 25 to 34 year olds, those in prime child-bearing years, suggests that their children will tend to go to college at a rate greater than the children of the previous generation. Since the people moving into Virginia tend to be young adults with high educational attainment, their children should attend college at a rate greater than that of the total population.

Another factor that may influence college attendance is the changing size of families. Recent studies have suggested that the educational attainment of individuals from small families is greater than for those from larger size families. The baby boomers are having fewer children on average, and average family size has dropped to less than two children per family. In smaller families, children tend to have greater opportunities to continue their education beyond high school.

These changes could have a dramatic effect on Virginia's system of higher education as it approaches the next century. The number of in-state, first-time freshmen should remain constant or decline only slightly until 1995. From 1995 through at least the early years of the next century, the number of freshmen should increase rapidly. In-state, first-time freshmen are expected to grow by more than 6,000 from 1988 to 2004 in Virginia's state-supported four-year colleges and universities. This itself could mean growth of 24,000 full-time students. Similar growth could occur in the independent institutions as well.

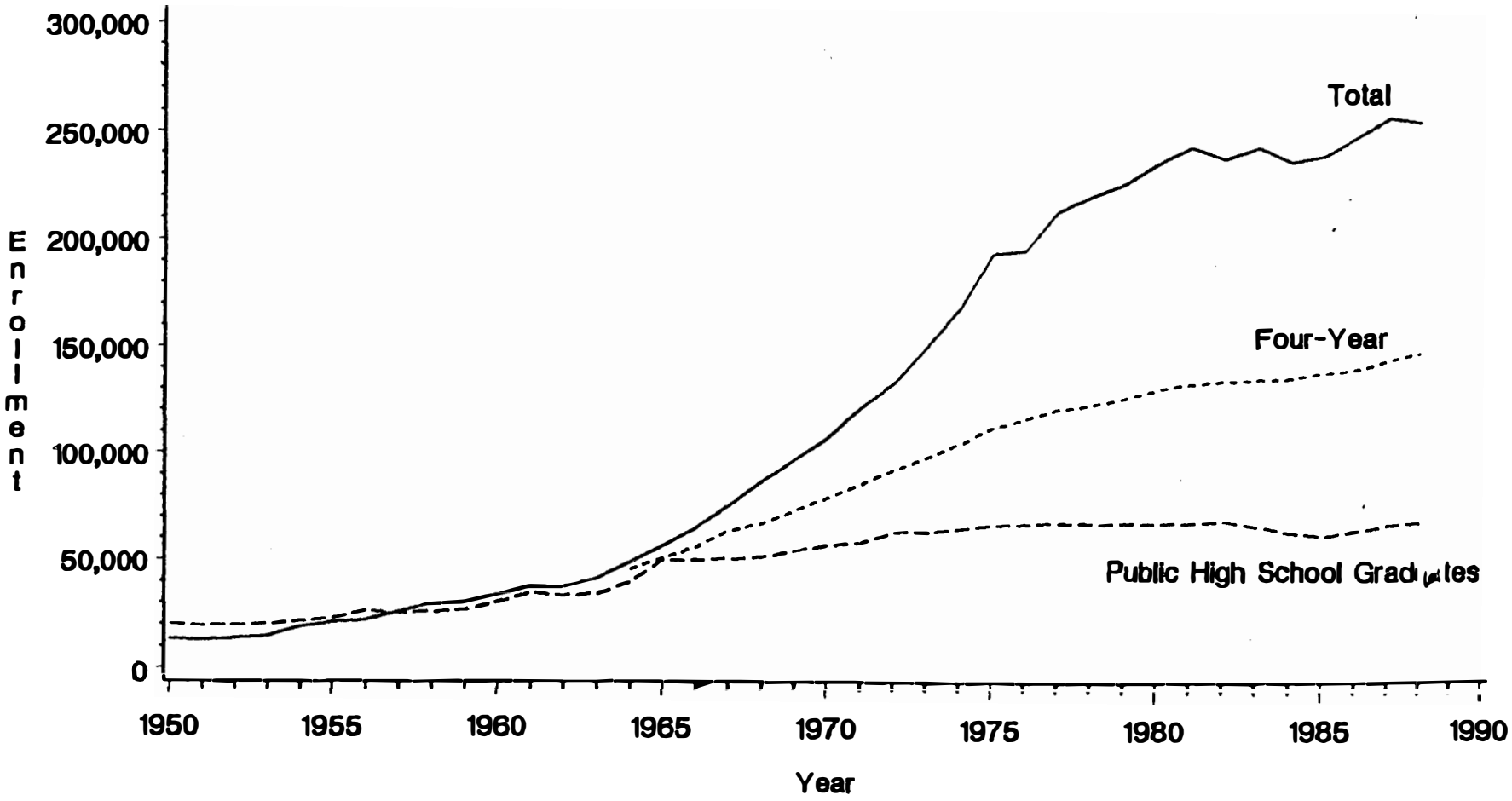
In-state, first-time freshmen comprise only one part of the total enrollment in Virginia's colleges and universities. The young student under the age of 22 represents 41 percent of total enrollment. Older students, particularly graduate and professional students are increasing as a proportion of total enrollment. In 1977, students aged 35 to 44 accounted for 14 percent of total enrollment while those under age 22 represented 43 percent. By 1987, the number of students under 22 years old grew by 12,820, but lost two percentage points of enrollment share. In contrast, more than 21,000 additional students between the ages of 35 and 44 enrolled in 1987, boosting their share to 20 percent. As the number of younger students increases they may regain a larger segment of total enrollment.

It is difficult to estimate the effect of these changes on total enrollment. The magnitude and distribution of growth in the higher education system will be influenced not only by population characteristics, but also by political decisions. The report of the Commission on the University of the 21st Century suggests directions for accommodating growth through the end of this century. The Council of Higher Education and the General Assembly will implement policies which will further shape the system. The institutions through their planning and actions also influence how growth might be realized. Finally, students themselves will determine the amount of growth and where it occurs.

In summary, since 1975, the on-campus enrollment in the state-supported institutions of higher education has grown by 59,000 students, from 191,000 to 264,000. When off-campus enrollments are included, enrollments reached more than 289,000 students in 1989. In-state, first-time freshmen at the four-year institutions grew by 2,000 to 17,000 in 1988 and by 2004 could be more than 23,000. As increasing numbers of students move through the higher education system enrollments of full-time students could increase by 24,000 or more. Add to this increases in part-time, graduate, professional, and unclassified enrollments in four-year and two-year institutions and the state-supported institutions could grow by 30 percent by 2005. Reductions in school dropouts would increase the potential pool of young adults who may go to college. Reductions in college

dropouts would increase over-all higher education enrollments. Increased rates of participation in higher education by older students, many of them motivated by the need to remain current in rapidly changing workplaces, could increase enrollment even further.

Public Higher Education Headcount Enrollment and Public High School Graduates



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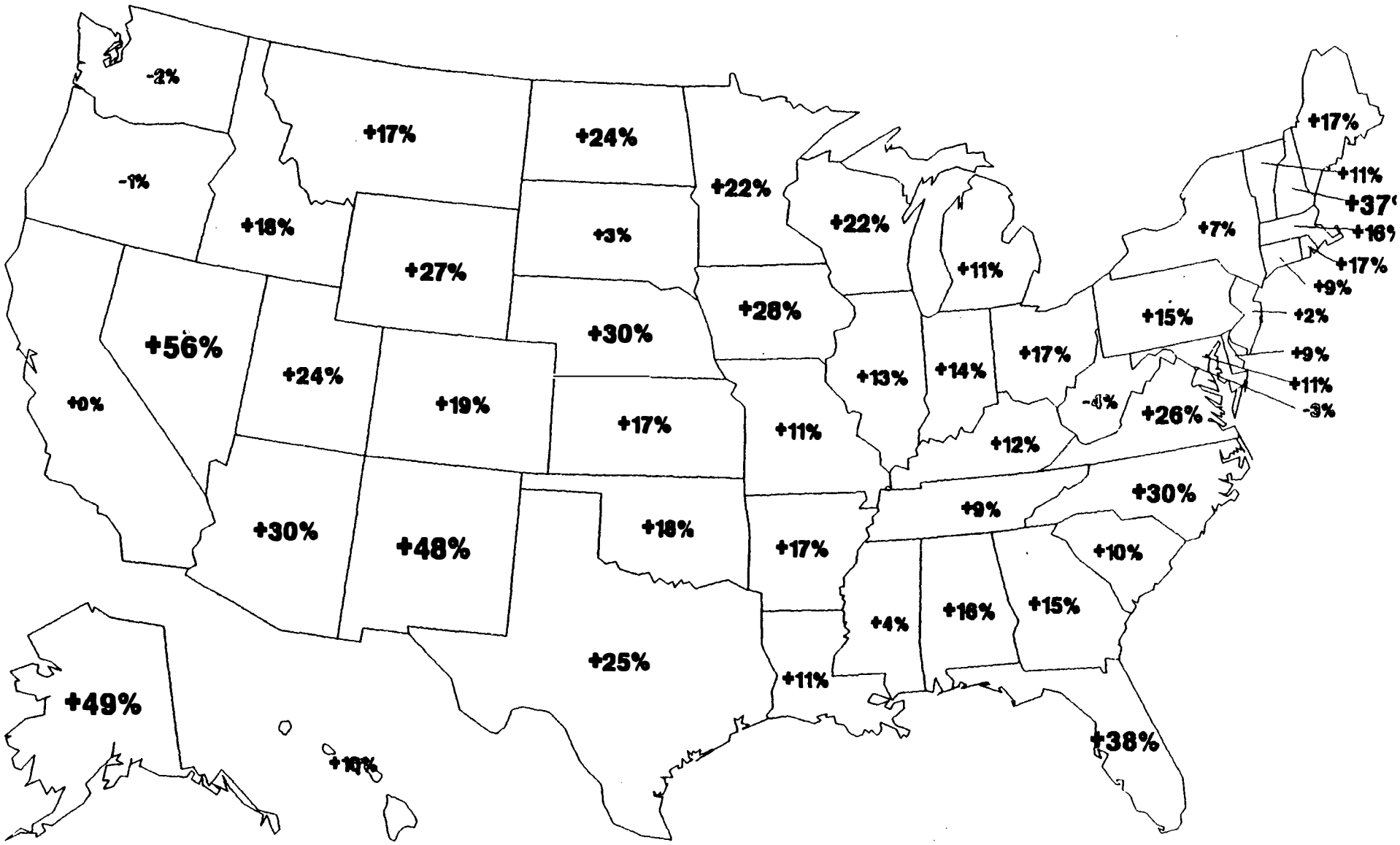
Percentage Change In College Enrollment: 1976 to 1986



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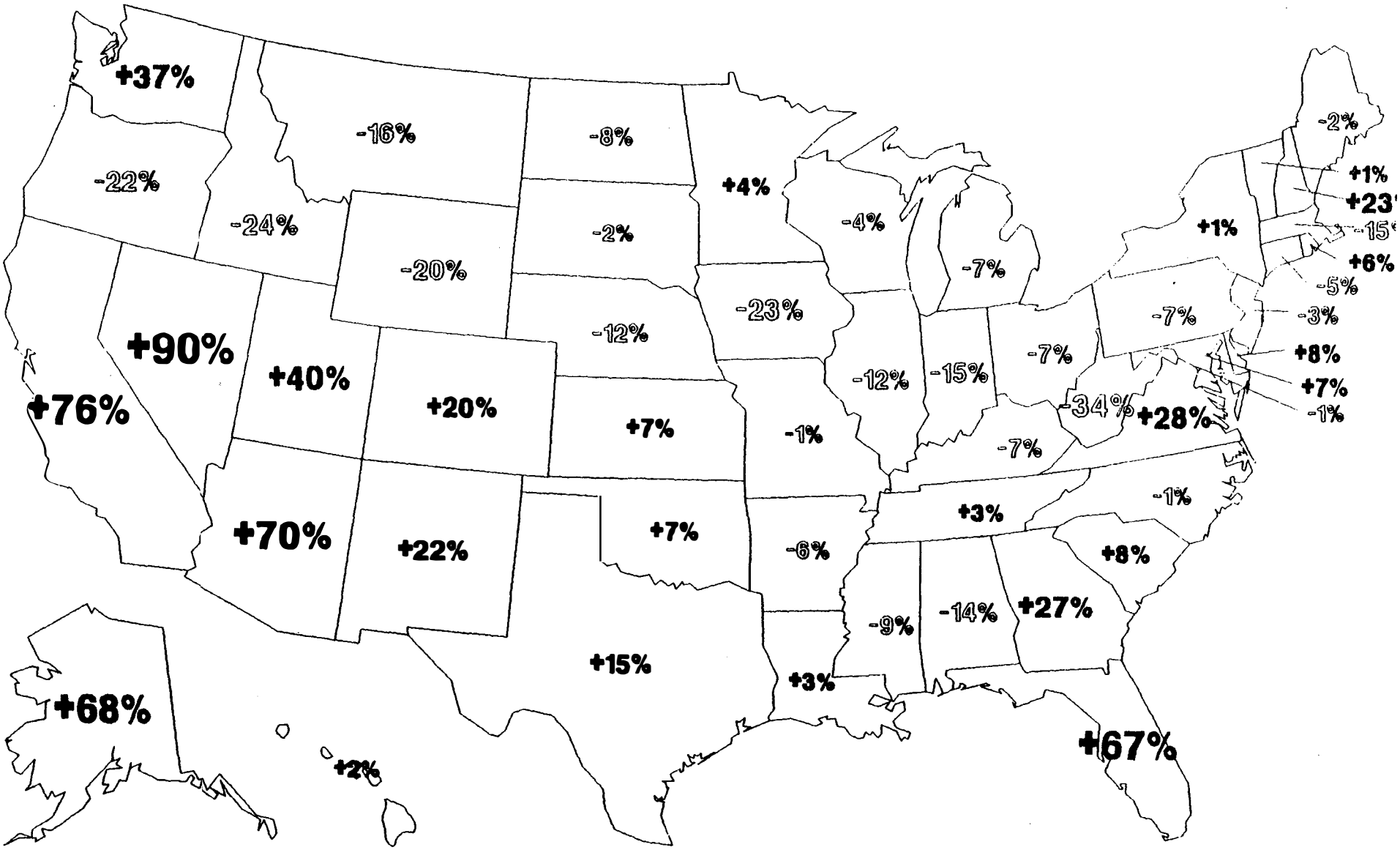
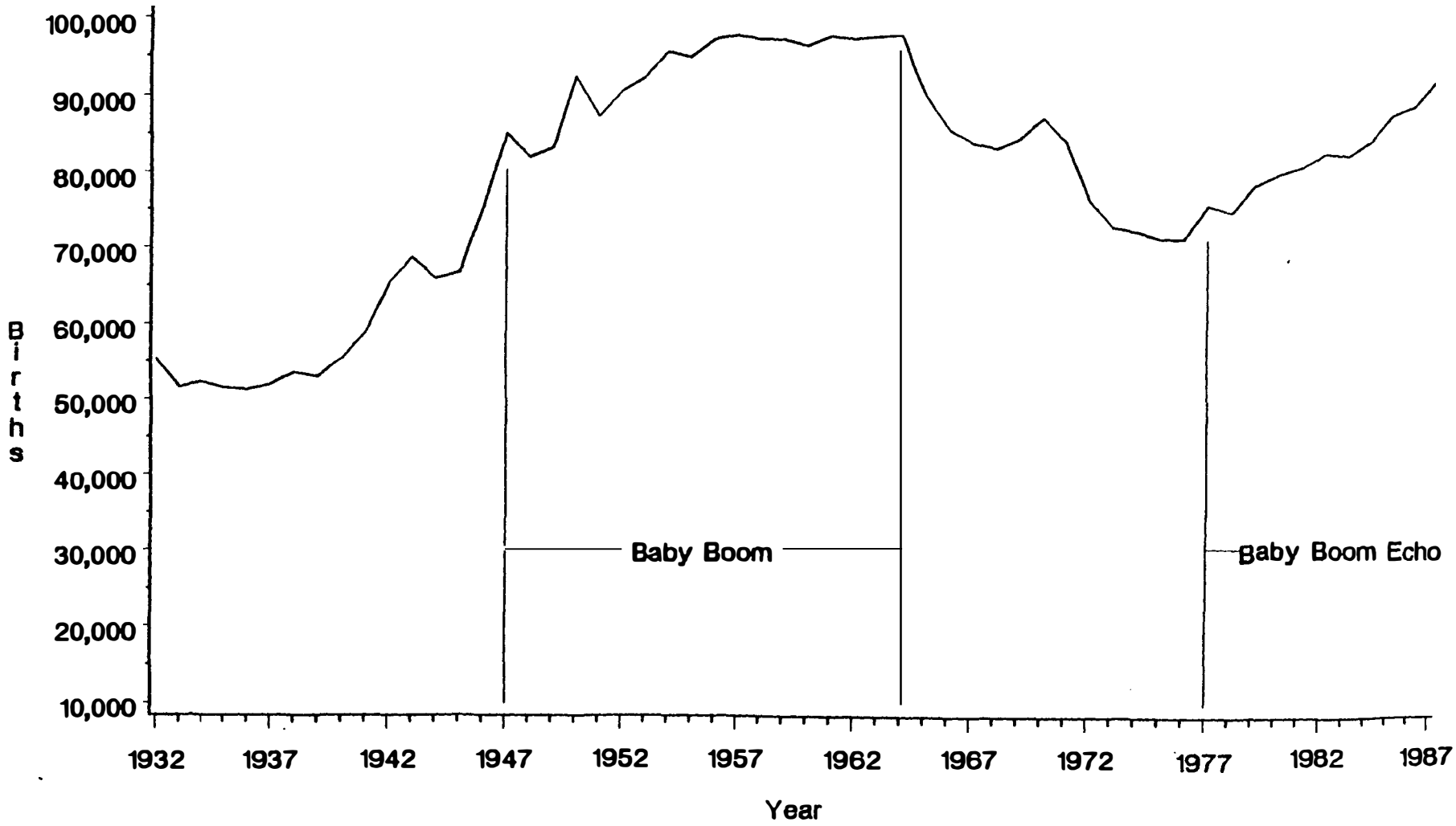
Projected Change in the Number of Public High School Graduates
1986-87 to 2003-04



Source: CHE

Virginia Live Births



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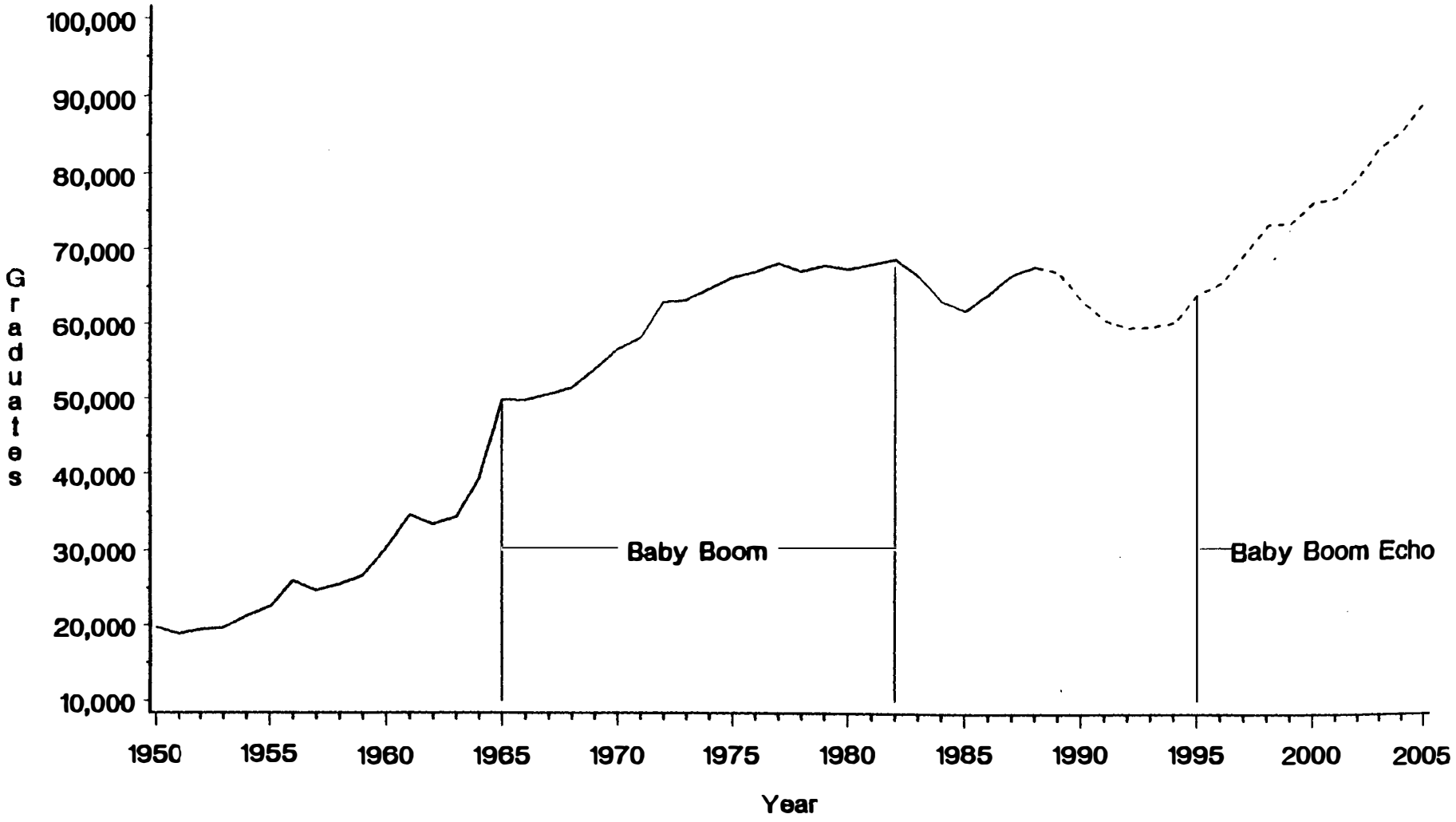
Virginia Public High School Graduates



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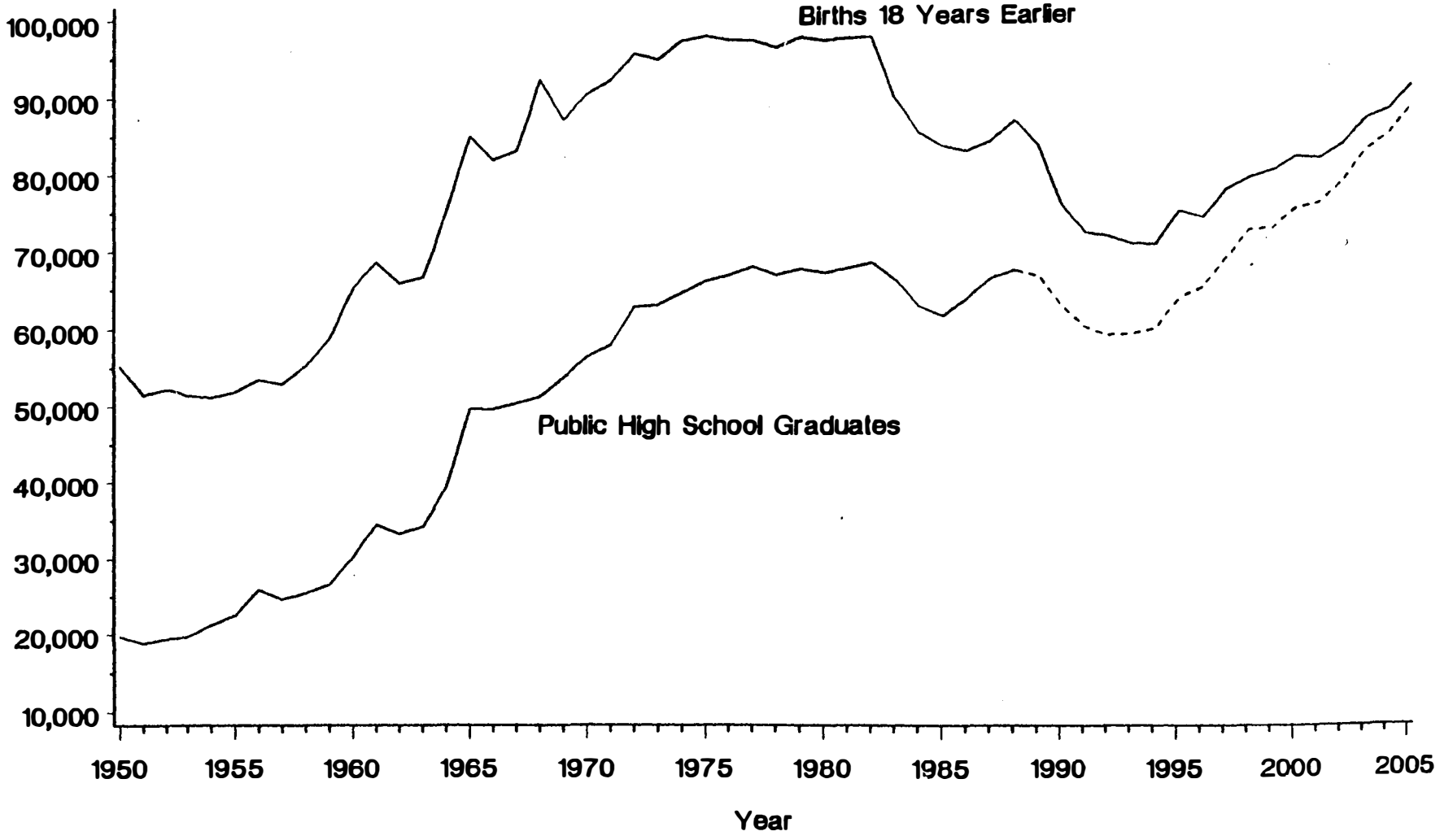
Public High School Graduates and Births 18 Years Earlier



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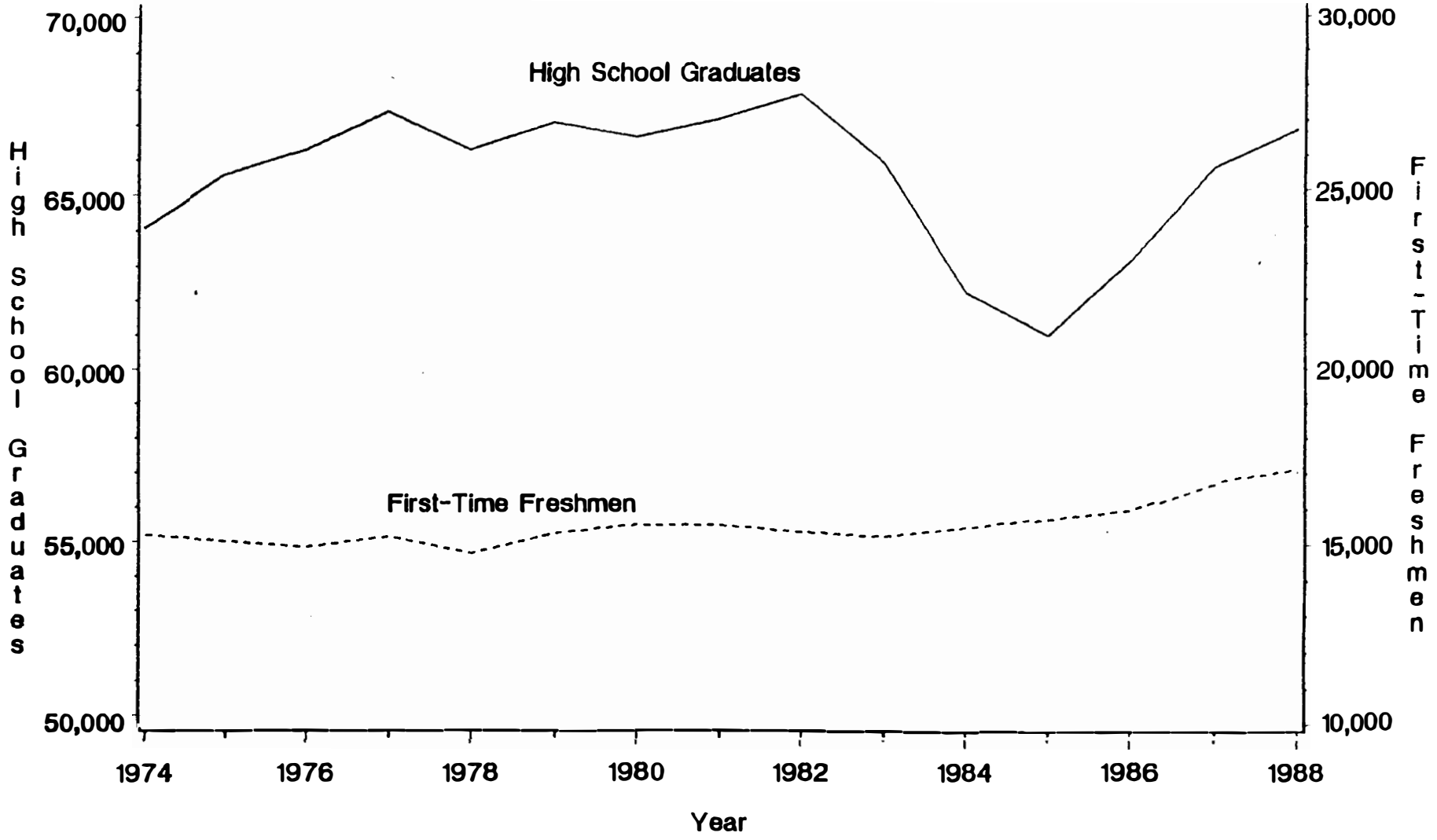
In-State First-Time Freshmen - Four-Year Institutions and Public High School Graduates



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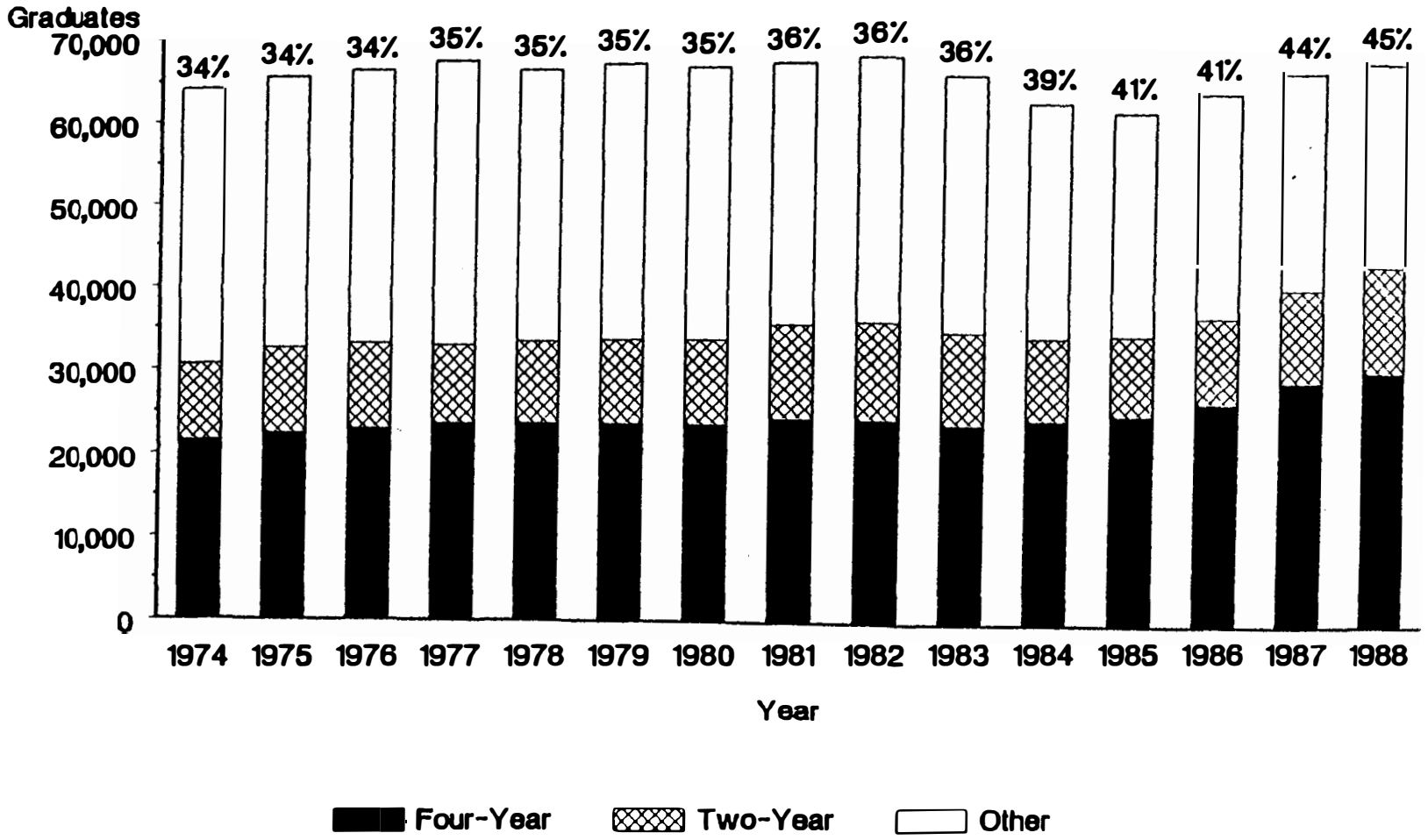
Virginia Public High School Graduates
Post-Secondary Education Plans

(Value above bar is percentage attending four-year institutions)

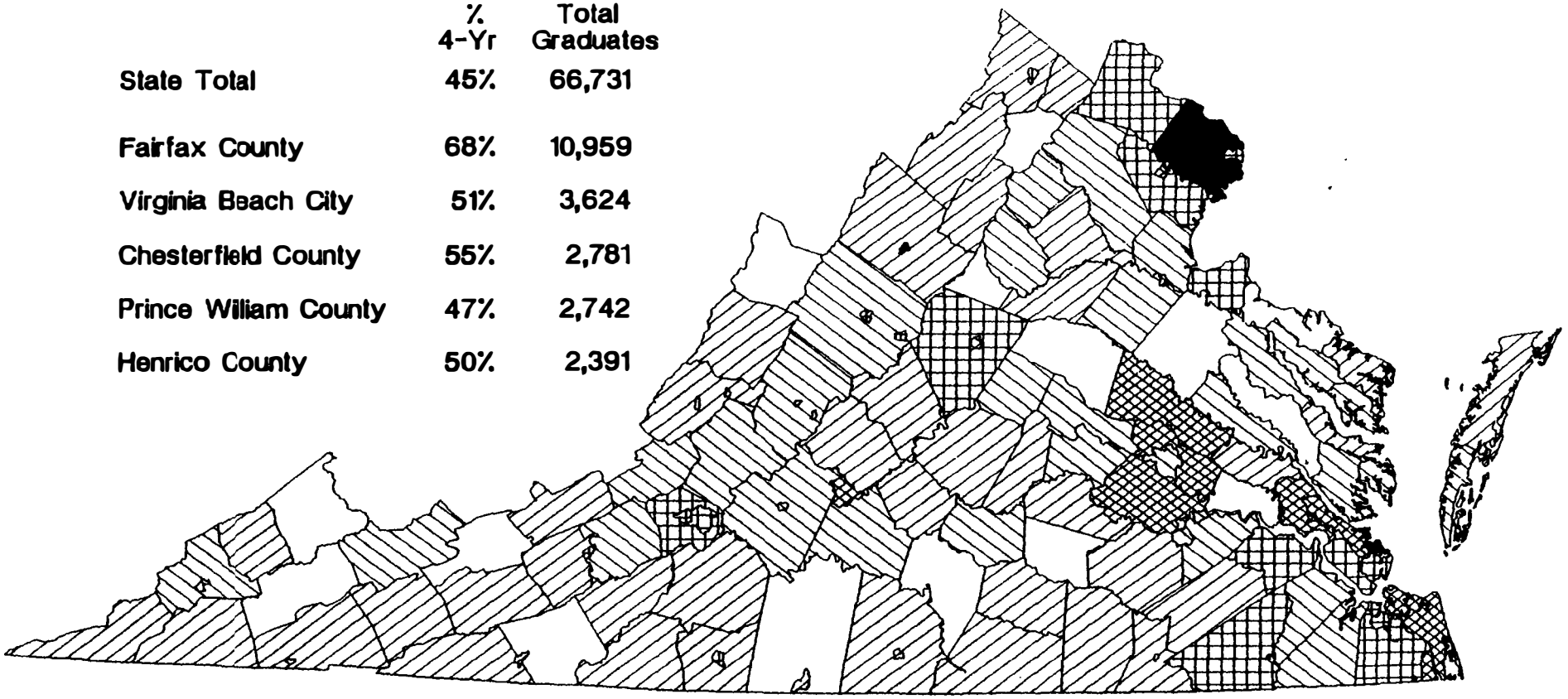


SCHEV 10/88

Virginia Public High School Graduates

Percentage Planning to Attend a Four-Year Institution By City and County - 1988

	% 4-Yr	Total Graduates
State Total	45%	66,731
Fairfax County	68%	10,959
Virginia Beach City	51%	3,624
Chesterfield County	55%	2,781
Prince William County	47%	2,742
Henrico County	50%	2,391



% Four-Year
Under 20%
20%-29%
30%-39%
40%-49%
50%-59%
60% & Above

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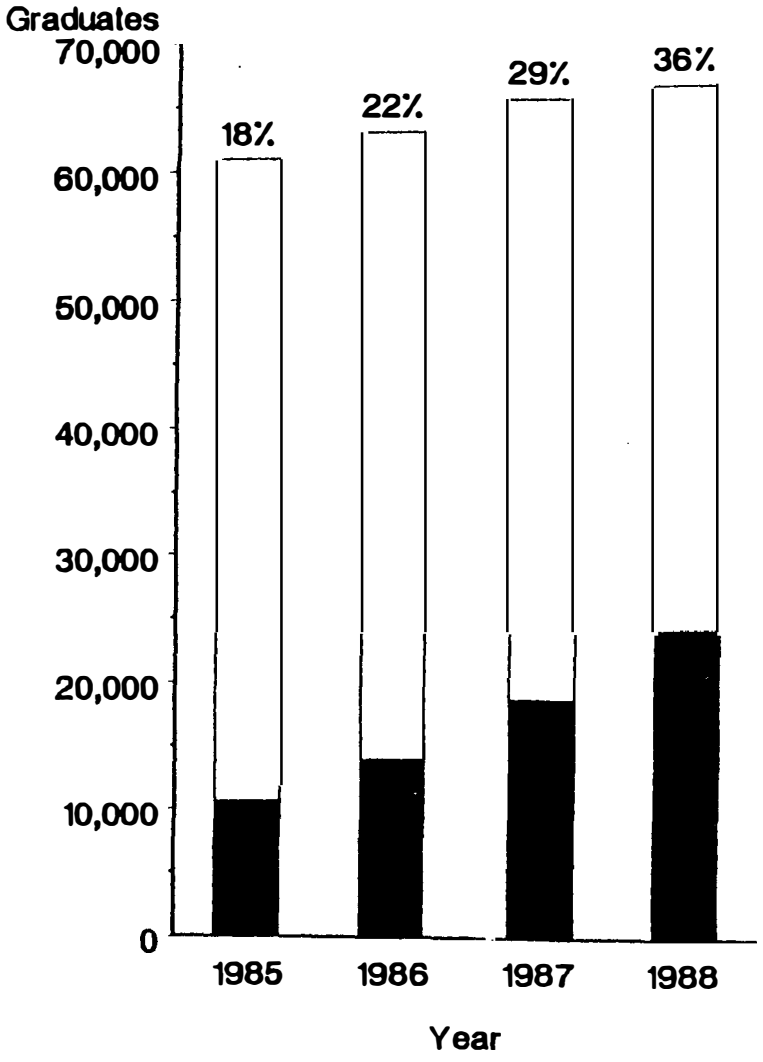
Virginia Public High School Graduates

(Value above bar is percentage receiving Advanced Studies Diploma)



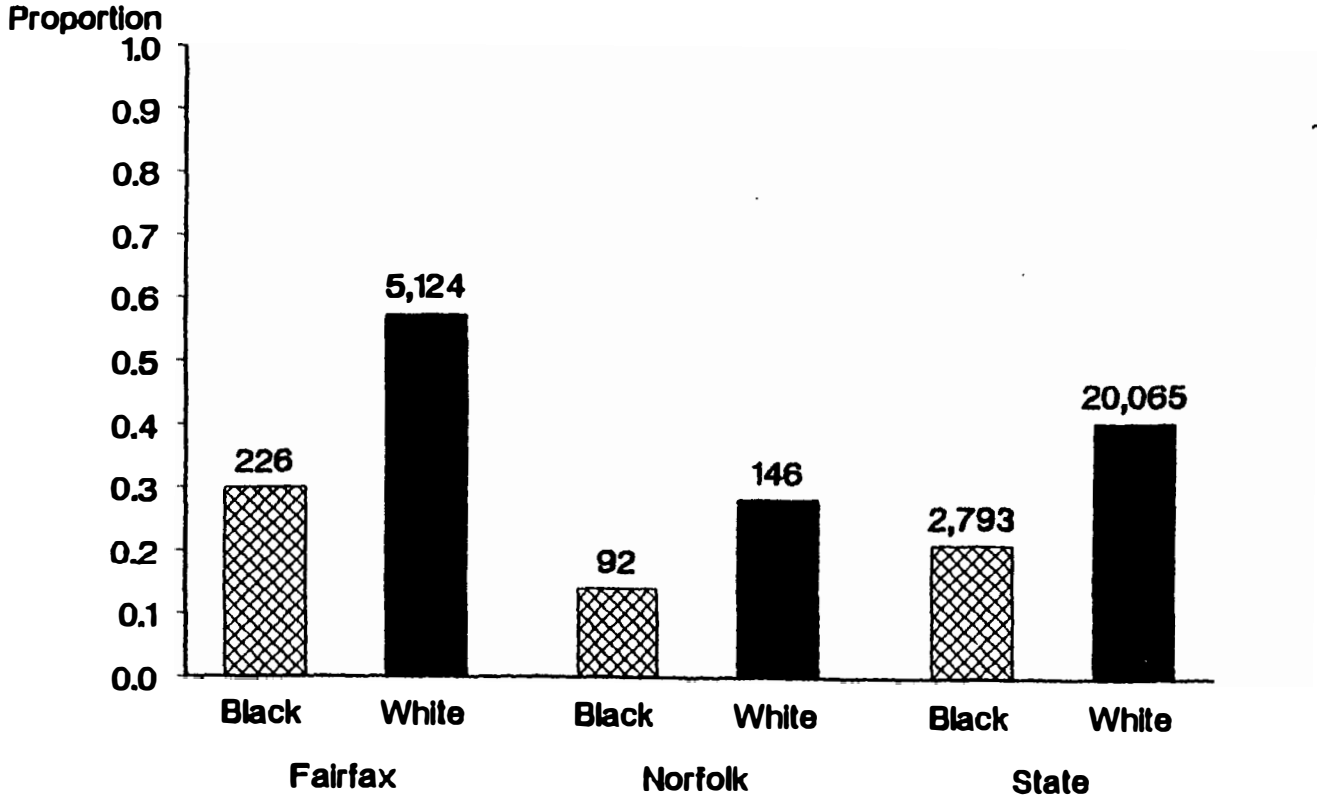
Fairfax County	55%
Virginia Beach City	42%
Chesterfield County	50%
Prince William County	47%
Henrico County	40%

Diploma ■ Advanced Studies □ Other

1987-88 Public High School Graduates

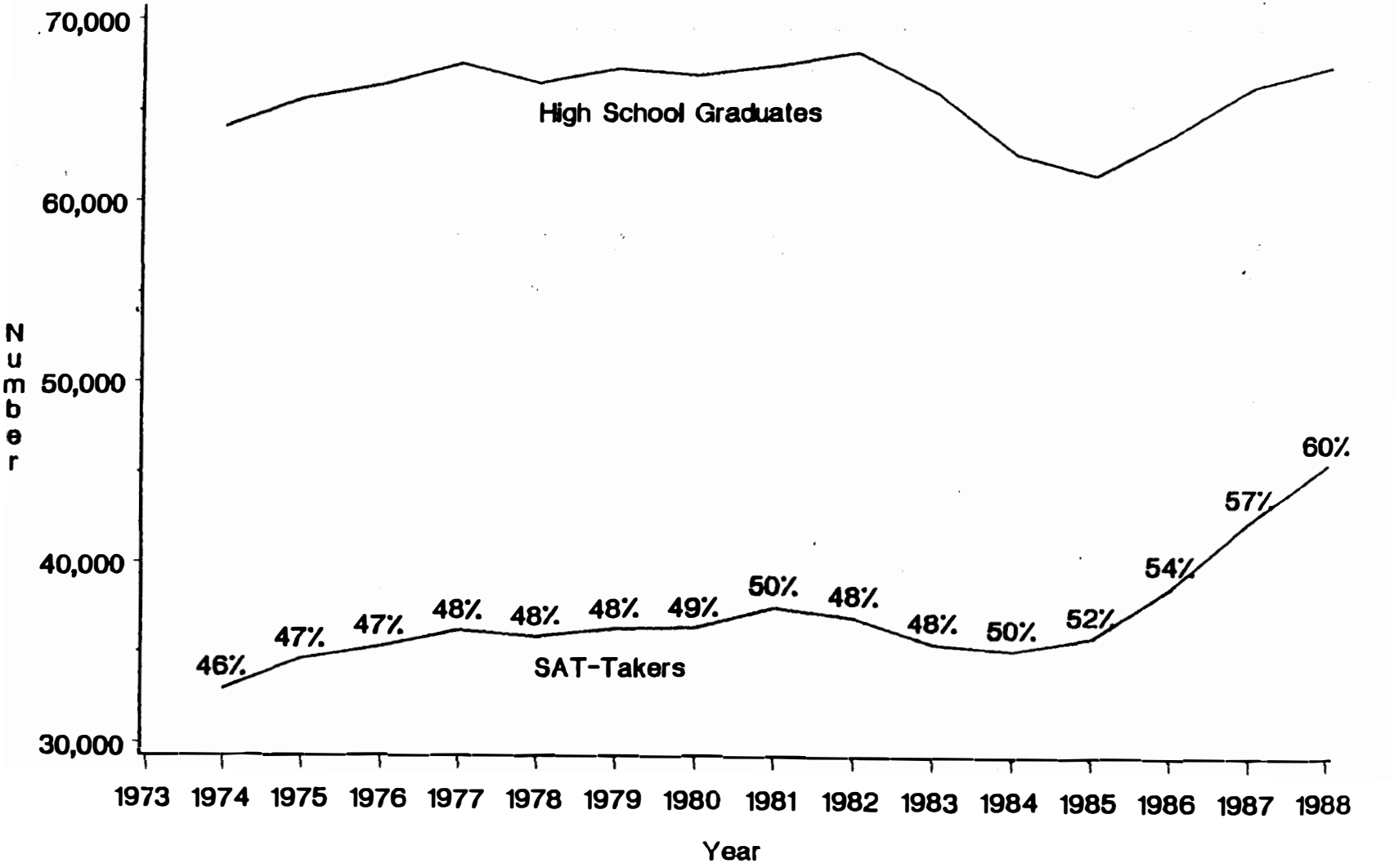
Proportion Receiving Advanced Studies Diploma
Selected Regions by Race

(Value above bar is number of Advanced Studies Diplomas in group)



Virginia Public High School Graduates And Virginia SAT-Takers

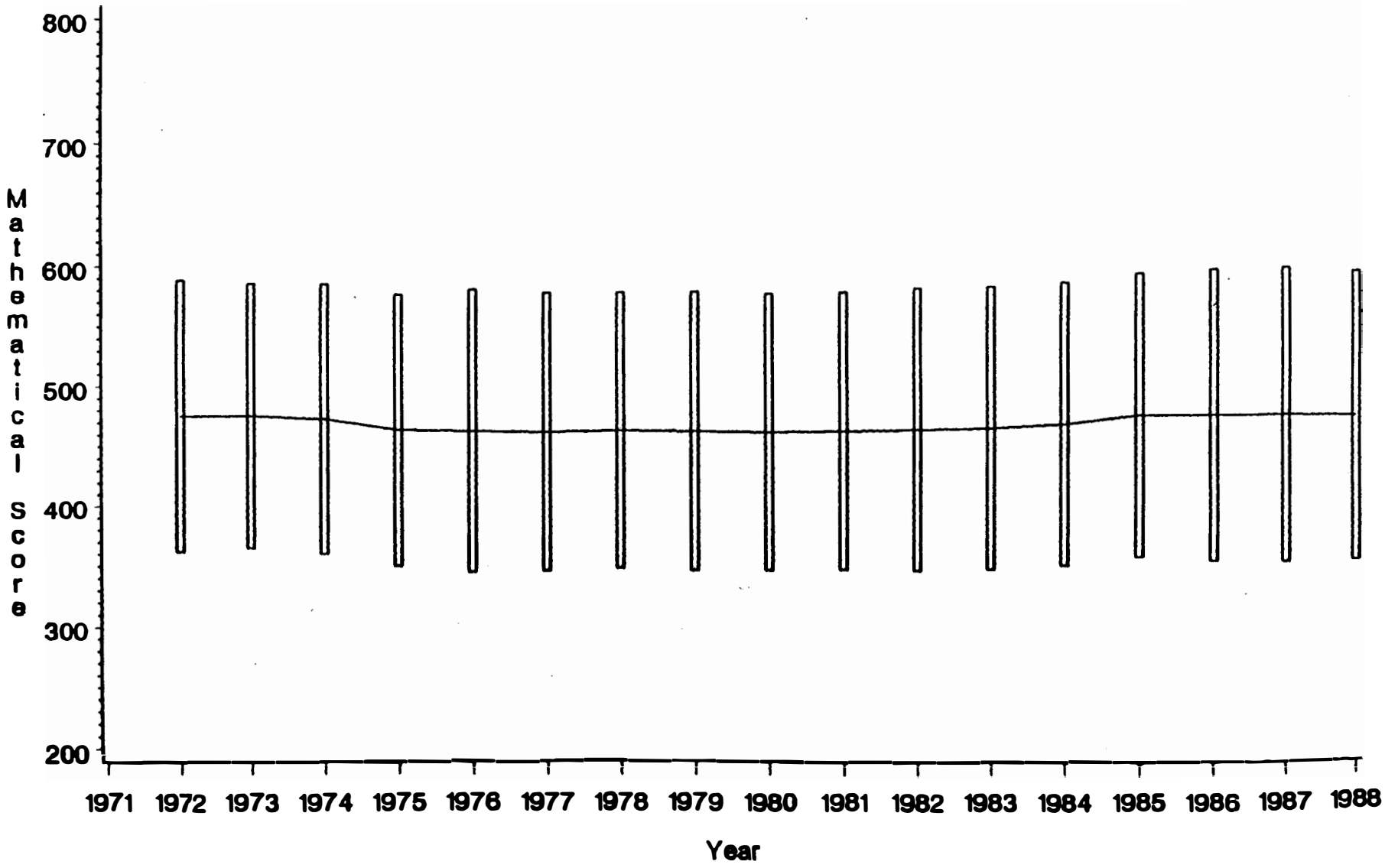
(Value above point is percentage of public high schools graduates taking SAT)



SCHEV 10/88

Virginia SAT Takers - Mean Mathematical SAT Score

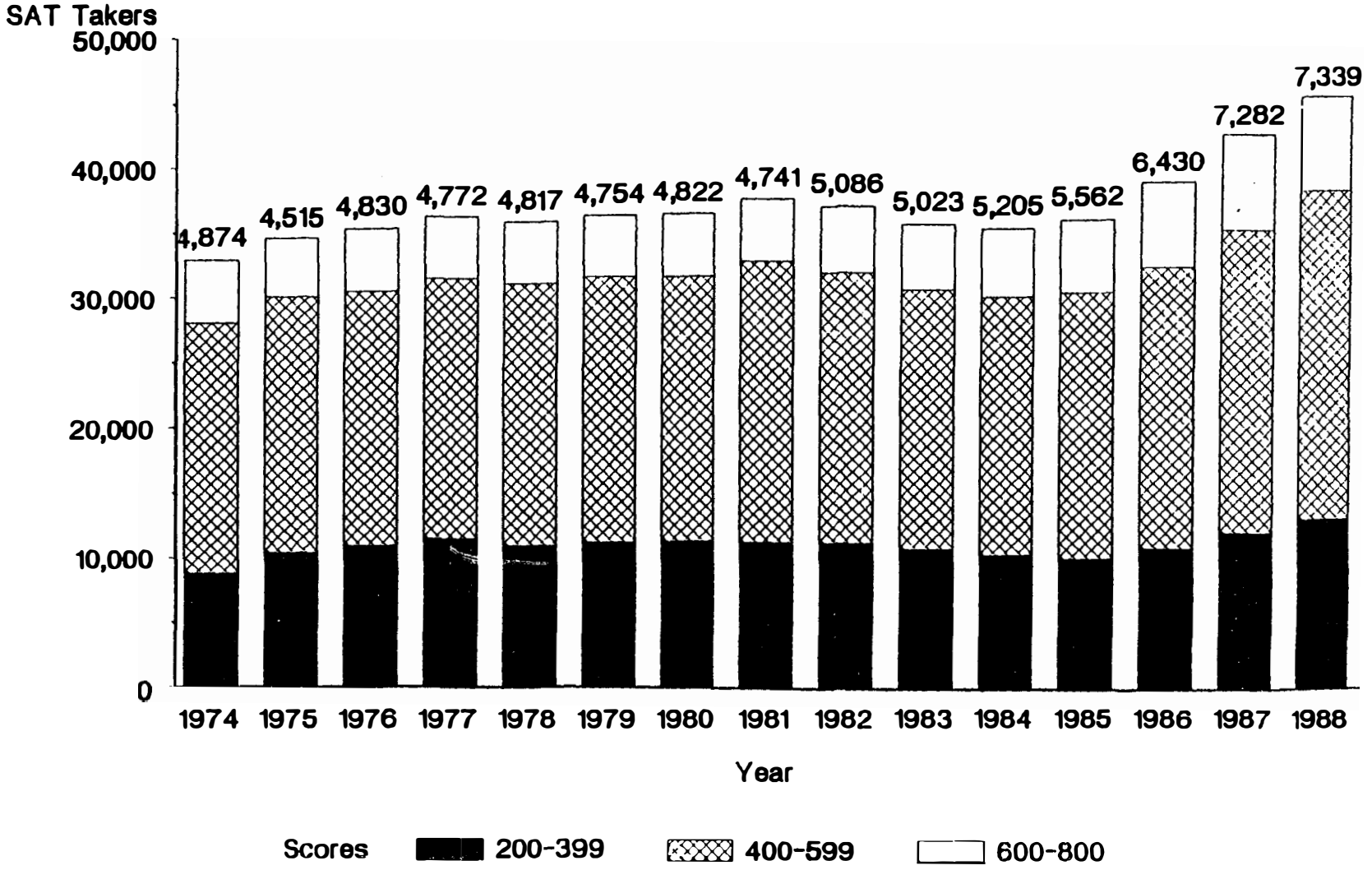
With One Standard Deviation Band



SCH 1/88

Virginia SAT Takers
Mathematical Scores

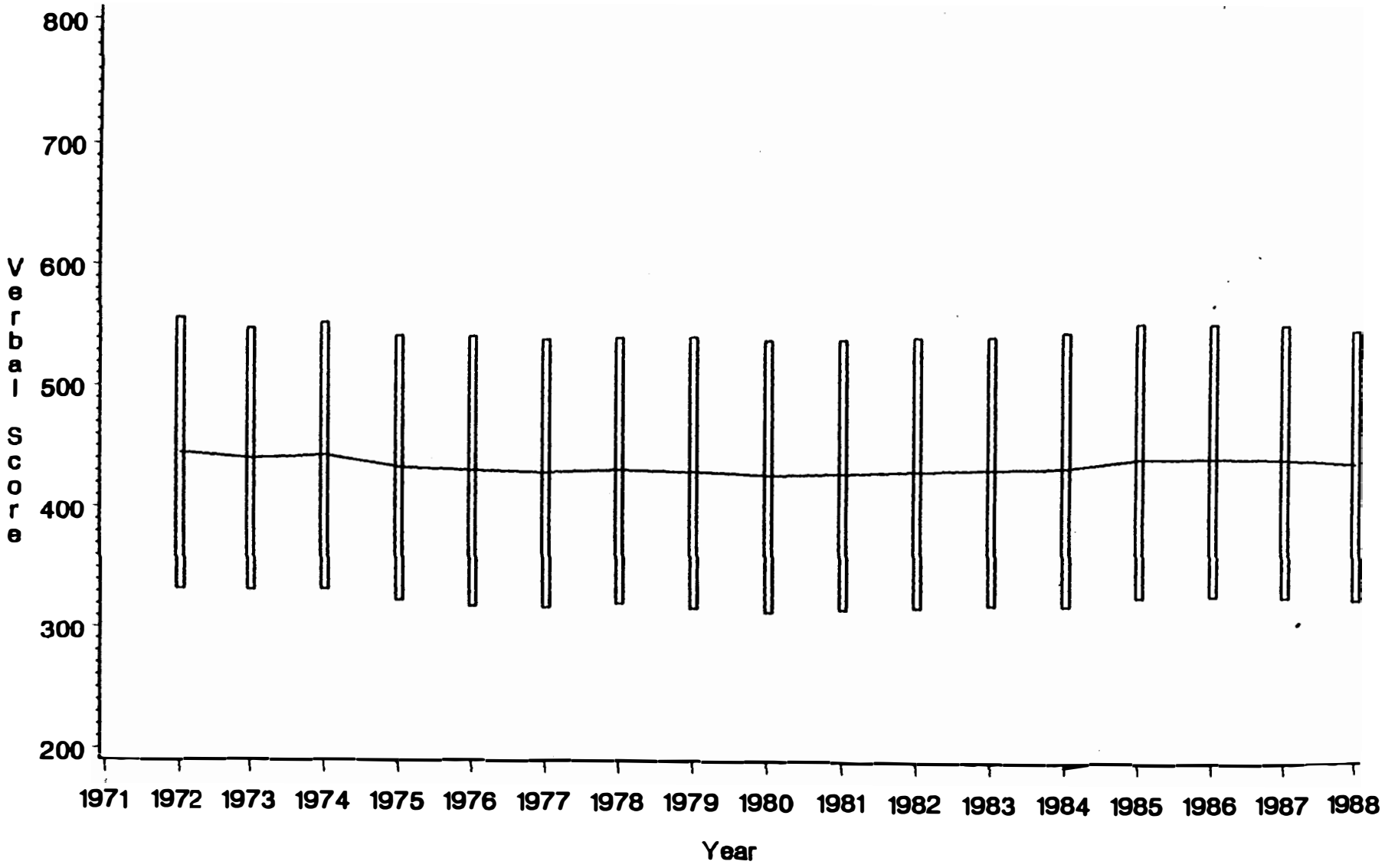
(Value above bar is number scoring 600 and above)



SCHEV 2/89

Virginia SAT Takers - Mean Verbal SAT Score

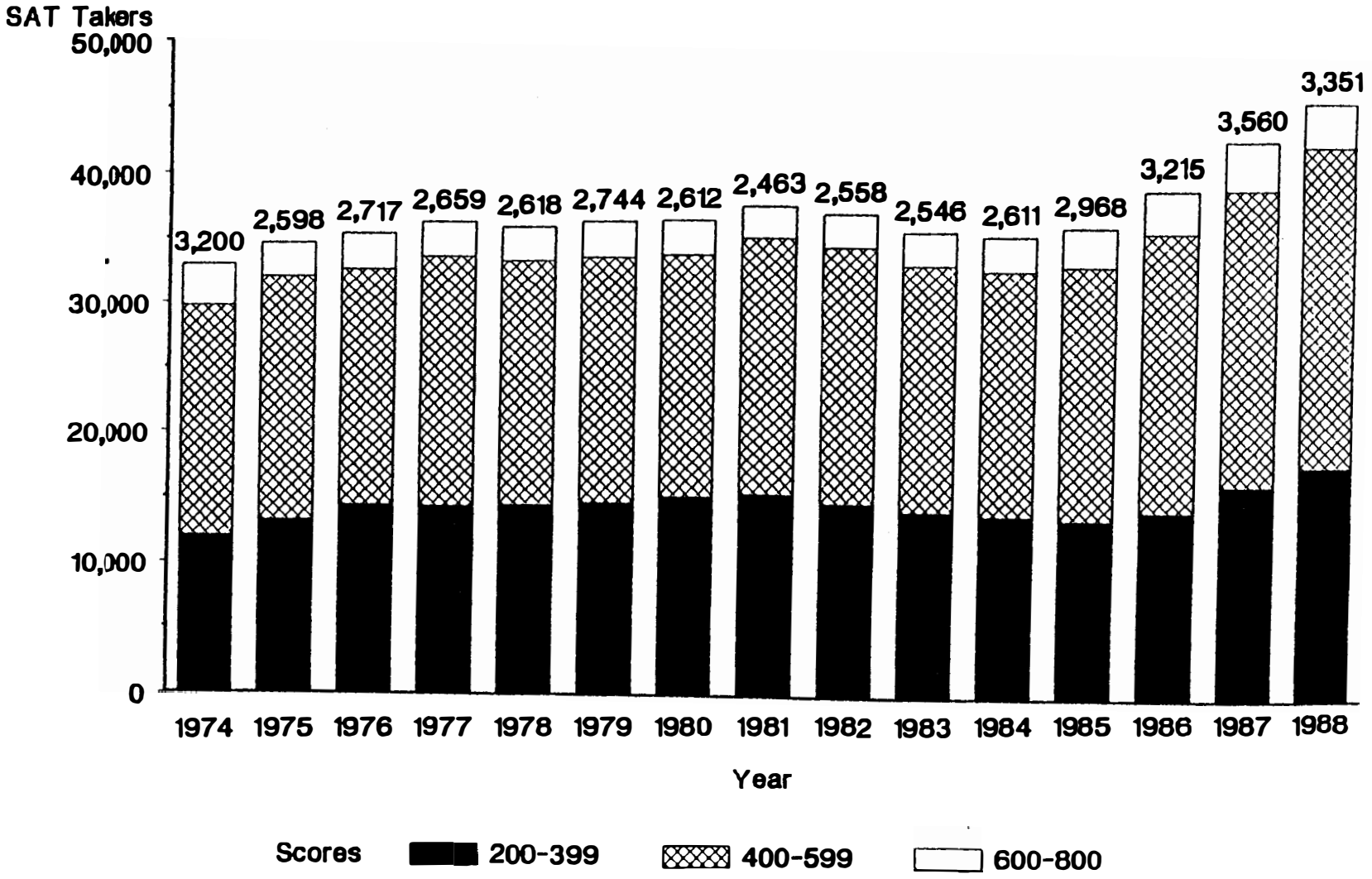
With One Standard Deviation Band



SCH 9/88

Virginia SAT Takers
Verbal Scores

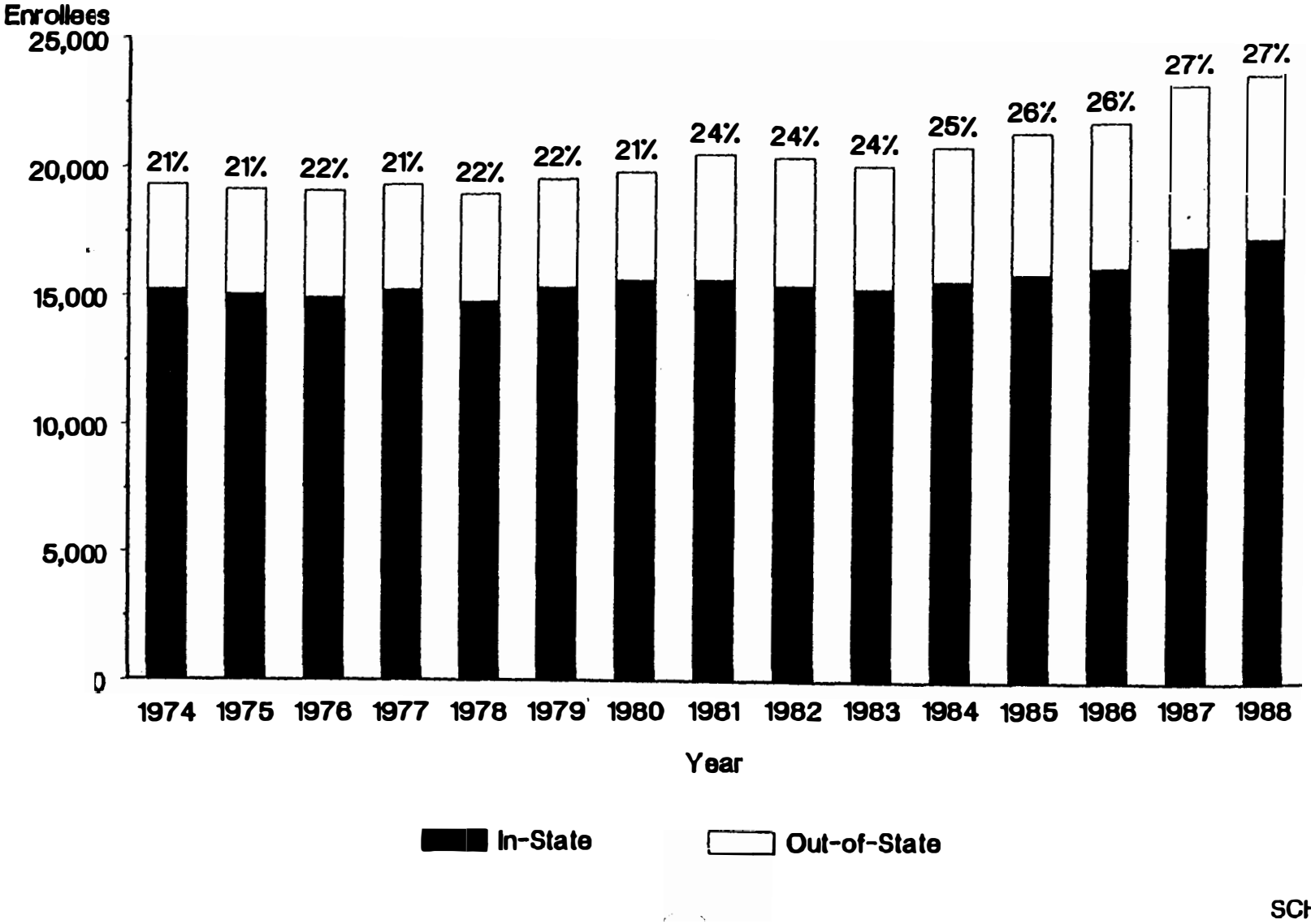
(Value above bar is number scoring 600 and above)



SCHEV 2/89

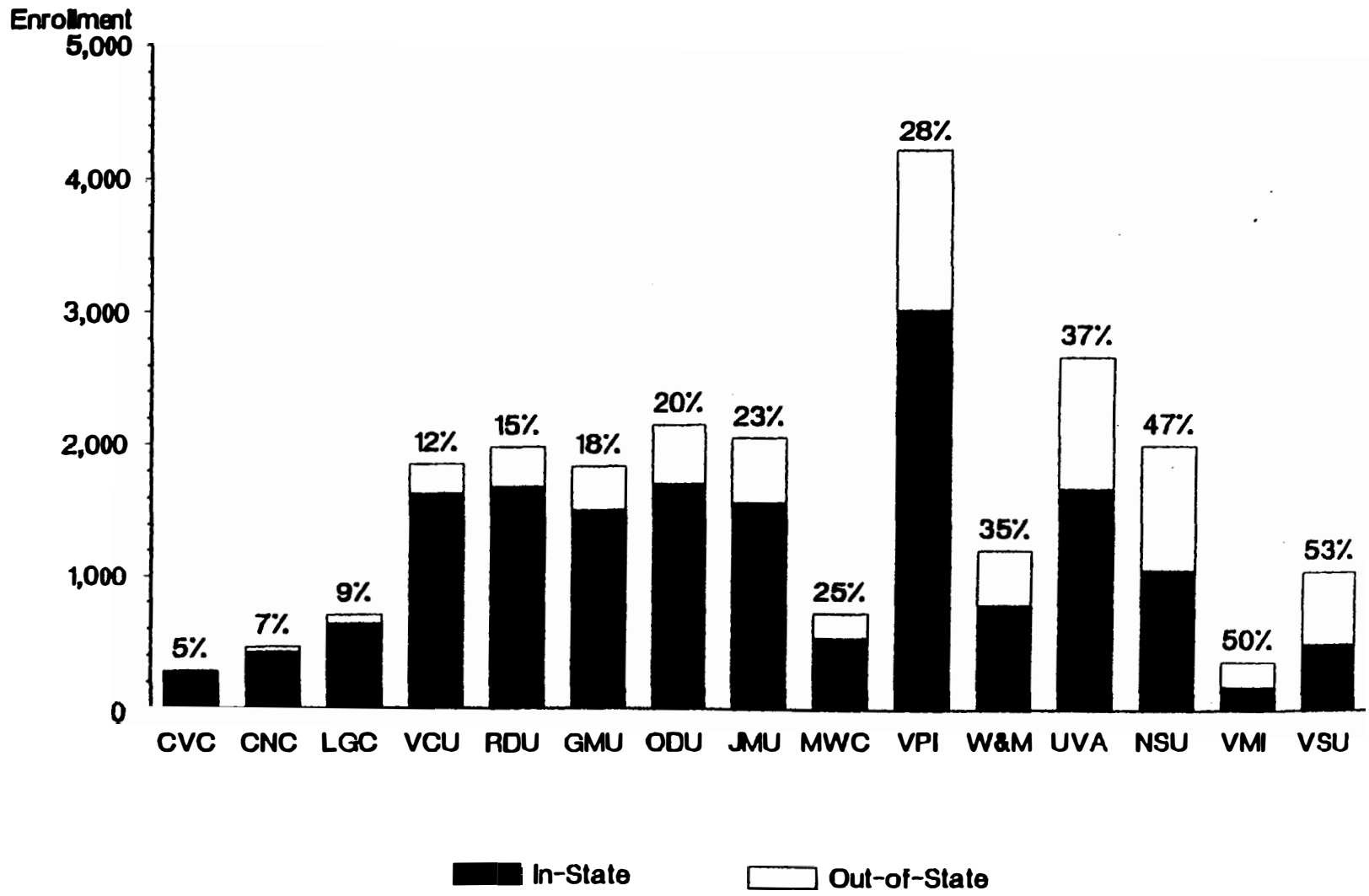
First-Time Freshmen Enrollees
Public Four-Year Institutions

(Value above bar is percentage from out-of-state)



SCHEV 11/88

1988 First-Time Freshmen
Public Four-Year Institutions
(Value above bar is percentage from out-of-state)

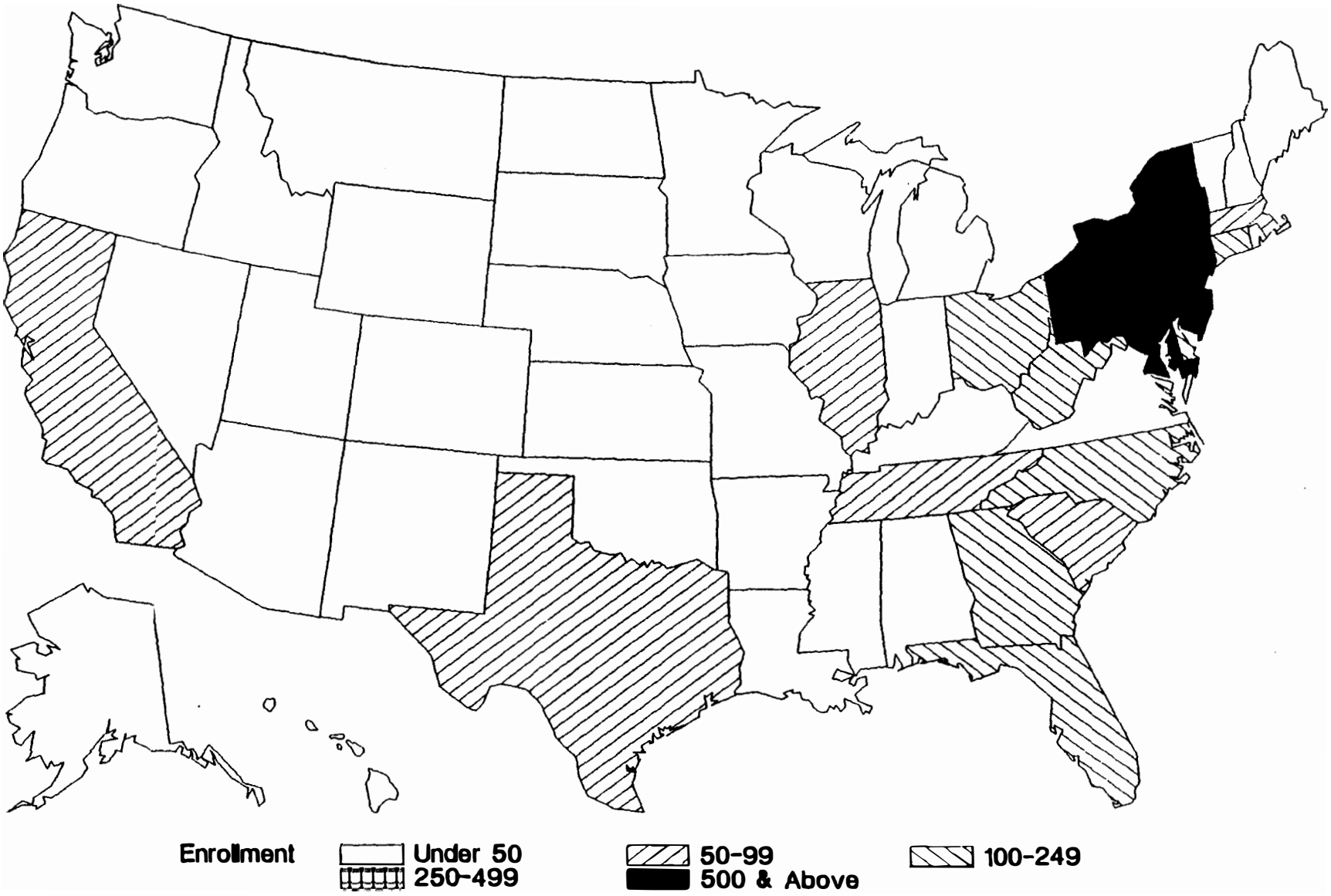


SCHEV 11/88

Fall 1988 Out-of-State Freshmen

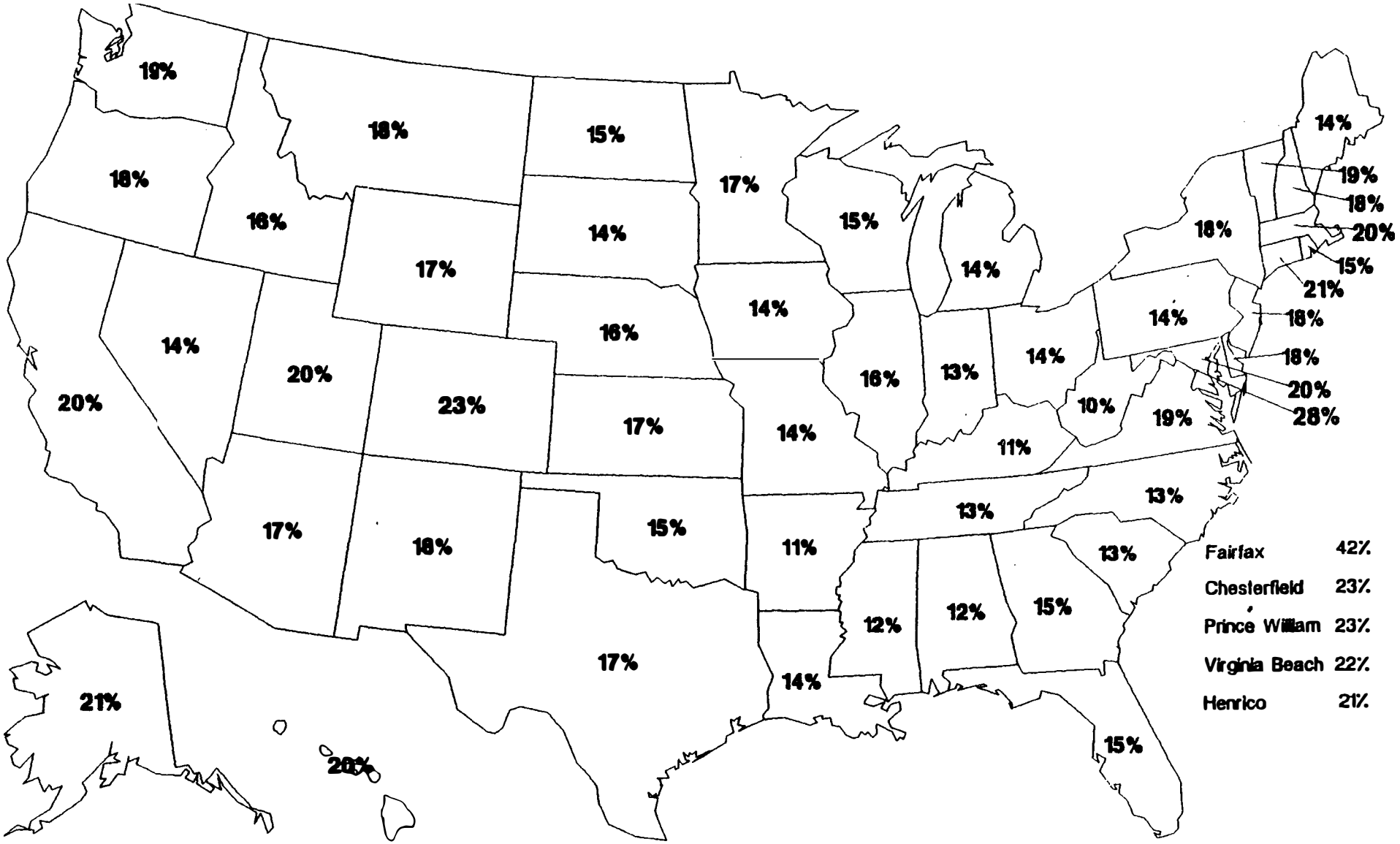
By State

Public Four-Year Institutions



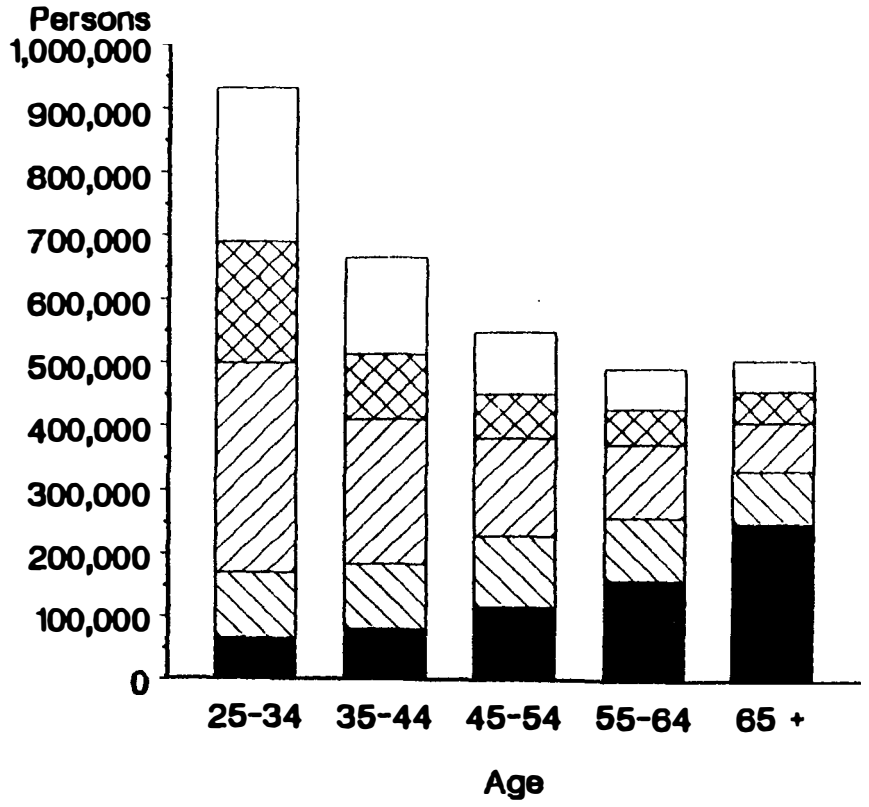
SCH ?/89

Proportion of Adults with Four or More Years of College



SCHEV 9/88

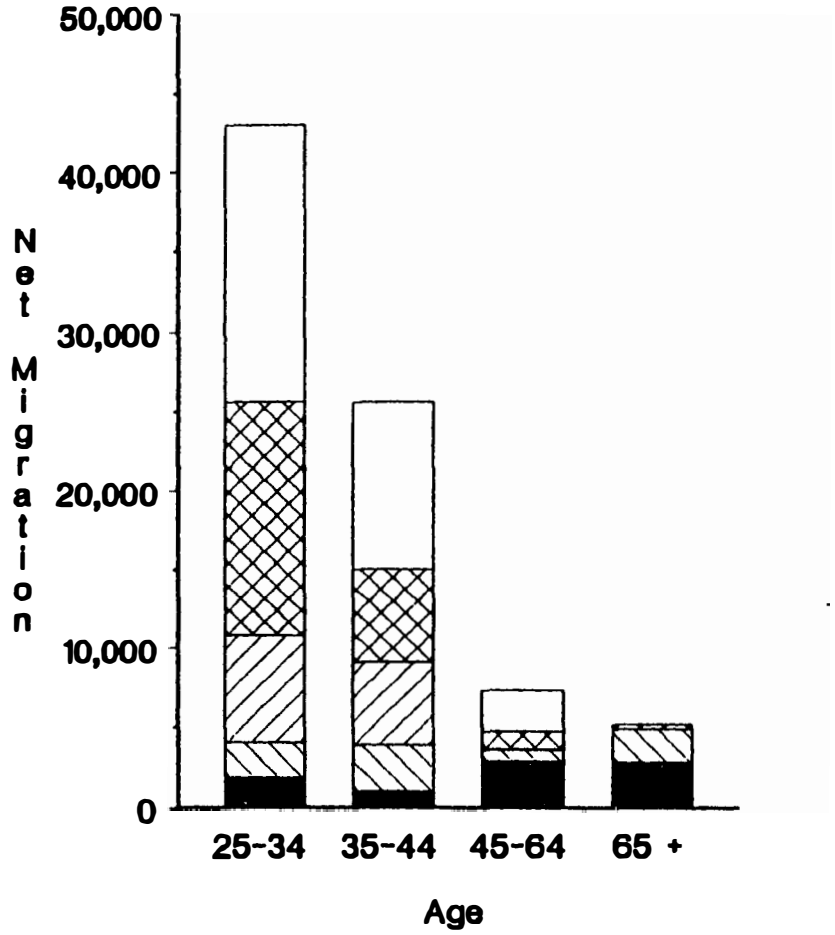
Years of School Completed - 1980
Virginia Persons 25 Years Old and Over



Years Completed

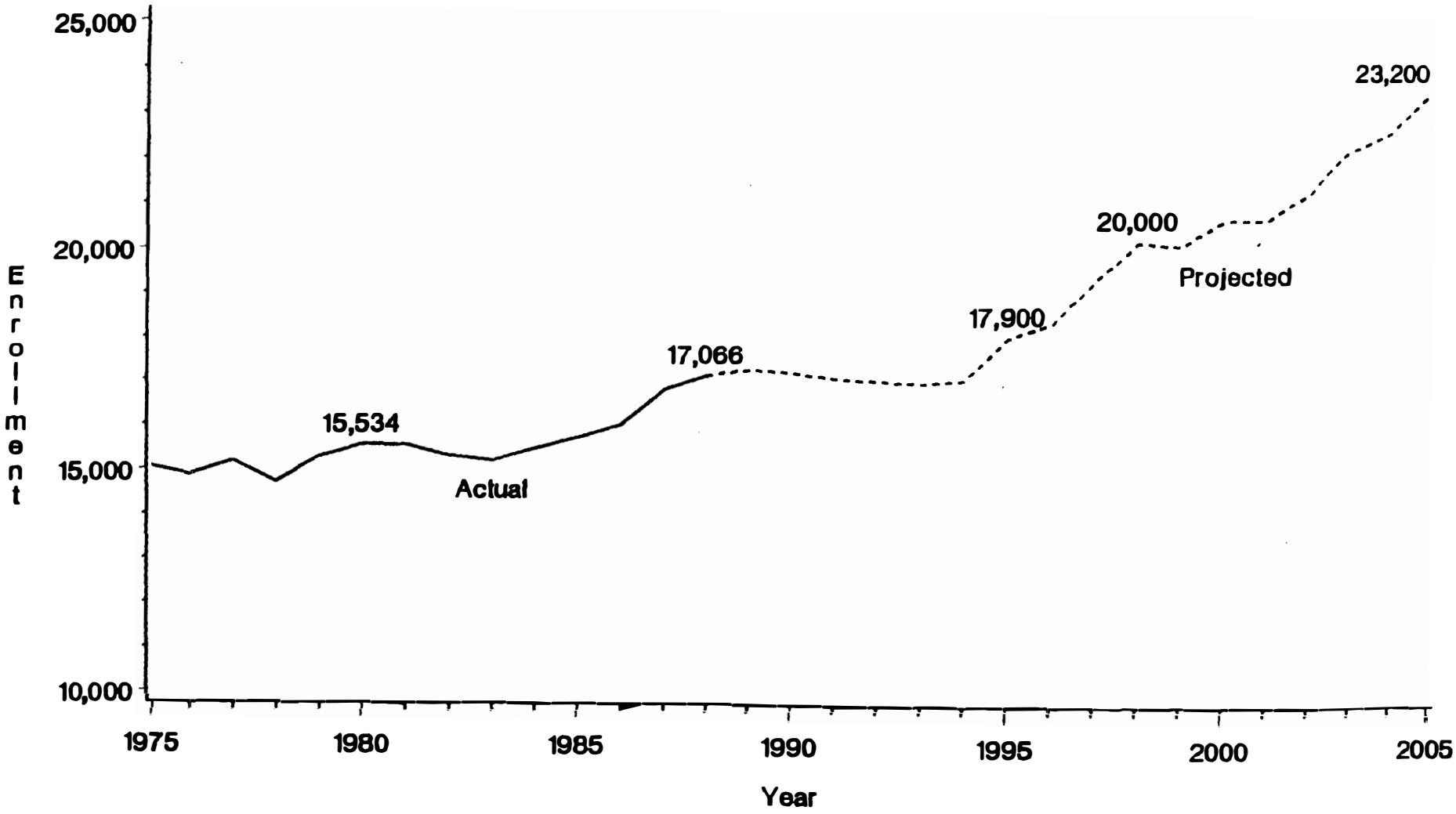
Elem or None
Col: 1-3
HS: 1-3
Col: 4+
HS: 4

Years of School Completed - Virginia Net Migrants Between 1975 and 1980



SCHEV 11/99

In-State First-Time Freshmen
Public Four-Year Institutions



SCHEV 11/88

APPENDIX B

COSTS OF ENROLLMENT GROWTH

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The commission has examined two different aspects of the cost of accommodating the additional undergraduate students expected to enroll early in the next century; additional operating costs and total capital outlay expenditures. The estimated number of additional students was identified as about 6,000 new first-time, full-time freshmen each year or an accumulation of approximately 28,000 new full-time undergraduate students over a four to five year period. In developing this cost estimate, it was necessary to make some assumptions about where the students would enroll, the operating support needed, and the need for additional classrooms, laboratories, and dormitories or food service facilities.

Distribution of enrollments. The additional students were anticipated to enroll in approximately the same proportions as current full-time Virginian. The proportion enrolling in public doctoral granting institutions was increased slightly because of geographic orientation of the growth (Northern Virginia) and the heavy demand for admissions to those institutions today. The proportion for the community college system was increased in response to the enrollment growth experienced in recent years. The distribution used is summarized in Table 1.

Operating Cost Estimates. Estimated operating costs were developed using average 1989-90 operating costs per full-time equivalent student and the distribution of students by type of institution. Only Educational and General costs were considered and no attempt was made to inflate or adjust the per student cost estimates. Current funding policies were used to determine the share of operating costs to be borne by the General Fund and that required from tuition and fees. The values used and estimated costs are summarized in Table 2. The estimated annual operating cost for an additional 27,600 full-time equivalent undergraduate students is about $170 million with about $115 million from the General Fund.

Capital Construction Estimates. The magnitude of additional classrooms, laboratories, library reader space, and support service space needs was estimated using Council of Higher Education's Space Planning Guidelines. The cost of educational space was estimated at $220 million based on a cost of $100 per square foot. The calculations are summarized in Table 3.

The need for dormitories, food service and other auxiliary enterprise facilities was estimated using the following assumptions:

1. New students would be provided university housing in approximately the same proportions as current students.

2. Auxiliary enterprise space can be estimated at a cost of $20,000 per dormitory bed. This estimate includes the cost of food service and other facilities.

3. No adjustments should be made for inflation or regional differences in the cost of construction.

The estimated capital cost of additional auxiliary facilities is about $265 million. Auxiliary enterprise facilities in Virginia are funded from user fees and other student fees rather than from general fund revenues. The distribution by type of institution is shown in Table 3.

TABLE 1

ENROLLMENT DISTRIBUTION ASSUMPTIONS

FOR ADDITIONAL FULL-TIME UNDERGRADUATES BY 2004

TYPE INSTITUTION	ENROLLMENT SHARE	ADDITIONAL ENROLLMENTS	GROWTH OVER 1988
STATE-SUPPORTED			
DOCTORAL GRANTING	48%	13.300	17%
COMPREHENSIVE	20%	5.500	15%
TWO-YEAR	20%	5.500	18%
SUBTOTAL	88%	24.300	17%
PRIVATE INSTITUTIONS	12%	3.300	9%
TOTALS	100%	27.600	15%

TABLE 2

OPERATING BUDGET COST ESTIMATES

FOR ADDITIONAL FULL-TIME UNDERGRADUATES BY 2004

TYPE INSTITUTION	ADDITIONAL ENROLLMENTS	OPERATING COST PER FTES	ESTIMATED COST INCREASE	ESTIMATED GF SHARE	TUITION & FEES
STATE-SUPPORTED					
DOCTORAL GRANTING	13.300	$7.500	$99.750.000	$74.812.500	$24.937.500
COMPREHENSIVE	5.500	$5.000	$27.500.000	$20.625.000	$6.875.000
TWO-YEAR	5.500	$3.500	$19.250.000	$15.400.000	$3.850.000
SUBTOTAL	24.300		$146.500.000	$110.837.500	$35.662.500
PRIVATE INSTITUTIONS	3.300	$7.500	$24.750.000	$4.950.000	$19.800.000
TOTALS	27.600		$171.250.000	$115.787.500	$55.462.500

TABLE 3

CAPITAL FACILITIES COST ESTIMATES

FOR ADDITIONAL FULL-TIME UNDERGRADUATES BY 2004

TYPE INSTITUTION	ADDITIONAL ENROLLMENTS	EDUCATIONAL SPACE PER FTES	ESTIMATED SPACE NEEDS	PERCENT OF STUDENTS HOUSED	ESTIMATED NEEDS AUX ENTERPRISE	TOTAL EST CAPITAL NEEDS	EST GF COST	EST NGF COST
STATE-SUPPORTED								
DOCTORAL GRANTING	13.300	100	$133.000.000	50%	$133.000.000	$266.000.000	$133.000.000	$133.000.000
COMPREHENSIVE	5.500	60	$33.000.000	75%	$82.500.000	$115.500.000	$33.000.000	$82.500.000
TWO-YEAR	5.500	60	$33.000.000	0%	$0	$33.000.000	$33.000.000	$0
SUBTOTAL	24.300		$199.000.000		$215.500.000	$414.500.000	$199.000.000	$215.500.000
PRIVATE INSTITUTIONS	3.300	60	$19.800.000	75%	$49.500.000	$69.300.000	$0	$69.300.000
TOTALS	27.600		[illegible]		[illegible]	[illegible]	$199.000.000	$284.800.000

@ $100/SQ FOOT

@ $20.000 PER RESIDENT

APPENDIX C

ECONOMIC FORECAST

Presented November 23, 1988
Updated in June, 1989

Virginia: A Plausible Economic Course Through 2007

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In November 1982, Governor Robb asked the Governor's Commission on Virginia's Future to "take the measure of Virginia's shadow during the closing decades of the twentieth century". Toward A New Dominion: Choices for Virginians, the Commission's report submitted in December 1984, still stands as a cogent vision of Virginia's future opportunities and challenges. Our perception of Virginia's future, however, needs to be reviewed regularly and modified to incorporate the insights offered by recent experience.

A full reassessment of Virginia's long-term prospects and problems will involve several articles with contributors from many backgrounds. A practical first step is to present some statistics describing a plausible economic environment for Virginia during the next two decades—the income and jobs likely to be generated, and the population to be accommodated.

For the year 2007, the Bureau of Business Research expects the personal income received by Virginia residents will reach $400 billion. By then our population will be 7.3 million, therefore the income per person will be $54,795. Most of that dollar increase is merely a match for inflation.

However, adjusted to the 1987 price level, the income per person in dollars with today's purchasing power will be $22,295 in 2007. That is a 35 percent real increase from Virginia's 1987 income per capita of $16,486. Generating much of that income will be 4.1 million nonagricultural payroll employees, a twenty-year gain of 1.4 million, 53 percent more than in 1987.

Those 2007 levels for Virginia must seem very high to most readers, especially those who have not examined Virginia's past trends closely. Indeed, the income, job, and population levels we expect for 2007 are higher than those projected for Virginia by the Bureau of Economic Analysis and the Bureau of the Census in the U.S. Department of Commerce. Yet our forecasts are not only a reasonable extension of currently observable patterns and trends, they in fact may be too conservative. The percentage growth rates for 1987-2007 underlying our Virginia predictions are lower than the growth rates achieved by the state in the past two decades. Thus the Bureau's outlook assumes some deceleration in growth, not acceleration. With that deceleration Virginia's growth path will converge more towards the national trends yet still remain above the national averages for income and job growth.

In what follows we offer you a picture of where Virginia is today, the 1967-1987 path followed in getting here, and some of the reasoning underlying our long-range projections. We hope you then will agree that the predicted path is indeed a plausible one.

Preliminary figures for 1988 leave no doubt that Virginia recently passed two significant milestones. Virginia residents' personal income definitely passed the $100 billion mark in 1988. The April preliminary

estimate by the Bureau of Economic Analysis is Virginia's 1988 income reached $105,774. The Commonwealth became the eleventh, and only new member in 1988, of the "one hundred billion plus" group of states. The second milestone is people. Sometime in 1988 Virginia's population crossed the 6 million mark.

Therefore we have achieved a high income distributed among a large population, with the net result being a very high income per person today. The 1988 per capita income reached $17,640, up 7 percent for the year. Exceptional growth has put the Virginia per capita income at 107 percent of the national average, the tenth highest per capita income among the fifty states for 1988.

The current high levels of income in Virginia, total and per capita, are the end result of spectacular growth since 1982. The average annual growth rate for total personal income was 8.84 percent during the five years 1982-1987, and income per person rose by an average of 7.3 percent annually. Each of those Virginia growth rates exceeded the nation's by over a percentage point. Thus Virginia's per capita income continually diverged from the national average, moving from 101 percent of the nation's average in 1982 to 106 percent in 1987, widening the gap by 5 percentage points in only five years.

The mid-eighties boom in Virginia has been highly visible, to the long-term Virginians who experienced it, the new Virginians who moved here to share it, and the non-Virginians who merely witnessed it. In the five years from 1982 to 1987, Virginia generated 534,000 net new nonagricultural

payroll jobs, a 25 percent increase. Complementing the job gains was a 30 percent rise in real personal income.

The job opportunities and general prosperity in Virginia attracted an estimated 260,000 net new residents to the state. That in-migration pushed the total five-year population increase to 418,500, up 7.6 percent. The population jump in turn created a residential construction boom, with 310,000 housing starts during those five years.

That population growth is more people than the combined total population of Norfolk and Portsmouth (373,000) in 1982. Even so, notice we created far more payroll jobs than we added in number of people. Virginians quite literally went to work in the eighties, with a rapidly rising number of multiple income families. The boom has meant more than just more income and jobs, it also has changed how we work and live. For many Virginians the income leap sparked and supported a change in lifestyle, creating new consumer markets in the state as well as reshaping existing ones. Therefore in both qualitative and quantitative ways, Virginia has moved toward a new dominion in just five years.

Experiencing the distinct changes that have occurred in Virginia since 1982 tends to blur one's recall of growth and change in earlier periods. The present unconsciously becomes the dominant, or only, guide in predicting the future. That may be a reasonably accurate approach to forecasting developments in the near future, such as the next quarter or year.

However, a long-term forecast looking ahead up to twenty years requires looking back well beyond just the last five years. Long-term trends

tend to be quite stable, at the state level as well as nationally. Those trends exert a powerful economic momentum of their own, underlying current developments. For long-term forecasting, a widely used and generally effective approach is to assume the path followed will converge to the long-run trend. The task then becomes to identify the long-run trend correctly. That is not simply a matter of fitting a line to past data because long-term trend components are not necessarily linear themselves. There can be fifty-year (more or less) cyclical forces at work, which graphically appear linear over a short span of 3 to 5 years but oscillate strongly over the longer span. One widely recognized and studied example is the post-World War II baby boom, creating a population wave moving through the age spectrum over time, a wave that will pass into the 50-plus age zone in the next two decades. Such long-term rhythms must be recognized and incorporated into the modelling of decades-long trends.

Having given that warning, the remainder of this article deals primarily with showing what Virginia's growth rates have been over the last two decades (given in Table I) and describing our best assessment of the probable rates during the next two decades (Table II). A comparison of the two sets of growth rates illustrates the continuity of the past and future, even in a dramatically changing environment.

Table I shows Virginia's past performance in two prior decades, 1967-1977 and 1977-1987. Comparing the percentage changes for those two decades reveals two very striking and significant features. First, the percentage changes are very similar—in nominal income, real income, and payroll jobs. For example, real income per capita rose 31.6 percent from 1967 to 1977 and 25.6 percent, 1977-1987, a very comparable growth rate—

on an annual basis the difference in the two average growth rates is less than one-half percentage point. The growth rates for nonagricultural employment are even closer: 40.0 percent for 1967-1977 versus 38.8 percent during 1977-1987.

The second striking relationship is almost all of the 1977-1987 growth rates are less than those experienced from 1967-1977. That perhaps is a surprise to most readers since the last five years, 1982-1987, dominate our memory. Remember, though, the recent spurt of growth partly was a recovery, nationally from two back-to-back recessions and in Virginia from a period of low growth. The spectacular gains since 1982 were an offset to the low 1977-1982 rates. The overall result was a decade average of high growth, yet slightly lower than the 1967-1977 average gains. That holds true for all of the overall measures: nominal and real income, population, nominal and real income per capita, and payroll jobs.

The only exceptions are in the employment (and industry) mix, the major one being the accelerating job growth in the private trade and services sectors. Here as nationally, service production in the private sector (broadly defined to include wholesale and retail trade, transportation and public utilities, and the finance, insurance, and real estate sectors (FIRE) as well as the specific service sector) is an increasing share of employment and output, becoming the dominant source of growth. There was one goods-producing industry sector in Virginia which accelerated dramatically—construction, where the 1977-1987 employment gain was 54 percent compared to 34 percent in the prior decade. Construction, though, is a highly cyclical industry, with long-term as well as short-term cycles. Accelerating growth in such an industry that produces very long-lasting products cannot be

sustained indefinitely when the general economy it supplies is growing at a steady or decelerating rate.

The evidence in Table I dramatically shows that high growth is not merely a recent phenomenon in Virginia. We consistently have achieved high income and job growth since at least the mid-sixties. Our previous growth also exceeded the national average—Virginia's income per capita in 1967 was only 91 percent of the national average and rose to 96 percent in 1977. Our growth rates in percentage terms for the 1967-1977 period were comparable to more recent rates. Our income level was far below present levels as well as below the level at the time in other states, so the economy may not have appeared to be expanding as dramatically as today.

In a sense that was true. With our larger economic base today, a one percentage point growth rate is considerably larger in number of units, whether that be people or computers. For example, the 1967-1977 population growth of 15.5 percent represented an additional 698,000 people; and the lower 13.6 percent rise for 1977-1987 yielded a slightly larger 709,000 gain in numbers. Percentage change generally is the most appropriate measure of growth, and the only one which can be used to compare performance effectively across industries, states, and periods of time. However it is worthwhile pointing out that the increasing weight of numbers over time represented by a one percent growth rate in itself creates a deceleration force, especially if the growing element requires substantial land area—the ground-level space in the state does have a finite limit.

The twenty-year history in Table I clearly shows Virginia's exceptional current growth rates, fueled by a cyclical upturn, exceeded the underlying

long-term trend rates for the Commonwealth. A visual inspection of the state's growth rates over time, by itself, leads one to expect Virginia's future growth to slow from recent levels, moving more in line with the longer-term patterns.

A structural assessment leads to the same conclusion. Virginia in recent years has experienced an investment boom, with high growth in commercial structures, residential housing, and the equipment and furniture to outfit them. Complementing the investment surge there has been an extraordinary cyclical upsurge in consumer spending, fueled partly by the pent-up demand that built up in the 1977-1982 period. The consumer boom in Virginia has been magnified compared to the nation's due to the higher income growth of Virginians, the influx of new residents, and the large tourism industry here which pulls in the recreational spending of non-Virginians. Nationally the growth of consumer spending already has decelerated, to a rate more in line with personal income growth. A similar but less pronounced slowdown will occur in Virginia's growth rate for retail expenditures. Furthermore our investment boom has been too strong too long; we are adding more structures each year than business and population demand growth can absorb. Investment growth, too, must decelerate, perhaps even become negative for a while, to establish a balance between demand and supply.

Slower consumption and investment growth means slower job growth. Going one step further, the slower job growth will not require or attract as many people to move to Virginia, thus yielding a lower population growth rate.

The pattern just described is the typical winding down of unsustainable, cycle-peak growth rates in a private market environment. In Virginia's case there is the additional depressant of a leveling off, or temporary decline, in the real value of Federal military spending. One could overreact to signs of a cyclical deceleration, and conclude we are entering a period of below-average growth. That definitely is not our conclusion. There are several reasons why we expect Virginia to achieve solid growth for the 1987-1997 period, with growth rates remaining above the national average. A major force at work is the changing nature of Virginia's service industries. Many are becoming more basic in nature, serving customers nationally and internationally and importing income to Virginia, rather than merely meeting the needs of Virginia customers. Our service industries include a strong and growing tourist industry, transportation and port-related companies, communications and information service providers, interstate financial institutions, and research and development firms, all of which are selling to markets beyond Virginia and serving as a basic source of income for the state. Such services will continue to grow strongly, with only modest deceleration.

A second important plus for the coming decade is manufacturing will be a stronger stimulus to Virginia jobs and income than in the 1977-1987 period. Several of our industries, such as apparel, electronics, and machinery, have gone through a painful decade of decline or product repositioning, caused primarily by the rise in the dollar's value internationally through early 1985. The subsequent decline in the dollar has reopened international markets and made U. S. firms more competitive. In addition, Virginia's government is carrying out a strong program of international trade development, a program that will yield results for years

to come. The recovery of some manufacturing industries hurt in the past decade and the formation of new international relationships, added to the strong growth already occurring in other industries such as printing and publishing, adds up to the promise of significant manufacturing growth in Virginia over the next decade.

Job growth in Virginia for 1987-1997 can and will remain strong, a predicted 30.7 percent increase over the decade. We also expect job creation again to exceed total population growth, reflecting a steady rise in the labor force participation rate of Virginians. However the percent of the population working will not rise quite as rapidly as in the past decade, so real income per capita will grow by a lower, but still substantial, 15.1 percent.

In sum, we predict the 1987-1997 growth rates for total real income and jobs in Virginia will be quite close to the rates experienced for 1977-1987—somewhat lower for jobs but slightly higher for total real income—although personal income growth per capita, in real terms, will rise by a lower percentage. The Virginia growth rates will be converging towards sustainable long-term rates, but those long-term rates are not the national ones. We will remain on an above-average growth path, which we have followed for the past twenty years.

Extending the analysis into the more distant future, with appropriate allowance for the aging of Virginians, the greater experience of the workforce, and the assumption of a renewed emphasis on productive investment after 1997 both nationally and in Virginia, yields the numerical forecasts for 1997-2007 in Table II. Distinctly slower job growth is predicted, but accompanied by a more rapid growth in real earnings per worker made

possible by increased productivity. Therefore total real personal income, 1997-2007, in the state can be expected to increase by almost the same percentage as projected for 1987-1997. A further decline in population growth, in line with national demographic trends, will occur. Thus real income per capita will rise somewhat faster in the early part of the next century.

The end results in 2007 will be very high income and employment levels in Virginia, along with almost 1.4 million more Virginians than in 1987. The projected path to that outcome is high growth, yet growth rates generally below those realized over the 1967-1977 and 1977-1987 decades. These growth rates are consistent with our past performance and the current forces shaping the economy. Virginia definitely has the potential to continue to stand tall among the 50 states, casting a long shadow as we move toward the twenty-first century. The challenge to government is to anticipate and provide the public services and environmental control that will insure the quality of life matches the promise offered by the quantitative gains.

TABLE II

VIRGINIA INCOME AND EMPLOYMENT 1987 LEVEL PLUS PROJECTIONS FOR 1997 AND 2007

	1987 LEVEL	% CHANGE '87-'97	1997 LEVEL	% CHANGE '97-'07	2007 LEVEL
INCOME($ MILLION)	$97,506	105.1%	$200,000	100.0%	$400,000
POPULATION(THOUSANDS)	5,915	12.6%	6,660	9.6%	7,300
INCOME PER CAPITA	$16,485	82.2%	$30,030	82.5%	$54,795
REAL PERSONAL INCOME (MILLIONS OF 1987$)	$97,506	29.6%	$126,363	28.8%	$162,751
REAL INCOME PER CAPITA	$16,486	15.1%	$18,973	17.5%	$22,295
NONAGRICULTURAL EMPLOYMENT(000s)	2,680	30.6%	3,500	17.0%	4,095
MANUFACTURING(000s)	429	18.9%	510	9.8%	560
MINING(000s)	16	-1.3%	15	5.2%	16
CONSTRUCTION(000s)	183	12.0%	205	7.3%	220
TRADE, SERVICES, TRANS. AND PUB. UTILITIES, AND FIRE(000s)	1,522	42.9%	2,175	22.0%	2,654
GOVERNMENT(000s)	530	12.3%	595	8.4%	645

TABLE I

VIRGINIA INCOME AND EMPLOYMENT
1967, 1977, AND 1987

	1967 LEVEL	% CHANGE '67-'77	1977 LEVEL	% CHANGE '77-'87	1987 LEVEL
INCOME($ MILLION)	$13,220	175.7%	$36,451	167.5%	$97,506
POPULATION(THOUSANDS)	4,508	15.5%	5,206	13.6%	5,915
INCOME PER CAPITA	$2,933	138.8%	$7,002	135.4%	$16,486
REAL PERSONAL INCOME (MILLIONS OF 1987$)	$44,964	52.0%	$68,331	42.7%	$97,506
REAL INCOME PER CAPITA	$9,974	31.6%	$13,126	25.6%	$16,486
NONAGRICULTURAL EMPLOYMENT(000s)	1,379	40.0%	1,930	38.8%	2,680
MANUFACTURING(000s)	346	15.8%	401	7.0%	429
MINING(000s)	14	53.8%	22	-27.3%	16
CONSTRUCTION(000s)	89	34.0%	119	53.8%	183
TRADE, SERVICES, TRANS. AND PUB. UTILITIES, AND FIRE(000s)	611	53.1%	935	62.8%	1,522
GOVERNMENT(000s)	320	41.9%	454	16.8%	530

APPENDIX D

REPORT OF THE UNIVERSITY TASK FORCE

on the

IMPACT OF DIGITAL TECHNOLOGY ON THE CLASSROOM ENVIRONMENT

REPORT
OF THE

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JANUARY 1989

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1.0 EXECUTIVE SUMMARY

As its name implies, the University Task Force on the Impact of Digital Technology on the Classroom Environment was established to identify and examine the impacts of digital technology on the future of the teaching-learning environment at Virginia Polytechnic Institute and State University. The task force looked at the current educational model and the changes new technologies will impose on that model.

The traditional method of evaluating education at VPI & SU and throughout the country, particularly at the undergraduate level, has followed the credit-for-contact model, wherein student progress and faculty instructional contributions are measured by hours of contact in lecture hall, seminar room, or laboratory. New digital technologies may make it possible to break this mold as the type of contact changes in three significant ways:

(1) The nature of formally structured contact will shift.

(2) A larger part of faculty/student contact will be ad hoc and relatively unstructured.

(3) The provision of an electronic message system will allow extensive contact without requiring student and teacher to be in the same place.

As classroom contact decreases, however, it becomes increasingly important for faculty to interact with students outside the classroom.

As classroom contact decreases, however, it becomes increasingly important for faculty to interact with students outside the classroom. But the lack of gathering places in the central campus and the failure to weigh such informal interaction with students in terms of promotion, tenure, and salary increases for faculty may tend to negate informal contact, both problems that need to be addressed.

Since graduate students generally are less involved in the credit-for-contact model, they should be less affected by the new digital technologies than are undergraduates, whose experience may become more similar to that of the graduate student. But the instructional role of graduate students may change as the new technologies reduce the need for lectures by graduate teaching

need for student daily-life-support facilities. With increasing off-campus classes made possible by the new technology, the University may need to establish two categories of students:

(1) Regular students whose attendance is required at reviews and exams and

(2) Non-degree students who do not go through the selective admissions process and who are enrolled for continuing education purposes.

The emphasis of the library must shift from ownership of information to access to information, with the library becoming more assertive and involved in the actual process of scholarship and research.

Another major area changed by the digital technology will be the library. The emphasis of the library must shift from ownership of information to access to information, with the library becoming more assertive and involved in the actual process of scholarship and research. The library also should be equipped to provide interactive media services to those students who lack facilities or equipment.

These changes and others rely on the incorporation of digital technology throughout the University, a move that depends on the ability and desire of the University to make a large economic investment. If the University cannot or will not take this step, it will develop into an environment of digital technology haves and have nots as the programs and departments with more resources develop in the field and the programs and departments without resources rely on traditional methods of education.

2.0 Charge to the Committeee

The task force was established to identify and examine the impact of digital technology on the future of the teaching-learning environment. Its task was to crystallize the salient issues in determining how the University can most effectively invest its resources to remain a leader in technology. These issues are identified and addressed in this report, which should serve as a focal point for discourse within the University community. Also included are scenarios that depict how these technologies might be integrated into the pedagogical framework of the University to enhance the educational environment.

3.2.1 Faculty

Extensive adoption of the new digital technologies may result in a change in the distribution of faculty effort across the semester. Preparation and revision of instructional media likely will occur before the term or during the early weeks of the term. On the other hand, one may expect a higher density of tutorials, seminars, and evaluation of papers and projects in the latter part of the term.

There is no reason to expect that actual faculty contact hours with students will decrease.

There is no reason to expect that actual faculty contact hours with students will decrease, but three types of changes in such contact may be expected. First, the nature of formally structured contact will shift, at least across the faculty as a whole. In large enrollment courses, the replacement of some or all auditorium lectures and demonstrations by video presentations available (on-line or off-line) via the student's own computer (modified to serve as a television set, or Compu-TV) will free faculty time for course development and revision and for individual and small group discussions and remediation. In small enrollment courses, interactive video, software tutors, and CD-ROM will allow more informal interaction, effectively extending the studio model of supervised individual work beyond its traditional applications in art and architecture.

Second, in the future, a larger part of faculty/student contact will be ad hoc and relatively unstructured. With less emphasis on scheduled classroom instruction, one of the most important faculty duties may be the keeping of office hours; i.e., being on call. During the early parts of a semester, most on call time may in fact be dedicated to research, revision of materials, or administration.

Students can ask individual questions and submit work at times of their choosing, and faculty can address students either individually or collectively.

Third, the provision of an electronic message system linking all students and faculty allows extensive contact without requiring that student and teacher be in the same place or that they attend to the exchange at the same time. Students can ask individual questions and submit work at times of their choosing, and faculty can address students either individually or collectively. Within the

The more extensive the provision of self-paced and remotely accessible ihstructional material, the greater the possible flexibility of a student's schedule.

How does one give students all the rope they can use and simultaneously minimize the number that hang themselves?

Graduate education should be affected less by the new technologies than is undergraduate education.

instructional material, the greater the possible flexibility of a student's schedule within the day, the week, the semester, or the entire academic (and non-academic) career. This increased freedom from specific temporal constraints will bring with it opportunities both for accelerated development and for the frittering away of time on a massive scale.

This wasting of time is not, of course, a new problem. How does one give students all the rope they can use and simultaneously minimize the number that hang themselves? While no general solution exists, the problem can be lessened by a faculty that is both available and concerned. Unfortunately, the new technologies increase the risks and in themselves offer no insurance.

3.3 Tailoring Instruction

In addition to the fairly obvious ways in which loosening the credit-for-contact standard would facilitate the individualizing of courses of study, there are two less obvious important possibilities. First is the reduction of course time conflicts. When the student can address the material in courses A and B at times and places of his/her choosing, time and place conflicts, an inherent problem in the currently used credit-for-contact system, cease to exist. Second is the possibility of more offerings of less popular courses. An undergraduate course requested by only four students each term generally will not be offered and will soon disappear from the catalog. But if it is possible to provide a substantial part of the material in a reusable form by means of the new technologies, it might be possible to offer such a course every term.

3.4 Graduate Students as Teachers and Tutors

Graduate education should be affected less by the new technologies than is undergraduate education. As these technologies decrease the emphasis on credit-for-contact in undergraduate education, the overall effect should be to close the gap between the levels by making the undergraduate's experience more similar to that of the graduate student.

3.5.2 Faculty

Similar remarks can be made about the system's instructional expectations of faculty. The number of contact, or teaching, hours per week (the hourly wage model) is too crude a measure; so is the number of student credits per semester (a sort of piecework model). What we should expect of faculty is that they make important contributions to the education of students (and of each other). Such contributions are made in many ways: lecturing, tutoring, guiding seminars, leading research, preparing materials, counseling, criticizing, and encouraging. No single measure can possibly capture these different sorts of contributions, and a university needs all of them in abundance.

This idea, however, is in contrast to the current emphasis on output measures being instituted across the country.

4.0 Assessment of Current Applications of Technology in Teaching

Before examining future technologies and their potential application to the instructional process, the impact of past and current technology on the present educational environment at VPI & SU should be assessed.

The eight colleges within the University have pursued the use of technology to varying degrees.

The eight colleges within the University have pursued the use of technology to varying degrees. This variation has resulted from differences both in the perceived need for such technology and in the financial ability to acquire necessary equipment. Regardless of the differences, however, it could be asserted that appropriate uses of technology have (1) aided the transfer of information to the student and (2) helped graduates feel less threatened by new technology as they pursue their careers. In other words, the technology has helped people to accommodate the ever-increasing rate of change present in most professions.

Throughout the University, the use of such visual equipment as the overhead projector and the slide projector is commonplace, particularly in large sec-

of 1983, the college offered the first remotely televised course via a microwave link to Richmond. Within two years, satellite communication was used to send courses to several downlink sites in Virginia as well as other eastern states. The college sends a wide range of credited graduate-level courses to industrial and government centers; for example, eight courses were remotely available during the fall of 1988. In addition, non-credit short courses, such as the Engineer-in-Training Review Course, are distributed on a national basis for a nominal fee. Another example can be found in the College of Business, which began offering an MBA course via satellite during the fall 1988 semester. Over 125 off-campus students enrolled in the course. Other uses of satellite technology at the University have included at least one cattle auction.

The televised-course experience gained thus far by the College of Engineering is mixed in nature. On the positive side, the college can reach those students unable to travel to Blacksburg or other University sites. On the negative side, many instructors have noted that the average performance of the remote students is substantially below that of students present in on-campus classrooms. If the remote students merely desire non-credit exposure to one course and do not intend to earn a degree, then the substandard performance is not a major concern. However, lowering standards for remote students does not appear to be a viable solution since a percentage of those students are seeking degrees and should be evaluated equally with on-campus students.

From the long-term planning viewpoint, the University must decide whether the teaching effectiveness associated with TV courses is sufficient to warrant a major effort in what is likely to become a competitive market. To date, VPI & SU has committed significant resources to the TV effort and is a regional leader in the area of remote instruction. Without continued and vigorous efforts by the University, competitors will capture significant market areas with relative ease. The major question is: Does VPI & SU wish to compete or will it let the teaching effectiveness issue lead to a high road stance of demanding student presence? The answer may well be discipline-dependent.

5.0 Institutional Issues

5.1 Evaluation of Teaching

Perhaps the one essential mission of higher education, one that could be accomplished by no other institution in our society, is that of advanced teaching and learning.

Perhaps the one essential mission of higher education, one that could be accomplished by no other institution in our society, is that of advanced teaching and learning. Because of this unique mission, colleges and universities must ensure that faculty are recognized and rewarded for quality teaching as well as provided opportunities for improving their teaching. Although new faculty members are advised that the mission of the University embraces teaching, research, and service, research generally emerges as the key to faculty success and survival. Thus, a commitment that fully recognizes and rewards teaching will require a fundamental rethinking, at all levels, of the ways in which teaching can be evaluated efficiently, fairly, and systematically.

At present, teaching encompasses at least three categories of skills and knowledge: (1) content expertise, (2) instructional delivery skills, and (3) instructional design skills. The first category draws from the advanced training that a faculty member has received and thus relates to the degree of expertise in a given discipline that can be expected to be conferred to the student. The most valid judgments of this dimension of teaching will come from colleagues in the department. The second category is concerned with skills and abilities that create a learning environment that promotes and facilitates student learning. Students can render valuable and valid judgments on this dimension of teaching. The third category comprises the skills and knowledge necessary to design instructional materials that will enhance the learning process and to develop appropriate measurement strategies and instruments that will confirm student learning. Faculty colleagues and department chairs can review the appropriateness of course syllabi, handouts, and other support materials as well as the design of examinations and other evaluation strategies.

these materials into the module(s).

These communications specialists most likely will be employed through the individual colleges as faculty members with special skills in one or more of these communication areas. However, a determination must be made about who has the responsibility to provide necessary resources and relevant time for faculty or professional staff members to develop the skills for implementing the teaching program.

At this point, it is difficult to estimate the number of instructional technologists and specialists that would be needed to begin the process of systematically incorporating digital technologies into units/courses and, more importantly, to sustain and expand the effort. Regardless of this estimate, there is no question that if VPI & SU continues to expand the use of digital technology in the teaching/learning environment, the size, structure, and function of the current Learning Resources Center must change drastically. Personnel in an expanded Learning Resources Center would play two important roles. The first would be one of support for those faculty who already actively use digital technologies in preparing and presenting units/courses. A second and more important role would be to identify those faculty needing assistance in developing units/courses.

In the process of using digital technologies to develop these new units/courses, faculty would not work with the instructional design team at all times nor would the instructional design team always work together.

In the process of using digital technologies to develop these new units/courses, faculty would not work with the instructional design team at all times nor would the instructional design team always work together. After the initial planning for the units/courses, the technologists/specialists would work on the actual production, while the faculty would return to their responsibilities in research, instruction, and advising. These development activities by faculty undoubtedly will require an alternative to the standard faculty model of 40 percent for instruction, 40 percent for research, and 20 percent in service. Such an alternative might involve a yearly or multi-yearly performance agreement between the faculty member and the department chair wherein the faculty member might spend a year or more developing pedagogical materials for some basic unit/course. The department chair, in accepting the proposal,

concentrated in that subset of the terminal professorial rank that commits major energy to teaching.

Not all courses in all colleges will use the latest technologies. Certain richer colleges may form a class of haves, with others constituting the have nots. But it is an oversimplification to explain a possible partitioning of technology among colleges by their resources. At least one other factor must be included in explaining the effect: How dynamic is the subject matter? Even with course-authoring software packages (such as Stanford's CAT), some fields change too rapidly to make it worthwhile for faculty to develop advanced software with interactive videodiscs. Paradoxically, the fastest moving, most technical fields may be limited to old-fashioned blackboard-and-chalk instruction for this reason. In these fastest moving technical fields, however, prepared media can play an important role in presenting basic concepts and giving examples of theories and principles. Investing in media presentations for such uses is reasonable since basic concepts are unlikely to change rapidly and production costs can be spread over a large number of students.

Course-authoring software packages make it remarkably easy to develop simulations incorporating movie clips and interactive video.

Course-authoring software packages make it remarkably easy to develop simulations incorporating movie clips and interactive video, for example. In fact, with these Apple-based packages, it may not be much more difficult to develop software utilizing the new technology than it has been for the College of Engineering to develop its own software since 1984. Any assistance could be provided by the Learning Resources Center, which has gained expertise in the evaluation and use of authoring software during the development of contract-related projects. Procurement of the authoring software package and experimentation with them is a necessary step in acquiring mastery in this area of digital technology.

5.3 Redefinition of a Student

Under the existing operational scheme, the University controls who may enter the classroom. Implicit in this scheme is the assumption of credit-for-contact; a student must be in official University-controlled space (Blacksburg and

The emphasis of the library must shift from ownership of information to access to information.

As the very nature of information changes, so must the role of the library. The traditional role of libraries has been to accumulate information in a static format, information packaged in books or papers from which the patron must extract useful segments. Today's electronic information is dynamic; it changes rapidly and can be tailored and assembled to the specific needs of individual patrons.

The emphasis of the library must shift from ownership of information to access to information. Energies must shift from acquiring and housing information to being pathfinders of information. As the traditional structure of the information becomes more ambiguous, the library's role will change, with the library becoming more assertive and involved in the actual process of scholarship and research. It will spend less time organizing packaged information and more time understanding and structuring the objective presentation of information in a coherent form suited to the individual user.

It will spend less time organizing packaged information and more time understanding and structuring the objective presentation of information in a coherent form suited to the individual user.

5.5 Timetable and Registration

The service level to both students and faculty should be enhanced considerably given the opportunity for on-line timetables as well as registration for courses that could occur either by telephone or through access to the University's communication network.

5.6 The Governor's Commission on the University of the Twenty-First Century

The first is to consider how to provide advanced education as the population increases and the economy develops in Virginia.

The Governor's Commission on the University of the Twenty-First Century will examine the public policy issues raised by population growth and the changing economy. It will also consider what people should know and be able to do in the early part of the next century, what it means to know, and how colleges and universities should be organized and administered in the future to carry out their missions.

The Commission has three broad objectives. The first is to consider how to

experimentation: computer simulations of very complex phenomena.

Access to new digital technology provides students with increased learning opportunities and advantages. Certainly, the University must consider the extent to which other educational institutions equip their students with this technology, giving them the edge over our students. Fortunately, VPI & SU has positioned itself to incorporate this new technology through its aggressive pursuit of a fiber-optic infrastructure; a digital switch for voice, video, and data; and the single-system image. Another fundamental issue the University must consider is the cost required to avail students of the benefits of these technologies given our current state.

Digital technology will impact the total gamut of learning. Future students will routinely gather background information for classes via PC (or Compu-TV) from videotapes, relatively few of which will have been produced at VPI & SU. The tapes may contain remedial information, a statement of basic principles, or points of view from world experts. Labs and homework will be replaced by sessions with interactive videodiscs, where the student can obtain hands-on experience through computer-generated images of the subject matter.[2]

The classroom itself frequently will contain large-screen voice/ video hookups with other classrooms or experts throughout the world.

Trips to the library will be via the personal computer; access to databases stored on media such as CD-ROM will become commonplace. The classroom itself frequently will contain large-screen voice/video hookups with other classrooms or experts throughout the world, providing two-way dialogue capabilities. Even quizzes can become interactive, taken on the PC from the comfort of the students' dorms, offices, or homes.

Some anticipate that the greatest benefit to students will be increased faculty contact time. The incorporation of digital technologies, they say, will free faculty from straight lecture preparation, giving faculty time for face-to-face

[2]The use of interactive videodiscs has already begun at the University. Recognizing the significant opportunities for improving learning through the use of this technology, the Learning Resources Center has targeted interactive media as a major area of growth and, consequently, is involved in several projects. One project, "A Visual Text: History of Architecture," has already been completed for the architecture program.

7.0 Resource Implications

7.1 Impact on the Physical Environment

The integration of digital technology potentially will impact the physical environment of the campus.

The integration of digital technology potentially will impact the physical environment of the campus. Fewer large lecture auditoriums should be required as more large-enrollment courses are televised directly to students' Compu-TVs or to college microcomputer laboratories. For those students who do not have access to these labs or who lack the personal equipment to see videotapes and/or interactive media, the library should be equipped to provide that service. For smaller classes that incorporate self-paced instruction with interactive video, interactive CD, or television, a need exists for a large number of multi-purpose digital learning environments. These learning environments, or classrooms, would house state-of-the-art audio-visual and digital technology and would not be scheduled by the registrar for classes. Students could use the facilities, which would be supervised by technicians and used at the students' convenience, to receive televised lectures (for those whose curricula do not have a computer requirement), use interactive video, or run self-paced educational software.

As the University looks ahead to modernizing its facilities to accommodate the latest technological innovations, then, it is not in a position to expand from a strong base of good classrooms.

The digital learning environments would not replace all traditional classrooms. On the contrary, a critical need would exist for traditional classrooms equipped fully with digital technology. These classrooms might be used for discussion groups, special demonstrations, and/or help sessions. Included in each room would be an audio/visual closet containing equipment that would allow overhead projection of computer monitor screens, photographic slides, and televised video.

This discussion assumes that all classrooms and the digital learning environments will be fully operational. Yet, the present status of classrooms on campus indicates the need for upgrading before the University spends large sums of money on high-tech classrooms or learning environments. At a minimum, heating, ventilation, and air conditioning (HVAC) must be improved

economic investment. Increasingly, academic units are incorporating digital technologies on a decentralized basis. Because of the economic and personnel investment, programs and departments are restricting use of such facilities to their own majors. If this trend continues, the University will become an environment of the digital technology haves and have-nots. Yet, the very notion of a major comprehensive university indicates that resource allocation of educational technologies should be egalitarian in nature, providing all students and faculty equal access to the latest in educational technologies.

The implementation of digital technology depends on an increase in support staff for the production of educational software and maintenance of the digital learning environments. Without additional support staff on a University-wide basis, the aforementioned problem of unequal resource distribution will result in some faculty making more use of digital technology while others are left with more traditional educational technology.

Because of the cost of developing materials, the University could initiate a strategy that draws upon faculty from a number of universities in a combined development effort, thereby allowing costs to be spread over a broader base. The University could also use this multi-university effort as a vehicle to recognize capable faculty.

8.0 Scenarios for the Future

8.1 Scenario A (High Innovation - High Resources)

Paul Simpson, an 18-year-old resident of San Diego, California, will graduate from high school in a few months. Paul has learned about the technological emphasis of Virginia Polytechnic Institute and State University in instructional, research, and service activities through an introductory interactive video program provided by his high school guidance counselor. Deciding to request further information about the University, Paul contacts the Admissions Office

actual visits to the library building will be minimal during the school year. In fact, the administration of the University is considering converting all library space to electronic workstations to accommodate both those students who live off campus and lack access to the VPI Information Network and on-campus students needing advanced workstation support.

Paul decides to visit the University Learning Materials Center (formerly known as the bookstore) to purchase the learning aids for the five courses he will be taking during the first academic session. The learning materials provided for each course are packaged in a digital format using compact discs and high-density 2-1/2 inch computer discs. Paul spends a total of $125 for the course materials. After returning to his dormitory room, he discovers that the course materials, which have a combined weight of less than five pounds, occupy less than eight linear inches on his resource shelf.

Paul's first class is German 1100. Professor Menzel indicates that this German course, like many undergraduate courses, is a highly interactive, self-paced program where the instructor is a facilitator and manager of the learning process. Dr. Menzel demonstrates the use of the interactive materials on the classroom Learning and Communications Module. He indicates that much of the material was produced in Germany so that variations in grammar and dialects are easily learned as the student interacts with the system. He emphasizes the importance of each student programming his/her voice characteristics into the system so that he/she will receive accurate feedback from the computer as he/she speaks German during interactive sessions. Professor Menzel also will teach the students a substantial amount about geography, social customs, politics, and religious practices since many of the course units were constructed around these activities. He stresses the importance of taking the examination (created randomly by the computer from the examination database) at the end of each module. The results are to be forwarded to the professor's electronic mailbox for review and comment. Based on the results, he will request via the electronic mail system that small groups of students needing similar assistance meet with him for special help sessions. In addition, he will periodically request each student in the class of 50 to meet

about this instructional research project, Paul wonders if distance learning might be applicable for some of the courses he intends to take.

Paul knows that the involvement of teachers in state-of-the-art research and in private-sector consulting activities increases the quality of the learning environment.

Paul also begins to appreciate the enhanced academic environment for faculty since the application of modern technology to the learning process has created ample time for them to actively engage in research. Also, he notes with interest that most of the faculty he has met have mentioned that they are significantly involved as consultants in the private sector. Professor Menzel indicated that he is a consultant to a German conglomerate with a major facility in Leesburg, Virginia. Paul knows that the involvement of teachers in state-of-the-art research and in private-sector consulting activities increases the quality of the learning environment.

8.2 Scenario B (High Innovation - High Resources)

Communication Network Services was furious because everyone started using their computers as alarm clocks, and it tied up the ROLM digital switchboard, especially at this time of the morning.

Wednesday morning. Karen's phone rang at 6:45 a.m.; she picked it up sleepily, and as she did, she began to hear a high-pitched screech in the earpiece. It was her MacIntosh over in Cowgill Hall calling her through one of the modems in the modem bank maintained by the University. A computer science student had written a little Pascal program that ran in the background under MultiFinder and would dial any phone number at a specified time. He had posted it to the hacker's conference on the campus e-mail net, and it spread quickly. Communication Network Services was furious because everyone started using their computers as alarm clocks, and it tied up the ROLM digital switchboard, especially at this time of the morning.

Nearly everyone left their machines on all the time so they could get mail at all hours.

Karen rolled out of bed, got dressed in eight or ten layers of clothes to be able to withstand the late February winds on the drillfield, and trudged over to Owens for a quick breakfast.

When she entered the studio at Cowgill, she ran the protection program on her Mac that unlocked all the files; nearly everyone left their machines on all the time so they could get mail at all hours, but during the night the security

after one or another of the seven dwarfs. She decided to use Super 3-D and requested a download for twelve hours. She did not keep much software on her machine because it was cheaper to use the file server. Grumpy would download a specially modified copy that would only work for the next twelve hours; after that it would erase itself. The College paid the software companies on the basis of the number of twelve-hour segments used each semester. It was a good system because everyone could use even the most expensive packages right at their desk instead of having to wait in line for one of the common-use machines like last year.

Since she had never used the numerical control machines in the shop, she downloaded the tutorial stack from Grumpy and flipped through it using HyperCard.

She worked for about two hours on her problem, manipulating with the 3-D package. She was finally satisfied with it. In fact, she was more than satisfied; she was excited about it. She showed it to Ron, and he suggested making a model from aluminum. Since she had never used the numerical control machines in the shop, she downloaded the tutorial stack from Grumpy and flipped through it using HyperCard. She discovered that she had to transfer the Super 3-D image to Autocad format before sending it to the shop. There was a button right in the tutorial that would download the translator, so she clicked it and kept reading; the transfer would take place in the background.

Karen also learned that there was a queue for shop jobs, and there was another stack that would help with checking the queue, sending the job over, and checking the work before it started. She clicked for another download and got out of the tutorial. She erased the tutorial stack immediately since she could always get it again from Grumpy. Just then her own computer beeped at her. Since she was in MultiFinder, she first opened the Shop Stack, then opened her alarm/calendar window. The beeping was from an alarm she had set a week ago to remind her to register for classes. Today was the last day.

She sighed because there was just too much to do. She wanted to get the model done today because she had to work on an English paper tomorrow, and the model was due first thing Friday morning. It was only 11:30 a.m., so

The Resource Stack was an enormous data stack built by a computer science student and put on the net.

history. The Resource Stack was an enormous data stack built by a computer science student and put on the net. Cards were in a standard format, and anyone could create a card on any topic. In just five months, 12,000 cards had been created on just about every topic imaginable. Students with Macs would create summary cards on any significant work that they had done, with pointers to books and articles. After about fifteen minutes of searching, she found two references that might help, one on archaic weapons and the other an account of pre-17th century English history. She would have to go to the library to see if the books were in.

The University had eliminated opscan sheets, but Karen could not remember what process was used.

She remembered that she had to register by five o'clock. The University had eliminated opscan sheets, but Karen could not remember what process was used. Joanne, a friend of hers, gave her a stack that formatted all the information and sent it off. You could submit the information through campus e-mail, but it had to be in an exact format, and if you omitted a space or anything else, you would not find out until the next day. Since she had no more time, she used the stack to verify the format for her. She typed in her courses, and the stack sent it off in the correct style to the University e-mail machine. From there it would be delivered to the mainframe.

She went out for a Coke, and when she got back, mail was waiting. It was from Sneezy; her shop job was done. She went over to pick it up, and it turned out just as she had expected. It was 4:30 p.m., so she left for an early dinner. She wanted to come back later and work on her history paper.

Wednesday Evening. Karen had been lucky at the library; both the books she wanted were in the stack. Using the outliner in Microsoft Word, she quickly formatted an outline of the material she wanted to discuss. She thought pictures would jazz up the paper, so she took the book on weapons over to the Image Lab and scanned some pictures. On impulse, she got one of the Landscape videodiscs from the attendant and loaded it on one of the SE/disc player combos. The College of Architecture and Urban Studies videodisc had been so successful that the people in landscape architecture had collected

9.0 Conclusion

Advances in digital technologies clearly have the potential to change significantly the teaching/learning environment of the University. The impacts of these technologies range from altering the role of faculty to enabling the University to become more geographically dispersed.

When assessing how new technologies can enhance learning, it is also necessary to evaluate the current capacity of the University to adapt. One telling point is that while significant investments in technology are being considered, the current classroom environment often does not meet minimum requirements for comfort and equipment.

A number of issues emerged that were not considered in the report. The discussion would be incomplete without their being mentioned. For example, how will new technologies affect the development of creative processes in students? Will extended interaction with computers alter methods for strengthening team building skills and the general capacity for interpersonal relations? How are factors such as the motivation of students by faculty accommodated? Will it be more difficult to identify students who are experiencing personal difficulties for which they often seek advice from faculty?

Although change is inevitable, it is always accompanied by uncertainty. The advent of the changes in digital technology offers significant opportunities to advance the quality of the educational experience for students and faculty. Technology will never replace those qualities of commitment, intelligence, and integrity that are central to maintaining the vitality of the University. However, it can serve as a vehicle to expand our reach.

where (1) large numbers of students can use the completed materials; (2) the majority of content is relatively stable for several years; (3) instructional goals cannot be met using conventional methods because of time, cost, and/or safety concerns; and (4) flexibility in time and place is needed to offer the instruction. These cases are predicated on the availability of sufficient time and money for development.

The process of planning interactive instruction is challenging because of its many instructional possibilities and technical capabilities. However, this multitude of options can be overwhelming if needs and goals are not carefully specified. At least half of the total time required to produce such instruction must be allocated to needs assessment, analysis, instructional design, and planning, which are especially critical for interactive multimedia simulations. The large number of instructional design variables makes formative evaluation of prototype programs essential, with sufficient time allotted for revision. Materials production can involve the design and creation of video, graphics, and computer software to control the program. A program development team approach has proven successful in planning and developing interactive multimedia programs.

10.1.2 Videodiscs

Videodiscs are a random-access, high-density audio and video analog optical storage medium. One side of a videodisc can hold 54,000 still images (e.g., slides, photomicrographs) or up to 30 minutes of high-quality motion video, with two independent sound tracks. Because the disc is read by a laser beam, no physical degradation occurs; image quality does not deteriorate with use. The principal advantage of the videodisc over videocassettes is the speed of access to any image scattered across the disc. Any image can be retrieved in three seconds or less. Such retrieval would require several minutes of searching on videocassettes.

If motion is not required, the multimedia storage capabilities of CD-ROM can be combined, such as in a dictionary application that gives a textual description of a bird species, shows a color picture of the bird, and plays a recording of its call. CD-ROM discs and accompanying software currently are used to distribute large bibliographic databases, library catalogs, and encyclopedias (e.g., Books in Print, ERIC, Westlaw).

10.1.4 Compu-TV

Within the next few years, high-definition television, or HDTV, should replace the television signal-reception system used in this country since the early 1950s. The new system, which will employ six times as many color dots and more than double the scan lines of the current system, will result in sharper pictures, allowing TV screens to double in size without loss of picture quality. This new system also is predicted to have a major impact on the personal computer industry as PCs are modified to accept HDTV broadcast signals, resulting in multi-faceted equipment that serves both as a computer and as a television, or Compu-TV. This blending of technologies should make a number of cross-media uses possible.

10.1.5 Simulations

Simulations allow students to experience processes and devices that are rare, dangerous, or inaccessible. Simulations are especially useful in learning about complex physical or social systems. Examples include applying CPR, life in present-day Japan, piloting an airplane, operating a nuclear reactor, and the politics of 16-century Italy. By teaching with simulations, faculty encourage exploratory learning, letting students experience the consequences of decisions and receive feedback on their actions. Computer graphics, video, and audio can substantially enrich a simulation, producing quite realistic experiences that involve students in unique ways and allowing a more externally valid assessment of performance in complex situations than may be possible through other means of teaching.

APPENDIX E

ARCHITECTURE - RELATED

CONCERNS FOR NEW LEARNING ENVIRONMENTS

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Architecture-Related Concerns for New Learning Environments

for

Commonwealth of Virginia
Commission on the
University of the
21st Century

Prepared by

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I Introduction

Jeffersonian Notions of Education and Architecture: The Past as Prologue

The state of Virginia has good reason to emphasize the important relationship between education and architecture. Thomas Jefferson provided a model for American institutions of higher learning in his design for the University of Virginia, one that still wields influence in campus architecture today. Jefferson intended UVA to serve as a monument to the noble pursuit of education that was to "exert a life-long influence on the aesthetic sensibilities" of young students.[1] UVA's colonnaded buildings, its library housed in a neoclassical rotunda and its view over the Virginia mountains were meant to symbolize the harmony of the intellectual and natural world.[2] They were also design principles inspired by a new democracy borne of revolution.

Ironically, school architecture of today's post-modern period is once again using traditional elements of palladian windows, gothic arches, and vaulted ceilings. However, these classical features mask another revolution going on within these school walls --a revolution in the name of school reform driven by information technology, global competition and a very diverse student population. In the 1990s these forces promise to reshape how, what --and where we learn.

Experts predict that a school of the future will have aspects of a traditional "skin" in the use of arched roofs, cupolas or turrets. However, its interiors will greatly depart from the traditional classroom that has not changed significantly since Jefferson's time. Adaptable configurations of small and large space, exposed structural elements, and visible mechanical systems conducive to advanced learning technologies will permanently replace the "eggcrate" classroom of fixed desks and uniform space regardless of function.

Two hundred years after Thomas Jefferson designed the University of Virginia, there is a new appreciation of Jefferson's belief that physical space does impact on human behavior. There is now a growing consciousness that the school environment itself--its spatial configuration, aesthetic appeal, and ability to enhance the physical and mental health of its students--plays a very significant role in the learning process.[3] How this consciousness is applied to learning environments of the future will be based on the public and private will to expend intellectual and financial resources on quality education. The following trend report explores this deepening interest in education and, in turn, school architecture.

II Changing Demographics: The Need For More Space and More Flexibility

Growing numbers

Ever since World War II educational institutions have had to hastily expand or contract according to widely varying numbers of students from generation to generation. From 1950 to 1975 a huge construction boom followed the Baby Boomers from public schools to college campuses. Higher education facilities alone grew by more than five-fold since 1950, from 570 million gross feet (gsf) to 3 billion gsf today.[4] However, the next Baby "Bust" generation, accompanied by soaring energy costs and inflation, left many school administrators in the late 1970s and early 1980s with fewer students, unused buildings and large debt.

However, the late 1980s is seeing yet another boom in school construction that will last through the 1990s. Although it will not equal the "golden days" of education of two decades ago, numbers of students are again rising with the Baby Boom "Echo." This new surge of births is expected to peak around 1990 at about 4 million a year. By 2005 high school graduates will have grown by 1/3 and first-time college freshmen will probably have increased by 6,000.[5] Kindergarten attendance alone increased 25% between 1981 and 1985. This wave will make its way through secondary school and higher education through the first decade of the 21st century.

Given many school districts' personal experience with population shifts that debilitate school finances, school facilities will be used and constructed somewhat differently in the future. For instance, school districts are beginning to use more sophisticated ways of projecting school needs through new computer programs that consider census data as well as local available data.

With demographic changes occurring every generation , public schools and colleges and universities will likely consider the possibilities for resale and reuse in the design of new or renovated space. This could in subtle ways affect design decisions. In the past decade many school facilities have been recycled and transformed into interesting office space, residential apartments or community facilities. Architects and school administrators will no doubt keep in mind the importance of flexible space that can at some future date be easily sold and recycled if population patterns change significantly.

Another accommodation to population shifts will be the expanded use of modular and portable buildings over the next decade. Practical and flexible, modular units will continue to improve in quality as they meet immediate needs of an expanded student population or the need for new programming such as day care. As an indication of its popularity, the California legislature has mandated that 30% of all new public school construction be modular. Modular structures can vary from a simple room with four walls to sophisticated facilities equipped for special programs with bathrooms, showers, kitchen facilities and demountable partitions. The more sophisticated portable structures of the future will be highly specialized to house, for instance, special kinds of computer laboratories.

III Growing Diversity of Students and Sites

In addition to changes in birth rates school facilities must accommodate themselves to older students, working women and more minorities. This new profile of the "typical" student in turn is changing the form and function of the "typical" learning environment of the future.

Adult illiteracy alone will mean potentially tens of thousands of adult learners in the classroom. It is estimated that between 29-35 million adults in America cannot read adequately to participate in modern society - roughly one in every six over the age of eighteen. If a concerted effort is made to address adult illiteracy, public schools K-12 and community colleges will be significantly affected. In addition, remedial education for sub-standard entry level workers will be needed for tens of thousands of high school graduates and high school drop-outs who are in general, poorly prepared for the workforce.

It is also estimated that, within the next decade, there needs to be an effective recycling of 15-20 million skilled blue collar, technical and professional employees who are likely to lose their jobs due to improved productivity.

Considering trends toward lifelong education and retraining, higher education facilities will best serve the needs of an older student population by being smaller, more decentralized satellite facilities, convenient for those with family and work responsibilities. The symbolic importance of a central campus will not be as important as an institution's ability to provide relevant and accessible education and training to people of all ages and circumstances. Therefore learning facilities will increasingly be found in unconventional sites such as high rises or office building suites.

IV Changing Functions of Public Schools

Demographic trends indicate an aging population, more single people and more working couples with no children. This means an ever larger segment of the population will have little vested interest in K-12 education over the next few decades. Communities and school boards will therefore seek expanded uses for school facilities to gain funding support from this constituency.[6] In the next decade more schools will function as community centers, serving the needs of many populations and more fully utilizing the physical facilities provided for primary student users. Athletic programming, continuing education and training, food service, libraries and meeting centers will be extended to the community. Schools also will provide more support services to students, such as counseling and health services.

Public schools will increasingly be expected to provide preschool and after-school programs and even general day care. With large increases in numbers of the elderly, schools could also provide adult day care and meal service. Evening programs for teenagers and adult education could extend the used of a facility to as many as 18 hours per day. In general, more schools will operate year round to respond to mounting pressure to increase academic performance.

These additional functions involve significant architectural and facilities issues. Spatial configuration must be very flexible. Access and security for the handicapped and elderly will require more attention to entrance and exits. Night-time lighting and special safety features for spaces that will house very young children will also be primary concerns.[7]

There will be other special design issues for urban schools as well. With limited land, high building costs, and the influence of other multifloor, urban dwellings, urban schools will increasingly be in high-rise buildings, or be incorporated in more complex mixed-use development.[8]

V The Building Boom in School Architecture: The Need for Renovation, Expansion and New Construction

To respond to the nation's desire for ongoing education and training higher education facilities will experience growth and expansion in the 1990s. Over the next decade colleges and universities will require at least $60 to 70 billion in capital renewal and replacement needs--$20 billion of which is urgent or priority in nature. According to a recent report which makes these estimates, many American campuses are "in decay".[9] Over the next decade campuses will pay the price for hasty and low cost construction which followed the 1960s boom in enrollments. In the late 1970s drops in student numbers, higher energy prices, and inflation shrunk school budgets and left maintenance and renovation a low priority. This same study reports that fully 1/3 of higher education's physical plant is now more than thirty years old and more than 2/3 is over twenty years old. Considering that much construction of the 1960s was only meant to last thirty years, infrastructure problems will abound in the next decade.

The nation's public schools are also in a state of disrepair. A study commissioned by the Education Writers Association, claims that fully 25% of public school buildings are "shoddy places for learning, lacking space, suitability, safety, and maintenance," and 33% are only adequate with no further enrollments. Another 42% are in good shape--but offer painful contrasts to other schools within the same county and even town.[10]

VI Budget Pressures

Poor safety standards, open stairwells that function like chimneys in fires, inadequate wiring and deteriorating foundations will preoccupy school systems at a time when they face many competing financial demands in the 1990s. Budget pressures will compel school systems to focus on cost-effectiveness and the challenge will be to avoid shoddy construction while facing competing needs for teacher salary increases and new educational technologies.

As with construction in higher education 1/2 the number of current public schools were constructed in the 1960s --with the typical thirty to thirty five year life span. States estimate that the education infrastructure needs an investment of $84 billion in new or retrofitting construction and another 41 billion for maintenance and repairs.[11]

States with a significant number of rural areas, such as Virginia, will have especially difficult problems. The average rural school was built in 1946. Given the economic decline and subsequent loss of tax base in many of these areas, these schools have suffered from poor maintenance and are due for $18 billion worth of repair and replacement.[12]

VII Global Competitiveness

As global economic growth accelerates over the next decade, so too does the nation's fear that U.S. schools cannot provide the skilled labor that the nation needs to remain competitive. Increased pressures on K-12 and institutions of higher education to improve student achievement will require "long-term investments in human capital" that could have a great impact on education's built environment as well as its curriculum.[13]

There is a growing understanding that education and training must go on in offices and on the factory floor, as well as in traditional school settings. Joint ventures between corporations and colleges as well as more government support for education at all levels should result in improved facilities at numerous educational sites in the private and public sector. Furthermore, it is likely that private sector design of education and training facilities will influence traditional classrooms.[14]

New joint ventures in education linking school systems with the business community and even social service agencies will also further the concept of educational facilities as community centers.

VIII The Information Revolution

The Information Revolution will continue to transform the classroom, as communications technologies give rise to new modes of teaching and learning. Existing technologies, such as distance learning, education computer conferencing and on-line services for teachers and students will further expand the learning environment from one classroom into another, out into the community and even across the world.[15]

Storage technologies promise to revolutionize access to learning materials. Advanced optical storage soon will become widely available , opening up a new world of low cost, desktop information access. The following "learning experience of the near future captures these possibilities:

"...imagine a college student picking his or her major and then immediately buying the 'Undergraduate Major Disk' to use in a portable "Electronic Book." This disk contains all major texts in the field, all reference manuals, with everything fully cross-indexed. It contains a myriad of learning and simulation games, AI tutorial software and software that allows information to be accessed according to the level of previous knowledge and the learning style of the user. It also contains communications software for getting up-to-date information from electronic data bases and for participating in relevant educational computer conferences."[16]

The presence of new learning technologies will give new meaning to the term "classroom without walls." Taken literally, classrooms without walls proved a failed experiment of the 1970s, mostly because of poor execution, such as the absence of acoustical barriers to noise. (Even these issues of noise problems in open spaces should be eliminated with new sound insulation technologies.) However, information exchange capability will continue to break down classroom walls in a much more dramatic and meaningful way. Two way television, computer terminals, microcomputers, radio, satellite distribution , audiovisual cassettes, VCRs and video disks are creating and connecting classrooms wherever there is a potential learner. Electronic links to homes, schools and businesses promise to blur the definition of the classroom.

Corporations will continue to expand their own training and education facilities enough so that private and public sector educational sites will begin to resemble one another as information technology becomes the mainstay of most educational settings--whether corporate training centers, workstations, large auditoriums or spaces for individualized learning.

Shared access to information technology will also encourage the concept of multi-locational schools. Schools will follow in the tradition of banks, stores and libraries by having systems of hubs and satellite systems.

New technologies will increasingly influence the nature of space, size, location as well as environmental conditions within educational facilities. Walls and floors must be configured according to power distribution. Choices of lighting, acoustics, and heating and cooling will be greatly influenced by conducive conditions for personal computers and other new learning technologies.

IX The Materials Revolution

The built environment will almost certainly be transformed by the Materials Revolution during the 21st Century. This unprecedented burst of innovation in plastics, ceramics, advanced composites, ferrous and non-ferrous alloys, and semi-conductor materials holds much promise for less expensive and innovative building structures in the future. How quickly these materials are incorporated into new design solutions will be based on a number of factors related to the construction industry.[17]

X New Attention to Energy Efficiency in Design

As energy costs rise again in the 1990s, interest in designing energy-efficiency buildings will heighten.[18] Energy-efficient design will mean more attention to "tighter" buildings, insulation, sun orientation, daylighting and thermal storage. High efficiency HVAC systems and lighting will become standard features. More advanced technologies such as "smart" wiring systems, "superwindows" and control systems that adapt lighting levels to daylight levels will become more common. Passive solar design will become important, and by the late 1990s, photovoltaics and other active solar energy systems will be coming into use.

Climate based planning will be a part of energy conservation. Facilities for cold weather climate will tend to be more condensed and multifloored and practical for areas with higher land prices and high energy costs. More classic campus designs of separate but scattered buildings could be found in warmer climates more exclusively.

XI New Focus on the Indoor Environment

Indoor pollution will grow as a health and liability issue for educational facilities. Causes of indoor air pollution include asbestos, radon, formaldehyde, pesticides, cigarette smoke and lead in drinking water. For the past decade, schools have grappled with problems of asbestos and lead in drinking water, most particularly. In the next decade asbestos removal or abatement will continue to be a great financial expense for school systems. The Asbestos Hazard Emergency Response Act, signed into law in 1986, requires that all schools plan and implement asbestos abatement programs. Estimates vary from $3.2 to 30 billion for this clean up.

Attention to air quality in general will influence school design in regard to new construction and retrofitting. There is a growing consciousness that fresh air circulation is essential to mitigate the toxic by-products of carpeting, building materials, cleaning solutions, bacteria from air conditioning systems and even chemicals from copying machines. New approaches to ventilation will be used, such as computer rooms with perforated raised floors and air supplies in columns or on walls.

As these hazards are discovered schools can expect more laws, tighter codes, more testing and more toxic tort claims--all of which will be a financial burden on school systems.

XII New Learning Theories

As an outgrowth of extensive research on how humans learn, such as the work on left-right brain differentiation, educators will increasingly perceive that different environments are appropriate for different learning styles and special kinds of subject matter. For instance, different learning styles will be reflected in quiet space for individualized work, flexible space for sharing ideas and laboratory space for testing out theories first-hand. In this sense, schools could follow museum design more closely in its attention to the varied use of space for different kinds of educational experience.

Overall, themes from educational restructuring could also have implications on built space. They include: individualized learning; collaborative learning and desk tutoring; self-directed learning, learning to learn; active/discovery-based/hands-on learning; and, skills of human interaction.

Finally, school architecture can and should return to one important aspect of Jeffersonian design. Whether a neighborhood school or university campus, an educational facility should express our highest ideals of democratic participation, the harmony of mind and nature and the potential for human development. Obviously, many schools fall far short of these ideals. However, in this "boom" decade for school construction and renovation there will be extraordinary opportunities to "reinvent" school space as the flexible and appealing centers for learning that are so vitally needed for educating Americans in the 21st century.

ENDNOTES

(1) Sensbach, Werner. Facilities Manager, Spring, 1989, p. 15.

(2) Ibid, p. 15.

(3) Anne Taylor, "Architecture Can Teach," In Context, Winter, 1988, p. 31.

(4) Association of Physical Plant Administrators of Universities and Colleges and National Association of College and University Business Officers in cooperation with Coopers & Lybrand, The Decaying American Campus: A Ticking Time Bomb, p. 5.

(5) Commission on the University of the 21st Century, Issue One: Demography and Democracy.

(6) AIA Committee on Architecture for Education, 21st Century Schools, March, 1989.

(7) AIA, Ibid, p. 2.

(8) Brubaker C. William, "These 21 Trends Will Shape the Future of School Design," Community Education Journal, April 1988, p. 32.

(9) Association of Physical Plant Administrators of Univerisities and Colleges and the National Association of College and University Business Officers in cooperation with coopers and Lybrand, The Decaying American Campus: A Ticking Time Bomb, 1989.

(10) Education Writers Association, Wolves at the Schoolhouse Door: An Investigation of the Conditions of Public School Buildings, March, 1989.

(11) Ibid, p. 5.

(12) Thompson, David C., David S. Honeyman and Craig R. Wood, "The Condition of School Facilities in Rural and Small Schools," as cited in Educational Writers Association, p. 32.

(13) Sylvester, Toni S., "Relocatable and Modular Classrooms: Booming Business," School Business Affairs, Jan 1988.

(14) American Institute of Architects, 21st Century Schools, March 1989, p. 3.

(15) Office of Technology Assessment, Power On! New Tools for Teaching & Learning: Summary, 1987.

(16) Olson, Robert, "Information Technology in Education," Remarks for the George Washington University Seminar on the Information Age, January 23, 1989, p. 4.

(17) Olson, Robert and Heather Kurent, Vision 2000: Trends Shaping

Architecture's Future, Prepared for the American Institute of Architects, May 1988, p. 28.

(18) Ibid, p. 25.

APPENDIX F

PROPOSALS TO THE COMMISSION

FOR NEW INSTITUTIONAL INITIATIVES

Christopher Newport College

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Office of the President (804) 594-7001

STATEMENT TO THE COMMISSION ON THE UNIVERSITY OF THE 21ST CENTURY (Revised)

On behalf of Christopher Newport College

by Anthony R. Santoro, President

September 25, 1989

Christopher Newport College believes that the issue is not whether there is need for another new university in the northern part of the State, but rather how to accommodate increased numbers of students from northern Virginia and selected other growing population areas across the Commonwealth.

Unlike some State-supported institutions which have elected to cap their enrollments, Christopher Newport College, along with other colleges, welcomes such growth and is able to accommodate it and the emerging needs of the Commonwealth, given the funds to respond to such natural and legitimate growth.

Approximately 90% of our student body are Virginia residents, some of whom come from outside the local area and reside in off-campus housing that does not belong to the College—local apartment and motel complexes and private houses. CNC completed a pre-planning study for a 600-student residence facility which its Board of Visitors has endorsed and for which planning is going ahead in good order. With support for residential housing and

academic facilities and staff, CNC could serve, and serve well, growing numbers of State residents from other regions in Virginia.

The CNC student body consists of recent high school and community college graduates and older, returning students many of whom hold full or part time jobs in the surrounding communities. Evidence for our capacity to provide quality academic programs was shown by funding given to develop special initiatives in Latin American and Japanese Studies. Our faculty is well-credentialed, with nearly 70% holding the doctoral degree. Increasing demand for our services is exceeding our ability to meet that demand. Our Fall semester headcount is 4832 students. Our annual projected FTE is 3425 students, and we are sure to exceed that figure. We are willing to meet the demands of our growing market and we accept a role in meeting the increasing need for quality higher education for more Virginians in our region as well as Virginians from other regions of the Commonwealth.

CNC believes that the best use of public monies and the best interests of the Commonwealth can be served in the area of higher education into the 21st

century by expanding and strengthening the state-supported institutions that are already in existence, particularly if these institutions are willing to expand and grow.

Our need is immediate as well as long term. Our classrooms are seriously overcrowded. We have faculty in trailer offices without restroom facilities. We have a number of faculty crowded into our modest administration building when they really need to be physically located closer to their students, classrooms, and labs.

To meet this demand, our capital project requests for this biennium include a classroom and faculty office building and Phase II of our Physical Education Building. These two requests add 140,765 gross square feet of space dedicated primarily to instruction. Also included in our capital requests is a residence hall, a public safety building and a parking lot.

At the April 1989 meeting of the Board of Visitors, Secretary Finley was supportive of our attempt to upgrade College offerings to graduate level on

a selected basis. CNC Education Department faculty have been working with members of the SCHEV Director's staff in the development of our Master of Arts in Teaching degree. With a significant number of our present student body already holding bachelor degrees, the time is right to pursue selected areas of graduate study to meet student needs.

CNC is ready to accept greater responsibility and to play a greater role in serving our State residents. Given the necessary resources, we look forward to serving increasing numbers of students in our area.

Thank you for the opportunity to offer comments to the Commission.

Commonwealth of Virginia
Commission on the University of the 21st Century

August 11, 1989

Prospectus for the Northern Virginia Campus of
The George Washington University

As President Stephen Joel Trachtenberg emphasized in his testimony to your Commission in January of this year, the dynamics of ideas and commerce and culture concentrated in the nation's capital region in the closing years of the 20th century are blind to all local boundaries. Anyone who has any role of leadership in this situation must cope daily with the consequences and the obligations of the interpenetration of the local, the regional, the national, and the international in every sphere of our lives. There is no better evidence for this than the fact that all major institutions of higher education in this region now serve on a regular basis the needs of individuals, of governments, and of corporations from every corner of the globe, as well as our own immediate constituencies.

This phenomenon is the point of departure for George Washington University's readiness to expand its partnership with the universities of the Commonwealth in meeting the truly staggering requirements for higher education presented by the extraordinary growth in Northern Virginia. The coincidence of this rising curve of demand for advanced instruction and research, on the one hand, and the gift to our University of a fifty-acre campus in Loudoun County, on the other, is nothing less than what our ancestors would have described as providential.

The concurrent timing of the work of the Governor's Commission and the planning for GWU's Northern Virginia Campus enables us to develop an array of courses and a research agenda that will be an optimum match between the

educational needs of the sector to be served and the strengths of our several faculties.

It is important from our perspective to acknowledge a strong sense of continuity with our past as we embrace this expanded mission on the other shore of the Potomac river. George Washington University's distinctive role in American higher education has always been shaped by its location. The academic programs of the University have evolved in response to the changing Washington environment. As the educational requirements of both government and private sector employees have become more sophisticated, the University has introduced a broad range of graduate and professional degree programs. And as the original District of Columbia has become the hub of a major metropolitan area, the University has undertaken to deliver its academic programs at convenient locations throughout the region. In a typical semester, for example, over fifteen hundred students are enrolled in our courses at various sites in Virginia.

In 1984, then George Washington University President Lloyd Elliott appointed a committee of faculty and administrators to establish priorities for the institution's long range development. The report of the "Commission for the Year 2000" recommended that the University acquire land in a suburban location "to give the institution flexibility in developing future research and instruction opportunities."

In the Spring of 1986, the University received a gift of 50 acres in Loudoun County from the Washington Engineering Associates Limited

Partnership. This land is part of a tract of 576 acres which is to be developed as a research and development park at the heart of which will be a comprehensive center for instruction and research. The owners, led by Mr. Robert Smith, a member of the GWU Board of Trustees and a long-time friend of the University, were interested in developing a University research park that would attract business organizations hoping to establish operations in Loudoun County.

The agreement signed between the University and the owners includes these provisions:

(1) The owner will donate to GW a site consisting of approximately 50 acres for the establishment of a campus devoted to graduate education and research.

(2) The University will have the option of acquiring an additional parcel of approximately 80 acres for the purpose of expanding the facility.

(3) The University will receive 20% of the net revenues received by the developer which is to be used for the construction and improvement of the Northern Virginia Campus.

The next two years were devoted to general academic planning, to a canvas of the educational needs of the community, and to extended negotiations with state and local authorities. The conclusion of this preliminary stage of development coincided with the arrival of the University's new President, Stephen Joel Trachtenberg, with final approval from the County Board of Supervisors, and with the acceleration of the project by the developer. The Northern Virginia Campus was immediately assigned top priority by the new University administration. A Northern Virginia Campus planning office was created under the oversight of the Vice President for Academic Affairs.

President Trachtenberg charged the Deans and other academic officers with development of a vision for the Loudoun campus that would be consistent with the University's broad tradition of service but that would also capitalize on this once-in-a-lifetime opportunity to create a new form of higher education institution responsive to that mix of local, regional, national, and international requirements alluded to earlier. He further directed that, in all of our thinking and in our consultations with others, we focus on the role of a private institution working in collaboration with the cluster of distinguished public institutions in Northern Virginia.

* * * *

A task force was formed in January 1989 and charged with developing a strategic plan for the new campus. A consultant with experience in both university and corporate education programs was engaged to guide the task force in one more round of surveys of local firms and local government agencies to determine more precisely their priority needs for instruction and research. A fresh inventory was taken of faculty resources required to meet those needs. All of this was coordinated with a very specific definition of physical facilities and laboratory equipment needed in order to sustain those programs that would be targeted for introduction in the first phase of the campus when it opens in the fall of 1991.

In the identification of programs to be included in the first phase of the campus, the planning task force insisted that four criteria be met:

(1) Quality. Programs should be staffed with top faculty, relying

first of all on existing strengths, but being flexible and future oriented with regard to new staffing.

(2) Content. The programs in research and teaching should focus on innovative thinking, being interdisciplinary in nature.

(3) Viability. The focus of all research and teaching activities should be global, linking research with education, with sufficient resources needed to support innovation.

(4) Community based. All offerings should address the community's needs, and assist business, industry, and government in meeting their needs for research and education.

The planning task force has made specific recommendations to the administration in three categories: graduate degree programs, research fields, and non-degree programs.

They have recommended that we prepare ourselves in terms of faculty staffing, library resources, and laboratory facilities to offer graduate degrees from three of our professional schools: Engineering and Applied Science, Government and Business Administration, and Education and Human Development. We have been told repeatedly by corporate executives throughout the Northern Virginia area that they are equally interested in advanced education for their scientists and engineers and in management training for employees in technical industries. The proposed degrees respond to that statement of need. They are:

(1) Executive MBA--Recent trends show that the demand for an executive MBA program continues to be high throughout the country. GWU can be the first local institution to establish such a degree in the area.

(2) Regular MBA with Special Options--Unlike the Executive MBA, this program will be offered on a part-time basis after work hours. The program's uniqueness will be its optional areas of concentration. Students will select a minimum of twelve semester hours from areas like Information Systems Management, International Business, and Management of Science, Technology and Innovation.

(3) M.S./Ph.D. in Computer Science and Applications--Given the concentration of high technology firms, and a common request from companies surveyed, a master's degree program in Computer Science and Applications is highly recommended. Given the University's reputation in computer science, the program should generate strong interest on the part of individual students as well as institutional support. The program may be expected to attract some full-time Ph.D. students to support research activities as well as part-time students working toward their M.S. degrees, very often with the support of their employers.

(4) M.S./Ph.D. in Electrical Engineering--Electromagnetics and Communication are areas of study in high demand. Once again, the student population would combine master's degree programs for employees of local industries and a full-time Ph.D. program for a select group of outstanding students. All discussions with representatives from local firms indicate a strong interest in supporting employees to study in this field.

(5) Ed.D. in Human Resource Development--The focus of this graduate program is to provide human resource professionals with the skills needed to enhance organizational effectiveness. This program will be designed for the experienced practitioner interested in pursuing a professional degree in managing human resources. All studies of the executive of the future indicate that the ability to manage human resources will be one of the most critical attributes for the effective management of organizations. Classes will be conducted on weekends over a period of years to enable employed persons to complete the degree program while maintaining their positions.

We project a total enrollment of at least 250 students in credit-earning courses (and as many as 200 in non-credit courses) in the first semester of operation. We would anticipate roughly twice that number in the second year.

* * * *

In the area of research, the Planning Task Force strongly recommended confining our agenda to a few high priority fields. They identified three in particular:

(1) Computer Science and Applications--The continuing high demand by American industry for advances in computer science is well known. There is also the strong probability that local industry will support this research in terms of equipment and funding for their personnel to enter into joint projects. The specific areas of research in this category would include VLSI design; computer graphics; educational software; parallel processing; user-computer interface; software engineering; computer aided design; image

processing; artificial intelligence and expert systems; and computational fluid dynamics.

(2) Electromagnetics and Communications--The areas of focus in this category would include: remote sensing; antennas; digital coding and signal processing; secure communications; data compression; computer communications networks; and cellular communications.

(3) Operations Research--Our School of Engineering and Applied Science has established itself as a center in this field with a faculty team of internationally distinguished experts. The growing need for American industry to improve the quality of its products in order to compete more successfully in the global economy requires the commitment of resources in developing quality control and operations research. The research activity can both train quality assurance personnel in upgrading their skills and assist their companies in becoming high quality producers.

Other areas in which our engineering faculty would be eager and prepared to undertake research if sponsorship were available would include: robotics; computer-aided manufacture; metal fatigue; reliability; and hazardous waste treatment.

* * * *

The potential range of subject areas for short courses in professional education and certificate programs is immense. We have, for example, a very extensive international program in Continuing Engineering Education. No doubt many of these courses presently offered on the main campus or on other sites around the area will either be duplicated or relocated on the Loudoun campus. Others will be developed in response to demonstrated local needs.

In the same way, our School of Government and Business Administration has a well-established set of professional development seminars--one for high level civil servants and one for private sector managers--which can be adapted to the environment in Northern Virginia as needed.

Conversations are already underway between members of the faculty in our Medical School who teach in the area of public health and health officials

in Loudoun County. It appears that there are a number of useful educational programs that our faculty will be prepared to begin offering for health professionals in the region. We would see this as only the beginning of various useful affiliations between our Medical Center and health care institutions and organizations in Northern Virginia.

We have an extensive repertoire of well-established certificate programs many of which will surely correspond to needs of the community. These could include technical writing, language training, emergency medical service training, counseling programs, landscape design, desktop publishing, and fundraising techniques.

There are some other program elements in our present design for the new campus that although not strictly academic will be a potentially important means of service to the community. The first University building will have an auditorium and suite of executive classrooms both of which could be made available for cultural events or for medium-sized conferences or for workshops for business, industry, government, or local community organizations. GWU has pioneered in teleconferences using satellite facilities. The conference room in the first building on the Loudoun campus will be equipped for participation in these interactive teleconferences. We also have developed the concept of a small business incubator which could be focused on high technology to provide a further link between faculty, graduate students, researchers, and the local business community. There is a strong interest in this topic on the part of the Loudoun County Department of Economic Development and the Northern Virginia Economic Development

Coalition. This operation could be started in a facility owned by Loudoun County which is adjacent to CIT and/or in University facilities on the new campus.

* * * *

Planning for the first structure to be erected has been done in close coordination with academic program planning. (A photograph of the architect's model of the first building is attached.) The first structure will be a four-storied building with approximately seventy thousand gross square feet of floor area. The usable space will be divided roughly into forty percent for class rooms, forty percent for research laboratories, and twenty percent for library and faculty offices and administrative offices. The building will be sited at the foot of the slope which dominates the property and will be the focal point of the main mall leading into the research park.

The design, by the architectural firm of Keyes Condon Florance, references the traditions of Virginia Georgian architecture in materials as well as scale. The exterior of brick masonry in both running and Flemish bond is articulated with limestone bases, still courses, and coping details. The sloped roof is terne metal, gray in color. Wall openings are in the proportions of colonial tidewater domestic architecture.

On the ground entrance level, a teleconference room will have tiered seating and tables, multi-media image projection as well as a T.V. screen and the capacity for interactive audio communication. The fourth floor will have an executive education suite comprised of a classroom with radial

tiered seating for fifty, small group discussion rooms, and a gallery/lounge that will accommodate catered dining.

Corridors with an open stair system connect the three levels of laboratories, library and faculty offices. Natural light is brought down from a clerestory and roof dormers to all levels via an open spline between the floors.

The long mass of the building under the gabled roof is assigned to laboratories and the library. The gabled roof shields from view roof-mounted mechanical equipment. A lower, flat roofed three-story section faces the mall and contains faculty offices, computer teaching facilities and a student lounge. The easterly semicircular wing houses classrooms and the entrance from the parking lot.

Construction is planned to start in 1990 and the building is to be ready for classes to open in the fall of 1991. This phase of the project also will initiate the planting of a landscape mall that will continue up the ridge top as subsequent University buildings are added.

* * * * *

In sum, everything is on schedule for our part of what promises to be an exciting new chapter in the history of higher education in northern Virginia. It is rare that a single project holds the potential for genuinely mutual benefit to so many parties.--The citizens of Loudoun County will have the direct and indirect benefits of the presence of a campus of a major private university. Industrial and commercial enterprises in the region will have access to a provider of advanced professional education for their employees and a partner in joint research ventures in a wide range of technical and scientific fields. George Washington University will have

the opportunity to develop new ways of delivering graduate and professional education programs and to enter into new areas of research in facilities that would be impossible to construct on our present campus. Working together with other institutions of higher education in Virginia, we can help the Commonwealth and the nation to undergird America's competitive position in the new world economy at the same time that we make good on the longstanding American promise of opportunity to all of our citizens.

Report to the Commission on the University of the 21st Century

James Madison University

Dr. Ronald E. Carrier
President

August 4, 1989

In response to the challenges facing higher education in Virginia in the 21st Century, James Madison University proposes to create an autonomous college of applied science and advanced technology founded on a creative, interdisciplinary approach to teaching and learning.

Whether the issue is global economic competition or the impact of technology on the environment, it is clear that the nation needs to expand not only the pool of science and technology graduates but the cadre of leaders in every field who are scientifically and technologically literate.

James Madison University proposes a college in which students and their teachers -- their mentors – confront the compelling issues facing society today, bringing both classical learning and practical experience to the task. Building on the university's established liberal learning foundation, the new college will seek to educate 21st-century Renaissance men and women who are highly adaptable, comfortable with technology, open to international perspectives and sensitive to the impact of technology and rapid change on the quality of human life.

The Site

The college of applied science and advanced technology will be located across Interstate 81 from the existing JMU campus on 110 acres recently purchased by the university. The property will be joined to the present campus by a bridge across the interstate.

The Students

The proposed enrollment will be 3,000 undergraduates, to be reached in 1998, and 250 graduate students, to be reached by 2000. The first 1,000 students would enroll in 1994.

The creation of a new college will allow enrollment on the main campus to remain stable at about 10,500 and control pressure on existing facilities. It is anticipated that students applying to the new college will have SAT scores of 1150 to 1250. Seventy percent would be Virginia residents; twenty percent would be recruited from outstanding high schools nationwide; and ten percent would be recruited from other countries.

A special effort would be made to identify and recruit women and minority students, who are traditionally under-represented in science and technology programs.

The Faculty

The new college will be headed by a provost who reports directly to the president of the university. There will be 200 faculty members, including one hundred on permanent assignment, fifty who rotate from the main campus and fifty who rotate from business, industry, government, the scientific community and other areas. Expertise in science and technology, appreciation of the role of the humanities, and experience or interest in the real problems of business, government and society will be important in faculty selection. Faculty members will be expected to work closely with undergraduates in instruction and research. Attention will be given to developing incentive and evaluation programs other than the traditional tenure and promotion systems.

The Curriculum

The curriculum will have four components. The foundation will be JMU's recently revised liberal studies sequence. The second component will be courses in a major or area of specialization or major. Third will include a variety of educational experiences designed to support the specialization. It is the fourth element – the interdisciplinary or systems component – which distinguishes the proposed curriculum model from traditional approaches.

The interdisciplinary program will involve the identification of persistent or compelling issues in society. Examples could include the impact of genetic engineering on waterway de-pollution, the effects of technology in the workplace or the impact of high-tech communication on First Amendment issues. Teams of students guided by an interdisciplinary faculty will address issues using a problem-solving model throughout their undergraduate experience. Beginning students (freshmen and sophomores) will participate as assistants. Students approaching graduation (juniors and seniors) will be team leaders. This approach will demand not only specific expertise in an area of specialization but it will foster the development of leadership and communication skills and a truly interdisciplinary point of view. Deliberate and careful attention will be focused on the need to incorporate the humanities and social sciences in the major and support components.

In addition, students and faculty members will be expected to develop cooperative relationships outside the university, with industry, government, business and related agencies. With advanced communication systems and digital technology – each student will be required to have a personal computer and satellite technology would be available on the campus – those relationships would not be limited by geographical boundaries or the traditional academic calendar.

Each student's program also would have an international component, including eligibility to participate in the university's rapidly expanding Studies Abroad programs and international internship programs.

Equally innovative is the delivery system anticipated for the new college. Instead of a traditional departmental structure, instruction would be delivered through a series of centers or institutes, each with an interdisciplinary approach.

Currently under discussion are centers for applied science, computational studies, computer and information science, technology management, technological expression and technology and society.

Potential programs within those centers also are being discussed. Possible applied science and mathematics programs include environmental image analysis, waste management, applied ecology, applied biochemistry, computer-aided design and manufacturing and computational chemistry, physics and mathematics. Supporting the science and technology studies will be business offerings such as information technology management, production and service delivery systems, along with graduate programs in technology management and business administration (see appendix I for additional details).

The Campus

The initial buildings of the new college will be built along a low ridge with handsome views of the main campus and the Allegheny Mountains to the west. The architecture will reflect the college's mission: it will have a 21st Century look with a human dimension. Design details will reflect the university's heritage, now more than eight decades long. The signature building will be the main science hall. Proposed features include distinctive exterior design and creative and flexible interior features, such as movable laboratory walls so that spaces can be rearranged to meet project and teaching needs. The college's communication complex, the second major program building, will incorporate imaginative treatments of the necessary antenna and satellite systems.

Planners envision an electronic computer-based resource library connected not only to the Carrier Library on the main campus but to off-campus databases. The Carrier Library will be available to students of the new college, as will selected recreational and support facilities on the existing campus. Support facilities will include residence halls, dining areas and campus center buildings designed for a living-learning environment, with convenient seminar and small-group meeting and study rooms and recreational areas. As on the main campus, there would be careful landscape planning aimed at creating appealing

and comfortable outdoor spaces, including the creation of small lakes and preservation of existing wooded areas.

It is anticipated that the university's planned performing arts center would also be located on the new campus, perhaps at the foot of the bridge near the college entrance, where it would embody both the relationship between the two campuses and the mission of the university. In an independent project, plans call for public television station WVPT, now located on the edge of the main campus, to build a new studio and office complex on the new college campus. Plans also call for the college's buildings to incorporate environmentally responsible and technically interesting features, such as solar panels, which can serve practical as well as research and teaching purposes.

The Challenge

Change, growth and innovation have been watchwords at James Madison University throughout its history. Today's challenges are no less exciting. Already highly competitive, the demand for admission to the JMU will surge in the new century as the pool of new Virginia college freshmen expands by 35 percent.

Research indicates that many of those students rank significantly behind students in other countries in science and mathematics tests. Studies also indicate a growing shortage of science and math teachers as well as graduate students in those and other technical disciplines. Those shortages have economic as well as intellectual consequences: last year 48 percent of U.S. patents were granted to residents of other countries, principally Japan.

Other challenges lie closer to home. As a university thrives, so does a community. The Shenandoah Valley, especially Harrisonburg and Rockingham County, is one of the fastest growing regions of the Commonwealth outside the "Golden Crescent." A college dedicated to the critical issues and emerging fields

of the new century can serve both as a catalyst for high-quality economic development and a key resource for managing such development in the region.

The development of a new college which redefines traditional academic structure, organization, instruction and curricula also challenges traditional measurement and evaluation methods. Individual grading, long standing policies of credit for attendance and clock hours are issues in serious need of alteration.

So to is the need to examine the way in which higher education is funded. Digital technology, interdisciplinary teaming and flexible scheduling can only be achieved if traditional funding formulas are revised to reflect changes in educational delivery systems.

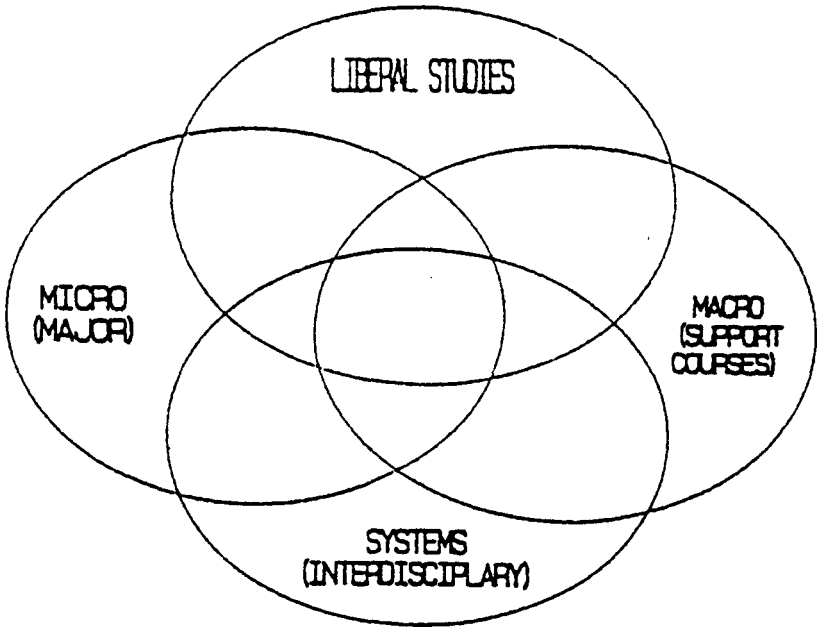
James Madison University is confident that the challenges will be met, and that Virginia will lead the nation into a new century and a new era in higher education.

APPENDIX I

Curriculum Planning

Proposed College of Applied Science and Advanced Technology

James Madison University (JMU) proposes to offer undergraduate and graduate programs in applied science and advanced technology. In planning for the delivery of these programs JMU will utilize the following curriculum model:



It will be noted that the curriculum model has four components. The first component is that of liberal studies. All students will be required to complete the newly revised liberal studies sequence of 44 hours. The second component is referred to as a micro component. Traditional terminology might describe this component as a major or area of specialization. The third area of interest is that of the macro component. In this component students will encounter a variety of educational experiences designed to support and complement the micro experience. In most instances, experiences will be carefully structured to assure students that a cohesive plan exists within this component. It is the fourth component that distinguishes the JMU proposed curriculum model from traditional approaches. In the systems component,

JMU will bring together the strengths of an interdisciplinary experience. This component calls for the identification of persistent or compelling problems of society such as the environment, waste management or the role of technology in society. Teams of students, guided by an interdisciplinary faculty, will address issues utilizing a problem solving model. Beginning students (freshmen and sophomores) will participate as assistants. Juniors, seniors and/or students approaching graduation will serve as team leaders on projects requiring the demonstration of leadership skills as well as the ability to function in an interdisciplinary setting while exercising the strengths of a given micro component. All four components will be offered concomitantly to assure students an interdisciplinary experience during the entire undergraduate program. Deliberate and careful attention will be focused on the need to incorporate the humanities and social sciences into both the macro and system components. It will be noted that at this time specific reference to the traditional four year experience is being avoided. The model has been devised to allow for a variety of experiences which could extend or alter a student's program by either a summer or two or one or two additional semesters. These experiences will include but are not limited to cooperative programs in industry, internships of a domestic or international flavor, and cooperative programs with businesses leading perhaps to a MBA.

INTERDISCIPLINARY PROGRAM INTEGRATION

During the development of the tentative programs and curricula for the New College of Applied Science and Advanced Technology at JMU the concept of a "systems" component has been widely discussed. It is the purpose of this note to suggest one approach to this concept which would achieve the apparent intent of the developers to provide an unique education for the students of the New College, an education which would prepare them for meaningful roles in an increasingly technologically oriented society and for fuller enjoyment of individual life experiences.

The approach envisioned would span the entire four years of the undergraduate programs. (1) The central feature of the program component is a series of projects, each of which is a technologically based endeavor with significant "real world" connections, carried out by small, five to fifteen person, interdisciplinary teams of students under the supervision of a member of the New College faculty. Each team would be composed of students at various stages of their programs and, for the upperclassmen, at least, of a variety of majors. It is expected that an individual student would be involved with three different projects during his/her undergraduate program; one as a freshman, one as a sophomore, and one which spans the junior and senior years. During the first two years of his/her program the student would be chosen by, or assigned to, project teams which are being directed by upperclassmen. The freshman and sophomore students would be used as workers to help with the planning, research and execution of the projects; the junior class members would be involved in the planning of a project and the senior class members would be involved in the execution and documentation. Freshmen and sophomores would have the opportunity to become acclimated to the group project environment, to be exposed to two different project areas, to assist in the development of the projects themselves, and to generate ideas for the projects which they will supervise and execute as upperclassmen. As an indication of the level of effort involved, the project work should involve at least three credit hours during each of the first three years and six credit hours during the senior year.(2)

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(1) The four year length is used here solely as a point of reference; it is understood that the actual undergraduate programs may, at some point, encompass a different timeframe such as summer.

(2) The assignment of credit hours is arbitrary, but is meant to show the level of effort and importance which should be attached to the different phases of the projects. The three and six credit hour assignments really means about 8-10% of the student's program during the first three years and 15-20% during the senior year.

The project subjects could be chosen by students, subject to approval by an oversight faculty member, or suggested by faculty members. The projects could be study projects or specific research projects which could be sponsored by external industrial concerns. The subjects could include such topics as application of genetic engineering to waterway de-pollution, use of quality circle concepts in automated manufacturing in a specific industry, establishment and operation of extra-terrestrial information systems, and evolution of the processed food industry. Each project team would be required to study at least the technical, economic, ethical, social and political aspects of the topic chosen and report, through a jointly authored senior thesis, on the results of the study. In this manner the seniors involved will have obtained a very broad and in-depth experience in an area of interest to society and future employers. The lowerclassmen would have a working knowledge of the areas in which they assisted in projects. It is expected that a project is essentially a two year proposition; it would be formed and planned by a team of juniors, with freshman and sophomore helpers. This continuity is important, as is the experience of working as a team with changing team members. The total experience could be greatly enhanced by involving students from the traditional disciplines in the project teams.

This approach should lead to the realization of the integrated education concept which the New College espouses. It would be necessary to get involvement of industrial concerns, but it would not be feasible to set up a project for a specific industry sponsored research topic. The use of cooperative education programs or internships in specific companies could be of significant benefit to particular students but should not be used as a substitute for part of the program described here. Coop programs and internships provide a lot of depth in the operation of a specific company but lack the breadth needed for the educational level desired. The involvement of faculty will be interesting and challenging, both in administration and program execution.

In emphasizing the need for interdisciplinary programming, it is recommended that the traditional departmental structure be avoided. One alternative worthy of consideration is that of specific centers focusing on timely issues. An advantage of this approach would be to allow for activity and faculty configurations to be predicated on a central issue or problem employing interdisciplinary teams. In the center setting, resources including faculty could be organized in any appropriate manner until such time that the issue has been resolved. Upon this resolution faculty, students and related resources could be redistributed in order to address a new issue. A center would allow faculty to concentrate time and energy on issues rather than the territorial concerns so common to departmental relationships. The creation of centers will also permit students to explore a variety of issues across centers thus allowing them to come into contact with a greater variety of professionals and other students.

1. The Center for Applied Science

This center will address real world issues as they relate to the practical application of such sciences as chemistry, physics and biology.

Areas:

A. Applied Biochemistry
B. Waste Management
C. Materials Science
D. Biotechnology
E. Environmental Image Analysis
F. Applied Physics
G. Applied Ecology
H. Applied Chemistry

2. The Center for Computational Studies

The application of numerical principles for modeling and simulation will serve as the primary mission of this center. Intensive work in applied mathematics and computer applications will be essential for all students. Numerical analysis and numerical methods will be among the course requirements for all programs in the center.

Areas:

A. Computational Chemistry
B. Computational Mathematics
C. Computational Physics
D. Operations Research

3. The Center for Technological Expression

This center would integrate performers from communication, art, theatre, dance, music and creative writing to explore the expressive potential of the new media: how new communication tools can be used to create new meanings and esthetic experiences. Work would emphasize the interaction and long-distance delivery potential of the latest communication tools. The focus of this work would be on artistic experimentation, individually and collectively. A second phase of the institute's performance/research dimension would be to bring artists together with researchers in traditionally non-"artistic" fields like computer science and business to consider art in relation to corporate, commercial/technical concepts and skills.

Areas:

A. Performance and Digital Technology
B. Technological Visual Communication

4. Center for Technology Management

This center will address issues related to the creation, acquisition and management for technology in organizations. Specific attention will be addressed to the nature and function of communication systems and production systems while being cognizant of interdisciplinary issues common to large systems and organizations.

A. Production Systems

1. Technology Management
2. Information Technology Management
3. Production and Service Systems
4. Systems Management

B. Communication Systems

1. Communication Technologies Management
2. Communication Technologies and Social Systems

5. Center for Computer and Information Science

The Center for Computer and Information Science will focus on computer hardware and software and the relationship of such to the organization and retrieval of information in a scientific setting.

The role of system and digital technology will receive special attention.

Areas:

A. Computer Science
B. Technical Information Science
C. Systems Science
D. Digital Electronics and Data Communication

6. Center for Technology and Society

This center will investigate the role and nature of technology as it relates to societal issues. Activities will focus on communication technologies, social systems, ethics, law and varying national and international issues.

Area:

Communication Technology and Social Systems

STATEMENT SUBMITTED TO THE COMMISSION ON THE UNIVERSITY OF THE 21ST CENTURY ON BEHALF OF MARY WASHINGTON COLLEGE

Submitted by William M. Anderson
President
August, 1989

Good Morning.

The two areas that I would like to concentrate on just briefly are the activities that we are now engaged in extensively in curriculum development, and secondly what we propose in the development of a second campus for our Fredericksburg Center, a current division of Mary Washington College.

As we continue the development of our strong program of liberal arts and sciences at the College, we will seek to aggressively move into a comprehensive program of undergraduate research.

OUR EXPERIENCE TO DATE HAS PROVEN THAT UNDERGRADUATE RESEARCH, GIVEN THE HIGH QUALITY OF OUR FACULTY AND STUDENTS, SIMPLY IS AN EFFECTIVE WAY TO ENGAGE OUR STUDENTS IN ACTIVE PARTICIPATION IN THE LEARNING PROCESS, AND TO FACILITATE THEIR OWN INTELLECTUAL GROWTH AS WELL AS EXPERIENCING FIRST-HAND THE PROCESS OF THE EXPANSION OF KNOWLEDGE.

OUR EXPERIENCE TO DATE, PRIMARILY IN THE AREAS OF PSYCHOLOGY AND LABORATORY SCIENCES, HAS CONVINCED US THAT UNDERGRADUATE RESEARCH ACTIVITIES ARE A SIGNIFICANT ENHANCEMENT OF OUR LIBERAL ARTS AND SCIENCES PROGRAM.

WE LOOK FORWARD IN THE NEXT SEVERAL YEARS TO IMPLEMENTING AN UNDERGRADUATE RESEARCH PROGRAM THROUGHOUT ALL DISCIPLINES AND WHEN POSSIBLE IN AN INTERDISCIPLINARY MANNER.

SPECIFICALLY, WE WILL NEED ADDITIONAL DOLLARS FOR FACULTY AND SUPPLIES.

ANOTHER CURRENT CURRICULUM INITIATIVE -- INTERNATIONAL EDUCATION

BECAUSE OF THE STRENGTH OF OUR FACULTY, BECAUSE OF THE EXCEPTIONAL QUALITY OF OUR STUDENTS, BECAUSE OF THE COURSES WE

ALREADY OFFER, AND BECAUSE OF OUR STRATEGIC LOCATION AS WELL AS THE SIZE OF OUR INSTITUTION, WE INTEND, STARTING THIS FALL, TO BEGIN TO IMPLEMENT A PROGRAM OF INTERNATIONAL EDUCATION. THIS PROGRAM WILL FUNCTION AS A MINOR PROGRAM OF STUDY FOR ALL OF OUR STUDENTS, REQUIRING NOT ONLY OUR CURRENT LANGUAGE REQUIREMENTS BUT ALSO ADDITIONAL COURSES FOR INDEPTH STUDY OF SELECTED FOREIGN CULTURES. IN ADDITION, WE WILL PROVIDE A STUDY-ABROAD PROGRAM LED BY OUR FACULTY, AND DURING THE SENIOR YEAR ENGAGE OUR STUDENTS IN A COMPARATIVE STUDY OF THAT FOREIGN CULTURE WITH THEIR OWN IN SENIOR SEMINARS.

I believe that this will be a most significant transformation of our curriculum and one that will prepare our students to be productive citizens in the 21st Century.

THE FREDERICKSBURG CENTER

During the last legislative session, the General Assembly provided funding for the initial staff for the College's Fredericksburg Center. The Fredericksburg Center is a division of the College that offers undergraduate and graduate courses of study specifically designed for our commuting population.

At the present time, our undergraduate Bachelor of Liberal Studies program enrolls approximately 700 students, and we foresee this program growing rapidly in the next several years.

In addition, we currently host one of the largest satellite electrical engineering programs in the state. As you know, the programs are conducted by Virginia Tech, University of Virginia, or Old Dominion.

We also offer the televised MBA program from Virginia Tech.

In the future we see the Fredericksburg Center developing as an educational division of Mary Washington that will offer graduate as well as undergraduate programs to support the educational aspirations of the citizens of the Fredericksburg area and also to support the economic development activities of the region.

In addition, we foresee extensive cooperation with the Center for Innovative Technology in meeting many of these needs. Where possible, we shall seek to bring in existing high-quality graduate programs

FROM OTHER INSTITUTIONS TO SERVE THE AREA. WE BELIEVE THAT THIS IS THE MOST COST-EFFECTIVE METHOD OF DELIVERING THESE PROGRAMS AND SEEMS TO MAKE GOOD SENSE FOR THE COMMONWEALTH.

WE ALSO ENVISION THE CENTER HAVING A LARGE PUBLIC SERVICE COMPONENT. IN ADDITION, I WOULD ADD THAT OUR PLANNING HAS BEEN EXTENSIVELY COORDINATED WITH THE ACTIVITIES OF GERMANNA AND RAPPAHANNOCK COMMUNITY COLLEGES. WE HAVE CURRENTLY EXISTING TRANSFER AGREEMENTS WITH THESE INSTITUTIONS AS WELL AS NORTHERN VIRGINIA COMMUNITY COLLEGE AND BELIEVE THAT THIS

COOPERATIVE EFFORT WILL PROVE TO BE AN EFFECTIVE AS WELL AS EFFICIENT WAY TO MEET THE NEEDS OF THE CITIZENS OF THE FREDERICKSBURG AREA.

THE GROWTH THAT POTENTIALLY EXISTS WITH THE CENTER WILL BE REALIZED IN JUST A FEW YEARS, AND WE FORESEE THE NEED WITHIN THE NEXT SIX YEARS OF ESTABLISHING THE CENTER'S OWN CAMPUS AND FACILITIES.

I AM SURE THAT AS YOU LOOK TO THE FUTURE AND FORESEE ALL OF THE ADDITIONAL RESOURCES REQUIRED TO MEET THE HIGHER EDUCATIONAL NEEDS OF THE STATE, YOU MUST

AT THIS POINT BE SOMEWHAT OVERWHELMED WITH THE MILLIONS OF DOLLARS CONTEMPLATED.

LAND VALUES IN THE FREDERICKSBURG AREA NOW RANGE FROM THIRTY THOUSAND TO FIFTY THOUSAND DOLLARS PER ACRE. HOWEVER, WE ARE LOOKING AT SEVERAL DIFFERENT LOCATIONS FOR THE CENTER AND BELIEVE THAT THERE IS THE POTENTIAL TO ATTRACT SOME LOCAL ASSISTANCE IN THE DEVELOPMENT OF THIS EDUCATIONAL COMPLEX. ALREADY WE HAVE IDENTIFIED ONE SUCH GIFT TO THE COLLEGE AND POSSIBLY A GIFT OF ONE TO TWO MILLION DOLLARS AS MATCHING MONEY TO WORK WITH THE STATE IN ESTABLISHING THE INITIAL FACILITY

NEEDED FOR THE COMPLEX. IN SUM, WE EXPECT TO PROVIDE FOUR OF THE NINE MILLION REQUIRED TO ESTABLISH THE CAMPUS THROUGH A COMBINATION OF LOCAL AND PRIVATE GIFTS.

WE BELIEVE OUR REASONING AND PLANNING IS EXTREMELY SOUND IN THIS REGARD AND THAT OUR DELIVERY METHODS ARE NOT ONLY OF HIGH QUALITY, BUT REPRESENT THE MOST ECONOMICAL WAY OF MEETING THE RAPIDLY GROWING NEEDS OF THE CITIZENS OF THE FREDERICKSBURG AREA. WE FORESEE SERVING SEVEN TO TEN THOUSAND STUDENTS THROUGH THE ACTIVITIES OF BOTH CAMPUSES.

In summary, we can assure you that we intend to meet the educational needs of the commuting population in Stafford, Spotsylvania, and throughout the Northern Neck.

REPORT TO
THE COMMISSION ON THE UNIVERSITY OF THE 21ST CENTURY

Submitted by
Norfolk State University

Norfolk State University, the third largest historically black university in America, has progressed dramatically since its humble beginnings in 1935. The University's fiftieth anniversary was a time to extol Norfolk State's excellence and its value as an important education and economic resource for all citizens of Hampton Roads.

The year 2010, the 75th anniversary of Norfolk State University, will be another benchmark in the historic evolution of the University. Every academic and administrative unit at the University will submit a plan for bringing its product and expertise along with the times. The primary goal of Norfolk State University has been, is, and will always be to produce citizens who are prepared to perform successfully in the marketplace, deal effectively with a technologically advanced society, and who contribute to that society. The following themes will be focal points for the University's aspirations.

••• Norfolk State University will be ***the flagship among America's historically black universities*** through excellence and leadership in teaching, research, and community service.

••• Norfolk State University, the most integrated university in the state and the primary institution of higher education in Virginia serving minorities, will distinguished itself even further as a leader in equal access by becoming a ***multicultural university*** through increased numbers of non-minority and international students.

••• By the 21st century, the University will provide ***quality housing*** for over four thousand students which, with its varying fee structure, will attract students from diverse economic, educational, and social backgrounds. Residence facilities will also include specialized housing for certain categories of students, such as honor students, graduate, pre-med, and married students.

••• Through ***social science research***, Norfolk State University will be the primary institution in the state and the nation to research the problems germane to contemporary society, particularly as related to black Americans. The University will thereby contribute to the body of knowledge which develops the potential of disadvantaged persons and creates persons who take their rightful place in society.

••• Whereas the shortage of blacks has reached critical proportions in teaching, engineering, the sciences, mathematics, journalism, medicine, and health related professions, Norfolk State University will be the key higher education resource within the state, and it will be nationally recognized for providing significant numbers of ***quality minority graduates*** in these areas.

••• Current efforts in the health sciences will have progressed to the point where Norfolk State University, in collaboration with other agencies and institutions, will be capable of establishing a ***state-supported School of Medicine.*** Such a school will be both the pride of the Commonwealth and of America.

••• A Norfolk State University ***School of Engineering*** will heed the call from throughout the state and nation for more minority engineers.

••• Already nationally recognized in the arts, the University will enhance its programs in art, music, literature, and theater through an ***institute for the study of the arts of African Americans.***

••• The School of Social Work, which occupies elite status among America's historically black universities, is a leader in the state and region, and which is the region's primary provider of human service professionals, will have graduated persons at the ***advanced certificate and doctoral levels*** by the University's 75th anniversary.

• Turn please •

• • • To address the severe shortage of minorities in international related occupations, the School of Social Sciences will provide a rigorous interdisciplinary undergraduate program in ***international studies*** for academically talented high school graduates. Other academic departments throughout the University will also establish numerous agreements with other countries to include student and faculty exchanges, study abroad, teleconferences, and collaborative research.

• • • Presently a recognized national advocate for increased representation of minorities in the teaching profession, Norfolk State University will achieve additional prominence by establishing an ***institute to educate and prepare minorities for the teaching profession.*** The institute will also research alternative ways of teaching effectively, especially to minority students, and provide models for combating illiteracy.

• • • By its 75th anniversary, the fully accredited Norfolk State University School of Business will offer a ***Master of Business Administration degree.*** Through its African American Entrepreneurial Studies program, the School of Business will significantly impact on minority business ownership by vigorously advocating minority entrepreneurship and providing necessary instruction to increase chances of success.

• • • During the twenty-first century Norfolk State University, whose community service problems are recognized throughout the state, will continue to be a ***beacon of opportunity for the underserved.*** While enriching the lives of the disadvantaged, the University will continue to provide a more relevant educational experience for students to include a credit course in student community service, increased internship experiences, and increased paid community work opportunities.

• • • Norfolk State University will use its premiere technology facilities to provide an opportunity for community persons to continue their education and improve their economic status. ***A career development institute,*** in partnership with other institutions and agencies, will provide marketable skills, general education development, and job placement counseling to the unskilled or persons seeking career change.

• • • Academic areas will develop ***increased partnerships*** and formal agreements with external agencies, including the private sector, other colleges and universities, governmental agencies, and public schools. These relationships will create student internships, broaden instructional opportunities, strengthen research capabilities, and provide greater access to new technology such as satellite and other communications.

• • • Since during the twenty-first century there will be a higher percentage of minorities and women in the workforce whose life expectancy is longer, a ***life style center*** at Norfolk State University will improve the quality of life for minorities and women with training in recreation and fitness, career development, health education, personal improvement, and personal finance.

• • • Already excelling in the state and recognized nationally for its ROTC programs, by its 75th anniversary Norfolk State University will enter into partnerships with regional naval installations and will become a national leader for its advocacy and ***programs to increase the number of black naval off***

• • • Student assessment will provide the information which will insure the University that a strong liberal arts foundation is in place to *produce citizens who have a broad appreciation* for the cultural opportunities available to them.

• • • On the University's 75th anniversary, *technological advances* will be a common part of the University's instructional delivery system, including advances such as telecommunications, supercomputers, parallel processes, vector processes, artificial intelligence, robotics, and expert systems.

We are on the threshold of the 21st century. Today's vision of Norfolk State University's future will become tomorrow's reality. The key to achieving that reality rests in the hands of the faculty, administration, staff, and community. Working together, this group has placed Norfolk State University among America's finest historically black universities. In the brief period since its inception in 1935, the University has risen to become an important educational, economic, and cultural resource for all citizens of Hampton Roads, the Commonwealth, and the nation.

In assuming its leadership role for the 21st century, Norfolk State University will seize the opportunities of a new era and will meet new challenges to become an even greater force in the region and Commonwealth, and to become America's flagship among historically black universities.

A Proposal for a University Presence in Prince William County

September 1989

Prince William County
Higher Education Advisory Committee

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Committee Chairman
Retired Circuit Court Judge
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Haymarket, Virginia 22069

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COUNTY EXECUTIVE
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BOARD of COUNTY SUPERVISORS

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Robert L. Cole, Vice Chairman
Hilda M. Barg
William J. Becker
John D. Jenkins
Kathleen K. Seefeldt
Terrence Spellane

September 29, 1989

Board of County Supervisors
1 County Complex Court
Prince William, Virginia 22192

Members of the Board:

It is a pleasure to transmit the final report of the Prince William Higher Education Advisory Committee. We believe that the composition of the Committee, the process by which the Committee reached its conclusions, and the substance of this report point to the need and the desirability of a university presence in Prince William County.

This proposal requires significant commitments from the Commonwealth, the County, and George Mason University. The continued growth of Northern Virginia Community College is also essential to meeting many of the needs defined in this report.

A unique feature of this proposal is the development of a higher education service district that would encompass 150,000 square feet of technologically advanced George Mason University classroom space, mixed-use office and educational buildings to maximize the benefits of public-private partnerships, and higher education offerings from other public and private universities. With George Mason University guiding the curricular development of this higher education service district, the higher education needs of Prince William County, Northern Virginia, and the Commonwealth will be met in a planned and coherent manner.

We recommend this report and proposal for your consideration. Clear and decisive action by the Board of County Supervisors will help to ensure our success in this process.

Very truly yours,

Arthur W. Sinclair
Committee Chairman

Edwin C. King
Committee Vice Chairman

EXECUTIVE SUMMARY

A Vision for the Future of Northern Virginia

The leadership of Prince William County is committed to the establishment of a university presence as an essential factor in the high-quality development of the County. To this end, they propose the establishment of the Prince William Institute of George Mason University (GMU), an undergraduate-level and graduate-level university presence in the Linton Hall area of the County.

A Higher Education District for Prince William County. The university presence the County envisions would be developed through a creative public/private partnership on a substantial tract of land of at least 100 acres. It would serve as the centerpiece of a "higher education district" that would include an innovative mix of academic, research, commercial, cultural, governmental, and residential facilities. This district would encourage and accelerate the economic expansion of the Linton Hall/Manassas region, creating a robust node of first-class, high-tech development. To accommodate this anticipated expansion, Prince William County is now implementing an ambitious road and transportation plan. Plans for light rail service to Manassas and for expanded service to Manassas Municipal Airport would make the higher education district readily accessible by road, rail and air.

Clearly, the County's proposed higher education district would consolidate Prince William County's emerging position as a vital and inviting economic, educational and cultural center in its own right. It would also yield substantial economic dividends to the surrounding areas and to the Commonwealth as a whole, as new, high-quality, high-tech businesses are drawn to the region. Moreover, the location of a university presence in the heart of the region will both address two major educational challenges facing the Commonwealth: (1) the current, pressing, educational needs of industry and growing adult populations, especially in Northern Virginia; and (2) the future needs of the large cohort of "baby boom echo" students who will be demanding access to higher education beginning in the mid-1990s and continuing into the 21st century.

A Creative Public/Private Partnership and a First-Class University Presence. The Prince William Institute will feature several important characteristics.

- **An aggressive and committed public/private partnership will provide the land, infrastructure, site planning and construction resources necessary** to launch the Prince William Institute without requiring the Commonwealth of Virginia to expend extensive capital outlay and planning resources.

- **This partnership will act quickly.** An initial, 50,000-square-foot "gateway" facility will be available by Fall 1991, and a 150,000-square-foot, technologically advanced instructional facility will be available by Fall 1993.

- **The Prince William Institute will be more than just another branch campus.** It will be a first-class higher education presence, one that would have a strong identity from its first day of operation.

- **GMU's programs will be anchored by a "vertical slice" of the larger university, focusing on transportation, regional planning and urban systems planning issues.** Its components will include undergraduate and graduate programs in urban systems engineering--a newly developed combination of urban planning, real estate development, public policy, and civil engineering; special seminars, contract learning, and

private sectors will assume responsibility, with GMU, for overseeing, coordinating, and articulating the development venture.

A Public/Private Partnership to Develop the Site and Facilities. There are three important advantages to the use of a public/private partnership to launch the Prince William Institute.

First, this arrangement spreads the risk for the venture among the County, the Commonwealth, and private landholders, donors, developers, businesses, and industry. Under conventional arrangements, the public sector would assume all risk.

Second, the active participation of the County and the private sector in the project in the form of donated land, infrastructure, design and planning, construction, equipment, services, and other resources reduces the Commonwealth's contribution dramatically. At a time of limited state resources, this has the welcome effect of bringing $30-$40 million in resources to the table just through the phase involving construction of the first permanent facility.

Third, the public/private partnership will mean a greatly accelerated time schedule for development and, ultimately, maturation of the Prince William Institute. Under a more conventional scenario, the development of a branch campus or new institution could take as long as five to seven years, rather than the two-year time frame now projected by the County for the opening of the gateway facility. The importance of greatly accelerated development of the Prince William Institute should not be underestimated from either the County's or the Commonwealth's perspective. The County has a very real and present need for advanced educational programs as high-tech industry and highly education-oriented young professionals flock to the region. GMU and NVCC are severely limited by their current shortage of facilities. And the Commonwealth has a strong stake in not only seeing that these immediate needs are met, but in assuring that the state will be able to accommodate a major surge in the demand for higher education by 18- to 24-year-olds in the next decade. This proposal is unique in its ability to address all of those needs.

Developing a Gateway Facility. The first phase of development will be the immediate construction of the gateway facility on land adjoining the permanent campus tract. The gateway landowner and the County will work together to make the necessary improvements--sewer, utilities, and the widening of existing roads and other improvements before construction begins. The gateway building, outfitted with electronic send/receive classrooms, will open for undergraduate and graduate courses in Fall 1991.

Developing the Permanent Facility. Development of the permanent tract by the public/private partnership will proceed rapidly. Sketches of the initial, 150,000-square-foot facility to be constructed on the site will be available by the end of October. This technologically advanced facility will be available for occupancy by Fall 1993. In conjunction with planning for the 150,000-square-foot facility, plans for the construction of subsequent facilities and related infrastructure will be included in the crafting of a detailed master plan. The master plan will likely call for additional academic and research facilities, cultural facilities, and potential residential facilities for students and faculty. The master plan will also address the development of lands adjoining the 100-acre tract, to assure high-quality, integrated development of the entire Prince William Higher Education District.

A Resource Package from Non-State Sources. This total package will amount to the equivalent of $30-$40 million in resources that will be made available from external, non-state sources to support this effort through the construction of the first permanent facility. Once the Institute is operational, state support for instruction and operations will be provided in a manner consistent with support for GMU at all of its locations. The

George Mason University

Office of the President
Fairfax, Virginia 22030-4444
(703) 323-2120

September 27, 1989

The Honorable Edward King
Chairman
Board of Supervisors
Prince William County

Dear Ed:

Thank you for sending me the county's Proposal for a University Presence in Prince William County. I am impressed with its thorough analysis and imaginative vision. George Mason University supports fully the recommendations made in the proposal and stands willing and eager to work with the county to ensure their implementation. The scope of the proposed program is completely compatible with our mission to serve the northern Virginia region.

You and your colleagues are to be commended for the diligence with which you have addressed the county's educational needs, and for the strong commitment to higher education represented in the proposal. George Mason is honored to be chosen as the university best suited to meet those needs.

Sincerely,

George W. Johnson
President

GWJ/dp

NORTHERN VIRGINIA COMMUNITY COLLEGE

office of the president

September 28, 1989

Mr. Edwin King, Chairman
Board of Supervisors
Prince William County
1 County Complex Court
Prince William, Virginia 22192

Dear Ed:

I have received and reviewed the report, "A Proposal for a University Presence in Prince William County," which addresses the desire on the part of the Prince William County Government for a "university presence in the county" through the establishment of the Prince William Institute.

The concept of the Institute, as outlined in the proposal, is a viable option for meeting the growing higher educational needs of Prince William County and the region. We agree with the proposal that Northern Virginia Community College be included as a full participant in the offerings of the Institute. We support the leadership role of George Mason University and the proposed Institute's flexibility in accomodating the programs of other colleges and universities.

We like the proposal and will support it. As you know, George Mason University and Northern Virginia Community College have a long-standing history of cooperation in a number of areas. This close relationship will serve us well in undertaking such a project.

Sincerely yours,

Richard J. Ernst
President

RJE/MLB:pd
cc: Dr. George Johnson

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APPENDICES (TO BE BOUND SEPARATELY)

A PROPOSAL FOR A UNIVERSITY PRESENCE IN PRINCE WILLIAM COUNTY

I. A VISION FOR THE FUTURE

A Higher Education District for Prince William County

From the rolling foothills of the Bull Run Mountains to the west, to serene battlefields to the north, to the winding estuaries of the Potomac River to the east, Prince William County boasts a landscape to rival any in Virginia. But Prince William County is more than just the sum of its natural beauty and colorful history. In 1985, it was home to 177,600 Virginians, as well as hundreds of large and small businesses, many of which have settled there in the last decade. This growth has visibly accelerated during the late 1980s. Prince William County is now the third most populous county in the Commonwealth of Virginia. The most recent projections suggest a population of 240,000 by the end of 1990. By the year 2000, Prince William County will see its population grow to roughly 320,000, a 38% increase over 1985.

The rate of employment growth in the County has even exceeded the growth rate in population. Between 1980-88, the total number of jobs more than doubled to 51,387. And another 6,000 new jobs will be added by the end of 1989. The Washington Council of Governments predicts that this trend will intensify as the new century approaches and that Prince William County will lead Northern Virginia in the rate of creation of new jobs by the year 2000.

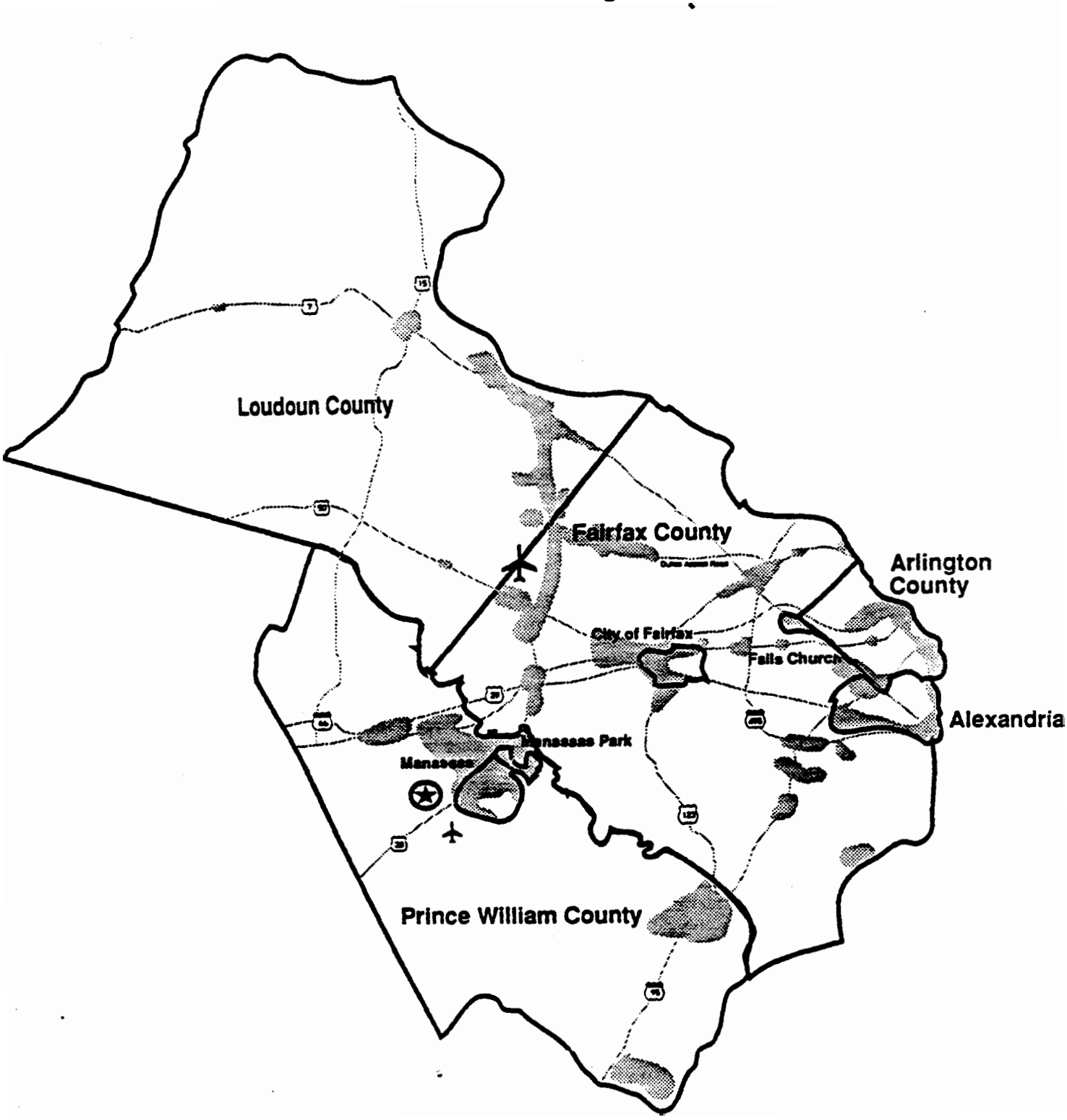
Prince William County shares these excellent prospects for growth with other Washington-area counties which were once considered outlying. Throughout the Washington metropolitan area, the regions lying ten to twenty miles outside the Capital Beltway will experience most of the growth in population and jobs over the next ten to fifteen years. Within these regions, clusters of development will occur along major highways, rail and Metro lines, and close to airports. While many Northern Virginians will continue to commute into the District to work, or to existing centers of employment, such as Tyson's Corner, Rosslyn, Alexandria, and Merrifield, more and more people will choose to live and work near these new nodes of development. In Northern Virginia, the strongest focal points of new or accelerated economic development and residential growth will include the Herndon/Reston area and the Route 28 corridor--often lumped together under the rubric of the "Dulles Corridor"--and the Fair Lakes, Springfield, Leesburg, Manassas/ Linton Hall and Woodbridge/Dale City areas.

Both the political and business leadership of the County welcome the prospect of Prince William's "coming of age," as it emerges as the economic center of Northern Virginia's growth in the 1990s and beyond. But the County leadership understands that this growth must be accompanied by a commitment to enhance the quality, and not just the number, of opportunities to live, work, and learn in Prince William. To this end, they propose the establishment of the Prince William Institute of George Mason University (GMU), an undergraduate-level and graduate-level university presence in the Linton Hall area, which encompasses the region south and west from the City of Manassas and extending to Route 29 and Route 66 to the North.

The university presence the County envisions would be developed through a creative public/private partnership on a substantial tract of land of at least 100 acres. It would

Exhibit 1

Location of Employment Centers in Northern Virginia



Prince William Institute

flexible enough to accommodate programs of other universities, public and private, in-state and out-of-state, in order to provide the full range of programs needed by citizens and industry throughout the region as these needs become apparent.

Locally, the Prince William Institute will include the Northern Virginia Community College (NVCC) as a full participant in its offerings. The upper-level program offerings at GMU's Institute will be seamlessly articulated with NVCC's academic programs. Telecommunications will link the Institute with NVCC campuses, and NVCC will be given the opportunity to occupy space both in the gateway facility and in the permanent facilities on the Prince William Institute's campus. Exhibit 2 portrays the network of GMU/NVCC sites that will be electronically linked through the Prince William Institute.

George Mason University's Prince William Institute as Part of a "Distributed University"

A second component to GMU's strategy to rapidly establish a distinctive, high-quality presence in Prince William County is to make the Prince William Institute an integral part of George Mason's "distributed university," which now includes its main campus at Fairfax, its Arlington campus, and its instructional and research presence at the Center for Innovative Technology (CIT) in Herndon. A distributed university is a geographically dispersed institution that is academically, organizationally, and technologically integrated. Its nodes are strategically placed around a metropolitan area to serve emerging "urban villages," where people live, work, and learn. Students and faculty at each of George Mason's nodes will have access to all of the University's resources, unlike students and faculty at isolated branch campuses of other institutions.

Distribution and Integration of Resources. One key to the success of the distributed university lies in the distribution of distinctive, high-quality academic and research centers at each node or site. GMU's Northern Virginia sites in Fairfax, Arlington, Prince William County, and at the CIT, will be the locations for new, multidisciplinary academic/research Institutes. These institutes will give their particular sites distinctive identities, such as the Arlington Institute for International Transactions, the Prince William Institute's focus on urban systems engineering and transportation, and the Performing Arts Institute at the Fairfax campus. In addition to these institutes, significant faculty resources in other graduate and undergraduate programs may be located at each node.

A second key to the success of George Mason's distributed university lies in its unique capacity to integrate its nodes. The centers at Fairfax, Arlington, the CIT, and Prince William will be integrated with one another through the creative use of faculty assignment, administrative support, and telecommunications. GMU's nodes are roughly 20 miles apart, and because of their proximity to one another, the university is better positioned to distribute, reassign, and integrate faculty and administrative resources among its nodes than are universities which lack this important geographic advantage.

Physical and Electronic Gateways. Beyond assigning significant resources to these nodes, GMU is committed to integrating the pieces so that the Prince William Institute--and all other sites--will be gateways to all of the resources of GMU. The key, integrative component of these institutes is not just that they operate under the auspices of a common "parent" institution, but that they will be linked by telecommunications, automated support services, and physical logistical links for instructional, administrative, and collaborative purposes. For example, students at a particular site will not only have access to instruction by faculty at the same site, but will have electronic access to instruction offered at other sites, as well. Thus, every site will both receive and transmit instruction.

Part of A Larger University Community. At the Prince William Institute, students, faculty, local business and industry, and community problem-solvers will enjoy access to all of the resources of GMU, not just those physically located in Prince William County. For students this will mean access to coursework, library and computing resources, social and cultural events, and other resources from the Fairfax and Arlington sites and from the CIT. It will also mean access to both traditional and innovative/alternative modes of instruction. Faculty at Prince William will collaborate on instruction and research with faculty throughout Northern Virginia and beyond. For local business and industry, the Institute will provide access to instruction and research resources across the region. And for community problem-solvers, a broad spectrum of multidisciplinary expertise on local and regional issues will be available through the Prince William Institute.

The Distributed Organization of The Future. The distributed organization is the model for the knowledge-based organization of the future. However, it is practical and feasible using today's technology and managerial experience. GMU is working with organizations such as AT&T's Bell Laboratories, which have successfully distributed their scientists, researchers and learning centers in clusters around a geographical region; then linked and reintegrated these clusters through technology, physical ties, and organizational/administrative procedures. The insights gained from these collaborations will be utilized by GMU as it adapts to the expanding educational needs of both Northern Virginia and the Commonwealth as a whole.

II. HIGHER EDUCATION AS A PRIORITY FOR PRINCE WILLIAM COUNTY

Current Limits to Higher Education in Prince William County

The educational needs of Prince William County are currently being served locally by two campuses of NVCC--one in Manassas and one in Woodbridge--and by GMU's campus in Fairfax. In 1987, NVCC and GMU served 68% of the high school graduates from Prince William County attending institutions of postsecondary education.

However, these local offerings are inadequate to meet the current and emerging needs of the County. Both the Manassas and Woodbridge campuses of NVCC were designed for 800 full-time equivalent students (FTES), yet they currently accommodate 1,600 and 2,200 FTES, respectively. While GMU currently serves over 1,500 students from Prince William County, this enrollment is constrained both by the lengthy commute from many parts of the County to the Fairfax campus, and by facilities limitations on the Fairfax campus. If GMU were serving the same proportion of the Prince William County population already going to college as it is serving in the areas closer to the Fairfax campus, its enrollment from the County would very likely be close to 3,000 students, rather than the 1,500 currently enrolled. And if a university were present in Prince William County, the proportion of the population enrolled in higher education would surely increase.

These data, which are consistent with testimony from citizens and business leaders in the County, strongly argue that Prince William County needs to expand its postsecondary educational offerings.

A History of Collaboration to Address Educational Issues

Prince William County officials and representatives of the local business community informally approached GMU in late 1984 to discuss the possibility of establishing a four-year, higher education presence in the County. Both groups emphasized the need for greater access to higher education for the residents and employers of Prince William County, as well as the positive effects of a university presence on local and regional economic development.

In 1986, the Prince William Board of County Supervisors designated the creation of a university presence a strategic County priority. In 1987, a joint task force comprised of representatives of Prince William County, the local business community, GMU, and NVCC, completed a feasibility study which concluded that a four-year university presence, involving solid cooperation between GMU, NVCC, and the County was both desirable and feasible. These conclusions were based on existing population and employment trends within a proposed service area that encompassed all of Prince William and Fauquier Counties, southern Loudoun County, and western Fairfax County.

In late 1988, the Prince William Board of County Supervisors appointed a Higher Education Advisory Committee to evaluate the need for higher education in Prince William County and to recommend ways to meet that need. The M&H Group, Inc., a management consulting firm specializing in partnerships between higher education, government, and industry, has assisted the Committee evaluating the County's needs and crafting an appropriate response. This proposal is the culmination of the work of the consulting firm and the Committee.

III. A STRONG, BROAD-BASED DEMAND FOR A UNIVERSITY PRESENCE IN PRINCE WILLIAM COUNTY

The Development of Northern Virginia and Prince William County in the 1980s

Like many other communities in the Washington metropolitan area, Prince William County has experienced a virtual tidal wave of population growth since the early 1980s. The County's rate of growth was higher than any other Northern Virginia jurisdiction between 1980-86, and is estimated as being even higher in the intervening years. Northern Virginia Planning District #8, in which the County is situated, was also the fastest growing district in the entire Commonwealth during this same period. In 1980, Prince William County's population of 144,000 was projected by the Commonwealth to grow to 190,000 by 1990. Its actual rate of growth appears to be roughly double the projected rate, resulting in an estimated population of 240,000. An additional 80,000 people are projected to be added by the year 2000. If recent experience is repeated, those forecasts may also be grossly underestimated.

Growth in Older, Working Adults and College-Age Residents. The period from 1990-2000 will witness a continuing increase in the population of working-age adults living in Prince William County. Moreover, unlike the remainder of the Commonwealth, where the traditional college-age population will not begin to increase until the mid-1990s, Prince William County's traditional college-age population is booming now. The population cohort aged 20-24 will increase by a dramatic 44% by the year 2000. Current projections suggest this age cohort will reach a peak in the late 1990s; however, this cohort is likely to continue to grow, because of additional in-migration to the County.

Of more immediate interest and concern to the County is the addition of more than 22,000 adults in their prime employment years, aged 25-40, who will have arrived in the County **since 1980.** By 1990, this age group will total nearly 73,000 people and by 2000, nearly 79,000. This group contains the largest number of in-migrants, who tend to be highly-educated professionals drawn to the region because of its relative affluence and job opportunities. While net in-migration constituted only 10% of the population increase in Prince William County in the early 1980s, most observers suggest that in-migration has grown substantially since 1985. These recent in-migrants are both potential students for the Prince William Institute in the 1990s and the parents of potential students in the 21st century.

Growth in Industry and Employment. The 1980s have also witnessed marked growth in the number of businesses locating or expanding operations in Prince William County. Many of these firms, such as IBM, Atlantic Research Corporation, GTE, AT&T, and Dynapac, are technology-based. From 1980-88, the total number of jobs created by new and existing employers in the County more than doubled, rising from 26,776 in 1980, to 51,387 in 1988. And more than 6,000 new jobs will be created in 1989 alone. Forecasters expect many other firms to consider migration to Prince William County in the 1990s.

Not surprisingly, unemployment in the County during the 1980s has remained well below state and national levels. At no time has unemployment been above 3.0% since peaking at 4.1% in 1982. There are other indications of a strong economic environment as well. Median family income continues to rise in Prince William. In 1987, the median income was a healthy $44,889. In 1988 it had risen to $47,452. And figures for 1989 show median family income at more than $50,000. In 1988, the Prince William County Department of Development approved $114 million in nonresidential development, up from

These innovative institutional responses to the educational needs of the urban village have several components in common:

(1) the programmatic focus and "themes" of these educational programs are based on the characteristics of the metropolitan area;

(2) they have adapted their organizational and administrative structures to carry out new missions;

(3) they use both traditional and nontraditional faculty, such as experienced professionals, to staff high-demand instructional programs;

(4) they use telecommunications and microprocessors to help deliver instruction and to foster communication and interaction;

(5) they enjoy the strong support of local business and government--many were formed through concerted political pressure and strong public/private partnerships;

(6) in many cases, public/private partnerships and creative funding have been used to launch these initiatives and to accelerate their development;

(7) the centers often include joint participation of public, private, research, four-year, and two-year colleges;

(8) these new models include cultural and quality-of-life components; and

(9) all of the urban village educational initiatives have developed at an accelerated pace in response to powerful needs and because of community involvement and creative organizational and financial arrangements.

Among hypergrowth areas that have responded quickly and successfully to the higher education needs of its residents and businesses, Montgomery County, Maryland, has the greatest value as a model for Prince William County. Montgomery County is home to many high-tech companies, while Prince William County has a respectable high-tech base that is projected to grow dramatically. The population centers of both counties are located twenty miles from a major university, but because of prohibitive traffic conditions, the distance may as well be 100 miles. In Montgomery County, as in Prince William, the business community, and particularly the high-tech community, has expressed strong need for convenient access to high-quality university instructional and research programs. And in both cases, the County leadership has taken the initiative in developing an aggressive and creative public/private partnership to address the need for a university presence that will foster economic development. While Montgomery County is farther along in its economic development than Prince William County, the former's success in meeting this need through the Shady Grove Educational Center bodes well for the success of the proposed Prince William Institute.

The Development of George Mason University. The development of GMU in the 1980s has paralleled that of Northern Virginia and Prince William County in many respects. For the university and its region, the steady growth of the 1970s was succeeded by dramatic growth in the 1980s. In the 1980s, GMU, found itself facing both increasing demand from traditional students and exploding demand for services from 25- to 40-year-old working adults with an appetite for advancing themselves professionally by means of

especially in outlying regions of Fairfax, Prince William, and Loudoun Counties. Exhibit 3 compares the clustering of population in 1985 with the year 2000, clearly illustrating the developing centers of population in Dale City/Woodbridge, Manassas, Route 28, Herndon/Reston, and Leesburg areas. The strategic location of the proposed site for the Prince William Higher Education Institute is compelling. With the completion of the Route 234 Bypass and the enhancement of Davis Ford Road, this site will be accessible to three of the developing clusters--Manassas, Dale City, and Route 28. Because of the congestion of the Interstate 95 corridor between Washington and Fredericksburg, the Route 234 Bypass/Davis Ford Road corridor will become the primary focal point for development between Manassas and Dale City/Woodbridge.

A Changing Economic Mix and Industrial Base. Dramatic changes in the population and economic base of the County, foreshadowed in the 1980s, will become the dominant characteristics of Prince William County in the 1990s. Like other hypergrowth metropolitan areas, Prince William County will see more young professionals, both single and with young families, choosing to live and work in the jurisdiction. And along with the influx of these young, highly educated and highly motivated professionals, the County will see an influx of both high-tech and service-based industries. The two phenomena will feed off of each other; as one grows, so will the other.

The experience of other hypergrowth areas demonstrates that the expansion of high-tech industries depends on a ready and reliable supply of sophisticated workers. And this supply, in turn, depends heavily upon the presence of higher education. Many such companies will only elect to locate in areas where there is a strong university presence, and one convenient to their work sites. They demand access to the kind of training, research support, and cultural/intellectual activities that only a first-class institution of higher learning can provide.

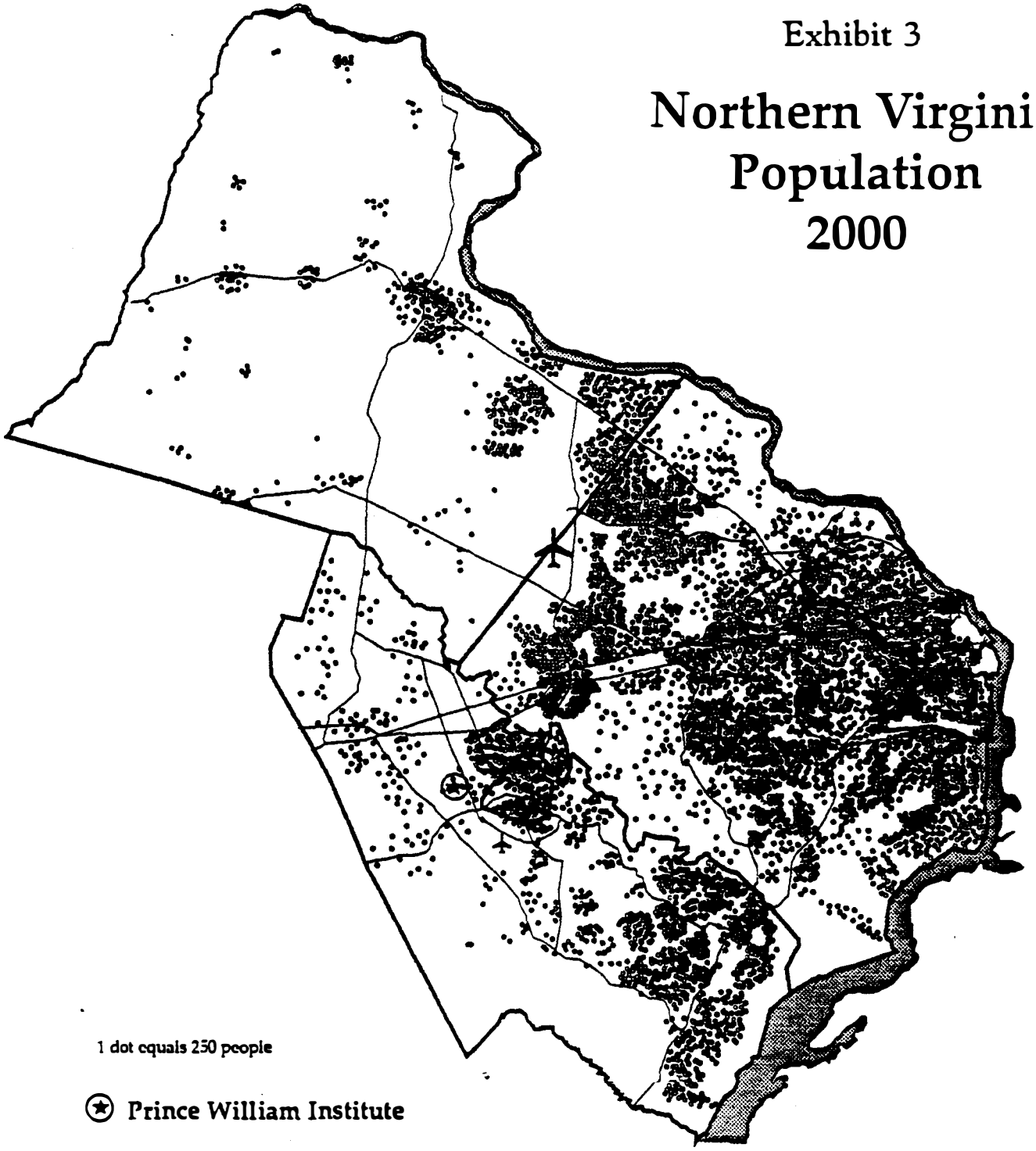
Exhibit 4 compares centers of employment in 1985 with those projected in the year 2000. The movement to outlying urban villages is clear. Even these figures are probably underestimated; as "suburban downtowns" grow and traffic congestion gets worse, the pace of outward movement of employment will undoubtedly quicken.

Education is Key to Maintaining Northern Virginia's Competitive Advantage. Northern Virginia generally has enjoyed a competitive edge in competing as a location for high-tech companies and in starting new, entrepreneurial ventures. Before 1980, Northern Virginia's primary competitive advantage was its location near the Federal government, robust economic growth and a pleasant quality of life. Since 1980, the presence of a developing high-tech region has both drawn other firms and nurtured the development of GMU, which has responded aggressively to the needs of high-tech industry. However, as Northern Virginia's high-tech community matures, it must compete more effectively to maintain its edge. The high cost of living in the Washington metropolitan area, the impact of congestion on quality of life, and increased competition will require new, more ambitious partnerships between higher education, industry and government. Moreover, this competitive edge must be nurtured and expanded to other locales in the region. The region, and the Commonwealth, cannot sustain its economic achievements, its attractiveness to new, high-quality companies, and its standing as an entrepreneurial center for new spin-off companies by maintaining the status quo.

Unlike many of the developing metropolitan areas, where a strong university presence preceded and fostered economic growth, the growth and development of GMU in the 1980s was stimulated by the economic growth of the region. In the 1990s, GMU will need

Exhibit 3

Northern Virginia Population 2000



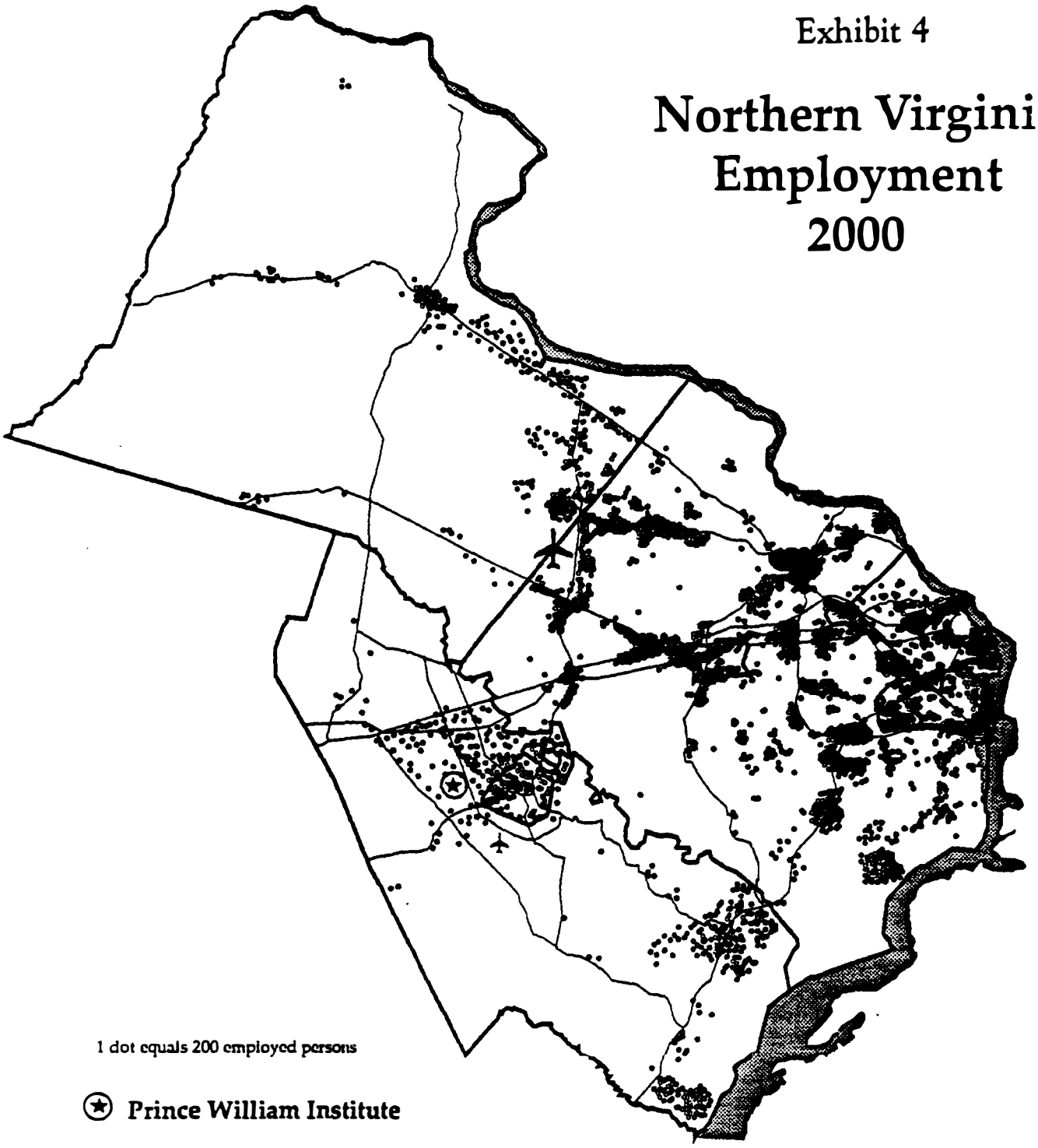
1 dot equals 250 people

Prince William Institute

Source: Washington Metropolitan Council of Governments, Round IV Cooperative Estimates, Intermediate Estimate Series

Exhibit 4

Northern Virginia Employment 2000



1 dot equals 200 employed persons

⊛ **Prince William Institute**

Source: Washington Metropolitan Council of Governments, Round IV Cooperative Estimates, Intermediate Estimate Series

needs surveys performed in other hypergrowth, high-tech communities, such as Montgomery County, Maryland.

Moreover, the need for this full range of offerings will increase dramatically in the 1990s given the migration of high-tech companies to this service area. Too often, educational planners underestimate the latent demand in these emerging hypergrowth areas. For example, in Montgomery County, Maryland, an area located only 20 miles from the University of Maryland at College Park, many felt the market was adequately served by the excellent interactive television programs in engineering from the University of Maryland. However, only two years after opening its Montgomery County campus at Shady Grove, Johns Hopkins University was enrolling 800 graduate students in engineering alone.

The proposed Prince William Institute will not only be able to address the needs of today's learners, but it will also have the capacity to serve 1,500 to 2,000 traditional undergraduates from the 18- to 24-year-old cohort by the late 1990s. This will ease enrollment pressures on other Virginia colleges and universities and particularly on the Fairfax campus of GMU. Thus, this Institute will play a critical role in solving two pressing educational challenges facing the Commonwealth; that is, the current career development needs of an expanding work force and the needs of the upcoming wave of traditional-aged students.

IV. A PROGRAM OF INSTRUCTION, RESEARCH, AND PUBLIC SERVICE

The proposed Prince William Institute is anchored by a "vertical slice" of selected multidisciplinary programs from GMU, including bachelor's through doctoral degree programs, seminars, workshops, contract offerings, and associated research centers. Exhibit 5 illustrates the components of these programs in the area of urban systems engineering, transportation and region planning for post-industrial regions that will form a centerpiece of the Prince William Institute of GMU. These programs are expected to achieve national and international distinction.

In addition, GMU will offer a variety of programs which have been selected for their applicability to the needs of Prince William County, including:

(1) carefully selected master's-level programs and upper-level, degree-credit offerings tailored to the needs of local industry and public education;

(2) selected upper-level, degree-credit offerings that are fully articulated with NVCC programs to allow students to pursue baccalaureate degrees;

(3) non-credit, special courses, seminars, and other offerings requested by the community and local industry;

(4) small business programs, such as those provided by GMU's Entrepreneurship Center, business incubation services, and access to all other problem-solving resources of GMU; and

(5) cultural and fine arts offerings from GMU and affiliated organizations.

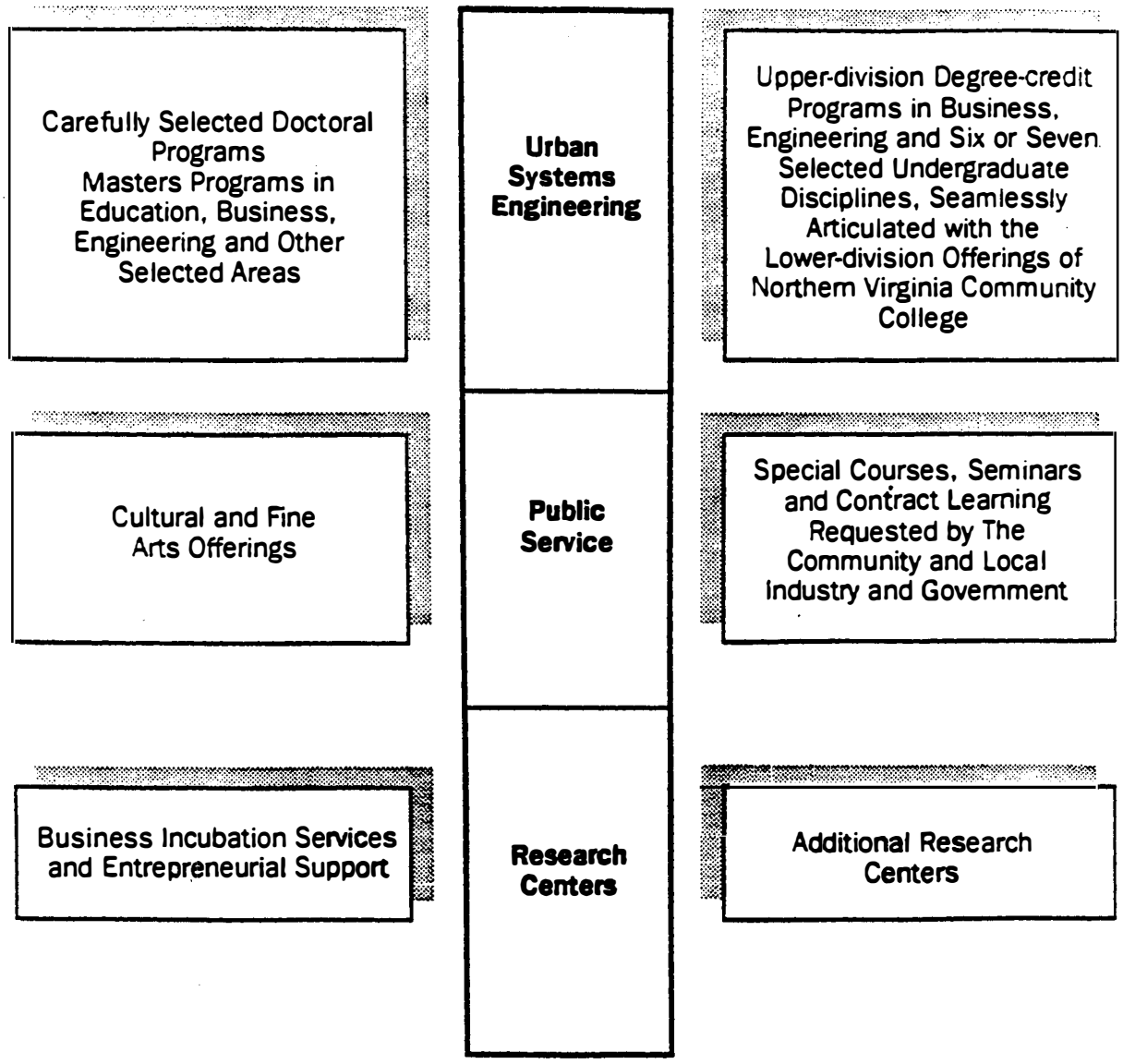
Exhibit 6 portrays the interrelationships of these programs.

To respond to the immediate need for these programs as quickly as possible, courses will be offered first through a "gateway facility" by the fall of 1991. This facility will be a fully equipped 50,000-square-foot building located on property adjoining the campus tract and accessing existing county roads. From the start, the gateway facility will have electronic, send/receive classrooms linking the Institute to the resources of GMU, to NVCC campuses, and other colleges and universities. Both GMU and NVCC will provide educational services at this gateway facility. Exhibit 7 illustrates how this gateway will provide access to the full range of resources of GMU.

The first building of the larger, permanent home for the Institute will open on the adjoining campus tract in the fall of 1993. This 150,000-square-foot, technologically advanced facility will be utilized by both GMU and NVCC. By the fall of 1994, the Institute is likely to enroll nearly 2,000 students. This is a conservative figure; in reality, enrollments could be even greater if GMU is able to move a full range of programs appropriate to the needs of local learners. By 1999, the Prince William Institute of GMU could easily enroll 4,500 students, and nearly 7,500 students could be enrolled by 2004.

Exhibit 6

The Prince William Institute Is Anchored by the Vertical Slice of the University and Offers Additional Programs...



...Tailored to the Needs of Prince William County and Integrated with the Needs of Northern Virginia.

Instructional Offerings (Degree Credit)

The Prince William Institute will provide a set of degree-credit offerings consisting of urban systems engineering, graduate programs in other disciplines, and upper-level programs closely articulated with NVCC programs.

Urban Systems Engineering. The centerpiece of the Prince William Institute will be a comprehensive program in urban systems engineering offering the bachelor's, master's, and doctoral degrees. A fully developed program with 350 undergraduate and graduate students will be in place within five years of the Institute's opening, and enrollments could easily double in the following five years.

The focus and purpose of the instructional program is to produce a new type of urban engineering and planning professional who is equipped with the conceptual, analytical, practical, and managerial skills that will be needed to meet the challenges of urban systems development in the new century. The urban systems engineer will use an information-based, systems approach to solve urban infrastructure and planning issues rather than a segmented, physical approach. Students could expect to take coursework in areas such as mathematics and statistics, physical sciences, civil engineering, econometrics and social science, systems methodology and design, systems management and enterprise management.

This program is being developed with the strong support and input of the leadership of civil engineering and urban development firms in Northern Virginia who are concerned about the lack of multidisciplinary expertise in graduates of existing programs. These leaders have agreed to finance 80, four-year scholarships and summer internships, as well as other forms of support, for undergraduate students in this program.

The urban systems engineering program will have a practical, problem-solving orientation. Students will be expected to acquire "hands-on" experience through co-operative and summer internship programs. Collaborative research and problem-solving projects with local firms will be strongly supported.

The target audience for the undergraduate urban systems engineering degree includes both future civil engineers who are interested in a broad-based program dealing with urban system problems and students who would not choose civil engineering per se as a field of study, but who would opt for a multidisciplinary, more comprehensive approach to urban systems problem solving. The program will draw students from a national market. It will both serve students from the Commonwealth and attract high-quality students from other states who are interested in the urban infrastructure planning issues of the 21st century.

Demand for the master's-level degree will come from experienced civil engineers and urban planners who wish to broaden their expertise by exposure to the urban systems perspective. Students who have completed their undergraduate training in urban systems engineering at the Institute will also return for advanced training after several years of professional experience. In addition, new baccalaureate degree engineers who wish to specialize in a particular subfield of urban systems engineering will be able to pursue master's degrees at the Institute.

At the doctoral level, the information technology Ph.D. program will appeal to experienced engineers who wish to develop a particular area of expertise in one of the urban systems specialties, all of which have a strong information technology focus on urban infrastructure issues.

Over time, other applied systems centers will also be established at the Institute, which bring innovative, multidisciplinary perspectives to the study of complex systems.

Public Service

The Prince William Institute will honor the public service tradition of its parent institution, GMU, in a number of ways. The Institute will offer non-credit courses open to the interested public and special courses tailored to the needs of industry and government. GMU is currently serving AT&T, Unisys, FDIC, FBI, MCI, ARC, and Xerox through its Employee Development Institute, and the same sorts of students will be enrolled in such offerings in Prince William County.

GMU will serve as a broker to make available program offerings from other colleges in Virginia and elsewhere. It will collaborate with local industry on research, problem-solving, and other joint ventures. It will provide advice and support for small businesses and start-up companies, including access to the services of the Small Business Development Center and other experts associated with the University. The Institute will also help to sponsor and support cultural activities, including live and electronically transmitted performances by the faculty and students from GMU's Performing Arts Institute and other affiliated organizations.

Critical Components of George Mason University's Prince William Institute

To reiterate, several ingredients are critical to the success of GMU's offerings at the Prince William Institute:

Telecommunications as Gateway and Integrator. The extensive and innovative use of telecommunications to link the Prince William Institute's classrooms and research centers to the full resources of GMU and other universities will be essential to its capacity to respond to the needs of its many constituents. Electronic send/receive hook-ups will enable faculty and students at the Institute to exchange information, collaborate on research, and deliver instruction to a wide range of business, governmental, educational, and research establishments. This electronic delivery system will not only prove to be extremely efficient, but, ultimately, economical as well, for it will eliminate costs associated with duplicating courses and personnel at separate campuses.

The gateway facility will house at least two electronic send/receive classrooms. The 150,000-square-foot facility on the permanent campus will contain six or more send/receive-equipped rooms which will be used for instruction, research, meetings, and administrative activities. These rooms will also be the site of on-campus collaborations between faculty and corporate professionals and faculty and community problem-solvers.

Early provisions will be made for linking the Institute to the CIT, GMU's Arlington and Fairfax campuses, NVCC's campuses, and other affiliated organizations. Individual GMU faculty members located throughout Northern Virginia will also have the opportunity to be electronically linked to each other's homes and offices.

Academic and Administrative Support Systems. The Institute's extensive use of telecommunications will likewise allow for sharing of fully-automated, real-time academic and administrative support services that will be available at all George Mason campuses. Students at the Prince William site will be able to seek admission, register, and obtain

Strong Community and Industry Support. Last but not least, the Prince William Institute will cultivate broad-based community and industry support for its programs. Efforts to this end are already underway. The establishment of the public/private partnership to develop the Prince William Institute demonstrates the powerful commitment of government and local business leadership. In what is clearly a strong vote of confidence in the future of the urban systems engineering program, a consortium of seven major, local engineering firms has committed itself to providing internships and endowment funds for the urban systems engineering program. Other corporate donors, both national and regional, have expressed interest in supporting the development of GMU's distributed university, including the Prince William Institute.

V. FACILITIES FOR THE PRINCE WILLIAM INSTITUTE

Location of the Site

The Prince William Institute will be situated near the center of a 44-square-mile area designated for mixed-use development under Prince William County's 1989 proposed Linton Hall Road Comprehensive Plan Amendment. The area is bounded on the north by the Interstate 66 corridor, on the east by the Route 234 corridor, on the south by Manassas Airport and the Broad Run/Kettle Run watershed boundary, and on the west by the boundary between Prince William and Fauquier Counties. Linton Hall Road passes through the approximate center of this region on a northwest-southeast axis. Wellington Road approximately parallels it to the northeast.

Prince William County is currently negotiating with landowners to secure the donation of a substantial tract of land of at least 100 acres located near the Route 234 Bypass. Access to existing roads, upgraded to four lanes, will be utilized to assure Fall 1991 startup. When the Route 234 Bypass is completed, it will provide optimal access to the site.

A wide range of development is planned for the Linton Hall region, including corporate/industrial areas; commercial/retail areas; office/light industrial areas; urban, suburban, and rural density residential areas; public areas (schools, libraries, etc.); and recreational/open space areas. To accommodate actual and anticipated development in this region, the County plans a number of major road improvements, some of which are already under development. The most important of these with respect to the location of the Prince William Institute are: (1) the construction of the Route 234 Bypass through the eastern portion of the Linton Hall region, (2) the widening of Route 28 between the City of Manassas and Manassas Airport, and (3) the widening to four lanes of Wellington Road and Godwin Drive. The City and County also plan the provision of commuter rail services from Washington, D.C./Crystal City, to Manassas, with terminal stations at Manassas Airport and City of Manassas. The effect of these transportation improvements will be to make the Prince William Institute extremely accessible by road, rail, and air.

This general location is unquestionably the best in Prince William County for achieving the County's educational, economic development and governmental service functions. With the completion of the Route 234 Bypass, the site will be proximate to the Route 28/Interstate 66 corridor, and it will be close to the rail and air connections in Manassas. It will serve as a focal point linking the eastern and western communities in Prince William County. Strategically, this site could not be better.

A Higher Education Foundation or Authority

The initial development of the Prince William Institute site will likely take place through the establishment of a 501(c)(3) corporation; however, the establishment of an educational "authority" is a possible alternative. Under either of these arrangements, participants from both the public and private sectors will assume responsibility, with GMU, for overseeing, coordinating, and articulating the development venture.

A local advisory committee will be established to counsel the educational foundation or authority in matters relating to the development of surrounding parcels of land. The exact composition of the advisory committee has yet to be determined. Prince William County's

available by the end of October. This facility will be available for occupancy by Fall 1993. In conjunction with planning for the 150,000-square-foot facility, plans for the construction of subsequent facilities and related infrastructure will be included in the crafting of a detailed master plan. The master plan will likely call for additional academic and research facilities, cultural facilities, and potential residential facilities for students and faculty. The master plan will also address the development of lands adjoining the 100-acre tract, to assure high-quality, integrated development of the entire Prince William Higher Education District.

VI. FINANCING CONSTRUCTION AND OPERATIONS

Schedule for Planning, Construction and Initiation of Operations

The proposed schedule for planning, construction and initiation of operations is as follows:

Dates	Phase of Development
August-September 1989	Planning and development of this proposal for a University presence in Prince William County
September-October, 1989	Share proposal with the Commission for the University of the 21st Century and the State Council of Higher Education for Virginia
October 1989-April 1990	Prince William County and GMU joint planning for academic programs and gateway facility; arrange financing
November 1989	Request state planning appropriation of $125,000 for 1990
January 1990-January 1993	Develop Master Plan for the entire Prince William Institute site
May 1990-July 1991	Construct gateway facility and infrastructure
July 1990-July 1991	Plan for permanent tract and facility
August 1991	Occupy gateway facility
January 1991-January 1992	Design and engineer access from gateway and initial permanent facility
January 1992-July 1993	Construction of infrastructure and initial permanent facility of 150,000 square feet
August 1993	Occupy initial, permanent facility

This is an ambitious schedule which reflects the commitment and sense of urgency of the County and local industry.

Resource Package and Funding Sources

The final size and composition of the resource package needed to establish the Prince William Institute site and build the initial permanent facility will depend on the nature of the land donation, specific components of the facilities to be constructed, and other issues.

VII. NEXT STEPS

To proceed with the establishment and planning of the Prince William Institute, the following steps will be taken:

First, Prince William County will share this proposal with the Commission for the University of the 21st Century and the State Council of Higher Education for Virginia.

Second, the entity which will oversee the development of the Prince William Institute will be formed. Whether this entity should be a foundation or educational authority will be thoroughly examined by the relevant parties.

Third, negotiations that are currently underway with potential land donors and developers to determine the precise size and location of the tract and the gateway facility must be completed; these arrangements are expected to be finalized by the end of 1989.

Fourth, Prince William County will present its request for $125,000 in state appropriation planning funds to the General Assembly in November 1989. Prince William County will provide an equal amount of funding. Planning for the gateway facility will begin in October 1989.

Fifth, the parties to the Prince William Institute venture will negotiate the details of the public/private partnership.

Sixth, upon the final negotiation of these matters, the partnership will proceed with planning of the Prince William Institute's facilities and academic programs.

Proposal for
The New College of Global Studies at Radford University

I. The Need for Global Literacy

During the next few decades the world will become vastly different. For example, global population is now a little over 5 billion-- two and one half times what it was only 40 or 50 years ago. And the world's population is expected to double to 10 billion shortly after the turn of the century.

The population explosion is but one of a number of critical global problems that will have to be faced in the 21st Century. Others include global warming trends due to the greenhouse effect, the depletion of the protective ozone layer, the rapidly dwindling store of both renewable and fixed resources, and the masses of refugees trying to escape areas of famine and armed conflict.

Even as the foregoing problems must be addressed, shifting economic alliances and the development of new economic power bases-- such as the emerging European Economic Community-- will significantly alter what has already become a global economy. We will see even greater increases in international economic competition, the globalization of companies, the vast and rapid spread of technology, and extraordinary demographic shifts. As a result of these accelerating changes, the United States-- still considered the preeminent economic and political force

in the world today-- may find itself losing ground around the globe tomorrow.

To survive, much less prosper, U.S. students must be educated to be sensitive and productive leaders in tomorrow's "global village," to appreciate the nature of their interconnectedness with all humankind, and to learn to communicate, negotiate, cooperate and compromise with their fellow global citizens.

Fortunately, Virginia has already evidenced its concern for global education. Governor Gerald Baliles noted in a recent commencement address: "... Virginia has established an alliance with the National Geographic Society to teach our children-- and our teachers-- about the world around us so that we better understand how geographic characteristics influence cultures and economies" (Radford University's Geography Department is one of the primary participants in that project).

Virginia is also a national leader in the teaching of foreign languages and tied for first among the 50 states in the percentage of secondary school students enrolled in foreign language courses. In addition, Virginia has established summer foreign language academies to teach French, German, Spanish, Chinese, Japanese, Korean and Russian (Radford University has a thriving English as a Second Language Institute).

Preparing students for the world in the 21st Century will require new and non-traditional responses from higher

education. Geographic knowledge and foreign language proficiency are only beginnings in the preparation of today's students for tomorrow's world. They must also be able to deal with rapid change, have sophisticated insight into other cultures, and appreciate the linkages between technological applications and social consequences.

Radford University proposes to create a New College of Global Studies-- an initiative that will be capable of addressing the education of those who would be world citizens.

II. Global Education Perspectives

Global education is not a new concept. Many institutions of higher education have international programs. But often times, promising attempts have been stymied by internal academic "turf battles" and politically expedient compromises. They represent at best a piecemeal approach to the vast challenge of providing a truly globally-oriented education.

Radford proposes to create a New College of Global Studies "from the ground up," as a relatively autonomous unit-- a unit in which innovative approaches need not be constrained by academic traditions, disciplines or inertia.

Through the establishment of the New College of Global Studies at Radford University, the opportunity exists to develop **now**, in Virginia, the type of university education that will be necessary for-- and demanded by-- students in the 21st Century.

III. The New College of Global Studies

A. Curriculum

The curriculum for the New College is envisioned as having a pervasive global orientation. Governor Baliles was clearly on target when he said in May at the American Forum Conference in Atlanta: "I remain convinced that the most important thing we can do as a nation is to develop a new way of thinking, to accept the principle that in almost every setting, for practically all fields of knowledge and for all methods of analysis, there must be an international dimension." The New College will incorporate that international dimension within a global perspective that will be applied to every area of study. "Global" subsumes "international," implying the wholeness, the complexity and the interdependence of all the nations of the world. Because the "international" dimension is important to a global orientation, it will naturally play a crucial role in the New College curriculum. But the emphasis across the curriculum will be on a "global" perspective that acknowledges the interrelatedness of all humankind.

A rigorous, multi-disciplinary curriculum is envisioned because global themes are, by nature, interdisciplinary. The development of this curriculum need not be constrained by traditional class periods, nor by the typical academic calendar. Lack of such constraints, however, does not imply lack of structure. In fact, rather than the traditional

smorgasbord of general education options, New College students might be required to take a multi-disciplinary core of courses emphasizing world ecosystems. Such courses might be team-taught in a two-hour block, five days a week across a six-month period.

Also, except in the rare case of an entering student who already has attained proficiency in a second language, students will receive intensive language training. Language study will continue until they are prepared for study or internship in a foreign country. A significant foreign educational experience will also be one of the degree requirements in the New College.

B. Autonomy of the New College

Because of its pervasive global perspective, multi-disciplinary curriculum and the unique expectations of its students, the New College will be, by necessity, a largely autonomous unit.

It is envisioned that the New College will have an independent admissions process which will enable it to admit quality students who are selected on the basis of course work, motivation, interests and experiences that are often overlooked or considered less important by traditional admissions offices.

The New College will have its own administration, headed by a Provost who will report directly to the President at Radford University.

The curriculum and other aspects of the New College will be planned by a national panel consisting of local and national leaders from within the field of education and outside it.

C. The New College Living/Learning Complex

Because of its affiliation with and proximity to Radford University, the New College will take advantage of economies of scale. Basic support services already in place at the main university-- such as library facilities, recreational facilities, health services, postal service and maintenance-- will be shared by the two campuses.

Initially, as many as 2,000 students will be housed within the New College's multi-use "living and learning" complex. The physical structure of the New College of Global Studies will be as innovative as its curricular approach.

To provide the best possible learning environment, the New College will feature an overlapping of the two traditional kinds of space: academic and residential. Historically, these two areas have been physically separated. Administrative structures, funding formulas and educational philosophies have consequently evolved that both reflect and reify the arbitrary distinction between intellectual and social life. But the advanced learning technologies that are currently on line, or which will be on line in the near future, are challenging those historical and arbitrary distinctions. Consequently, a living

environment in which social and intellectual interactions are unavoidable, and in which languages other than English are used, will require other than the traditional dormitory configurations of space.

In the next couple of decades, the learning process will rely upon and be enhanced by even greater technological advances than those presently available. The New College facilities will make use of existing technology, and will be prepared to accommodate tomorrow's advances.

Recognizing that advances in learning technology are breaking down the traditional distinction between learning and living space, the New College envisions a well-equipped, high-tech learning space built into each living area. Features such as personal computing systems and Compu-TV, interactive multimedia, computer access to library catalogues, and an electronic mail network will enhance the speed and breadth of learning, and will allow for the curricular integration of self-instruction. Other learning tools will be conveniently available to students and faculty in the complex's laboratory and resource centers.

The need for large classrooms will be greatly diminished in the New College as only a few areas will be needed to serve classes of 100-200 students. Most classes will be rather small-- probably about 15-25 students. If properly equipped, lounge areas could double as small class learning areas.

Careful study and consideration of traffic flows, noise control, security and privacy will result in the mixing of faculty offices, residential areas, classrooms, dining facilities, social areas, laboratories and resource centers.

IV. The Globally-Educated Student

As a result of the New College experience-- a pervasive global orientation, a multi-disciplinary curriculum, intensive study of a foreign language, and immersion into a foreign culture-- a student graduating from the New College will not be typical of graduates from traditional universities.

New College graduates will be acutely aware of the interrelatedness of the peoples of the world. They will have a greater understanding of and sensitivity for the perspectives of others, which reflexively will give them a greater grasp of their own personal and cultural perspectives. They will recognize the multi-disciplinary synthesis necessary to address global concerns. They will be able to step back to see global issues more wholistically.

In short, they should emerge from a New College of Global Studies even better educated than graduates of traditional academic programs. Why? Because they will have received not only a solid education, but one that has been enhanced by a consistent global perspective in all matters.

V. Conclusion

At Radford University, Governor Baliles' charge to the Commission on the University of the 21st Century is seen as an imperative: "This is not the time to be timid...do not be constrained by the present shape of colleges and universities." Recognizing that colleges and universities in Virginia must prepare to meet changing needs in higher education, Radford University proposes the establishment of the New College of Global Studies to provide future students with the type of education necessary for those who will be tomorrow's world citizens.

RICHARD BLAND COLLEGE PLANS TOWARD THE 21ST CENTURY

This proposal is in response to the request to colleges in Virginia by the State Council of Higher Education to study their needs and prospects and to report their plans to the Governor's Commission on the University of the 21st Century.

The Academic Program

As the only public-supported junior college in the Commonwealth, Richard Bland College provides quality transfer programs in the liberal arts and sciences. The Associate in Arts, the Associate in Science, and the Associate in Science in Business degrees have served as the primary delivery vehicle for students since 1961 when the College was created by the General Assembly as a branch of The College of William and Mary in Virginia.

In their 64 hour requirement for a degree, all graduates complete the following common core of 42 hours of general education courses:

Humanities		12
English Composition	6	
Art or Music Appreciation	3	
Literature, Philosophy, or Religion	3	
Science and Mathematics		14
Biology, Chemistry, or Physics	8	
Mathematics	6	
Social Sciences		12
Government or History	6	
~~Economics,~~ Geography, Psychology, or Sociology	6	
Physical Education		4

In addition, candidates for Associate in Arts must complete six hours of a foreign language at the intermediate level; candidates for Associate in Science in Business must complete six hours each in accounting, computer science, and economics in preparation for entering an accredited School of Business. Remaining elective hours are carefully chosen to conform to the articulation agreements between Richard Bland College and the public senior institutions.

Articulation Agreements

Articulation is a vital component of the College's educational program. It is the basis for recruitment, academic advising, and retention. Since 1986 the College has concluded articulation agreements with Christopher Newport College, Clinch Valley College, George Mason University, James Madison University, Longwood College, Mary Washington College, Norfolk State University, Old Dominion University, Radford University, Virginia Commonwealth University, Virginia Polytechnic Institute and State University, Virginia State University, and The College of William and Mary. Dialogue is continuing on an agreement with The University of Virginia, which should be concluded soon.

In addition to the articulation agreements, the Degrees and Curriculum Committee has developed specific transfer guides to selected four-year colleges and universities that may be used to further assure the student that Richard Bland College is doing all that it can to foster the transferability of its courses, the meeting of individual student's needs, and the initiation of a comprehensive transfer plan for all students.

Assessment of Outcomes

To assess results of transfer programs provided in the past and now covered in the articulation agreements, the College initiated a comprehensive research project involving 657 Richard Bland College transfer students who subsequently enrolled in nine senior public institutions in the Commonwealth. Individual contacts were made with each institution and in most instances full student transcripts were provided that allowed Richard Bland to review and compare the following information on each student: degree/status, hours transferred, hours earned at the senior college, student's major, and a comparison of grade-point averages at the two institutions. Key findings are presented in the following table.

HOURS ACCEPTED AND COMPARISON OF GRADE-POINT AVERAGES 1981-1987

Number of Students	Institution	RBC GPA	Senior College GPA	Hours Accepted[1]
44	College of William & Mary	3.47	2.58	61.14
51	James Madison University	2.97	2.80	60.07
11	Mary Washington College	3.04	2.62	60.50
6	Norfolk State University	2.56	2.58	69.00
49	Old Dominion University	2.92	2.61	65.63
23	Radford University	2.64	2.24	62.78
7	University of Virginia	3.57	3.19	63.20
71	Virginia State University	2.50	3.06	65.94
395	Virginia Commonwealth Univ.	2.87	2.64	60.32
657	Composite	2.95	2.70	63.18

[1]Includes only those students who spent four semesters at RBC, a total of 462 from the 657 students in the study.

This study indicates there is only a .25 grade-point differential in how these students performed at Richard Bland and at the four-year institutions; and perhaps of even more significance, credits earned at Richard Bland College are readily accepted at the senior institutions.

Plans for 1990-2000 Decade

Approximately 20,000 more college-age students are projected to enter Virginia's college and universities early in the next century. Richard Bland College is eager to assist in the alleviation of this problem by building on its demonstrated strengths of providing a sound grounding in the liberal arts and sciences for some of these new students, in the nurturing environment of a small junior college whose primary mission is and will continue to be to offer transfer associates degree programs.

Existing instructional and administrative facilities at Richard Bland College, some of which are scheduled for renovation at this time, will permit the expansion of enrollment from the 750 regular session FTE now enrolled (1988-89) to a total of 2,000 regular session FTE by the year 2000 with a minimal General Fund investment for new facilities.

This expansion would be accomplished in four phases beginning in 1992 and would require $7,500,000 in General Funds, at current costs, for construction of a Library in the 1994-96 Biennium and a Performing Arts/Classroom Building in the 1998-2000 Biennium. Supporting auxiliary facilities would be provided from private gifts, revenue bonds, and other Nongeneral Funds.

Phase I: 1992-94 Biennium

Renovate existing food service facilities	$200,000 NGF

Phase II: 1994-96 Biennium

Construction of Library	$3,500,000 GF

Phase III: 1996-98 Biennium

Renovate existing facility for expanded food service/student center	$600,000 NGF

Phase IV: 1998-2000 Biennium

Performing Arts/Classroom Building	$4,000,000 GF

Summary

Richard Bland College is and plans to remain a junior college that offers the first two years of general education requirements in liberal arts and sciences for students desiring to transfer to a senior institution to complete the baccalaureate degree.

The aforementioned statistics fully demonstrate that Richard Bland College, through special attention and a carefully cultivated learning environment, can and does prepare entering students with varying abilities to do well at Virginia's four-year colleges and universities.

With a minimal expenditure of General Fund dollars, by early in the 21st Century more than a thousand additional students each year could have access to and develop to their potential through the programs already in place at Richard Bland College.

APPENDIX G

NEWSLETTERS OF THE COMMISSION ON THE UNIVERSITY OF THE 21st CENTURY

WOODROW WILSON

COLLEGE

A proposal to establish a new college in Northern Virginia

A joint response to the Commission on the University of the 21st Century by the University of Virginia and Virginia Polytechnic Institute and State University

November, 1989

Woodrow Wilson College

A Proposal to Establish a New College in Northern Virginia

A Joint Response to
the Commission on the University of the 21st Century

by

The University of Virginia

and

Virginia Polytechnic Institute
and State University

November, 1989

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FOREWORD

This proposal responds to keen interest expressed during the past year by the Commission on the University of the 21st Century. In its draft report, released on November 15, the Commission addressed among other issues the prospect of enrollment growth and noted the proposals of several institutions to accommodate that growth. The report listed 10 specific criteria by which it believed such proposals might best be judged, presumably by the State Council of Higher Education for Virginia.

This proposal has now been reshaped to respond to those criteria. We believe it is highly responsive to the Commission's concerns in ways developed more fully in the text of the document. We wish, however, to indicate here in brief summary the ways in which we have addressed each of the criteria:

(1) *Planning should be done cooperatively.* This proposal is, in fact, the product of two doctoral institutions, partners in other areas, working very closely together and sharing hopes and ideas. The college that it describes would be a joint endeavor and would build upon the past and present collaboration, especially in Northern Virginia, of its two sponsors. Earlier versions of the proposal were shared with all the other Virginia public colleges and universities and have been thoroughly discussed in visits with the presidents of several.

(2) *Virginia should retain its commitment to institutions of moderate size.* A central premise of this proposal is that the creation of a new institution in Northern Virginia would be preferable to massive expansion of existing institutions there or elsewhere in the state. The enrollment we envision would be of the moderate size the Commission commends.

(3) *Undergraduate growth should occur in a diverse array of institutions.* The proposed creation of a new institution, drawing upon but quite different from its sponsors, would add a vital new element of choice for students in the region of greatest growth. Its programs would take into account the diverse population to be served, including substantial numbers of nontraditional students.

(4) *Growth should be accompanied by curricular improvement.* Innovative curricular offerings are at the core of the Woodrow Wilson College proposal, beginning with a diverse list of required areas of study reflecting a global perspective, continuing through a required field experience with emphasis on public service, and capped by an unusual certificate program. The curriculum at Woodrow Wilson College will be academically sound and relevant to the interests that will characterize the 21st century.

(5) *Growth accompanied by curricular improvement should receive greater funding than standard growth.* The innovative elements of the Woodrow Wilson College proposal will, quite naturally, require funding beyond that required to add enrollment to an existing institution. It is important to note, however, that thousands of new students will require similar facilities and personnel wherever they are located. Woodrow Wilson College will be optimally located and equipped for new students, while not having to bear fixed costs associated with older institutions. The costs will be higher for a new institution, but the margin of

difference is likely to be small and attributable mostly to the innovations in curriculum.

(6) *Institutions that do not plan to grow should develop proposals for curricular improvement.* Woodrow Wilson College will not eliminate the possibility of growth at the University of Virginia, but may represent the only growth, although indirect, that Virginia Tech can accommodate. Both senior institutions, however, will continue to examine their curricula and are likely to offer separate proposals for curricular improvement on their home campuses.

(7) *Proposals should place special emphasis on the education of minorities and women.* Both the University of Virginia and Virginia Tech are committed to the improvement of access to higher education for women and members of minority populations. This commitment extends directly to Woodrow Wilson College in several ways. Many of the nontraditional students that the new college will be designed to serve will be members of those categories. Consistent with the goals of the Commonwealth and the two senior institutions, the recruitment and admission program of Woodrow Wilson College will explicitly include components to encourage the enrollment of female and minority students, and the college's advising system, like those at the senior institutions, will devote special attention to the retention and success of female and minority students. Finally, the certificate program will offer special advantages to students whose academic careers have been interrupted or otherwise affected by nonacademic factors; such students will often be women or minorities.

(8) *Enrollment growth should consist primarily of Virginians.* The enrollment of Woodrow Wilson College is planned to be 90 percent Virginian.

(9) *Funding for growth should not occur at the expense of existing students.* The two senior institutions have predicated this proposal on the assumption that funding for Woodrow Wilson College would be separate and would not adversely affect funding for UVA or Virginia Tech operations.

(10) *Many adults need educational opportunities within commuting distances from workplaces and homes, and faculty should go to these students either electronically or physically.* The need to offer Northern Virginians another option for public higher education is a basic premise of the Woodrow Wilson College proposal. The new college will take advantage of electronic capabilities to bring faculty from UVA and Virginia Tech to Northern Virginia students, but Woodrow Wilson will maintain a substantial resident faculty whose primary concern will be the educational needs of the students in close commuting range.

EXECUTIVE SUMMARY

The University of Virginia and Virginia Polytechnic Institute and State University propose to establish a semi- autonomous, four-year college in Northern Virginia, Woodrow Wilson College. Projected to begin operation in 1997 when enrollment will begin to rise, the college will have about 5,000 students when fully operational eight years later. Student enrollment could thereafter increase if demand were sufficiently high and resources were available.

This proposal is in response to requests from the Commission on the University of the 21st Century to develop ways in which the state's leading doctoral universities can meet projections of greatly expanded enrollment in the state, especially in Northern Virginia. Current projections indicate that by the year 2005 there will be a dramatic increase (36 percent) in the number of freshmen in Virginia's public colleges and universities.

Built on a foundation of the time-honored traditional liberal arts education, the universities propose a distinctive curricular arrangement. Course offerings, while taught in the tradition of the arts and humanities, will include study areas unique to the needs of the region. A certificate attesting to an interdisciplinary study concentration will be awarded. A "field experience" or internship will be a fundamental element of the college experience.

Most students will be of traditional college age, but the curriculum, special study needs, scheduling, and site location will also be sensitive to the expanding needs of nontraditional students. Those who are pursuing an education on a part-time basis will have access to the educational opportunities afforded by Woodrow Wilson College.

Planning costs for the 1990-92 biennium are estimated to be $380,000. Fully operational educational and general costs are projected to be $26.7 million annually.

The substantial strengths of both universities — the overall quality of academic programs, the faculty, administration, library and computing resources, and telecommunications facilities—can be mobilized to start Woodrow Wilson College. Because both the University of Virginia and Virginia Tech have experience in forming and nurturing other state colleges, Woodrow Wilson can quickly and efficiently reach operational status.

I. INTRODUCTION

"I think by far the most important bill in our whole code is that for the diffusion of knowledge among the people. No other sure foundation can be devised for the preservation of freedom and happiness . . ."

— Thomas Jefferson

The University of Virginia and Virginia Polytechnic Institute and State University present this proposal in response to a charge from the State Council of Higher Education for Virginia and the Commission on the University of the 21st Century to evaluate ways to respond to projected increased demand for higher education in Virginia. Specifically, the Commission asked the universities to consider their roles in meeting expanding educational needs, particularly in Northern Virginia.

To help meet the forecasted needs, the universities propose to establish in Northern Virginia a new four-year institution, Woodrow Wilson College. The campus, projected to open in 1997, initially will be operated jointly by the University of Virginia and Virginia Tech.

This proposal is but one aspect of what must be a multifaceted solution to the projected enrollment growth in Virginia. Intended to complement solutions brought forward by other Virginia colleges and universities, the proposal presents a curriculum that includes the traditional liberal arts and is simultaneously responsive to the needs of modern society.

II. BACKGROUND

RESPONDING TO THE COMMISSION

On January 6, 1989, the Commission on the University of the 21st Century requested that the University of Virginia and Virginia Polytechnic Institute and State University provide information on their present and future roles in Northern Virginia. On March 6, the Commission was presented a joint report that outlined the history of both institutions' extensive activities in Northern Virginia and the current status of their instruction, research, and public service commitments.

Both institutions have had a significant presence in Northern Virginia since the 1940s. Both were founding members of the Northern Virginia Consortium, and continue to have an active presence in the area that reflects the responsibilities inherent in their statewide missions and obligations. The Commission asked the two universities to indicate how they might assist the Commonwealth in addressing the anticipated growth in the educational needs of Northern Virginia.

The two university presidents presented a second report to the Commission on August 21. The document outlined a general framework for the establishment of Woodrow Wilson College. This present proposal is an expansion on the second report, providing greater detail on the programs to be offered at Woodrow Wilson College.

ENROLLMENT GROWTH–THE LOOMING PROBLEM

The State Council has projected an increase of 6,200 in in-state freshmen enrollment at the Commonwealth's senior institutions by 2005, a growth of 36 percent over 1987 first-time freshmen in-state enrollments. This annual increase, sustained over four years, will add about 25,000 students to the Commonwealth's system of public higher education. This number exceeds the present total enrollment of the state's largest university.

Virginia's population has been growing at a rapid pace — far faster than the national average. And Northern Virginia presents a special, acute case. In the 1980s, Northern Virginia grew by more than 22 percent, twice the Virginia average rate. Projections show no sign of slowing. For example, Fairfax County projects a 27 percent increase in population from 1990 to 2010 to almost one million people. In the same period, the 15-to-19 age

group in Fairfax County alone is expected to increase by 16 percent to 64,077.

Rapid growth is but one unique characteristic of Northern Virginia: it also has a student population with special needs. For example, increasingly, business is moving to and expanding in Northern Virginia. Recently, major firms such as Electronic Data Systems and Mobil Oil Corporation moved their corporate headquarters there. People associated with these growth sectors have special educational requirements.

The Woodrow Wilson College concept addresses not only projected growth in enrollment demand, but also the changing profile and distinct needs of nontraditional students. Many of these students will be older. Some will experience financial limitations that will keep them close to work or home. And others will require continuing education opportunities that coexist with full-time employment.

A HISTORY OF HELPING IN NORTHERN VIRGINIA

Both the University of Virginia and Virginia Tech have been recognized as statewide universities. They have achieved national and international recognition in many fields. At the same time, they have identified distinct educational needs in Northern Virginia and have been conducting educational and public service programs in this growing area for the greater part of this century. A unique dimension of their offerings has been graduate degree programs for resident credit in shared facilities approved by the State Council of Higher Education.

Virginia Tech, through the Virginia Cooperative Extension, has been providing educational opportunities in Northern Virginia since the early part of this century, implementing its land-grant mission of instruction, research, economic development, and public service. Virginia Tech established the Northern Virginia Graduate Center in 1969 to assist in fulfilling its mandate to provide service statewide.

Today, Virginia Tech offers almost 300 courses and annually enrolls nearly 2,000 students at the Northern Virginia Graduate Center, where 43 full-time faculty members are stationed. The UVA/Virgina Tech televised graduate program reaches nearly 400 students in Northern Virgina alone, including many working professionals. Nearly 300 graduate degrees were conferred at the conclusion of the 1988-89 session. The Washington-Alexandria Center combines the expertise of five American and European universities addressing issues such as public-policy planning, urban design, historic preservation, and international development. Another Virginia Tech facility, the Marion duPont Scott Equine Medical Center near Leesburg, provides diagnostic and treatment facilities for more than 2,200 horses annually. Through the Occoquan Watershed Monitoring Laboratory, Virginia Tech monitors the quality of drinking water supply for 700,000 residents.

Virginia Tech's Northern Virginia programs illustrate the role of the contemporary land-grant university — to teach, conduct research, and provide service in urban as well as rural settings.

In addition to previous operations in Northern Virginia, the University of Virginia established an extension center there shortly after World War II to accommodate returning veterans. In 1959 the town of Fairfax conveyed a tract of land to the university for a permanent branch campus. That institution, then given community college status, is now George Mason University.

Today, the University of Virginia, through the Northern Virginia Center, offers four graduate degree programs and has an enrollment in credit courses of about 7,500 per year. The UVA Center for Public Service offers substantial service to Northern Virginia communities by assisting local governments and their governing bodies, training local elected officials and local government managers, providing services to public school teachers, and conducting civic education programs. The university conducts a liberal arts lecture series for the public and in-house training seminars for teachers in Northern Virginia. The university's School of Medicine in Charlottesville has ties with Fairfax General Hospital, where medical students take elective courses in order to experience urban emergency room situations.

A HISTORY OF EXCELLENCE

Virginia's system of diverse and independent colleges and universities is unusual in higher education, and its benefits are substantial. Each institution, with its unique strengths built upon proud traditions, provides a rich blend of educational

opportunities. It is fitting that both senior doctoral universities join forces to respond to the special challenge presented by statewide growth, the evolving nature and requirements of higher education, and the shifting demographics of college populations.

The University of Virginia and Virginia Tech have outstanding faculties and excellent students, and both universities have strong research programs. The cooperative nature of this proposal is an attractive feature of the Woodrow Wilson College concept. The forces of the two universities, each with a long history of service to the Commonwealth, will be synergized to meet future student population growth through a new campus. The combined strengths of both institutions will give Woodrow Wilson College the potential to become a very special institution, known for the quality of its teaching and its unique learning environment.

III. THE PROPOSAL

MODEL AND MISSION

This proposal draws upon a model that has been successfully used to establish a number of now free-standing institutions around the Commonwealth. Virginia Tech and the University of Virginia propose to follow this model to establish a new four-year college, Woodrow Wilson College. The model, especially configured to Northern Virginia, is based on the proposition that higher education should be available within the proximity of students' geographical locations.

Moreover, Virginia's educational leaders in state government and the General Assembly have consistently decided to foster small to medium-size colleges and universities rather than large mega-universities. Encouraging this multi-campus concept, the General Assembly created a system of branch colleges between 1917 and 1960. George Mason University, Mary Washington College, Radford University, and Christopher Newport College are several institutions that have evolved in this fashion. They are now thriving, free-standing universities and colleges.

Woodrow Wilson College will at first be an undergraduate branch college of the University of Virginia and Virginia Tech. It will be a fast-growing public college located near the nation's capital. Its declared mission will be the development of high-quality education for students at all stages of life, with a primary focus on undergraduate programs. Five thousand students will be enrolled in basic liberal arts degree programs. These programs will draw on the strengths of the two senior universities and are well suited to the expanding metropolitan environment of Northern Virginia. The school will feature a multidisciplinary curriculum that covers a focused range of study from urban problems to international relations. The size of the student body and the strength of the faculty will ensure an education that is both personal and intellectually challenging.

In sum, this proposal provides a traditional liberal arts education, but also seeks to go beyond tradition by addressing special needs unique to the area's students, businesses, governments, and communities. In addition, the curriculum will reflect the developing needs of higher education and society, each of which is experiencing change at an unprecedented rate.

STUDY AREAS

The curriculum will be organized around five basic divisions:

1. Arts and Humanities
2. Social Sciences
3. Natural and Mathematical Sciences
4. Business, Government, and Economics
5. Education

The divisions provide for course offerings and, in most cases, major programs of study in several areas:

Arts and Humanities

English, Foreign Languages & Literature, Philosophy & Religious Studies, Art, Music, and Theatre

Social Sciences

History, Anthropology, Geography, Sociology, Psychology, Communications Studies, and Urban Affairs

Natural and Mathematical Sciences

Mathematics, Statistics, Computer and Infor-

mation Sciences, Biology, Chemistry, Geology, Physics, and Environmental Science

Business, Government, and Economics
Business Administration, Public Administration, Accounting, Economics, and Government & Foreign Affairs

Education
Courses will be offered for teacher certification for students receiving degrees in the other four divisions. This program will be consistent with the nine guidelines issued by the Ad Hoc Committee on Teacher Education for restructuring teacher education in Virginia.

Degrees will be conferred under Woodrow Wilson College of the University of Virginia and Virginia Polytechnic Institute and State University.

UNIQUE STUDY CONCENTRATIONS

In addition to the traditional liberal arts component, students will be required to complete introductory courses in environmental issues, international programs, urban studies, and health affairs.

The curricular plan will stress the interconnected nature of the various disciplines. Furthermore, an interdisciplinary mix of study areas will be coupled to the special needs of the 21st century, as well as those needs unique to Northern Virginia communities. For example, waste management, urban highway impact, the global economy, and the need for specialized governmental structures are issues already affecting the northern region of Virginia. Programs at Woodrow Wilson will cut across the four basic divisions to emphasize areas such as environmental science, transportation, urban planning, international affairs, communications, public administration, tourism and hospitality, or international trade and economics.

Programs in these disciplines, which are already strong at Virginia Tech and the University of Virginia, will bring special qualifications to Woodrow Wilson's program. For example, students wishing to pursue specialized study in waste management could work in conjunction with Virginia Tech's Waste Policy Institute or the Center for Environmental and Hazardous Materials Studies. Students looking for an international business concentration could find experts in the University of Virginia's Tayloe Murphy International Business Studies Center or the Center for International Banking Studies, affiliated with the Bankers' Association for Foreign Trade.

Virginia Tech and the University of Virginia have many research and study centers that would be ideal for supporting the curricular offerings of Woodrow Wilson College as shown in the following table.

SELECTED UNIVERSITY CENTERS AND INSTITUTES

THE UNIVERSITY OF VIRGINIA
Tayloe Murphy International Business Studies Center
Olsson Center for Applied Ethics
Center for International Banking Studies
Institute for Environmental Negotiation
Center for Public Service
White Burkett Miller Center for Public Affairs
Center for South Asian Studies
Center for Russian and East European Studies

VIRGINIA TECH
Virginia Water Resources Research Center
Center for Hospitality Research and Service
University Center for Environmental and Hazardous Materials Studies Waste Policy Institute
Biobased Materials Technology Development Center
Center for Transportation Research
Center for Public Administration and Policy
Institute for Information Technology
Virginia Productivity Center

THE FIELD EXPERIENCE–SERVICE TO SOCIETY

The college will take the name of President Woodrow Wilson, who demonstrated a lifelong commitment to the principle that individuals should return to society a fair share of the fruits of their labor. In pursuit of this principle, Woodrow Wilson College will place a special emphasis on community service. An important part of this emphasis is the "field experience."

In the field experience, each student will participate in a semester-long internship that ties the theory of the classroom to the reality of the world beyond the campus. The experience, which will be closely supervised by academic officers, may include work with a variety of state and federal agencies, city governments, legislative offices,

public interest groups, legal aid societies, courts, social service agencies, businesses, newspapers, labor unions, and volunteer organizations. While most internships will be in Northern Virginia, placements can be throughout the United States and overseas. The field experience component will also allow students at Charlottesville or Blacksburg to participate in an educational experience linked with an urban environment. Selected students, through field experience participation, can personally observe and address problems associated with the heavily populated area of Northern Virginia.

INTERNATIONAL STUDY

Students will be able to spend one or more semesters abroad, earning academic credit. They will receive guidance from the University of Virginia dean of international studies and will have opportunities to participate in the Regent's College program, located in London and sponsored by the University of Virginia. In addition, there are 47 other study-abroad programs in 36 countries in which Woodrow Wilson College students may participate, in association with the University of Virginia Office of International Studies.

Virginia Tech also provides many opportunities for international study. Its International Studies Program offers an interdisciplinary approach to teaching students about foreign cultures and languages. The university's Educational Foundation recently purchased a facility in Lugano, Switzerland, for a European study center. And Virginia Tech also provides student exchange opportunities with about 70 universities in 30 countries.

RESPONDING TO MODERN NEEDS–THE CERTIFICATE PROGRAM

The curricular offerings anticipate the conferring of the time-honored B.A. or B.S. degree to successful candidates. In addition, students may earn certificates in selected interdisciplinary fields. Somewhat analogous to a minor (which specifies a second field of study) or graduate study (which reflects increased specialization) the certificate will indicate a specialization that cuts across several disciplines.

Students currently enrolled in an undergraduate program, as well as students already possessing degrees but desiring retraining or advanced training, can participate in the certificate program. Indeed, educators, businesspersons, and futurists have stressed the need for continuing education. The certificate program is designed to meet continuing learning needs.

Because of Woodrow Wilson College's emphasis on addressing current regional and national issues, students will be encouraged to pursue certificate study in environmental issues, international affairs, urban studies, and health affairs.

The degree programs, the curricular offerings, the field experience internship, and the course scheduling will be sensitive to the needs of the nontraditional student. These new students — business professionals, part-time workers/part-time students, career changers, women returning to the workplace, displaced workers — will require special consideration. Woodrow Wilson College will be responsive and hence will offer courses under a flexible scheduling concept from 8 a.m. to 10 p.m.

SPECIAL TECHNOLOGIES– THE CAMPUS OF THE FUTURE

Modern living requires technical literacy. The move to computerization and automation in all sectors of society demands an understanding of current technology. Woodrow Wilson students will have ready access to computer-assisted instruction, interactive television, electronic mail, digital transmission and storage of data, and of course, the personal computer.

An important advantage of this proposal is the ability of the new college to draw upon the considerable library, communications, and computing resources of the sponsoring institutions. Successful institutions of higher learning in the 21st century must take maximum advantage of new instructional technologies. Efficient use of technologies, such as interactive satellite-delivered television courses, will be an important feature of the educational program at Woodrow Wilson. Certain specialized instructional programs of an interdisciplinary nature will be more economical to produce in Blacksburg and Charlottesville and can be transmitted to the Woodrow Wilson campus. This modern, efficient transmission is another special advantage of the UVA/Virginia Tech sponsorship of this new Northern Virginia campus.

THE STUDENTS

Woodrow Wilson students will be comparable to students at Virginia's traditionally strong colleges and universities. The college will control its own admissions policy and standards. Enrollment for

the opening year in 1997 is projected at 1,797 (943 FTE) first-time freshmen and transfer students. By the eighth year total enrollment will reach 5,001 (3,665 FTE) students (see Appendix B). Enrollment projections are for general planning purposes. The ultimate size could be larger and will evolve as more data becomes available.

Working assumptions are that enrollments will be 60 percent full-time and 40 percent part-time. Approximately 90 percent of the students will be from Virginia. Transfer requirements will be especially hospitable to community college students and to nontraditional students. Initially 20 percent of the student body will live on campus in residence halls. This number will increase to 35 percent by the eighth year of enrollment. Summer session will begin in summer 1999.

THE FACULTY–THE FOUNDATION FOR QUALITY

Woodrow Wilson College faculty members will have credentials similar to those of their colleagues at Virginia Tech and the University of Virginia. Emphasis will be placed on excellent teaching. Academic deans and faculty members at the sponsoring institutions will be instrumental in the recruitment and selection of faculty members at the new college. In the early years of development, about 80 percent of the faculty will be resident. Ten percent will come from Blacksburg and 10 percent from Charlottesville, either through temporary assignments, shared arrangements, academic leave, or satellite delivery.

The faculty members of Woodrow Wilson will be expected to be proficient in their chosen disciplines and have superior classroom skills. They will also assume a significant advisory role in the guidance of students.

ADMINISTRATIVE STRUCTURE AND GOVERNANCE

The new college will operate on a semi-autonomous basis under the care of administrators from both universities and, in appropriate areas, local leaders. It will be governed by a board consisting of the presidents, chief academic officers, and chief financial officers from both the University of Virginia and Virginia Tech, as well as the rector of the board of visitors from each parent institution. Additionally, the governor will appoint to the board several members drawn largely from Northern Virginia communities.

Day-to-day leadership will be provided by a chancellor appointed by and serving at the pleasure of the board. Ultimately, the college will become fully independent and add to the fabric of higher education in Virginia.

COSTS AND FUNDING

Regardless of what solution is adopted, the Commonwealth will have to invest substantial resources to meet future enrollment demand in higher education. Consequently, Woodrow Wilson College, which represents an expansion of the baccalaureate instruction in the state, will be supported by incremental funding increases and appropriations from the General Assembly separate from those for Virginia Tech and the University of Virginia.

First-year educational and general (E & G) expenditures are estimated to be (in 1989 dollars) $2.1 million for faculty salaries and $6.3 million for total E & G operations. By the eighth year, total costs are estimated to be $26.7 million annually and cost per FTE will be $6,082. (Forward year resource requirements in constant dollars are shown in Appendix C.)

PROJECTIONS

	Regular Session		(In $1,000)
	Enrollment	FTE	Total E & G
1997	1,179	943	$ 6,306
1998	2,261	1,808	$11,287
1999	3,165	2,514	$16,355
2000	3,995	3,161	$20,935
2001	4,280	3,304	$24,046
2002	4,541	3,434	$25,029
2003	4,781	3,554	$25,918
2004	5,001	3,664	$26,743

Capital costs are estimated on a student FTE basis for E & G activities. The educational space requirement is estimated at 75 square feet per FTE student at a cost of $130 per square foot. Space costs for 5,000 headcount (3,665 FTE) students will be approximately $36 million. Auxiliary space costs will amount to an additional $34 million, assuming a cost of $28,000 per resident bed and other auxiliary support space for one-third of the headcount students. These figures are in 1989 dollars.

LOCATION

At the present time, it is premature to identify a specific location in Northern Virginia for Woodrow Wilson College. Site selection will require extensive consultation, negotiation, and review. The sponsoring institutions, however, will be acutely sensitive to the access by students, faculty, and staff; proximity to other institutions of higher learning; the concerns of business and industry in the area; and the location of new roads and arteries.

Following site selection, the universities will work in concert with local governments to minimize the physical impact on the surrounding community and to establish a campus in harmony with its neighbors. In addition, innovative public-private partnerships with developers may leverage Commonwealth resources and allow for the provision of land, infrastructure, site planning, and construction in a manner and on a time schedule that existing methods and procedures are not designed to accommodate.

IV. GRADUATE STUDY AND CONTINUING EDUCATION

Although Woodrow Wilson College is envisioned as an undergraduate institution, it will serve as a locus for the graduate, continuing education, and public service programs of the University of Virginia and Virginia Tech. The missions of both senior institutions have included for many years the provision of such programs at locations throughout the Commonwealth. Both institutions recognize their responsibility to address more comprehensively the needs of Northern Virginia's citizens, businesses, schools, and municipalities by expanding existing programs through their own graduate and continuing education faculty and their research and public service centers.

Each senior institution plans to expand its graduate and public service programs to bring further assistance in professional development to the Northern Virginia populace. The two universities will assist the region as it develops plans in such areas as economic development, transportation access, governmental cooperation, and other sectors of urban management. These programs will be offered from a number of Northern Virginia locations, including the Woodrow Wilson College campus, but will continue to be programs of the senior institutions.

V. THE NEXT STEP

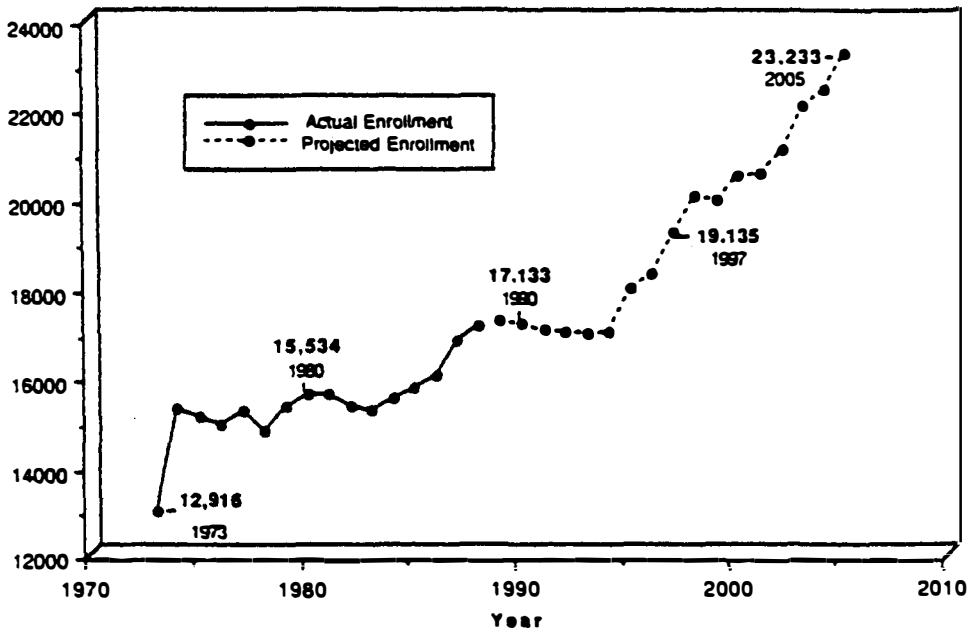
This proposal is but one option the State Council and the Commission on the University of the 21st Century should pursue to direct the future course of Virginia higher education. Woodrow Wilson College is not the only answer to future student population growth; rather, it is just one solution that should be considered with many other scenarios. However, this new college will fill an important educational niche by responding to the unique blend of requirements presented by Northern Virginia's demographics, culture, business, commerce, and environment.

Because of the long lead time required to plan for and undertake a project of this magnitude, the University of Virginia and Virginia Polytechnic Institute and State University strongly urge the Commission on the University of the 21st Century, the State Council of Higher Education, and the governor and governor-elect to endorse this pro-

posal and support its continuance by requesting planning authorization from the General Assembly in the 1990-92 biennium. Planning monies for staff and operations in the amount of $380,000 are requested for the coming biennium (see Appendix A).

If planning is approved to begin in 1990, Woodrow Wilson College can readily achieve a 1997 startup. That is the year that the number of high-school graduates is projected to return to the 1987 level, after a decade of decline and gradual recovery. After that, projections soar. Moreover, it is important to note that any new educational initiatives, whether a new or branch campus or an expansion of existing campuses, will require substantial appropriations. Using this time in the early 1990s enables not only comprehensive planning and substantial public input, but also delays substantial appropriation decisions until a time when the growth of the state economy may better sustain increased spending on higher education.

Enrollment of in-state, first time freshmen in Virginia's four-year public institutions



TIME LINE

1990-92 Biennium
1. Request planning authorization to proceed with Woodrow Wilson College
2. Hire first administrators
3. Prepare capital funding proposal

1992-94 Biennium
1. Prepare comprehensive proposal
   - Curriculum
   - Facilities
   - Location
2. Request renewed authorization to proceed
3. Establish the college and governing board

1994-96 Biennium
1. Obtain SCHEV approval of degree and certificate programs
2. Identify core administrators and core faculty

1996-98 Biennium
1. Hire faculty and staff
2. Establish and implement admissions procedures
3. Enroll students
4. Inaugural opening, Fall 1997

1998-2004 Biennia
1. Continue to hire faculty and staff commensurate with enrollment
2. Continue to respond to enrollment demand

2004-06 Biennium
1. Achieve target enrollment

VI. CONCLUSION

The University of Virginia and Virginia Tech have a history of directing programs in Northern Virginia, the result of their mandated statewide missions. Both have also been instrumental in starting up other thriving colleges and universities. The combined experience of the two institutions and their leadership in the Commonwealth in academic and research programs will ensure a sound footing for the new college. University of Virginia and Virginia Tech administrators, academic officers, faculty members, and professional and technical staff members will be readily available to provide guidance as the new college builds administrative and support systems.

The establishment of Woodrow Wilson College is consistent with Virginia's healthy tradition of senior universities nurturing new institutions. The new college will be an innovative and cost-efficient organization with carefully focused programs that are backed by the strengths of the Commonwealth's leading doctoral universities.

Woodrow Wilson College will be the product of cooperative planning by the University of Virginia and Virginia Tech, as well as the State Council of Higher Education and the Commonwealth's other institutions. In keeping with the Commonwealth's tradition of outstanding colleges with moderate enrollment, Woodrow Wilson College will help address major increases in college-age population, offsetting the need to increase radically the sizes of existing state universities. At the same time, the new college will represent a new educational opportunity in the Commonwealth's higher education spectrum, with distinctive programs that combine aspects of the liberal arts curriculum with special features reflecting the special nature of the modern urban environment.

Appendix A

Woodrow Wilson College

Resource Requirements Planning Activities

1990-92 Biennium

	1990-91	1991-92	Biennium Total
Positions			
Professional–CY Admin. Faculty	1.0(a)	2.0	
Staff–Secretary Senior	1.0(a)	1.0	
Subtotal Positions	2.0	3.0	
Salaries	$67,482	$174,650	$242,132
Fringe Benefits	22,364	43,736	66,100
Total Personal Services	$89,846	$218,386	$308,232
Ongoing Operations	18,200	26,700	44,900
One-time Startup Expense	18,500	8,000	26,500
Grand Total Resource Requirement	$126,546	$253,086	$379,632

(a) Assumes position will be filled in Sept. '90.

Appendix B

Woodrow Wilson College

Forward Year Resource Requirements
Projected Enrollments

Programs	Opening 1997	2nd Year	3rd Year	4th Year	5th Year	6th Year	7th Year	8th Year
Headcount Enrollment								
-Regular Session								
Academic Level 1	1,002	1,370	1,370	1,370	1,370	1,370	1,370	1,370
Academic Level 2	0	552	890	1,200	1,200	1,200	1,200	1,200
Academic Level 3	177	242	748	748	1,033	1,294	1,294	1,294
Academic Level 4	0	97	157	677	677	677	917	1,137
	1,179	2,261	3,165	3,995	4,280	4,541	4,781	5,001
FTE Students								
-Regular Session								
Lower Level	802	1,537	1,706	1,861	1,861	1,861	1,861	1,861
Upper Level	141	271	808	1,300	1,443	1,573	1,693	1,803
Total Regular Session	943	1,808	2,514	3,161	3,304	3,434	3,554	3,664
-Summer Session								
20% of Regular Session			503	632	661	687	711	733
Total FTE Students	943	1,808	3,017	3,793	3,965	4,121	4,265	4,397

Appendix C

Woodrow Wilson College

Forward Year Projections

($'s = 000's and stated in 1989-90 economics)

Projected Resource Requirements

Revenue Projections

	Opening 1997	2nd Year	3rd Year	4th Year	5th Year	6th Year	7th Year	8th Year
General Fund	$4,414	$7,901	$11,449	$14,655	$16,832	$17,520	$18,143	$18,720
Non General Fund	1,892	3,386	4,906	6,280	7,214	7,509	7,775	8,023
Total	$6,306	$11,287	$16,355	$20,935	$24,046	$25,029	$25,918	$26,743

Expense Projections

FTE Positions

Faculty	61.6	109.8	185.8	240.1	253.1	264.9	275.7	285.7
Classified	48.5	83	115.7	146.6	160.1	165.6	170.7	175.4

Dollars

Genl. Acad. Inst./Acad. Support	$3,218	$6,179	$9,566	$12,550	$15,148	$15,905	$16,592	$17,230
Libraries	523	723	893	1,056	1,091	1,125	1,152	1,177
Student Services	777	1,282	1,769	2,216	2,320	2,416	2,503	2,584
Institutional Support	980	1,486	1,972	2,419	2,523	2,619	2,707	2,788
Oper. & Maint. of Plant	808	1,617	2,155	2,694	2,964	2,964	2,964	2,964
Total	$6,306	$11,287	$16,355	$20,935	$24,046	$25,029	$25,918	$26,743

Computation of Tuition Requirement

	Enrollment Factor	Tuition Policy	Tuition Requirement
In-state Enrollments	90%	.25	
Out-of-State Enrollments	10%	.75	
	100%		30%

Appendix D

WOODROW WILSON COLLEGE

Forward Year Projections

($'s = 000's and stated in 1989-90 economics)

Projected Resources -- All Programs

	Opening 1997	2nd Year	3rd Year	4th Year	5th Year	6th Year	7th Year	8th Year
Current Fund Revenues	$10,489	$20,043	$27,907	$35,128	$37,027	$38,805	$40,374	$41,844
Current Funds Expenditures and Transfers								
Educational & General	$6,306	$11,287	$16,355	$20,935	$24,046	$25,029	$25,918	$26,743
Scholarships/Fellowships	0	1,097	1,662	2,180	2,305	2,420	2,525	2,622
Auxiliary Enterprises	2,544	4,880	6,831	8,622	9,236	9,800	10,318	10,793
Sponsored Programs	0	361	547	717	758	796	831	862
Total	$8,850	$17,625	$25,395	$32,454	$36,345	$38,045	$39,592	$41,020
Net Current Funds Revenues Less Expenditures	$1,639	$2,418	$2,512	$2,674	$682	$760	$782	$824

Issue One
Demography and Democracy

Commonwealth of Virginia
Commission on the
University of the
21st Century

At its meeting November 23,1988, the Commission on the University of the 21st Century heard presentations on economic, demographic, access and equity issues that may affect Virginia higher education into the next century.

Changes are occurring that have profound implications for Virginia's colleges and universities, said James M. Alessio, director of research and information systems at the State Council of Higher Education. The number of births in Virginia has increased by 23 percent since 1978. This "baby boom echo" will result in continued growth in the number of births well into or through the next decade.

By 2005, the number of public high school graduates probably will grow by nearly one-third. The number of Virginians who finish high school now is twice the number that finished in 1950. In addition, Virginia has experienced a steady in-migration of highly educated people to meet the demands of a growing economy.

Alessio explained that this translates into a probable increase of over 6000 new, first-time, full-time freshman at Virginia's public four year colleges and universities. That represents an increase of over 35 percent. How the "baby boom echo" will affect community colleges, graduate and professional schools, and private colleges is more difficult to assess. Community college enrollment patterns have been more variable in the past. More part-time students may enroll as well, seeking retraining and renewal in light of shifting professional and personal needs.

"We could assume," said Commissioner Joshua Darden, "that our graduate and professional schools will play an important role in meeting the state's growing needs for advanced education, research, and technology."

The Commonwealth's population growth has been accompanied by economic prosperity, reported Roy L. Pearson, director of the Bureau of Business Research at the College of William and Mary. With the 10th highest per capita income in the United States, Virginia has an economy that is growing faster than the national average. Pearson forecasts that it will continue to do so into the next century.

"Jobs and income can be expected to grow for the next 20 years," said Pearson, "and more people will be attracted to the opportunities the state has to offer."

Many of the people who have migrated to Virginia in recent years are highly skilled workers, brought here by businesses in need of their talents. Many have brought families with expectations of participating in a full spectrum of educational, social, and cultural experiences.

But Virginia's economy has boomed more in some regions, than in others. Northern Virginia, the cities and counties between it and Richmond, and the Charlottesville area each showed more growth in personal income than did the state as a whole.

Pearson forecast exceptional economic growth over the next 20 years. "A fiscally sound state government can continue to finance the infrastructure for growth," said Pearson. "And the service sector provides research and development opportunities, information-communication services, tourism and travel industries, health care, consulting and transportation."

Virginia's service sector is not entirely dependent on the federal government for support, although the state will surely feel the effects of actions taken to eliminate the federal budget deficit.

Growth and general prosperity should not mask particular areas of need. While there is economic expansion in the Northern Virginia-Richmond-Tidewater crescent, stability or decline is occurring in many other places. Moreover, within the crescent and without, socially and economically disadvantaged populations still exist. Helping them to realize their full potential and to become productive citizens must be a priority of higher education in the future.

University of Virginia professor of commerce and education Charlotte H. Scott raised fundamental issues of access to higher education and equitable income distribution. Noting that unfair income distribution may indeed stem from problems of access to higher education, she called for more focus on equity.

"Excluded from the benefits of higher education, disadvantaged students become caught in a cycle of failure that can threaten democracy," said Scott.

Commissioner George Rainsford pointed to a growing pool of blacks graduating from high schools who are not taking advantage of college. Also, while 19 percent of Virginia's citizens may have a college degree, 22 percent have been classified by the Department of Education as functionally illiterate.

"Any disadvantaged student who might benefit from higher education should have the opportunity to become socially functional and economically productive," said Rainsford, who is president of Lynchburg College.

Scott called for higher education standards and levels of student achievement even as we seek equity. Over half the jobs created between 1984 and 2000 will require some

education beyond high school, she noted. "We must prepare Virginians for this requirement."

"We should enrich educational possibilities throughout Virginia's schools," added James Dyke, commissioner and member of the Virginia Board of Education. "From preschools through higher education, we must lay the groundwork for a cycle of success. It is a matter of economic necessity to increase the educational attainment of Virginia's students."

Future meeting dates and topics are as follows:

January 6	To What End: Learning How To Learn
March 6	Business and Higher Education
May 1	Knowledge and Self
June 23	Blueprints for Organization

From 1693 to the present, the Commonwealth of Virginia has benefited from higher education. Thomas Jefferson saw that a strong and democratic society required an educated citizenry and designed a university where such learning might be accomplished. Successive generations of Virginia governors, legislators, educators and citizens have maintained a vision of education for democracy amid the challenges of the times in which they lived. Over the years, Virginia's colleges and universities have served at once as a gateway to new frontiers and a bridge for travelers across the times.

Today, as in the past, Virginia's institutions of higher education have many opportunities for service. The 21st century brings with it profound changes in the ways we think, work and live. We know that we participate in an international economy and must be sensitive to other ways of perceiving and understanding the world. We also must recognize the diverse ways in which people learn.

Preparing people to work as citizens toward the best ends of a free society is perhaps higher education's most important task. We try to ensure access for all who can benefit from higher education, to create and manage new technology, and to shape colleges and universities that can help our children's children learn what they need to know and be able to do in the early years of the next century.

To address such challenges, Governor Gerald L. Baliles appointed the Commission on the University of the 21st Century and charged the commissioners to think boldly about the future of Virginia higher education. Calling attention to Virginia's changing population and rapid economic development, Governor Baliles asked the Commission to consider what Virginia's response to the issues of the 21st century might be, saying, "I think the best way to predict the future is to create it."

The members of the Commission have developed a plan to

fulfill their responsibility. Our initial meetings will involve briefings and discussion on topics deemed central to the future of Virginia higher education. At the most recent meeting, our theme was "Demography and Democracy." You will find a summary of that meeting in this newsletter. During December and early January the Commission held public hearings throughout Virginia, seeking to hear from the people what they deem important in conceiving a direction for higher education.

Finally, in addition to its own meetings and public hearings, the Commission is sponsoring a series of colloquia for faculty members of Virginia's fine colleges and universities, both public and private.

We envision colloquia on understanding change in the humanities, on scientific methods of knowing, on graduate and professional education and several other important topics. Each of these colloquia will be organized by faculty from one or more institutions. They will inform the Commission's work and serve to stimulate discussion among faculty across the Commonwealth.

The Commission's agenda is full and its time is short. We have begun our deliberations in the eager spirit of our charge and look forward to the challenges of the coming months. We shall report periodically through this newsletter as we create a vision for Virginia higher education in the 21st century.

Joan S. Jones, Chair
Commission on the University of the 21st Century

Issue Two
To What End:
Learning How to Learn

Commonwealth of Virginia
Commission on the
University of the
21st Century

"Excellence" and "quality" are fashionable terms in discussing higher education. "They are seldom defined and yet they imply a set of values that people act upon daily," said Alexander Astin at the January 6 meeting of the Commission on the University of the 21st Century.

Astin, who is director of the Higher Education Research Institute and a professor at the University of California, Los Angeles, talked about what he calls the "implicit curriculum" in today's colleges and universities: what students learn from the ways we teach, organize and administer higher education. He noted that judgments about excellence in higher education usually are based upon institutions' reputations or the resources at their disposal. These criteria create a hierarchy and competition among institutions, and students learn that they can only win as individuals if others lose.

"Reputational criteria equate excellence with an institution's position in the hierarchical pecking order, which we quantify by doing surveys like those seen in national magazines," said Astin. "Resource criteria equate excellence with such things as freshmen SAT's, the endowment and amount of research funding, faculty salaries, and the size of the library."

The two definitions are mutually reinforcing: having more resources influences reputation and a good reputation garners more resources. These definitions also parallel the materialistic values of our society, suggested Astin, where individual worth and quality of life are measured in material possessions. Neither addresses the central mission of most colleges and universities, which is or should be developing students' talents.

As an alternative, Astin proposed "a talent development view of excellence," which "emphasizes the educational effect of an institution on its students." The most excellent institutions would increase students' knowledge and personal development the most."

Astin thinks that there are two different world views that influence contemporary social issues and related educational issues: the competitive and the cooperative. Many of the dilemmas confronting higher education might be more clearly defined within this competitive-cooperative framework.

For example, reputational definitions of excellence foster competition among colleges and universities for ever-higher places in the pecking order. Similarly, resource definitions encourage institutions to vie with each other for students, faculty, and funding. Even within institutions, people approach the resource acquisition game with a mind toward gaining larger shares than their

colleagues of limited funds, facilities, equipment, and the like.

"Criteria of excellence involving talent development describe institutional success in terms of the common purposes all institutions share in seeking to maximize the educational and personal development of students," suggested Astin. Here, one institution's success does not diminish another's, as institutions learn from each other by sharing information on successes and failures. Even business has been talking more of late about cooperation. Helping employees learn to work cooperatively toward common goals is a feature of the effectively managed team in business and industry. "Being a productive team member who can work cooperatively with coworkers is a basic skill that general education ought to develop in students," said Astin.

Unfortunately, the implicit curriculum in higher education today does not encourage teamwork. Debates among faculty over what should be required in a curriculum frequently are resolved by carving up the curriculum into fiefdoms that reflect the power (resources) of departments. Cooperation is absent in the delivery of a curriculum as well, as core courses are required with little regard to a student's individual talents, goals, needs, or accomplishments. "Our core is less designed to develop talent than to settle territorial disputes," said Astin. "This competitive emphasis is further reinforced by grading systems that rank students relative to one another. Testing has pitted student against teacher, when students view the teacher as someone to be manipulated for a good grade rather than as a trusted ally in a learning process."

Likewise, when faculty evaluation produces a rank ordering of people and their work, faculty personnel policies are denying the value of good colleagueship. Institutional rewards accrue to those most successful in promoting their own status and visibility while scant recognition goes to colleagues who contribute to the welfare of their students, peers, or the institution. Astin, who has been conducting surveys of freshmen since 1966, contended that we can and must move toward more cooperative approaches to higher education if we are to take students beyond the materialistic, self-serving values many espouse today in survey after survey. By examining the way we teach our classes and treat our students and colleagues, we can shape curriculum decisions, planning activities, indeed the fabric of institutional life.

Taking a complementary stance, Peggy McIntosh, associate director of the Wellesley Center for Research on Women, drew from her work in Women's Studies as she spoke to the commission about collaborative, interactive approaches to learners and to global education. She said that the strength of American higher education lies in the breadth of

students who pursue advanced study and who go on to productive lives as a result. McIntosh stressed the need for cooperative classroom ventures that engage diverse kinds of students in subject areas of their own choosing. Especially where science or technology, for example, might be the choice of a population group not traditionally well-represented in these fields, McIntosh said that we must make an effort to help new kinds of students to these fields succeed.

"What if the cure for AIDS or the solution to the Middle East crisis is in the mind of a woman or a black, an Asian or Hispanic, whose potential we do not seek to realize?" asked McIntosh. "We need the help of all the good minds we can cultivate in the days ahead."

McIntosh outlined what she called the "interactive phases of personal and curriculum revision" that could be applied to integrating many kinds of knowledge in existing curricula. Noting that we need to recognize the partiality of extant curricula, she emphasized the need for continuing education of faculty.

"Policy that calls for investment in faculty development is central to building the collaborative processes required of institutions over the next 100 years as they seek to integrate diverse learners and their ways of knowing the world into our education systems," said McIntosh.

McIntosh also described the difference between success that is defined by competitive top-down, win-lose approaches to accomplishment and success that is defined by the cooperative daily maintenance activities required to "weave the cultural fabric of society."

"The vertical ladder that people climb on their way to success has very little room at the top," explained McIntosh. "Curriculum, teaching, literature that only depict people and events at the peaks of this competitive activity leave vast expanses of human experience unrecognized and undervalued." More importantly, learners realize in subtle but explicit ways their experience of life is not reflected in a curriculum. Students know how a society values them and what roles they are expected to play as they engage literature, teachers, and institutions that reflect a particular view of the world. "We know that there are multiple views, many existences that operate at the same time," said McIntosh. "Curricula must mirror these existences if we seek to embrace the full potential of many kinds of students." McIntosh's phases of curricular revision include five interactive stages, any of which might be present at a given time. Using teaching and learning styles as an example, she explained how one might work toward involving students as the subject of learning, rather than as the object of teaching. In stage one, the teacher

is the authority who talks, while the students listen. This authoritarian approach is effective only in limited instances where the subject matter is appropriate to an information-delivery style. In stage two, the teacher brings along certain star students to illuminate perspectives sanctioned by the teacher. This stage causes great student disaffection among those not deemed to be stars or those whose perspectives are left unexplained and unacknowledged. Stage three allows students to have their say, but in an adversarial fashion and with the teacher still in control. In stage four a significant shift occurs as each person relates his or her own experience to the material being studied. Teachers and students alike listen for the many ways of knowing, for the "plurality of voices." "Stage five," said McIntosh, "is education reconstructed and redefined to use all of our capacities for teaching and learning." People need to find themselves mirrored in the curriculum, explained McIntosh. The United States has many cultural perspectives to acknowledge. If an aim of higher education in the 21st century is to create global understanding, the curriculum must expand along broad, inclusive multicultural lines. "Certainly we will read and teach the great works of civilization. But we will read them differently as we learn alternative ways of seeing, being, and knowing," said McIntosh. "When students and teachers arrive at this point of 'constructed knowing,' they will have acknowledged their own contribution to shaping the universe of knowledge."

The information explosion and the emergence of electronic-based information technologies during the latter decades of this century are profoundly affecting the ways in which data are gathered, information is transmitted, and knowledge is assimilated. With extraordinary speed and precision, the new technologies support the observation and analysis of data, the creation of aural, graphic, and textual works, and the editing, publication and preservation of anything in electronic format. Moreover, the new technologies break the barriers of time and place by affording instantaneous access to a network of diffuse information resources. But at some cost. The computer provides remarkable assistance to the process of intellectual creativity. It also influences it. Word-processors permit lengthy documents to be drafted quickly and edited easily. But this facility influences style, just as the evolution of the lengthy, complex sentences in Victorian prose literature has been attributed to the fountain pen. In addition, the capacity for continual textual revision destroys the evidence of the creative process. Had computers existed a century ago, the manuscript of Joyce's "Ulysses," the three versions of Bruckner's eighth symphony, Picasso's study sketches, and the working drafts of the Atlantic Charter might not.

The proliferation of data makes it possible to create new knowledge, not just to do more quickly what used to be done with paper and pencil. Key word textual searches give scholars access to far more literature than they could have explored earlier. Scientific observations of thousands or millions of events per second make possible knowledge that is different not in degree but in kind. This proliferation also changes the way in which knowledge assimilated and transmitted within the academic community. The modern academic library is evolving from a repository of information to a central source of information about information. It is a place, but it also is the nerve center of multiple networks that provide access to data banks all over the world. We should expect the archival, repository functions to diminish in relative importance as electronic information technology becomes ubiquitous. In the past, the library's holdings have been carefully selected by faculty and bibliographers to comprise well-balanced and reliable collections for study and learning. This quality control is largely absent in the electronic environment. In the electronic database, unlike the library stacks, the writings of the Nobel laureate may share equal place with those of the idiot savant. A new and pressing challenge to the faculty is to nurture the discriminant judgment of the student in using these new resources. Perhaps the biggest danger posed by the new technology is its potential to create a two-class society based on ability to access information resources. Information published in a book can be passed from hand to hand and read by any literate person. But literacy alone is not sufficient for use of the new electronic information resources. Large portions of the world do not have reliable electric utility service, much less the equipment necessary to link to information networks. In addition, information technology is expensive, and today the costs are borne by end-users. We need to find ways to make electronic information resources available to all citizens as a matter of public policy.

-John E. Molnar

Next meeting: March 6, 10 a.m.-4 p.m., Senate Room A, General Assembly Building, Richmond. The topic is Business and Higher Education.

Issue Three
Business and Education

Commonwealth of Virginia
Commission on the
University of the
21st Century

Business and Higher Education

Generalists who are well-versed in languages--English and other spoken tongues, computer languages, and mathematic and scientific notations--will be in high demand in the coming years, proposed J. Carter Fox and Philip A. Campbell to the Commission on the University of the 21st Century. Heading a panel discussion on "Business and Higher Education," the executives also called for special efforts to save the young people who fall through the cracks of our educational systems as they ultimately wind up in the workplace lacking the basic skills for productively functioning in today's world.

"Once thought of as the three R's, today's basics must encompass much more," said J. Carter Fox, chief executive officer and president of Chesapeake Corporation and chair of the Virginia Business Council. Leading off the discussion, Fox suggested that the basics include good communication skills: speaking, writing and listening. Central to Virginia's future economic development is a broad knowledge of foreign lands, languages and cultures among employers, employees, customers and vendors.

"Computer skills, interpersonal skills, and reasoning and generalizing skills are other basics," Fox said. Managing tomorrow's businesses will require flexibility and a willingness to continue learning over a life-time. The rapid pace of change and increasing technological sophistication demand no less.

"We've found that many of the people we hire today have good technical skills and excellent ideas, but are unable to communicate well with customers, suppliers, and fellow employees," reported Fox. Moreover, as the work force is increasingly organized in teams, team members must understand their colleagues even as they attempt to be understood. Flawed communication and lack of understanding can lead to anxiety, distress, and poor working conditions within companies.

"What we need is more college graduates who are in touch with the real world. We should explore more business-higher education partnerships so that students can learn the practical aspects of business and modern business techniques," concluded Fox. "Furthermore, I believe that a solid arts and sciences undergraduate education helps instill in people the ability and willingness to learn and continue to learn throughout their lives. Colleges and universities must embrace and form better alliances with community colleges, secondary schools, business and institutions to educate, train, and re-train citizens broadly in the years ahead." Philip A. Campbell, vice chairman and chief financial officer for Bell Atlantic, elaborated on this theme: "The 1990s will be a white-knuckle decade for business due to the need to adjust to the

changing face of the work force, 80 percent of whose new entrants will be women and minorities; the globalization of business and the economy; and the increased use of computers and other technologies in daily life."

The arrival of the information age signals a shift in the way managers must behave as well. Organizations will have half the number of levels and managers they have today, Campbell predicted.

"Look to a symphony for an analogy," said Campbell. "At once every organizational player will be a specialist (artist) and responsive to the chief executive officer (conductor) and the total production. Where the work calls for it, a small ensemble might perform in lieu of the whole company. To accomplish this, more collegial behavior must inform the knowledge-based organization of the future."

"As decisions are pushed to all parts of an organization that is located in several places," explained Campbell, "people engaged in the increasingly varied work of a firm must be comfortable with flexible organizational structures, skilled in problem-solving and interpersonal relations, and able to communicate across cultures. Since the static chain of command is disappearing, higher education needs to adopt an approach to teaching that allows students to embrace evolving forms of interaction more readily."

Three eminent journalists agreed with Fox and Campbell, but added distinctive twists to the discussion. Edward B. Fiske, education editor for the NEW YORK TIMES, concurred that flexibility, sophisticated thinking skills, and learning to learn are predominant themes for educational reform from pre-school through higher education.

"These themes run through every institution in the industrialized world today," said Fiske. "The global economic order is forcing decentralization and down-sizing from the United States to the Soviet Union to Japan. Around the world, change is in the air and more rigid systems of higher education, like those in Japan and the Soviet Union, will have worse problems than American higher education should in accommodating shifting needs."

Companies take education seriously, often providing the opportunity and the financial support for employees to acquire a college degree at the workplace. If special needs exist, many companies will establish their own educational programs to meet the requirement or will contract with another institution to do it. In some instances, colleges and universities have provided this service.

Some of the contemporary, corporate education effort is aimed at changing the way managers and other workers relate to each other on the job. Fiske suggested that the

qualities being developed today in the new corporate manager resemble those that teachers need to assume. Neither teachers nor managers should be viewed as the source of knowledge. Rather they need to function more as coaches of teams.

"The strengths of the American higher education system must not be ignored," said Fiske. "We educate an enormous number of people from all walks of life. We attract thousands of foreign students to our doors. In addition, we have great diversity among types of institutions. From the community colleges to land-grant institutions our capacity for continuing education is great."

The relationship of higher education to other institutions in our society needs attention. In particular, the role of elementary and secondary education in setting the stage for life-long learning and to higher education should be emphasized, and colleges and universities should take a more active role in improving the public schools. The reform effort currently underway in American education is like perestroika in the Soviet Union: major restructuring is called for.

Outmoded industrial models for analyzing and solving problems will provide few, if any, relevant answers for an information age, argued Fiske. "New models involve a transformation based on interdependent systems. We need to strengthen education schools, for example, and find ways to educate kids that the system has never reached. We have labor shortages and unemployment at the same time. So we must curb the school drop-out rate and prevent the emergence of an underclass, unfit for work. The crises we see in many of our social systems connect to higher education at some point."

Theodore J. Marchese, executive editor of CHANGE magazine, added that American higher education does well with high ability students and high ability schools.

"We don't do a good job with average students and average schools," said Marchese. "Most elementary and secondary schools are not set up to teach the average student skills in communication, analysis, problem-solving, or teamwork. As a consequence, 80-90 percent of high school graduates are not prepared for college mathematics, and 40-50 percent are not prepared for reading and writing in college."

The "university of the 21st century" in Virginia, Marchese suggested, might be an elite undergraduate college for average students where there are high expectations, progressive levels of attainment, and no drop-outs.

"You don't get a high-performing college such as this by

changing one or two things in the institution," said Marchese. "Reorganization might be around small cluster colleges; where faculty are organized around tasks rather than disciplines; where the hiring and rewarding of faculty is different; where students negotiate contracts for certain outcomes undertaken through collaborative approaches to learning. In the next century Virginia may need smaller, human-sized college units, organized for certain tasks and held accountable for results."

Kay Mills, editorial writer for the LOS ANGELES TIMES, called for special attention to the educational needs of minorities and women, saying, "We must encourage people regardless of race, ethnic background or gender to realize their full potential."

Mills zeroed in on the particular efforts needed to save young people whose potential might be lost to American society if business and education cannot intervene successfully. At this time, neither the education nor the corporate sector attends to women and minorities sufficiently, said Mills. As they continue to enter our institutions in increasing numbers, we must be careful not to try to press people in either group into existing molds. We need to examine the current mold for the marks it leaves even as we seek to learn how women and minorities might shape the enterprise.

"For example, for every business started by a man today," Mills reported, "four are started by women. And the womens' businesses tend to be more flexible structurally and functionally. We might learn something from these women, since flexibility is much sought-after in many places."

Business can and should insure women and minorities of advancement, at a more rapid pace than heretofore achieved. Business can also support higher education through endowments with fewer strings attached and through active participation in higher education, as with internships, practitioner fellowships, and other cooperative efforts. Business leaders can use their influence with governors and legislators to persuade them of higher education's needs in the information age. "Similarly, higher education must be more involved in its own service to the public," concluded Mills. "Colleges and universities must look to new people, programs, and pedagogy that blend and reconcile the needs of a different student body and a different society than that currently perceived by the majority of our institutions."

Recommended Background Reading:

Alan D. Bloom, The Closing of the American Mind
E. D. Hirsch, Cultural Literacy
George D. Kub and Elizabeth J. Whitt, The Invisible Tapestry
Jaroslav Pelikan, Scholarship and Its Survival
Rushworth M. Kidder, An Agenda for the 21st Century

Next Meeting: "Knowledge and Self" May 1 10:00 a.m.-4:00 p.m. Senate Room A of the General Assembly Building
Speakers: Parker Palmer, Evelyn Fox Keller, Edward T. Hall

Issue Four
Knowledge and Self

Commonwealth of Virginia
Commission on the
University of the
21st Century

Knowledge and Self

As part of its continuing series of public meetings, the Commission on the University of the 21st Century heard presentations by three scholars interested in how higher education contributes to the formation of the human self; how scholars -- especially scientists -- typically conceive of knowledge; and how the complexity of human communication makes multi-cultural education both difficult and critically important. Addressing the commissioners were Parker Palmer, former executive director at Pendle Hill, a Quaker study center, a former faculty member, and now an independent scholar; Evelyn Fox Keller, professor at the University of California at Berkeley; and Edward T. Hall, emeritus professor at Northwestern University.

Questioning the common assumption that there is such an activity as "pure science," Evelyn Keller suggested that there was no such thing as science that is detached, unaffected by emotion, biases, politics, or the social and cultural environment in which it occurs. She argued that the questions shaping basic research in such fields as genetics might already imply the development of eugenics, just as original conceptions of nuclear physics probably anticipated explosive power.

Keller also rejected the notion that science is supposed to pursue the truth and let the social consequences of its work be determined by others in public and private life. Science is value-laden, as everything else is.

Scientific theories, she argued, are tools and, as such, neither mirror reality nor correspond to it. These tools are useful, but the effectiveness of their use depends on how people act upon them. Moreover, the world of what Keller called "residual reality" is vastly larger than any theory or set of theories.

Scientific stories are like other stories human beings tell about themselves and the world in which they live, but with a difference: scientific stories "work." The question, Keller asked, is "what does science work at?" This is a question that should involve the entire body politic, and not just the scientific community itself.

Recalling the old saying that "education is too important to be left to the educators," Keller suggested that the same is true of science. She suggested a curriculum in which the study of science -- its philosophy, history and sociology --is a necessary component of general education for all students.

Keller further urged that there be places in the university of the 21st century in which science is studied in depth as one of the most important of all modern human activities --with the greatest potential for good, as well

as the greatest potential for ill. She suggested that there might be centers for the study of science in which the presuppositions, implicit frameworks, assumptions and agendas could be brought into focus as a matter of public policy.

We have literary criticism, art criticism, film criticism, but we have no such thing as science criticism in either our science curriculum or in our public discourse. Keller urged that this deficiency be remedied. She also observed that, in her experience, undergraduate curriculum reform most often fails because the sciences prove intractable, being either unwilling or unable to change. She rejected the conception of science and scientific method as fixed, immutable and dictated by a reality, "out there." To re-vision science, Keller concluded, we must understand how science really works and what it works at.

Parker Palmer began his presentation by suggesting to the commission that "every way of knowing tends to become a way of living." He then went on to explore ways in which the assumptions about what knowledge is and what it means "to know" something shape the behavior of students in our colleges and universities.

Palmer criticized the notion that knowledge is a kind of commodity that exists in and of itself, independent of the knowing person, as if it were a canned good on a supermarket shelf: the same no matter who bought it or when, or for what purpose. He also found fault with the model of knowing that he called "objectivism," which sets the knowing human being over against and separate from the object being known.

To illustrate the differences between two kinds of knowing, Palmer told a story about William and Mary in its early days. In 1693, William and Mary's charter explicitly stated one of the College's responsibilities as seeing "that the Christian faith may be propogated amongst the Western Indians." In attempting to realize this mission, the College ultimately convinced some local chiefs to send their sons to study, promising "to teach them to read, write, and all other arts and sciences, that the best Englishmen's sons do learn." The school for Indians did not work out as expected, however, as the chiefs became increasingly reluctant after a while to send their young sons to such a school. As one chief put it when declining to send more young boys from his tribe, "When they came back to us, they were bad runners, ignorant of every means of living in the wood, unable to bear either cold or hunger...were therefore neither fit for hunters, warriors, nor councilors; they were totally good for nothing." With perhaps a touch of irony, the chiefs suggested that the English farmers send them a number of their sons to be educated in the ways useful to native American culture. The colonists of course declined.

Drawing upon work presented earlier to the commission by Alexander Astin, Palmer cited survey results in which students said that the world was going to get worse but that they would prosper because they were going to good schools that were preparing them to be successful in life. He suggested that it was possible for the students to offer two apparently incompatible answers because they had been taught to make a total distinction between themselves and the world: it was possible, in other words, for the world around them to get worse and for their lives to get better. For obvious reasons, Palmer stated, the students are wrong. It is not enough just to teach students logic. He suggested that higher education also examine ways of knowing, as every way of knowing tends to become an ethic and thus a way of looking at and being in the world.

Palmer cautioned against a typical higher education response that he called "add-a-course." This is an easy response, he said, because there is no reason for anyone to give anything up and no need to integrate the curriculum. But this solution serves also to dilute resources-money, staff, and most of all, student and teacher energy.

Palmer urged that the university of the 21st century merge student services (now the domain of subjective personal development) and instruction (now the domain of intellectual, supposedly objective development). The two cannot exist without each other, he argued, and ought never to have been separated in university organization. Again, the way in which institutions operate and are organized conveys a lesson to students: hold the two parts of yourself away from one another.

Palmer also asked that the university be reconceived to ensure that learning is not a "spectator sport" with students sitting passively, taking notes, and watching an instructor at the head of the class. In this he echoed the earliest of the recent reports on higher education, Involvement in Learning, whose authors suggested that students be made active participants in their own educations rather than passive receptacles into which knowledge is poured. He joined other persons speaking before the commission in advocating that teaching be made more important in the reward system for faculty, figuring more prominently as promotion, tenure, salary increases, leaves, and other personnel decisions are made.

One way to encourage good teaching, Palmer concluded, is to designate selected senior faculty as master teachers. The master teacher would help younger faulty and graduate students develop teaching skills and learn how to be successful and productive as faculty members.

Shifting gears to address other aspects of our culture and cultural change, Edward T. Hall said that we are now

entering the "age of the ethnics and ethnicities." The era of kings and the class systems associated with monarchies ended, for the most part, at the close of World War I, when we entered a period of ideologies.

"This was a period of dogmas, bureaucracies, procedures, images, and icons," said Hall, "and it was a highly judgmental era. Information and power flowed from the top down."

In today's growing ethnic movement, Hall suggested top-down power no longer works, and ideologies are beginning to collapse. Questioning established authority is an international phenomenon. As a result, the 21st century faces serious problems of intercultural communication, within and among nations.

"We must learn to communicate with each group we encounter at their 'real' level of communication," said Hall. "This involves the nonverbal aspects of culture as much as the verbal, if not more."

Hall argued that learning to deal effectively with people of other cultures involves far more than learning to speak and read foreign languages. Verbal communication probably constitutes only 10 percent of all the communication that goes on in a culture. It is very important, therefore, that American students have opportunities to study abroad and that Virginia's colleges and universities welcome students from other nations and cultures to enrich the learning of the entire academic community. Courses about other cultures-their histories, economies, social structures, religious beliefs and practices-should be part of the modern college and university curriculum.

Hall also pointed out that different cultural approaches to time and space can pose enormous difficulties in communication. For example, some cultures emphasize schedules, orderliness, and promptness, while others are more comfortable with everything happening at once. Hall asked the commissioners to imagine two cultures, in one of which business is transacted in discretely timed appointments behind closed doors, while in the other business is transacted in a large room where many people interact with little regard to the sequence of events. Students should be prepared for such differences, or they will find themselves both distressed and unsuccessful in global, multi-cultural business relationships.

People view words, relationships, and printed messages differently from one culture to another. There are cultures that do not like to write contracts because of a basic distrust in words. To these people, words are for appearances, while the real meaning of a message is derived

more from nuance, from behaviors exhibited and relationships formed. This, of course, has implications for an electronic age where people can choose to send messages by letter, telephone, telex, or fax machine. Cultures will prefer different media because of their ability to convey nuance.

It is important for conversationalists in any situation-regardless of the subject (love, business, science)-to get to know each other well enough to realize what each person is and is not taking into account, Hall explained. Where one person might find a pat on the back acceptable and even welcome, another might take it to be aggressive and offensive.

Hall emphasized the complexity of cultural literacy. He agreed with those who argue for its importance, but suggested that careful attention be paid to the non-verbal dimensions of culture. He concluded by urging that Americans learn to be truly literate not only in their own culture but in those of others throughout the world.

Next Meeting, June 23rd, Blue Prints for Organization

Issue Five
Blueprints for Organization

Commonwealth of Virginia
Commission on the
University of the
21st Century

Blueprints for Organization

"Can higher education stay awake on a full stomach?" Patrick Callan asked the Commission on the University of the 21st Century. Acknowledging that he echoed the sentiments of others, like John Gardner, who are posing this question nationally, Callan joined Donald Schon, Ford professor of urban studies and education at the Massachusetts Institute of Technology, in urging the commissioners to help create the conditions that will foster the changes required for learning in the next millennium.

Taking a theme heard at earlier commission meetings, Schon began the discussion by saying that higher education must prepare students to meet more effectively the needs of the world in which they live. But the dilemma of achieving either rigor or relevance has posed a stumbling block to colleges and universities in meeting these pressing needs.

"Imagine a high, dry cliff where people can study things rigorously," explained Schon. "That cliff represents the university. Over time, it is possible to feel that rigor is being applied to more and more trivial matters. There is a swamp below, moreover, where it is hard to be rigorous, where the crucial problems of any age swirl around. In this swamp, people must abandon rigor to provide solutions with any relevance to life."

Schon said that the university is based on a particular conception of knowledge which he called technical rationality. This concept assumes that knowledge is fundamentally scientific and that practice only becomes professional when it is based on science.

"The professions paid a price when they came into the university," said Schon. "They had to accept a curriculum in which the basic science of the profession was taught first, then applied. Then a practicum was offered as a culminating experience. There was a separation of research and practice as practice is notoriously uncontrollable and thus outside the requirements of rigorous research. The consequence today is that political science has little to say to politicians and economics offers limited practical knowledge to business managers.

Recently people have become more aware of what we call indeterminate zones of practice, Schon explained, where uncertainty and conflict prevail. How do we train people to be effective under these conditions?

There is, for example, uncertainty in the setting of a problem. A person might have the technical knowledge to build a highway, but not know where to place it.

"Framing problems is an artistic phenomenon" said Schon,

"not a technical one."

What kind of knowledge is built into practice? When people do things well, what do they know? Schon said that when we try to put practical knowledge-like how to ride a bicycle-into words, we cannot. There is a tacit knowledge, a knowing in the action.

"Doctors learn theory-based knowledge in medical school," said Schon. "But they learn to practice in hospital wards. Likewise, lawyers learn to practice law, not in law schools, but in the courtroom."

Schon urged the commission to consider the use of the studio experience, a reflective practicum that is a tradition of professional education dating to the 16th and 17th centuries. It involves learning by doing: doing along side of others who also do; and learning in the presence of a coach. This studio experience allows for a virtual world of practice where students can work with low risk and low cost and can pace themselves according to need.

The limitations of the reflective practicum are twofold: science is not used, since theory is not applied; and there is little relationship to the humanities, as problem-framing is not learned. Problem-framing is taught in history, in the classics, in literary criticism, but usually is not brought into the studio. Hence, architects could come out of a studio experience with little knowledge of how to place a building in relation to the sun and wind.

Schon proposed a new way of looking at knowledge that would require reform at the graduate and undergraduate levels. He suggested that reflective practica should be built into the university or that universities should be built around reflective practica to allow students to integrate life's practices with university programs. By intertwining field careers with the academic, questions of what happens in the world can be better related to questions of how a model works.

"To do this," Schon said, "the coach's role must be more important and central. Also, the sciences and humanities should be deployed around the practicum, becoming the background as the practicum moves to the foreground of learning experiences."

The obstacles to such reform are many and powerful. The incentive system of the university supports technical rationality. The department provides a rather inflexible political structure for disciplines that, in turn, are difficult to cut across with new approaches to learning. Because the university promotes individual accomplishment, collective action is also difficult. All of this is masked by a surface cordiality that obscures the obstacles and

makes them more difficult to deal with.

Tenure is also hostile to reform, Schon added, because it is the primary incentive vehicle through which the university expresses itself. While tenure has been a safeguard of free inquiry, it may be possible in the future to safeguard this critical value without tenure by designing institutional programs to assure due process in hiring and firing.

Addressing himself to systems of higher education, Patrick Callan said that Virginia is the only state that is trying to look at higher education for the next millennium in a profound way. The recommendations of the commission are therefore being anticipated by educators not only in Virginia but across the nation.

"Remember one paradox as you work," suggested Callan. "Those systems that regulate most, fail most. Systems need to have a healthy balance between the tensions of state control and the forces of the marketplace."

The reason for supporting highly decentralized systems with relatively autonomous institutions is that public needs are best served in this way. With this model, for example, American higher education has been able to move from elite to mass education with a minimum of difficulty.

"There are enormous pressures to improve education as an economic strategy," said Callan, "and there is greater pressure for American higher education to be more centralized in the espoused interest of quality of education." But, he went on, there is no evidence that increased central control results in improved education.

Higher education needs to be focusing instead on the greater diversity of students, higher expectations about what students need to know, and how to handle the explosion of knowledge. These are questions to be addressed by the institutions and the systems of education simultaneously.

Callan agreed with Schon that the research university model dominates the incentive system of higher education. Many state master plans place the research university at the top of a pyramid, allowing it to do what it wants, and then limit the other kinds of institutions by defining what they cannot do. In doing this, a narrow set of universities is used as a model for all with the added effect of restricting the definition of scholarship.

"What do we want 21st century colleges and universities to do?" asked Callan. "Decide what institutions can and should do, then create the kind of leadership required to effect the change."

Risk-takers are needed on the faculties and in the administrations of colleges and universities, but a high degree of control does not encourage risk-taking. Higher education needs powerful presidents and powerful boards who take risks together, empowering each other and the institutions they represent.

"Be wary, too, of the notion that bigger is better," said Callan. States with massive institutions, like California, responded too late and without vision to enrollment and other pressures and went well beyond any economies of scale that size might have produced.

"Nationwide, we are doing a poor job of putting the students at the center of learning. School reform is not being influenced by research. We need incentives to encourage higher education to cooperate with elementary, middle, and high schools as well as post-secondary institutions. Arrogance in academe often gets in the way of such cooperative ventures."

The competitive grant approach to incentives can encourage change, suggested Callan, if institutions have adequate basic support. Citing Virginia's Funds For Excellence program as a good example, he urged the commission to consider identifying areas for incentive grants, while leaving the institutions free to choose whether they might propose initiatives.

"In setting the agenda for the 21st century, higher education should be careful not to promise more than it can do," said Callan in summary. "The times call for sophisticated leadership using existing resources to accomplish the educational reforms required by this age of change. These reforms will benefit other aspects of society. But higher education should not be viewed as the sole agent of economic, political, social or cultural change that society desires."

Issue Six
The Case for Change

Commonwealth of Virginia
Commission on the
University of the
21st Century

The Case for Change in Virginia Higher Education

Virginia and Her People

The basic question for higher education is this: "How can Virginia cause constructive and fundamental change to occur within its colleges and universities so they will be ready to meet the demands of 21st century life?" We ask the question with a sense of urgency not because enrollments will soon swell in the Commonwealth's colleges and universities, but because the world's social and economic orders are changing at an unprecedented pace. We are not certain what shape the changes will take. Yet we firmly believe that education is the key to helping Virginia's citizens adjust and thrive amid change.

Population Growth, New Centers of Commerce, and Access

The population of Virginia will continue to increase and so will enrollment in higher education. Undergraduate enrollment could grow by as much as 30,000 by 2004. New centers of commerce will accompany the population growth, primarily in the crescent from northern Virginia through Richmond to Hampton Roads. The new population and industry will need additional higher education services. But as it seeks to provide them, Virginia should not forget the needs of other regions of the state that will not directly benefit from new centers of wealth.

Providing Opportunities

Too many Virginians remain unserved by higher education. Their lives would be more productive and fulfilled if they possessed better skills and were more broadly educated. They also will make greater contributions to society. The Commission supports Virginia's commitment to the principles of equal educational opportunity and to encouraging the individual initiative necessary for a well-educated citizenry. Our citizens need basic literacy: the ability to read, write, and compute. But they also need more advanced skills: the ability to think through problems, to analyze various options, and to communicate effectively. Since acquiring these skills best begins in early childhood, cooperation across levels of education is necessary.

Global Perspectives

Our lives are inextricably linked to those of people in other nations, culturally, politically, and economically. Our standard of living depends upon our success in foreign commerce. we can understand ourselves and our society only in the context of the global environment.

This year, Virginia companies will do about $7.7 billion in business abroad. To be able to work successfully in this

international arena, students need a global perspective--a way of looking at things--that will allow them to communicate with others whose view of the world may differ from their own. They need to know the languages, histories, religions, art, and customs of other cultures to deal directly and effectively in an international marketplace where conflicting ideologies and national aspirations may inform events. Teaching and learning in graduate, undergraduate and occupational-technical programs need to be reshaped to reflect a full range of human experiences.

Technology in Society

We and our children live in a society in which technological sophistication is the difference between success and failure. Modern technology enables us to create information, to manage complex systems, and to expand the universe in which we live. Now we must decide how we want to take advantage of technology while avoiding its pitfalls. Students should be technologically literate and they should have the thinking skills to discern how they want to use technology for good in their lives.

Technology in the University

Regular and interactive television, computer-assisted instruction, electronic mail, digital data transmission and storage -- all will affect how teaching and learning occurs within colleges and universities. The ways in which technology is incorporated into teaching and learning could increase instructional quality and personal contact between faculty and students, but also could undermine them. New approaches to faculty advising and individualized instruction will be important complements to computer-assisted and televised instruction for students.

As technology removes the constraints of time and space on instruction, architectural distinctions among classroom and laboratory buildings, libraries, student centers, residence halls and faculty offices will blur. Already, for instance, libraries have become central nodes in complex, electronic information networks, to which access within and among institutions is essential. Thousands of data bases exist that can assist in learning and research. This is a time of rich opportunity for libraries in which they can become true learning centers.

Research

Research is an engine that drives the economy through basic discoveries and application. Virginia's colleges and universities, part of the 11th largest system of higher education in the nation, rank 20th in sponsored research volume in the nation. Strong research universities are essential to Virginia as it transforms its economic base

from agriculture and basic manufacturing to advanced technology and information service industries. Research is also central to raising and examining the pressing economic, social, political and cultural questions that confront us.

The Aging Faculty

The present faculties are aging, there are insufficient numbers of potential new faculty preparing in graduate school, and minorities and women are under-represented across the board. Between 2000 and 2010 as many as half of the 8,724 faculty members now employed at Virginia's colleges and universities will retire. The nation's major universities need to prepare more people to enter the academic profession. They will need additional support, especially for graduate student fellowships, to do so. Particular attention should be paid to increasing the number of minorities and women in the faculties.

Renewing the Faculty

In order to keep abreast of rapid changes in the disciplines (and in the gaps between them), to present global perspectives in the curricula, to use technology more effectively, and to work constantly on the quality of their teaching, Virginia's faculty members will need more opportunities for professional renewal and development. As in any profession in which conditions are changing dramatically, faculty need both time and resources to learn new skills and gain new perspectives on their work.

Academic Organization

Some forms of academic organization hinder changes that are needed in the curriculum. Academic departments, for instance, set the requirements for the degree programs in which students enroll. They often control tenure, faculty promotion, salary increases, teaching assignments, travel opportunities, and laboratory and office space. Institutional rewards for working outside established disciplines are few and professional opportunities often are limited for faculty who choose to work in the regions between the established disciplines. Yet some of the most interesting problems lie in these regions because the actual dilemmas that confront human beings do not come neatly labelled by department. For example, the study of population growth issues requires that ecological, political, social, religious, and economic influences be considered.

The University's Message

There is considerable confusion about higher education's role in society. The great need for financial support from the private sector, emphasis upon involvement in economic

development, stress upon training a workforce that has basic skills, efforts to convert research and scholarship into intellectual property -- all have given rise to questions as to the proper role of the university in contemporary American life. Clearly that role has changed and is changing further as colleges and universities enter into new partnerships that are essential to their research and instructional mission, but nonetheless call into question their role in society.

What is higher education's role in dealing with the deep social problems of our times? There are many to solve: drugs; poverty; crime; homelessness; the absorption of new immigrant populations whose traditions do not include participatory government; great difficulties in public school education; an aging population; the cost and availability of health care; the loss of civic responsibility among individuals and corporations. It would be arrogant to claim that higher education can solve these problems, (an error that was made in the 1960's). Yet it is irresponsible to ignore them. What higher education can do immediately is provide leadership in bringing about the educational reforms required for people to ready themselves to begin thinking about solutions.