

4G. THE ROLE OF THE LIBERAL ARTS

The role of the liberal arts actually increases in importance as the knowledge economy grows. While at first glance the knowledge economy requires specialized skills, especially in science, math and technology, it actually most prizes employees who have strong critical thinking and problem solving skills; who have effective communication skills; who have the ability to work in collaborative teams; who have intellectual curiosity; and who can not just make a living but be productive citizens and contributing community members. As someone once said, "Education is what's left after you have forgotten everything you have been taught."

The knowledge and skills of the liberally educated graduate of higher education have also become more valuable because, unlike in previous eras, most graduates will have multiple careers and will work with technologies yet to be invented. Thus those entering the knowledge economy must have a high degree of flexibility and the ability to be lifelong learners. They must also have a sensitivity to the demands of operating within a global society and economy. For these and other reasons, it will be crucial that the preparation of the future workforce not just be considered a vocational enterprise, but rather a total education challenge. As the earlier analysis shows there is an increasing demand for employees who have the so called "soft skills."

Fortunately, both the NCCCS and the UNC have made a strong commitment to the liberal arts in their academic programs. UNC institutions have a wide-range of liberal arts majors, most of which produce significant numbers of graduates. Of greatest importance, though, are the general education core requirements in both systems. Both systems have extensive general education/core requirements. Furthermore, a number of states have helped ensure the transferability of general education courses between the two systems. Statutes in the 1995 legislative session led to considerable activity in 1996, resulting in an agreed upon transferable general education core. This core is portable and transferable as a block across the Community College system and to all University of North Carolina institutions, as long as the student has at least a 2.0 GPA and a C or better grade in each core course. However, there is not a comparable block transfer of a general education core among University of North Carolina institutions.

The associate in arts and associate in science degree programs in the NCCCS require a total of 64-65 semester hours credit for graduation. Of these credit hours, 44 represent the general education transfer core. These include study in the areas of humanities and fine arts, social and behavioral sciences, natural sciences and mathematics, and English composition.

The course distribution for the general core for Community Colleges is as follows:

English Composition (6 Semester Hours Credit)

Humanities/Fine Arts (9-12 Semester Hours Credit)
Four courses from at least three of the following discipline areas: music, art, drama, dance, French, German, Italian, Russian, Spanish, interdisciplinary humanities, literature, philosophy, and religion. At least one course must be a literature course. (3 SHC in Speech/Communication may be substituted for 3 SHC in Humanities/Fine Arts. Speech/Communication may not substitute for the literature requirement).

Social/Behavioral Sciences (9-12 Semester Hours Credit)
Four courses from at least three of the following discipline areas: anthropology, economics, geography, history, political science, psychology, and sociology. At least one course must be a history course.

Natural Sciences/Mathematics (14-20 Semester Hours Credit)
Natural Sciences (8 SHC): Two courses, including accompanying laboratory work from among the biological and physical science disciplines.
Mathematics (6 SHC): At least one introductory mathematics course (college algebra, trigonometry, calculus, etc.) must be selected; the other unit may be selected from among other quantitative subjects, such as computer science and statistics.

The specific courses used to fulfill the requirement in each of these areas are identified by each Community College as meeting its own general education requirements. The courses are drawn from those courses designated in the North Carolina Community College Common Course Library as being appropriate as part of a general education core transfer curriculum.

The UNC institutions do not have as much uniformity in their general education requirements as do the Community Colleges. Total credits required range from 36 at the School of the Arts to 45 at Chapel Hill. These include courses in the following categories: English; Speech; Foreign Language; Humanities; Literature, Philosophy/Religion; Fine Arts; Social Science, History, Western Civilization, World Cultures; Science; Math; P.E.; and Other. Within these categories, the institutions vary considerably in their requirements. While all institutions have requirements in English (mostly 6 credits), Math (from 2-8 credits), Humanities (from 3-18), Social Science (from 3-21), Science (from 2-14), only six institutions have requirements in Speech, eight in Foreign Language, twelve in Fine Arts, and thirteen in P.E. These variations may help explain why the general education core does not automatically transfer from one UNC institution to another.

Both the Community College and University general education core are very traditional in nature, with a menu of course possibilities distributed over a number of general academic discipline categories. While it is noteworthy that the Community College general education core transfers to UNC, that core was largely developed in 1996 so it has been almost a decade since it was reviewed. Furthermore, proponents of a contemporary general education program suggest it ought to be built on defined skills and knowledge with a clearly articulated set of expectations for the student rather than just a large number of course options. They also suggest that certain skills (such as the ability to work in teams) and knowledge (such as the role of technology in modern society) be incorporated into the general education core.

PRELIMINARY FINDINGS

1. Both NCCCS and UNC institutions have significant requirements in the Liberal Arts.
2. The general education core from the Community Colleges transfers as a block to other NCCCS institutions and to all UNC institutions.
3. The general education core varies considerably from one UNC institution to another.
4. The general education core does not transfer automatically from one UNC institution to another.
5. The NCCCS general education core was largely developed nearly a decade ago and has not undergone a comprehensive review and revision since then. The increased demand for "soft skills" at all levels may also suggest the need to reexamine the role of general education in applied associates degrees, especially as they serve more students who will later seek other degrees.

6. Neither the NCCCS nor the UNC institutions' general education core has a clear articulation of its aims or of the skills and knowledge required. Furthermore, it is not clear that there is sufficient emphasis on developing the "soft skills" in either the general education curriculum or other areas of the curriculum. This has important implications for the preparation of the workforce in a global knowledge economy.

The centrality of the liberal arts in preparing the workforce for a knowledge economy must be reaffirmed. There is every indication that cross-discipline knowledge and skills will be vital preparation for the jobs of tomorrow at every level. From students earning a Ph.D. in science, there will be a significant need for employees with both technical knowledge and "soft skills." This is equally as true for those with Associate of Arts degrees. As the management guru Tom Peters said, "Victory in the brain-based, global economy will go to the perpetually curious." The liberal arts, at its best, creates such lifelong curiosity and inventiveness.

4H. THE ROLE OF HISTORICALLY MINORITY INSTITUTIONS (HMI'S)

The UNC has six of its 16 campuses identified as "Historically Minority Institutions" (HMI's); five of these (Elizabeth City State University, Fayetteville State University, North Carolina A&T State University, North Carolina Central University, and Winston-Salem State University) are Historically Black Colleges and Universities (HBCUs). This is an unusually large proportion of the total number of public institutions in the state. These six institutions enrolled a total of 33,682 students (18.9% of the UNC enrollment up from 16.1% in 1999) and awarded 4,636 degrees in 2004 (3,773 bachelors, 835 masters, 28 doctorates). This represents 12.98% of the degrees awarded in the UNC. Of the minority students attending the UNC institutions, 52.6% attend the six HMIs.

These institutions have a long history, with the oldest (Fayetteville State University) being founded in 1867 and the "youngest" (North Carolina Central University) opening its doors in 1909. They tend primarily to serve full-time (ranging from 91% at North Carolina A&T to 77% at UNC Pembroke), majority female (ranging from 68% at WSSU to 52% at North Carolina A&T), and predominantly non-white (ranging from 95% at North Carolina A&T to 49% at UNC Pembroke) students. They have relatively high freshman to sophomore retention rates (ranging from 78.2% at North Carolina Central University to 67.2% at UNC Pembroke). None of them has a six year graduation rate above 50% (ranging from 46.5% at North Carolina Central University to 34.9% at Fayetteville State University).

The changing demographics of the state, with minority population growth projected to be above the national average, further increases the centrality of the HMIs to the growth of the state's economy as does the growth of their programs for all students. North Carolina and its University system have recognized this and have implemented such programs as the "focused growth initiative." This program was established in 1999. One of its primary goals was to continue the historic access for students in North Carolina by disproportionately growing enrollment at those campuses with excess capacity. Seven of the 16 UNC institutions were included (the six HMIs and Western Carolina University, which serves a rural area of the state). Referenced in Attachment 5 of this report as Appendix 4.H.1, is a report on the focused growth program.

The "focused growth" program has received several recurring funding allocations from the legislature (\$10M in 1999; \$2.3M in 2000; \$11M in 2002-03) as well as one-time funding from the legislature, including special funding managed from the Office of the President. In addition, these institutions benefited, disproportionately, from the millennium bond program, receiving \$580M for new facilities. The resulting increases in enrollment earned \$69M in enrollment growth funding.

These unprecedented investments have allowed the focused growth institutions to, among other initiatives, add 66 new academic degree programs including 29 masters, and 3 doctorates. More academic programs are in the planning stage. Special emphasis has been placed on adding academic programs that respond to regional and state needs. In this time period over half the new bachelors degrees approved in the UNC were at these institutions, as well as over a third of the masters degrees.

Enrollment has increased substantially at these institutions. Between 1999 and 2004, their enrollment increased 36.3% (ranging from 72.4% at Winston Salem-State University to 11.5% at Fayetteville State University). During that same period, the total UNC enrollment increase was 17.8%. In the same period (the first five years of a two-phase ten year plan), research and sponsored program grants among the HMTs more than doubled from \$45.3M to \$119M.

The academic program array for the HMTs is extensive.

- North Carolina A&T, as one of the state's two land grant institutions, has programs through the doctoral level. Its programs include engineering, arts and sciences, agricultural and environmental sciences, business and economics, education, nursing, technology, and graduate studies. It has over 10,000 students and a graduate enrollment of approximately 1,300. It awarded 1,240 degrees in 2004.
- North Carolina Central University has a total enrollment of over 7,000 and a graduate enrollment of approximately 1,700, and its programs include arts and sciences, business, education, library and information sciences, and a law school. It awarded 956 degrees in 2004.
- Elizabeth City State University has recently been approved for a joint program in pharmacy (with UNC Chapel Hill); it has predominantly undergraduate programs with over 2,400 students. It awarded 363 degrees in 2004.
- Fayetteville State University has over 5,400 students, including approximately 1,000 graduate students, mainly in masters programs, although it also has a doctorate in educational leadership. It has undergraduate programs in business and economics, education, humanities and social sciences, and basic and applied sciences. It awarded 778 degrees in 2004.
- UNC Pembroke, with a total enrollment of just over 5,000 students, offers degrees up through the masters level in arts and sciences, business, and education. It awarded 742 degrees in 2004.
- Winston-Salem State University, with a total enrollment of over 4,800 students, also offers degrees up through the masters; it has a relatively young graduate school. It has undergraduate programs in arts and sciences, business, education, and health sciences. It awarded 557 degrees in 2004.

As the matrix below indicates, the HMIs offer a substantial number of programs, at both the bachelors and masters level, that produce graduates in the projected high growth areas.

	ECU	FSU	NCAT	NCCU	UNC-P	WSSU
Acct	B	B	B	B	B	B
Bus.	B	BM	BM	BM	BM	BM
CPS	B	B	BM	B	B	BM
Education	BM	BMD	BM	BM	BM	BM
Electr. Eng	-	-	BMD	-	-	-
Nursing	-	B	B	B	B	BM
Clinical Psych	-	-	-	-	-	-
Social Work	B	M	BM	B	B	B
SP/Lang Path	-	-	-	-	-	-
Chem	B	B	BM	BM	B	B

PRELIMINARY FINDINGS

1. The HMIs have benefited enormously from the focused growth initiative, taking considerable advantage of the opportunities presented them. They have been transformed in size, in range of academic programs, and in facilities in a remarkably short period. While the investment has been substantial, the returns already appear to justify both the dollars and commitment to these institutions. Other states have attempted to strengthen their HMIs, but it is hard to imagine any program that has been more successful than this one.
2. The HMIs have not all managed to take equal advantage of the focused growth program (some have more challenging environments than others). For example, the rate of enrollment growth has a very wide range, not all of them have added academic programs that will be in high demand, and the increase in funded research has not been uniform.
3. The HMIs have experienced an unprecedented growth in academic programs, both at the bachelors and masters level. Most of these programs have been in high demand fields. For example, nursing, biotechnology, MBA, and computer science all received focused growth planning funds at Winston-Salem State University; all four of these programs have been identified as high state need programs by this study.
4. The HMIs have put special emphasis on academic programs in the sciences, where there are likely to be overall shortages and where minorities are traditionally seriously underrepresented, yet where increasingly the best employment opportunities are to be found in the knowledge economy.

5. The HMIs are critical to the economic future of the state. Not only are minority (and immigrant populations) increasing at a rate above that of whites (this growth is above the national average in North Carolina, although much of the projected increase is Hispanic), but also these institutions are assuming an increasingly important role in addressing the overall enrollment and economic development needs of the state.

6. The HMIs have considerable ambitions to continue to add new academic programs. This is understandable given their success to date. They are, however, experiencing some challenges as a result of the rapid growth, including managing the faculty recruitment and orientation process and managing infrastructure growth at the same time. Budget and tuition limitations may also impact their ability to secure additional programs, especially those that are high cost programs. Thus the selection of additional programs will need to be paced appropriately and selected strategically, especially as it relates to responding to demonstrated high occupational needs.

5. PRELIMINARY GAP ANALYSIS: STATE NEEDS/ACADEMIC PROGRAMS

This gap analysis section focuses primarily on the identified occupational areas with the greatest projected growth (See Section 3.A) and those emerging areas that may see increased demand (See Section 3.B). In the case of the former, the projections are largely based on data from the Labor Market Information (LMI) Division of the Employment Security Commission of North Carolina, except in teacher education and nursing, where statewide supply/demand reports supplemented the data and in engineering where a NCHEMS supply and demand report was prepared for the system. In the instance of the latter, regional economic development plans and specific industry group plans are examined in conjunction with the ECS data.

For most of the information presented in this section, the UNC and the NCCCS are treated separately. In a few areas where it seems logical to do so, the two systems are treated together.

5.A. PROJECTED HIGH DEMAND TRADITIONAL OCCUPATIONS REQUIRING BACHELORS, MASTERS, OR DOCTORATES

This section examines those occupational growth areas that are currently predicted to require bachelors, masters, doctorate, or professional degrees.

Bachelor Degree Requirements

In the bachelor degree category those occupational areas include high predicted needs for degrees in: computer science (and related fields); business (management, accounting, finance construction management); teacher education; child, family, and social work; pharmacy; chemistry; and electrical engineering. Nursing is also clearly a high current, and probably future, need. In meeting these needs for bachelor degrees, UNC has produced the following results. (Note: future references to "all UNC institutions" will exclude the North Carolina School of the Arts, unless otherwise indicated.)

- UNC institutions produced 653 bachelors degrees in computer science in 2004; the highest number of degrees awarded in the five-year period (1999-2003) was 720 in 2003. The projected annual need is for 4,830 bachelors degrees. However, recent national data confirm that this projected need is probably substantially overstated.

All UNC institutions offer bachelors degrees in computer science.

- UNC institutions produced 2,246 bachelors degrees in business administration and management (general) in 2004; this was the highest number of degrees awarded in the five-year period (2000-2004). There were also 577 bachelors degrees awarded in accounting in the same period, with a five-year high of 596 in 2000. If the projected high demand fields that may require general business degrees (business operations specialists, financial analysts, and loan officers) are totaled, 1,420 degrees are

required annually. The need for accountants and auditors is projected to be 690 annually. All UNC institutions offer bachelors in general business and accounting undergraduate degrees.

- UNC institutions produced 361 bachelors degrees in social work in 2004; the highest number of degrees awarded in the five-year period was 390 in 2003. The projected annual need for social work bachelors degrees is 390. All UNC institutions offer bachelors degrees in social work.

- UNC Chapel Hill produced 135 Pharm.D. graduates in 2004, a five-year low (the highest was 146 in 2002; before the introduction of the Pharm.D. the graduates numbered over 160). UNC Chapel Hill is now working with Elizabeth City State University to offer pharmacy degrees through a collaborative program. The need for pharmacists is projected to be 350 annually. A significant proportion of current pharmacists in North Carolina in-migrated.

- UNC institutions produced 328 general chemistry degrees in 2004; the highest number of degrees awarded in the five-year period was 334 in 2003. The projected annual need for chemistry bachelors degrees is 240. All UNC institutions offer bachelors degrees in chemistry.

- UNC institutions produced 339 electrical, electronics, and computer engineering bachelors degrees in 2004, a five-year high and up approximately 100 degrees from the previous four-year average. The projected annual need for electrical engineering bachelors degrees is 140. North Carolina A&T, North Carolina State University, UNC Charlotte, and a joint program between UNC Charlotte and Western Carolina University offer bachelors degrees in electrical, electronics, and computer engineering.

- UNC institutions produced 2,313 teacher education graduates in 2003. In addition, there were over 5,000 alternative entry students who had a bachelors degree in some field and were taking teacher education courses to qualify for teacher certification. Approximately 25% of these earn the certification each year. The projected annual need utilizing the Employment Security Commission Methodology is 4,830. A more detailed analysis, however, is available from the December 2004 report, "A Plan to Address the Shortage of Teachers in North Carolina," produced by the UNC Office of the President.

That analysis paints a very different picture, with an annual average need of 11,483 over the eleven-year period 2004-05-2014-15, with the highest need in 2014-15 (12,165) and the lowest in 2007-08 (10,984). The methodology uses a projection model based on student-teacher ratios (including assumptions about state plans to reduce class size in K-3 through 2004-05) that is adjusted for turnover replacements (with turnover from one North Carolina school district to another deducted) and new additional teachers needed.

In addition to examining the general need for teachers in North Carolina, the report also examines such special need areas identified by the North Carolina Department of Public Instruction as math, science, middle grades, and exceptional children. The first two have particular importance in a knowledge economy. UNC institutions produced 84 math teacher education graduates in 2004 (up from 76 in 2003); 59 in science (down from 61); 174 in middle school (up from 126); and 212 in exceptional children (up from 183). UNC projects increasing the number of traditional graduates in these programs to 192 in math a year by 2009-10, to 157 in science, to 353 in middle school, and to 329 in exceptional children.

All UNC institutions offer undergraduate teacher education programs, except the North Carolina School for the Arts.

■ UNC institutions produced 1,076 nursing bachelors graduates in 2004; the highest number of degrees awarded in the five-year period was 1,019 in 2004. (In addition, see the NCCCS section that follows.) Although the Employment Security Commission data did not separately identify nursing as a high demand bachelors degree area, it listed a need for 3,460 registered nurses a year. A more detailed analysis is available, however, from the May 2004 "Task Force on the North Carolina Nursing Workforce Report," produced by the North Carolina Institute of Medicine. This report concludes that:

"The state needs to add a total of 34,812 more RNs to the workforce over 2000 levels (21,975 new jobs plus 12,837 replacement openings) by 2010 in order to meet the demands of both new job growth and replacement openings. Given that approximately 65,000 RNs were in the workforce in 2000, these figures suggest that North Carolina will need to increase its RN workforce by 50% by the end of the decade in order to avoid a shortage." (p.13).

The report also concludes a similar percentage increase will be needed for LPNs over the same period (7,874 additional positions over the 2000 workforce of approximately 14,500). Of particular note is the fact that approximately 60% of new RNs entering the North Carolina workforce currently come from out of state (and about 55% of the LPNs). (Also see the NCCCS section that follows.)

Eleven UNC institutions offer bachelors degrees in nursing.

Master Degree Requirements

In the masters degree category, the high demand occupations include: management analysts; educational and vocational counselors; clinical psychologists; rehabilitation counselors; speech language pathologists; medical and public health social workers; librarians; medical and substance abuse social workers; and postsecondary nursing instructors.

- UNC institutions produced 991 MBAs in 2004 which would prepare graduates to be **management analysts**, the highest number in the five-year period. The reported annual demand is for 430 masters prepared graduates annually for this sector of business. Twelve UNC institutions offer an MBA (Appalachian State University, East Carolina University, Fayetteville State University, North Carolina Central University, North Carolina State University, UNC Charlotte, UNC Pembroke, UNC Wilmington, Western Carolina University, Greensboro, Winston-Salem State University).

- UNC institutions produced 170 masters graduates in **counselor education** in 2004; the highest number of masters awarded in this discipline in the five-year period was 181 in 2003. The need for such masters graduates is 320 annually, according to the Employment Security Commission data. Ten UNC institutions offer the masters in counselor education, counseling, and guidance services.

- UNC institutions produced 23 masters in **clinical psychology** in 2004; the highest number of such masters produced in the five-year period was 26 in 2001. The reported annual demand is for 270 masters, prepared graduates. Only five UNC institutions (Appalachian State University, East Carolina University, UNC Chapel Hill, UNC Charlotte, and Western Carolina University) offer this masters degree.

- UNC institutions produced 28 **rehabilitation counselors** with masters degrees in 2004; the highest number produced was 38 in 2003. The projected annual demand is for 260 masters prepared graduates. The following UNC institutions offer this masters degree: East Carolina University, UNC Chapel Hill, and Winston-Salem State University.

- UNC institutions produced 88 masters in **audioLOGY and speech-language pathology** in 2004; the highest number produced was 108 in 2000. The projected annual demand is for 180 such graduates. UNC Chapel Hill, East Carolina University, and UNC Greensboro have programs in this academic area. (Several other UNC institutions have masters programs in general communication disorders.)

- UNC institutions produced 275 masters in **social work** in 2004, the highest number produced in the five-year period. The annual demand for social workers specializing in medical and public health social work is 140 and 120 for medical and substance abuse social work. In 2004, UNC institutions produced 8 masters in substance abuse/addiction counseling. Six UNC institutions offer a masters in social work (East Carolina University, Fayetteville State University, North Carolina A&T, UNC Chapel Hill, UNC Charlotte, and UNC Greensboro). Three new MSWs have been added at North Carolina State University, UNC Wilmington, and Western Carolina University.

- UNC institutions produced 269 **library science/librarianship** masters in 2004, the highest number produced in the five-year period. The annual demand for masters prepared librarians is projected to be 180. Five UNC institutions offer this masters degree (Appalachian State University, East Carolina University, North Carolina Central University, UNC Chapel Hill, and UNC Greensboro).

- UNC institutions produced 252 Masters of Science in nursing degrees and eight Ph.D.s in 2004, by far the highest in the five-year period. These are the graduate degree nurses who are most likely to enter postsecondary teaching, although they also enter other professions as well. The demand for such graduates is 110 annually. East Carolina University and UNC Chapel Hill both offer doctorates and UNC Greensboro offers a masters in nursing science and has been authorized to offer a doctorate starting fall 2005.

Doctorate Degree Requirements

The projected high demand occupations requiring a doctorate are all post-secondary faculty positions, although all fields or institutions will necessarily need graduates with doctorates for post-secondary institutions. Since many higher education institutions recruit nationally, state production of doctorates is not directly relevant (although indirectly each state contributes to the national marketplace). The areas with the greatest need are health specialties (330 annually), art, drama, and music (140 annually), math (120 annually), computer science (110 annually), medical science (120 annually), and biology (100 annually).

Unless some states produce doctorates at much higher rates than North Carolina there are likely to be gaps in all of these fields (gaps that may be exacerbated by the predicted decline of international students in many of these fields and/or the increase in the number of foreign-born Ph.D.s who will return to their native countries). The size of the gaps could be considerable. For example, UNC institutions produced 19 Ph.D.s in computer science in 2004 and 37 in mathematics. Most of the areas which need new faculty also have to compete with the private sector for graduates.

Professional Degree Requirements

The projected high demand occupations requiring professional degrees include Clergy (210 positions annually), Family and General Practitioners (560 positions annually), and Veterinarians (500 positions annually). There are many pathways to positions in the clergy and public higher education does not play a prominent part in these pathways. UNC institutions produced a total of 234 medical degrees in 2004 (154 at UNC Chapel Hill and 80 at East Carolina University); this was a five-year high for medicine graduates. UNC institutions produced a total of 76 graduates in veterinary medicine in 2004, again a five-year high; North Carolina State University offers veterinary medicine.

5B. PROJECTED HIGH DEMAND TRADITIONAL OCCUPATIONS REQUIRING ASSOCIATE DEGREES/DIPLOMAS/CERTIFICATES

This section examines those occupational growth areas that are currently predicted to require postsecondary education at less than the baccalaureate level, including associate degree, diploma, and certificate offered by the 58 Community Colleges.

In addition, it is assumed that the continuing education programs offered by NCCCS, particularly those that directly support the education and training needs of business and industry, will continue to be vital to the future economic growth and development of North Carolina.

Using ESC data, high growth occupations were identified that require an associate degree. Referenced in Attachment 5 of this report as Appendix 5.B.1. All Occupational Projections gives North Carolina occupational employment projections sorted by level of education. Average annual openings (growth plus replacements) for the 2000-2010 interval are given for each occupation. Occupations pertinent to Community College programs are given in the Associate degree and the Post-secondary Vocational Training categories, with some falling into the Long-term on-the-job Training category. It is obvious from an analysis of the categories that jobs for which Community College students obtain education and training do not neatly fall into the framework of this classification structure. However, it does give a general overview of occupations for which workers need education and training provided by Community Colleges. Also, many of the occupations are ones for which Community Colleges provide numerous short-term training through non-credit continuing education programs.

The following occupations are ones that show sizeable average annual openings (given in the first set of parentheses) for the 2000-2010 time period using ESC's projections. Completions or graduations in 2003-2004 in the Community College curriculum program that most closely fit each occupation are given in the second set of parentheses (A = associate degree, D = diploma, and C = certificate).

- Registered nurses (3,460) (1,679 A)
- Executive secretaries/administrative assistants (1,540) (404 A)
- Secretaries – excluding legal, medical, and executive (820) (107 D, 322 C)
- Practical and vocational nurses (790) (730 D)
- Cosmetologists (540) (287 D, 245 C)
- Medical secretaries (430) (433 A, 41 D, 360 C)
- Computer programmers (370) (220 A, 6 D, 137 C)
- Emergency medical technicians and paramedics (360) (123 A)
- Medical records/health information technicians (310) (433 A, 41 D, 360 C)
- Dental Assistants (290) (276 D)
- Legal secretaries (230) (22 A, 1 D, 9C)
- Paralegal and legal assistants (220) (223 A, 30 D, 34 C)
- Electrical and electronic engineering technicians (220) (180 A, 1 D, 29 C)

- Dental hygienists (200) (201 A)
- Medical and clinical laboratory technicians (200) (76 A)
- Aircraft mechanics and service technicians (190) (4 A, 10 C)
- Respiratory therapists (170) (163 A)
- Surveying and mapping technicians (170) (30 A)
- Medical transcriptionists (150) (98 D)
- Surgical technologists (140) (22 A, 173 D)

5C. PROJECTED DEMAND FOR HIGHER EDUCATION (BOTH UNC AND NCCCS) IN EMERGING FIELDS

In addition to examining the Employment Security Commission projections, the regional economic development partnership strategic plans were examined to identify occupations that may have faster growth rates as a result of specific initiatives or because they are emerging fields that would not be captured by trend data. The targeted industries that emerge from this approach include:

- ✓ Biotechnology and pharmaceuticals
- ✓ Computing, software and the Internet
- ✓ Logistics and distribution
- ✓ Advanced manufacturing
- ✓ Advanced materials: chemicals and plastics
- ✓ Advanced materials: nanotechnology
- ✓ Arts and design

■ **The biotechnology and pharmaceutical industry** has an unusually high need for the proportion of its workforce with a bachelors degree or higher (60%). In particular, it requires life scientists, physical scientists, and specialized engineers (biomedical, chemical, industrial). From the ESC data, it appears that this sector will employ over 16,500 bachelors and above professionals in 2010, compared to 14,410 in 2000.

Using data from trend projections makes little sense in this emerging area. While traditional fields such as chemical engineering, chemistry, the life sciences, microbiology, medical sciences, and biomedical engineering may be producing sufficient graduates currently, the emerging interdisciplinary nature of this industry means that both the current production and projections may not be sufficient. Not only are these sciences becoming more interdisciplinary, but there are also other non-science disciplines (for example, specialized areas of business and law) that will see increased demands as this field emerges and matures.

Currently, UNC Chapel Hill and North Carolina State University offer biomedical engineering bachelors, masters, and doctoral degrees. North Carolina State University and North Carolina A&T offer chemical engineering (the former at all three levels, the latter at the bachelors and masters level). East Carolina University and UNC Chapel Hill offer primarily doctorates in the medical sciences. North Carolina State University offers microbiology at all three levels. North Carolina Central University's BRITB initiative is part of the state's emphasis on biotechnology; the university will develop undergraduate and graduate programs in biomanufacturing and biotechnology. All UNC institutions offer chemistry and biology majors. Several institutions are either just starting or planning to start new programs specifically in biotechnology.

In the NCCCS, biotechnology and related programs are receiving special emphasis. Biomanaufacturing is projected to be a major growth area for North Carolina. The NCCCS, with the aid of the Golden LEAF Foundation, has established the BioNetwork to provide education and training for the emerging biotechnology area. This special funding has allowed the establishment of the biotechnology office at the Centers on Community College System Office, the selection of six BioNetwork Competitiveness Centers on Community College campuses, and provided approximately 65 innovation, equipment/facility enhancement, and distance learning grants to the Colleges.

The NCCCS has curriculum programs in biotechnology (at five Colleges and at 24 others by way of collaborative arrangements) and industrial pharmaceutical technology (at two Colleges and collaboratively at three others). Another College is planning a plant biotechnology curriculum to be submitted for approval later this year. Completions or graduations for these programs are shown in Attachment 5 of this report as Appendix 4.A.3. Industrial pharmaceutical technology has shown the highest graduation rate, with 22 AAS graduates in 2003-04. As the BioNetwork initiative continues to develop system-wide, enrollments are expected to significantly increase.

Forsyth Technical Community College received a \$5 million grant in 2004 that partners it with four other Community Colleges from around the nation to develop curricula and training modules for biotechnology workers. This initiative is part of a national effort to address workforce challenges facing the biotechnology industry.

■ **Computing, Software and Internet.** See previous analysis regarding UNC production in this area.

UNC institutions produced 653 bachelors degrees in computer science in 2004; the highest number of degrees awarded in the five-year period (1999-2003) was 720 in 2003. The projected annual need is for 4,830 bachelors degrees, although this is probably substantially overstated because the projection is based on trend data that include the computer "boom" years of the 1990s. Recent national data confirm that this projection is likely overstated.

The NCCCS offers 13 curriculum programs leading to the AAS degree that fall into the area of computing, software, and the Internet. In 2003-04, only five had significant graduations at the associate degree level: computer programming (220); information systems (555); network administration and support (400); Internet technologies (121); and networking technology (69). All five of these programs offer tracks that lead to a diploma or a certificate. Students that take one of these options usually chose the one-semester certificate program. In 2003-04, certificate completions in these five programs were: computer programming – 137, information systems – 403, network administration and support – 162, Internet technologies – 69, and networking technology – 30.

Logistics and Distribution, while a growing industry, has a relatively low proportion of its positions in occupations that require a bachelors degree (approximately 5%) in such areas as business, marketing, accounting, industrial relations, or economics. Some universities offer certificates in logistics and a few offer masters degrees. No UNC institution offers a degree program in this area.

The NCCCS has one curriculum program in this area, logistics management. In 2003-04, there were two completions in this program. With the recent announcement by Dell to build a large production facility in Winston-Salem, logistics and distribution education and training needs will increase.

Advanced Manufacturing as an industry also has a relatively low proportion of its employment in bachelors (or above) required occupations. Of those that do (commercial and industrial designer, mechanical engineer, electrical engineer, industrial engineer, and computer programmer) several have been covered in the previous analysis. In addition, a 2003 study for the UNC President's Office by the National Center for Higher Education Management Systems (NCHEMS) found an oversupply of engineering graduates by UNC institutions, with the exception of electrical engineering and some select masters degrees for practicing professionals.

The Chemical and Plastics industry has been identified as an emerging and targeted area for growth. Fewer than half of the occupations in this field require a bachelors degree or above. Those that do generally require degrees in business or engineering, both discussed previously. In 2000-01 the NCHEMS report on engineering indicated that UNC institutions produced 166 bachelors degrees in chemical engineering for 30 average annual openings.

In the NCCCS, Manufacturing Technology/Plastics is offered by eight Colleges, including a consortium in the Raleigh region with seven member Colleges.

Nanotechnology is a fast-emerging, highly interdisciplinary field that will probably influence a number of occupations in several industries rather than create specific industries of its own. Therefore, it is not possible at this time to anticipate the openings or even the degrees required (existing disciplines such as engineering have to be infused with the life sciences and different modes of thinking). A number of UNC institutions are planning degrees in this field.

Forsyth Technical Community College in Winston-Salem received approval in September 2004 from the State Board of Community Colleges to establish an AAS degree program in nanotechnology. This program is offered in collaboration with Wake Forest University's Center for Nanotechnology and Molecular Materials. It is the only nanotechnology program offered in the NCCCS.

■ **Art & Design "industries"** are often forgotten when discussing workforce and economic development. However, not only is there demand for such professionals in and of themselves, but such professionals contribute to the quality of life and sense of place that can be major factors in economic development. The occupations include fine artists, multimedia artists and animators, and art directors; they also include design occupations, such as commercial and industrial designers of manufactured products, fashion designers, floral designers, graphic designers, and interior designers. Most of these fields, with the exception of floral design, either require a bachelors degree or the person's skills are enhanced by getting a degree.

Art degrees, both visual and performing, are available from multiple UNC institutions, and in 2003 1,263 bachelors degrees, 142 masters, and 14 doctorates were awarded in the fine and applied arts. Design and visual communications degrees are offered by North Carolina State University; graphic design is offered by Appalachian State University, North Carolina State University and North Carolina A&T; industrial design is offered by Appalachian State University and North Carolina State University; and interior design at Appalachian State University, East Carolina University, UNC Greensboro, and Western Carolina University.

The NCCCS has a cluster of curriculum programs called the Commercial and Artistic Production Technologies. Included are several professional crafts programs (e.g., clay, fiber, and jewelry), photographic technology, interior design, film and video production, and digital effects/animation.

5D. CAUTIONS

A number of cautions have to be outlined about this interim gap analysis:

- This analysis focuses on the UNC and the NCCCS institutions.

The UNC and NCCCS institutions are not, however, the sole providers of graduates in the state. Independent colleges and proprietary schools also produce graduates in a number of these areas. Most Community College students stay in the area where they attend college. Students from the independent colleges and universities, particularly the larger ones, may come from out-of-state and may be less likely to enter the North Carolina workforce than graduates from the UNC institutions. Nevertheless, the independent colleges clearly do contribute to the workforce. For example, they produced 3,315 graduates in business (compared to 4,789 by UNC), 478 in computer science (721), and 572 in education (2,026). In total, independent colleges produce about half as many graduates as UNC (12,218 bachelors to 25,263; 2,831 masters to 7,432; 1,111 first professional to 898; and 308 doctorates to 850).

- This analysis does not examine migration patterns. Many states experience a net in-migration of graduates, especially in the high demand fields. This is particularly true for certain southern states where in-migration has been extensive, especially from midwestern and northeastern states. Nursing, for example, has over 50% of its new and replacement workforce coming from out of state. Teacher education, computer science, and pharmacy have significant in-migration.

- This analysis focuses on new graduates, most of whom will be new to the workforce. However, the majority of the workforce for 2010 is already in the workforce.
- This analysis does not consider the intent of students in receiving degrees in certain areas. For example, some students who take degrees in areas like education, nursing, and social work do not necessarily intend to enter the workforce in those fields.

- This analysis looks at trend data for projected job growth. Trend data cannot anticipate either abrupt changes in the economy (such as the reversals faced in computer fields around 2000) or intentional changes in state policy to fuel new directions in the state's economy.

- This analysis does not, at this point, examine these trends by geographic region. While it is possible to see projected job growth by region, there is not a reliable way to predict where graduates will go for employment. Some academic areas (education, for example) tend to see their graduates employed in the region where they got their degree; other academic areas (such as engineering and computer science) tend to see their graduates gravitate to where the best jobs, salaries, and quality of life are offered.

PRELIMINARY FINDINGS

UNIVERSITY OF NORTH CAROLINA

1. UNC institutions are not currently producing a sufficient number of bachelors degrees for the projected needs in the following high demand areas, although the projected gaps need to be understood within the context of the issues cited in the paragraph that follows:

- Computer Science (annual gap of 4,183)
- Teacher Education (annual gap of 2,517 or 9,170, depending on study)
- Nursing (annual gap of 2,384)
- Accounting (annual gap of 113)
- Social Work (annual gap of 29)

It should be noted that the NCCCS has 54 Associate Degree nursing programs and that 1,679 graduated from these programs in 2003-2004. Without taking into consideration the type of RN (i.e., BSN or ADN), this significantly reduces the gap, but still leaves an annual gap of several hundred registered nurses. Also, computer science may be overstated because the trend years used for the projections include the

years of the computer "boom." Conversely, the need for the accounting degree may be understated because the trend years preceded Sarbanes/Oxley requirements for corporate accounting and auditing. Both teacher education and nursing have been the topic for major supply/demand reports in the last year; these reports both include specific recommendations for responding to the projected shortages.

2. UNC institutions are currently producing sufficient graduates for the projected needs in the following high demand areas:

- Business (annual excess of 826)
- Electrical Engineering (annual excess of 199)
- Chemistry (annual excess of 88)

In the case of business, however, students have a number of other choices for careers beyond those identified as high demand. So there may or may not be a sufficient supply for those fields.

3. UNC institutions produced the largest number of graduates in 2004 in only two of the projected high demand areas: business and electrical engineering. (The latter increase was very substantial). None of the other areas show a trend towards increasing the number of graduates, although some show increased enrollments.

4. UNC institutions are not currently producing a sufficient number of masters degrees for the projected needs in the following high demand areas:

- Counselor Education (annual gap of 150)
- Clinical Psychology (annual gap of 247)
- Rehabilitation Counseling (annual gap of 232)
- Audiology and Speech Language Pathology (annual gap of 92)
- Social Work (275 produced; 260 needed for just two areas of Social Work; medical and public health; medical and substance abuse)

5. UNC institutions are currently producing a sufficient number of masters degrees in the following high demand areas:

- MBA (as long as MBA students choose management analyst positions in sufficient numbers)
- Library Science
- Nursing Science

6. While the number of masters graduates needed (the gap) are not as great as the number of undergraduates, in many instances the need is proportionately greater. The masters degree may be emerging as a key degree in some academic areas for employment. UNC has a major initiative to create more professional science masters degrees and has received Sloan Foundation funding for parts of this activity.

7. The demand for higher education faculty is likely to increase substantially, especially in fields like math, science, and technology. While not all fields nor all higher education institutions will require faculty with doctorates, the number of doctorates will likely need to increase. The faculty marketplace tends to be a national one, so the gaps in the high demand fields in North Carolina cannot be taken as absolute. For one thing, the national reputation of higher education in North Carolina and quality of life issues make North Carolina an attractive destination for prospective faculty members. On the other hand, the national marketplace may see a decline in doctorates if predicted trends in some key fields (such as math, science, engineering, and computer science) develop, such as a reduction in the number of international students coming to U.S. universities and an increase in the percentage of those students who return to their home countries. China and India, for example, intend to train many more of its own doctorates.

8. There are substantial gaps in the production of two professional degrees (medicine and veterinary science); however, these fields tend to have substantial in-migration.

9.a. In the emerging industries and/or the industries that are part of regional initiatives, UNC institutions will need to produce sufficient graduates especially in the life sciences and computer sciences particularly for the biotechnology and pharmaceutical industries. It appears that UNC institutions are responding to this need, particularly in biotechnology.

b. In the emerging industries and/or the industries that are part of regional initiatives, UNC institutions will need to produce sufficient graduates with either specialized or interdisciplinary skills in such areas as business and engineering. While the institutions are producing sufficient graduates in those fields, they may need to reexamine the curriculum and/or the need for new concentrations, specialized certificates, or masters programs. This is true for the logistics and distribution industry; advanced manufacturing; and chemical and plastics.

c. In nanotechnology, UNC institutions do not presently have as many programs available as do the leading states.

d. In arts and design there are great possibilities for expanding both employment opportunities and quality of life issues that can be central to economic development. A number of UNC institutions have identified this as a growth area.

e. In virtually all gap areas (from traditional fields like nursing and teaching to emerging fields like nanotechnology and logistics) there are great opportunities for expanded partnerships and "ladder" programs between NCCCS institutions and UNC institutions. There are a number of such existing programs and prototypes, including some that use e-learning exclusively. Thus the primary issue is one of scaling up such activities and program availability.

NORTH CAROLINA COMMUNITY COLLEGE SYSTEM

1. Community Colleges are not producing an adequate number of graduates to meet projected needs in the following high demand areas:

- Registered nurses (see prior discussion in UNC section)
- Office staff – including executive secretaries, administrative assistants, and so on. (annual gap of several hundred, depending on how projected needs are viewed)
- Computer programmers (annual gap of 150 at associate degree level)
- Emergency medical technicians (annual gap of 237)
- Legal secretaries (annual gap of 208 at associate degree level)
- Medical and clinical lab technicians (annual gap of 124)
- Aircraft mechanics and service technicians (annual gap of 186 at associate degree level)
- Surveying and mapping technicians (annual gap of 140)
- Medical transcriptionists (annual gap of 52)

It should be noted that as technology becomes more embedded in the workplace, it will have impacts that are difficult to precisely measure at this time. For example, as the information needed and used by health care providers (for example, medical records) becomes digitized, it will have a dramatic impact on those work places, including the skills needed by workers.

2. According to the occupational projections developed in this study using ESC data, the NCCCS is not producing an over supply of graduates in any of the high growth areas.

3. The NCCCS is responding to the targeted industries that emerge from the trend data (e.g., biotechnology and pharmaceuticals), though its responses are in the early stages. The BioNetwork initiative is in its second year of operation and has offered significant opportunities for collaboration with UNC institutions, particularly North Carolina State University. This should serve as a model as other emerging industries (for example, nanotechnology) expand and present the need for increased numbers of trained workers.

4. As noted in the UNC section above, there are many opportunities for new and expanded partnerships between the two public higher education systems. Addressing the needs in some critical areas, such as increasing the supply of teachers and nurses, has more to do with building new and better collaborative programs than with building new bricks and mortar facilities.

5. Distance learning options should be a critical consideration in all plans to expand programs, to develop collaborative arrangements, or to provide new services. This should apply to both systems.

6. A NEW COMMUNITY OF LEARNERS

In developing the academic and training programs of the future, it is important to recognize the many different kinds of student learners to which higher education must now be responsive. The students entering universities and community colleges represent a broad range of ages and experiences, economic, family and ethnic backgrounds. They are also driven by a variety of motivations that bring them into the college classroom.

As in the past, many higher education students are there to obtain the necessary skills to prepare them for their *first job*. Whether in a degree program or a technical training/certification program, these students are generally preparing to enter the workforce for the first time. They may be recent high school graduates, or coming into the workforce well after high school after years spent in other life pursuits.

Increasingly, a growing number of students are returning to higher education in order to *maintain* the careers that they already have. In today's competitive economy, industries and professions are changing rapidly, driven by new technological innovations, new technical knowledge, new products and services, new regulations, or changing consumer demands. The skills and knowledge required to maintain one's current position, and certainly to advance to more senior levels, require a constant retraining and reeducation. This continuing need for learning may be fulfilled by a single training session, an additional certification, or the achievement of a more advanced degree. The demand comes from students who are typically older, further along in their work and personal life responsibilities, and less able to sit in a traditional classroom or follow a traditional program of study. Student/faculty interactions, and modes of course delivery, must be adapted to meet these differing needs. This group of students is one of the fastest growing groups making demands on higher education. They require a wholly different understanding of their needs and the support structures required by them, versus the educational programs, financial and academic support structures in place thirty years ago.

Similar to the students returning to maintain their careers, an additional growing number of learners are turning to higher education to assist them in *changing* their career path. This change may be forced upon them due to job layoffs or a change of personal circumstances. Or it may result from a change in personal career choices and/or lifestyle. Here we see the long-term worker suddenly without employment and without transportable skills; or the middle-aged or retired workers rethinking their career history and seeking a new direction in their lives. A key driver here is the speed with which the education and training can be accomplished, a greater urgency to arrive at an end point that places one into that next job. For these learners, the traditional higher education programmatic structures and timelines, and the locations and/or modes of delivery may be especially inadequate. This group is relatively newly recognized within the higher education environment. For North Carolina, in the midst of its economic transformation and its pressing needs for workers within certain professions, this group of learners requires special attention.

In planning for North Carolina's future in higher education, old patterns and structures and formulas may no longer be sufficient to serve this far more diverse student population. It is a population which no longer experiences higher education at only one point in their lives. And it is a population that has many different expectations for its higher education experience. This is one of the many challenges that state and higher education officials must address in its planning for educating North Carolinians into this future workforce.

on FY 2004 figures.

Note: The category 'Not-for-Profit Organizations' and its corresponding sub-categories are new in FY 2004 and may have impact

Dollars Received		Sponsor						
	% of Total	Fiscal 2002		Fiscal 2003		Fiscal 2004		Trend
		% of Total	Fiscal 2002	% of Total	Fiscal 2003	% of Total	Fiscal 2004	
N.C. Business and Industry	\$8,569,699	1.02%	\$8,171,060	0.87%	\$7,194,387	0.71%	-16%	
All Other Business and Industry	\$29,922,886	3.56%	\$54,437,004	5.78%	\$42,416,451	4.17%	42%	
Total Business and Industry Awards	\$38,492,585	4.58%	\$62,608,064	6.65%	\$49,610,838	4.88%	29%	
UNC TOTAL AWARDS		\$840,556,027		\$941,278,688		\$1,016,473,232		21%

# of Awards					
	FY02	FY03	FY04		
Sponsor	Number	% of Total	Number	% of Total	Trend
N. C. Business and Industry All Other Business and Industry	313	4.43%	368	4.99%	-17%
Total Business and Industry	904	12.80%	1,048	14.20%	28%
Total Business and Industry Awards	1,217	17.23%	1,416	19.19%	16%
UNC TOTAL AWARDS	7,065	7,380	7,586		7%

Exhibit 1: Selected Sponsored Research Award Data FY 2002 through FY 2004

Industry Sponsored Research. In North Carolina and in every other state, funding from federal agencies provides a very high proportion of the total research dollars. In FY04 UNC institutions generated \$1.016 billion in total research awards, of that \$664.8 million was federal research and \$49.6 million was industry sponsored research. Industry sponsored research reveals, to some degree, the extent of engagement Universities have with their state and national businesses and industries. Exhibit 1 below arrays these data.

create start-up companies.

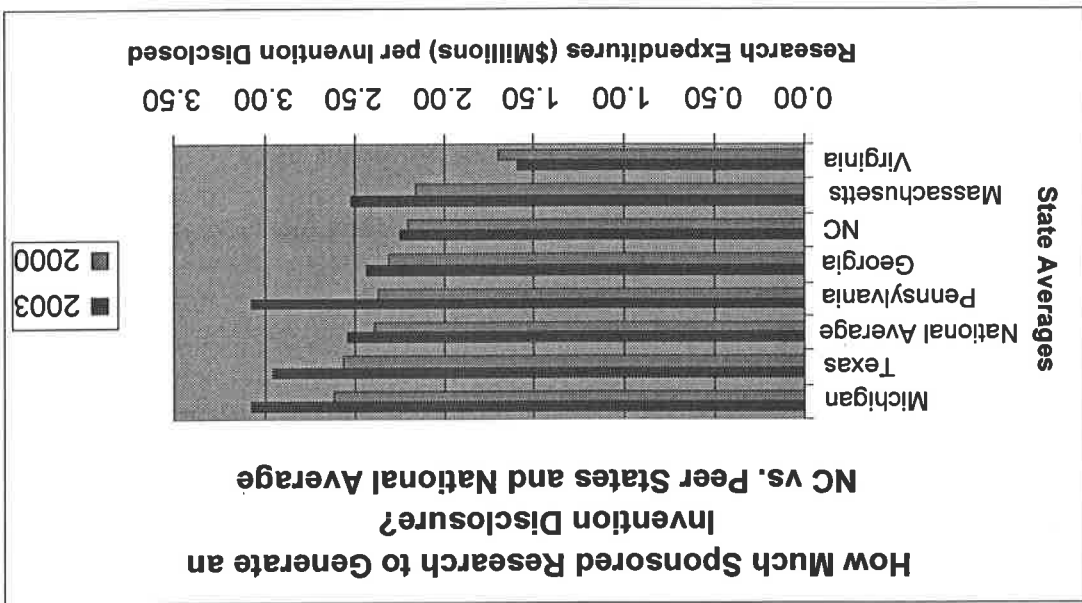
Technology Transfer. Universities have a responsibility to add to the body of knowledge through their research. Where this research has direct and practical applications for industry and business, the “technology” needs to be “transferred” from the research lab in a university to the marketplace through business and industry. This can be done through a number of different mechanisms such as industry-sponsored research, inventions, licensing intellectual property, and helping

Technology Transfer, Research, Campus Culture and State Support for Innovation

7. ADDITIONAL TOPICS

✓ **Invention Disclosure.** The number of invention disclosures per million dollars of research is a surrogate for measuring the amount of intellectual property generated by the research efforts. (An invention disclosure is made at the conception of an invention and is the first step in seeking a patent.) Select UNC institutions (plus Duke and Wake Forest Universities) expended an average of \$2.2M per disclosure in both FY 2000 and FY 2003. National and peer data were also examined for both years and are reported in Exhibit 2 below.

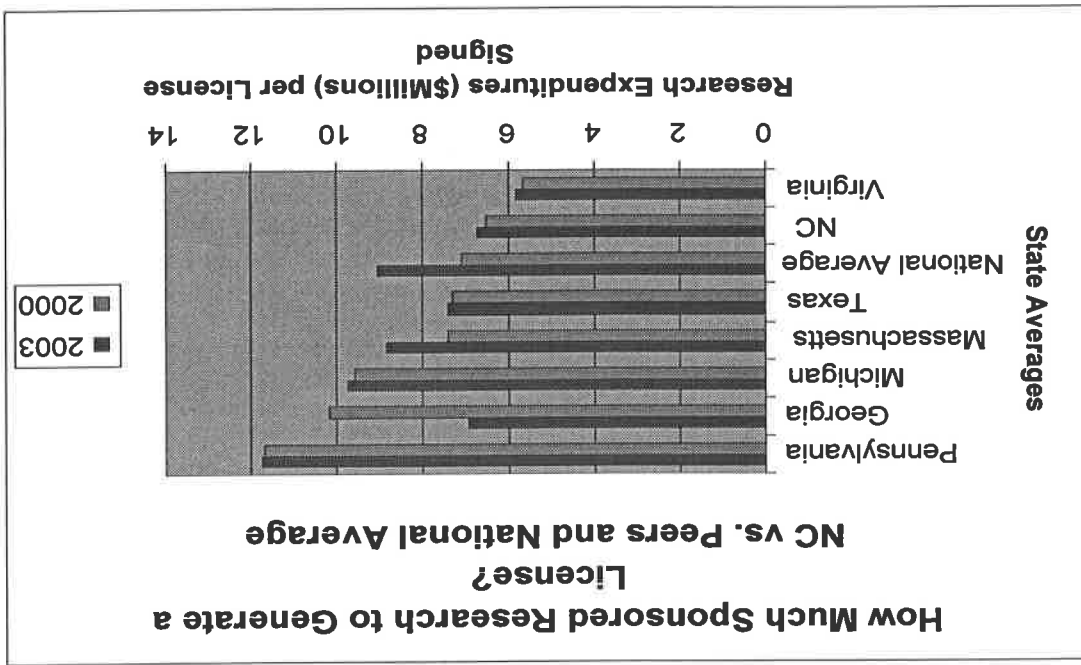
Exhibit 2: Sponsored research expenditures per invention disclosed, FY 2000 and FY 2003



Sources: Association of University Technology Managers (AUTM)
 FY 2000-2003 Annual Surveys
 Peer States (Georgia, Michigan, Texas, Massachusetts, Pennsylvania, and Virginia) were selected from the
 2003 Tracking Innovation Report of the North Carolina Board of Science and Technology.

✓ **Licensing Intellectual Property.** This measure examines how many research dollars, on average, were expended in relation to licenses or options signed. Select UNC institutions (plus Duke and Wake Forest Universities) expended \$6.5M per license in 2000 and \$6.7M in 2003. National average and peer data were also examined for both years and are reported in Exhibit 3 on the following page.

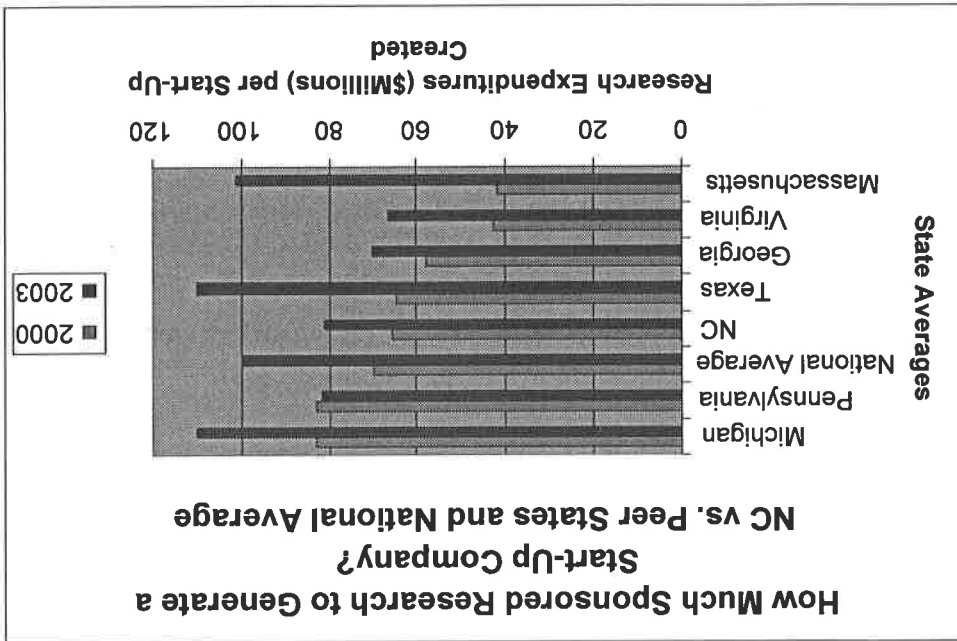
Exhibit 3: Sponsored research expenditures per license/option signed, FY 2000 and FY 2003



Sources: Association of University Technology Managers (AUTM)
 FY 2000-2003 Annual Surveys
 Peer States (Georgia, Michigan, Texas, Massachusetts, Pennsylvania, and Virginia) were selected from the
 2003 Tracking Innovation Report of the North Carolina Board of Science and Technology.

✓ **University Start-Up Company Formation.** This measure examines, on average, the number of start-up companies formed as a result of University intellectual involvement in relation to total research dollars expended. Select UNC institutions (plus Duke and Wake Forest Universities) expended on average \$66M per University start-up company created. National average and peer data were also examined for both years and are displayed as Exhibit 4 on the next page.

Exhibit 4: Sponsored research expenditures per university start-up company created, FY 2000 and FY 2003



Sources: Association of University Technology Managers (AUTM)
FY 2000-2003 Annual Surveys

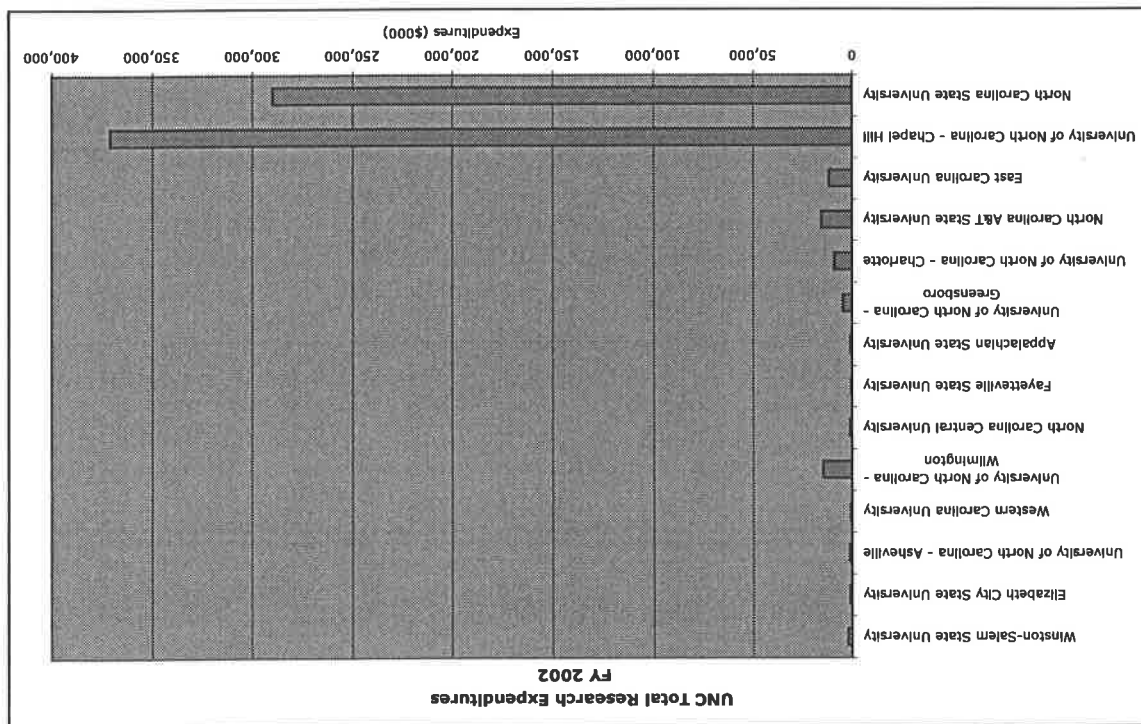
Peer States (Georgia, Michigan, Texas, Massachusetts, Pennsylvania, and Virginia) were selected from the 2003 Tracking Innovation Report of the North Carolina Board of Science and Technology.

• **Research.** Funded research is an indicator of the quality of the research faculty and, therefore, has a relationship to the universities' role in economic development, although it is important to note that not all funded research has a direct relationship to economic development. While all UNC institutions have some involvement in funded research, North Carolina, like most states, has its research concentrated in a relatively small number of institutions.

UNC total research expenditures in FY2002 were \$722.6 million. Of that total, UNC Chapel Hill expended \$370.8 million and North Carolina State University expended \$290 million, followed by North Carolina A&T at \$15.4 million, UNC Wilmington at \$14.6 million, and East Carolina University at \$11.5 million.

A similar pattern exists when just federal research expenditures are examined. Total federal expenditures in FY2002 where \$372.5 million with UNC Chapel Hill at \$254.6 million, North Carolina State University \$75.2 million, North Carolina A&T \$12.0 million, UNC Wilmington \$10.0 million, and East Carolina University \$6.0 million. Utilizing data from The Center at the University of Florida, national rankings were established for these universities and appear as Exhibits 5 and 6 on the following pages.

Exhibit 5



Source: <http://thecenter.wfl.edu>

UNC Universities with Research Dollars			
2002	2002	All Universities	Control Rank Public Universities
***	***	***	***
Total Research x \$1000	National Rank		

21	33	290,018	North Carolina State University
17	28	370,806	University of North Carolina - Chapel Hill

Doctoral/Research-Intensive

189	258	11,513	East Carolina University
171	234	15,353	North Carolina A&T State University
206	284	8,773	University of North Carolina - Charlotte
236	328	4,454	University of North Carolina - Greensboro

Master's Comprehensive

334	510	781	Appalachian State University
361	565	311	Fayetteville State University
316	479	1,035	North Carolina Central University
175	238	14,568	University of North Carolina - Wilmington
344	525	653	Western Carolina University

Baccalaureate-Liberal Arts

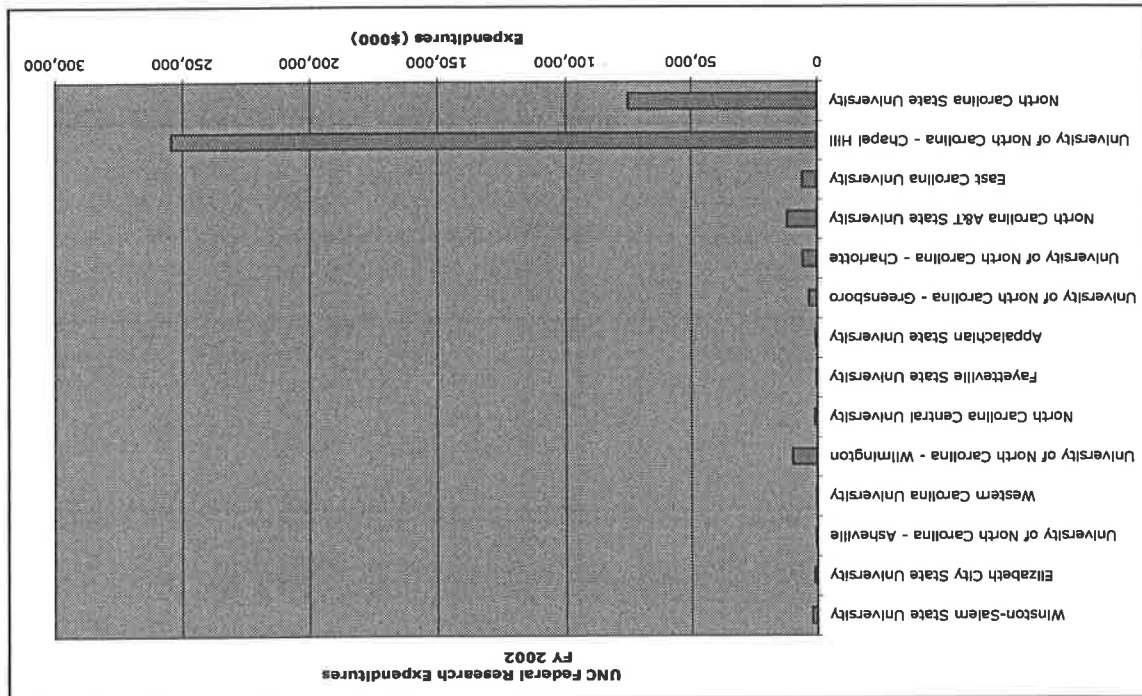
304	452	1,232	University of North Carolina - Asheville
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Baccalaureate-General

313	475	1,058	Elizabeth City State University
282	406	2,022	Winston-Salem State University

Source: <http://thecenter.wfl.edu>

Exhibit 6



Source: <http://thecenter.unc.edu>

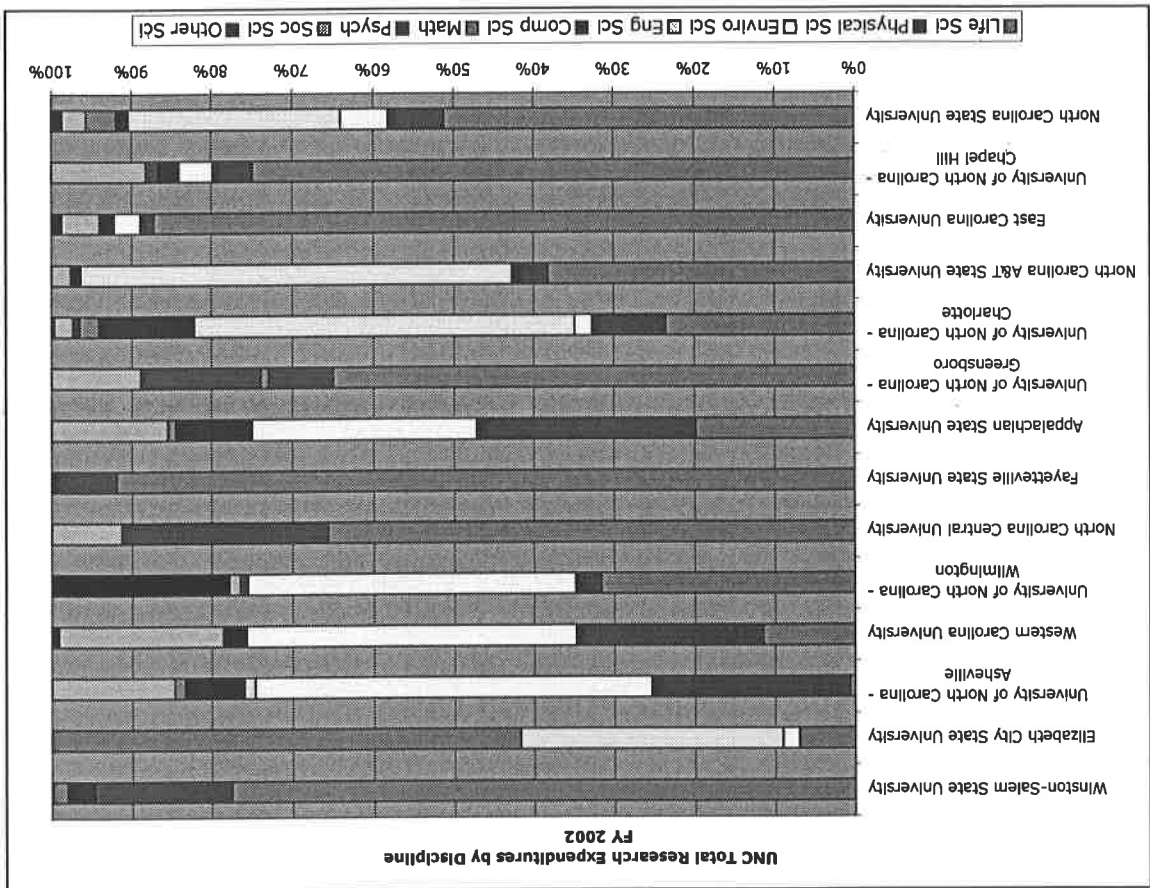
UNC Universities with Federal Research Dollars	2002 *** Federal Research x \$1000	2002 *** National Rank All Universities	2002 *** Control Rank Public Universities
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Doctoral/Research-Extensive	75,204	92	60
North Carolina State University			
University of North Carolina - Chapel Hill	254,571	22	10
Doctoral/Research-Intensive			
East Carolina University	6,030	262	189
North Carolina A&T State University	11,953	211	150
University of North Carolina - Charlotte	5,850	268	192
University of North Carolina - Greensboro	3,340	313	223
Master's Comprehensive			
Appalachian State University	543	472	315
Fayetteville State University	311	514	335
North Carolina Central University	971	414	289
University of North Carolina - Wilmington	9,950	226	163
Western Carolina University	280	521	338
Baccalaureate-Liberal Arts			
University of North Carolina - Asheville	412	490	324
Baccalaureate-General			
Elizabeth City State University	1,058	402	282
Winston-Salem State University	2,022	346	247

Source: <http://thecenter.unc.edu>

These research expenditures, when examined by discipline (See Exhibit 7), show strong life sciences concentration on most UNC campuses. Seven of the universities (including UNC Chapel Hill and North Carolina State University) have over 50% of their funded research activity in the life sciences area; twelve of the Universities have research expenditures in the physical sciences, and five have research expenditures in the engineering sciences.

Exhibit 7



Source: <http://theecenter.wfl.edu>

This research activity is supported by graduate education, particularly at the Ph.D. level. As the gap analysis contained earlier in this report indicated, UNC institutions produced a total of 850 doctorates, a substantial number of which are in the high demand occupations (although, as was pointed out, most of these are for faculty careers where the marketplace is national not state). UNC Chapel Hill ranks 17 for public universities nationally in the number of doctorates produced (412), followed by North Carolina State University at 24 (322), and UNC Greensboro at 108 (67). Many of these doctorates are awarded in fields that do not produce funded research.

- **Campus Culture and State Support for Innovation.** In addition to the measurable items above, successful University involvement in research and technology transfer requires a supportive campus culture for and a state commitment to research, innovation, and entrepreneurship. The UNC Technology Development Initiative (TDI) examined campus issues and developed a number of recommendations, such as training for faculty and administrators in innovation and entrepreneurship; incorporating of these activities into promotion and tenure guidelines; explicit identification of economic development as a central mission; and recognition for success for the period 2000-2004. Other states, such as Georgia and California, have created models to invest state dollars to stimulate economic growth by leveraging University innovations and partnerships with the private sector. Georgia, for example, has created "Centers for Innovation" in targeted areas of research strength and state need. (See <http://www.georgiainnovation.org/> for more details). California, through its "California Institutes for Science and Innovation" and its "University of California Discovery" (See <http://www.ucop.edu/california-institutes/about/about.htm> and <http://uc-industry.berkeley.edu/about/goals.htm> for more details.) is investing both in specific areas with the former program (for example, bioengineering, biotechnology, and quantitative biomedical; telecommunications and information technology; and nanosystems) and in general collaborative research with the latter. The most competitive states in innovation and technology transfer will be those that have both supportive campus cultures and focused state support.

PRELIMINARY FINDINGS

I. TECHNOLOGY TRANSFER

1. UNC institutions are trending upward on total research awards (21%), federal research (65.4%), and industry sponsored research (29%). However, business and industry outside of North Carolina have fueled that growth; industry-sponsored awards from North Carolina business and industry have declined 16%. (Note: some data definition changes might have impacted to some degree these percentages.)
2. UNC institutions are, in relation to the overall research activity, only minimally involved in joint research with North Carolina business and industry. This equates at best to 1% of the total research amount awarded.
3. North Carolina selected institutions (Duke University, East Carolina University, North Carolina State University, UNC Chapel Hill, UNC Charlotte, and Wake Forest University) at \$2.2M per invention disclosure, were more efficient than the national average in both years examined (national averages \$2.4M in FY 2000 and \$2.5M in FY 2003.)

4. North Carolina selected institutions ranked second of seven states (behind only Virginia) examined in 2003 in efficiency of invention disclosures. In 2000, North Carolina was behind Virginia and Massachusetts and ahead of Georgia, Pennsylvania, Texas, and Michigan.)

5. North Carolina selected institutions, at \$6.7M in 2003 and \$6.5M in 2000 per license, were more efficient than the national average in both years examined.
6. North Carolina selected institutions ranked second of seven states in both years (behind Virginia) in their efficiency at converting research dollars into licenses.

7. North Carolina selected institutions are above the national averages in both 2003 and 2000 (more so in 2003), for research dollars expended per university start-up company created. North Carolina institutions expended \$88M in 2003 compared to a national average of \$100M. (In 2000, it expended \$66M compared to the national average of \$70M.)

8. North Carolina selected institutions ranked fourth (behind Massachusetts, Virginia, and Georgia) in their efficiency at converting research dollars into start-up companies created. They ranked fifth in 2000.

Overall, then, the technology transfer findings indicate select North Carolina institutions compare favorably to both national averages and to some other states, although they do not have a dominant competitive advantage in any of the areas. In addition, it appears that potential exists to grow significantly the North Carolina business and industry sponsored research.

II. RESEARCH

1. UNC Chapel Hill ranks 17 in total research expenditures by public universities (2002 data), followed by North Carolina State University (21), North Carolina A&T (171), UNC Wilmington (175), and East Carolina University (189).
2. UNC Chapel Hill also ranks very high (10) on federal research expenditures by public universities (2002 data), with a larger gap before the next institution; University of North Carolina State University (60). These two institutions were followed by North Carolina A&T (150), UNC Wilmington (163), and East Carolina University (189).

3. The two primary doctoral research universities (UNC Chapel Hill and North Carolina State University) have strong national rankings. They, and many of the other UNC institutions with smaller funded research programs, have developed areas of specialization in such fields as life sciences, which should have positive implications for supporting a number of the identified emerging industries in North Carolina.

III. CAMPUS CULTURE AND STATE SUPPORT FOR INNOVATION

1. UNC has begun initiatives to address insuring a campus culture at each of its institutions that supports innovation and entrepreneurship. While progress has been made, much work remains to be done.
2. North Carolina has traditionally provided very substantial support for its universities in general and has gained a national reputation as a result. However, a number of competitor states have made more substantial state investments in specific programs aimed at maximizing the partnerships among the state, its universities, and targeted businesses and industries.

8. OTHER PRELIMINARY FINDINGS

While the following do not necessarily fall within the scope of the current project, these findings surfaced during our work and are presented for consideration:

I. FUNDING

1. The funding formula for the NCCCS does not provide a financial incentive for developing or expanding academic programs in the areas of high state need. These programs are often high cost programs. While the UNC funding formula recognizes discipline cost differences, it does not recognize the high start up or expansion costs of such programs.

2. The funding formula for the NCCCS is based on a schools model, reflecting the origins of the System. For example, it provides no funding for curriculum programs in the summer even though that would be an ideal time for extensive developmental education programs and other academic programs. (The same is largely true of the UNC funding formula.)

3. While there are modest amounts in the state budget for collaborative programs between the two systems (and among institutions within each system), these are largely targeted and not extensive enough to provide adequate incentives.

4. With a high school drop-out rate in excess of 40%, North Carolina has a high need for basic skills programs. While the NCCCS has an extensive and successful program, it will not meet the future needs.
5. State budget priorities and shortfalls will require higher education to diversify its resource base.

II. POLICY

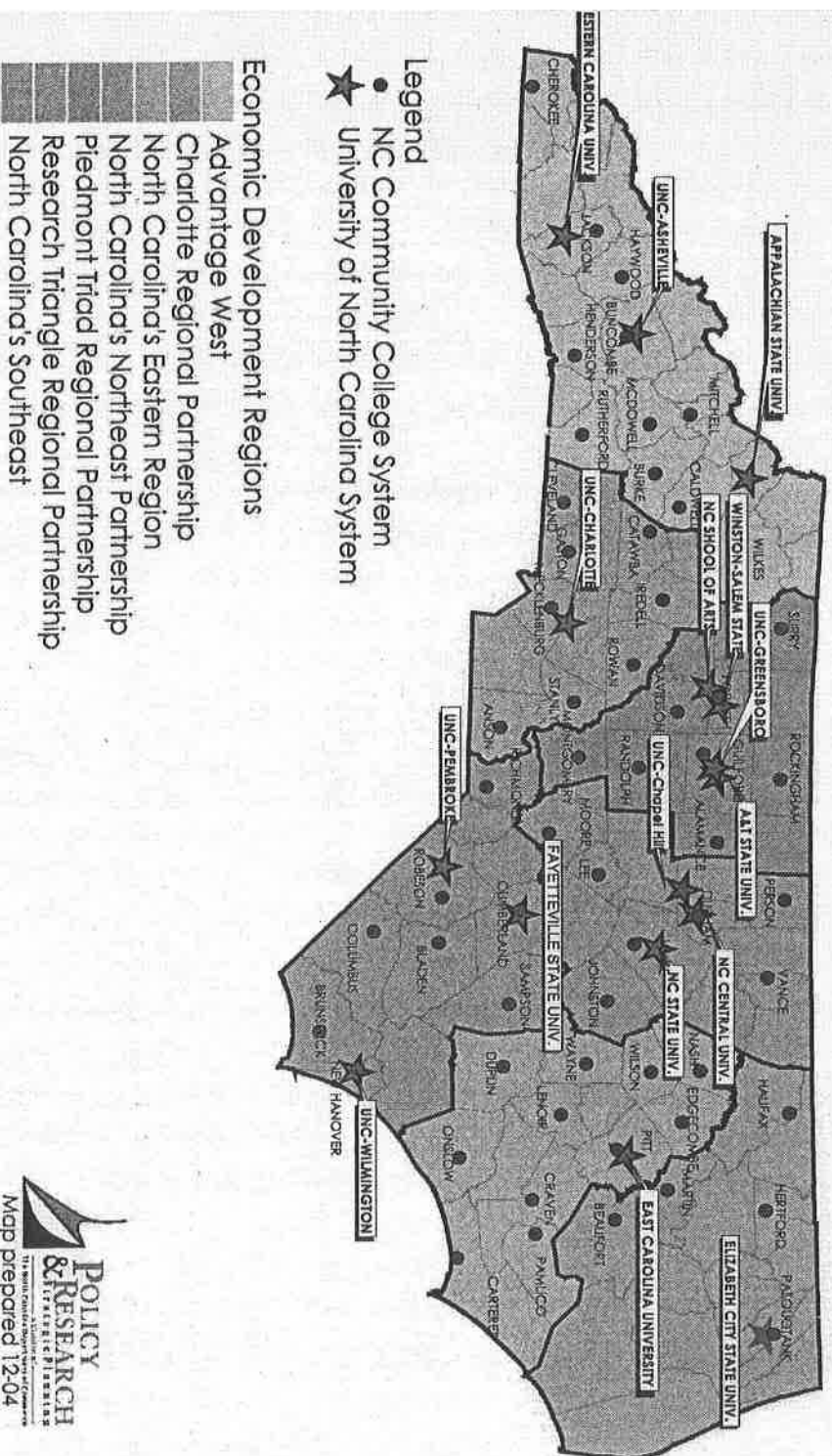
1. While UNC has well developed policies for program review and for taking programs off campus, it does not have a policy for the establishment or development of branch campuses or new campuses.
2. Both systems have program approval processes that appear thorough and timely, including notification of other institutions within each system of new program intents; however, there is no notification requirement between the two systems, although UNC posts its program proposal information on its website.
3. The NCCCS falls under the administrative rule making of the state which, in some instances, inappropriately slows response time (for example, approving and implementing new academic programs). Collaborative initiatives with UNC are often hindered because the Board of Governors can take quicker action than can the State Board of Community Colleges.

4. North Carolina does not appear to have as highly developed a P-16 approach to seamless education as do the leading states. With increased interest in innovations such as early and middle colleges in North Carolina and with a very high school dropout rate, it would seem an appropriate time to expand the P-16 initiative in the state to include all segments of the education system and the business community. The development of a K-16 data warehouse would be an example of a beneficial activity for such an expanded initiative.
5. Unlike many states, North Carolina does not have reciprocal in-state tuition with bordering counties in other states (it does have scholarships for students in border states who indicate their intention to become teachers in North Carolina's schools). Some economic development opportunities in border parts of the state may involve more than one state.
6. With the associate degree replacing the high school diploma as an entry level qualification for many occupations, the role of the bachelors degree and particularly the masters degree is changing. The need for the masters may even be proportionately higher than the need for students with bachelors. At the same time, many people with bachelors degrees may seek a specific diploma or certificate from a community college at some point in their careers.
7. North Carolina, like all states, has achievement gaps between its white and Asian students and African-American, Hispanic, and Native American students. Even though African-American and Native American participation rates in college are similar to whites, minority students do not have as high graduation rates for undergraduates nor the participation rates in graduate programs.
8. Current financial aid policies do not adequately address the financial needs of students taking multiple courses in joint programs at different campuses, as well as joint UNC and NCCCS programs.
9. Not all academic program expansions are initiated by UNC based solely on need and existing/projected data; external program initiatives can undermine the integrity of the academic program review process.
10. Both internal and external communications about higher education's role in workforce and economic development are inadequate for building support for increased involvement.
11. There is a history of collaborative policies and agreements for joint academic programs and shared facilities between UNC and NCCCS; these could be expanded.
12. Many UNC, NCCCS, and other facilities exist that could be considered as sites to provide greater access to higher education in North Carolina (both for in-person and e-learning).

ATTACHMENTS

- ATTACHMENT 1: State of North Carolina Higher Education System and Economic Development Regions
- ATTACHMENT 2: North Carolina Community College System – Summary
- ATTACHMENT 3: University of North Carolina - Summary
- ATTACHMENT 4: Issues Regarding Employment Data and Projections
- ATTACHMENT 5: Listing of Appendices/URLs
- ATTACHMENT 6: Original Language of HB 1264

State of North Carolina Higher Education System and Economic Development Regions



ATTACHMENT 1

ATTACHMENT 2:

NORTH CAROLINA COMMUNITY COLLEGE SYSTEM - SUMMARY

North Carolina has 58 comprehensive community colleges and one specialized technology center, listed alphabetically below. The system serves all 100 counties. Individual colleges have service areas that may include one or several counties.

COLLEGE	COUNTY	REGION
Alamance CC, Graham	Alamance	Triad
Asheville-Buncombe TCC, Asheville	Buncombe	West
Beaufort County CC, Washington	Beaufort	Northeast
Bladen CC, Dublin	Bladen	Southeast
Blue Ridge CC, Flat Rock	Henderson	West
Brunswick CC, Supply	Brunswick	Southeast
Caldwell CC/TI, Hudson	Caldwell	West
Cape Fear CC, Wilmington	New Hanover	Southeast
Carteret CC, Morehead City	Carteret	East
Catawba Valley CC, Hickory	Catawba	Charlotte
Central Carolina CC, Sanford	Lee	Triangle
Central Piedmont CC, Charlotte	Mecklenburg	Charlotte
Cleveland CC, Shelby	Cleveland	Charlotte
Coastal Carolina CC, Jacksonville	Onslow	East
College of The Albemarle, Elizabeth City	Pasquotank	Northeast
Craven CC, New Bern	Craven	East
Davidson County CC, Lexington	Davidson	Triad
Durham TCC, Durham	Durham	Triangle
Edgecombe CC, Tarboro	Edgecombe	East
Fayetteville TCC, Fayetteville	Cumberland	Southeast
Forsyth TCC, Winston-Salem	Forsyth	Triad
Gaston College, Dallas	Gaston	Charlotte
Guilford TCC, Jamestown	Guilford	Triad
Halifax CC, Weldon	Halifax	Northeast
Haywood CC, Clyde	Haywood	West
Isothermal CC, Spindale	Rutherford	West
James Sprunt CC, Kenansville	Duplin	East
Johnston CC, Smithfield	Johnston	Triangle
Lenoir CC, Kinston	Lenoir	East
Martin CC, Williamston	Martin	Northeast
Mayland CC, Spruce Pine	Mitchell	West
McDowell TCC, Marion	McDowell	West
Mitchell CC, Statesville	Iredell	Charlotte
Montgomery CC, Troy	Montgomery	Triad
Nash CC, Rocky Mount	Nash	East

COLLEGE	COUNTY	REGION
Pamlico CC, Grantsboro	Pamlico	East
Piedmont CC, Roxboro	Person	Triangle
Pitt CC, Greenville	Pitt	East
Randolph CC, Asheboro	Randolph	Triad
Richmond CC, Hamlet	Richmond	Southeast
Roanoke-Chowan CC, Ahoskie	Hertford	Northeast
Robeson CC, Lumberton	Robeson	Southeast
Rockingham CC, Wentworth	Rockingham	Triad
Rowan-Cabarrus CC, Salisbury	Rowan	Charlotte
Sampson CC, Clinton	Sampson	Southeast
Sandhills CC, Pinehurst	Moore	Triangle
South Piedmont CC, Polkton	Anson	Charlotte
Southeastern CC, Whiteville	Columbus	Southeast
Southwestern CC, Sylva	Jackson	West
Stanly CC, Albemarle	Stanly	Charlotte
Surry CC, Dobson	Surry	Triad
Tri-County CC, Murphy	Cherokee	West
Vance-Granville CC, Henderson	Vance	Triangle
Wake TCC, Raleigh	Wake	Triangle
Wayne CC, Goldsboro	Wayne	East
Western Piedmont CC, Morganton	Burke	West
Wilkes CC, Wilkesboro	Wilkes	West
Wilson TCC, Wilson	Wilson	East
NC Center for Applied Textile Technology, Belmont	Gaston	Charlotte

ATTACHMENT 3:

UNIVERSITY OF NORTH CAROLINA - SUMMARY

COUNTY / REGION	STATUS	FOUNDED	UNIVERSITY
Watauga West	Master's I (Comprehensive)	1899	Appalachian State University, Boone
Pitt Eastern	Doctoral/Research-Intensive	1907	East Carolina University, Greenville
Pasquotank Northeast	Baccalaureate	1891	Elizabeth City State University, Elizabeth City
Cumberland Southeast	Master's I (Comprehensive)	1867	Fayetteville State University, Fayetteville
Guilford Triangle	Doctoral/Research-Intensive	1891	NC Agricultural & Technical State University, Greensboro
Durham Triangle	Master's I (Comprehensive)	1909	NC Central University, Durham
Forsyth Triangle	Specialized	1963	NC School of the Arts, Winston-Salem
Wake Triangle	Doctoral/Research-Extensive	1887	North Carolina State University, Raleigh
Buncombe West	Liberal Arts	1927	UNC Asheville, Asheville
Orange Triangle	Doctoral/Research-Extensive	1789	UNC Chapel Hill, Chapel Hill
Mecklenburg Charlotte	Doctoral/Research-Intensive	1946	UNC Charlotte, Charlotte
Guilford Triangle	Doctoral/Research-Intensive	1891	UNC Greensboro, Greensboro
Robeson Southeast	Master's I (Comprehensive)	1887	UNC Pembroke, Pembroke
New Hanover Southeast	Master's I (Comprehensive)	1947	UNC Wilmington, Wilmington
Jackson Western	Master's I (Comprehensive)	1889	Western Carolina University, Cullowhee
Forsyth Triad	Baccalaureate	1892	Winston-Salem State University, Winston-Salem

ATTACHMENT 4:

ISSUES REGARDING EMPLOYMENT DATA AND PROJECTIONS

Many countries and regions, for example, Shanghai, Malaysia, and Germany, develop comprehensive country-wide economic and workforce development plans focusing on the growth of strategic clusters. In North Carolina, there appears to be no comprehensive plan or overview of the economic and workforce development needs of the State. Different regions gather data differently, the classification systems differ, and there appears to be no central data depository for the various parts of the system to feed into. The quality and consistency of secondary data available in North Carolina makes it difficult to pinpoint precise areas of skill shortages as they are perceived by employers, who are the customers of the state's workforce development and post-secondary system. In the process of the research supporting this study, significant discrepancies were uncovered between the kind of data gathered by the State, by its regions, and the US DOL's Bureau of Labor Statistics. These discrepancies are a cause for concern and an opportunity.

Specifically, the following issues hinder North Carolina's ability to see clearly economic development and employment opportunities:

1. *The way in which data are cut.* The US Bureau of Labor Statistics (BLS) maps specific occupations into industries, but not necessarily in sectors or clusters. For example, biotechnology workers are spread over a number of occupational categories found in the BLS data.

2. *Challenges with regional data.* The data and economic development strategies for the regions are highly variable in quality, depth, and accuracy, and not sharply enough defined in terms of occupational forecasts. Also, the studies were highly dissimilar in scope and content. Several of the regions had not completed the current visioning process. This led to gaps in the data, especially for the Northeast region. The regional forecasts do not tie back to the occupational categories, either in the NCESC or in the BLS because the classifications are different. For example, North Carolina's biopharmaceutical report divides occupations into three broad categories: entrepreneur/leader, R&D, and manufacturing. No such categories (colored by the needs of the biopharmaceutical sector) exist in the NCESC or USDOL data. What specific occupations fit under those headings in North Carolina's biopharmaceutical cluster(s) can only be gathered with primary research. There is a similar problem with the IT industry, as the heading "computing and mathematical occupations" may not include enough occupations found in that industry in North Carolina.

3. *Problems with the NCESC data.* The biggest challenge is that the NCESC is in the middle of completing its 2012 forecast. Therefore, this study had to rely upon the 2010 projections. These projections were based on 1976-2000 occupational and employment data. Since major changes have occurred in the economy since 2000, these forecasts have limits as to their use. Additionally, the NCESC occupational forecasts did not always add up. For example, manufacturing workers for the state were forecast to decline by 10,000; however, looking at the seven different regions showed an increase for each region of a total of 50,000.

**ATTACHMENT 5:
LISTING OF APPENDICES/URLS**

APPENDICES

3. NORTH CAROLINA EMPLOYMENT ENVIRONMENT

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- 3.A.4. Summary of Charlotte- related Reports
- 3.A.5. Summary of Southeast- related Reports
- 3.A.6. Summary of Research Triangle- related Reports
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- 3.A.9. Top 25 North Carolina Occupations Forecast for 2000-2010 sorted by Annual Percent Change
- 3.A.10. North Carolina Occupations Forecast for 2000-2010 sorted by Educational Requirements, only Occupations with change greater than 500 positions and requiring Vocational or Higher Training Included
- 3.A.11. Top 25 North Carolina Occupations Forecast for 2000-2010 sorted by Absolute Change
- 3.A.12. North Carolina Counties by Workforce Development Board Regions and Economic Development Regions.
- 3.A.13. North Carolina Occupational Forecasts 2000-2010 by Major Occupational Groups
- 3.A.14. Piedmont Triad Occupational Forecasts 2000-2010 by Major Occupational Groups
- 3.A.15. Advantage West Occupational Forecasts 2000-2010 by Major Occupational Groups
- 3.A.16. Charlotte Occupational Forecasts 2000-2010 by Major Occupational Groups
- 3.A.17. Research Triangle Occupational Forecasts 2000-2010 by Major Occupational Groups
- 3.A.18. Eastern Occupational Forecasts 2000-2010 by Major Occupational Groups
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- 3.B. Job Projections and Educational/Skills Requirements**
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**ATTACHMENT 5:
LISTING OF APPENDICES/URLS**

APPENDICES continued

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- 4.A.4. Curriculum Student Information II; Student Enrollment by College 2003-04 (North Carolina Community College System Fact Book: Section IV-Page 69-70)
- 4.A.5. Continuing Education Student Information, Student Enrollment by College, 2003-04 (North Carolina Community College System Fact Book: Section IV-Page 71-72)
- 4.A.6. New and Expanding Industry Training Annual Statistical Data 1986-1987 through 2003-2004

4.B. University of North Carolina System

4.B.1. Program Matrix by Program Area, by Institution, and Degree Level

- 4.D. Joint Programs and Partnerships**
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4.H. Role of Historically Minority Institutions (HMIs)

- 4.H.1. Progress Report on Focused-Growth Institutions of the University of North Carolina

5. PRELIMINARY GAP ANALYSIS: STATE NEEDS/ACADEMIC PROGRAMS

5.B. North Carolina Community College

5.B.1. All Occupational Projections

URL WEBSITES/FOOTNOTE/SOURCE DATA LISTING

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- Source: RTI calculations based on aggregation of NCESC data**
- Figure 3.A.6 Percent Job Changes by Major Occupational Grouping by Economic Development Regions
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- Source: NC Employment Security Commission**
- Table 3.B.3 North Carolina Occupation Trends 2000-2010: Employment in Production Occupations
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 - Table 3.B.13 North Carolina Occupation Trends 2000-2010: Employment in Transportation and Material Moving Occupations
 - Table 3.B.15 North Carolina Occupation Trends 2000-2010: Employment in Selected Transportation and Material Moving Occupations

- Source: Figure 5.1 Nanotechnology's Probable Business Impact in 2007, Larta, 2003**
- Figure 3.B.6. Nanotechnology's Impact on Traditional Industries:

Source: I. Creating a Bio-science Workforce: National Skills Standards for Entry into the Bioscience industry. EDC 1995. Monika Airing and Judith Leff. Funded by the US Department of Labor and US Department of Education. Source 2. Windows on the Workplace 2003: A Training Needs Assessment for the Biomanufacturing Workforce. March 2003. NC Biotech Center Education and Training Program.
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- Table 3.B.9. Analysis of Skills Requirements for Biopharmaceutical Workforce

- **Source:** <http://demog.state.nc.us>
- Table 3.C.1 Population Forecasts for 2010 by Age
- Figure 3.C.2 Growth 2000-2010 by County
- **Source:** www.ncruralcenter.org
- Figure 3.C.3 Manufacturing Decline: **Source:**
- www.ncruralcenter.org/databank/trendpage_employment.asp
- Figure 3.C.7. Educational Attainment Levels: **Source:**
- www.ncruralcenter.org/databank/trendpage_education.asp
- Figure 3.C.8 Population with a College Degree by County: **Source:**
- www.ncruralcenter.org/databank/trendpage_education.asp
- **Source:** www.census.gov
- Table 3.C.4 North Carolina Educational Attainment, 2004, Percent of Population 25 and Older
- **Source:** www.census.gov/population/www/socdemo/education/cps2004.html. Tables A, 12 and 14, accessed 4/12/05.
- Table 3.C.5 North Carolina Educational Attainment, 2004, Percent of Population 18 and Older
- **Source:** www.census.gov/population/www/socdemo/education/cps2004.html. Table 14, accessed 4/12/05.
- Table 3.C.6. North Carolina Educational Attainment, 2004, Percent of Population 25 and Older
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- *Ref. 2005-7 Expansion Budget Request Justification*, page 1, para 2.)
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- Statistical Abstract of Higher Education, which is produced on an annual basis by the UNC. (It is available online and includes data for all higher education institutions in North Carolina.)
- Data from The Center at the University of Florida

- Georgia, for example, has created "Centers for Innovation" in targeted areas of research strength and state need. (See <http://www.georgiainnovation.org/> for more details)
- California, through its "California Institutes for Science and Innovation" and its "University of California Discovery (See <http://www.ucop.edu/california-institutes/about/about.htm> and <http://uc-industry.berkeley.edu/about/goals.htm> for more details.) is investing both in specific areas with the former program.

**ATTACHMENT 6:
ORIGINAL LANGUAGE OF HB 1264**

Original Language as approved in House Bill 1264:

**PART 6. UNIVERSITY SYSTEM AND COMMUNITY COLLEGE SYSTEM
JOINT STUDY OF HIGHER EDUCATION STRATEGY**

SECTION 6.1. To ensure that the State's citizens are academically prepared and equipped for current job opportunities and jobs of the future in North Carolina's growing knowledge economy, the Board of Governors of The University of North Carolina, in collaboration with the State Board of Community Colleges, shall, within 60 days after this act becomes law, contract with a private consulting firm that has experience in higher education to conduct a comprehensive study of the mission and educational program needs for the University System and the Community College System. The Board of Governors may enter into contracts with consultants for the purposes authorized in this section without complying with the provisions of Article 3C of Chapter 143 of the General Statutes. The study shall include all of the following:

(1) An analysis of demographic, economic, and educational data regarding the needs for higher education programming in the State as a whole, as well as in all geographic and economic regions of the State.

(2) An updated enrollment projection for each System and each institution that includes adult, noncredit, career, and degree program enrollments.

(3) An analysis of current program offerings and majors in undergraduate, graduate, nondegree, and workforce training programs, offered by each institution.

(4) Recommendations as to how the institutions might better serve current and emerging needs related to existing and new programs; opportunities for regional program delivery; enhanced effectiveness and quality that can be achieved via sharing of resources, and program partnerships and collaborations both within and between higher education systems; and opportunities for online program delivery and other distance technology delivery systems.

(5) An analysis of and suggested updates to existing long-range capital plans of both the University and Community College Systems that will address land acquisition and facility needs to support the program recommendations identified in this study, taking into account opportunities for modernization of and new uses for existing facilities.

Technical Correction – the following change was made in Senate Bill 1225, 2004 Technical Corrections Act:

SECTION 51. If House Bill 1264, 2003 Regular Session, becomes law, then the first paragraph of Section 6.1 of House Bill 1264, 2003 Regular Session, reads as rewritten:

"SECTION 6.1. To ensure that the State's citizens are academically prepared and equipped for current job opportunities and jobs of the future in North Carolina's growing knowledge economy, the Board of Governors of The University of North Carolina, in collaboration with the State Board of Community Colleges, Carolina and the State Board of Community Colleges shall, within 60 days after this act becomes law, contract with a private consulting firm that has experience in higher education to conduct a comprehensive study of the mission and educational program needs for the University System and the Community College System. The Board of Governors and the State Board may enter into contracts with consultants for the purposes authorized in this section without complying with the provisions of Article 3C of Chapter 143 of the General Statutes. The study shall include all of the following:"