Help Wanted:

Community Colleges' Role in Meeting Work Force Shortages

by John Manuel

Executive Summary

North Carolina's economy has shifted from a manufacturing-based three-legged stool of textiles, tobacco, and furniture to a service-based ladder missing the rungs of the "traditional middle jobs." Without some postsecondary education or extensive on-the-job training, those on the bottom rungs of low-skill, low-pay jobs have no way of climbing to the higher rungs of "new middle jobs" or to the top rungs of high-skill, high-pay jobs. The community college system has the ability to bridge the gaps in the new economic ladder left by the missing rungs of traditional middle jobs.

Of the various work force shortages North Carolina currently faces, the most serious are in the fields of allied health, nursing, pharmacists, physical therapists, respiratory therapists, laboratory technicians, and radiology technicians (see Table 1, items 2, 4, 9, and 13, p. 150). As the Baby Boom generation ages and the state's in-migration of retirees continues to increase, the demand for health care is rising rapidly.

Although registered nursing is our state's second fastest growing occupation, North Carolina will have a shortage of 9,000 ***nurses*** *in 2015 and almost 18,000 by 2020. North Carolina will need roughly 2,400 more graduates annually in the field of health care, 2,000 of which will need some postsecondary education or training. For academic year 2005–06, North Carolina colleges and universities produced a total of 3,380 pre-licensure (not yet licensed to practice) registered nurse (RN) graduates. Of the RN graduates, 68 percent, or 2,292, came from the community colleges. One issue affecting the shortage of nurses involves the differentiated funding needed for high-cost programs such as allied health programs.*

The state faces a critical shortage of nursing faculty as well. One reason for the faculty shortage is the inability of community colleges to offer competitive salaries. The average 9-month salary for instructors for the associate's degree in nursing program during the 2006–07 academic year was $47,303. However, in 2007, the average salary for an RN in North Carolina was $61,347.

Added to the pay differential is the fact that there may not be enough nurses trained at a master's degree level to fill the teaching vacancies. Currently, a bachelor's or *master's degree of science in nursing is the minimum education degree required by the N.C. Board of Nursing to teach in that profession. However, a rule proposed by the N.C. Board of Nursing would require that all faculty initially employed after December 31, 2014, have a master's degree or a nursing doctorate degree from an accredited institution. This proposal is opposed by the N.C. Association of Community College Presidents and the State Board of Community Colleges.*

Another severe shortage is that of ***public school teachers.*** *The shortages are especially great in high school math; special education: general curriculum; high school science; middle school math; middle school science; special education: adapted curriculum; cross categorical; behavioral/emotional disabilities; learning disabilities; and second languages (see Table 1, item 18, p. 150). Due to projected population growth, North Carolina will need 953 more* new *teachers each year even to maintain current student-teacher ratios, much less improve them. In addition, the public schools must* replace *approximately 10,000 teachers every year due to resignation and retirement. North Carolina will need approximately 6,500* more *graduates each year in order to address the teacher shortage.*

While not quite as dire as the allied health care and public teaching situations, the service and manufacturing industry also must cope with labor shortages, specifically with maintenance workers, machinists, skilled tradesmen, and ***truck drivers*** *(see Table 1, item 6, p. 150). In 1949, North Carolina established the first national Truck Driving Training School at Johnston Community College, which now graduates 300 drivers per year. However, there are a total of 3,430 annual job openings in this field.*

The field of ***biotechnology*** *also faces significant work force shortages. North Carolina's government leaders recognized the potential of biotechnology as a major employer early, creating the North Carolina Biotechnology Center in 1984, the world's first government-sponsored organization dedicated to developing the biotechnology industry. But while the state now ranks third in the nation in the number of biotechnology companies, the state has only recently begun supporting biotechnology work force development, as in BioNetwork, a statewide network of community college campus-based education and training programs. The BioNetwork's multifaceted partnerships have paved the way for North Carolina to be the only state in the nation to rank in the top 10 for job growth in all biotechnology sectors. Despite the efforts of BioNetwork, the demand for biotechnicians exceeds the community college output by an estimated 200 percent.*

Conclusions and Recommendations

As North Carolina's economy shifts from a three-legged stool of textiles, tobacco, and furniture to a ladder missing the rungs of the traditional middle jobs, our state must take new initiatives to address key work force shortages. The N.C. Community College System has a crucial role to play.

Based on our research, the N.C. Center for Public Policy Research recommends:

(1) The N.C. General Assembly, the State Board of Education, and the N.C. Department of Public Instruction should adopt policies that establish the N.C. Community College System as the primary venue through which to train the number of teachers and nurses the state needs.

North Carolina must be strategic in trying to meet work force shortages in teaching and nursing. Any state plan to address these shortages must provide for the N.C. Community College System to play the primary role. There are three reasons for this—the community colleges' greater affordability, greater ability to produce a larger number of program completers and graduates, and greater ability to meet region-specific demands in terms of the number of graduates produced.

(2) The State Board of Education, Community College System, and Department of Public Instruction should work together to establish policies that address the shortage of public school teachers, including making it easier for community colleges to train teacher education students for licensure. Two policy options could accomplish this goal:

(a) The State Board of Education should amend current policies to accept teacher education licensure credits from community colleges in all nine areas of teaching competence. *Currently, the State Board only accepts community colleges licensure credits in six of the nine areas of teaching competence. The State Board of Education only accepts licensure credit for the remaining three areas of teaching competence from four-year colleges and universities.*

(b) The State Board of Education and N.C. Community College System should work together to ensure that all 58 community college campuses take advantage of the State Board of Education's new policy of permitting community colleges, in conjunction with a university, to participate in lateral entry teaching programs that lead to licensure. *As of April 2008, no applications for lateral entry teaching programs had been received by the State Board of Education. In order to raise community college awareness of the opportunity available, the State Board of Education should encourage community college participation in lateral entry teaching programs by developing and promulgating rules under which community colleges can apply. In turn, the N.C. Community College System should encourage all of its 58 campuses to apply.*

(3) The N.C. General Assembly should provide differentiated funding for community college programs, including more funding for high-cost programs in areas of increased state need such as allied health.

Because funding per full-time equivalent students (FTEs) is determined by the previous year's enrollment and is the same for all programs regardless of cost, the current funding model fails to account for differences in program costs. In other words, all FTEs have the same financial value despite the fact that certain programs are more expensive to operate than others. Health science programs, in particular, are in great need now and for the future but cost $1,520 more per FTE than other curriculum programs. Due to the paucity of additional funding for high-cost programs, community colleges must limit program enrollments, eliminate other

high-cost programs, or funnel money from other areas. In response, the State Board of Community Colleges has identified the establishment of differentiated funding as a priority. The Center endorses this concept. While the General Assembly made an important step towards differentiated funding for high-cost programs in the 2007 legislative session, the General Assembly should continue to adopt differentiated funding policies, especially granting higher funding for high-cost programs in areas of high state need such as allied health programs.

(4) The N.C. Community College System should use the BioNetwork's strategy of forming innovative, strategic, and diverse partnerships with industry, private grant-making foundations, the UNC system, and the General Assembly as a blueprint for achieving similar success in the fields of allied health, teacher education, and other fields of strategic importance. The System also should identify its top four fields of strategic importance for the General Assembly and the public.

Just as the BioNetwork has taken forceful strides in satisfying work force demands in the field of biotechnology, the occupations of nursing, teaching, and other fields of strategic importance could benefit from similar partnership strategies.

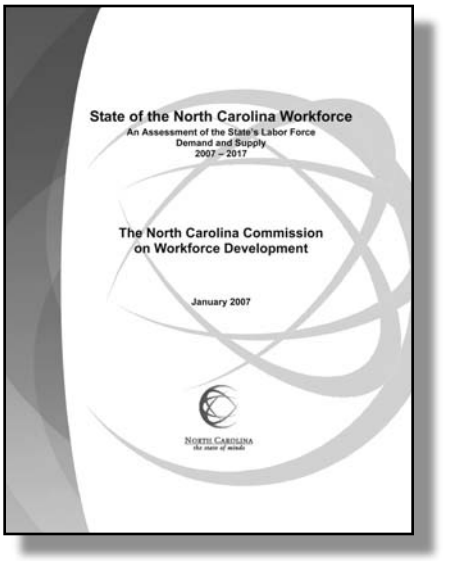
The BioNetwork is so effective because it is precisely that—a "network" of various partnerships. The N.C. Community College System should try to emulate the BioNetwork example by diversifying partnerships in health, teaching, and other fields. This diversification strategy could prove particularly effective in allied health if stronger partnerships with UNC were linked with partnerships with the health industry.

(5) The General Assembly should adopt a policy of moving community college faculty salaries to the national average by 2016.

In 2005–06, the average salary for North Carolina community college faculty was $40,989. That same year, the average community college faculty salary nationally was $55,405, and North Carolina community college faculty pay ranked 46th in the nation. By comparison, the average North Carolina public school teacher salary is $46,410, ranking 27th in the nation. The average full-time faculty member at North Carolina's 16 public universities is paid $80,784, ranking 13th in the nation. Raising community college faculty pay to the national average would cost an estimated $77.3 million over the period 2007–10. The community college system is the key to addressing work force shortages and adjusting to the huge transition in North Carolina's economy. That being the case, community college faculty pay must improve, or the state's response to work force shortages and economic transformations will be as below average as the pay.

North Carolina's economy has shifted from a manufacturing-based three-legged stool of textiles, tobacco, and furniture to a service-based ladder missing the rungs of "traditional middle jobs." Without some postsecondary education or extensive on-the-job training, those on the bottom rungs of low-skill, low-pay jobs have no way of climbing to the higher rungs of "new middle jobs" or to the top rungs of high-skill, high-pay jobs. The community college system may have the unique ability to bridge the gaps in the new economic ladder left by the missing rungs of traditional middle jobs.

North Carolina's economic shift is evidenced in the fact that no manufacturing industries are included among North Carolina's current 25 fastest growing industries, and between 2007 and 2017, only one manufacturing industry—animal slaughtering and processing—is predicted to be among the top 50 fastest growing industries.[1] During the past four years alone, North Carolina has lost 72,000 manufacturing jobs, 75 percent of which were in textiles, apparel, furniture, and computer electronics.[2]



According to the N.C. Commission on Workforce Development's 2007 report, *State of the North Carolina Workforce*, the state's new service economy has actually created an imbalance that may prove detrimental to those most affected by the loss in manufacturing jobs. While the state is expected to add almost 700,000 more jobs to its current 5.15 million by 2017, few of those new jobs will offer "family-sustaining" wages to the dislocated work force without significant upgrades in their skill set.[3] While many of North Carolina's fastest-growing jobs will be in the more knowledge-intensive industries that require far higher education levels, industries that require only the existing skills of dislocated workers pay less than 80 percent of average earnings.[4]

The commission describes the advent of "new middle jobs" which require workers in traditional middle jobs to upgrade their skills. According to the commission, "Those that do not make the investment or whose companies do not adapt, run the risk of falling behind. Increasingly, those that do not adapt are losing their jobs and settling for re-employment opportunities in one of the low skill occupations" requiring less than a General Equivalency Degree.[5] Furthermore, the advent of new middle jobs has been coupled with an increase in the percentage of low-skill, low-wage jobs. While low-skill jobs currently constitute 34 percent of North Carolina's *total* jobs, they will represent more than 40 percent of jobs *created* between 2007 and 2017, thus driving down North Carolina's average earnings as compared with the U.S. average.

Ultimately, the loss of traditional middle jobs and the growth both of high-skill, high-pay and low-skill, low-pay jobs are "creating an increasingly polarized workforce," in which low-skill workers have fewer opportunities for upward mobility.[6] According to the commission, "The challenge for North Carolina's workforce and education system will be to ensure that North Carolinians are prepared to take advantage of the better-paying, higher skill jobs, and preventing people from having to accept low pay jobs just because they are not prepared for the good job opportunities available in the state."[7]

The commission says North Carolina's community colleges are key to meeting this challenge. Community colleges must generate almost 19,000 more "program completers" annually in order to satisfy the demand for workers with associate's degrees and occupational licenses.[8] Program completers are students who complete certificate or work force training programs, as opposed to associate's degree

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programs. The commission also notes employers' upcoming difficulty in filling both high-end jobs and "new middle jobs," saying, "If the University of North Carolina and the North Carolina Community College System, combined, were charged with meeting all of the anticipated needs, the two postsecondary educational systems would need to generate an additional 39,000 program completers per year during the next decade." Specifically, North Carolina will need approximately 6,500 more completers each year in order to address the state's teacher shortage. In addition, the health care field will require roughly 2,400 more completers annually, 2,000 of which will need at least an associate's degree, technical training, or extensive on-the-job training.[9]

While the community college system may be North Carolina's greatest asset in helping the work force bridge the gaps in the new economic ladder left by the missing rungs of traditional middle jobs, its capacity to do so is not a given. Students must be recruited constantly and educated through new methods that meet their budgets and life situations. Skilled faculty and administrative personnel must be hired and retained with competitive salaries and professional development. Facilities and equipment must be upgraded to correspond to what is used in the workplace. In some crucial cases, that is not happening.

Hospital Emergency

Of the various work force shortages North Carolina currently faces, the most serious are in the fields of allied health, nursing, pharmacists, physical therapists, respiratory therapists, laboratory technicians, and radiology technicians. As the Baby Boom generation ages and as the in-migration of retirees to the state in-

creases, the demand for health care and its associated personnel is rising. Yet the production of allied health care workers, particularly of qualified nurses, is nowhere close to meeting the demand.

According to the Employment Security Commission, registered nurses (RNs) represent the second fastest growing occupation in North Carolina with a projected 26,060 openings occurring through 2014 (see Table 1, p. 150). Nursing aides represent the ninth fastest growing occupation with 13,150 openings, and home health aides the 13th fastest growing occupation with 9,300 job openings.[10]

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North Carolina's community colleges have been involved in the training of nurses since 1963. Currently, all 58 community colleges in the state offer programs in nursing and allied health. Associate's degree nursing (ADN) is a two-year program, graduates of which take the same state board examination as four-year college graduates to become registered nurses (RNs). Licensed practical nursing (LPN) is a one-year program leading to certification as a licensed practical nurse, which requires less training. Once the State Board of Community Colleges approves a new nursing program for Martin Community College in Williamston, every college in the system except Pamlico Community College in Grantsboro will have either an associate's degree in nursing or LPN, with many having both. Pamlico has only a certified nursing assistant (CNA) program and one other allied health program.

For academic year 2005–06, North Carolina colleges and universities produced a total of 3,380 pre-licensure (not yet licensed to practice) RN graduates. Of those, 2,292 of the graduates, or 68 percent, came from the community colleges. Of RN graduates from four-year colleges and universities, 843, or roughly 85 percent, matriculated through the UNC system, while 144, or roughly 15 percent, matriculated through private colleges and universities.[11]

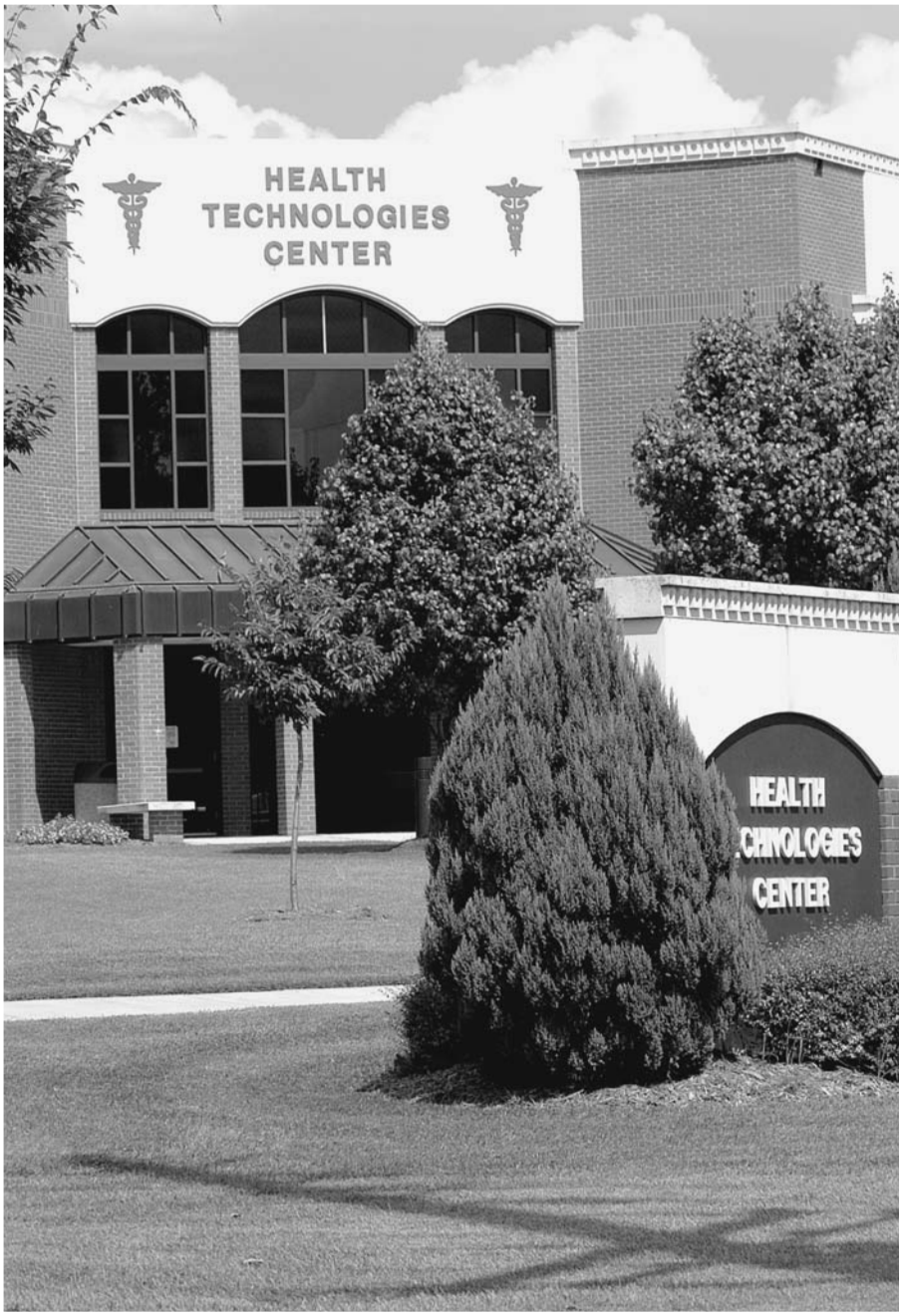
One cause of the nursing shortage is the lack of adequate funding for nursing programs at community colleges. Following the 2005–06 legislative session, N.C. Community College System President Martin Lancaster expressed frustration in dealing with the legislature over the issue of funding for allied health. "We requested $29 million for Allied Health programs in the latest [2005–06] session. They gave us $1 million for personnel and $5 million for equipment and technology. They give us the same amount of money per FTE [full-time equivalent] in allied health as they do for cosmetology. They need to understand that it costs 10 times as much to train a nurse as a cosmetologist."

However, following the 2007 session, President Lancaster reports that some progress has been made. President Lancaster says, "We *asked* for $31 million in the regular session to address salaries, differential funding, and other allied health needs. We *got* $5.6 million, which is being used for differential funding in allied health programs—to cover salary and equipment costs that are greater per FTE than any other curricula." While Lancaster says that allied health programs remain "grossly underfunded," he says, "We at least we have our foot in the door and have broken the ice on the concept of differentiated funding."

In 2004, the N.C. Institute of Medicine's Task Force on the N.C. Nursing Workforce called on the state's colleges and universities to significantly increase their enrollment of nursing students.[12] Enrollment has been increasing but is running up against a barrier caused by a shortage of faculty. North Carolina colleges were forced to deny admission to 6,588 *qualified* applicants for entry-level RN programs in 2005–06, a deficit that N.C. Center for Nursing's associate director of research,

Linda Lacey, attributes to "a lack of faculty, classroom space, and clinical placements for these students."[13]

Kathy Weeks, director of the associate's degree nursing program at Wake Technical Community College in Raleigh, says, "I do feel like it [the shortage of faculty] is a very significant issue. This fall [2007], we had several teaching vacancies that were difficult to fill. We need full-time and part-time faculty with expertise in psychiatric nursing. The full-time position for the mental health nursing course remained unfilled all semester. Fortunately, we could shift several students to other courses. Nursing programs are required by law to have a faculty-to-student ratio of no more than one-to-10 in clinical settings. Because of the high acuity level of patients [indicating that the patients are beyond uncomplicated, short-term illness], we try to



keep that ratio to one-to-eight. We can get by with larger numbers [of students] in a classroom and be fairly effective, but students in clinical settings are providing care to patients. That's why we need so many faculty. In a clinical setting, the students can't do the work of a nurse without a nursing instructor or preceptor [a supervising, experienced staff member] on the floor."

The N.C. Center for Nursing is the nation's first state-funded agency dedicated to ensuring adequate nursing resources for the state's health care needs. Its 2006 report says, "A shortage of new nursing faculty, compounded by the aging of current faculty, will sorely challenge us in successfully addressing an evolving nursing shortage . . . . Unfortunately, the situation could get much worse."[14]

"The Task Force on the N.C. Nursing Workforce ... predicts a shortage of 9,000 nurses in 2015 and almost 18,000 by 2020."

Likewise, Lacey says, ". . . without an immediate increase in the number of registered nurses qualified and willing to teach in nursing education programs, we cannot begin to address the general shortage of registered nurses we expect to deepen in the next 5 years. While we were able to expand registered nurse production between 2003 and 2005, the total number of new registered nursing graduates is down from 3,422 in 2005 to 3,380 in 2006—a total loss of 42. But in the associate's degree in nursing programs, total new registered nursing graduates declined by a total of 67 from 2005 to 2006."[15]

Lacey continues, "While these numbers are small, I think it indicates that at the very least we have hit the ceiling in terms of being able to expand our community college programs with existing staff and facility resources. Couple that with increasing workloads for community college faculty as evening and weekend program options open up, salaries that are far behind what these registered nurses can earn in clinical practice, and a general aging of the faculty pool in North Carolina where the average age among instructors was 50.6 in 2006, and almost half (47.8 percent) are over the age of 50."

As early as 2004, the Task Force on the N.C. Nursing Workforce, convened by the N.C. Institute of Medicine, released a report addressing some of Lacey's concerns. The report predicts a shortage of 9,000 nurses in 2015 and almost 18,000 by 2020.[16] Using other models to forecast the demand for nurses, estimates of the shortage of RNs is even higher, with 19,914 needed by 2015 and 32,072 needed by 2020 (see Table 4, p. 155). Renee Batts, health sciences program coordinator for the community college system says, "The N.C. Center for Nursing reports that we are at the beginning of a nursing shortage that will become more severe by 2020. They estimated that for 2007 we had an 8.9 percent shortage that will increase to 20.8 percent in 2015 and in 2020 the shortage will be 29.6 percent." The N.C. Center for Nursing also predicts that the state may have less than half of the faculty needed to train new nurses by 2020.

One reason for the faculty shortage is the inability of community colleges to offer competitive salaries. "The community college system struggles to match the salaries that a nurse can get in a clinical setting," says Linda Hofler, vice-president of office quality for Pitt County Memorial Hospital. "Nurses might find the teaching hours attractive, but the pay difference is too great." According to Keith Brown, associate vice president for planning, accountability, research, and evaluation for the N.C. Community College System, the average 9-month salary for system faculty instructing the associate's degree in nursing program during the 2006–07 academic year was $47,303. However, in 2007, the average salary for a registered nurse in North Carolina was $61,347.[17]

Added to the pay differential is the fact that there are not enough nurses trained at a master's degree level to fill the teaching vacancies. Currently, a bachelor's *or* master's degree of science in nursing is the minimum education degree required by the N.C. Board of Nursing to teach in that profession. However, a rule proposed by the N.C. Board of Nursing would require that all faculty initially employed after December 31, 2014, have a master's degree or a nursing doctorate degree from an accredited institution.

The Need for Nurses as Caretakers and Faculty

North Carolina needs more nurses to serve two primary functions: We need caretakers, and we need nursing faculty. First, and most immediately, North Carolina needs nurses to care for the aging Baby Boom population. Beginning in 2011, the Baby Boom generation will begin to reach the retirement age of 65. By 2020, there will be an estimated 1,618,578 Baby Boomers aged 65 and older in North Carolina.[1] Many of these retirees will need care from nurses, and nurses retiring from the field of nursing will need to be replaced. Second, North Carolina needs more nursing faculty in order to train the number of nurses needed to meet projected shortages.

These two needs for nurses lead to differing proposals on how to satisfy the nursing shortage. Community colleges, as contrasted with four-year colleges and universities, are best equipped to satisfy the immediate need for nurses as caretakers. There are three reasons for this—the community colleges' greater affordability, greater ability to produce a larger number of program completers and graduates, and greater ability to meet region-specific demands in terms of the number of graduates produced. North Carolina will have an estimated shortage of 9,000 registered nurses (RNs) in 2015 and almost 18,000 by 2020.[2] The state will need roughly 2,400 *more* graduates annually in the field of health care, 2,000 of whom will need some postsecondary education or training.[3] For academic year 2005–06, North Carolina colleges and universities produced a total of 3,380 pre-licensure (not yet licensed to practice) RN graduates.[4] Of the RN graduates, 68 percent, or 2,292, came from the community colleges.[5]

In addition to their capacity to produce a greater number of RN graduates, community colleges also have shown they can produce high-quality nurses equal to any other source. In 2006, North Carolina's passing rate for *all* registered nursing licensures was 90 percent. The community colleges' passing rate for all associate's degree in nursing licensures was 89 percent, while the passing rate for all bachelor's of science in nursing licensures was 92 percent.[6] Within bachelor's of science licensures, the UNC system passing rate was approximately 89 percent, while the passing rate for private colleges and universities was approximately 94 percent.[7]

Out of North Carolina's registered nurses, 60 percent have an associate's degree in nursing (ADN) and 40 percent have a bachelor's of science in nursing (BSN). A 2004 report from the N.C. Institute of Medicine recommended that North Carolina flip the current percentages in its RN work force to be 60 percent BSN and 40 percent ADN "through enabling more ADN and diploma graduates licensed as RNs to extend their educational credentials through RN-to-BSN programs, as well as through expansion of pre-licensure BSN programs and accelerated BSN options."[8]

The N.C. Center for Nursing supports the Institute of Medicine's recommendation to produce more BSN than ADN nurses on the grounds that four-year colleges and universities may be better equipped to satisfy the long-term need for nursing faculty. According to a report by the N.C. Center for Nursing, more than 80 percent of all nurses who attain a master's degree or a doctorate in any field began their nursing career in a bachelor's degree program. In other words, those nurses with a BSN, as opposed to those with an ADN, are more likely to attain a master's degree or doctorate in nursing. According to Brenda Cleary, executive director of the N.C. Center for Nursing, "We are not making sustained progress [in flipping the current percentages], which has many implications in light of the nursing faculty shortage."

But, the N.C. Center for Nursing's position assumes that all nursing faculty must have a master's degree or doctorate in nursing. Currently, that is not the case—nursing faculty need only have a bachelor's of science in nursing. However, a recent proposal from the N.C. Board of Nursing would alter current rules to require that all nursing faculty initially employed after December 31, 2014, have a master's degree or a nursing doctorate degree from an accredited institution. This proposal has been formally opposed by the N.C. Association of Community College Presidents and the State Board of Community Colleges.[9]

Some experts say the community colleges are actually contributing to the shortage of nurses. "The majority of nursing graduates are coming from the community colleges and are prepared at the associate's degree level," says Brenda Cleary, former executive director of the N.C. Center for Nursing. "The vast majority of these nurses never complete additional degrees beyond entry, and those who do rarely complete more than one additional degree. That is a recipe for disaster. We have to get more master's degree and doctorally prepared nurses, or we can't prepare the next generation of any kind of nurse."

It's not that you've got the qualifications, for this or any other work, but there are plenty who have. You haven't got the disqualifications, though, and that's much rarer. Any more questions?

–Kingsley Amis, Lucky Jim

Cleary applauds the community colleges' "open door" admissions policy, but says it attracts a stream of students who don't advance their education and, in many cases, drop out before graduation. "We lose about 40 percent of students in the nursing track," Cleary says. "We need to provide these students more support in terms of child care and the like, but we also need to look at whether we are setting students up for failure because of the lack of rigorous admission requirements. We need to have more rigorous admission requirements for community college nursing programs, and we need to urge the graduates to go on for higher degrees. We need to increase salaries for faculty. And we need to look at non-traditional methodologies for increasing nursing education, such as expansion of distance learning and online formats, and sharing of faculty and other resources across nursing education."

The UNC Board of Governor's Committee on the Future of Nursing released a report on this issue in 2004. The report includes a goal of doubling the number of the UNC system's prelicensure BSN graduates to 1,132 by 2009–10 (the system had 843 graduates in 2005–06). Alan Mabe, vice president for academic planning and university-school programs with UNC-General Administration says of the report, "It is quite a dramatic plan to both double the number of prelicensure nurses produced by UNC and to expand the production of nursing faculty generally and especially for community colleges. We have expanded to three doctoral programs, added a number of MSN programs in nursing education, with at least three online. Through Project Health, we also have partnered with the community colleges and the N.C. Hospital Association to provide more than twenty nursing faculty to the community colleges, and UNC led the effort to get the 2.4 million scholarship/loan program for graduate study with the condition that the graduates teach in a North Carolina nursing program."

Everyone agrees that in order to meet the need for nurses, North Carolina must address the need for nurses both as caretakers and as nursing faculty. But many disagree about which credentials should be required for nurses teaching nursing.

—Lauren Law Akers

Footnotes

[1] *Interim Projections of the Population by Selected Age Groups for the United States and States: April 1, 2000 to July 1, 2030*, U.S. Census Bureau, Washington, D.C. Accessed Jan. 7, 2008 on the Internet at *http://www.census.gov/population/projections/SummaryTabB1.xls*

[2] *Task Force on the North Carolina Nursing Workforce Report,* N.C. Institute of Medicine, Durham, N.C., May 2004, p. 5. On the Internet at *http://www.nciom.org/projects/nursingworkforce/nursingreport.html*

[3] *Ibid.,* pp. 46–47.

[4] *North Carolina Trends in Nursing Education: 2003–06,* N.C. Center for Nursing, Raleigh, N.C., Aug. 2007, pp. 35–36. On the Internet at *http://www.ga.unc.edu/NCCN/research/Trends2007/final%20report%20schools%202007.pdf*

[5] *Ibid.*

[6] *Five-Year NCLEX Pass Rates (RN & LPN)*, N.C. Board of Nursing, Raleigh, N.C. Accessed Oct. 29, 2007, on the Internet at *http://www.ncbon.com/content.aspx?id=1090&terms=NCLEX+pass+rates*

[7] *Ibid.*, editorial calculation.

[8] *Task Force on the North Carolina Nursing Workforce Report*, note 2 above, p. 102.

[9] On the Internet at *http://www.ncccs.cc.nc.us/news_releases/Nursing_resoluton.htm*

Delores Parker is vice-president of academic and student services for the N.C. Community College System. Parker agrees that the shortage of faculty is a major problem and getting worse. She cites a July 2006 department poll that identified 29 full-time and 84 part-time teaching vacancies in the licensed practical nursing and associate's degree in nursing programs systemwide. She says the department even has had difficulty filling its own nursing administrator position.

Parker points out the quality of community college nursing students, given that their passing rate on nursing licensing exams for community college graduates is comparable to that of the four-year colleges and universities. In 2006, North Carolina's passing rate for *all* registered nursing licensures was 90 percent (88 percent nationally). The community colleges' passing rate for all associate's degree in nursing licensures was 89 percent (about 88 percent nationally), while the passing rate for all bachelor's of science in nursing licensures was 92 percent (about 86 percent nationally).[18] Within bachelor's of science licensures, the UNC system passing rate was approximately 89 percent, while the passing rate for private colleges and universities was approximately 94 percent.[19]

Alan Mabe, vice president for academic planning and university-school programs for the UNC General Administration, says, "Faculty shortages are a problem. UNC has added two new doctoral programs—one at East Carolina University and one at UNC-Greensboro—to produce more doctoral level graduates. We have also increased the size of our master's programs in nursing, especially nursing education, with at least two programs fully online. This should be a good source for community college faculty. We now have funding from the General Assembly of $2.4 million for graduate scholarship/loans for those who will teach in North Carolina for two or three years depending on the length of their scholarship. The community colleges have been trying to raise the salaries of nursing faculty to be better able to attract more faculty."

N.C. Community College System President Lancaster says that the Board of Nursing's proposed requirement that all faculty, including clinical supervisors and clinical faculty, have at least a master's degree "has greatly exacerbated the already critical shortage of nursing faculty." Lancaster says, "We can't fill our classroom

slots as it is and to expect that our clinical staff also have a master's degree is an impossible task, especially given the fact that most of that staff is adjunct—working as nurses in the hospital and taking on part-time responsibilities as clinical faculty. Very few direct care nurses on hospital staffs even in metropolitan areas have a master's. There is such a dearth of master's-prepared nurses that most of them fill supervisory roles of various kinds. We do not see how we—or the universities for that matter—will ever hire enough master's-prepared adjunct faculty to do the clinical rotations. We believe this will lead to the closure of many, especially rural programs where the need for nurses we produce is most critical."

> *"It is increasingly important as we see the aging of the American population and as we see the demand for health care continue to grow that the community college be capable not only of providing the historic pool of well-trained and well-motivated workers that they do already, but to actually expand that capability. I think there's probably no better education return for the dollar in North Carolina."*
>
> **Bill Atkinson, president and chief executive officer, WakeMed Health & Hospitals**

Both the N.C. Association of Community College Presidents and the State Board of Community Colleges have passed resolutions opposing the Board of Nursing's proposal. According to Hilda Pinnix-Ragland, State Board of Community Colleges Chair, many part-time instructors for the community college system do not have master's degrees. The task of finding part-time nursing teachers with master's degrees could prove difficult. The resolution passed by the State Board of Community Colleges says, "The pay for part-time faculty is insufficient to justify their returning to university to obtain their master's degree."[20]

In response to the challenges in the allied health field, numerous community colleges have developed innovative and strategic partnerships with the health industry. For instance, due to the need for highly trained health professionals, WakeMed Health & Hospitals and Wake Technical Community College in Raleigh have collaborated with Wake County Public Schools to create the Wake Early College of Health and Sciences. Stemming from Governor Easley's Learn and Earn program, the school enables high school students to graduate with both high school and associate's degrees without any added costs. Coursework occurs on Wake Tech's campus under instructors experienced in training individuals for work at WakeMed.

Due in part to the high demand for the Wake Early College of Health and Sciences, Wake Tech president Steve Scott is excited about the $92 million bond referendum that passed on the October 2007 ballot. Scott intends to use $50 million of the $92 million for Wake Tech's health care programs. According to Scott, "We have a huge need for investment into the program. . . . We help physicians expand their reach to patients and improve the overall quality of health care and the quality of life."

One particular need is health care technology. According to Scott, sophisticated machines permit students to learn decision-making in a simulated environment. "It's about making it as realistic as possible for the student before they get to real people. If you can speed up that process, we can take more students into the pipeline and meet the big demands," Scott says.

Bill Atkinson, president and chief executive officer of WakeMed Health & Hospitals, says, "It is increasingly important as we see the aging of the American population and as we see the demand for health care continue to grow that the community college be capable not only of providing the historic pool of well-trained and well-motivated workers that they do already, but to actually expand that capability."[21] Consequently, Atkinson advocates increased resources for community

(continues)

Table 1. Fastest Growing Occupations in North Carolina
***by Number of Job Openings,* 2004–14**

	Occupation	Total Job Openings	Total Percentage Change
1.	Retail Salespersons	29,470	+24.03
2.	**Registered Nurses**	**26,060**	**36.73**
3.	Combined Food Preparation and Serving Workers	17,150	20.39
4.	**Home Health Aides**	**16,680**	**48.33**
5.	Waiters and Waitresses	16,420	25.47
6.	**Truck Drivers, Heavy and Tractor-Trailer**	**15,770**	**27.10**
7.	Customer Service Representatives	15,440	25.85
8.	Janitors and Cleaners, Except Maids and Housekeeping	15,060	29.15
9.	**Nursing Aides, Orderlies, and Attendants**	**13,150**	**27.78**
10.	General and Operations Managers	11,090	20.22
11.	Cashiers	10,580	9.98
12.	Laborers and Freight, Stock and Material Movers	10,510	13.67
13.	**Personal and Home Care Aides**	**9,300**	**49.47**
14.	Landscaping and Groundskeeping Workers	9,280	30.01
15.	Team Assemblers	9,220	15.23
16.	Teacher Assistants	9,150	26.70
17.	Executive Secretaries and Administrative Assistants	8,660	16.83
18.	**Elementary School Teachers, Excluding Special Education**	**8,520**	**24.07**
19.	Maintenance and Repair Workers	7,550	15.66
20.	Maids and Housekeeping Cleaners	7,350	20.92

Note: **Bold** indicates those occupations for which the N.C. Community College System provides training.

Source: North Carolina Occupational Trends, Projections 2004–2014, N.C. Employment Security Commission, Raleigh, N.C. Accessed Oct. 1, 2007, on the Internet at *http://eslmi23.esc.state.nc.us/projections/index.asp?section=2&periodID=07*

Table 2. Fastest Growing Occupations in North Carolina *by Percentage Change*, 2004–14

Occupation	Total Growth Openings	Total Percentage Change
Medical Assistants	4,880	+52.03%
Biomedical Engineers	140	51.85
Physician Assistants	1,320	50.38
Network Systems and Data Communications Analysts	3,810	50.13
Personal and Home Care Aides	9,300	49.47
Home Health Aides	16,680	48.33
Dental Hygienists	2,430	46.55
Dental Assistants	3,200	46.24
Physical Therapist Assistants	870	44.85
Computer Software Engineers, Applications	3,880	43.16
Diagnostic Medical Sonographers	610	42.66
Occupational Therapist Assistants	230	41.07
Occupational Therapists	850	40.28
Veterinary Technologists and Technicians	1,040	40.00
Network and Computer Systems Administrators	2,930	39.92
Tile and Marble Setters	390	39.80
Medical Scientists, Except Epidemiologists	980	39.04
Psychiatric Technicians	950	38.78
Physical Therapists	1,440	38.30
Employment, Recruitment, and Placement Specialists	2,070	37.91
Riggers	30	37.50
Athletic Trainers	70	36.84
Registered Nurses	26,060	36.73
Paralegals and Legal Assistants	2,800	36.70
Forensic Science Technicians	110	36.67

Source: North Carolina Occupational Trends, Projections 2004–2014, N.C. Employment Security Commission, Raleigh, N.C. Accessed Oct. 1, 2007, on the Internet at *http://eslmi23.esc.state.nc.us/projections/EmpByMajIndGrp.asp?areatype=01&area=000037&PeriodID=07&version=&OccGroup=&whichMethod=&socCode=*

colleges. "I think there's probably no better education return for the dollar in North Carolina."[22]

Wake Tech is not unique in its collaborative effort to meet work force needs in the health field or in its need for funding. Asheville-Buncombe Technical Community College in Asheville has partnered with Mission Hospitals both to ease the nursing shortage and train employees for better-paying jobs in the health field. With nearly 6,000 employees, Mission Hospitals is western North Carolina's regional medical referral center and Buncombe County's largest employer. With funding from Mission Hospitals, Asheville-Buncombe Tech was able to expand its nursing program to include evening and weekend classes. Moreover, in 2002, the hospital loaned the community college a fully equipped teaching lab for its surgical technology program. Asheville-Buncombe Tech utilizes Mission Hospitals as the clinical site for all its allied health programs and has been given hospital equipment for nursing, surgical technology, emergency medical science, medical laboratory technology, and sonography programs (an ultrasound-based diagnostic imaging technique used to view muscles and internal organs).

Table 3. Average Job Openings in North Carolina *by Occupational Group*, 2004–14

Major Occupational Group	Total Annual Openings	Percent of Total Openings	Annual Growth Openings	Annual Replacement Openings
Architecture and Engineering Occupations	2,130	1.24%	870	1,260
Arts, Design, Entertainment, Sports, and Media Occupations	1,780	1.04%	910	870
Building, Grounds Cleaning, and Maintenance Occupations	6,450	3.75%	3,740	2,710
Business and Financial Operations Occupations	5,240	3.05%	2,850	2,390
Community and Social Services Occupations	3,170	1.85%	1,780	1,390
Computer and Mathematical Occupations	3,420	1.99%	2,310	1,110
Construction and Extraction Occupations	8,330	4.85%	4,290	4,040
Education, Training, and Library Occupations	11,540	6.72%	6,730	4,810
Farming, Fishing, and Forestry Occupations	440	0.26%	30	410
Food Preparation and Serving-Related Occupations	19,530	11.37%	7,080	12,450
Healthcare Practitioners and Technical Occupations	9,930	5.78%	6,250	3,680
Healthcare Support Occupations	6,070	3.53%	4,310	1,760

Mission Hospitals also has partnered with Asheville-Buncombe Tech to create two job training programs. The first program, health advancement training, assists Mission employees with basic reading, English as a Second Language, and General Equivalency Degree certification. The second program, career advancement training, grants Mission employees the necessary time, money, and materials to pursue community college training for the hospital's "high demand, hard-to-fill jobs."[23]

Another watershed work force development partnership has been struck between Laboratory Corporation of America Holdings, or LabCorp, and Alamance Community College in Graham. Over a period of almost 20 years, LabCorp has invested approximately $1 million in the college, including financial assistance, equipment donations, scholarships, cooperative education positions, jobs for graduates, and volunteer service on boards and advisory committees.

For instance, over a two-year period, 12 LabCorp employees designed and implemented Alamance's laboratory technology program. The company also provided space in downtown Burlington for the college's small business center and computer lab used to instruct employees from 84 companies, not just LabCorp.

Table 3. Average Job Openings in North Carolina *by Occupational Group*, 2004–14, *continued*

Major Occupational Group	Total Annual Openings	Percent of Total Openings	Annual Growth Openings	Annual Replacement Openings
Installation, Maintenance, and Repair Occupations	7,100	4.13%	2,910	4,190
Legal Occupations	840	0.49%	580	260
Life, Physical, and Social Science Occupations	1,760	1.02%	800	960
Management Occupations	8,130	4.73%	3,920	4,210
Office and Administrative Support Occupations	20,900	12.17%	6,910	13,990
Personal Care and Service Occupations	4,730	2.75%	2,520	2,210
Production Occupations	12,730	7.41%	2,520	10,210
Protective Service Occupations	3,630	2.11%	1,270	2,360
Sales and Related Occupations	21,750	12.66%	7,290	14,460
Transportation and Material Moving Occupations	12,200	7.10%	5,260	6,940
Total Occupations	**171,850**	**100%**	**75,180**	**96,670**

Source: North Carolina Occupational Trends, Projections 2004–2014, N.C. Employment Security Commission, Raleigh, N.C. Accessed Oct. 1, 2007, on the Internet at *http://eslmi23.esc.state.nc.us/projections/EmpByMajIndGrp.asp?areatype=01&area=000037&PeriodID=07&version=&OccGroup=&whichMethod=&socCode=*

Alamance used the donated space from 1995 through 2000 and opened its own Burlington facility in 2001. Since 1989, LabCorp has funded scholarships for 63 students to help them study basic laboratory techniques, biotechnology, medical laboratory technology, and phlebotomy. And, LabCorp provides about $36,000 in annual general support for these programs from an endowment of $723,000. Since 1990, LabCorp has hired more than 70 percent of the 160 graduates of Alamance's medical laboratory technology program graduates at an average salary of approximately $26,000 per year.[24]

Crisis in the Classroom

Paralleling the shortage of allied health personnel is a shortage of teachers in North Carolina's public schools as they face population growth and teacher retention problems. In July 2007, the N.C. State Data Center said North Carolina had a school-age population (ages 5–17) of 1,584,471. By July 2020, the school-age population will increase to 1,848,662, adding demand for a minimum of 953 more *new* teachers each year to maintain current student-teacher ratios, much less improve them.[25] In addition, according to annual reports published by the N.C. Department of Public Instruction, the public schools must *replace* approximately 10,000 teachers every year due to resignation and retirement.[26] By comparison, the 16 public universities graduated 3,969 prospective teachers in 2005–06[27] (see Table 5, p. 158). In 2005–06, North Carolina's private colleges and universities graduated 897 prospective teachers (see Table 6, p. 159).[28]

This figure includes "traditional graduates" from four-year colleges as well as "alternative completers." Traditional graduates include both students who complete a four-year bachelor's degree in education at a senior college or university and those who complete the 2+2 programs, which allow students seeking a bachelor's degree or licensure in education to take the first two years of coursework at a participating community college and then transfer to a four-year college. Alternative completers include lateral entry students, or individuals with a bachelor's degree in an area other than education hired by a North Carolina public school prior to meeting state licensure requirements. Lateral entry students are granted three years upon being hired to complete all course requirements at the community college level and at the university level through online courses or special workshops. Other routes of alternative preparation exist, but vary from campus to campus.

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"As an uninsured adjunct instructor, tonight, as I give my lecture on quantum physics, I will also be doing a low-impact aerobic workout."

Teacher shortages are occurring all over the state and in every discipline. For the fall of 2006, the N.C. Department of Public Instruction listed vacancies for 211 K-6 instructors, 108 math teachers, 38 language arts teachers, and 35 English

Table 4. Supply and Demand Forecast for Registered Nurses in North Carolina: 2000–2020

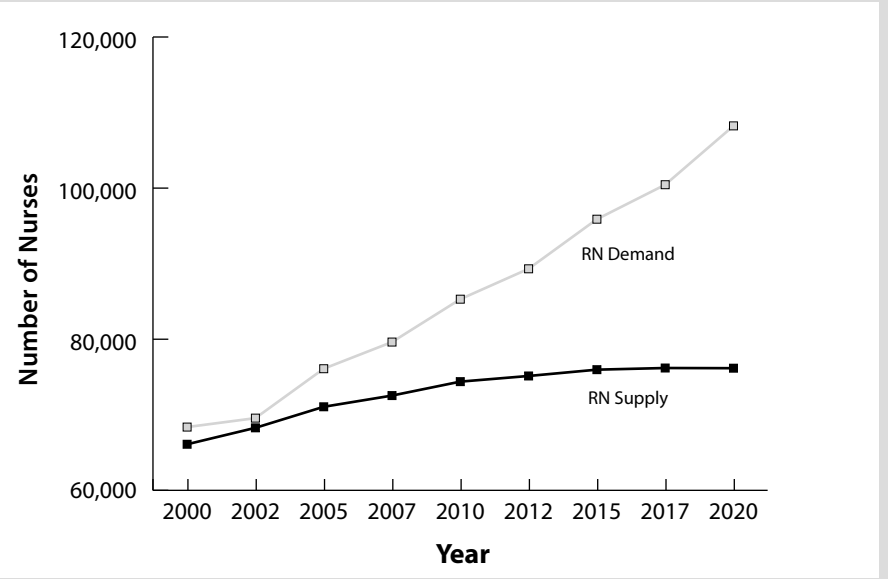
Year	RN Supply	RN Demand	Excess or Shortage	Percent Shortage
2000	66,097	68,372	-2,275	-3.30%
2002	68,272	69,557	-1,285	-1.80%
2005	71,058	76,096	-5,038	-6.60%
2007	72,541	79,625	-7,084	-8.90%
2010	74,387	85,299	-10,912	-12.80%
2012	75,136	89,320	-14,184	-15.90%
2015	75,971	95,885	-19,914*	-20.80%
2017	76,189	100,449	-24,260	-24.20%
2020	76,165	108,237	-32,072*	-29.60%

Note: Excess or shortage is determined by supply minus demand figures. A negative sign indicates a shortage of RNs in a given year.

This table was created using an econometric model. Future supply of RN's was calculated using the nurse supply model. Demand for RNs was calculated using the nurse demand model. Both forecasting models were developed by the Bureau of Health Professions National Center for Health Workforce Analysis in the Health Resources and Services Administration, U.S. Department of Health and Human Services. However, default values in the model were replaced with historical data for North Carolina whenever possible.

* Using a different model, the N.C. Institute of Medicine also predicts a nursing shortage, but at much lower levels. See p. 145.

Source: "RN and LPN Supply Trends," *North Carolina Trends in Nursing: 1987–2006*, North Carolina Center for Nursing, Raleigh, N.C., Apr. 2007.



teachers.[29] Reflecting the growing population of Hispanic students, schools are in need of 42 English as a Second Language instructors. Speech and language pathologists are also in demand (35 vacancies), as are psychologists (33 openings) and guidance counselors (32 openings). Schools also are in desperate need of administrative staff, including 84 central office personnel, 23 assistant principals, and 7 principals.[30]

> *By July 2020, the school-age population will increase to 1,848,662, adding demand for a minimum of 953 more* new *teachers each year to maintain current student-teacher ratios, much less improve them.*

According to the N.C. Department of Public Instruction's October 2006 "System Level Teacher Turnover Report," North Carolina's top 10 teacher shortage areas are high school math; special education: general curriculum; high school science; middle school math; middle school science; special education: adapted curriculum; cross categorical (which permits students with different areas of disability to be combined for delivery of services); behavioral/emotional disabilities; learning disabilities; and second languages (see Table 7, p. 160).[31]

Geographically, the greatest need is occurring in the fast-growing metropolitan areas of the state. Mecklenburg County Schools topped the list with 136 vacancies, Wake County Schools had 62, Durham had 55, and Guilford had 41. But rural counties are suffering as well, especially in the eastern part of the state. Robeson County Schools posted 33 vacancies, Wayne had 23, and Bertie had 21.

For several decades, the state's community colleges and four-year colleges and universities have partnered together to offer 2+2 programs. The 2+2 programs allow students seeking a bachelor's degree in education and licensure in a number of different education areas (such as elementary education or special education) to take the first two years of coursework at a participating community college and then transfer to a four-year college or university to complete their degree. While transfer to a university is still an option, 2+2 programs have evolved towards providing the full four-year program at community colleges and/or online.

In what is called the University Center Model, Appalachian State University, East Carolina University, and UNC-Wilmington each have formed partnerships with area community colleges to deliver the final two years of coursework to students on community college campuses. Instructors from these public universities travel to the local community colleges to teach classes and may offer some courses online. Another East Carolina University partnership with Pitt Community College provides the university portion of coursework entirely online. The net result is that students can now pursue a degree in education without leaving their area.

By all accounts, this latest version of 2+2 is shaping up to be a success. Appalachian State University was the first to adopt the off-campus learning model, forming a partnership in 1999 known as the Appalachian Learning Alliance with 10 community colleges in the western region.

"This program has been tremendously helpful in meeting the needs for teachers in this region," says Tom Fisher, former director of extension and distance education at Appalachian State. "Since 1999, we have graduated 152 students in elementary education, middle grades, special education, and birth-kindergarten. We had approximately 375–380 students in the pipeline seeking undergraduate degrees in teacher education disciplines in the spring of 2007 after we added our first ever daytime program on the campus of Caldwell Community College."

Wachovia Partnership East, a joint venture between East Carolina University and area community colleges, is designed to serve eastern North Carolina, ranging from the Virginia line south to Onslow County, with hub sites at 19 community colleges. It also serves all of North Carolina through virtual courses. This partnership was launched in 2002 and was awarded a grant of $1.25 million in scholarship money from The Wachovia Foundation in 2004. Marilyn Sheerer, former dean of East Carolina's college of education and interim provost, helped create Wachovia Partnership East

after realizing that students receiving associate's degrees in education at community colleges were failing to complete four-year degrees simply because they were predominantly 30-something women with children, and they could not travel to a distant senior college or institution. Wachovia Partnership East allows such students to complete a bachelor's degree in education by using a "community college campus in their own backyard."

According to Wachovia's regional president for eastern North Carolina, David Parker, "I always thought it [Wachovia Partnership East] was sort of an economic development effort on our part because teaching is a very meaningful career in a lot of smaller, rural markets." The first 16 teachers-to-be graduated from ECU in December 2005. As of the fall 2007 semester, more than 260 students enrolled.[32] By the end of the fall 2007 semester, the number of Wachovia Partnership East graduates totaled 129.

The partnership currently is focused on training teachers for the elementary schools. "Elementary is the area that most people are interested in teaching," says Anne Faulkenberry, coordinator of the Wachovia Partnership East. "It's a much easier program for us to establish, because high school teachers must have a core competency. We are hoping to find prospective middle grade math and science students to start this summer. This is where the real need is."

Faulkenberry says they actively recruit students to participate in the 2+2 programs by speaking to different classes at area community colleges and high schools. "Many students believe a four-year program is not attainable for them, but when they hear about our program, they change their minds," Faulkenberry says. "About half our students are already teacher assistants, so they know what they want to do professionally." *(continues on page 161)*

Table 5. Teacher Education Graduates and Completers, University of North Carolina, 2005–06

	Campus	Traditional Graduates	Alternative Completers	Total
1.	Appalachian State University	482	46	528
2.	East Carolina University	427	323	750
3.	Elizabeth City State University	26	16	42
4.	Fayetteville State University	94	39	133
5.	NC A&T State University	34	42	76
6.	NC Central University	46	119	165
7.	NC State University	155	114	269
8.	UNC-Asheville	41	36	77
9.	UNC-Chapel Hill	83	103	186
10.	UNC-Charlotte	250	262	512
11.	UNC-Greensboro	376	94	470
12.	UNC-Pembroke	87	58	145
13.	UNC-Wilmington	255	103	358
14.	Western Carolina University	150	79	229
15.	Winston-Salem State University	21	8	29
	UNC Total	**2,527**	**1,442**	**3,969**

Note:

Traditional graduates include both students who complete a four-year bachelor's degree in education at a senior college or university and those who complete the 2+2 programs, which allows students seeking a bachelor's degree or licensure in education to take the first two years of coursework at a participating community college and then transfer to a four-year college.

Alternative completers include lateral entry students, or individuals with a bachelor's degree in an area other than education hired by a North Carolina public school prior to meeting state licensure requirements who are granted three years upon being hired to complete all course requirements.

Source: Report on UNC Production of Teacher Education Graduates and Alternative Licensure Completers 2005–2006, The University of North Carolina, Raleigh, N.C., Mar. 2007, p. 4.

Table 6. Teacher Education Graduates, North Carolina Private Colleges and Universities, 2005–06

	Institution	Total
1.	Barton College	34
2.	Belmont Abbey College	23
3.	Bennett College	2
4.	Brevard College	3
5.	Campbell University	57
6.	Catawba College	19
7.	Chowan University	22
8.	Duke University	20
9.	Elon University	102
10.	Gardner-Webb University	44
11.	Greensboro College	24
12.	Guilford College	21
13.	High Point University	44
14.	Johnson C. Smith University	8
15.	Lees-McRae College	78
16.	Lenoir-Rhyne College	27
17.	Livingstone College	3
18.	Mars Hill College	58
19.	Meredith College	64
20.	Methodist College	20
21.	Montreat College	6
22.	NC Wesleyan College	8
23.	Pfeiffer University	40
24.	Queens University	31
25.	Salem College	11
26.	Shaw University	3
27.	Southeast College at Wake Forest	3
28.	St. Augustine's College	3
29.	St. Andrews Presbyterian College	43
30.	Wake Forest University	31
31.	Warren Wilson College	15
32.	Wingate University	30
	North Carolina Private Colleges and Universities Total	**897**

Source: Dan Holloman, Manager of the Center for Recruitment, Retention, Recognition, and Advancement, North Carolina Department of Public Instruction.

Table 7. Top 20 Teacher Shortage Areas in North Carolina, 2005–06

	Teacher Shortage Area	Number of Local Education Agencies Indicating Need (out of 115 LEAs)
1.	High School Math	97
2.	Special Education: General Curriculum	77
3.	High School Science	72
4.	Middle School Math	62
5.	Middle School Science	49
(tie)	Special Education: Adapted Curriculum	49
7.	Cross Categorical	34
8.	Behavioral/Emotional Disabilities	32
9.	Learning Disabilities	29
10.	Second Languages	28
11.	Mental Disabilities	20
12.	Speech Language Pathologist	14
(tie)	English as a Second Language*	14
(tie)	Middle School Language Arts	14
15.	High School Family/Consumer Sciences	12
16.	Elementary Education	11
(tie)	High School English	11
18.	Middle School Social Studies	8
(tie)	Severely/Profoundly Disabled	8
20.	Counselor	7

*Spanish was the second language most often identified.

Note: Numbers above include only those areas identified by five or more LEAs.

Source: *System Level Turnover Report*, N.C. Department of Public Instruction, Oct. 2006, pp. 3–4. On the Internet at *www.ncpublicschools.org/docs/recruitment/surveys/turnover/2005–06turnoverreport.pdf*

(continued from page 157)

Verlie Pittman, 38, of Seven Springs in Wayne County, is one such person. Previously a teacher's assistant at an elementary school and mother of two, Pittman had wanted to earn a teaching degree, but couldn't afford the time away or the expense of attending a full-time university. Through Wachovia Partnership East, Verlie has set out to accomplish her goal. "I can take Internet classes and work and be a mom," says Pittman. "I take three to four classes a semester and don't commute. If the professor wants a face-to-face class, I go to Wayne Community College [in Goldsboro]."

Pittman was one of a group of 24 students, 22 of whom graduated in December, 2007. She loved being part of a group that got to know each other, both in person and through online discussion groups. And she loved the price. "If you are employed by a school system, the N.C. Model Teacher Education Consortium helps pay your tuition," she says. "They also pay you $1,000 to help set up your classroom." Pittman was offered a full-time teaching job before graduation. She will be teaching in 2008 at the Seven Springs Elementary School.

"But, conditions imposed by the legislation and by the Department of Public Instruction, which administers the program, make lateral entry more complex than some say it should be."

Recently, the N.C. General Assembly has allowed community colleges to offer a second option aimed at further increasing the supply of teachers. House Bill 563, passed in the 2005–06 General Assembly and implemented by the State Board of Education in 2006, allows teachers to be certified through a process known as "lateral entry" via courses taught at community colleges. Lateral entry is intended to provide a quick route to licensure for those who hold at least a bachelor's degree in areas other than education and who have been hired by a North Carolina public school. This bypasses the traditional four-year education degree track by providing the necessary courses at the community college level and at the university level through online courses or special workshops.

By law, applicants for a lateral entry license must have earned a minimum cumulative grade point average of at least 2.5, including a GPA of at least 3.0 in their major field of study, or have passed the National Teacher Examination or the Praxis II test, which measures general and subject-specific knowledge and teaching skills. Individuals licensed through lateral entry must, within three years, complete an approved education program in their area of licensure at a college or university or through a regional alternative licensing center, of which there are four in North Carolina. The college or regional alternative licensing center evaluates the individual's credentials and outlines a plan of study for the coursework necessary to earn a license.[33]

But, conditions imposed by the legislation and by the Department of Public Instruction, which administers the program, make lateral entry more complex than some say it should be. Currently, the State Board of Education accepts community college course credits in six of the nine areas of teaching competence—human growth and development, educational and instructional technology, learning theory and styles, school policies and procedures, home school and community collaborations, and classroom management. The public schools also can offer teacher workshops in four of these six areas of competence. The four-year universities have retained the sole right to provide the other three areas of teaching competence—reading, special education, and instructional core content. Thus, any given applicant may have to enroll in multiple courses in multiple locations in order to earn their teaching license. And the training may vary from one institution to another.

Until the 2001 legislative session, lateral entry applicants also had to be employed by a North Carolina public school for the coming academic year. This requirement eliminated a large pool of potential students, such as retired or soon-to-be-released military personnel who wanted to teach but who needed to get their lateral entry

certification out of the way while still on active duty. It also eliminated career-changers who needed to remain employed in their old jobs until they completed the credentialing for their new teaching jobs. UNC system President Erskine Bowles became convinced that community colleges had a larger role to play in teacher training and worked with N.C. Community College System President Lancaster to get the legislature to lift all restrictions. This included the employment restriction, except for the requirement that community colleges partner with a four-year college to provide three of the nine competencies required for teacher licensure. Partnerships have led to online provision of most of the competencies. President Lancaster says, "This change in the legislation has led to much greater interest on our campuses to offer lateral entry, and I believe our colleges will become major players by fall 2008."

> *"But it would be much easier if we could teach all the competencies; then we could offer a complete package."*
>
> **Peggy Teague,** vice president of academic services for Wayne Community College

"We [the community colleges] have the capacity to train hundreds of teachers every year through this program," says Peggy Teague, vice president of academic services for Wayne Community College in Goldsboro. "But it would be much easier if we could teach all the competencies; then we could offer a complete package."

However, Kathy Sullivan, senior policy analyst at the State Board of Education, says that the State Board of Education passed a policy in June 2007 saying that a school system or community college, in conjunction with a university, could submit to the Board a proposal for an innovative lateral entry teaching program that would lead to licensure. "Community colleges now have the option of working with the universities to develop a lateral entry program," Sullivan says. "So far, we have not had any applications for the experimental program."

"It's always been an issue of meeting the same standards as the four-year institutions," Sullivan says. "We can't have two different sets of standards. If the community colleges want to meet the same standards as the universities, that's fine." Alisa Chapman, vice-president for academic planning at UNC General Administration, says, "We recognize the extreme shortage of teachers and that the community colleges have a role to play in this—perhaps a more expanded role than in the past."

Teague says, "The University of North Carolina system wants to hold on to the idea that their schools of education are the only place that teachers can be educated and licensed, and they worked to have the community college bill that allowed us to teach all nine competencies changed to limit our offerings. This, then, limited the options of some of the lateral entry teachers, especially in rural areas that are served by community colleges. I firmly believe that it takes all of us working together to resolve this critical issue."

"The problem is there may not be a critical mass of applicants in one area who need a particular course, so it's difficult to offer a course for one or two people at community colleges," says Vivian Covington, director of teacher education at East Carolina University's college of education. "All three entities—the community colleges, the public schools, and the universities—need to work together to make sure people can complete their coursework in a timely manner." The N.C. Teach program has addressed this issue by offering summer workshops where aspiring teachers can take both the methods courses and the specialty courses, completing their licensure in one year. "This works better than putting random courses online," Covington says. "We do general methods first, then break the students out into specialty areas."

The lateral entry program was started in 1986. Between 1995–96 and 2005–06, 9,129 students completed the program. However, Mike Cash, information analysis officer for N.C. Department of Public Instruction, says this number underestimates the overall impact of lateral entry teachers. Cash says, "There are still those [lateral entry students] from 2004–05 and 2005–06 who are working toward satisfying their requirements [but are now teaching]. Therefore, the 9,129 is short.... In addition, I think it would be a grave error to exclude the impact and importance that lateral entry teachers have played. While only 9,129 have so far *completed* the process,

all of the 18,291 laterals [entry students reported] were teaching, regardless of whether they eventually completed the process. Therefore, they were all filling vacant teacher positions, which is significant, considering the teacher shortage." Nonetheless, lateral entry does not appear to be the panacea for the teacher shortage that some had hoped.

Some efforts to ease the teaching shortage also have been forged through community college partnerships with the UNC system. For instance, prompted by the teacher shortage in Onslow County and the fact that Coastal Carolina Community College in Jacksonville is one of the state's only community colleges without a university within 30 miles, a group of local leaders met in a Coastal Carolina conference room in Jacksonville. Participants included Coastal Carolina President Ron Lingle, Onslow County Public Schools Superintendent Ron Singletary, Marine Corps Camp Lejeune commanding officer Maj. Gen. Lawrence H. Livingston, former UNC-Wilmington Chancellor James Leutze, and Representative Robert Grady (R-Onslow).

Ultimately, the meeting led to the 1995 creation of a cooperative extension department through Coastal Carolina and UNC-Wilmington that enables students to obtain an education degree and employment without ever leaving Jacksonville. Over the past three years, 64 of the 200 UNC-Wilmington graduates who teach in Onslow County graduated from this cooperative extension department. Currently, almost 200 more students are enrolled in the cooperative extension program for elementary or secondary education.

My occupational hazard is my occupation's just not around.

–Jimmy Buffett

"A Pirate Looks at Forty"

Coastal Carolina President Ron Lingle says, "Every time I see Jim Leutze or Ron Singletary or talk to Gen. Livingston, we always seem to get around to that topic and how scared we all were because we all knew we had this huge problem out there and very limited resources to throw at a problem that big. We all just kind of chuckle at the audacity of it."[34]

The partnerships between the N.C. Community College System and the UNC System have resulted in part from the direct support of the systems' presidents. N.C.

Community College System President Lancaster says, "When people ask me about major progress in our system since I've been president, I have to rank greatly expanded and improved partnerships with universities—including private ones—right near the top."

Likewise, UNC system President Erskine Bowles says, "Our community colleges … are every bit as important, if not more so, than the university is to the economic well-being of North Carolina."[35] Bowles adds, "I truly believe our community colleges are North Carolina's greatest assets for economic development… I also believe it just makes common sense—and good economic sense—for our public universities and community colleges to be working together in partnership… ."[36]

Wanted: Truck Drivers

Though not as severe as the shortages in allied health or teaching, North Carolina also faces labor shortages in certain sectors of the service and manufacturing economy. Larry Keen, president of Fayetteville Technical Community College and former vice-president of economic and work force development for the N.C. Community College System, says the state is currently experiencing shortages in industrial maintenance workers, machinists, truck drivers, and skilled trades such as carpentry. These are jobs for which the community colleges have traditionally provided sufficiently trained workers, but that situation is not guaranteed.

"At times, we've faced a shortage of facilities and/or training equipment," Keen says. "But just as important is the perception that these are undesirable, low-wage jobs. We are trying to foster a more accurate portrayal of these jobs, but we are limited in our ability to do so. Other than through our class brochures, our printed descriptions of course offerings, and our websites, we don't have a budget to advertise."

"The state is currently experiencing shortages in industrial maintenance workers, machinists, truck drivers, and skilled trades such as carpentry."

The difficulty of enticing people into the truck driving profession, combined with the high rate of retirement, is leading to a significant shortage of truck drivers. The N.C. Employment Security Commission estimates North Carolina has 2,380 annual job openings for heavy truck and tractor trailer truck drivers and 1,050 annual job openings for light or delivery service truck drivers.

"Nationwide, there is a need for at least 6,000 truck drivers," says Paul Jump, head of the Truck Driving Training School at Johnston Community College in Smithfield. "If the trend continues, we will need 100,000 by 2010. We've started a task force to beef up the ranks and to retain the drivers we have, but it's hard to do. The working conditions are difficult. Truckers are getting tired, changing jobs, or retiring."

Still, some students are drawn to Johnston's truck driving school. Richard Hopkins, a 54-year-old carpenter by training, realized his age and competition from low-wage carpenters would not allow him to make a good living from his profession in the future. He felt it was not too late to learn another skill, and having no wife or children, decided truck driving offers good possibilities.

Hopkins looked at private companies that offered training, but they were too expensive—$3,000 on average. Then he discovered Johnston Community College's Truck Driver Training School. At $800 for a 12-week course, Johnston's program was cheaper, and it offers classes at nights and on weekends, allowing Hopkins to continue working while earning his degree.

Hopkins has been well-pleased with the program. "The course has been very thorough, teaching government rules and regulations, as well as driving skills," he says. "You not only graduate with a CDL [commercial driver's license], but also you

get a certificate that proves you have the skills and experience. That can help you start out at a higher wage."

Hopkins is confident that his life situation, combined with his degree and the nationwide shortage of drivers, will make him an attractive prospect for many trucking companies. "Near the end of class, the college will bring in a number of companies to recruit people," he says. "You can also use their Internet service at the library to search for openings around the country."

Yet even with students such as Hopkins who have become attracted to the truck driving profession, Johnston Community College's truck driving school still faces significant obstacles. Begun in 1949, it is the oldest in the nation. The program operates seven days a week, with both a full-time day program and a part-time night program, and it graduates 280–300 people per year. Jump says they have sufficient faculty to teach that number and more, a reasonable advertising budget, and a regular presence at job fairs.

However, they are short on decent equipment. "Our newest truck is a year 2000 model, then it drops to 1998 and a 1995," Jump says. "We constantly need to upgrade our equipment, but our budget won't allow for that. We make a new request every year. Each year, it comes and goes."

Aged equipment is not the problem faced by the machining program at Guilford Technical Community College in Jamestown. It recently moved into a new $12.9 million building on the Greensboro campus with $5 million worth of new equipment. But as with truck drivers, the program is having trouble attracting students. "We have 16 students in our daytime program and 16 at night," says Chris Halker, department chair of machinery technology at Guilford Tech. "We could get jobs for three times that many."

Halker says he is constantly being called by area companies looking for skilled machinists, particularly CNC (computer numerical control) and CAD-CAM (computer-aided design/computer-aided manufacturing) operators. These are positions

that pay from $12–26 an hour, but many of the jobs go begging. "The reason is all the stories in the press about manufacturing jobs moving overseas," Halker says. "People are scared to take a job [in manufacturing] for fear of losing it. But the jobs going overseas are mostly low-skilled. There are still good jobs in automotive and aircraft manufacturing right here."

Halker has been out talking to area high schools and says enrollment is looking better. "Companies say they will hire good students even if they don't need them right away. The need will come."

Scott Ralls, president of Craven Community College in New Bern, who will become President of the N.C. Community College System in May 2008, has faced a similar problem. Ralls says, "One of the programs where we have low enrollments is machining and auto body repairs, even though there are a lot of jobs in this field. On the other hand, two cosmetology programs have high enrollments, but not as many jobs open. We don't even have to advertise to get people to enroll in that program. Logically, we would have closed the low-performing machining and auto body repair programs and expanded the cosmetology program. We did the opposite, and luckily it worked out."

In a manner similar to allied health programs, some community colleges have developed strategic partnerships with the transportation industry in order to address the economic and enrollment shortages within the service and manufacturing curricula. For example, in spring 2008, Lexington's Davidson County Community College will break ground for a transportation technology center funded by an $810,000 grant from the Economic Development Administration in the U.S. Department of Commerce. The new center will enable the college to expand truck driver training, automotive technology, and heavy equipment technology, thus enabling Davidson County to meet the needs of regional transportation employers with 600 new job openings. U.S. Xpress, also located in Lexington, pays tuition and fees for graduates upon signing a six-month employment contract. The college's program also partners with Old Dominion Freight Line, A.M. Haire Body Co., Richard Childress Racing, May Heavy Equipment, Coastal Transport, and Sun Delivery.[37]

Biotech Boom

Biotechnology, in the form of domesticating crop plants and farm animals through selective breeding, has been practiced for thousands of years. Contemporary biotechnology, involving the use of living cells and their molecules to grow and manufacture products, has evolved rapidly in the last 50 years. North Carolina's government leaders recognized the potential of biotechnology as a major employer early, creating the North Carolina Biotechnology Center in 1984, the world's first government-sponsored organization dedicated to developing the biotechnology industry.

"North Carolina today ranks third in the nation in biotechnology companies, with nearly 400 companies employing nearly 50,000 people."

North Carolina today ranks third in the nation in biotechnology companies, with nearly 400 companies employing nearly 50,000 people.[38] "There isn't a single biomanufacturing company in the state that hasn't grown in the last few years," says Norman Smit, marketing and recruitment director for BioNetwork, a statewide biotech work force preparation initiative sponsored by the N.C. Community College System. "Although we're producing more [biotechnology] graduates now than ever before, there is still more demand than we can meet."

How great is the shortage of workers? The question is difficult to answer for a variety of reasons. Biotechnology *per se* is not an industry, but rather an array of

technologies used by a wide variety of enterprises. In North Carolina, biotechnology might be employed by everything from vintners developing new breeds of grapes to pharmaceutical giants manufacturing the latest cancer drugs. Therefore, it can be hard to identify exactly who qualifies as a biotechnology company, how many workers are needed, and what types are needed. Further, work force needs can vary widely from year-to-year and from region-to-region as companies bring facilities into operation.

In response to industry demand for more entry-level workers with some biotechnology training, the N.C. Biotechnology Center and the N.C. Community College System jointly developed BioWork in 2001. BioWork is a 128-hour introductory course that brings together the basics of manufacturing technology and the fundamentals of science. It is intended for high school graduates and traditional manufacturing workers who have lost their jobs. As of the spring of 2007, 14 community colleges were offering BioWork. As local industries recognized the value of BioWork, they came to the UNC and N.C. Community College systems and asked that they more comprehensively address the work force shortage.

To get a picture of work force needs, the N.C. Biotechnology Center, N.C. Community College System, UNC System, and local industries commissioned a study in 2002 which surveyed 32 companies in biomanufacturing research and development and the pharmaceutical fields in North Carolina. The results, published in *Window on the Workplace: A Training Needs Assessment for the Biomanufacturing Workforce*,[39] estimated a need of 2,270–2,970 workers in the scientific and technical fields. More than 60 percent of the prospective biomanufacturing and pharmaceutical jobs required education beyond high school, such as a certificate or associate's degree (AAS) in biotechnology, but not a bachelor's degree or higher. Employers subsequently expressed the opinion that education at the community college level is the minimum they would prefer. Based on this data and an estimated annual growth rate of 3–10 percent, spokespersons for the Biotechnology Center have said we need 1,000–2,000 workers per year trained at a community college level.[40]

With the *Window on the Workplace* study in hand, the N.C. Community College System, UNC System, and Biotechnology Center presented a comprehensive Biotechnology Education and Training plan to the Golden LEAF Foundation of Rocky Mount to obtain funding. Golden LEAF is a grantmaking foundation that uses one-half of the funds from the state's settlement agreement with cigarette manufacturers to help North Carolina's tobacco-dependent and economically-distressed counties. Golden LEAF made a four-year grant for programs and buildings which gave rise to BioNetwork, the Biomanufacturing Training and Education Center, and the Biomanufacturing Research Institute and Technology Enterprise. Seeing the immediate results produced by BioNetwork, the North Carolina legislature then picked up and fully funded the initiative upon the expiration of Golden LEAF funding.

Another Public/Private Partnership: Google and Caldwell Community College

During the first half of 2007, two groundbreaking events occurred in the town of Lenoir, North Carolina. First, Google announced the formation of a local data center in the town. Second, Google initiated an unprecedented partnership between itself and a community college—namely, an information technology institute co-developed with Caldwell Community College and Technical Institute. Caldwell opened the institute in May 2007, offering an 129-hour training program designed to prepare students for entry-level information technology positions. The institute equips students with current knowledge and skills, resumés tailored for the computer industry, and portfolios for prospective employers.

College officials traveled to Google's California headquarters in order to garner insight into the company's particular culture, which in turn equipped them to instruct students not only on "hard" technical skills, but also "soft" skills involved in team-building, problem-solving, interviewing, communication, and self-management. In turn, Google officials have hosted several public forums on the Caldwell campus to educate the local community about opportunities within their company.

Source: "Google & Caldwell Community College and Technical Institute: Workforce Development Partnership," *NC Magazine*, North Carolina Chamber, Raleigh, N.C., Oct. 2007, p. 43.

Since the publication of *Window on the Workplace,* North Carolina's biotechnology industry has grown as expected, with companies such as Merck and Novartis opening or expanding major manufacturing facilities and numerous small companies being created across the state. Based on this growth and incorporating a larger definition of biotechnology than simply biomanufacturing and pharmaceuticals, BioNetwork Director Matthew Meyer says, "Community colleges will need to train 3,500 to 4,000 workers per year in order to help the North Carolina life science industry maintain its current growth rate."

How many biotechnology students are the community colleges graduating each year? Again, identifying exactly which students are trained for work in the biotechnology industry is inexact. The course entitled "biotechnology," for example, is clearly geared to employment in that industry, while industrial engineering technology could lead to work in a variety of settings. Norman Smit, marketing and recruitment director for BioNetwork, estimates that out of 4,113 students enrolled during 2004–05 in the biotechnology, biology, and biological/chemical engineering curricula, approximately 1,800 will graduate with skills suitable for employment in the biomanufacturing and pharmaceutical industry.[41] That is less than half of the upper estimate of 4,000 jobs needed.

Meyer says, "If program completers from related life science programs are any indication of how the goal of 3,500 to 4,000 students per year is being approached, then there is still much room for improvement." There were 1,421 program completers (students who complete certificate or work force training programs, as well as associate's degree programs) in 2005–06 and 1,780 in 2006–07. While the need for 3,500–4,000 workers per year is still not met, BioNetwork has shown promising

Sam Watts

Homeland Security: A New Work Force Shortage?

Since the attacks of 9/11 in 2001, the term "homeland security" has become part of our everyday jargon. The responsibility for protecting us from all imaginable manner of terrorist attacks has been cast on everyone from small town policemen to the Office of the President, from food inspectors to airport screeners. A federal Department of Homeland Security has been created and more than $1 billion in grants has been awarded to states and cities across the nation to spend on planning, equipment, training, and management. Is there a shortage of "homeland security" workers in North Carolina and do the community colleges have a role in meeting that?

"There is a shortage of sorts," says Scott Bullard, director of emergency services at the N.C. Community College System. "I can't think of a single community that is able to keep up with the demand for fire protection or police protection, but that's more a question of growth rather than a response to homeland security alone. The immediate need is for training of existing personnel in incident command, and there is a huge role for the community colleges in that." The Incident Command System employs a "first-on-scene" model in responding to emergencies, in which the first responder on a scene takes charge until the incident is resolved or another, more-qualified responder arrives and assumes command.

In 2003, President Bush issued Homeland Security Presidential Directive #5 (HSPD-5), directing the Secretary of Homeland Security to develop and administer a National Incident Management System (NIMS). NIMS provides a consistent nationwide model to enable all government, private sector, and nongovernmental organizations to work together during domestic incidents. Courses have been developed to implement this model and, in 2006, the N.C. Community College System received $1.2 million to provide the training.

The N.C. Community College System sent requests for proposals out to the local campuses offering to provide up to $40,000 worth of training each. Forty-three of the 58 colleges chose to participate. Sixteen courses have been designed for community colleges by the federal government, most in a continuing education context. "These involve upgrading and standardizing incident management systems, terminology, and training," Bullard says. "A number of our community colleges have been offering Incident Command System programs that already meet federal requirements."

After the events of September 11, 2001, Elizabeth Frosberg longed to join the Coast Guard to help people out in a state of emergency. But a medical disability disqualified her. She was a high school graduate but had not attended college. In 2006, she learned of Durham Technical Community College's two-year degree program in Emergency Preparedness Technology, which offers courses in areas such as response to terrorism, the sociology of disaster, emergency preparedness centers, and the need for coordination between federal, state, and local agencies and volunteer responders. Most courses are offered online.

When she graduates, Frosberg hopes to work in the public sector or for a private company in the area of risk prevention and analysis. She believes she will need to supplement her education with a bachelor's degree. "I think this program is most useful as an additional degree for people who work in emergency management services or for fire departments," she says. "An associate's degree is probably not enough for a career in emergency preparedness, but it gives you a good start."

Scott Bullard says, "It's safe to say that we [the community colleges] have an obligation to provide this training . . . . We've got more than 50,000 fire fighters across the state that need Level 100–400 Incident Command Training and 33,000 emergency medical services folks. Then there's the state's law enforcement group. Other disciplines identified by the Department of Homeland Security as needing to be in compliance with NIMS include hazardous materials, emergency management, public works, governmental administration, public safety communications, health care, and public health. It's a huge job."

—John Manuel

growth. Between 2004–05 and 2006–07, the number of program completers more than doubled, says Meyer.

The community college system developed a new and more rigorous course entitled "Bioprocessing in the Workplace" through a pilot project at Johnston Community College in Smithfield involving true biotechnology—working with living cells to produce products like insulin. Currently, BioNetwork is running another pilot project with Durham Technical Community College in conjunction with Eisai Corporation, a U.S. pharmaceutical subsidiary of Tokyo-based Eisai Co., Ltd. The Durham Tech pilot program is focused on working with chemicals to produce pharmaceuticals. They hope to be able to offer pharmaceuticals to the general public in the spring of 2008.

Recognizing the need for a comprehensive approach to worker training, the N.C. BioSciences Organization—which monitors legislation and lobbies on behalf of the state's bioscience industry before the North Carolina General Assembly, state courts, regulatory agencies, and executive branch policy leaders—collaborated with the N.C. Community College System, the UNC System, and the N.C. Biotechnology Center to create the N.C. Biomanufacturing and Pharmaceutical Training Consortium in 2003.[42] The Consortium conceptualized a three-part training initiative to include BioNetwork; the N.C. Community College System's statewide network of campus-based education and training programs; a Biomanufacturing Training and Education Center at North Carolina State University; and a Biomanufacturing Research Institute and Training Enterprise at North Carolina Central University.[43]

In 2004, the Golden LEAF Foundation provided a $60 million grant for the construction and initial operation of these facilities. This was supplemented by $11.9 million in operational funding from the General Assembly for Fiscal Year 2005–06 and $13 million in in-kind equipment donations and donations of employee time to advise and participate in engineering design and specifications for new buildings.

BioNetwork's core activity is providing grants to the local community colleges for the development of courses and the purchase of equipment. As of March 2007, BioNetwork had awarded direct grants to 39 community colleges, serving 68 of the 100 counties. Fourteen additional community colleges have developed "1+1 agreements," which allow students at a community college that may have only limited biotechnology offerings to transfer after one year to another community college without losing credit. These agreements provide coverage to an additional 25 counties.[44] "Effectively, we are serving 53 out of the 58 community colleges, covering 93 out of 100 counties," says BioNetwork associate director Kris Allsbury.

The initial plan funded by Golden LEAF made appropriations for the formation of five centers based at community colleges to serve as support facilities for colleges statewide. The centers now are funded by the legislative appropriation, which took effect once Golden LEAF funds expired. These centers are the BioBusiness Center at Asheville-Buncombe Technical Community College, the BioEducation Center at Gaston College, the Pharmaceutical Center at Forsyth Technical Community College (in collaboration with Guilford Technical Community College), the BioAgricultural Center at Robeson Community College, and the Bioprocessing Center at Pitt Community College. Staff at these centers develop curriculum, train the trainers, review textbooks, and develop equipment protocols.

A sixth center, the Capstone Center, is housed at the newly completed $34 million Biomanufacturing Training and Education Center on N.C. State University's Centennial Campus and is managed by Wake Technical Community College. The Golden LEAF Biomanufacturing Training and Education Center features a facility where students can learn current good manufacturing practice employed by biopharmaceutical companies manufacturing Federal Drug Administration-approved drugs. Students trained on bench-scale equipment at the community colleges will be able to come to the Golden LEAF Biomanufacturing Training and Education Center for a "Capstone experience" using commercial-scale equipment. Some cur-

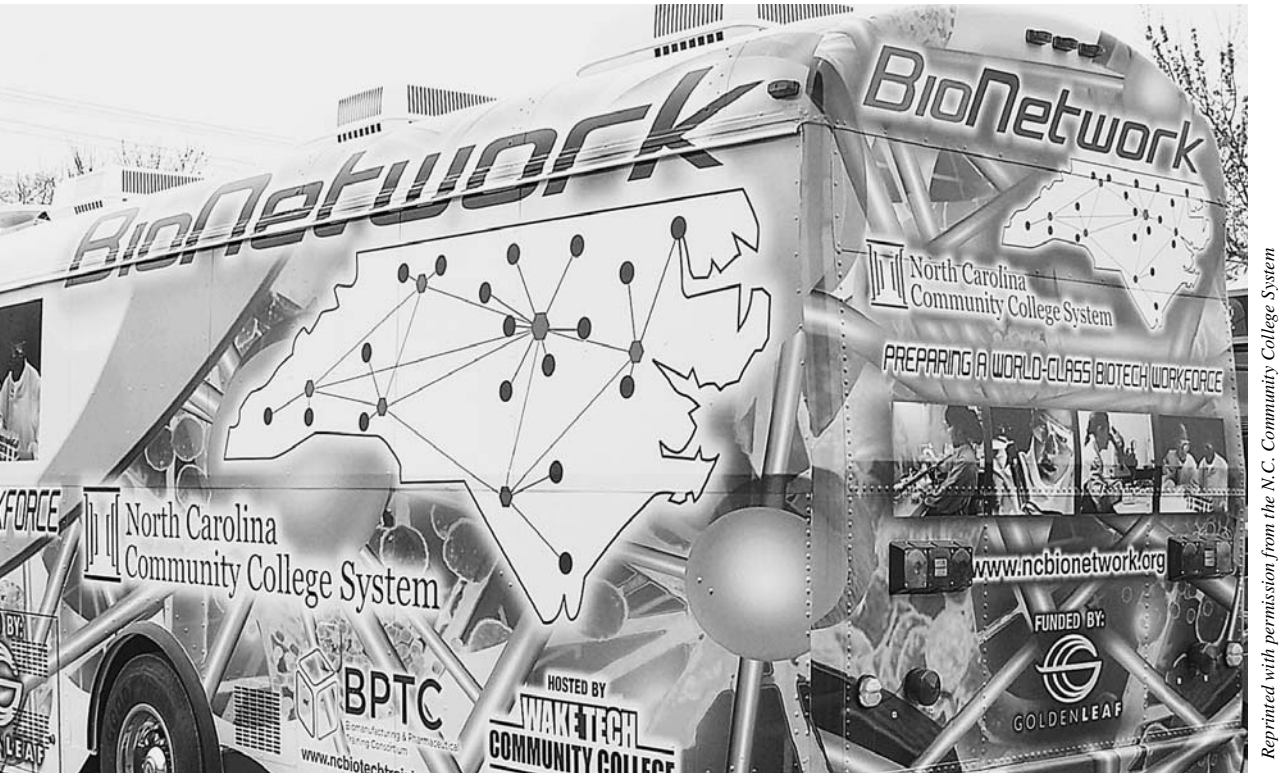
ricula may call for one week's training, but other curricula may call for longer training, such as a month to six weeks. According to Matthew Meyer, "The Capstone Center's ability to adapt to industry's most pressing needs by offering customized, 'shut-down,' or 'just-in-time' training must not be overlooked. This capability is unmatched nationally." Students will leave prepared to step into a job for which they will need only minimal company-specific training. Sponsors estimate that the Biomanufacturing Training and Education Center will train 2,000–3,000 community college students, incumbent workers, university students, and distance education students each year.[45]

BioNetwork also sponsors a mobile laboratory which travels to industrial work sites to provide worker training in biotechnology. The BioNetwork mobile laboratory, managed by Wake Tech, is available to support biotechnology training at community colleges that lack specialized equipment.

In February 2006, ground was broken on the 311,000-square foot David Murdock Core Laboratory Building, the centerpiece of what will be the N.C. Research Campus in Kannapolis, dedicated to the advancement of biotechnology.[46] The campus is a public-private partnership between David Murdock (president of Dole Foods Co., Inc.), the city of Kannapolis, the UNC System, Duke University, and the N.C. Community College System. It is hoped that more than 100 biotechnology companies will locate on campus, generating more than 5,000 jobs. The N.C. Community College System will run a 40,000-square foot biotechnology education and training center on campus, which is currently housed at nearby Rowan-Cabarrus Community College.

According to Allsbury, "We are trying to develop an entire portfolio of biotechnology education and technology, so that if a company is thinking of coming into the state, we can say these are the resources that we can offer at the community colleges. This might be an entire course or it might be a four-hour training session

BioNetwork Mobile Laboratory



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with the BioNetwork mobile laboratory. For example, one company wanted to train its employees in proper staining techniques. We sent the [BioNetwork mobile laboratory] out there and conducted a one-day training."

Will all this be enough to eliminate North Carolina's shortage of biotechnology workers? "If it doesn't, we'll be very surprised," says Sam Taylor, president of the N.C. BioSciences Organization. "It is a comprehensive, vertically-integrated training system. A student can get in anywhere and get out anywhere, starting at a community college and going on to an advanced degree from a four-year university. Likewise, existing workers could go in at the appropriate level and refine their skills or take advanced training and work their way up to a B.A. or post-graduate degree. We feel it is a model for worker training in other industries."

> *"[BioNetwork is] probably one of the most impressive collaborations between academics and industry that I have ever seen."*
>
> **Joanne Steiner,**
> **retired Novozymes executive**

According to the North Carolina Chamber's *NC Magazine*, BioNetwork has "propelled North Carolina to be the only state in the nation to rank in the top 10 for job growth in all biotechnology sectors."[47] An economic impact report released in May 2007 gave N.C. Community College System officials more reason to praise and stress the importance of the BioNetwork Initiative. The study indicated that due in part to growth of training at community colleges, biotechnology's four primary sectors—agricultural feedstock and chemicals, drugs and pharmaceuticals, medical devices and equipment, and research testing and medical laboratories—employ nearly 61,000 people statewide, and are projected to increase employment by approximately 15,000 more positions, or by 25 percent, within 10 years. Furthermore, important niche biotechnology areas that were not at the forefront when BioNetwork was conceived—such as biofuels, natural products and nutraceuticals, and biosafety—have since emerged. This has community colleges and industry stakeholders looking to BioNetwork to respond with new worker training programs. The challenge for the organization is to continue to meet industries' needs even though each new niche area further strains BioNetwork's limited resources.

According to Joanne Steiner, a retired Novozymes executive who now serves on the State Board of Community Colleges and chairs BioNetwork's industry advisory board, BioNetwork's favorable work force impact is no accident. Steiner lauds both the industrial catalyst for the network and the partnership created, saying, "I have to give credit to the industry people who came together to try to solve this. When you look at industries needing the same resources and talent but coming together to solve the problem, it is quite impressive. It's probably one of the most impressive collaborations between academics and industry that I have ever seen."

Steiner indicates that the prototype for BioNetwork was a partnership between Novozymes and Vance-Granville Community College, but the true catalyst for the network's creation was the Golden LEAF Foundation, which funneled millions of dollars into the project. Valeria Lee, the foundation's president (who has announced her retirement in March 2008) says, "The reports we get back indicated that the funding from Golden LEAF has done exactly what we thought it would do. The BioNetwork has taken the training literally across North Carolina." Lee does not see the foundation's investment payoffs as limited to 2007. "We are looking down the road and believe it will pay off in 2010 and 2020 and beyond."

Steiner looks at possible BioNetwork payoffs and says, "This may sound a bit trite, but I think it's kind of limitless. Biotechnology and pharmaceutical industries, there are so many facets to that . . . . From a standpoint of work force development and economic development, it's a wonderful tool for North Carolina. I would say it's a gem."[48]

(continues)

Table 8. National Council Licensure Examination Passing Rates: Associate's Degree in Nursing (ADN), Bachelor's of Science in Nursing (BSN), Nursing Diploma (DIP), and Licensed Practical Nursing (LPN), 2000–2006

School	Type	2000	2001	2002	2003	2004	2005	2006
National Pass Rate	**ALL RN**	**83.84**	**85.5**	**86.6**	**87**	**85**	**87.3**	**88**
State Pass Rate	**ALL RN**	**87**	**92**	**90**	**90**	**86**	**89**	**90**
National Pass Rate	**ADN**	**83.81**	**85.29**	**86.62**	**87**	**85**	**87.5**	**87.95**
State Pass Rate	**ADN**	**87.45**	**92**	**90**	**91**	**86**	**89.3**	**89**
Alamance CC	ADN	87	90	81	94	78	83	87
Asheville-Buncombe CC	ADN	89	91	95	97	92	91	96
Beaufort County CC	ADN	90	86	96	93	82	85	92
Bladen CC	ADN							53
Blue Ridge CC	ADN	87	74	71	100	88	90	81
Cabarrus College of Health Sciences	ADN	90	88	89	88	97	98	93
Caldwell CC	ADN	86	96	81	81	91	84	90
Cape Fear CC	ADN	100	100	95	97	89	100	100
Carolinas College of Health Sciences	ADN	81	95	89	84	86	95	97
Catawba Valley CC	ADN	97	86	93	91	93	84	88
Central Carolina CC	ADN	69	100	93	100	88	100	100
Central Piedmont CC	ADN	77	80	93	91	92	76	88
Coastal Carolina CC	ADN	92	92	96	88	92	91	96
College of The Albemarle	ADN	100	86	91	96	90	100	96
Craven CC	ADN	84	89	92	91	74	86	90
Davidson County CC	ADN	92	97	94	92	100	98	98
Durham Tech CC	ADN	96	83	92	96	90	91	96
Fayetteville Tech CC	ADN	96	94	93	82	90	89	82
Foothills Nursing Consortium	ADN	88	92	89	97	83	87	71
Forsyth Tech CC	ADN	82	86	92	95	77	86	90
Gardner-Webb University	ADN	75	89	84	85	78	72	83
Gaston College	ADN	96	89	100	100	95	86	90
Guilford Tech CC	ADN	88	86	85	86	100	93	97
James Sprunt CC	ADN	70	75	78	100	91	90	77
Johnston CC	ADN	100	100	100	91	97	100	97
Lenoir CC	ADN	95	78	93	83	83	77	97
Mayland CC	ADN	50	75	89	94	77	100	100
Mitchell CC	ADN	94	89	97	96	100	97	100
Nash-Edgecombe-Wilson-Halifax Nursing Consortium	ADN	79	84	90	94	83	95	91
Piedmont CC	ADN	100	100	92	100	75	93	95
Pitt CC	ADN	78	67	77	93	92	91	80
Presbyterian School at Queens University	ADN	81	91	76	89	98	89	91
Randolph CC	ADN	78	92	91	86	76	76	71

(continues)

Source: Five-Year NCLEX Pass Rates, N.C. Board of Nursing, Raleigh, N.C. Accessed on Oct. 29, 2007, on the Internet at *http://ww.ncbon.com/contenxt.apsx?id=1090&terms-NCLEX+pass+rates.*
EE = Exit Exam.

Table 8. National Council Licensure Examination Passing Rates: Associate's Degree in Nursing (ADN), Bachelor's of Science in Nursing (BSN), Nursing Diploma (DIP), and Licensed Practical Nursing (LPN), 2000–2006, *continued*

School	Type	2000	2001	2002	2003	2004	2005	2006
Region A Nursing Consortium	ADN	93	87	89	94	85	90	84
Richmond CC	ADN	100	97	91	94	89	78	88
Roanoke-Chowan CC	ADN	74	75	81	91	83	100	95
Robeson CC	ADN	70	67	90	83	56	57	96
Rockingham CC	ADN	93	89	100	100	88	96	74
Rowan-Cabarrus CC	ADN	84	70	88	93	94	100	100
Sampson CC	ADN	88	93	83	96	92	88	77
Sandhills CC	ADN	96	100	85	85	91	84	96
Southeastern CC	ADN	88	86	96	100	82	92	83
Stanly CC	ADN	95	89	88	88	82	97	92
Surry CC	ADN	85	94	98	85	73	99	95
Vance-Granville CC	ADN	96	90	94	89	75	79	74
Wake Tech CC	ADN	100	98	100	92	94	91	84
Wayne CC	ADN	100	100	93	92	91	93	91
Western Piedmont CC	ADN	86	89	82	86	59	88	97
Wilkes CC	ADN	76	86	86	82	88	65	86
National Pass Rate	**BSN**	**83.89**	**85.86**	**86.5**	**86.9**	**85**	**86.7**	**86.2**
State Pass Rate	**BSN**	**86**	**91**	**91**	**87**	**84**	**87.2**	**92**
Barton College	BSN	83	94	93	86	71	84	100
Duke University	BSN				100	85	98	94
East Carolina University	BSN	91	93	97	81	83	94	99
Lenoir-Rhyne College	BSN	91	92	100	88	73	76	94
NC A&T State University	BSN	77	81	77	75	81	69	69
NC Central University	BSN	94	81	82	81	65	65	82
Queens University of Charlotte	BSN	84	93	71	79	93	75	89
UNC-Chapel Hill	BSN	93	94	94	93	97	94	98
UNC-Charlotte	BSN	83	94	86	89	72	77	97
UNC-Greenboro	BSN	82	92	98	95	80	93	93
UNC-Wilmington	BSN	79	91	90	89	74	94	96
Western Carolina University	BSN	87	95	88	71	88	88	85
Winston-Salem State University	BSN	90	84	93	94	97	87	83
National Pass Rate	**DIP**	**83.38**	**86**	**86.31**	**89.8**	**88**	**90.2**	**86.2**
State Pass Rate	**DIP**	**89.66**	**92**	**83**	**91**	**97**	**99**	**98**
Watts School of Nursing	DIP	100	100	96	94	93	98	96
Mercy School of Nursing	DIP	88	89	92	91	98	100	100

Table 8. National Council Licensure Examination Passing Rates: Associate's Degree in Nursing (ADN), Bachelor's of Science in Nursing (BSN), Nursing Diploma (DIP), and Licensed Practical Nursing (LPN), 2000–2006, *continued*

School	Type	2000	2001	2002	2003	2004	2005	2006
National Pass Rate	**LPN**	**85.1**	**86.45**	**86.4**	**88.2**	**89**	**89.4**	**88.33**
State Pass Rate	**LPN**	**92**	**92**	**94**	**96**	**97**	**93.9**	**94**
Asheville-Buncombe CC	LPN	97	97	98	100	100	97	97
Beaufort County CC	LPN	88	100	90	100	100	92	94
Bladen CC	LPN	90	95	91	97	100	100	100
Brunswick CC	LPN	95	87	80	100	100	81	90
Caldwell CC	PN EE	100	100	96	100	100	100	100
Cape Fear CC	LPN	100	92	100	100	100	95	100
Carteret CC	LPN	93	93	92	85	86	95	100
Central Carolina CC	LPN	91	100	95	96	100	100	97
Cleveland CC	LPN	67	100	100	100	100	89	81
Coastal Carolina CC	LPN	100	100	94	100	100	100	100
College of The Albemarle	LPN	83	80	82	80	78	77	100
Craven CC	LPN	90	92	100	85	100	100	100
Durham Tech CC	LPN	76	88	85	88	67	74	97
ECPI-Charlotte	LPN						84	86
ECPI-Raleigh	LPN						100	80
Fayetteville Tech CC	LPN	94	77	95	100	100	95	94
Forsyth Tech CC	LPN	100	100	100	100	100	100	92
Gaston College	LPN	94	100	100	93	96	97	96
Guilford Tech CC	LPN						93	100
Isothermal CC	LPN	76	86	86	96	100	89	100
James Sprunt CC	LPN	81	80	73	77	100	100	93
Johnston CC	PN EE	100	100	94	100	100	100	100
Lenoir CC	LPN	100	100	100	100	93	100	88
Mayland CC	LPN						88	95
McDowell Tech CC	LPN	88	76	95	95	95	96	94
Montgomery CC	LPN	84	86	75	96	96	90	95
Nash-Edgecombe-Wilson-Halifax Nursing Consortium	LPN	99	100	100	97	96	100	99
Roanoke-Chowan CC	PN EE	100	100	100	100	100	100	100
Robeson CC	PN EE	91	92	100	100	94	91	89
Rockingham CC	LPN	79	92	90	81	94	86	80
Rowan-Cabarrus CC	LPN	95	97	84	95	87	89	88
Sampson CC	LPN	91	100	92	100	96	97	96
Sandhills CC	LPN	90	94	89	100	100	88	96
South Piedmont CC	LPN	100	78	100	80	100	100	100
Southeastern CC	LPN	100	100	100	100	100	100	83
Southwestern CC	LPN					100	100	100
Surry CC	LPN	78	96	100	95	100	100	100
Vance-Granville CC	LPN	65	90	94	100	91	94	90
Wayne CC	LPN	100	92	100	93	100	100	100

Conclusions and Recommendations

As North Carolina's economy shifts from a three-legged stool of textiles, tobacco, and furniture to a ladder missing the rungs of traditional middle jobs, our state must develop a new means to fill the new middle jobs and prevent North Carolinians from having to accept low-skill, low-wage jobs due to lack of education or skills. The N.C. Community College System has a crucial role to play in creating a new middle work force that will realign the economic imbalance and polarization left by the loss of textiles and tobacco and the waning furniture industry.

For now, biotech is the leading model in North Carolina for dealing with work force shortages at the community college level through innovative and strategic partnerships with industry, private foundations, the UNC system, and the General Assembly. But the occupations of nursing, teaching, truck driving, and machining are a century or more old, and the shortages here speak to different kinds of problems. Dramatic retirement and departures from the existing work force and a lack of job appeal for emerging workers are testing the community college's abilities to fill these gaps. Added to this is a lack of funding to provide competitive salaries, proper facilities and equipment, and advertising to attract the needed students. This situation needs to change if the community colleges are to continue to be the engines for economic development that they have been in the past.

Based on our research, the N.C. Center for Public Policy Research recommends:

(1) The N.C. General Assembly, the State Board of Education, and the N.C. Department of Public Instruction should adopt policies that establish the N.C. Community College System as the primary venue through which to train the number of teachers and nurses the state needs.

North Carolina must be strategic in trying to meet work force shortages in teaching and nursing. Any state plan to address these shortages must provide for the N.C. Community College System to play the *primary* role. There are three reasons for this—the community colleges' greater affordability, greater ability to produce a larger number of program completers and graduates, and greater ability to meet region-specific demands in terms of the number of graduates produced.

This does not mean that the University of North Carolina system has no role. It does. It means that the public universities are unlikely to be able to ramp up to produce the number of teachers and nurses needed as fast as they are needed. In the field of teacher education, North Carolina's will need 953 more *new* teachers each year even to maintain current student-teacher ratios, much less improve them.[49] Public schools must *replace* approximately 10,000 teachers every year due to resignation and retirement.[50] North Carolina will need approximately 6,500 *more* graduates each year in order to address the state's teacher shortage.[51] Yet, for academic year 2005–06, all of North Carolina colleges and universities combined produced a total of 4,866 pre-licensure teaching graduates and completers. Of the 3,969 teaching graduates and completers from the UNC system, 1,442, or roughly 36 percent, were alternative completers, a classification that includes lateral entry applicants, among others.[52] Since April 2006, the UNC system has adopted a policy of producing more teachers. While the number of UNC system teacher education program graduates has increased from 2,282 in 2001–02 to 3,969 in 2005–06, the total number of teachers produced is not nearly enough.

In the field of health care, North Carolina will have an estimated shortage of 9,000 nurses in 2015 and almost 18,000 by 2020.[53] Using other models to forecast the demand for nurses, estimates of the shortage of RNs is even higher, with 19,914 needed by 2015 and 32,072 needed by 2020 (see Table 4, p. 155). North Carolina will need roughly 2,400 *more* graduates annually in the field of health care, 2,000 of whom will need some postsecondary education or training.[54] For academic year 2005–06, North Carolina colleges and universities produced a total of 3,380 pre-licensure (not yet licensed to practice) RN graduates.[55] Of the RN graduates, or 68 percent, or 2,292, came from the community colleges.[56]

And, community colleges have shown they can produce high-quality nurses equal to any other source. In 2006, North Carolina's passing rate for *all* registered nursing licensures was 90 percent (88 percent nationally). The community colleges' passing rate for all associate's degree in nursing licensures was 89 percent (about 88 percent nationally), while the passing rate for all bachelor's of science in nursing licensures was 92 percent (about 86 percent nationally).[57] Within bachelor's of science licensures, the UNC system passing rate was approximately 89 percent, while the passing rate for private colleges and universities was approximately 94 percent (see Table 8, p. 173).[58]

According to Renee Batts, health sciences program coordinator for the community college system, two primary factors limit the community college system's capacity to expand nursing student enrollment. First, funding for nursing programs is provided retrospectively. In order to expand, a nursing program must initially use non-state funds or grants. Second, the community college system faces a shortage of nursing faculty. Batts says the faculty shortage is due in part to the inability to offer competitive salaries.

In addition, Batts indicates that the faculty shortage could be worsened by the N.C. Board of Nursing's pending rule that would require all nursing faculty initially employed after December 31, 2014, to have a master's degree or a nursing doctorate degree from an accredited institution. Batts says, "If approved, this rule would have a negative impact on our enrollment in some areas and would further increase the nursing shortage." Batts explains, "A number of the community colleges use part-time clinical nursing instructors to satisfy the 10:1 student to teacher ratio requirement in clinic. Part-time clinical nursing faculty are hired based on their clinical expertise. They are bedside nurses with multiple years of experience, but usually they will not have a master's. If the master's is required for part-time faculty, we will lose an invaluable source of instructors and will probably not be able to recruit adequate staff to meet our student's needs." The Center joins the N.C. Association of Community College Presidents and the State Board of Community Colleges in opposing the N.C. Board of Nursing's proposed rule requiring that all nursing faculty initially employed after December 31, 2014, have a master's degree or a nursing doctorate degree from an accredited institution.

Due to the N.C. Community College System's affordability, large pool of students, ability to meet region-specific demands, and the UNC system's current inability to move fast enough to produce the number of teachers and nurses needed, policymakers in North Carolina should establish the community college system as the primary venue through which to train teachers and nurses.

(2) The State Board of Education, N.C. Community College System, and Department of Public Instruction should work together to establish policies that address the shortage of public school teachers, including making it easier for community colleges to train teacher education students for licensure. Two policy options could accomplish this goal:

(a) The State Board of Education should amend current policies to accept teacher education licensure credits from community colleges in all nine areas of teaching competence. Currently, the State Board only accepts community college licensure credits in six of the nine areas of teaching competence—human growth and development, educational and instructional technology, learning theory and styles, school policies and procedures, home school and community collaborations, and classroom management. The State Board of Education only accepts licensure credit for the remaining three areas of teaching competence—reading, special education, and instructional core content—from four-year colleges and universities.[59]

(b) The State Board of Education and N.C. Community College System should work together to ensure that all 58 community college campuses take advantage of the State Board of Education's new policy of permitting community colleges, in conjunction with a university, to participate in lateral entry teaching programs that lead to licensure. State Board of Education senior policy analyst Kathy Sullivan says that as of April 2008, no applications for lateral entry teaching programs have been received and only one is expected in the near future. In order to raise community college awareness of the opportunity available, the State Board of Education should encourage community college participation in lateral entry teaching programs by developing and promulgating rules under which community colleges can apply. In turn, the N.C. Community College System should encourage all of its 58 campuses to apply.

(3) The N.C. General Assembly should provide differentiated funding for community college programs, including more funding for high-cost programs in areas of increased state need such as allied health.

Community college programs vary in their cost to community college campuses. Therefore, program funding from the N.C. General Assembly should be "differen-

tiated," or allocated according to relative cost, so that high-cost programs remain affordable for community college campuses. Following the 2005–06 legislative session, Martin Lancaster, President of the N.C. Community College System, expressed frustration in dealing with the legislature over the issue of funding for allied health. "We requested $29 million for Allied Health programs in the latest [2005–06] session. They gave us $1 million for personnel and $5 million for equipment and technology. They give us the same amount of money per FTE [full-time equivalent enrollment] in allied health as they do for cosmetology. They need to understand that it costs 10 times as much to train a nurse as a cosmetologist."

However, following the 2007 session, President Lancaster reports that some progress has been made. President Lancaster says, "We *asked* for $31 million in the regular session to address salaries, differential funding, and other allied health needs. We *got* $5.6 million, which is being used for differential funding for allied health programs—to cover salary and equipment costs that are greater per FTE than any other curricula." While President Lancaster says that allied health programs remain "grossly underfunded," he says, "We at least we have our foot in the door and have broken the ice on the concept of differentiated funding."

According to Jennifer Haygood with the legislature's Fiscal Research Division, the N.C. General Assembly appropriated $1 million in differentiated funding specifically for nursing on a recurring basis in 2006. It is allocated among colleges based on associate's degree nursing (ADN) FTE. There has also been what are called "special allotments" provided for certain high cost programs. For fiscal year 2007–08, these special allotments are for: Caldwell Community College's truck driving program ($119,574); Johnston Community College's truck driving program ($186,004); Cape Fear Community College's marine technology program ($460,362); Haywood Community College's Regional High Tech Center (robotics) program ($613,736); and Wilson Community College's heavy equipment operation ($296,650). These special allotments have been funded for several years. Typically, the funds are to support the additional staff and operating expenses related to maintaining the program's equipment.

The N.C. Community College System relies upon the state for 69.1 percent of its budget, with local governments accounting for 12.7 percent, tuition receipts for 12.5 percent, and other sources for the remaining 5.7 percent.[60] In the 2006 fiscal year, the N.C. Community College System received more than $934 million in state appropriations, 92 percent of which was allocated according to full-time equivalent enrollment (FTE).[61] In curriculum programs, community college campuses receive one FTE for every 32 credit hours completed by a student over two semesters. For continuing education programs, community colleges earn FTEs at a lower rate (75 percent).[62]

Because FTEs are determined by the previous year's enrollment and are the same for all programs regardless of cost, the current funding model fails to account for differences in program costs.[63] In other words, all FTEs have the same financial value despite the fact that certain programs are more expensive to operate than others and the fact that certain programs are more key to the state's needs and future at a particular time. Health science programs, in particular, are in great need now and for the future but cost $1,520 more per FTE than other curriculum programs.[64] Due to the paucity of additional funding for high-cost programs, community colleges must limit program enrollments, eliminate other high-cost programs, or funnel money from other areas. In response, the State Board of Community Colleges has identified the establishment of differentiated funding as a priority.[65] The Center endorses this concept. While the General Assembly made an important step towards differentiated funding for high-cost programs in the 2007 legislative session, the General Assembly should continue to adopt differentiated funding policies, especially granting higher funding for high-cost programs in areas of high state need such as allied health programs.

(4) The N.C. Community College System should use the BioNetwork's strategy of forming innovative, strategic, and diverse partnerships with industry, private grantmaking foundations, the UNC system, and the General Assembly as a blueprint for achieving similar success in the fields of allied health, teacher education, and other fields of strategic importance. The System also should identify its top four fields of strategic importance for the General Assembly and the public.

Just as the BioNetwork has taken forceful strides in satisfying work force demands in the field of biotechnology, the occupations of nursing, teaching, and other fields of strategic importance could benefit from similar partnership strategies. Such strategic and innovative partnerships with industry and/or the UNC system provide another avenue to help community colleges satisfy work force needs.

Our research has revealed important partnerships between community colleges and the health industry (the Wake Early College of Health and Sciences), UNC teaching programs (the Wachovia East Partnership), and the trucking industry (Davidson County Community College's Transportation Technology Center). However, only in the field of biotechnology have the state's community colleges engaged in diversified partnerships with the biotechnology industry, the UNC system, a private foundation, and the General Assembly. The BioNetwork's multifaceted partnerships have paved the way for North Carolina to be the only state in the nation to rank in the top 10 for job growth in all biotechnology sectors. BioNetwork has shown promising growth. Between 2004–05 and 2006–07, the number of program completers more than doubled, with 1,780 program completers in 2006–07.

The BioNetwork is so effective because it is precisely that—a "network" of various partnerships. The N.C. Community College System should try to emulate the BioNetwork example by diversifying partnerships in health, teaching, and other fields. This diversification strategy could prove particularly effective in allied health if stronger partnerships with UNC were linked with partnerships with the health industry.

The American Association of Community Colleges has proposed one possible method for such a diversification called the RN (registered nursing) to MSN (master's of science in nursing) Faculty and Scholarship Initiative, "which would establish the first collaborative effort between the nation's largest source of new registered nurses (associate's degree programs), its largest employer of RNs (hospitals) and nurse educators (master's degree programs) to address the greatest obstacle to increasing RN program enrollments—faculty shortage." [66] According to Brenda Cleary, formerly of the N.C. Center for Nursing, similar programs exist at both East Carolina University and UNC-Chapel Hill. The N.C. Community College System and UNC system should collaborate to create more such programs between their constituent institutions, private industry, and private grantmaking foundations.

(5) The General Assembly should adopt a policy of moving community college faculty salaries to the national average by 2016.

In 2005–06, the average salary for North Carolina community college faculty was $40,989. That same year, the average community college faculty salary nationally was $55,405, and North Carolina community college faculty pay ranked 46th in the nation.[67] By comparison, the average North Carolina public school teacher salary is $46,410, ranking 27th in the nation. The average full-time faculty member at North Carolina's 16 public universities is paid $80,784, ranking 13th in the nation.[68] Raising community college faculty pay to the national average would cost an estimated $77.3 million over the period 2007–10. The community college system is the key to addressing work force shortages and adjusting to the huge transition in North Carolina's economy. That being the case, community college faculty pay must improve, or the state's response to work force shortages and economic transformations will be as below average as the pay.

Footnotes

[1] North Carolina Commission on Workforce Development, *State of the North Carolina Workforce: An Assessment of the State's Labor Force Demand and Supply 2007–2017,* N.C. Department of Commerce, Raleigh, N.C., 2007, p. 14. On the Internet at *http://www.nccommerce.com/en/WorkforceServices/FindInformationForWorkforceProfessionals/PlansPoliciesandReports/#Resource3*

[2] *Ibid.,* p. 15.

[3] *Ibid.,* pp. 12–13 and 15.

[4] *Ibid.,* p. 15.

[5] *Ibid.,* pp. 17–18.

[6] *Ibid.,* p. 23.

[7] *Ibid.,* p. 44.

[8] *Ibid.*

[9] *Ibid.,* pp. 46–47.

[10] *North Carolina Occupational Trends—Projections 2004–2014*, Employment Security Commission of North Carolina, Raleigh, N.C. Accessed on the Internet at *http://eslmi23.esc.state.nc.us/projections*

[11] Editorial calculation from *North Carolina Trends in Nursing Education: 2003–06,* N.C. Center for Nursing, Raleigh, N.C., Aug. 2007, pp. 35–36. On the Internet at *http://www.ga.unc.edu/NCCN/research/Trends2007/final%20report%20schools%202007.pdf*

[12] Brenda Cleary, "North Carolina Center for Nursing and the Nursing Workforce," *NC Medical Journal*, Vol. 65, No. 2, Mar./Apr. 2004, p. 112.

[13] Editorial calculation from *North Carolina Trends in Nursing Education: 2003–2005*, note 11 above, p. 8.

[14] Billy Bevill *et al., Who Will Teach Tomorrow's Nurses?*, N.C. Center for Nursing, Raleigh, N.C., 2006, p. 3.

[15] *North Carolina Trends in Nursing Education: 2003–06*, note 11 above, p. 38.

[16] *Task Force on the North Carolina Nursing Workforce Report*, N.C. Institute of Medicine, Durham, N.C., May 2004, p. ix.

[17] North Carolina Commission on Workforce Development, note 1 above, p. XVIII.

[18] *Five-Year NCLEX Pass Rates (RN & LPN)*, N.C. Board of Nursing, Raleigh, N.C. Accessed Oct. 29, 2007, on the Internet at *http://www.ncbon.com/content.aspx?id=1090&terms=NCLEX+pass+rates*

[19] *Ibid.*, editorial calculation.

[20] "Colleges resist raising bar for nursing teachers," *The News & Observer,* Raleigh, N.C., Nov. 26, 2007, p. B5.

[21] As quoted in Nick Zulovich, "Wake Tech, WakeMed Strive to Meet Demand for Health Care Professionals," *NC Magazine*, North Carolina Chamber, Raleigh, N.C., Oct. 2007, p. 40.

[22] As quoted in "Lancanster's Leadership Aids System's Significant Improvement," *NC Magazine*, North Carolina Chamber, Raleigh, N.C., Oct. 2007, p. 38.

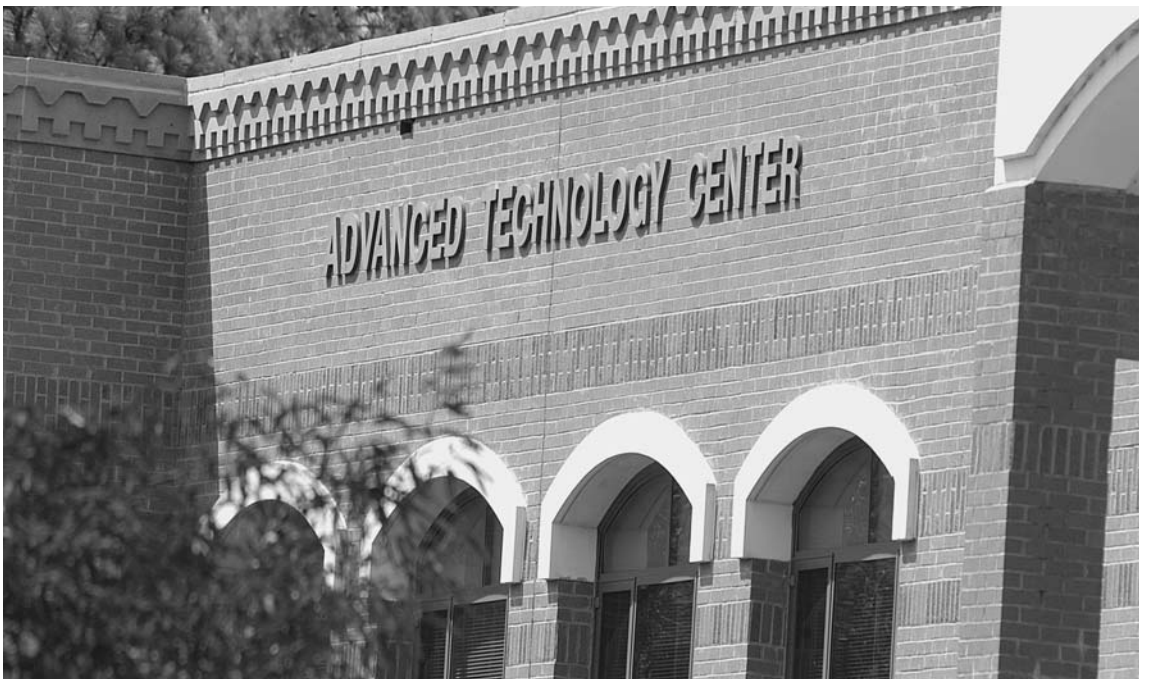
[23] As quoted in "Mission Hospitals & Asheville-Buncombe Technical Community College: Workforce Development Partnership," *NC Magazine*, North Carolina Chamber, Raleigh, N.C., Oct. 2007, p. 40.

[24] As quoted in "LabCorp & Alamance Community College: Workforce Development Partnership," *NC Magazine*, North Carolina Chamber, Raleigh, N.C., Oct. 2007, p. 46.

[25] Editorial calculation based on average teacher-to-student ratios provided by Scott Douglass with N.C. Department of Public Instruction's school business division and "July 1, 2007 County Total Age Groups-Children" and "July 1, 2020 County Total Age Groups-Children," N.C. State Data Center, Raleigh, N.C. Accessed Nov. 9, 2007, on the Internet at *http://demog.state.nc.us/*

[26] *Report and Recommendations from the State Board of Education Task Force on Teacher Retention*, State Board of Education, Raleigh, N.C., Feb. 2005, p. 2.

[27] *Report to the Joint Legislative Education Oversight Committee of the General Assembly Regarding Teacher Education Enrollment Plans*, UNC General Administration, Mar. 2007,



p. 4. See also "Addressing the Shortage of Teachers in North Carolina," *North Carolina Insight*, Vol. 21, No. 3, N.C. Center for Public Policy Research, Raleigh, N.C., Aug. 2004, pp. 2–31.

[28] Dan Holloman, Manager of the Center for Recruitment, Retention, Recognition, and Advancement, North Carolina Department of Public Instruction.

[29] "Vacancies K-12 in Chapel Hill," Oct. 2006. Unpublished document provided by Danny Holloman, N.C. Department of Public Instruction. See also "Addressing the Shortage of Teachers in North Carolina," *North Carolina Insight*, Vol. 21, No. 3, N.C. Center for Public Policy Research, Raleigh, N.C., Aug. 2004, pp. 2–31.

[30] The accuracy of reported vacancy data depends on the consistency of LEA reporting.

[31] *System Level Turnover Report*, N.C. Department of Public Instruction, Oct. 2006, pp. 3–4. On the Internet at *www.ncpublicschools.org/docs/recruitment/surveys/turnover/2005–06turnoverreport.pdf*

[32] As quoted in Nick Zulovich, "Wachovia Partnership East Combines Resources to Train More Teachers," *NC Magazine*, North Carolina Chamber, Raleigh, N.C., Oct. 2007, p. 26.

[33] *Lateral Entry: Criteria and Conditions,* State Board of Education—Department of Public Instruction, Licensure Section, Raleigh, N.C., July 2003, p. 1.

[34] As quoted in Nick Zulovich, "Breakthrough Teacher Training Program Tackles Community Shortage," *NC Magazine*, North Carolina Chamber, Raleigh, N.C., Oct. 2007, p. 42.

[35] As quoted in "Lancanster's Leadership Aids System's Significant Improvement," note 22 above, pp. 37–38.

[36] As quoted in Tom Harris, "Bowles: UNC System is a Key Business Resource," *NC Magazine*, North Carolina Chamber, Raleigh, N.C., Oct. 2007, p. 12.

[37] As quoted in "Transportation Partners and Davidson County Community College: Workforce Development Partnership," *NC Magazine*, North Carolina Chamber, Raleigh, N.C., Oct. 2007, p. 42.

[38] "Biotechnology in North Carolina," N.C. Biotechnology Center website, Sept. 5, 2007. On the Internet at *http://www.ncbiotech.org/news_and_events/media_center/fast_facts.html*

[39] "Workforce Development," N.C. Biotechnology Center website, Research Triangle Park, N.C. On the Internet at *http://www.ncbiotech.org/services_and_programs/workforce_development?Goldenleafrpt.pdf*

[40] The Biotechnology Center is updating its *Window on the Workplace Report* with publication expected in 2008.

[41] North Carolina Community College System 2004–05 Data. Enrollments for BioWork Process Technician, Biotechnology/Pharmaceutical-related Associate Degree, Biological/Chemical/Engineering Technology Associate Degree, BioNetwork Capstone Center, and Associate Science Degree Curriculum Enrollments. Unpublished.

[42] North Carolina Biomanufacturing and Pharmaceutical Worker Training Program Business Plan, Aug. 1, 2003, p. 1. On the Internet at *http://www.ncbioscience.org/forums/documents/BPTCBusinessPlanAbridged.pdf*

[43] *Ibid.*, p. 4.

[44] Data provided by Kris Allsbury, assistant director of BioNetwork.

[45] "Biomanufacturing Center Taking Shape at NCSU," press release by the NC Biotechnology Center. On the Internet at *http://www.biotech.org/news_and_events/industry_news/ncsu_training_center.html*

[46] "North Carolina Research Campus—The Plan." On the Internet at *http://www.ncresearchcampus.net/theplan.html*

[47] As quoted in "Lancanster's Leadership Aids System's Significant Improvement," note 22 above, p. 37.

[48] As quoted in Nick Zulovich, "System Continues to Praise Success of BioNetwork," *NC Magazine*, North Carolina Chamber, Raleigh, N.C., Oct. 2007, pp. 52–53

[49] Editorial calculation based on average teacher-to-student ratios provided by Scott Douglass with N.C. Department of Public Instruction's school business division and "July 1, 2007 County Total Age Groups-Children" and "July 1, 2020 County Total Age Groups-Children," N.C. State Data Center, Raleigh, N.C. Accessed Nov. 9, 2007, on the Internet at *http://demog.state.nc.us/*

[50] *Report and Recommendations from the State Board of Education Task Force on Teacher Retention*, note 26 above,

[51] North Carolina Commission on Workforce Development, note 1 above, pp. 46–47.

[52] Editorial calculation based on *Report on UNC Production of Teacher Education Graduates and Alternative Licensure Completers 2005–2006*, The University of North Carolina, Raleigh, N.C., Mar. 2007, p. 4, and data provided by Dan Holloman, Manager of the Center for Recruitment, Retention, Recognition, and Advancement, North Carolina Department of Public Instruction.

[53] *Task Force on the North Carolina Nursing Workforce Report*, note 16 above, p. ix.

[54] North Carolina Commission on Workforce Development, note 1 above, pp. 46–47.

[55] Editorial calculation from *North Carolina Trends in Nursing Education: 2003–2006,* note 11 above, pp. 35–36.

[56] *Ibid.*

[57] *Five-Year NCLEX Pass Rates (RN & LPN)*, note 18 above.

[58] *Ibid.*, editorial calculation.

[59] Kathy Sullivan, *Executive Summary: Revision of SBE Policies to Reflect Changes in Initial and Continuing Licensure Requirements*, N.C. State Board of Education, June 2005, p. 6. On the Internet at *http://www.ncpublicschools.org/sbe_meetings/0506/0506_QP03.pdf*

[60] *A Matter of Facts 2007: The North Carolina Community College System Fact Book*, North Carolina Community College System, Raleigh, N.C., May 2007, p. 9. On the Internet at *http://www.ncccs.cc.nc.us/Publications/ docs/Publications/fb2007.pdf*

[61] *Ibid*., pp. 48 and 51.

[62] John Quinterno, *North Carolina's Unfinished Transformation: Connecting Working Families to the State's Newfound Prosperity*, North Carolina Budget & Tax Center, Raleigh, N.C., 2006, p. 22.

[63] *Ibid.,* and *Staying A Step Ahead: Higher Education Transforming North Carolina's Economy, Interim Report to the Joint Legislative Education Oversight Committee of the N.C. General Assembly as authorized by Session Law 2004–179* (H.B. 1264, § 6.1–6.3), Pappas Consulting Group, Stamford, Conn., p. 138.

[64] *2007–09 Consensus Budget Request*, North Carolina State Board of Community Colleges, Raleigh, N.C., Nov. 2006, p. 22.

[65] *Ibid*., p. 21.

[66] *The Sensible Solution to the Nursing Faculty Shortage: Increase RN to MSN Enrollments and Graduations*, American Association of Community Colleges, Washington, D.C. Accessed Oct. 29, 2007, on the Internet at *www.aacc.nche.edu/Content/NavigationMenu/HotIssues/Nursing/The_Sensible_Solution.pdf*

[67] "The Nation," The Chronicle of Higher Education Almanac Issue 2007–08, Vol. LIV, No. 1, Washington, D.C., Aug. 31, 2007, p. 8. According to preliminary 2006–07 data released from IPEDS, N.C. Community College System faculty salaries ranked 41st out of the nation's 49 community college systems.

[68] Ibid.