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State Board of Education
Department of Public Instruction

Report to the North Carolina General Assembly

Increase Access to Career and Technical Education

Session Law 2013-1

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Attracting Students to High Skill and High Demand Occupations

In accordance with Section 3.(b) of Session Law 2013-1, this report describes the progress made by the State Board of Education and the State Board of Community Colleges in developing strategies to increase student engagement in Career and Technical Education, particularly in occupational areas where future demand for employees is anticipated to be high.

LEAD and the Department of Commerce provided information to the Department of Public Instruction about occupations where officials anticipate employees will be in great demand. Department of Public Instruction and Department of Community Colleges staff analyzed the occupations to determine what current programs prepare employees to work in these fields, how well Career and Technical Education is meeting the need, and what strategies can be implemented to improve these efforts.

Focusing on careers with high demand for employees has long been a focus of Career and Technical Education. The Carl Perkins Career and Technical Education Act of 2006, legislation that guides the implementation of secondary and postsecondary Career and Technical Education across the United States, requires that federal CTE funds be used to prepare students for high wage, high skill, and high demand jobs. In recent years, CTE has moved away from "consumer" courses and focused attention on occupational programs that meet federal requirements. While enrollment in traditional CTE programs is strong, data suggest students also are searching for programs that prepare them for high demand, high skill careers. Particular attention is being paid to so-called emerging careers, where employment numbers are currently small, but are expected to increase dramatically in the future.

Enrollment data demonstrate that current students are less likely to become concentrators than were students in the past. A concentrator is a student who has earned four related technical credits, at least one at the second level (requires a prerequisite). Studies show CTE students who become concentrators are more likely to graduate and are better prepared for careers or further education than are students who may take a variety of CTE courses, but not in a related area.

Chart 1 compares the number of CTE enrollments for students in grades 6-12 by year since 2010 with the number of concentrators.

Chart 1. Comparison of CTE Enrollment and Concentrator Data

Year	6-12 CTE Enrollments	Number of concentrators	Concentrator Graduation Rate
2010	810,203	46,890	89.2%
2011	804,850	47,486	89.6%
2012	788,343	40,586	94.0%
2013	808,134	26,545	93.6%
2014	849,432*	TBD	TBD

*Preliminary data. Final numbers may be lower

Preparing Students for High Skill/High Demand Careers

Secondary Education

Chart 2 identifies careers in the Engineering Technologies and Industrial Technologies pathways with high projected demand for employees in the future, notes education and work experience requirements, and identifies 2013-14 enrollment in Career and Technical Education courses that support preparation for these careers. These are 10 examples. Many others also apply.

Chart 3 identifies 10 additional careers with anticipated high future demand for employees, notes education and work experience requirements, and identifies 2013-14 enrollment in Career and Technical Education courses that support preparation for these careers.

Career and College Promise (CCP) noted on these charts is North Carolina's dual enrollment program for high school students. This program allows eligible NC high school students to enroll in college classes through their high school. CTE Pathways available through CCP allow students to begin a certification or diploma program in a particular technical field or career area. CTE Pathways vary by community college. At present, more than 700 community college courses are available to high school students through this program. In addition to earning dual credit through Career and College Promise, The NC High School to Community College Articulation Agreement allows students to earn community college credit for selected courses taken in high school that are closely aligned to the community college curriculum.

Local Course Options noted on the chart allow individual school systems to develop courses to address local employment needs. Districts can collaborate with each other to develop curriculum aligned to needs of local business and industry.

In addition to specific coursework, students can develop skills in these areas through work-based learning opportunities such as Apprenticeships and internships.

Students can earn credentials through their high school course work that can provide a way for employers to assess skills and often result in an advantage when seeking initial employment or setting salary levels. Charts 2 and 3 list related credentials that can be earned by secondary students by career area. Secondary CTE students earned more than 300,000 credentials during 2013-14 in areas such as Microsoft Office Specialist, ServSafe Manager Food Protection Certification, OSHA Industry Certification, Fire Fighter Certification, Nurse Aide Certification, NCCER Modules, NIMS certifications, and Automotive Service Excellence. In addition, more than 30,000 students earned Career Readiness Certificates.

CTE also works to interest students in careers in Engineering Technologies and Industrial Technologies through efforts such as the following:

- Cultivate-a-Career exhibit at the NC State Fair, which introduces students and families to careers
- NC Manufacturing Awareness Week, which allows students to visit education institutions and businesses to see opportunities for future employment
- Co-curricular student organizations that provide opportunities for students to develop leadership and technical skills

- Students at Work, a program that exposes Middle School students to the world of work and available careers

Postsecondary Education

Chart 4 shows enrollments in Engineering and Technology programs in North Carolina Community Colleges. Chart 5 shows enrollments in high demand Career Clusters.

Ongoing activities to increase students in the pipeline in these areas include the following:

1. **Improved Identification of High School to Community College CTE Articulated Courses**

- NCCCS identified high school articulated courses on our *Combined Course Library* which will assist curriculum college awareness of courses that "may" be articulated through previously taken high school courses. This display and query ability will be available fall 2014.

2. **Aligned Curriculum to Career Clusters**

- Aligned 250+ community college curriculum titles with the appropriate Career Cluster title to assist in high school to community college course alignment.

3. **Set data requirements to identify CTE students**

- Initiated computerized identification of programs titles by career cluster titles so we can cluster identify each course of study so that data can be readily pulled and evaluated.

4. **Aligned high demand high school and community colleges business courses**

Reviewed the current Career and College Promise pathways between the North Carolina Department of Public Instruction and the North Carolina Community College System. Recommended ways to improve the seamless transition through pathways. These pathways included the following:

  - Business Administration (General Business)
  - Banking and Finance
  - Human Recourses Management
  - Marketing
  - Operations Management
  - Public Administration
  - International Business
    - Global Business Management
    - Import/Export Compliance

5. Career Technical Education Pathway (Freshmen and Sophomores)

The appropriations Act of 2013, S.B. 402, amended NC General Statutes 115D-20(4)a.2 to allow "academic transition pathways for qualified freshman and sophomore high school students that lead to a career technical education certificate or diploma in industrial and engineering technologies.

Joint Efforts with Postsecondary Education

Programs of Study

The Department of Public Instruction and the Department of Community Colleges are working together to ensure that all school districts establish at least one Program of Study. A Program of Study assists students in designing a coherent sequence of courses that includes high school and postsecondary coursework and provides a smooth transition to community college or other postsecondary education.

NC Works Pathways

NCDPI and NCDCC initiated the proposal process to fund 20 pilot Career Pathways Projects where high schools and community colleges will work together with regional employers and local workforce development boards to develop a 9-14 career pathway in critical career clusters as identified by the December 2013 North Carolina Economic Development Jobs Plan.

NCWorks Pathways are rigorous programs of study (grades 9-14), designed for students. Pathways integrate academic and technical coursework that is taught in a contextual manner offering a sequence of coursework or training modules, leading to opportunities for certificates and credentials with workplace value that may facilitate multiple entry and exit points while individuals work toward a diploma or AAS degree. Key to the pathway success are engaged employers, multiple work based learning experiences, strong career advising, coordination with workforce boards, and integration with employer intermediaries.

NCWorks Pathways help prepare students enter and succeed in the 21st century workforce by requiring cooperation and mutual collaboration among educators, employers, families and policy makers. Career pathways require the same high level of achievement for all students while recognizing and addressing a variety of learning styles. Career pathways integrate relevant applications into academics and encourage critical thinking and lifelong learning. Career pathways begin in high school continue at the community colleges, and are linked to the regional workforce system.

NCWorks Pathways prepare our future workforce through structured strategies of education in collaboration with regional employers and workforce development boards to develop and retain a globally competitive workforce with the knowledge and skills for high quality, sustainable jobs. Pathways seek to increase North Carolina's' competitive advantage by further developing and enhancing CTE that provide students the opportunity to gain necessary skills to create, make, and build.

NCWorks Pathways will target efforts to enhance programs and enrollments in critical career

cluster areas that compliment key targeted growth industries including STEM; Manufacturing, Information Technology; Health Science; Transportation, Distribution and Logistics; Agriculture, Food and Natural Resources; and Architecture and Engineering, and Construction. NC Works Pathways will work to increase the talent pipeline, competency-based credentials, and work-based learning opportunities in critical career cluster areas.

Advanced Manufacturing Week

- Twenty Nine (29) North Carolina Community Colleges hosted open houses for area high schools where middle and high school students experienced tech high touch workshops, tours of electrical electronics programs, experienced robots built by community college students, toured facility maintenance, welding, biotechnology classrooms and laboratories. Colleges held open house in various centers on campus including carpentry centers, electric power production, industrial system, and manufacturing classroom and training centers. This collaborative effort was between NCCCS and NCDPI Career and Technical Education.
- Fourteen (14) Community colleges also sponsored one day career focused open houses advanced manufacturing and industrial technology showcases
- Four (4) community colleges sponsored employer and counselor breakfasts, receptions and lunchbox tours for employers, counselor and teachers
- Six 6 advanced manufacturing company offered open house tours coordinated by high schools and community colleges during this advanced manufacturing week.
- Skills USA sponsored a skills competition in areas of advanced manufacturing and areas that support advanced manufacturing such as welding and electronics.

The North Carolina High School to Community College Articulation Agreement

First developed 1999, the High School to Community College Articulation Agreement provides a seamless process that joins secondary and postsecondary CTE programs of study. This agreement provides students with a way to earn community college credit for about 50 high school CTE courses that match the knowledge and skills taught in similar community college courses. The articulation agreement ensures that if a student is proficient in their high schools courses, they can receive college credit for that course at any North Carolina community college. The agreement has been revised and expanded in 2004 and 2013.

Recommendations for Future Activities

To ensure that North Carolina has employees with proper education and experience to meet future workforce needs requires a concerted effort at all levels. The Department of Public Instruction and Department of Community Colleges make the following recommendations to assist in this work:

- Strengthen opportunities for work-based learning both at the high school and community college levels.
- Improve relationships with business including developing a cadre of personnel who can help bridge the gap between education and business.
- Continue Pathways to Prosperity work.

- Work more closely with Career and College Promise programs to ensure that students have access to a non-duplicative coherent sequence of courses.
- Use data to identify necessary changes.
- Find sources of funding to expand awareness activities to lower grades.
- Add additional education partners including the University of North Carolina campuses.
- Continue to promote students earning industry-endorsed credentials with labor market value.
- Work more closely with Department of Commerce to identify job needs both for the near-term and distant futures.
- Promote use of Apprenticeships to combine on-the-job training with classroom instruction to prepare students for selected occupations.
- Continue to update and expand the NC High School to Community College Articulation Agreement , which allows students to earn postsecondary credit for high school courses that meet community college standards.
- Implement strategies to encourage students to complete concentrations.

Chart 2. Examples of how North Carolina CTE Supports Careers in Engineering Technologies and Industrial Technologies

Occupational Title	Employment Estimate 2010	Employment Estimate 2020	Annualized Growth Rate	Total Average Annual Openings	Education Required	Work Experience	Job Training Required	Related High School Course Enrollment 2013-14	Related Credentials Earned by High School Students
First-Line Supervisors of Construction Trades and Extraction Workers	23,100	26,590	1.4	880	High school diploma or equivalent	More than 5 years	None	Various CCP and Local Option courses	
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	11,480	13,910	1.9	440	Postsecondary non-degree award	None	Long-term on-the-job training	Various CCP and Local Option courses	
Plumbers, Pipefitters, and Steamfitters	9,700	11,120	1.4	420	High school diploma or equivalent	None	Apprenticeship	Agricultural Mechancis I (4,209) Agricultural Mechanics II (1,888) Various CCP and Local Option courses	• Certified Welder
Machinists	11,440	13,350	1.6	400	High school diploma or equivalent	None	Long-term on-the-job training	Metals Manufacturing I (626) Metals Manufacturing II (223) Various CCP and Local Option courses	• NIMS Job Planning Benchmark • NIMS Measurement, Materials and Safety • NIMS Manual Milling Skills
Operating Engineers and Other Construction Equipment Operators	9,350	11,030	1.7	390	High school diploma or equivalent	None	Moderate-term on-the-job training	Various CCP and Local Option courses	
Industrial Machinery Mechanics	8,130	9,910	2	340	High school diploma or equivalent	None	Long-term on-the-job training	Various CCP and Local Option courses	
Civil Engineers	8,490	9,840	1.5	310	Bachelor's Degree	None	None	Technology Engineering and Design (6,714) Project Lead the Way (pre-engineering) (7,677) Drafting-Engineering (12,927)	• AutoDesk Certifications
Welders, Cutters, Solderers, and Brazers	6,970	7,850	1.2	280	High School Diploma or equivalent	None	Moderate on-the-job training	Welding Technology I (941) Welding Technology II (472) Welding Technology III (249) Agricultural Mechanics I (4209) Agricultural Mechanics II (1888)	• Certified Welder
Mechanical Engineers	5,280	6,040	1.4	250	Bachelor's Degree	None	None	Technology Engineering and Design (6,714) Project Lead the Way (7,677) Drafting-Engineering (12,927)	• Autodesk Certifications

Chart 3. Ten highest NC occupations in terms of projected total average annual openings

Occupational Title	Employment Estimate 2010	Employment Estimate 2020	Annualized Growth Rate	Total Average Annual Openings	Education Required	Work Experience	Job Training Required	Related High School Course Enrollment 2013-14	Related Credentials Earned by High School Students
Registered Nurses	92,540	109,790	1.7	3,410	Associate's degree	None	Associates	Health Team Relations, 10,046 Health Science I, 15,150 Health Science II, 9,449 Nursing Fundamentals, 2,742 Fundamentals of Gerontology, 51 Public Health Fundamentals, 281 Various Career and College Promise (CCP) and Local Option courses	• CNA 1 (1,1712)
Customer Service Representatives	74,700	84,800	1.3	3,130	High school diploma or equivalent	None	Short-term on-the-job training	Various CCP and Local Option courses	• National Professional Certification in Customer Service • Microsoft Office Specialist
Office Clerks, General	58,170	65,520	1.2	1,770	High school diploma or equivalent	None	Short-term on-the-job training	Microsoft Word & PowerPoint, 39,064 Microsoft Excel & Access, 11,923 Principles of Business and Finance, 21,256 Various CCP and Local Option courses	• Microsoft Office Specialist
Elementary School Teachers, Except Special Education	37,090	45,730	2.1	1,680	Bachelor's degree	None	Internship/residency	Early Childhood Education I, 2,355 Early Childhood Education II, 1,179 Various CCP and Local Option courses	• NC Lead Teacher Certification
Childcare Workers	36,230	41,150	1.3	1,630	High school diploma or equivalent	None	Short-term on-the-job training	Early Childhood Education I, 2,355 Early Childhood Education II, 1,179 Exploring FACS Education, 30,109 Various CCP and Local Option courses	• NC Lead Teacher Certification • Red Cross Babysitter's Training
Receptionists and Information Clerks	30,770	37,130	1.9	1,570	High school diploma or equivalent	None	Short-term on-the-job training	Microsoft Word & PowerPoint, 39,064 Microsoft Excel & Access, 11,923 Principles of Business and Finance, 21,256 Various CCP and Local Option courses	• Microsoft Office Specialist
First-Line Supervisors of Office and Administrative Support Workers	38,980	43,790	1.2	1,520	High school diploma or equivalent	1 to 5 years	None	Microsoft Word & PowerPoint, 39,064 Microsoft Excel & Access, 11,923 Principles of Business and Finance, 21,256 Business Management, 769 Business Law, 4,901 Various CCP and Local Option courses	• Microsoft Office Specialist

Chart 3. Ten highest NC occupations in terms of projected total average annual openings (continued)

Occupational Title	Employment Estimate 2010	Employment Estimate 2020	Annualized Growth Rate	Total Average Annual Openings	Education Required	Work Experience	Job Training Required	Related High School Course Enrollment 2013-14	Related Credentials Earned by High School Students
Teacher Assistants	33,980	39,640	1.6	1,340	High school diploma or equivalent	None	Short-term on-the-job training	Early Childhood Education I, 2,355 Early Childhood Education II, 1,179 Various CCP and Local Option courses	NC Lead Teacher Certification
Accountants and Auditors	31,300	35,700	1.3	1,110	Bachelor's degree	None	None	Accounting I, 3,869 Accounting II, 669 Microsoft Word & PowerPoint, 39,064 Microsoft Excel & Access, 11,923 Principles of Business and Finance, 21,256 Business Management, 769 Business Law, 4,901 Business Financial Planning, 121 Various CCP and Local Option courses	Quickbooks Certification Microsoft Office Specialist
Secondary School Teachers, Except Special and Career/Technical Education	25,240	28,480	1.2	1,010	Bachelor's degree	None	Internship/residency	Various CCP and Local Option courses	

Chart 4		
Enrollments in Engineering and Technology Programs		
Career Cluster Title – Engineering and Technology	**High School Enrollment in College**	**Unduplicated College Enrollment**
Architecture and Construction	229	7,304
Manufacturing	747	6,485
Science, Technology, Engineering and Math	417	7,320
Transportation, Distribution, and Logistics	567	7,336

Chart 5		
Enrollments in High Demand Career Clusters		
Career Cluster Title – High Demand	**High School Enrollment**	**Unduplicated College Enrollment**
Business Management and Administration	760	30,490
Health Sciences	742	28,320
Information Technology	496	13,871
Law, Public Safety, Corrections, and Security	1366	15,161
Education and Training	261	14,678