

A Thesis
entitled
Preparedness of Career and Technical Education Students in the IT Field:
Is Wake County Public School System Optimally Capitalizing on Local Resources?

by

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Abstract

Information Technology is one of the fastest growing fields in regards to career vacancies, so why is the Wake County Public School System not taking advantage of an opportunity to prepare their students for these in-demand jobs? The Wake County Public School System's Career and Technical Education high school programs reach over 40,000 students a semester. Only a small portion of that population is pursuing a course of instruction that prepares for employment opportunities in the Information Technology field. The job market for Wake County and the surrounding counties is filled with Information Technology opportunities, so why isn't Wake County Public School System preparing their students to fill the vacancies?

The goal of Career and Technical Education is to prepare students for high paying, highly skilled, and highly-demanded career possibilities. Information Technology is one field that fits this description. CTE has shown the importance of the field by creating a branch aptly named Business and Information Technology Education, but how much of this department is actually geared toward the IT field?

The county enrollment practices are a mismatch for the current available jobs in the local area. The Wake County Public School System has a very small portion of students who enroll in their Information Technology courses even though it is one of the bigger needs in the job market. In some cases school are not offering any IT courses for their students, which is a large population of students who are never extended the opportunity to jump into a field within which they would have a great chance to become employed.

With a plethora of IT companies that exist in the Triangle Area it seems that the Wake County Public School System would be able to work with employers to help develop a program that would effectively provide skilled employees for the businesses. The companies lack of involvement in the IT area of Wake County Public School System's BITE department shows disconnect between the employers and the school system. How feasible is it for the school system to create their own curricula that will prepare their students for these local and in demand job opportunities?

Some of the IT curricula date back as far as 1997. Most of the curricula were created within a year of 2005. Information Technology is an ever changing field and the curricula must address the changes or it is not meeting the needs of its students. The curriculum is not up-to-date enough to provide the students with a relevant education in the field.

This research takes a look at solutions to this problem. The issues that limit Wake County Career and Technology will be discussed.

**Preparedness of Career and Technical Education Students in the IT Field: Is Wake County
Public School System Ignoring a Great Employment Opportunity for their Students?**

A Thesis

Presented To the Faculty of the Department of Business and Information Technology Education
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Masters in Arts of Education in Business and Information Technology Education

by
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I dedicate this research to my father, John Hill, for instilling the value of education within me.

Without his push and encouragement I would never have made it as far as I have.

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CHAPTER ONE: INTRODUCTION TO THE STUDY

The Triangle Area has garnered national attention for its rapidly-growing Information Technology (IT) job market (Badenhausen, 2009). Technology companies are starting up and expanding in the area, and the Research Triangle has become a hotbed for technology job seekers (Stewart, 2008). In his 2009 article about best cities for career and business opportunities Forbes cited Raleigh as first in the nation, pointing to the major IT companies as the driving factor (Badenhausen, 2009). In his article “Where the Jobs Are”, CNN writer Tom Zeigler identified Wake County as the fifteenth best county in America for job prospects (2011). Available positions are wide ranging in job description, skill level, pay scale, and desired educational background. Further, the availability of positions is increasing as technology becomes crucial for growth and efficiency in the business world and in everyday life and as technology and non-technology companies alike are seeking employees with the ability and expertise to develop and manage cutting edge technology (Andriole & Roberts, 2008; BLS, 2011; Wright, 2009).

Non-technology companies rely on IT professionals to connect their business strategy with technology that can enhance competitive advantage and advance the firm’s strategic objectives (Andriole, 2008; Kirk, 2008; BLS, 2011). In the past, IT professionals were deemed supporting characters in the corporate landscape. However, in today’s business environment, internal IT departments are no longer limited to setting up networks and trouble-shooting software and hardware issues; rather, IT professionals are critical enablers of business growth and expansion and are integrated into the core business lines to design, utilize, and maintain technology and software that advances business objectives (Andriole & Roberts, 2008; Wright, 2009). The internal IT department has evolved from a cost center to a revenue enabler or, in

some situations, generator, and hiring of IT professionals has taken on a greater level of importance (Hutson, 2010).

In most professional jobs, companies have robust training programs for integrating new employees into the corporate culture and for ensuring that new employees are acclimated to the companies' policies and procedures for fulfilling the responsibilities outlined in the job description. Through a written manual, in-processing training modules or on-the-job mentoring programs, companies outline the expectations of employee performance and provide the necessary tools to facilitate successful performance to those expectations. In contrast, due to the limited number and lack of internal corporate understanding of the requirements for employees, most IT positions require that candidates have sufficient experience and expertise with the technology platforms, systems, software, and security as well as an ability to expeditiously learn the culture, values, and direction of the company. Ascertaining these qualities in an IT candidate is challenging for corporate leadership, who depend upon educational institutions to prepare and refer students with sufficient knowledge and capabilities to deliver on the company's needs (Hyslop, 2008). Establishing an in-house training program for IT professionals is neither efficient nor cost-effective for most companies, so the majority of the training and knowledge must be resident in the newly-hired candidate upon commencement of their role (Andriole, 2008).

Technology companies are seeking similarly experienced and educated employees, but for a different reason. Given the recent focus on technology employment as a highly salaried, in-demand career, technology companies have the ability to recruit nationally from a robust pool of highly-qualified applicants. While on-the-job training may be available to new employees, the expectation of these firms is that a candidate will possess a certain level of qualifications upon

entering the firm. In a technology firm, identifying under-qualified or underperforming IT professionals should be less challenging than in a non-technology firm, as the employee is executing tasks and projects that fall within the core competency of the firm.

Description of the Research Problem

The Carl D. Perkins Vocational and Applied Technology Education Act (20 U.S.C. §2304 et seq.) of 2006 states,

“...building on the efforts of States and localities to develop challenging academic and technical standards and to assist students in meeting such standards, including preparation for high skill, high wage, and or high demand occupations in current or emerging professions.”

In essence, the objective of the Perkins Act of 2006 is to enable school systems to provide students the necessary skill sets to be seen as desirable candidates for positions that require specialized skills, present high earning opportunity or are in high demand. Career and Technical Education (CTE) was borne of the necessity to prepare students to enter the workforce with skills that position them as desirable job candidates for such positions. Accordingly, the Perkins Act of 2006 sets forth the federal regulations currently in place for CTE. Within CTE, the Wake County Public School System (WCPSS) Business and Information Technology Education (BITE) branch incorporates IT and oversees compliance with the Perkins Act of 2006 relative to IT.

In today's business environment, IT positions both require skill and are in demand (Schmeiser, 2008). Further, the new trends in IT show that salaries are very competitive in today's job market, and that they are on the rise (Marsan, 2010; BLS, 2011). While the requirements for opportunity outlined in the Perkins Act of 2006 are disjunctive, the IT field in

fact meets all three requirements (Andriole & Roberts, 2008; Marsan, 2010). While IT should be a critical component of the BITE curriculum, the IT aspect of the program has not been fully realized as enrollment numbers in advanced IT classes are relatively minimal (WCPSS Enrollment Data, 2011).

The primary challenge to advancing the WCPSS IT programs is the requirement that CTE teachers must strictly adhere to the curricula that is produced and provided by the North Carolina Department of Public Instruction (NCDPI). The NCDPI does not develop curricula that focus on the localities throughout the state, but rather are more apt to focus on the overall needs of the state. Therefore, although the industry needs of Wake County vary greatly from those of Asheville, North Carolina, which resides in the Appalachian Mountains and is known for its manufacturing industry, teachers in both locations are required to adhere to the same IT course curricula. Further, while the NCDPI endeavors to establish and update curricula based on needs, including those of local communities, the Information and Technology Skills curricula are outdated and, accordingly, irrelevant (Andriole & Roberts, 2008).

The State of North Carolina will be awarded up to \$400 million dollars as a grant from the Federal government in order to help reach the goals of Race to the Top (News and Observer, 2010). The state was named one of 19 finalists, based on a submitted application that outlined how NCDPI would utilize the grant to help align educational goals in North Carolina with that of Race to the Top. In its application, North Carolina cited preparing students for postsecondary schools as well as developing workplace readiness as “Priority 1: Absolute Priority”, according to the executive summary of Race to the Top (RttT, 2011). As part of the federal Race to the Top funding, NCDPI has established the *Career & College: Ready, Set, Go!* Program, which is intended to improve graduation rates and enhance the preparedness of high school graduates for

postsecondary education or employment. According to the 2008 to 2010 Biennial Report on the program, North Carolina's four-year cohort graduation rate in 2010 was 74.2%, with 66% of all graduates pursuing postsecondary education (2008 to 2010 Biennial Report, 2010).

While the WCPSS CTE program is expansive, it overlooks one very important piece of the local job market. Information Technology positions are available and in relatively large numbers compared to other fields (Sears, 2010). WCPSS has over 140,000 students currently enrolled in its schools, and with such a large population of students educated by the system, it would seem that WCPSS should be encouraging students to investigate the potential for a career in Information Technology (WCPSS, 2011). While over 44,000 WCPSS students are enrolled in CTE courses in the Fall 2011 semester (this figure does not factor in dual enrollment), only a small percentage of those students are enrolled in the courses that reflect the needs of the companies that are currently hiring IT professionals in the Triangle Area and only 400 students are enrolled in advanced IT courses that would differentiate them from other candidates for these positions (WCPSS Enrollment Data, 2011).

Through the evolution of CTE, some focus has been lost on preparing students for employment based on the needs and jobs available in their local areas (Lewis, 2010). The Perkins Act of 2006 provides not only for the state to focus on the direction of CTE, but also for the local school departments to contribute in the development of standards upon which courses are based. Badenhausen proclaims that IT is an emerging field in the Research Triangle with GlaxoSmithKline, SAS, and Cisco Systems fueling employment (2009). The IT field consistently provides a large number of available positions, even during a time of economic sluggishness (Sears, 2010; Hutson, 2010). According to the Bureau of Labor Statistics, IT jobs are projected to grow by 24% from 2008 to 2018, relative to a 10% growth in all other fields

(Wright, 2009; BLS, 2011) In spite of the confluence of IT job supply and job demand in the local area, the WCPSS CTE department lacks graduates with an IT concentration (WCPSS Enrollment Data, 2011).

Given current unemployment levels, it is crucial that CTE programs provide students with the best opportunity to find employment, both by identifying fields in high demand and by providing students with the necessary skills and expertise to succeed in those fields. In order to do this, each individual school system must understand the business climate and, more specifically, the job market, in their region (Lewis, 2010). For Wake County, the number of IT jobs available in the local area should drive WCPSS to not only encourage students to enroll in courses that would prepare them for a career in IT, but to also engage local businesses in the development and implementation of IT courses (Lewis, 2010).

WCPSS student advisors should identify students with an aptitude that would align with IT, increase awareness of available opportunities among those individuals, and encourage students to explore the option by enrolling in appropriate courses. WCPSS should also be charged with updating and enhancing curricula for IT students. Because IT is an emerging field, the technology, practices, and jobs are constantly evolving (Andriole & Roberts, 2008). Due to constant advancements in the field, it is critical for the state and the county to monitor trends in the field and enable teachers to incorporate those trends into lesson plans. If a curriculum becomes outdated in a field like IT, that curriculum will be irrelevant to enhancing students' skill sets (McKendrick, 2011). Accordingly, the WCPSS should make every effort to engage local IT professionals in order to define the skills and concepts necessary for success in the IT field and to integrate those skills and concepts into curricula (Andriole & Roberts, 2008). Unlike core academic fields such as mathematics and reading, the IT field is dynamic and progressive.

Accordingly, IT calls for new pedagogical practices that allow for evolving curricula that will reflect the knowledge and skills required to keep pace with changing and emerging needs of the various IT fields (Mayoral Task Force, 2008; Reese, 2011). In order to prepare students to become strong candidates in the IT field, WCPSS must assume responsibility to ensure that students are prepared with relevant and up to date knowledge and skills (McKendrick, 2011).

Given the proximity to major technology firms, WCPSS has a unique opportunity to leverage the intellectual capital within those firms. The WCPSS CTE program must make a greater effort to bring the local business community into the classroom, thereby making the learning experience more relevant for students (Beltram, 2010). By engaging local businesses, WCPSS can forge relationships between potential job candidates and potential employers while also capitalizing on available, no-cost resources to enhance IT curricula. A strong IT business alliance working together with WCPSS will prepare a stronger, better trained, and affluent population of graduates with IT skills. Businesses are generally willing to help schools train students, as the more highly trained candidates that the school systems are producing, the more will be available for companies in future years (Ryan, 2009). Local companies can help cater the course work to fill the skills gap that companies often refer to when speaking of newly hired IT professionals (Lewis, 2010). Businesses will typically provide capital resources in order to ensure that students are being trained on the most relevant equipment and software (Jarosz, 2006). Further, bringing local business into the school system allows students the opportunity to develop relationships with prospective employers.

The WCPSS has an in-house model for this type of relationship. Housed in Apex High School, the Academy of Information Technology (AOIT) provides a smaller learning community environment with an integrated curriculum that centers on IT. A number of local businesses,

including many that provide national and international career opportunities, are represented on the Advisory Board for the AOIT. However, this program is limited in scope and serves less than 1% of the WCPSS population. Over 90% of AOIT students pursue post-secondary education, whereas the overall four-year cohort graduation rate for WCPSS was 80.9% in the 2009-2011 school years (AOIT, 2011; NCDPI 4-year Cohort Graduation Rate Report). From the current cohort of four year high school seniors over 2,000 students will not graduate with their peers (NCDPI 4-year Cohort Graduation Rate Report). While other factors contribute to the relative success of AOIT students when compared to the remaining population of WCPSS students, the AOIT program provides a control group for assessing the impact of a focused IT curriculum and strong connection with local IT employers on students' preparedness to pursue postsecondary education and careers.

Justification

In this paper I will examine the enrollment practices in the WCPSS CTE department, the job market in the Triangle Area, and the NCDPI IT Curriculum in order to determine whether the largest school district in the state of North Carolina is capitalizing on the unique local corporate landscape and properly preparing students for a associated emerging job opportunities for which CTE is ideally suited.

The WCPSS CTE program provides a natural platform for developing qualified IT candidates. Further, because IT opportunities do not necessarily require a four year degree, a robust IT academic platform would provide an alternative to graduates who do not seek to pursue higher education (BLS, 2011). Computer Support Specialists would be an example of a position that can be attained with just a high school degree, aptitude for computers, and ability to communicate effectively (Wright, 2009).

I contend that NCDPI must develop curricula that accommodate the varying business environments within the localities throughout the state in order to meet the needs of local companies and students. As the major contributing industries vary from region to region in the State, core academic courses must be supplemented with programs tailored to respond to the local market. Accordingly, WCPSS CTE needs to set up more programs that are directly charged with preparing students for jobs in this growing industry, as well as bringing the industry into the school systems in order to capitalize on the wealth of local technology resources. Further, I contend that facilitating tailored curricula and enhancing WCPSS IT programs will assist the NCDPI to achieve its objectives set forth under the *Career & College: Ready, Set, Go!* Program.

Statement of Questions

In order to demonstrate the need for localization and addressing the specific needs of both the WCPSS CTE students and Research Triangle businesses, specifically in regards to the Information Technology field, I will attempt to answer the following three questions. How do the enrollment numbers in specific CTE fields reflect the available careers in the local job market? Do WCPSS's curricula reflect the skill set and knowledge base required succeeding in pursuing and performing in an IT career? The data that I have found will highlight the fundamental issue of IT preparedness in the WCPSS CTE department in relation to the availability of IT jobs within the Triangle Area.

Description of Method

This is a quantitative research project that will examine several different facets that point to a need for an overhaul of the current CTE enrollment practices, course of studies, class opportunities, and interconnectedness of the business world and classroom in regards to IT career

opportunities in the Triangle Area. CTE enrollment statistics, local employment statistics, and current WCPSS curricula information will be examined in order to provide insight to the apparent skill gap between education and IT employment demands of local companies.

A variety of resources were used to assess the need for revamping the current practices of preparing WCPSS students for employment in the IT field. The CTE enrollment information was provided by WCPSS and reflects enrollment as of the start of the 2011-2012 school year. Attendance is based off of a ten-day count in which WCPSS determines enrollment based on student attendance after 10 days of actual school attendance. Enrollment numbers do not reflect the possibility that students are taking multiple CTE courses.

Research on comparative data between state, county, and school level performance was conducted using information and statistics available on the NCDPI website.

All of the curricula information provided in this paper is from the course of study that is currently being followed within WCPSS. The NCDPI is responsible for providing CTE curricula throughout the state, and detailed information regarding the curricula was procured from their website.

Employment opportunity numbers were collected using national and local job search sites which include: www.trianglehelpwanted.net, www.monster.com, and www.linkedin.com. Employment opportunity numbers were based on searching all full time jobs within 50 miles of Raleigh, which includes Chapel Hill and Durham and several smaller towns that comprise the Triangle Area.

Definition of Terms

The *Research Triangle Park (RTP)* is located in Durham, North Carolina. It is home to over 170 companies and employs over 38,000 people. Thirty eight of the current companies that

reside in the research triangle are classified as IT companies. RTP is one of the country's biggest and oldest science/research parks in the county, and it has continued to grow from year to year (RTP, 2011)

The *Triangle Area* is a native term for the surrounding communities near the Research Triangle. The term derives from the triangle that forms when connecting Raleigh, Durham, and Chapel Hill on a map. The term refers to the communities that are affected and have an effect on the Research Triangle Park.

SAS, which headquarters resides in Cary, North Carolina which geographically neighbors Raleigh, is a self proclaimed leader in analytical software for business solutions. SAS employs 4,811 people at their Cary location. Their business has grown from \$1.68 billion in annual revenue to \$2.43 billion from 2005 to 2010 and continues to expand (SAS, 2011).

Cisco is a network solution based company that has a branch located in the Research Triangle Park. They employ around 3,800 people in the Triangle Area (Cisco, 2011).

Benjamin Wright, an economist for the Bureau of Labor Statistics, explains that there is not a consistent definition for what classifies a position as IT (Wright, 2009). He does however, outline 10 IT occupations that he believe are the most prevalent in the IT field.

- *Computer Programmer* is an individual who can develop software, both system and application software.
- *Network systems and data communication analysis* are responsible for creating, maintaining, and securing the technological interconnectivity of a business.
- *Computer and information research scientists* whom are charged with furthering the knowledge base, practices, and technology in the IT field.

- *Computer and information systems managers* are charged with determining networks and technology that would best suit company needs. They may also provide training on the systems for employees, as well as managing the IT team that maintains said systems.
- *Computer Hardware Engineers* devise the logistics of the hardware that includes processors, casing, motherboards, and every other physical aspect of technology.
- *Computer Software Engineers* plan the operability, style, graphical, and navigation attributes of software programs to best need user needs.
- *Database administrators* determine the optimal medium for storing and maintaining pertinent information for a company.
- *Computer system analysts* determine optimal hardware and software to organize a computer system in the most advantageous possible way.
- *Network and computer system administrators* ensure the computer and network systems are running properly.
- *Computer Support Specialists* help train employees on software as well as troubleshoot technical problems or challenges.

NCPDI is the North Carolina Department of Public Instruction, which oversees implementation of public education across the state. NCDPI has current enrollment has current enrollment of over 1.4 million students, and oversees a budget of approximately 8 billion dollars (NCDPI Organization).

WCPSS is the Wake County Public School System, which is made up of 163 schools and has 143,289 students enrolled for the 2010-2011 school year (WCPSS, 2011).

CHAPTER TWO: REVIEW OF LITERATURE

Data and literature regarding careers in the information technology (IT) field are limited, especially with regards to how schools can prepare individuals with interest in entering the field. Authors who have investigated careers within the IT field agree on one thing, namely that careers within the IT field are steadily climbing and that the IT field will provide a stable, financially-secure career path for years to come. Over the next few years, jobs within the IT field are expected to increase in availability and growth potential, especially when compared to other career possibilities. In order to prepare students to enter the IT field, educational institutions must focus on providing skills that are relevant and reflect ever-changing trends. Current IT educational programs are not keeping pace with technological developments and applicants are entering the field unprepared. Professionals entering the IT field today are being forced to overcome an extreme learning curve in order to perform their job duties successfully. Literature suggests that academia must take responsibility for closing the skill gap. In addition to developing educational programs that provide students with the essential IT skills, these programs also need to attract more students, thereby enhancing both the quality and quantity of graduates entering the IT workforce. Encouragement of enrollment in IT programs is important to ensure that the number of qualified IT professionals meets the needs of the growing universe of IT job opportunities.

Simultaneously, a greater focus is required to engage at-risk students in order to improve graduation rates and enhance postsecondary opportunities for these students. Literature identifies students' perception of curricula relevance to postsecondary opportunities as a primary driver of the decision to drop out. The IT field presents a viable career option for students who

do not intend to pursue postsecondary education, but competitive for IT positions necessitates that applicants have certain skills and experience in order to achieve success (Wright, 2009; McKendrick, 2011)

Population and Job Growth in Research Triangle Area

With unemployment rates at an all time high and technology enabling greater connectedness despite geographic distance, individuals in search of employment today are more increasingly likely to relocate for a job opportunity. Additionally, many businesses, especially those in emerging fields, are locating new offices and relocating existing offices in areas that offer incentives and a ready workforce. The Triangle Area has received many national accolades for business prospects and job opportunities. Large populations of people are moving to the Triangle Area. On average, nearly 25,000 residents moved into the area annually, representing 2.4% annual growth of the population and placing the Research Triangle 7th in the nation in population growth. The demographics of this population growth are particularly attractive to major area employers, such as Cisco Systems, GlaxoSmithKline and SAS, as the new residents tend to be younger and possess strong skill sets (Badenhausen, 2009). Simultaneous with population growth, the availability of emerging jobs within the IT field continues to increase in the Triangle Area.

The Research Triangle Park is a catalyst for this growth and currently employs more than 48,000 employees between 170 firms such as: IBM, GlaxoSmithKline, Cisco Systems, and DuPont (RTP, 2011). Although the area wants to continue to attract and invest in new businesses, the Research Triangle Park also recognizes the importance of retaining current companies. Recently Red Hat, a Linux software developer, hinted about the possibility of moving their headquarters out of Raleigh. In response, the State offered \$18 million worth of

incentives an effort to keep the company. Red Hat subsequently announced that it will remain in the area and will create 540 jobs over the next decade (Zeigler, 2011).

Career Opportunities within the IT Field

Long-term projections indicate that approximately 943,000 positions will be created during the period from 2008 and 2018 in computer system design and computer network, system and database administration (Hutson, 2010; BLS, 2011). Two of the top five fastest-growing job categories, as projected by the US Bureau of Labor and Statistics, are “network systems and data communications analyst” and “computer software engineers, applications.” Both fields require extensive programming experience (Andriole, 2008; BLS, 2011).

In addition to the careers that require experience, entry-level IT positions are readily available in a broad array of disciplines. One of the greatest aspects of the IT field is that it easily merges within other industries. Technology is everywhere. A candidate can easily combine personal interests such as music, sports, art, or theater with technology to find a career best suited for them (Hutson, 2010; Wright, 2009). Pairing IT with experience from disciplines such as marketing, engineering, finance, or sales can make enhance the marketability of a candidate and that candidate’s job prospects (Hutson, 2010; Wright, 2009).

Experts agree that the IT market will continue to grow as software development and programming are becoming increasingly important in a society that revolves around technology (Andriole & Roberts, 2008). Not only are these jobs growing to be in demand, but the salaries will fall in the “high wage” category. According to the Bureau of Labor Statistics, median annual wages for network and computer systems administrators as of May 2008 were in the mid-\$60,000s. Salaries for specialized or management positions range between \$63,000 and \$117,000 (Hutson, 2010; BLS, 2011). Salaries within the IT job market will continue to grow,

reflecting the critical nature of technology in all aspects of business administration and strategy (BLS, 2011). Companies will continue to hire applicants from within the IT field to keep a competitive edge over their rivals. "It's a core area that every company needs." (Schmeiser, 2008)

Closing the Skills Gap/ Designing IT Curricula

A major complaint from current IT employers is that there is a large skill gap that has become apparent, between industry practices and education of IT professionals. New employees lack essential skills required to perform the job effectively. A recent survey identified that nearly 40% of hiring companies stated that recent IT hires were insufficiently prepared to perform their job duties. Further, the number of companies rating recent IT hires as “well-trained, ready to go” was 11% (McKendrick, 2011). The results of this survey highlight the opportunity for education institutions to more directly prepare students for initial positions and underscore the need for IT curricula that adapt to current industry trends and emerging practices.

In order for schools to prepare students for future employment, educators must remain abreast of technology trends and integrate new trends into lesson plans. However, without a connection between IT education and technology firms, meeting this objective are not possible. Unlike core academic subjects such as mathematics or history, the IT field is evolving rapidly and can only be effectively taught when teachers are current on emerging technology. Through observation of and interaction with businesses, educators can understand current practices, gain perspective on future technological advances and ascertain the skill sets and practice knowledge that today’s IT students will require to succeed as tomorrow’s IT professionals (Andriole & Roberts, 2008).

The IT field is constantly changing. Yet current IT educational platforms, including those implemented at WCPSS, neither recognize nor integrate the scope and trajectory of these advances. As technological advances are introduced at an ever-faster pace, the gap between IT education and current technology grows exponentially (Andriole & Roberts, 2008). To address this issue, not only do current IT curricula need to be rewritten to address today's technology, but educators' approaches to developing and implementing IT courses must be revamped to enable constant evolution at the same pace as technology.

By restructuring IT education to more readily incorporate changing needs of technology firms, students will be better prepared to enter the IT workforce "ready to go". As this approach would address the challenge faced by firms hiring IT professionals, those companies have a vested interest in assisting schools with understanding current technologies and developing educational programs based on those technologies. Observation of how companies utilize technology and participation in training programs on hardware and software developed by technology firms should provide a practical understanding of the concepts critical to a relevant IT curriculum (Gayton, 2006; Andriole & Roberts, 2008).

WCPSS has a unique opportunity to engage with local businesses to include community businesses in student preparation programs. While certain IT teachers and programs, specifically AOIT, already engage local companies in their IT curriculum, the approach is not standard practice. WCPSS is sorely underutilizing the wealth of IT knowledge resident in the Triangle Area. Educators and students alike would benefit from businesses assisting in the development of IT standards for education (Gayton, 2006).

Increasing connectivity with local businesses further benefits students by providing a viable alternative to postsecondary education. The IT field provides a unique range of

opportunities – from entry level positions for which a high school diploma is the minimum requirement, to more skilled positions that require postsecondary education or equivalent experience. According to CompTIA, an IT trade association, entering the IT realm as a help desk technician provides broad exposure to the many facets of IT from within the industry (Hutson, 2010).

In addition to the concepts being taught, it is essential that the technology being used in the classroom is also up to date. If students are learning on outdated technology, what they are learning could be completely irrelevant to the field. Technology has evolved substantially in the past ten years, and the half-life of a hardware or software is very short. At the same time, our society has become increasingly connected to – and dependent upon – consumer electronics for daily life. Companies are more aware of the importance of technology as a business enabler, whether through enhancing effectiveness of data warehousing or increasing mobility of workforce (Hutson, 2010). Schools have not kept pace with these trends. The NCDPI *College & Career: Ready, Set, Go!* program recognizes the importance of updating technology to facilitate performance of educators and students alike; one of the four program goals is to enhance technology infrastructure (NCDPI, 2010).

Surplus of Recession Proof IT Positions in the Future

The IT sector may have trouble filling open job positions in the future, as many predict a deficit between the output of IT-prepared students and job growth in IT (Andriole & Roberts, 2008). The confluence of the departure of the 76 million Baby Boomers from the workforce and the lack of IT-proficient graduates in 44 million-strong Generation X is anticipated to result in a substantial shortfall in qualified applicants for technology positions (Schmeiser, 2008). While the number of students' pursuing a degree in IT has continued to grow, the trajectory of that growth has not kept pace with the trajectory of job growth in the sector. While graduates concentrating in other disciplines may struggle to find available positions, qualified IT graduates will continue to have limited competition while searching for a job.

A decade ago, most students took for granted that an abundance of available positions would await them upon graduation. However, the recent recession and associated recovery has highlighted the importance of considering future job availability and security when selecting a course of secondary or postsecondary study and future career. A recently-published list of recession-proof careers was comprised largely of IT positions, including software design and development, networking and systems administration, software implementation analysis, testing and Quality Assurance, and database administration (Schmeiser, 2008). Training for many of these careers can begin in high school, subject to the quality and relevance of the curricula.

As our country's economy continues to recover, technology has also played a major part in the development of new job opportunities. Although it serves many purposes, one of the main purposes of the American Recovery and Reinvestment Act (ARRA) was to create new jobs and retain existing ones. In furtherance of this objective, the Broadband Technology Opportunities

Program (BTOR) was established in July 2011 to support the installation, development and maintenance of broadband infrastructure and to create jobs (Hutson, 2010).

Meeting Goals

While much focus in secondary education is on preparing graduates for further educational opportunities, not all students have an interest or ability to continue past high school education. A portion of these students elect to – or are forced to – drop out of high school. Civic Enterprises, a public policy firm, has conducted several national assessments of dropout trends, including the primary drivers and prospective solutions to reducing dropout rates. Two key findings of these assessments are central to this report. First, involvement of local businesses and civic organizations in the educational process ensures a better reflection of community and student needs in the learning experience, thereby reducing drop-out rates. Second, and related, ensuring that curricula is current and relevant fosters student engagement, by enabling students to appreciate how the skills they are developing will provide postsecondary success (Balfanz, Bridgeland, Hornig Fox, & Moore, 2011).

A 2006 nationwide survey conducted by Civic Enterprises asked individuals who had dropped out of high school what could have been done to keep them in school. The most frequent solution, cited by over 80% of respondents, was enhancing the relevancy of the learning experience. Specifically, those surveyed cited teaching and curricula that would provide specific skills for the workforce and utilization of direct-learning experiences and real-world examples (Bridgeland, DiIulio, Jr., & Burke Morison, 2006).

CHAPTER THREE: RESULTS

In this section, I will analyze the results of this research, organized in accordance with the three questions outlined in the Introduction.

Question One: How do the enrollment numbers in specific CTE fields reflect the available careers in the local job market?

One of the major drivers of this research was to analyze the number of WCPSS students who focus on IT in high school and to compare IT enrollment with the number and types of IT jobs available in the Research Triangle. CTE is held responsible for preparing students for high-demand and high-skill jobs, and the IT field should be heavily promoted via CTE (Perkins Act of 2006). CTE must not only prepare students for post-secondary education, but must also dedicate resources to the students who are looking to enter the workforce directly after high school. Students can find IT jobs with the high school experience, and then can continue their education through certification programs in order to move up in the field (Hayes, 2009).

The IT field is one of the most represented in the Research Triangle (Badenhausen, 2009; Stewart, 2008). The large – and growing – market points to the need for educating a larger population of students to be prepared for careers in technology. The following figure shows the largest employers in the Research Triangle Park, which employs over 38,000 workers (Badenhausen, 2009; RTP 2011).

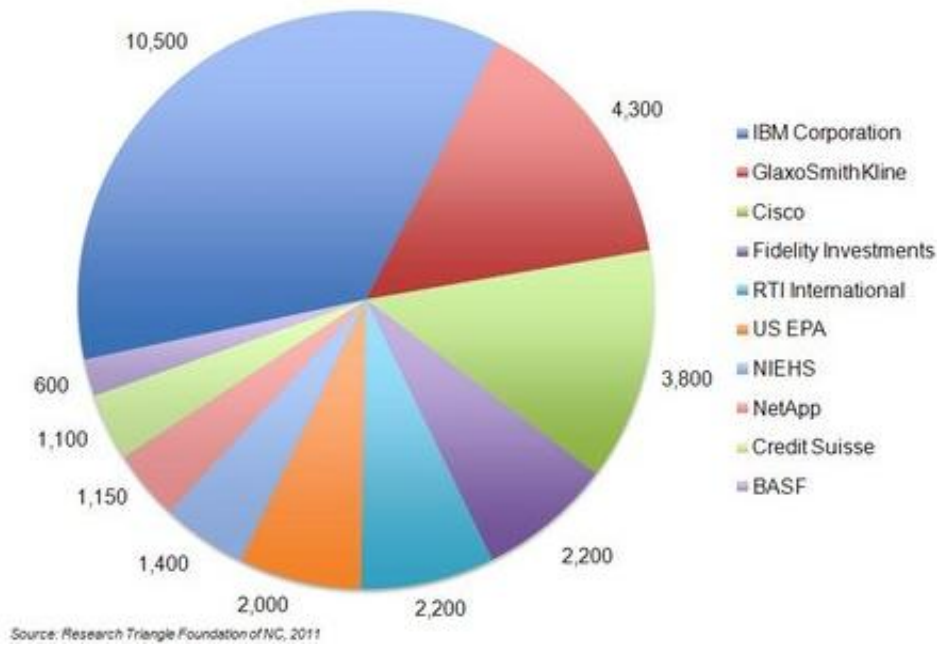


Figure 1. Number of Employees at Research Triangle Park by Largest Employers

As demonstrated in the figure, two of the three largest employers are technology companies. IBM Corporation and Cisco employ 14,300 people in the Research Triangle Park, alone. NetApp, which is the eighth largest employer in Research Triangle Park, is also a technology company and employs over 1,000 people in the Research Triangle Park (RTP, 2011).

The majority of jobs are IT related in the Research Triangle Park, demonstrating that even non-technology firms employ IT professionals at the Research Triangle Park. The graphic below shows the number of jobs divided by industry.

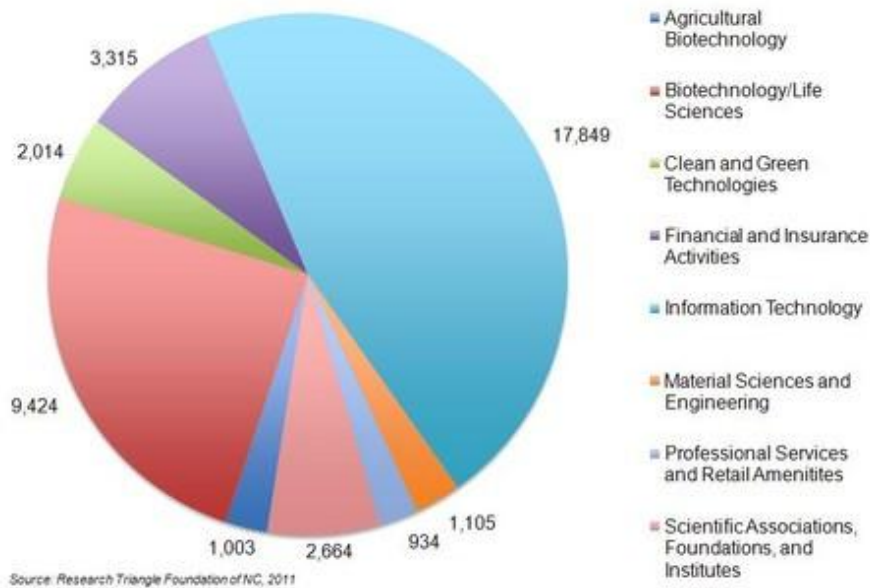


Figure 2. Number of Employees at Research Triangle Park by Industry

As demonstrated above, Information Technology positions comprise almost half of the employees that work in the Research Triangle Park (RTP, 2011).

The two previous figures demonstrate IT employment in the concentrated area of the Research Triangle Park, and expanding the search area to the largest employers in the Triangle Area demonstrates a similar pattern. The following figure shows the largest employers in the Triangle Area by number of employees.

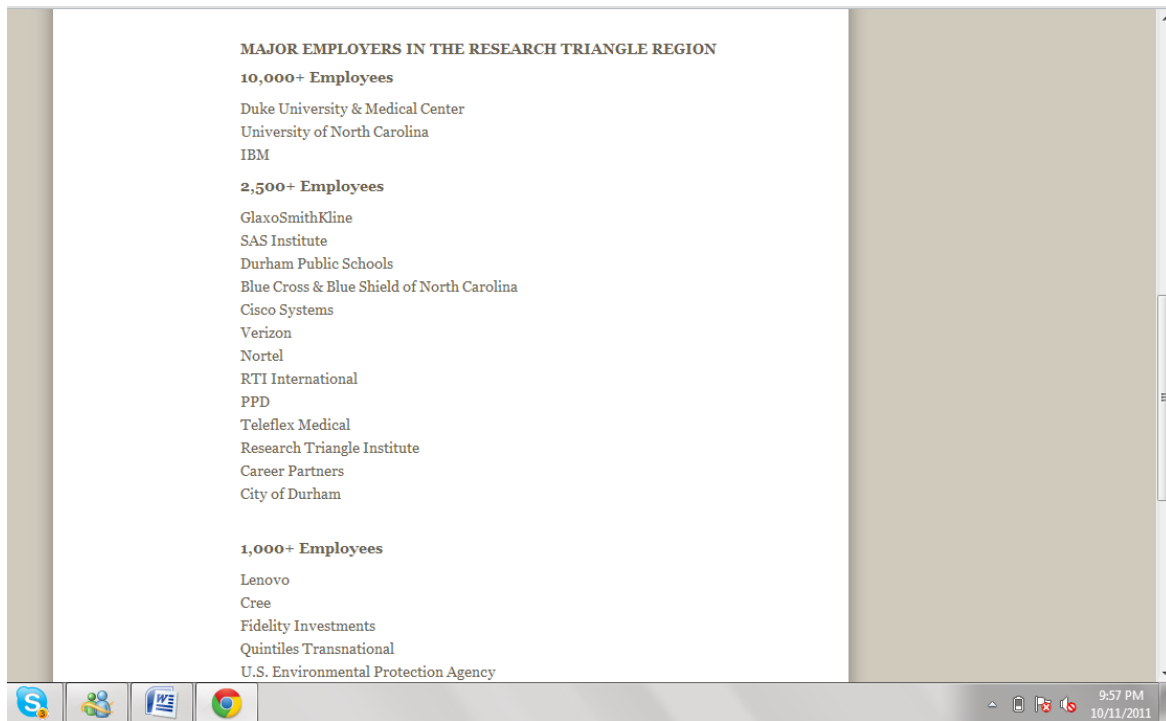


Figure 3. Largest Research Triangle Region Employers

Only three entities in the region exceed 10,000 employees; the IBM Corporation being one of those three and the only corporation. SAS, Cisco Systems, Verizon, and Nortel are all companies that focus on technologies and employ over 2,500 people in the Triangle Area. Of the companies with 1,000 or more employees, Lenovo and Cree both are focused in the technology realm. Accordingly, seven of the 21 largest employers in the Triangle Area are technology firms (raleigh4u.com, 2011).

Job Market for IT

While the above information and graphs discussed the total number of jobs within the Triangle Area, evaluating available positions provides a more robust understanding of opportunity.

LinkedIn has become one of the more respected places for job searches (Comer, 2011). LinkedIn expands beyond a typical job search to enable an individual to create a professional network, with the intent of digitally representing one's connections. In addition to creating a virtual Rolodex, LinkedIn also identifies second and third tier connections, highlighting mutual connections. Further, LinkedIn enables users to self-select groups based on industry, interests or affiliations, providing an online networking tool. By identifying connections within certain industries and to specific companies, an individual can greatly increase the chances of finding a desired job (Sheppard, 2011). East Carolina University (ECU) uses LinkedIn as their searching resource on the ECU website to connect students with careers.

I conducted a search for jobs within 50 miles of Raleigh using LinkedIn, resulting in identification of 525 professional job openings. In order to determine which type of position was most available, I sorted the opportunities by industry. Software design, the most available job type, yielded 103 job openings, approximately about 20% of all job vacancies. Information Technology and Services, the second most represented job type, yielded 89 available positions within 50 miles of the Raleigh area. Hardware was the third most represented job type, with 53 available jobs. In addition to these three categories, Telecommunications represented 38 available positions.

This search demonstrated the predominance of the IT industry in the Raleigh area. Not only did IT positions represent the top three job categories available locally on LinkedIn, but they also combined to represent 47% of the positions listed for the Triangle Area. The inclusion of Telecommunications increases the IT field's share of open positions to approximately 55%.

Another source for data on available positions, trianglehelpwanted.net is utilized by over 400 area companies to advertise job openings (Trianglehelpwanted.net, 2011). Unlike LinkedIn,

trianglehelpwanted.net is a regional resource and is heavily marketed in the Raleigh area as a source for connecting job seekers with local industry. Further, while LinkedIn includes primarily professional jobs in its database, trianglehelpwanted.net incorporates all types of positions.

Similar to the process I followed with the LinkedIn search, I sorted available jobs posted to trianglehelpwanted.net by industry. The two most in-demand classifications – Computer Programming and IT/Computer – are within the IT field. Computer Programming, with 199 available positions, and IT/Computer, with 162 available positions, comprise 345 openings.

One of the more popular job search engines is Monster.com, which has approximately 26.0 million unique visitors each month (EbizMBA, 2011). A search of Monster.com for career opportunities available within 50 miles of Raleigh, which would include the Research Triangle, the top three categories were all within the IT field. Namely, the three industries with the largest number of openings including “Computer/IT”, with 261 job postings, “Hardware”, with 142 job postings, and “Computer Software, with 135 job postings. Within the top ten most frequently appearing industries, “Telecommunications” ranked 8th, with 56 job postings.

Graduation Rates and Postsecondary Intentions

The State of North Carolina has recognized the importance of technology and quality, relevant pedagogical tools in ensuring success of students following graduation, as evidenced by its submission for federal Race to the Top funding and its associated development of the *Career & College: Ready, Set, Go!* program. One of the critical factors to successful implementation of this program, and a primary indicator of the program’s progress, is increasing graduation rates.

The NCDPI has more closely monitored four-year cohort graduation rates in recent years. This metric measures the number and percentage of students who graduate within four years of

matriculation in high school. The following table presents four-year cohort graduation rates for the state, WCPSS and each of the high schools in WCPSS.

Table 1			
<i>Four-Year Cohort Graduation Rates (2011)</i>			
	Students		Graduation Rate
	Matriculating	Graduating	
State of North Carolina	110,377	85,986	77.9%
Wake County Public School System	10,430	8,439	80.9%
Apex High School	577	524	90.8%
Athens Drive High School	455	387	85.1%
Cary High School	505	419	83.0%
East Wake School of Arts, Education and Global Studies	117	81	69.2%
East Wake School of Engineering Systems	91	73	80.2%
East Wake High School of Health Science	87	70	80.5%
East Wake School of Integrated Technology	91	63	69.2%
Fuquay-Varina High School	450	375	83.3%
Garner High School	580	435	75.0%
Green Hope High School	500	476	95.2%
Holly Springs High School	464	398	85.8%
Knightdale High School	450	344	76.4%
Leesville Road High School	635	541	85.2%
Longview School	22	6	27.3%
Middle Creek High School	413	354	85.7%
Millbrook High School	617	505	81.8%
Needham Broughton High School	528	453	85.8%
Panther Creek High School	575	537	93.4%
Phillips High School	48	39	81.2%
Sanderson High School	454	352	77.5%
Southeast Raleigh High School	445	340	76.4%
Wake Early College of Health and Sciences	55	54	98.2%
Wake Forest-Rolesville High School	497	426	85.7%
Wakefield High School	697	609	87.4%
William G. Enloe High School	653	555	85.0%

As demonstrated above, WCPSS's four-year cohort graduation rates exceed state-wide levels. However, the results vary greatly among high schools within WCPSS; of schools with 9th grade matriculation of 400 or more students, the low four-year cohort graduation rate was 75.0% at Garner High School and the high four-year cohort graduation rate was 95.2% at Green Hope High School. Accordingly, at Garner High School, 145 of the 580 students who entered 9th grade in Fall 2007 had not graduated by Spring 2011. On the other end of the spectrum, all but 24 of the 500 students entering Green Hope High School as Freshman in Fall 2007 graduated by Spring 2011 (NCDPI 4-year Cohort Graduation Rate Report).

In addition to graduation rates, surveys of postsecondary intentions of high school graduates provides insight into the opportunities and needs associated with North Carolina, and more specifically, WCPSS, students. The following table presents postsecondary intentions of students graduating in 2010.

Table 2				
<i>Postsecondary Intentions of 2010 Graduates</i>				
	North Carolina		WCPSS	
	Total	Percent	Total	Percent
Four-Year Public Higher Education				
North Carolina	29,832	33.6%	3,850	46.0%
Out-of-State	2,531	2.9%	408	4.9%
Subtotal for Four-Year Public Higher Education	32,363	36.5%	4,258	50.8%
Four-Year Private Higher Education				
North Carolina	6,556	7.4%	559	6.7%
Out-of-State	2,384	2.7%	269	3.2%
Subtotal for Four-Year Private Higher Education	8,940	10.1%	828	9.9%
Community College				
North Carolina	32,070	36.2%	2,055	24.5%
Out-of-State	828	0.9%	85	1.0%
Subtotal for Community College	32,898	37.1%	2,140	25.5%
Private Junior College				
North Carolina	410	0.5%	75	0.9%
Out-of-State	130	0.1%	15	0.2%
Subtotal for Private Junior College	540	0.6%	90	1.1%
Trade Schools				
North Carolina	1,311	1.5%	44	0.5%
Out-of-State	335	0.4%	7	0.1%
Subtotal for Trade Schools	1,646	1.9%	51	0.6%
Military	4,016	4.5%	239	2.9%
Employment	6,562	7.4%	289	3.4%
Other	1,733	2.0%	483	5.8%
Grand Total	88,698	100.0%	8,378	100.0%

As demonstrated in the table above, in 2010, only 46.6% of North Carolina graduates and 60.7% of WCPSS graduates intended to pursue four-year postsecondary education. Combining the number of students who matriculated but did not graduate within four years with the number

of graduates who intend to pursue employment post-graduation yields over 30,000 students statewide and over 2,200 students in Wake County who could potentially benefit from greater training in IT-related fields on an annual basis (NCDPI 4-year Cohort Graduation Rate Report; Public Schools of North Carolina, 2011).

IT Course Offerings and Enrollment

NCDPI has drafted a copy of what they believe will be an extensive and encompassing IT cluster that will provide four different career pathways for students that chose to pursue an IT focused high school education (WCPSS, 2011). During the Fall semester of 2011 WCPSS only had 14 of these courses available. Many of the courses are currently being developed by NCDPI, and it is apparent that the state is adding a fourth tier of classes that will allow the students to develop a deeper understanding of the concepts and knowledge in each of the pathways. While this is a positive step in the right direction for addressing the growing need for IT professionals, it still does not address the three major needs that I have highlighted in this Research.


North Carolina Career Clusters						Draft 6/16/2011
Middle School Courses	Pathways	 Cluster Foundation Courses				Cluster Enhancement Courses
6158 Exploring Career Decisions 6207 Computer Skills & Applications 6208 Exploring Business, Marketing & Entrepreneurship (BFIT & MEE) 8201 Technology Design & Innovation	Programming & Software Development	8811 Foundations of Information Technology (BFIT & T&I)	8421 Computer Programming I	6422 Computer Programming II [*] 6428 SAS Programming I [*] ^ 6451 Oracle Database Programming I [*] ^	2508 AP Computer Science [^] 6429 SAS Programming II [*] ^ 6452 Oracle Database Programming II [*] ^	8145 Career Management 8417 Microsoft Word, PowerPoint, & Publisher [^] 8419 Microsoft Excel & Access [^] 8710 Entrepreneurship I (BFIT & MEE) 8721 Principles of Business & Finance (BFIT & MEE) 8726 Personal Finance (BFIT, FACS & MEE)
	Web & Digital Communications	6414 Multimedia & Webpage Design (BFIT & T&I)	6415 e-Commerce I [*]	6416 e-Commerce II		8505 CTE Advanced Studies 8508 DOL Apprenticeship 8507 CTE Internship 8508 CTE Community College 8509 CTE University
	Information Support & Services	8811 Foundations of Information Technology (BFIT & T&I)	7991 Computer Engineering Technology I (BFIT & T&I)	7992 Computer Engineering Technology II [*] (BFIT & T&I)		
	Network Systems	8811 Foundations of Information Technology (BFIT & T&I)	7980 Network Engineering Technology I 6342 Network Administration I [^]	7981 Network Engineering Technology II [*] 6347 Network Administration II [*] ^	7982 Network Engineering Technology III 6348 Network Administration III [^]	
			8510 Project Management I	8511 Project Management II – Global [*] 8512 Project Management II – Technology [*]	8513 Project Management III	
	National Academy Foundation – Academy of Information Technology [^]					

Figure 4. Proposed NCDPI Career Pathways for Information Technology

While the pathways draw a logical order of progressive courses, the enrollment trends from school to school are still entirely based on the individuals enrolling students into courses and the offering of various IT courses at each individual high school. In other words, this dichotomy does not necessarily help boost the enrollment in higher level IT courses.

This draft also fails to address a requirement for updating curricula and skills according to the changing landscape of the IT field. The pathways allow the possibility for students to attain a deeper knowledge base and skill set in a specific IT field, but how current is NCDPI planning on keeping the curricula that will be employed in each pathway?

Finally, while this approach tenders a greater ability for WCPSS to have a pronounced IT department, it still handcuffs the teachers in regards to having the local businesses help steer the curricula to better serve the students. The proposed pathways will create a more coherent IT department that would be better suited for having business get involved, as opposed to the fragmented IT departments that currently are in place in the WCPSS schools. However, until the WCPSS is respected as a locality with a rich corporate landscape that could enhance WCPSS students' knowledge, career opportunities, and real world skills, there will never be a truly strong business alliance for WCPSS in the IT field.

During Fall 2011, WCPSS had an enrollment count of 44,053 in its CTE. This number does not represent the number of students enrolled in CTE courses, as it does not account for students enrolled in multiple CTE courses. Of these CTE offerings, 14 are IT courses, with four primary tiers. Tier One courses are entry level courses in the IT category. These two courses cover a broad variety of IT facets at an introductory level. Tier Two courses allow the students to choose a more specific focus in the IT field. These courses provide a basic understanding of what programming or network technology may be like as a profession. Tier Three courses are

advanced in nature, with a focus on critical, specific skills. These courses represent Level II, or advanced offerings that expand on concepts learned in Tier Two prerequisites. A number of these courses are only offered at AOIT (WCPSS Enrollment Data, 2011).

Table 3				
WCPSS Enrollment in IT Courses by Tier (Fall 2011)				
		Course Enrollment Fall 2011		
Course Number	Course Name	Apex HS	All Other HS	WCPSS
Tier One Courses				
6414	Multimedia and Webpage Design	159	1,112	1,271
8811	Foundations of Information Technology	-	1,392	1,392
Total Tier One Courses		159	2,504	2,663
Tier Two Courses				
6415	E-Commerce I	77	166	243
6421	Computer Programming I	155	366	521
6423	NAF Computer Programming I C++	-	21	21
6426	Computer Programming I C++	55	-	55
6428	SAS Programming I	24	-	24
7980	Network Engineering Technology I	18	186	204
7991	Computer Engineering Technology I	60	479	539
8125	Communications Systems	-	28	28
Total Tier Two Courses		389	1,246	1,635
Tier Three Courses				
6416	E-Commerce II	46	29	75
6422	Computer Programming II	-	90	90
7981	Network Engineering II	10	70	80
7992	Computer Engineering Technology II	20	142	162
Total Tier Three Courses		76	331	401
Total IT Course Enrollment		624	4,081	4,705

Tier One courses, which are entry level and cover the very basic information related to the IT field, have an enrollment of 2,663 students. Students exploring the IT field would

commence with these courses, demonstrating an interest in the field. With enrollment of 1,635 students, Tier Two courses, which focus on specific areas of IT, have 1,000 fewer students enrolled relative to Tier One. Tier Three courses, the more advanced IT courses offered by WCPSS, have enrollment of only 407 students. Overall, IT courses represent approximately 10.7% of CTE enrollment, with advanced IT courses representing less than 1.0% of CTE enrollment (WCPSS Enrollment Data, 2011).

When removing Apex High School, which houses the AOIT, from the data set, the results are more substantial. The following table demonstrates IT enrollment and the IT enrollment share of overall CTE enrollment for Apex High School, all other high schools and WCPSS overall. It is important to note that of the eight Tier Two courses, two are exclusively offered at Apex High School in Fall 2011.

Table 4						
<i>IT Enrollment at Apex High School Relative to Other High Schools (Fall 2011)</i>						
	IT Enrollment (Absolute)			IT Enrollment (% of CTE Enrollment)		
	Apex HS	All Other HS	WCPSS	Apex HS	All Other HS	WCPSS
Tier One	159	2,504	2,663	6.1%	6.0%	6.0%
Tier Two	389	1,246	1,635	15.0%	3.0%	3.7%
Tier Three	76	331	407	2.9%	0.8%	0.9%
Total	624	4,081	4,705	24.1%	9.8%	10.7%

Part of the challenge for students interested in pursuing an IT concentration is the lack of class offering at various schools. The table below outlines IT course offerings by high school. To interpret the table, the columns represent level of IT course and the rows represent the number of IT courses offered. As an example, six WCPSS high schools offered no Tier One

courses, whereas nine offered one Tier One Course and 12 offered both available Tier One courses.

Table 5						
<i>Number of WCPSS High Schools Offering IT Courses by Tier (Fall 2011)</i>						
	Number of High Schools					
Number of IT Courses Offered	0	1	2	3	4	5 or More
Tier One	6	9	12	N/A	N/A	N/A
Tier Two	11	6	5	2	1	2
Tier Three	13	7	4	2	1	N/A

This table demonstrates that one challenge to increasing IT enrollment is the availability of courses, and specifically advanced courses, at WCPSS high schools. For example, while Andriole points out that computer programming is one of the more in demand IT jobs, only four WCPSS high schools offered an advanced course in the discipline in Fall 2011 (2008). Only one Tier Three course, Networking Engineering II, is offered at more than a third of WCPSS high schools in Fall 2011 (WCPSS Enrollment Data, 2011).

Enrollment figures when a course is offered demonstrated that interest exists across WCPSS high schools for IT offerings. When Tier One courses are offered, enrollment averages 80.7 per course offering across all high schools. Tier Two courses average enrollment of 44.2 per course offering and Tier Three courses average 16.3 per course offering. The arithmetic average enrollment for Level II CTE courses in Fall 2011 is 19.3 per course offering, with a minimum enrollment of 3.0 per course offering and a maximum enrollment of 43.3 per course offering. Accordingly, advanced IT courses fall within the middle 50th percentile for enrollment in Level II courses, despite the fact that IT offers a viable postsecondary career option at

substantially higher median income than the majority of the other careers represented in CTE (WCPSS Enrollment Data, 2011; BLS, 2011).

As an example, Fall 2011 enrollment in Apparel Development II was 374 students across 15 offered courses, relative to enrollment of 407 across 25 course offerings. According to BLS, the availability of apparel manufacturing positions is expected to decline by 55.4% from 2008 to 2018, whereas non-managerial IT positions are expected to grow 30.0% from 2008 to 2018. Further, 2008 weekly wages averaged \$415 for apparel manufacturing (equating to \$21,580 over a 52-week year), relative to median non-managerial IT salaries of \$66,310 per year in 2008 (WCPSS Enrollment Data, 2011; BLS, 2011).

Based on this data, I conclude that two of the obstacles to increasing enrollment in IT courses is the lack of availability of middle-level and advanced courses in which students can enroll and the lack of focus on the potential available to IT-trained graduates.

Question Two: Does the county's curriculum reflect the practices of the current IT professional's necessary skill set and knowledge base?

The NCDPI has a responsibility to the students it serves to provide them with the best and most relevant education it can provide. This includes preparing CTE curricula that is up to date and relevant. The IT field is a relatively new field. Practices in the workforce are changing at a high rate as professionals streamline their work in order to be more efficient and more secure (Hyslop, 2008). Technology has evolved substantially in the past ten years and will continue to evolve into the future. NCDPI must be responsive to these changes and advancements within their curricula.

The following are the fourteen NCDPI curricula that were in use by WCPSS during the Fall 2011 semester under the IT umbrella accompanied by the date that the curricula were released:

- Foundations of Information Technology (2005)
- Multimedia and Webpage Design (n/a)
- Computer Programming I (2005)
- E-Commerce I (2006)
- Computer Engineering Technology I (2010)
- Network Engineering Technology I (2004)
- NAF Computer Programming I C++ (n/a)
- Computer Programming I C++ (2005)
- Communications System (2005)
- SAS Programming I (2010)
- Computer Programming II (2005)
- E-Commerce II (2005)
- Computer Engineering Technology II (2010)
- Network Engineering II (2006)

Of the twelve courses that had dates of release provided, eight of the courses had curricula that were written in 2006 or earlier. It is of the utmost importance that NCDPI realize that with curricula that is five years or older they could be providing students with skills and knowledge that are no longer relevant to the IT field (Andriole, 2008).

CHAPTER FOUR: DISCUSSION

All of the data in the results section points to the conclusion that WCPSS must overhaul its approach to IT education and that NCDPI must enable local school systems to update and tailor their curricula to meet the evolving needs of students. Further, to accomplish this objective, WCPSS must research successful partnerships between school systems and local businesses and pursue similar partnerships with Triangle Area businesses. Finally, WCPSS must establish processes for identifying students with an aptitude for, and interest in, IT and for providing the optimal educational tract for those students.

In a posting on the NCDPI website, State Superintendent June Atkinson highlights the problems faced by students who do not graduate from high school, including higher rates of incarceration, poor health, poverty and reliance on social services programs (NCDPI, The Message: Graduate!). With almost 20% of students not graduating within four years of matriculation in high school, WCPSS, and the greater Wake County community, must identify opportunities to address this population (NCDPI, 4-year Cohort Graduation Rate Report). As evidenced previously, Civic Enterprises' 2006 survey of high school dropouts identified enhancing the relevancy of curricula to postsecondary opportunities as the single greatest factor that would have enticed dropouts to remain in school through graduation (Bridgeland, DiIulio, Jr., & Burke Morison, 2006).

In this section, I outlined a proposed approach to addressing part of this issue through engaging local businesses in the enhancement of WCPSS IT curricula and educational implementation.

Control of Content

While NCDPI has included Cisco and SAS in the design of its most recent curricula blueprint, limiting engagement to two companies in curricula development does not robustly address challenges with improving IT course enrollment and integrating WCPSS IT programs into the local business climate. All local IT companies should be invited to participate in the creation of curricula, the delivery of the content and the overall enhancement of WCPSS IT education. Partnerships with various local IT companies would ensure that educational content was relevant, that students had the opportunity to collaborate with real-world professionals, and that communications between prospective employees and local employers would begin early in the process. The NCDPI is responsible for creating state wide curricula, which limits the WCPSS BITE teachers' ability to teach emerging and current topics. Providing WCPSS with the ability to engage local technology firms to develop countywide IT curricula would address the needs of both students and local businesses.

The companies should not only be involved in the curricula writing, but professionals in the field should be visible in the classroom, and those companies should become an extension of the classroom. Engagement of businesses in WCPSS IT programs would benefit both parties. Students could develop relationships with the companies as well as receive a relevant education. WCPSS must stay competitive to help local students compete against the influx of young people moving to the Triangle Area for the IT jobs (Badenhausen, 2009). WCPSS needs to set up a feeder program, where companies are involved in a student's education.

Due to budget issues, many WCPSS programs have experienced substantial funding cuts or have been eliminated. This scarcity of resources can have an enormous impact on the IT courses taught in WCPSS schools. Through partnership with local businesses, reduced funding

for course materials and equipment can be offset by corporate donations of time and equipment. These local businesses could also provide feedback on what needs to be taught in the classroom in order for the students to be prepared to step into an IT position after graduation. They could also help the school system continuously update their curriculums so that what was being taught in the classroom was relevant to the jobs available post graduation. In order to repay the companies for their funding and influence on the instructional information, students who take the funded IT courses could intern with the local companies. This would provide the student's with relevant work experiences but also provide extra help to the local industries without needing to hire an additional employee.

The Apex Academy of Information Technology

One of the major reasons for the gap between CTE and high-demand job training is the disconnectedness between local business and the WCPSS CTE department. Providing local businesses with input into the objectives and skills addressed in the CTE classroom is a critical component of addressing this gap (Ryan, 2009; Reese, 2011). Local employers are active in the job market, and CTE can take advantage of this perspective on both the requirements for success in IT positions as well as the qualifications of candidates against which WCPSS graduates will compete for those positions.

A program that truly models how a CTE department should be established is the Academy of Information Technology (AOIT) in Apex High School, which is part of WCPSS. AOIT was designed in 2001 as part of WCPSS smaller learning community's directive, which sought to implement teaching strategies that personalized the educational experience for selected students while enhancing the performance and attendance of those students (AOIT, 2004).

In response to the smaller learning communities' directive, WCPSS identified IT as an ideal theme for one of its initial career academies, based on the abundance of local resources to support the initiative and the opportunities created for students attending the academy (AOIT, 2011). The AOIT follows the National Academy Foundation (NAF) model, which provides greater flexibility than the NCDPI IT curricula and focuses on engaging local businesses in the education of students relative to specific courses of study. Further, an AOIT Advisory Board includes representatives from local businesses and postsecondary educational institutions to integrate varied perspectives into the educational approach. Additionally, students in the AOIT are required to complete an internship with a local business to ensure real-world application of classroom learning.

However, because the AOIT is funded by CTE, teachers are held responsible for following the CTE curricula developed by NCDPI, thereby limiting their flexibility in integrating local business into the curricula. Originally, the CTE fund provided 12 Months of Employment (MOE) enabling the AOIT to employ 12 full-time teachers dedicated to the IT curricula. In 2010 state budget cuts resulted in a reduction of seven MOE from the academy, leaving only five full-time teachers. Apex High School recognized the success of the academy and, based on concerns about the substantial impact of the reduction in dedicated staff, elected to provide six MOE to compensate for the loss of CTE funds. This decision required reallocation of funding from other Apex High School budget line items and, accordingly, resulted in the partial or total reduction of other activities and programs. While the school was almost forced to drop the program down to five positions for the 2011-2012 school years, Apex High School secured funding for the remaining six positions.

The AOIT is limited to 300 students in grades nine through 12, or 75 students per grade level (AOIT, 2011). Based on recent enrollment data, at capacity AOIT students represent less than 1% of the 44,053 students enrolled in CTE courses in WCPSS. The main focus is on providing the educational platform to prepare students to qualify IT specialist positions within the local community.

The Advisory Board that presides over the academy primarily represents local business, including many of the larger technology companies in the local area (Reese, 2011). The current Advisory Board is comprised of members from major corporations, including IBM, Cisco, SAS, Lenovo, NetApp, LORD, Compuware, Fidelity Investments and American Airlines (AOIT, 2011). Many of the AOIT internships are with these companies, leveraging the close working relationship between the school and business representatives. Fundamentally, WCPSS career academies, and AOIT in particular, are successful because of their connection with local industry. This model recognizes that the benefits of engaging business leaders with programs that are specifically designed to prepare the students to work for like companies (Emeagwali, 2010).

The following figure displays the layout of a student's academic pathway through AOIT.

**Apex High School
Academy of Information Technology
Four Years At-A-Glance**

Up to 90 students per cohort (grade)

	9 th Grade Cohort	10 th Grade Cohort	11 th Grade Cohort	12 th Grade Cohort	Any year
English	AOIT English I (Academic & Honors)	AOIT English II (Academic & Honors)	AOIT English III** (Academic & Honors)	AOIT English IV** (Academic & Honors)	
Social Studies	AOIT World History (Academic & Honors)	AOIT Civics & Economics (Academic & Honors)	AOIT U.S. History** (Academic & Honors)	student choice	
Science	AOIT Biology (Academic & Honors)	AOIT Earth Science (Academic & Honors)	student choice	student choice	
Math	Varies	Varies	Varies	Varies	
IT – Elective Students must complete one of the two full 4- year sequences	AOIT MS IT Academy*(Word, Publisher, PowerPoint, Excel)	Multimedia & Webpage Design	AOIT e-Commerce I Honors	AOIT e-Commerce II Honors	Computer Programming I
	AOIT Computer Programming I – VB.NET	AOIT Computer Programming I – C++	AOIT SAS Programming Honors	AOIT AP Computer Science	
Elective	Healthful Living (required)	student choice	student choice	student choice	
Elective	student choice	student choice	student choice	student choice	
Elective	student choice	student choice	student choice	student choice	

All shaded courses will be all or majority AOIT students

*All AOIT 9th graders will take MS IT Academy (Word, Publisher, PowerPoint & Excel)

**If students select AP courses, they do not have to take the AOIT cohort class

Figure 5. AOIT Four Year Schedule

As displayed in the figure, AOIT students’ IT courses are complemented by integrated learning in core academic subjects and the same electives available to other Apex High School students. Accordingly, while the academy prepares students for the high-demand careers in the local community, enrollment does not limit students’ post-graduate pursuits to entry-level IT positions. AOIT allows for students to earn college credits while taking courses within the academy. About 90% of the students from this program pursue postsecondary, with a continued focus on IT (AOIT, 2011). Accordingly, while the AOIT provides for a tailored approach to educating students with a demonstrated aptitude for and interest in the IT field, the academy is

not a parochial experience reminiscent of last century's vocational schools, but rather provides broad, widely-applicable education.

While the AOIT fulfills the requirements of the smaller learning communities directive, the model has broader applicability across WCPSS. More specifically, the WCPSS CTE department must identify the elements of the AOIT model that can and should be integrated into the general IT programs at all WCPSS high schools. It is vital that WCPSS's CTE programs identify opportunities for representatives from local businesses to engage with the entire CTE curriculum (Ryan, 2009; Reese, 2011).

However, the NCDPI is responsible for creating the CTE curriculum and must focus on the needs and opportunities available to all students, not only those in Wake County. While many of the career positions available in the Triangle Area focus on software development and programming, IT educational needs of students statewide may not call for a focus on the same skills and training that are needed for software development and programming. Further, in some parts of the state, the lack of an industry for software development and programming may be reflected in a lack of student interest in the topics or in an inability of CTE teachers to provide adequate instruction.

Three potential solutions would enable NCDPI to continue to focus on statewide needs for IT education while also enabling local school systems to leverage opportunities presented by the business environment of their community. The first alternative would be for NCDPI to establish curricula that provide sufficient flexibility or optional modules to allow each local school district to incorporate learning objectives that meet the unique requirements of their students and/or integrate the available resources resident in their local communities. As a second option, NCDPI could provide each local school system the ability to develop customized IT

curricula. The NCDPI would have the right to review and approve the curricula prior to implementation, which would ensure that minimum standards are met while enabling local school districts to include modules that exceed the baseline standards. The third alternative is for the WCPSS CTE department and Research Triangle businesses to develop IT curricula and a process for continual evolution of the curricula to reflect current trends. These curricula, prepared under the supervision of the NCDPI, would form the basis for statewide IT education, thereby enabling students from across the state to benefit from the technology resources resident in the Research Triangle area. However, to ensure success, these curricula would also necessarily be accompanied by training modules or certification requirements to ensure that teachers in other areas have the ability to successfully implement the curricula.

A program like AOIT engages local businesses to help enhance the curricula to elevate students' learning so that they may be prepared out of high school for IT jobs, which are "high skill, high wage, and or high demand occupations in current or emerging professions" within their local area while also providing a platform for postsecondary education. Until local school system CTE departments are afforded flexibility in the design and implementation of their programs in order to meet the local needs, the success of learning environments such as AOIT will not benefit students outside of these limited programs. A major restructuring of the CTE curricula at a local level to reflect the employment opportunities within varying localities would provide the greatest benefit to all students (Emeagwali, 2010). With a broad application of a dynamic, business-centric IT curricula, WCPSS would be preparing students for jobs that not only are in demand, but for which demand is also increasing, thereby enhancing their opportunity for success in today's challenging economic environment.

CHAPTER FIVE: RECOMMENDATIONS FOR FURTHER RESEARCH

Based on the Research and Discussion portions of this study, five areas of further research are recommended to advance this study.

Recommendation 1: Further research on the process of updating IT course curricula at NCDPI must take place in order to analyze the procedures, methodology, and timeliness of updates to IT course curricula. With more than two-thirds of the current IT curricula dating from 2006 or earlier, the gap between information in NCDPI's IT curricula and the knowledge and skills base in the current IT workforce is growing. WCPSS must be allowed to have evolving IT curricula that keep pace with the advancing IT needs of the local business. Local stakeholders must also be involved with the process of aligning the curricula with local standards. If NCDPI would allow this to happen, local companies would be confident that the local graduates would be employable as they possess an up to date knowledge base and skill set in the IT field.

Recommendation 2: Further research on the reason for lack of enrollment in IT courses in WCPSS would be advantageous. With just over four hundred advanced IT students enrolled in Fall 2011 despite the significant market for IT jobs (about half of all available jobs in the Triangle Area are IT positions), it must be determined why IT enrollment is minimal. WCPSS's schools lack structured IT departments, sans the AOIT at Apex, which may be one of the drivers for low enrollment. Lack of advertisement and promotion by counselors and advisors may also be responsible for the small number of advanced IT students. WCPSS must produce a reasonable amount of IT graduates that are prepared to enter the local job market in order to demonstrate to local companies that they need not look outside of the Triangle Area to identify competitive and qualified IT candidates.

Recommendation 3: Further research into the availability of certifications for teachers and students in the Triangle Area must be performed. Researching the effect that various IT certifications received by a high school teacher have on the learning that takes place in the IT classroom is necessary to determine if IT certified teachers have a greater impact on IT students. Teacher certification would also create a stronger bond between local business and the classroom, as the teacher would become familiar with local company needs. Research should also be performed on which local companies would be willing to certify students and teachers and in what disciplines. If various local businesses are willing to offer certification programs to local high school students, the symbiotic relationship would ensure that local companies have a trained pool of talent from which to hire and that students would have more marketable skills when seeking employment or pursuing higher education.

Recommendation 4: Advancing research on the Triangle Area companies' willingness to employ high school graduates with IT skills, but without advanced degrees would determine if students leaving high school in search of employment would be considered for these high-skill and high-wage careers. As stated previously in this study, curricula content relevancy was one of the main reasons for students dropping out of high school. If the IT field is an area that students can enter with a high school diploma and an IT background via high school IT courses, then there is a possibility that WCPSS could reduce its drop-out rate by enhancing its IT curricula. If local employers are willing to hire IT-focused high school graduates, then the drop-out rate could be reduced while providing local businesses with a strong local talent pool for IT employees.

Recommendation 5: Further research should examine the post-graduate pursuits of AOIT students to determine what portion of the graduates move on to IT careers, and how many end up

within the companies that are represented on the AOIT board. This would help determine how a structured IT program as well as an evolved board representing local companies can influence students' career options and pursuits. To further this point, I would recommend research on the students who apply for but are not admitted into the AOIT at Apex. Demonstration on the difference in eventual post-secondary educational and career pursuits between AOIT and non-AOIT students with a demonstrated interest in the IT field would identify the value of a structured IT program and involvement from local businesses for more high schools than Apex.

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APPENDIX

Current WCPSS High School Business and Information Technology Education Course Offerings

The following pages present the current WCPSS High School Business and Information Technology Education (BITE) course offerings, as presented in the *High School Program Planning Guide: 2011 – 2012* (WCPSS High School Program Planning Guide, 2011).

BUSINESS AND INFORMATION TECHNOLOGY EDUCATION

BIT PERSONAL FINANCE	70862B	1 credit
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Recommended for grades 11-12

This course is designed to increase financial literacy among high school juniors and seniors and prepare them to be successful managers of their personal, family, and environmental resources. Students learn to manage resources through authentic applications that are relevant to their lives – e.g. ., spending plans, cost analyses, strategic career plans, comparison shopping, individual and family scenarios, and product care demonstrations. Lesson activities are derived from a series of highly motivational, activity-based lessons.

PRINCIPLES OF BUSINESS AND FINANCE	62002C	1 credit
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Recommended for grades 9 - 10

This course introduces students to topics related to business, finance, management, and marketing to cover business in the global economy, functions of business organization and management, marketing basics, and significance of business financial and risk management. Appropriate work-based learning strategies are job shadowing, field trips, and service learning. Participation in DECA and FBLA leadership activities, conferences, competitions, and meetings in addition to projects, simulations and teamwork provides the opportunity for application of instructional competencies.

BUSINESS LAW	62152D	1 credit
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Recommended for grades 11 – 12

This course is designed to acquaint students with the basic legal principles common to business and personal activities. Knowledge of contract law is applied to personal and business situations, including understanding how our legal and financial systems operate, maximizing purchasing power through credit, selecting appropriate insurance, renting and owning real estate, and how contract law applies to life's milestones, such as marriage, retirement and death. Business concepts such as contracting, ethics, starting a business, employment law, environmental law and intellectual property rights are included. Skills in critical thinking, oral and written communication are reinforced.

BUSINESS MANAGEMENT AND APPLICATIONS (COOPERATIVE)*

62256A

2 credits

Prerequisite(s): Keyboarding skills and Computer Applications I or Microsoft ITA: Word, PowerPoint, and Publisher

Recommended for grade 12

This course covers the organizational functions of businesses including total quality concepts, project management, and problem solving. Emphasis is placed on analyzing the social, technological, and organizational systems in businesses, such as human relations, communications, records management, and meeting and conference coordination. Skills in communications and mathematics are reinforced as the student uses the appropriate business technology to perform business applications. Off-campus on-the-job training must be included to earn two units of credit. This course is included as a capstone (*) course in the Business Technologies Pathway only.

BUSINESS MANAGEMENT AND APPLICATIONS (NON-COOPERATIVE)*

62252H

1 credit

Prerequisite(s): Keyboarding skills and Computer Applications I or Microsoft ITA: Word, PowerPoint, and Publisher

Recommended for grade 12

Identical instructional areas covered in Business Management and Applications (Cooperative) are presented in this course. Work-based skills are acquired through alternative avenues of learning such as internships, simulations, and group/individual projects. The cooperative experience is not a component of this course. This course is included as a capstone (*) course in the Business Technologies Pathway only.

SMALL BUSINESS/ENTREPRENEURSHIP*

62355A

1 credit

Prerequisite(s): Two technical credits in same CTE program area

Recommended for grades 11-12

This course introduces students to the rewards and risks of owning or operating a business enterprise. Emphasis is placed on the mastery of skills needed to plan, organized, manage, and finance a small business. Skills in communication, technical writing, mathematics, research, and problem-solving are reinforced as each student prepared his/her business plan. Work-based learning strategies appropriate for this course include cooperative education and paid/unpaid internships. Simulations, projects, teamwork, DECA and FBLA leadership activities, meetings, conferences, and competitions provide opportunities for application of instructional competencies.

ACCOUNTING I

63112A

1 credit

Recommended for grades 10-12

This course provides an understanding of the basic principles of the accounting cycle. Major areas of study include business transactions, preparation and interpretation of financial statements, flow charts, accounting systems, banking and payroll activities, types of business ownership, and accounting career orientation. Mathematical and critical thinking skills are reinforced.

ACCOUNTING II (HONORS)* **63125A** **1 credit (HN)**

Prerequisite(s): Accounting I and teacher recommendation

This course is designed to provide students with an opportunity to develop in-depth knowledge of accounting procedures and techniques utilized in solving business problems and making financial decisions. Emphasis includes departmental accounting; corporate accounting; cost accounting and inventory control systems; managerial accounting and budgeting; and further enhancement of accounting skills. Mathematics skills and critical thinking are reinforced. Work-based learning strategies appropriate to this course are school-based enterprises, internships, cooperative education, and apprenticeship. Simulations, projects, teamwork, and FBLA leadership activities, meetings, conferences and competitions provide opportunities for application of instructional competencies.

MICROSOFT ITA: Word, PowerPoint, and Publisher **64112N** **1 credit**

Students in Microsoft IT Academies benefit from world-class Microsoft curriculum and cutting-edge software tools to tackle real-world challenges in the classroom environment. The first part of the class is a supplemental section where students will learn to create, edit, organized, and share a virtual notebook. In the second part, students will learn to use the newest version of Microsoft Word interface, commands, and features to create, enhance, customize and share documents as well as create complex documents features to create, enhance, customize and deliver presentations. In the last part, students will learn to use the basic features of the newest version of Microsoft Publisher to create, customize, and publish a publication.

MICROSOFT ITA: Excel and Access **64112O** **1 credit**

Students in Microsoft IT Academies benefit from world-class Microsoft curriculum and cutting-edge software tools to tackle real-world challenges in the classroom environment. The first part of the class is designed to help you use the newest version of Microsoft Excel interface, commands, and features to present, analyze, and manipulate various types of data. Students will learn to manage workbooks as well as how to manage, manipulate, and format data. In the second part of the class students will learn how to create and work with a database and its objects by using the new and improved features in newest version of Microsoft Access. Students will learn how to create, modify, and locate information as well as how to create programmable elements and share and distribute database information.

MULTIMEDIA AND WEBPAGE DESIGN **64122A** **1 credit**
(formerly Computer Applications II)

Prerequisite: Computer Applications I of MSITA: Word, PowerPoint, Publisher

This revised course focuses on desktop publishing, graphic image design, computer animation, virtual reality, multimedia production, and webpage design. Communication skills and critical thinking are reinforced through software applications. Work-based learning strategies appropriate for this course are service learning, field trips, and job shadowing. Simulations, projects, teamwork, and FBLA leadership activities, meetings conferences and competitions provide opportunities for application of instruction competencies.

e-COMMERCE I (HONORS) **64155A** **1 credit (HN)**

Prerequisite(s): Computer Applications II

This course is designed for students who have demonstrated an advanced level of interest and achievement in Business and Information Technology Education. The curriculum is designed to help students master skills in the design and construction of complex web sites for conducting business electronically. Emphasis is on skill development in advanced web page construction and entrepreneurial applications of conducting business electronically as well as economic, social, legal, and ethical issues related to electronic business. Students plan, design, create, publish, maintain, and promote an electronic business web site. Communication and critical thinking

are reinforced through software applications. The course provides the opportunity for advanced work, rigorous academic study, practical application, and transfer of knowledge and skills. This course is only available as an online course and is taught at the honors level.

e-COMMERCE II (HONORS) *

64165A

1 credit (HN)

Prerequisite(s): e-Commerce I (HONORS)

This course is designed for students who have demonstrated an advanced level of interest and achievement in Business and Information Technology Education. The curriculum is designed to help student"s master advanced skills in electronic commerce security, payment infrastructure, secure electronic commerce transactions, and electronic commerce order entry, tracking and fulfillment. Emphasis is placed on marketing techniques for electronic commerce websites, tracking and using customer and sales data, and other uses of databases in electronic commerce sites. Communication skills, problem solving, research, and critical thinking skills are reinforced. This course is only available as an online course and is taught at the honors level. The course provides the opportunity for advanced work, rigorous academic study, practical application, and transfer of knowledge and skills. This course is included as a capstone (*) course in the Business Technologies Pathway only.

COMPUTER PROGRAMMING I (VB.NET) 64212C 1 credit

Prerequisite(s): Algebra I

Recommended for grades 10-12

This course is designed to introduce the concepts of programming, application development, and writing software solutions in the Visual Basic.Net environment. Emphasis is placed on the software development process, principles of user interface design, and the writing a series of increasingly complex Visual Basic.NET programs. Communication, critical thinking, and lifelong learning skills are reinforced through the completion of course activities.

COMPUTER PROGRAMMING II – (VB.NET) (HONORS) * 64225A 1 credit (HN)

Prerequisite(s): Computer Programming I

This course is designed for students who have demonstrated an advanced level of interest and achievement in Business and Information Technology Education. This continuation course begins with an overview of the basic and intermediate level skills introduced in Computer Programming I, while adding new techniques and skills as the class proceeds. Communication, critical thinking, and lifelong learning skills are reinforced through the completion of course activities. The course provides the opportunity for advanced work, rigorous academic study, practical application, and transfer of knowledge and skills. This course is included as a capstone (*) course in the Business Technologies Pathway only.

COMPUTER PROGRAMMING I C++

64262A

1 credit

Recommended for grades 11-12

The C++ Programming course builds upon and extends object-oriented programming concepts learned in Computer Programming I (Visual Basic.Net). Students will build upon their foundation knowledge and extend their understanding and skills while programming in Microsoft Visual C++.

SAS PROGRAMMING I (Honors)**64285A****1 credit**

Prerequisite: One course in another computer programming language.

Recommended for grades 11-12

This course is the entry point for students to learn SAS programming and is a prerequisite for the second SAS programming course. Students will learn how to plan and write SAS programs to solve common data analysis problems. Instruction provides practice running and debugging programs. The emphasis is placed on reading input data, creating list and summary reports, defining new variables, executing code conditionally, reading raw data files and SAS data sets and writing the results to SAS data sets. Work-based learning strategies appropriate for this course include entrepreneurship, internship, mentorship, service learning, and job shadowing. Cooperative education is not available for this course. FBLA competitive events, community service, and leadership activities provide the opportunity to apply essential standards and workplace readiness skills through authentic experiences. This course can help prepare students for the SAS Base Programming Exam for SAS 9 certification exam.

DIGITAL COMMUNICATION SYSTEMS**65142A****1 credit**

Recommended for grades 9-10

This course is recommended for students who have not taken the middle grades keyboarding course or have no keying/document formatting skills. The course is designed to teach basic digital input skills including using the touch method, speech recognition, and use of handheld devices. The course is built around three basic software programs (word processing, spreadsheet, and databases). Emphasis is on the daily use and operation of commonly used digital communication devices to develop skill with concentrated application of those skills in the production of business communication and correspondence. Communication skills are reinforced as the students format, compose, and proofread.

BUSINESS AND ELECTRONIC COMMUNICATIONS**65352A****1 credit**

Prerequisite(s): Keyboarding skills (35 words per minute with errors corrected)

This course provides students essential competencies for oral and written communications in the technological workplace. Emphasis is placed on utilizing the computer to develop written communication skills such as composing memos, letters and reports; describing processes or mechanisms; and completing forms and responding to e-mail. Utilizing technology (presentation software and telecommunication) to develop skills in oral presentations, giving instructions, interviewing for information, and presenting information/reports in an effective manner are reinforced. This course supports the competencies studied in English II.

NETWORKING I**63412B****1 credit**

Recommended for grade 10-12

This course provides a broad-based foundation in engineering and administration of computer network systems. Emphasis is on PC/network hardware and operating systems, architecture, protocols, design and security, and career development. Communication, mathematical, and critical thinking skills are strengthened throughout the course.

**NETWORK ADMINISTRATION II -
MICROSOFT (HONORS)***

63475B

1 credit (HN)

Prerequisite(s): Networking I

Recommended for grade 11-12

This course is designed for students who have demonstrated an advanced level of interest and achievement in Business and Information Technology Education. This course is the second of two courses of a certification program based on industry-validated skill standards. Topics in this course include networking security, administrator responsibilities, and documentation of work-based experiences. Critical thinking skills are taught. The expectation of this course sequence is for students to sit for the appropriate industry-credentialing exam. The course provides the opportunity for advanced work, rigorous academic study, practical application, and transfer of knowledge and skills. This course is included as a capstone (*) course in the Business Technologies Pathway only.

**NETWORK ADMINISTRATION II -
NOVELL (HONORS)***

63465B

1 credit (HN)

Prerequisite(s): Networking I

Recommended for grade 11-12

This course is designed for students who have demonstrated an advanced level of interest and achievement in Business and Information Technology Education. This course is the second of two courses of a certification program based on industry-validated skill standards. Topics in this course include networking security, administrator responsibilities, and documentation of work-based experiences. Critical thinking skills are taught. The expectation of this course sequence is for students to sit for the appropriate industry-credentialing exam. The course provides the opportunity for advanced work, rigorous academic study, practical application, and transfer of knowledge and skills. This course is included as a capstone (*) course in the Business Technologies Pathway only.

BUSINESS ADVANCED STUDIES*

65992A

1 credit

Prerequisite(s): Three technical credits in Business and Information Technology Education, including a capstone course Recommended for grade 12

This is a culminating course with a career focus in accounting and finance, business administration, business management and ownership, information technology, and/or office systems technology. The three parts of the course include writing a research paper, producing a product, and delivering a presentation. Students demonstrate their abilities to use content and apply knowledge to professional business situations in a selected career. In addition, they also demonstrate their ability to write, speak, apply knowledge, problem solve, and use life skills such as time management and organization. Students work under the guidance of a teacher-advisor in collaboration with community members, business representatives, and other school-based personnel. This course is included as a capstone (*) course in the Business Technologies Pathway only.

**THE FOLLOWING FOUR COURSES CAN BE OFFERED IN THREE CTE PROGRAM AREAS:
BUSINESS EDUCATION, TECHNOLOGY EDUCATION, AND TRADE AND INDUSTRIAL
EDUCATION**

NETWORK ENGINEERING TECHNOLOGY I 79802F

1 credit

Prerequisite(s): None

This course introduces the fundamental principles of networks and their operation by using CICSO CCNA Discovery 1 curriculum. The goal of this course is to introduce students to fundamental networking concepts and

technologies. This course provides a hands-on introduction to networking and the Internet using tools and hardware commonly found in the home and small business environment. This course prepares students with the skills needed to obtain entry-level Home Network Installer jobs. It also prepares students for some of the skills needed for Network Technician, Computer Technician, Cable Installer, and Help Desk Technician jobs. Work-based strategies appropriate for this course are job-shadowing, internships, cooperative education, and apprenticeship. Hands-on experiences and SkillsUSA leadership activities provide many opportunities to enhance classroom instruction and career development.

NETWORK ENGINEERING TECHNOLOGY II (HONORS)* **79815A** **1 credit (HN)**

Prerequisite(s): Network Engineering Technology I

This course begins with certification preparation for the Certified Cisco Entry-level Network Technician (CCENT) exam. This course will cover CISCO CCNA Discovery 2 curriculum. CCNA Discovery 2 teaches networking based on application covering the types of practical networks students may encounter from simple home or small office networks to more complex enterprise models. This course prepares students with the skills required for entry-level Help Desk Technician and entry-level Network Technician jobs. Work-based strategies appropriate for this course are job-shadowing, internships, cooperative education, and apprenticeship. Hands-on experiences and Skills USA leadership activities provide many opportunities to enhance classroom instruction and career development. The course provides the opportunity for advanced work, rigorous academic study, practical application, and transfer of knowledge and skills This course is included as a capstone (*) course in the Engineering Technologies Pathway only.

COMPUTER ENGINEERING TECHNOLOGY I 79912A **1 credit**

Computer Engineering Technology I (CET I) introduces basic skills and safety procedures required to become an A+ Certified computer technician. Emphasis is on skills needed to build, upgrade, configure, and troubleshoot computers, peripherals, and operating systems. This course focuses on the CompTIA A+ exam objectives.

COMPUTER ENGINEERING TECHNOLOGY II (HONORS)* **79925A** **1 credit (HN)**

Prerequisite(s): Computer Engineering Technology I

This course is designed for students who have demonstrated an advanced level of interest and achievement. Computer Engineering Technology II (CET II) offers advanced hands-on training and theory to enhance skills introduced in CET I. New topics include printers, portable systems, networks, Internet, and customer interaction. Course content follows industry guidelines for A+ Certification. The course provides the opportunity for advanced work, rigorous academic study, practical application, and transfer of knowledge and skills. This course is included as a capstone (*) course in the Engineering Technologies Pathway only.

NATIONAL ACADEMY FOUNDATION COURSES

The following courses are available only through the National Academy Foundation sponsored academies:

Academy of Finance (Available at Sanderson High School)

NAF ACADEMY OF FINANCE: FINANCIAL SERVICES 63532A .5 credit

NAF ACADEMY OF FINANCE: BUSINESS ECONOMICS 63522A .5 credit

WAKE TECHNICAL COLLEGE: INTRO TO BUSINESS 64985D 1 credit

NCSU: SURVEY OF ECONOMICS 64985E 1 credit

SAS PROGRAMMING 64285A 1 credit

WCPSS Fall 2011 Enrollment in CTE Courses

The following tables present the Fall 2011 10th day CTE Enrollment for each WCPSS high school and the overall program, downloaded from the O.A.S.I.S. Information System in September 2011 (WCPSS Enrollment Data, 2011).

	10TH DAY CTE ENROLLMENT (DATA DOWNLOADED FROM O.A.S.I.S.-INFO SYSTEMS)	Apex	Athens Drive	Longview	Broughton	Cary	Enloe	Fuquay-Varina	Garner Magnet	Green Hope	Heritage	Holly Springs	Knightdale	Leesville Road	Middle Creek
CTE#	COURSE NAME	316	318	324	348	368	412	428	436	441	445	455	466	473	495
6145	CAREER MGT		102	4		57		157	76	99		123	181	144	178
6198	CAREER DEV INTERNSHIP	34			61				8	8			6		
6200	POB & FINANCE									206	56		78		
6209	VIRTUAL ENTERPRISES														
6215	BUS LAW	28	72				44		40	29	26	27	51	34	52
6225	BUS MGT & APPS						11						11		
6227	IB BUS MGT				198										
6235	SM BUS ENTRE								114	35		61			59
6311	ACCOUNTING 1		23				15	20	25			29	24		19
6312	ACCOUNTING II						2								
6352	NAF BUS ECON (.5)														
6353	NAF FIN SERVICES (.5)														
6411	COMPUTER APPS I														
6412	MULTIMEDIA WEBPAGE DES	159	116		15	45	46	46	66	46	46	57	43	71	60
8110	FUNDAMENTALS OF TECH				55		66	111	101		72	114	161		178
6416	E-COMMERCE II	46	11		1	13			3						
6417	MS WORD PPT PUBLISHER	337	213		104	183	188	142	330	171	224	109	157	176	182
6419	MICROSOFT EXCEL & ACCESS		48			73	25	40	50	36		108	24	58	
6422	COMP PROG II					5				36					
7981	NET II	10	17			9				24			8		6
7992	COMP ENG TECH II	20	20			36							31		18
6415	E-COMMERCE I	77	8		26	41	12		11	20			7		
6421	COMP PROG I	155				53				83					
6499	CC BUS TECH							59							1

	10TH DAY CTE ENROLLMENT (DATA DOWNLOADED FROM O.A.S.I.S.-INFO SYSTEMS)	Apex	Athens Drive	Longview	Broughton	Cary	Erloe	Fuquay-Varina	Garner Magnet	Green Hope	Heritage	Holly Springs	Knightdale	Leesville Road	Middle Creek
CTE#	COURSE NAME	316	318	324	348	368	412	428	436	441	445	455	466	473	495
6423	NAF: COMP PROG I C++									21					
6598	BUS ED INTERNSHIP														
6599	BUS ADV STUDIES					20			2	4		1			
6615	SM BUS ENTRE	54	21		42	33	59	59				1	61	26	
6621	MKT	140	23		27	65	39	117		32		61		53	51
6626	STRATEGIC MKT	31	17				13			53					
6631	FASHION MERCH	56				28	46	41							
6645	TRAVEL TOUR & REC MKT		23		41									21	
6670	SP & ENTERTAIN MKT I	56	41		65	32	45	139	107	218	83	88	89	120	
6671	SP & ENTERTAIN MKT II		6		11		6	55	23	46	24	27	15	31	
6698	MKT ED INTERNSHIP														
6699	MKT ADV STUDIES		3				5								
6810	AGRISCIENCE APPS	57						19			74		32		
6821	ANIMAL SCI I												107		
6823	ANIMAL SCI II - SM AN												25		
6825	EQUINE SCIENCE I														
6831	AG MECHANICS I							39							
6832	AG MECH II							34							
6833	AG MECH II - SM ENG														
6841	HORT I	52		6				22			33		53		
6842	HORT II										8				
6843	HORT II-TURF GRASS												18		
6851	ENVIRON & NAT'L RES I												50		
6852	ENVIRON & NAT'L RES II												5		
6871	BIOTECH & AG RES I														
6882	HORT II-LAND CONST														
6898	AG INTERNSHIP														
6899	AG ADV STUDIES							5					13		
7009	PROSTART I					25									
7009	PROSTART II					12									
7015	TEEN LIVING	96	101	4			77	148	172	53		250	182	126	
7035	APPAREL DEV I	75	75		125	81	52	90	74	57	55	85	46	40	
7036	APPAREL DEV II	14	18			20	36	2	14		18	35	18		

	10TH DAY CTE ENROLLMENT (DATA DOWNLOADED FROM O.A.S.I.S.-INFO SYSTEMS)	Apex	Athens Drive	Longview	Broughton	Cary	Erloe	Fuquay-Varina	Garner Magnet	Green Hope	Heritage	Holly Springs	Knightdale	Leesville Road	Middle Creek
CTE#	COURSE NAME	316	318	324	348	368	412	428	436	441	445	455	466	473	495
7045	FOODS I-FUNDAMENTALS	155	82		219	150	84	58		256	97	120	133	261	165
7046	FOODS II-ADV	40	32		80	49	47			35	41	74	41	119	110
7055	HOUSING & INTERIORS I	28	25		57	55	34		54	69		91			84
7056	HOUSING & INTERIORS II				9							30			19
7065	CHILD DEV	57	109		141	166	61	148	159	59	60	60	134	113	188
7075	FOODS II - FOOD TECH					25		18							
7086	PERSONAL FINANCE				38	83	22		31	20		49		94	
7111	EARLY CHILDHOOD ED I				31	15		19	27				27	12	
7112	EARLY CHILDHOOD ED II		4		8	6			12				12	3	
7121	CULINARY ARTS & HOSP I	26	10												
7122	CULINARY ARTS & HOSP II	10													
7198	FACS INTERNSHIP				5	2									
7199	FACS ADV STUDIES	5			42	11	28		62	1		10			
7200	BIOMEDICAL TECH		102			57				52		102			
7209	HEALTH SCIENCE II		39												
7210	HEALTH TEAM RELATIONS	59	55						64	49	111	64			
7221	MEDICAL SCIENCE I	91	80			53	72	84	52	117	67	146			
7222	MEDICAL SCIENCE II	23				34	48	46	30	38	31	39			
7232	PHARMACY TECHNICIAN		10				8		4			4			
7299	HOE SCIENCE ADV ST		5				12								
7399	CC HEALTH SCIENCE	6	17							9					2
7511	AUTO SERVICE TECH I	74			47		30		126						
7512	AUTO SERVICE TECH II	9			16		16		45						
7513	AUTO SERVICE TECH III	7			11		10		7						
7521	COLLISION REP TECH I														
7522	COLLISION REP TECH II														
7531	AEROSPACE I				54									68	
7532	AEROSPACE II				25									21	
7621	FURN & CABINET I		63							78					
7622	FURN & CABINET II		19							35					
7631	ELECTRONICS I							57							
7632	ELECTRONICS II														
7711	MASONRY I							79							

	10TH DAY CTE ENROLLMENT (DATA DOWNLOADED FROM O.A.S.I.S.-INFO SYSTEMS)	Apex	Athens Drive	Longview	Broughton	Cary	Enloe	Fuquay-Varina	Garner Magnet	Green Hope	Heritage	Holly Springs	Knightdale	Leesville Road	Middle Creek
CTE#	COURSE NAME	316	318	324	348	368	412	428	436	441	445	455	466	473	495
7712	MASONRY II							20							
7721	CARPENTRY I	39				91		66			95	40	81	88	
7722	CARPENTRY II	16				17		11			14	32	23	22	
7723	CARPENTRY III	7													
7899	CC T&I ED	1						12			6				
7911	PRINTING GRAPHICS I		45		81		53	63	80						92
7912	PRINTING GRAPHICS II		28		26		19	16	16						11
7921	DRAFTING I	97	151		43	96	57	80	76	77	95	135	51	63	
7935	DIGITAL MEDIA I		86			95		53	60					65	197
7936	DIGITAL MEDIA II		32			32			15					3	44
7962	DRAFTING II ARCH	8	29		11	22	20	27	29	40	24	35	12	30	
7963	DRAFTING III ARCH	12	5		7		11	11	8			7	4	12	
7972	DRAFTING II ENG		42		8	26	16				20	33	6		
7973	DRAFTING III ENG				3	5				40		12	1		
6426	COMP PROG I C++	55													
6428	SAS PROG I	24													
6514	DIGITAL COMM SYS			13	93	38	44								
7980	NET I - CISCO	18	23			21				23			20		44
7998	T&I INTERNSHIP								4						
7999	T&I ADV STUDIES		4			3	10		4	6		1		9	49
8005	TECH ADV STUDIES				13		4		4			1		11	41
8006	SCI VISUALIZATION I						11				70	36		65	
8007	SCI VISUALIZATION II											56		29	
8009	GREEN ENG & SUS ENERGY I												39		
8011	PRINCIPLES OF TECH I														44
8018	PHYSICS/PRINC OF TECH II														16
8020	PLTW - INTRO TO ENG DES														
8021	PLTW - PRINC OF ENG														
8022	PLTW - DIG ELECTRONICS														
8031	PLTW - CIVIL ENG & ARCH														
8033	PLTW - AEROSPACE ENG														
8040	PLTW - ENG DESIGN & DEV														
7991	COMP ENG TECH I	60	52			86				96			39		45

	10TH DAY CTE ENROLLMENT (DATA DOWNLOADED FROM O.A.S.I.S.-INFO SYSTEMS)	Apex	Athens Drive	Longview	Broughton	Cary	Enloe	Fuquay-Varina	Garner Magnet	Green Hope	Heritage	Holly Springs	Knightdale	Leesville Road	Middle Creek
CTE#	COURSE NAME	316	318	324	348	368	412	428	436	441	445	455	466	473	495
8115	MANUFACTURING SYS				59										
8125	COMM SYS						15								
8126	TRANSPORTATION SYS				38				24						
8141	STRUCTURAL SYS								25				9		
8210	TECH														
8595	CTE ADV Studies														
8710	BUS MGT						11							22	
8721	POB & FINANCE	168			71	81	20		112			130		98	116
	SCH TOTALS	2592	2107	27	2007	2150	1550	2213	2346	2377	1450	2483	2128	2108	2071

10TH DAY CTE ENROLLMENT (DATA DOWNLOADED FROM O.A.S.I.S.-INFO SYSTEMS)		Millbrook	Panther Creek	Phillips	Sanderson	Southeast Raleigh	NCSU STEM Early College	Wake Early College	Wake Forest-Rolesville	Wakefield	EW Health Science	EW Integrated Tech	EW Arts Ed Global St	EW Engineering Sys	WCPSS
CTE#	COURSE NAME	500	526	528	552	562	582	583	588	595	700	701	702	703	920
6145	CAREER MGT	91		8							58		80		1358
6198	CAREER DEV INTERNSHIP	2				35				51					205
6200	POB & FINANCE	4			153					169			16		682
6209	VIRTUAL ENTERPRISES											32			32
6215	BUS LAW				55	69			47	31		33			638
6225	BUS MGT & APPS									29					51
6227	IB BUS MGT														198
6235	SM BUS ENTRE	121		7	57				16			40	16		526
6311	ACCOUNTING 1	26	112		35				42	28		24			422
6312	ACCOUNTING II		6									1			9
6352	NAF BUS ECON (.5)				33										33
6353	NAF FIN SERVICES (.5)				33										33
6411	COMPUTER APPS I					102									102
6412	MULTIMEDIA WEBPAGE DES	83	115	6	64				54	51		45	37		1271
8110	FUNDAMENTALS OF TECH		244		104				93	93					1392
6416	E-COMMERCE II	1													75
6417	MS WORD PPT PUBLISHER	336	343	26	176	74			210	266	34	67	68		4116
6419	MICROSOFT EXCEL & ACCESS	47	182		13	26			40			66			836
6422	COMP PROG II		43		6										90
7981	NET II	3				3									80
7992	COMP ENG TECH II									21		16			162
6415	E-COMMERCE I	2	39												243
6421	COMP PROG I		190		40										521
6499	CC BUS TECH							3							63
6423	NAF: COMP PROG I C++														21
6598	BUS ED INTERNSHIP				2										2
6599	BUS ADV STUDIES								3				1		31
6615	SM BUS ENTRE		171			54				52					633
6621	MKT	91	136		49	22			45	47					998
6626	STRATEGIC MKT	28							29	13					184
6631	FASHION MERCH	26										39			236

	10TH DAY CTE ENROLLMENT (DATA DOWNLOADED FROM O.A.S.I.S.-INFO SYSTEMS)	Millbrook	Panther Creek	Phillips	Sanderson	Southeast Raleigh	NCSU STEM Early College	Wake Early College	Wake Forest-Rolesville	Wakefield	EW Health Science	EW Integrated Tech	EW Arts Ed Global St	EW Engineering Sys	WCPSS
CTE#	COURSE NAME	500	526	528	552	562	582	583	588	595	700	701	702	703	920
6645	TRAVEL TOUR & REC MKT											44			129
6670	SP & ENTERTAIN MKT I	129	176		108	31			113	103		49			1792
6671	SP & ENTERTAIN MKT II	39							29	34					346
6698	MKT ED INTERNSHIP				1										1
6699	MKT ADV STUDIES		22		2				17						49
6810	AGRISCIENCE APPS	85				23								10	300
6821	ANIMAL SCI I								83						190
6823	ANIMAL SCI II - SM AN								21						46
6825	EQUINE SCIENCE I								35						35
6831	AG MECHANICS I	34				44									117
6832	AG MECH II	26				32									92
6833	AG MECH II - SM ENG					8									8
6841	HORT I	77							77	83				41	444
6842	HORT II	9							7	24				22	70
6843	HORT II-TURF GRASS														18
6851	ENVIRON & NAT'L RES I														50
6852	ENVIRON & NAT'L RES II														5
6871	BIOTECH & AG RES I								15						15
6882	HORT II-LAND CONST	6							3	6					15
6898	AG INTERNSHIP													18	18
6899	AG ADV STUDIES	5				7			9	12				26	77
7009	PROSTART I			1	23										49
7009	PROSTART II														12
7015	TEEN LIVING		116	13	180	84			52						1654
7035	APPAREL DEV I	79	94		61	68			84	130					1371
7036	APPAREL DEV II	51	24		31	17			40	36					374
7045	FOODS I-FUNDAMENTALS	205	194	9	83	201			147	215			76		2910
7046	FOODS II-ADV	63	111	4	45	55			56	72			5		1079
7055	HOUSING & INTERIORS I	83	46		98	64				44					832
7056	HOUSING & INTERIORS II				15					9					82
7065	CHILD DEV	178			142	195			94	158			37		2259
7075	FOODS II - FOOD TECH														43
7086	PERSONAL FINANCE		86	8	62	22			61	92	1	15			684

	10TH DAY CTE ENROLLMENT (DATA DOWNLOADED FROM O.A.S.I.S.-INFO SYSTEMS)	Millbrook	Panther Creek	Phillips	Sanderson	Southeast Raleigh	NCSU STEM Early College	Wake Early College	Wake Forest-Rolesville	Wakefield	EW Health Science	EW Integrated Tech	EW Arts Ed Global St	EW Engineering Sys	WCPSS
CTE#	COURSE NAME	500	526	528	552	562	582	583	588	595	700	701	702	703	920
7111	EARLY CHILDHOOD ED I	48			15	42			13	16			15		280
7112	EARLY CHILDHOOD ED II	22			10				3	7			7		94
7121	CULINARY ARTS & HOSP I														36
7122	CULINARY ARTS & HOSP II														10
7198	FACS INTERNSHIP	7													14
7199	FACS ADV STUDIES	4		11	17				2	22					215
7200	BIOMEDICAL TECH										81				394
7209	HEALTH SCIENCE II														39
7210	HEALTH TEAM RELATIONS	98						53	32	25	87				697
7221	MEDICAL SCIENCE I	30				74			73	74	67				1080
7222	MEDICAL SCIENCE II					18			50	29	26				412
7232	PHARMACY TECHNICIAN								21						47
7299	HOE SCIENCE ADV ST					2			2		8				29
7399	CC HEALTH SCIENCE	2	2			3		64	23	22	15		1		166
7511	AUTO SERVICE TECH I													70	347
7512	AUTO SERVICE TECH II													20	106
7513	AUTO SERVICE TECH III														35
7521	COLLISION REP TECH I								38						38
7522	COLLISION REP TECH II								12						12
7531	AEROSPACE I														122
7532	AEROSPACE II														46
7621	FURN & CABINET I														141
7622	FURN & CABINET II														54
7631	ELECTRONICS I					79									136
7632	ELECTRONICS II					8									8
7711	MASONRY I														79
7712	MASONRY II														20
7721	CARPENTRY I								46	85				68	699
7722	CARPENTRY II								22	21				18	196
7723	CARPENTRY III								1						8
7899	CC T&I ED									2		4			25
7911	PRINTING GRAPHICS I		48										58		520
7912	PRINTING GRAPHICS II		15										13		144

	10TH DAY CTE ENROLLMENT (DATA DOWNLOADED FROM O.A.S.I.S.-INFO SYSTEMS)	Millbrook	Panther Creek	Phillips	Sanderson	Southeast Raleigh	NCSU STEM Early College	Wake Early College	Wake Forest-Rolesville	Wakefield	EW Health Science	EW Integrated Tech	EW Arts Ed Global St	EW Engineering Sys	WCPSS
CTE#	COURSE NAME	500	526	528	552	562	582	583	588	595	700	701	702	703	920
7921	DRAFTING I	73		1	114	52			81	107					1449
7935	DIGITAL MEDIA I	91			85					108		45			885
7936	DIGITAL MEDIA II	22			39					21		29			237
7962	DRAFTING II ARCH	14			21	10			16	41					389
7963	DRAFTING III ARCH	3			10	2			8	17					117
7972	DRAFTING II ENG	13			15	8				33					220
7973	DRAFTING III ENG	3													64
6426	COMP PROG I C++														55
6428	SAS PROG I														24
6514	DIGITAL COMM SYS														188
7980	NET I - CISCO	31				24									204
7998	T&I INTERNSHIP														4
7999	T&I ADV STUDIES	2			2				13	4			3	22	132
8005	TECH ADV STUDIES		4			3			3						84
8006	SCI VISUALIZATION I		156			17									355
8007	SCI VISUALIZATION II		45												130
8009	GREEN ENG & SUS ENERGY I														39
8011	PRINCIPLES OF TECH I														44
8018	PHYSICS/PRINC OF TECH II														16
8020	PLTW - INTRO TO ENG DES					50	55							80	185
8021	PLTW - PRINC OF ENG					30								111	141
8022	PLTW - DIG ELECTRONICS					15								20	35
8031	PLTW - CIVIL ENG & ARCH					9								15	24
8033	PLTW - AEROSPACE ENG					12									12
8040	PLTW - ENG DESIGN & DEV					15								23	38
7991	COMP ENG TECH I					74				65		22			539
8115	MANUFACTURING SYS														59
8125	COMM SYS								13						28
8126	TRANSPORTATION SYS		47		17				16						142
8141	STRUCTURAL SYS				12										46
8210	TECH									1					1
8595	CTE ADV Studies									1					1
8710	BUS MGT							1							34

10TH DAY CTE ENROLLMENT (DATA DOWNLOADED FROM O.A.S.I.S.-INFO SYSTEMS)		Millbrook	Panther Creek	Phillips	Sanderson	Southeast Raleigh	NCSU STEM Early College	Wake Early College	Wake Forest-Rolesville	Wakefield	EW Health Science	EW Integrated Tech	EW Arts Ed Global St	EW Engineering Sys	WCPSS
CTE#	COURSE NAME	500	526	528	552	562	582	583	588	595	700	701	702	703	920
8721	POB & FINANCE	214	252			104			108						1474
	SCH TOTALS	2607	3019	94	2028	1887	55	121	2118	2570	377	571	433	564	44053