The North Carolina Community College System
And
The University of North Carolina
Joint Report on
The NCCCS – UNC 2 + 2 E-Learning Initiative
(Session Law 2006-66, Section 9.1)

Submitted at the Request of
The North Carolina General Assembly

Dr. R. Scott Ralls, President
North Carolina Community College System

Dr. Thomas W. Ross, President
University of North Carolina

April 15, 2013

Table of Contents

Contact Persons:

Dr. Saundra Wall Williams, Senior Vice President and Chief Technology Officer
Technology Solutions & Distance Learning
North Carolina Community College System

Dr. Alisa Chapman, Associate Vice President
Academic Planning and University School Programs
University of North Carolina – General Administration

Part I
North Carolina Community College System
Session Law Summary

NCCCS/UNC 2 + 2 E-Learning Initiative
2012-2013

Pursuant to Section 9.3(d) of Session Law 2010-31, the University of North Carolina (UNC) and the North Carolina Community College System (NCCCS) shall report by April 15, 2010, and annually thereafter, to the Joint Legislative Education Oversight Committee, the State Board of Education, the Office of State Budget and Management, and the Fiscal Research Division of the General Assembly on the implementation of the UNC-NCCCS 2 + 2 E-Learning Initiative. The attached report is in fulfillment of this requirement.

(The reporting dates were amended by the General Assembly of North Carolina in the 2010 Session.)

The North Carolina Community College System (NCCCS) is dedicated to providing high-quality, easily accessible educational opportunities that encourage and support student success. In keeping with these objectives, funds provided by the 2 + 2 E-Learning Initiative have provided additional resources to create and expand online courses and programs, professional development services, and acquisition and implementation of needed infrastructure.

The demand by students for easier access to courses and programs in the North Carolina Community College System has never been greater. In the 2011-2012 academic year, curriculum enrollments through distance learning reached an all time high of 52.89% of all course enrollments according the NCCCS Data Warehouse DL100ANN Report, http://vlc.nccommunitycolleges.edu/about/DL2012.pdf. Online and hybrid course enrollments increase each year. Student access to courses no longer means physical presence in a traditional classroom at a specified time. Attendance is on the rise in virtual classrooms which can be managed around job and family responsibilities. Further, many students enjoy a combination of both traditional and distance learning formats. Regardless of a student's learning preference, the 2 + 2 E-Learning Initiative provides the community college system with resources to better equip students to meet the demands of a technologically advanced environment.

Courses and Programs within the 2 + 2 E-Learning Initiative

Background

In 2005, the General Assembly of North Carolina created the 2 + 2 E-Learning Initiative to address the critical shortage of teachers in our state. The North Carolina Community College System (NCCCS) and the University of North Carolina General Administration (UNC-GA) were the recipients of the newly created 2 + 2 E-Learning Initiative. This collaborative project focused on the development of online course content as a means to educate additional teachers in North Carolina.

NCCCS creates online course content through the Virtual Learning Community (VLC), http://vlc.nccommunitycolleges.edu, which provides quality online courses to the 58 community colleges. Online courses and degrees provide access to students who may not be able to attend college in a traditional face to face method. Access to college is difficult for many students as funds for education have decreased, gasoline prices have increased, and job and family responsibilities often prohibit students from attending college. Funds from the 2 + 2 E-Learning Initiative provide both higher educational systems with resources to meet the daily challenges facing students. In 2005, the first order of business for the two systems was to identify five pre-education programs under the North Carolina Comprehensive Articulation Agreement (CAA) which allows for students to begin their education at a community college with an associate degree and then transfer to a university to complete a bachelor's degree.

The five identified associate degree programs were completed by NCCCS in June 2009 through the efforts of VLC course development centers. All 58 community colleges may access the courses for the following online degrees: Associate in Arts/Elementary Education (*online June 2008*), Associate in Arts/Middle Grades Education and Special Education (*online June 2008*), Associate in Science/Chemistry and Chemistry Education *(online June 2009),* Associate in Science/Biology and Biology Education *(online June 2009),* and Associate in Science/Mathematics Education *(online June 2009).*

With the successful completion of the pre-education degrees in 2009, the North Carolina Community College System expanded the focus of course and program development to include majors in science, technology, engineering and mathematics (STEM) education, nursing and allied health programs, developmental math, and career and technical programs.

In 2008-2009, the State Board of Community Colleges approved the funds for a Virtual Learning Community course development center focused on STEM course development. The center developed seven (7) courses and the corresponding labs. In 2009-2010, nine (9) additional courses with labs were developed. The VLC STEM Center also developed three developmental math courses and one developmental chemistry course providing the necessary prerequisite knowledge to ensure the success of students as they entered programs of study in STEM related majors. The online Associate in Science/Engineering degree was completed in 2009-2010, with the successful completion of these courses.

In 2010-2011, the North Carolina Community College System combined state appropriated VLC funds and 2 + 2 E-Learning Initiative funds to fund one VLC course development center that

developed 11 math and science courses. Previously, two centers would have produced the same number of courses. By reducing the administrative costs of multiple centers, resources were used for additional course development. Development of these STEM courses completed six (6) additional online degrees bringing the total to 37 online degrees available in the VLC. (*See Appendix B)*

VLC courses must meet strict content reviews for curriculum goals and objectives, instructional design processes, and pass technical reviews for software applications and appropriate learning management system requirements. Subject matter experts, instructional designers, and technical editors from NCCCS institutions are hired by VLC development centers to work collaboratively on each course. A course can be developed by the VLC for $5,000. All VLC courses are jointly owned by all 58 community colleges and available and accessible to all instructors in the system. The courses are housed on servers at the NCCC System Office where they may be downloaded by any college in the community college system. Each course may be customized by instructors with additional content to personalize the academic experience for students. These courses are available in both Blackboard and Moodle learning management systems.

It should also be noted that 2 + 2 funds support the development of online continuing education courses as well as curriculum courses. Continuing education courses support the State's teachers and the workforce as they seek to meet the requirements of state job certifications and to remain current in their fields.

On May 20, 2011, the State Board of Community Colleges approved the funding and establishment of three permanent Virtual Learning Support Centers in the areas of Professional Development, Technology, and Quality and Assessment. Permanent centers provide for consistency and continuity in development of strategic goals and objectives, and more efficient use of funds, personnel, and resources. Multi-year initiatives and projects are now possible. The Professional Development Center is housed at Wake Technical Community College in Raleigh, NC. The Technology Center is located at Fayetteville Technical Community College in Fayetteville, NC, and the Quality and Assessment Center is housed at Surry Community College in Dobson, NC. (*For more information,* http://vlc.nccommunitycolleges.edu/about/support.html)

The Virtual Learning Community Centers support online learning in the community college system with a commitment to continuous improvement and quality development of courses, programs and resources for instructors and students. High quality courses and instruction go hand in hand. In 2011-2012, the VLC centers developed three exemplary courses; CIS 110 - Introduction to Computers, ENG 111 - Expository Writing, and PSY 150 - General Psychology. In the same year, the VLC developed the first in a series of four Certified Online Instructor courses to provide NCCCS instructors with pedagogically sound professional development for the online teaching and learning experience.

Many community college students require at least one developmental education course before enrolling in college level courses. According to data generated for the Federal Race to the Top Initiative, 67% of North Carolina public high school graduates entering the community college system in 2012 required at least one developmental course before entering their college program of study. For this reason, the VLC redesigned and developed eight (8) one-credit hour developmental math course modules in 2011-2012. A student may now complete each module in as little as four weeks. The new math modules accelerate the developmental education experience for students by focusing on only the specific skills and knowledge a student lacks

rather than requiring each student to take a full semester course covering information a student has already mastered which wastes valuable time and money. The ability to individualize a student's educational experience allows a student to adequately prepare for a desired program of study in less time and with less tuition/financial aid disbursements. Modular redesign of online developmental reading and English courses will be completed in fiscal year 2013-2014 and will be a future project for the VLC.

In addition to developmental education courses, some students require an educational experience that begins with the Basic Skills Adult High School Education Program. In 2012-2013, the VLC developed three online Adult High School courses to provide students in this program with access to a path for higher education. AHS Algebra I, AHS Biology, and AHS English I are now available to NCCCS instructors and students. For the first time, students in Basic Skills Adult High School can now access course materials online.

In 2012-2013, VLC centers will complete development/editing of 45 online courses bringing the total courses in the VLC library to 304 curriculum, 49 continuing education, and three (3) basic skills adult high school courses. (*See Appendix C*) Three (3) online seminars were also developed for the Small Business Center Network to provide information on how to start a new business, write a business plan, and then how to effectively market that business. This library of online courses is owned and available to all 58 community colleges. The courses may be downloaded and customized by each college instructor to provide an educational experience that reflects the style of each instructor and the needs of the student population at each local college. Currently, the VLC contains courses for 37 associate degree programs. (*See Appendix B)*

2012-2013 2 + 2 E-Learning Initiative Projects: Collaborative Education Tools and Resources

NCCCS participated in multiple collaborative projects in 2012-2013 which allowed for maximization of educational resources and provided administrative efficiencies and cost savings for the System and state. Ongoing projects are the North Carolina Learning Object Repository (NCLOR), the Integrated Teaching and Learning Gateway, e-Text Application Pilot Project, and the Virtual Computing Environment. The UNC/NCCCS Moodle Open Source Collaborative project was completed in December 2012, with the award of an open source learning management system hosting solution for the community college system.

K-14 North Carolina Learning Object Repository (NCLOR)

Virtual Learning Community courses combine quality online course content with engaging interactive learning objects, videos and self-assessments housed in the North Carolina Learning Object Repository (NCLOR). The NCLOR contains close to 16,000 learning objects, professional development tutorials, and 287 free e-textbooks. (*See Appendix D*) Licensed collections of content in the NCLOR aid faculty by providing tutorials, research materials, and exercises for students. (*See Appendix E*) Professional development support for educators is available through tutorials in the NCLOR as well as resources mapped to community college courses for focused digital searching capabilities.

The NCLOR can be searched and shared by faculty throughout the community college system and state. Community college staff and faculty members may request a login which provides access to all of the content including the NCCCS licensed collections. A login also provides faculty and staff with the ability to contribute learning objects to the repository. NCCCS faculty can also search the NCLOR content by accessing it through their college's learning management system which provides a single sign-on authentication for the user. To login to the NCLOR as a guest or member, go to www.explorethelor.org. By 2011, the NCLOR could also be accessed through mobile devices as well.

NCLOR content may be searched by discipline, collections, learning resource types, and academic levels such as K-8, Higher Education, Professional Development, and Adult/Continuing Education. Learning Objects (LO) are also searchable by the resource series and/or by selecting a specific VLC course. LOs are mapped to specific courses and listed on one page for easy access by instructors. NCCCS instructors may browse the Combined Course Library in the NCLOR as they search for course information.

There are over 416 professional development webinars and tutorials in the NCLOR. These resources are appropriate for personal viewing as well as group training sessions. Many of these resources were created by the VLC Professional Development Center.

In November 2012, NCCCS and the NC Education Cloud representing the Department of Public Instruction (DPI) and all North Carolina Local Educational Agencies (LEA) collaborated on a new perpetual license agreement to expand the NCLOR to a K-14 repository. By combining federal Race to the Top funds with 2 + 2 E-Learning Initiative funds this new shared repository will benefit faculty and students throughout North Carolina by sharing the administrative costs, support, and maintenance of this statewide collection. In subsequent years, the maintenance fees for NCCCS will decrease which will release additional funds to create or license new digital content. The Center for Urban Affairs and Community Services (CUACS) at NC State University is creating metadata and content for the DPI demo collection in the NCLOR. As a part of this collaboration, math and English language arts Common Core Standards have been added to the NCLOR.

In 2012-2013, the community college system added many newly created learning objects and assets to support the Developmental Math Redesign Modules and new Code Green initiative courses. Over 500 resources were added by the VLC for developmental math course content and 245 resources were added from the NROC algebra and developmental math resource series. In addition to VLC and NCCCS instructor-created content, the NCLOR contains many collections to support student learning. Since July 2012, 266 new National Science Foundation Resource Series items were added to the existing collection. Fifteen (15) new resources were added to the NCCCS Customized Training Program series, and 17 new free e-textbook series were added to the NCLOR. Thirty-seven (37) natural science lecture demonstration videos from Harvard University were contributed as well as 26 resources from the Stanford Center for Professional Development.

Integrated Teaching and Learning Gateway: **Phase I, Year 2**

The purpose of the Integrated Teaching and Learning Gateway (ITLG) is to unite all aspects of academic support and resources for the NCCCS faculty and students in one location. This multi-year project will provide centralized access to online resources, expand the use of these

resources, and bring efficiencies to the process as duplicative services are identified. The project is currently in Phase I, Year 2. Monthly reports of the project team may be found on the SuccessNC website: http://www.successnc.org/initiatives/integrated-teaching-learning-gateway.

The Integrated Teaching and Learning Gateway was identified as one of the Implementation Priorities of the 2012 System Office Priorities Plan. When completed, the Gateway will unite all electronic resource systems and websites providing easy access to teaching, learning, and professional development resources for NCCCS faculty and students. Currently, these websites and resources reside in numerous dissimilar environments. These systems are difficult to find and many require unique logins. Without a consistent content platform, marketing, and communication strategy, needed information is unavailable to faculty and students. The Teaching and Learning Gateway will provide access and efficiency to the academic and pedagogical needs of the NCCCS community.

The Integrated Teaching and Learning Gateway will be implemented in a three-phrase development plan that will spread the costs over multiple funding years. In Phase I of the project, the leadership team will define the resources and content to be linked; evaluate and secure a hosting vendor; analyze and catalog the current content; link all content to a single hosting solution; evaluate and secure the software solution to develop the gateway; hire a part-time project coordinator; select project team members for all three phases; evaluate the ability to link all of the current systems and resources; and develop a common branding proposal. The technology requirements, metadata schema for all resources and full implementation including marketing and training will comprise Phases II and III.

Phase I is utilizing a "Recruit and Redirect" strategy. The evolution of a common platform for disparate systems and resources will occur in subsequent phases and build out. Phase I will have the following benefits: faculty awareness (through one central source) of the abundance of existing tools and resources available to them despite their location and/or campus assignment; and the ability for system-wide and campus leadership to gain additional insight and make informed decisions regarding continued development and support and/or to leverage existing systems to meet common requirements.

A development plan cannot be established without first completing the discovery phase and developing an inventory of all available resources that meet certain criteria and definitions for ITLG consideration. The Steering Committee compiled a faculty and administrator survey that was beta tested by Wake Technical Community College. An additional survey of learning resource systems was released and completed by the ITLG Steering Committee. Additional resources were defined for inclusion on the website. The final survey will be sent system-wide in early April 2013 with the hope of receiving many more tools and resources in current use. Data received from the faculty and administrator survey will serve as a gap analysis on what needs/requirements are currently being met, which needs/requirements may be met through broader access and awareness of resources and which needs/requirements are not being met by any resource currently available. A well developed plan will result in future cost avoidance and savings in maximizing solutions across the community college system.

In order to develop a more comprehensive plan, the ITLG Steering Committee was expanded in 2012-2013 to include a representative from the following areas: executive sponsor, learning technology systems, continuing education, eLearning, NCCCS project management office, library services, NCLOR, academic program services, computer information systems (CIS)

training, documentation, basic skills, college tech. prep, college CIO, SuccessNC, external project management, and the Virtual Learning Community. The committee has hired an external project manager to coordinate all activities and design the website. The desired outcome of Phase I is the development of a site that consists of a complete inventory of all community college teaching and learning resources despite their current campus assignment, back-end support structures, specifications, and hosting arrangements. A "decision point" will be implemented at the end of Phase I, after completion of the discovery process, business requirements, and project scope before the final solution is developed.

e-Text Pilot Project

In 2012-2013, 2 + 2 e-Learning Initiative funds provided resources for the second year of a pilot project involving eight (8) colleges which tested four (4) e-book software platforms that will allow students across the state to purchase affordable online textbooks and support student learning. This project provides the opportunity for students to better utilize their educational dollars as well as to increase access to textbooks with built-in learning tools.

The e-Text Pilot Project is providing detailed evaluation of e-Text software applications for faculty and students in our System. E-Text materials allow students to access textbooks in a digital form and provide enhanced features which include the ability to highlight, annotate, search, copy, paste, share, and print within the digital textbook environment. The participating community colleges are Robeson, Fayetteville Technical, Surry, Wilkes, Southwestern, South Piedmont, Catawba Valley, and Caldwell Community College & Technical Institute. Funding allocations for this pilot include travel expenses for participants and/or coordinators, training seminars on the individual software applications, research on best practices and other existing e-Text pilots, development of the criteria list for software evaluations, and the selection process of willing faculty members at each college to serve on evaluation committees.

On March 22, 2013, the e-Text Symposium was held at Surry Community College. Over 175 participants from 44 community colleges gathered to hear the results of the two-year comprehensive pilot of the four e-text software platforms. The platforms were reviewed for functionality, cost savings, portability, ease of use, and accessibility. Instructors and students piloted the platforms in a wide range of courses using laptops, tablets, and other mobile devices. One of the key factors under review is the change to the current business model of textbook sales through college bookstores. E-text usage on a college campus signals a paradigm shift of resources. Collaboration during this pilot has been necessary among instructors, business offices, administrators, bookstore managers, and publishers in determining the appropriate implementation for this new technology at colleges. The average cost savings of the e-text application and book for students is 46% of the original textbook purchase price. While the most cost effective option is still the rented used hardbound textbook, most students prefer the functionality of the e-text software and digital copy.

At the conclusion of the pilot in June 2013, a written report will be submitted to the Executive Director of eLearning and Learning Technology Systems with the evaluation results and recommendations. The ultimate goal of the e-Text Pilot is to provide students with enhanced quality online reference materials at reduced prices which will support individual student learning and degree completions. The next step following the pilot summary report will be the development of a request for proposal to identify the best and most cost-efficient e-text application and/or e-text publisher for the System and to achieve cost savings for students.

Virtual Computing Environment:

Another collaborative program of the 2 + 2 E-Learning Initiative is the Virtual Computing Environment (VCE) blade upgrade project. The VCE is a remote access service that allows students and faculty to request or reserve a computer with a desired set of applications, and to remotely access it over the Internet. Students and faculty can use a number of advanced computer applications on Linux, Solaris, and numerous Windows environments. NCCCS and NC State University have and will continue to work with community colleges wishing to provide additional specialized software for faculty and student course access. Funds designated for the VCE are through state appropriations.

There are many reasons for participating in the VCE. Colleges save money on software licenses since access to the software is 24/7 through the cloud as compared to loading software in computer labs that requires a student to be physically present during specified hours. There is a reduced need for new computer labs which includes hardware savings as well as classroom utilization. The life of computers in the existing labs is extended because less computing power is needed for access. There is a reduced cost of IT support for computer labs. And, colleges benefit through the ability to offer more asynchronous classes resulting in more FTE. Students save money by not having to purchase the software themselves. They can use older computers, and make fewer trips to campus to use the computer labs.

In 2011, 2 + 2 E-Learning Initiative funds were used to replace six (6) of the original blades purchased in 2007. The older blades are less efficient and require more power and support than the new IBM HS22 blades. NC State University purchased the replacement IBM HS22 blades at the discounted educational consortium base purchase price of $5,557 per blade. In 2012, six (6) additional blades were purchased. In addition to the blades, NC State University purchased the power supply and networking upgrades necessary for the new blades. The new blades provide approximately 10 times the capacity per blade of the original blades. Many more students are served with the same number of blades. Each college participating in the VCE program has been able to add additional software images and expand the number of student users because of the replacement blades.

The VCE business model provides community colleges a cost-effective alternative to expensive, traditional computer labs. The VCE will continue to support the twenty-one (21) community colleges and System Office which currently participate in the project. Six (6) of the 21 colleges joined the VCE in 2013. In 2013-2014, additional community colleges will be selected via a competitive request-for-participation process, and will be provided the training necessary to fully utilize the cloud computing services. NCCCS plans to expand the participants by at least 10 colleges in the next fiscal year.

The current community colleges using the VCE in 2012-2013 are:

Alamance
Asheville-Buncombe – New 2013
Cape Fear
Carteret – New 2013
Cleveland
Davidson County

Edgecombe
Fayetteville Technical
Guilford Technical
James Sprunt – New 2013
McDowell Technical – New 2013
Nash
Pitt
Roanoke-Chowan
Rockingham – New 2013
Sandhills
South Piedmont
Surry
Tri-County
Wake Technical
Wilson – New 2013

Collaborative Resources

The North Carolina Learning Object Repository (NCLOR) fosters collaboration across the community college system. Faculty and staff contribute and share digital content in the form of videos, learning objects, lectures, self assessments, and other academic assets. Collaboration occurs on the single campus as well as multi-campus levels. With the infusion of federal Race to the Top funds, the Department of Public Instruction has laid the foundation for all public schools to participate in this digital warehouse as well. Collaboration by North Carolina educators allows digital content to be created, shared, and contributed to one repository which benefits the faculty, staff and students of all North Carolina K-12 public schools, 58 community colleges, the Duke University School of Nursing, the North Carolina School of Science and Math, the North Carolina Alliance of Surgical Technology Educators, the NCCCS Small Business Center Network, NC BioNetwork, and North Carolina State University. By sharing the financial and administrative tasks of the NCLOR, all educational systems have worked collaboratively to provide licensing, training, maintenance, and support for one large repository instead of many smaller repositories which could share digital resources within their one educational entity. The NCLOR has been structured so that one perpetual license covers all partners. In addition, the partners benefit from the efficiencies of discounted annual maintenance and support fees, a shared Project Manager from ITS, over 15,000 learning objects, and combined training events. Without this collaboration, each entity would be responsible for all costs from the license to the maintenance and support to the training.

Another collaborative project between NCCCS and UNC-GA schools has provided the framework to share resources in the development of common goals. The UNC Moodle Open Source Collaborative, a project of the UNC-GA and NCCCS, provided universities and community colleges with software to pilot the Moodle learning management system. This collaboration provided a foundation for exploration of this open source platform which led to the request for proposal process for the community college system. NCCCS concluded the Open Source Collaborative project in December 2012, with implementation of an open source hosting solution for the colleges. The earlier collaboration allowed NCCCS schools to pilot an alternative open source learning management system at no cost to the participating campuses. The pilot provided training and support to faculty and staff. Thirty-three (33) community

colleges using 40 unique instances participated in the Moodle Open Source Collaborative. Participating community colleges and universities were able to collectively explore this open source learning management system without the expense of individual hosting contracts, support fees, and training.

A further example of academic collaboration and efficiency is the Virtual Computing Environment (VCE) between NCCCS and NC State University which uses blade technology in a cloud computing environment to provide software to students and college PC labs. The cloud computing environment, maintenance and support, and administrator and instructor training is provided by NC State University. Hardware purchases and planning support are shared responsibilities of NCCCS and NC State University. Participating community colleges are responsible for college administration managers, instructors, and software licensing. The new blades which are shared by NCCCS and NC State University provide 10 times the computing capacity of the original blades. Without this efficient sharing of hardware, software, and people, each system would be forced to maintain duplicative cloud computing platforms at a higher cost to the State.

Undoubtedly, the Virtual Learning Community (VLC) is an example of collaboration at its finest in the community college system. All content and resources developed and purchased are jointly owned and shared by the 58 community colleges. Faculty and staff collaborate on course development and editing projects, creation of interactive learning objects and all other VLC generated programs. The efficiencies of the VLC are best explained by the concept that a VLC online course is created for $5,000 for the entire System of 58 colleges, as opposed to 58 colleges producing the same course for $5,000 each which would cost the State's taxpayers $290,000.

The three regional VLC Support Centers provide all NCCCS colleges with information and resources in the areas of quality and assessment, technology, and professional development. The VLC Quality and Assessment Center is coordinating the Integrated Teaching and Learning Gateway and the e-Text Pilot Project. The Integrated Teaching and Learning Gateway will provide a collaborative forum to share resource platforms and tools used by colleges throughout the system. The project steering committee is made up of representatives from the System Office, colleges, and external members of the education community. Surveys sent to colleges and committee members will provide collaborative sharing of information and resources. With implementation of this Gateway, the NCCCS will have a central access point for all teaching and learning resources and tools which will provide easy access and better utilization of system assets.

Another project of the VLC Quality and Assessment Center is the e-Text Pilot. It is a collaborative project between eight (8) community colleges, the VLC support centers, and the remaining 52 colleges who were invited to participate in the e-Text Symposium to learn the project results. The e-Text Pilot Project evaluated four (4) e-text applications in a wide variety of courses. This process saved each college from investing in four e-text software systems. The Pilot Summary Report will be shared with all the colleges. The System Office will issue a request for proposal which will result in a system-wide contract for one e-text application that provides consortium discount pricing for the colleges as well as cost savings for the students.

The VLC Technology Center vets new technologies and tools, produces three-D learning objects, videos, and other interactive learning objects to share with instructors and students throughout

the system. The learning objects are housed in the NCLOR for easy access by NCCCS faculty members. Technology training and white papers are also provided to the colleges. The third VLC support center, the Professional Development Center provides webinars, tutorials and face to face training workshops for faculty, staff, and administrators. Adequate training is often the luxury item left off the list when new technologies and learning systems are acquired. By having a center dedicated to training faculty and staff at the colleges, NCCCS has provided a cost effective way for schools to stay current and ahead in this ever-expanding world of online teaching and learning. As the training tutorials and webinars are produced, they are housed in the NCLOR where they are accessible to all faculty and staff in the System.

A further collaboration has not been limited to colleges and universities. In 2012, NCCCS collaborated with the Career and College Promise program participants and the North Carolina Virtual Public School (NCVPS) by sharing resources and infrastructure. Students enrolled in community college courses through the Career and College Promise program are using NCLOR interactive learning activities and assets embedded in their online courses. NCVPS also participated in the Moodle Open Source Collaborative for their online instruction platform during the summer and fall of 2012. The community college system welcomes this sharing of resources and cost savings for the Department of Public Instruction.

Most recently, the School of Science and Math contributed a resource series of 500 items to the NCLOR. This resource series includes items in the subjects of algebra, calculus, chemistry, history, physics, pre-calculus, and statistics. The School of Science and Math has also contributed 95 new music videos that include theory and how to play various musical instruments. These videos were contributed by faculty members. All 595 items are available and accessible in the NCLOR.

NCLOR system administrator training originally scheduled for spring 2013 was intended to train NCCCS and DPI system administrators on advanced technical and network administration of the NCLOR. NCCCS has chosen to defer this training opportunity until fiscal year 2013-2014 to provide additional cost savings for the State for the current fiscal year. The training will cost $16,500.

Another collaborative project which would have removed over 50,000 duplicated titles from the system-wide SIRSI/Dynix library catalog has also been deferred until fiscal year 2013-2014 to provide additional cost savings for the State in the current year. The project will cost a one-time fee of $10,280.

Quantitative Data

The goal of many students in the community college system has been enrollment in degree programs with the intent of transferring to a four-year institution. Funds from the 2 + 2 E-Learning Initiative have provided the courses, online degrees and resources to assist in educating these students. Through the NCCCS Data Warehouse, student enrollment growth can be tracked. The Department of Public Instruction (DPI), NCCCS, UNC-GA, and the private colleges and universities do not share a uniform tracking platform that will follow a student throughout his/her educational career. For this reason, NCCCS can provide information limited to the number of students who graduate from the community college system with associate degrees in teaching, nursing, and other critically needed careers in our state, but cannot track the transfers to

universities to show completion of bachelor's degrees. Many student career choices require four-year degrees from a college or university. Often students who come to the community college system to begin their higher education careers transfer before they attain an associate's degree. These students are not counted as completers even though they have completed necessary coursework to transfer to a four-year institution. A Data Initiative is presently underway between NCCCS and SAS which will provide more in depth data collection to provide this missing information.

Qualitative Data

The North Carolina Community College System embraces the primary role in training and retraining the workforce in our state. This role has not been limited by the economic conditions of our state. When the state and national economy took a sudden downturn in 2008, the community college system was able to step up and face the challenge of burgeoning student enrollments as North Carolina citizens looked to our System for new job skills and careers. With the help of proactive programs like the 2 + 2 E-Learning Initiative, the System was able to deliver distance learning tools, resources, and courses into the hands and minds of the instructors and students who needed them. The economic recession has forced the higher education community to refocus its efforts away from only a bricks and mortar mentality to one in which virtual learning has become a necessary partner. Many students no longer have the luxury of driving long distances to campuses, living on or near a college campus and providing funds for childcare or other accommodations. The job market itself has also gone through a sea change of direction. Greater use of technology and relocation of manufacturing and industry to other states and/or countries has greatly impacted the job market in North Carolina.

Our System has proven itself to be both flexible and innovative in the face of these challenges. Distance learning courses had already been developed when the recession hit and more courses are created each year through the Virtual Learning Community and on individual community college campuses. System-wide tools and resources were also in place to respond to the immediate need for online course enhancements. The following resources were ready to go: the NCLOR which houses over 15,000 learning objects, videos, tutorials, assessments, and free e-textbooks mapped to the courses; Late Nite Labs which provides online labs in biology, chemistry, and microbiology; V-Scope Explorer: Basic Biology Edition and the Anatomy and Physiology Edition providing online microscopy slides and videos; Stat!Ref which includes the RN Database and Dental Database and Animated Dissection of Anatomy for Medicine (A.D.A.M. Interactive Anatomy Online) which provide online medical textbooks, articles, videos and interactive assessments for allied health, nursing, and dental programs; online library resource information through CHOICE Reviews Online; and greater efficiencies for delivery such as the Virtual Computing Environment which utilizes cloud computing allowed our System to meet the needs of our instructors and students. (*See Appendix A*) The emphasis on technology for course delivery and in the job market is preparing our students to step into jobs and careers with the required knowledge and confidence to succeed in the workplace.

Furthermore, technology has quickly become the primary delivery for the majority of the communications to and from businesses due to its cost and time efficiencies and the ability to reach the global marketplace with almost effortless ease. It is no wonder that distance learning enrollments continue to grow rapidly in the community college system. In 1998-1999, when NCCCS was just beginning to use online education, there were only 26,695 enrollments in

courses. In 2011-2012, the enrollment numbers increased to 961,147, and for the first time out stripped the traditional enrollments. Distance learning enrollments were 52.89% of the total student course enrollments of the System. Distance Learning enrollments accounted for 50.49% of the total FTE of the System. (NCCCS Data Warehouse DL100ANN Report, http://vlc.nccommunitycolleges.edu/about/DL2012.pdf) This trend will only continue to increase as students blend their higher education goals with their job and family responsibilities.

The criticality of higher education credentials, diplomas, and degree programs in technical and business careers in the 21st century will continue to draw more students to the community college system because of its industry specific programs, affordable educational opportunities, and the wide range of programs and accessibility to colleges. The 2 + 2 E-Learning Initiative has provided the necessary funds to nimbly move with the workplace as the career shifts have moved from the need for more teachers to other areas of STEM (Science, Technology, Engineering and Mathematics) careers, allied health, and nursing.

Figure 1: DL Curriculum Duplicated Enrollment 1998-2012

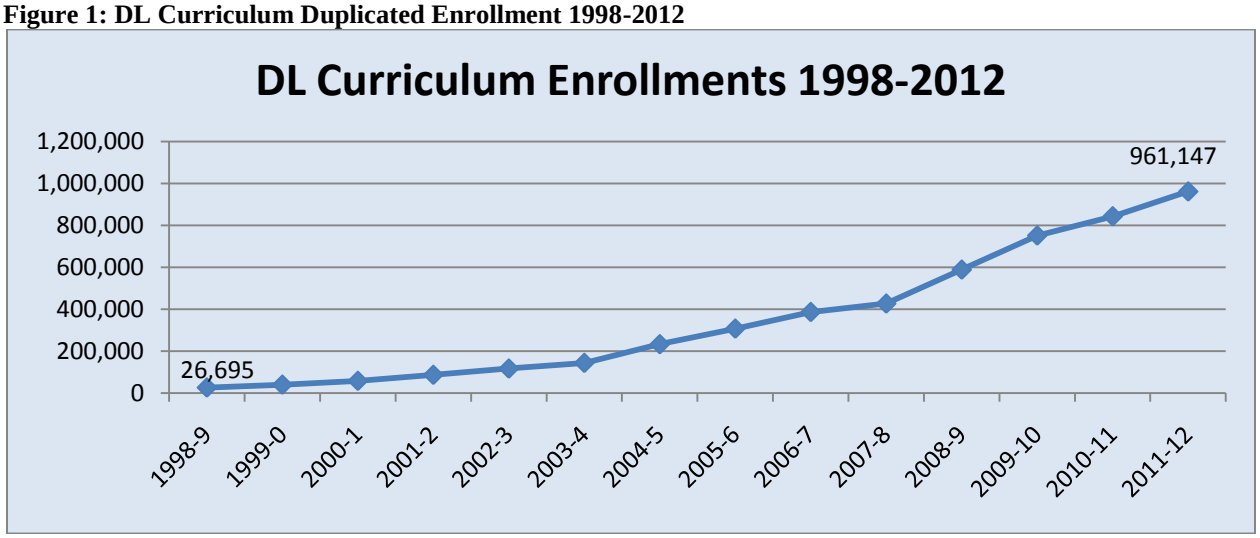
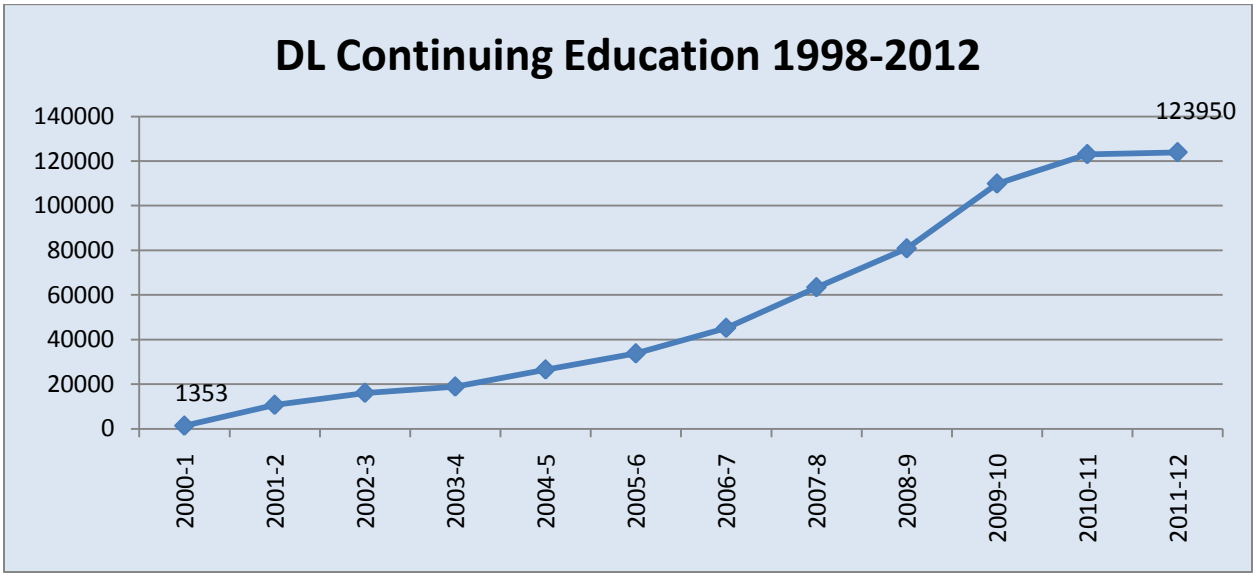


Figure 2: DL Continuing Education Duplicated Enrollment 2000-2012 (no distance enrollments recorded before 2000)



The expenditures from the 2 + 2 E-Learning Initiative have provided the necessary funds to support distance learning courses, resources and tools throughout the community college system. This support has provided for infrastructure, training, professional development, and system-wide cost savings as our System was able to provide tools and resources that individual colleges were unable to purchase/license. This initiative allowed the same consistency and access to distance learning programs to instructors and students regardless of their location or college enrollment in our state. (*See Appendix A*)

Expenditures for Fiscal Year 2012-2013

Figure 3: 2+2 Expenditures for Fiscal Year 2012-2013

2 + 2 E-Learning Initiative	**2012-2013 Budget $653,000.00**
TEACHER EDUCATION RESOURCES	
Late Nite Labs Biology, Chemistry, Microbiology	10,500.00
V-Scope Explorer: Basic Biology Edition	15,626.00
V-Scope Explorer: Anatomy & Physiology	12,500.00
Monterey Institute/NROC Learning Objects	19,444.00
National Library Alliance:	
Stat!Ref, Anatomy TV	
Dental Database, RN Database	39,678.00
A.D.A.M. Interactive Anatomy Online	11,980.00
NCLOR License and Training	189,000.00
CHOICE – American Library Assn. Subscription	600.00
Category Expenditures	**299,328.00**
INFRASTRUCTURE	
NCLOR Hosting	41,104.00
NCLOR ITS/Project Manager	79,300.00
*NCLOR System Admin Training *(Deferred - $16,500.00)*	
Open Source Collaborative - Moodle	51,384.00
Virtual Computing Environment (VCE) Upgrades	40,000.00
*SIRSI De-duping Project *(Deferred - $10,280)*	
Category Expenditures	**$211,788.00**
VIRTUAL LEARNING COMMUNITY (VLC) PROJECTS	
Teaching and Learning Gateway	60,000.00
e-Text Pilot	46,500.00
Category Expenditures	**$106,500.00**
Total Expenditures	**617,616.00**

*** Expenditures deferred until 2013-2014 to return funds to State as a cost savings measure.**

Recommendation Review for 2012-2013 E-Learning Initiative

In 2011-2012, the North Carolina Community College System presented the following recommendations to address online learning needs and resources.

It was recommended to:

1. **Expand resources to continue to develop the Integrated Teaching and Learning Gateway**.

   The Integrated Teaching and Learning Gateway is in Phase I, Year 2 of a three-phrase development plan that will spread the costs over multiple funding years. The leadership team is defining the resources and content to be linked; in the process of hiring a hosting vendor; distributing a system-wide survey to gather tools and resources in use by community colleges; planning for data analysis and cataloging; seeking a single hosting solution; evaluating a software solution to develop the gateway; hired a part-time project coordinator; selected project team members for all three phases; evaluating the ability to link all of the current systems and resources; and developing a common branding proposal. The technology requirements, metadata schema for all resources and full implementation including marketing and training will comprise Phases II and III.

   The Steering Committee has hired an external project manager to coordinate all activities and the website design. A decision point will be applied at the end of Phase I to mark the completion of the discovery process, business requirements, and the project scope for the final solution.

2. **Expand utilization of e-book technologies**.

   In 2012-2013, 2 + 2 funds provided resources for the second year of a pilot project involving eight (8) colleges testing four (4) e-book reader software platforms that will allow students across the state to purchase affordable online textbooks and support student learning. This project provides an avenue for students to better utilize their educational dollars as well as to increase access to textbooks with built-in learning tools.

   On March 22, 2013, the e-Text Symposium was held at Surry Community College. Over 175 participants from 44 community colleges gathered to hear the results of the two-year comprehensive pilot of four e-text software platforms. The platforms were reviewed for functionality, cost savings, portability, ease of use, and accessibility. Instructors and students piloted the platforms in a wide range of courses from history to nursing on various devices including laptops, tablets, and mobile devices. One of the key factors under review is the change to the current business model of textbook sales through college bookstores. Collaboration during this pilot has been necessary between the instructors, business offices, administrators, bookstore managers, and publishers in determining the appropriate use for this new technology for colleges. The average cost savings for students is 46% of the original hardback textbook purchase. The most cost effective option is a rented used hardbound textbook. However, most students prefer the functionality of the e-text software and digital copy.

At the conclusion of the pilot, a written report will be submitted to the Executive Director of eLearning and Learning Technology Systems with the evaluation results and recommendations. The ultimate goal of the e-Text Pilot is to provide students with enhanced quality online reference materials at reduced prices which will support individual student learning and degree completions. An additional deliverable will be a request for proposal to identify an e-text platform best suited to faculty and students in our System.

In addition to the e-Text Pilot Project, free open source textbooks continue to be added to the NCLOR and used by the Virtual Learning Community in online courses. There are currently 287 e-textbook series in the repository.

3. **Collaborate with other educational entities to maximize resources and minimize costs**.

   In 2012-2013, NSSSC colleges collaborated with: UNC-GA, East Carolina University's Project Heart, and the NC Virtual Public School on the Moodle Open Source Collaborative which was completed in December 2012; NC State University on the Virtual Computing Environment; and DPI, UNC-GA, Duke University, as well as other United States colleges and universities collections contributed to the NCLOR. All of these collaborations will continue except for the Moodle Open Source Collaborative which was completed in December 2012.

4. **Evaluate the effectiveness of technologies used in distance learning**.

   Resources and tools licensed with funds from the 2 + 2 E-Learning Initiative are reviewed by System Office program coordinators from the appropriate subject areas, elearning staff members, the NCLOR administrator, VLC Center Directors, and other external university and educational entity collaborators. With the increased growth of online courses, resources such as Late Nite Labs biology, chemistry and microbiology online labs, the two V-Scope Explorer microscopy editions in biology and anatomy & physiology; the wide range of allied health and medical information and e-textbooks from National Library Alliance, and the over 15,000 learning objects in the NCLOR are providing the enhancements and engaging content that adds value and clarity to the online teaching and learning experience. These online resources are valuable tools and resources to both traditional and online faculty and students. During the first two months of use, January-March 1, 2013, newly licensed Animated Dissection of Anatomy for Medicine (A.D.A.M. Interactive Anatomy Online), recorded 2,875 sessions by instructors and students using this resource.

   Evaluation of new technologies and tools is one of the primary functions of the VLC Technology Center which reviews, vets, and produces white papers and training on free and licensed software applications available to NCCCS instructors. *(For more information: http://ncccstechcenter.com/)*

   The VLC e-Text Pilot is another example of an evaluative process looking for effective teaching and learning resources as well as cost savings for faculty and students. The pilot was coordinated by the VLC Quality and Assessment Center. In a two-year pilot, community colleges evaluated four e-text software applications using a wide range of

courses, delivery devices, and purchasing considerations. Results were shared on March 22, 2013, at the e-Text Symposium before 175 community college and System Office participants. A white paper will be published in June 2013 and a request for proposal process will follow to choose an application for the colleges.

5. **Perform Research and analytical interpretation of data to make strategic decisions for incremental e-learning program improvements and policy adjustments.**

   Online course development and licensing of resources is based on the needs of faculty, staff, and students throughout the system. For the first time in 2012-2013, VLC online courses were developed for Adult High School programs, manufacturing, welding, machining, and agricultural programs. Online seminars for the Small Business Center Network were created to assist entrepreneurs and small business owners with starting a business, writing a business plan, and performing market research and developing a marketing plan. *(See Appendix C)*

   Online courses representing new green technologies were developed as a result of the Code Green Course Improvement Plan recently completed by the NCCCS. Courses were also developed as part of a federal Department of Labor grant.

   System-wide analysis of course and student data will be available with the implementation of the Data Initiative Project currently underway between NCCCS and SAS. This project is in the first stage of defining and discovery and involves hundreds of System Office, college, and external representatives. Policy recommendations and realignment of academic objectives and delivery will be some of the results coming out of this initiative.

Recommendations for 2013-2014 E-Learning Initiative

1. **Continue to look for efficiencies that will be used across all 58 colleges to support instructional and student services and provide additional cost savings for the System.**

2. **Continuation and completion of Phase 1 of the Integrated Teaching and Learning Gateway.**

3. **Completion of the e-Text Pilot with the distribution of a white paper evaluating the four applications; submission of a request for proposal to select an e-text platform that is cost effective and meets the functional requirements of the system; and plan the implementation strategy for the system.**

4. **Continue to develop online courses and content for targeted programs that provide online access in the areas of STEM, career/technical education, and additional areas of critical need in the workplace.**

5. **Expand professional development opportunities for faculty and staff focused on online course certifications, tutorials, and new technology resources and tools.**

6. **Expand the participation of NCCCS colleges using the Virtual Computing Environment with a goal of 31 colleges.**

Appendices

Appendix A

2012-2013 Expenditures for 2+2 E-Learning Initiative
Student, Teaching and Learning Resources Implemented by the NCCCS

Educational Resource: Virtual Learning Community (VLC) Quality & Assessment Center Project: Integrated Teaching and Learning Gateway

Description: The Integrated Teaching and Learning Gateway will bring together all electronic resource systems and websites providing easy access to teaching, learning, and professional development resources for NCCCS faculty and students. Currently, these websites and resources reside in numerous dissimilar environments. These systems are difficult to find and many require unique logins. Without a consistent content platform and a comprehensive marketing and communication strategy, needed information is unavailable to faculty and students or they are unaware that it exists. The Integrated Teaching and Learning Gateway will provide access and efficiency to the academic and pedagogical needs of the NCCCS community.

The Gateway will be implemented in a three-phrase development plan which will spread the costs over multiple funding years. Phase I of the project will define the resources and content to be linked; evaluate and secure a hosting vendor; analyze and catalog the current content; link all content to a single hosting solution; evaluate and secure the software solution to develop the gateway; hire a part-time project coordinator; select project team members for all three phases; evaluate the ability to link all of the current systems and resources; and develop a common branding proposal. Technology requirements, metadata schema for all resources, full implementation including marketing and training, and an overall evaluation of the results will comprise phases two and three.

Audience: NCCCS faculty and students

Cost: $60,000.00

Status: Phase I (year two) tasks are underway and will be completed by June 30, 2013.

Educational Resource: Virtual Learning Community (VLC) Quality & Assessment Center - e-Text Pilot Project

Description: The e-Text Pilot Project evaluated four (4) e-text software applications for faculty and students. E-Text materials allow students to access textbooks in a digital form and provide enhanced features which include the ability to highlight, annotate, search, copy, paste, share, and print within the digital textbook environment. Four (4) software applications were evaluated by eight (8) NCCCS colleges. At the conclusion of the pilot in June 2013, a written report will be submitted to the Executive Director of eLearning and Technology Systems with the evaluation results and recommendations. On March 22, 2013, 175 NCCCS faculty and staff members from

44 colleges met at Surry Community College for the e-Text Symposium to hear the pilot program results presented and to receive information analyzing the four software applications. The published white paper analysis will compare the cost, functionality, accessibility and integration of the four e-text applications. A request for proposal will be posted to select a vendor for the System institutions.

Audience: NCCCS faculty and students

Cost: $46,500.00

Status: Instructors and students are participating in the e-text pilot. The summary results will be published in June 2013. A request for proposal to select system-wide e-text vendor will be written during the 2013 summer semester.

Educational Resource: Virtual Computing Environment Blade Upgrade

Description: This collaborative project of NCCCS and NC State University was approved by the State Board for its annual renewal in November 2012. This contract amendment expands the VCE capacity through purchase of new blade hardware, power supply, and networking upgrades for the virtual environment, which provides additional computer lab services for the colleges through cloud computing. Cloud computing is a general term for anything that involves delivering hosted services over the Internet.

The original blade hardware currently in use is from 2007, and is less efficient than the technology available today. The older blades require more power and support than the proposed IBM HS22 blades. NC State University purchased six (6) replacement IBM HS22 blades at the discounted educational consortium base purchase price of $5,557 per blade in 2011. Six (6) additional blades were purchased in 2013 by NC State at the discounted price. In addition, NC State University will purchase the power supply and networking upgrades necessary for the new blades. The new blades are not simply a one-to-one replacement of the retired blades, as advances in technology now provide approximately 10 times the capacity per blade of the original blades. Many more students will be served with the same number of blades.

Audience: NCCCS faculty and students; NC State University faculty and students

Cost: $40,000.00

Status: NC State University has purchased six (6) replacement blades for NCCCS use. The set-up procedures are currently underway for these blades.

Savings: Twenty-one (21) participating colleges are saving money due to: the need for fewer software licenses; reduced need for new computer labs and upgrades; extended life of computers in the existing labs because less computing power is needed for access (computing power is in the cloud); reduced cost of IT support for computer labs; and the ability to offer more asynchronous classes resulting in more FTE. Students save money by not having to purchase the software themselves. They can use older computers, and make fewer trips to campus to use the computer labs.

Educational Resource: Late Nite Labs - Online Chemistry, Biology, and Microbiology Lab Simulations

Description: Late Nite Labs offers chemistry, biology, and new microbiology simulations that provide instructors with the capability to develop and customize high quality online chemistry, biology, and microbiology laboratory simulations. This software allows students to complete labs anytime, anywhere.

Audience: NCCCS faculty and students

Cost: $10,500.00

Status: Online biology and chemistry courses are developed using Late Nite Labs. PINS are available to be used in courses from developmental CHM 090 - Chemistry Concepts through advanced courses such as CHM 252 - Organic Chemistry II; BIO 111- General Biology I and BIO 112 - General Biology II. These simulations are used for fully online laboratory courses, as well as pre-lab and pre-test scenarios in hybrid and traditional courses. In 2013, Late Nite Labs added microbiology labs to the combined science collection.

Savings: Instructor PINS are free and do not expire for NCCCS instructors. Labs may be created and/or customized. Student PINS are provided at the reduced cost to NCCCS students of $15.00 per course compared to $49.99 for students in all other academic institutions. This is a savings of $34.99 per student per course.

Annual site license fees of $500 per college have been waived for NCCCS schools. This is a savings of $29,000 a year.

Microbiology labs were added to the Late Nite Labs collection of science resources at no additional cost to NCCCS.

Educational Resource: Science Learning Resources, Inc. – V-Scope Explorer: Basic Biology Edition

Description: The V-Scope Explorer: Basic Biology Edition (formerly Virtual Microscope) provides a cost effective way for students to experience state-of-the-art microscopy by viewing images created with research quality microscopes and camera systems. It imitates the physical functionality of a real microscope and requires students to follow traditional laboratory process and protocol. The high resolution prepared biological specimens imaged for the program illustrate fundamental biological principles. The program can be accessed through the NCLOR and can be downloaded to college computers in classrooms and computer labs.

Audience: NCCCS faculty and students

Cost: $15,626.00 (maintenance fee and annual license renewal for system-wide use 4/1/12-6/30/13)

Status: This resource is being used in science courses and other related fields of study. NCCCS licenses the Basic Biology Edition which includes videos, study guides and frequent upgrades. Slides from this resource are #23 and #25 in the top 25 most viewed resources in the NCLOR.

Savings: Free professional development faculty workshops and webinars are provided by Science Learning Resources.

Educational Resource: Science Learning Resources, Inc. – V-Scope Explorer: Anatomy and Physiology

Description: The V-Scope Explorer: Anatomy and Physiology series provides a cost effective way for students to experience state-of-the-art microscopy focused on content to support courses in nursing, allied health, and higher level science programs. The program can be accessed through the NCLOR and can be downloaded to college computers in classrooms and computer labs.

Audience: NCCCS faculty and students

Cost: $12,500 for maintenance and annual license renewal for system-wide use (6/1/12-5/31/13)

Status: This resource is being used in upper level science, nursing, and allied health courses. This resource is listed as #13 of the top 25 items accessed in the NCLOR.

Savings: Free professional development workshops and webinars for NCCCS faculty are provided by Science Learning Resources.

Educational Resource: Monterey Institute for Technology and Education/ National Repository of Online Content (NROC) Learning Objects)

Description: The NROC collection of over 3,800 multi-curriculum learning objects is available to all NCCCS faculty, staff, and students to enhance online, hybrid, and face to face course content. Faculty may access the NROC resources through the NCLOR. This collection includes the subject areas of Algebra, American Government, Biology, Calculus, Developmental Math, Environmental Science, Physics, Psychology, Religion, Statistics, and US History.

Audience: NCCCS faculty and students

Cost: $19,444.00 (License from 2/15/13 – 6/14/14)

Status: A NROC learning object is #6 in the top 25 most viewed learning objects in the NCLOR. NROC developmental math objects are used in conjunction with the newly redesigned DMA developmental math modules.

Savings: NCCCS was able to receive the Southern Regional Education Board (SREB) member discount for this resource. The discount coupled with a multi-year agreement allowed NCCCS

to save over $11,000. The balance of $19,444 was paid in year two. The license totaling $38,888 runs from 2/15/2012 – 6/14/2014. NCCCS is in year two of the subscription.

Educational Resource: National Library Alliance / Anatomy TV, STAT!Ref®, / Dental Database / RN Database

Cost: $39,678.00

Status: There were 21,344 hits on these National Library Alliance resources from July 1, 2012 to March 31, 2013.

Savings: NCCCS was able to save $10,000 by licensing all National Library Alliance resources in a bundled price package.

1) National Library Alliance / Anatomy TV
(Subscription 7/1/12 – 12/31/12; Parent company is no longer offering system-wide licenses.)

Description: Online resource of interactive 3D skeleton animations that include bones, ligaments, muscles and vessels throughout the human body. The body parts may be moved and manipulated by a computer mouse. These animations may also be exported from the software as short movie files. The animations are relevant for students in seated and online courses. It is a valuable enhancement for allied health programs, anatomy and physiology, and other science-related programs.

Audience: NCCCS faculty and students in allied health related programs

2) National Library Alliance / STAT!Ref®

Description: STAT!Ref® is a database that includes 35+ electronic medical textbooks which are cross-searchable, full-text, top-tier titles in a full range of healthcare disciplines from a wide variety of reputable authors, publishers, and societies and appropriate for multiple curriculum and continuing education courses.

Audience: NCCCS nursing, allied health, and related medical faculty and students

3) National Library Alliance / Dental Database

Description: The Dental Database includes nine (9) electronic medical titles, and additional resources including Stedman's Medical Dictionary; MedCalc 3000, a computerized medical reference and tool set; Pub Med, a service of the National Library of Medicine which includes over 15 million citations for biomedical articles; and the National Guideline Clearinghouse, a public resource for evidence-based clinical practice guidelines.

The East Carolina University Dental School opened in August 2011. Satellite dental clinics are housed on community college campuses across the state to support program collaborations with ECU. NCCCS expects the demand for dental hygienists to grow by 37.1% from 2006-2016.

Audience: NCCCS dental related programs of study and allied health faculty and students.

4) National Library Alliance / Animated Dissection of Anatomy for Medicine (A.D.A.M. Interactive Anatomy Online)

Description: The North Carolina Community College System Office has licensed Animated Dissection of Anatomy for Medicine (A.D.A.M. Interactive Anatomy Online) through the National Library Alliance for use by all 58 colleges. An annual license beginning January 1, 2013 – December 31, 2013 is provided through 2 + 2 E-Learning Initiative funds. A.D.A.M. Interactive Anatomy replaced Anatomy TV as of December 31, 2012. The parent company providing Anatomy TV is no longer providing system-wide licenses.

A.D.A.M. Interactive Anatomy Online is an online comprehensive interactive anatomy teaching tool. It includes detailed graphics and advanced functionality combined with an award-winning Multimedia Encyclopedia, a complete library of 3D images, and over 3,000 illustrations for learning clinical concepts. This resource is designed to enhance allied health, nursing, continuing medical education (CME) or other medical related courses requiring the study of clinical applications and concepts. Access to A.D.A.M. Interactive Anatomy Online is through IP authentication on campus or by using a campus-wide username and password for remote access. In just the first two months of this license (January-March 1), there were 2,875 sessions by instructors and students using this resource.

Audience: NCCCS Instructors and students

Educational Resource: North Carolina Learning Object Repository (NCLOR) – Pearson/Equella (vendor), Hosted by ITS, NCCCS LOR Hardware

Description: The North Carolina Learning Object Repository (NCLOR) is a system-wide resource which provides the capacity to catalogue and store, search, access, and utilizes digitized learning/teaching content. Learning object repository technology promotes sharing of high quality resources and drastically reduces costs of duplication. The 2+2 funds have been used to establish the North Carolina Learning Object Repository. University and community college faculty, administrators, and support staff collaborated in all phases of planning, Request for Proposal development, evaluation of vendor proposals, implementation, and expansion of the NCLOR. The project includes 2+2 funds to be directed for appropriate project management services required to satisfy Senate Bill 991 documentation and protocol; and contract services to assure that all testing components of the vendor Request for Proposal and contract development are properly completed and documented. In 2013, the Department of Public Instruction joined the NCCCS contract with funds from the federal Race to the Top grant.

Audience: Faculty and students of NCCCS, UNC System; private colleges and universities; and Department of Public Instruction (DPI)

Cost: $189,000.00	(License and Training)
41,104.00	(ITS Hosting)
79,300.00	(ITS Project Manager: budgeted amount per Senate Bill 991)
$309,404.00	

Status: In April 2013, the State Board of Community Colleges is scheduled to renew the annual contract agreements with (1) Pearson/Equella for software and professional services and (2) the State Information Technology Service (ITS) to provide hosting and project management services.

Educational Resource: UNC Moodle Open Source Collaborative

Description: An open source system allows for the use of the most effective course designs without the limits of a proprietary system. This pilot project consolidated the efforts of NCCCS and UNC institutions as they explored the options of less expensive and open source course management system solutions. The NCCCS staff contracted with UNC General Administration to establish a central facility at which collaboration and experimentation could take place to assess Moodle as an online learning platform, establish high quality faculty training and migration tools, and explore centralized, turn-key solutions for the higher education community in North Carolina.

In 2011, it was determined that the NCCCS would fund two learning management systems; Blackboard and Moodle. Colleges were encouraged to participate in the Moodle Open Source Collaborative for pilot and production phases. In 2012-2013, NCCCS renewed the Open Source Collaborative for six (6) months, 7/1/12-12/31/12, in order to assist colleges who were transitioning from the Moodle Open Source Collaborative to the NCCCS Moodle Hosting Solution Remote-Learner.Net.

Audience: Faculty and students of NCCCS and UNC-GA universities; NC Virtual Public School faculty and students

Cost: **$51,384.00**

Status: Completed December 31, 2012

Educational Resource: CHOICE Reviews Online

Description: *Choice: Current Reviews for Academic Libraries* is the premier source for reviews of academic books, electronic media, and Internet resources of interest to schools of higher education. Choice publishes more than 7,000 reviews each year that librarians, faculty, and key decision makers use when compiling purchasing lists for collection development and scholarly research. Choice reaches almost every undergraduate college and university library in the United States.

Audience: NCCCS library resource community and system-wide faculty

Cost: $600.00

Status: Subscription in place through 6/30/2013.

Appendix B

Degrees Available from the NCCCS Virtual Learning Community® (VLC)

There are currently 304 curriculum courses in the VLC Library with which colleges in the NCCCS could build programs of study to offer 37 online degrees. Those degrees include:

1. AA/Associate in Arts (A1010A)
2. AA/Business Administration, Accounting, Economics, Finance, & Marketing (A1010B)
3. AA/Business Education and Marketing Education (A1010C)
4. AA/Criminal Justice (A1010D)
5. AA/English (A1010E)
6. AA/Health Education (A1010G)
7. AA/History (A1010H)
8. AA/Nursing (A1010I)
9. AA/Physical Education (A1010J)
10. AA/Political Science (A1010K)
11. AA/Psychology (A1010L)
12. AA/Social Science Secondary Education (A1010M)
13. AA/Sociology (A1010N)
14. AA/Communication (A1010O)
15. AA/Social Work (A1010Q)
16. AA/Elementary Education (A1010R)
17. AA/Special Education (A1010S)
18. AA/Computer Science (A1010T)
19. AA/Liberal Arts (A1010U)
20. AA/Information Systems (1010V)
21. AA/Middle Grades Education (A1011A)
22. AA/General Education (A1030O)
23. AS/Biology/Biology Education (A1040A)
24. AS/ Chemistry/Chemistry Education (A1040B)
25. AS/Mathematics (A1040E)
26. AS/Associate in Science (A1040O)
27. AS/Engineering (A1040D)
28. AAS/Accounting (A25100)
29. AAS/Business Administration (A25120)
30. AAS/ Business Administration/Human Resources Management (A2512C)
31. AAS/Business Administration/International Business (A2512D)
32. AAS/Business Administration/Marketing and Retailing (A2512F)
33. AAS/ Business Administration/E-Commerce (A2512I)
34. AAS/Computer Programming (A25130)
35. AAS/ Office Systems Technology (A25360)
36. AAS/Paralegal Technology (A25380)
37. AAS/Criminal Justice Technology (A55180)

Appendix C

304 Curriculum Courses
49 Continuing Education Courses

Course #	***Course Name***
Curriculum Courses	***Curriculum Courses***
ACA 090	Study Skills
ACA 111	College Student Success (*2012-2013) e-text*
ACA 112	Intro. To Distance Learning (*2012-2013) e-text*
ACC 115	College Accounting
ACC 118	College Study Skills (*2012-2013) e-text*
ACC 120	Principles of Financial Accounting
ACC 121	Principles of Managerial Accounting
ACC 122	College Transfer Success (*2012-2013) e-text*
ACC 129	Individual Income Taxes
ACC 130	Business Income Taxes
ACC 140	Payroll Accounting
ACC 150	Accounting Software Applications
ACC 220	Intermediate Accounting I
ACC 225	Cost Accounting
ACC 270	International Accounting
ACM 110	Intro to Animal Care *(2012-2013)*
AGR 170	Soil Science *(2012-2013)*
AHR 120	HVACR Maintenance *(2012-2013)*
AHR 160	Refrigerant Certification *(2012-2013)*
ANS 110	Animal Science *(2012-2013)*
ANS 150	Animal Health Management *(2012-2013)*
ARC 131	Building Codes *(2012-2013)*
ANT 210	General Anthropology
ART 111	Art Appreciation
ART 114	Art History Survey I
ART 115	Art History Survey II
BIO 111	General Biology I
BIO 112	General Biology II
BIO 120	Introductory Botany
BIO 130	Introductory Zoology
BIO 140	Environmental Biology

BIO 145	Ecology
BIO 165	Anatomy & Physiology I
BIO 166	Anatomy & Physiology II
BIO 168	Anatomy & Physiology I
BIO 169	Anatomy & Physiology II
BIO 175	General Microbiology
BIO 275	Microbiology
BPM 110	Bioprocess Practices
BPR 111	Blueprint Reading
BUS 110	Introduction to Business
BUS 115	Business Law I
BUS 116	Business Law II
BUS 121	Business Math
BUS 135	Principles of Supervision
BUS 137	Principles of Management
BUS 153	Human Resource Management
BUS 217	Employment Law and Regulations
BUS 225	Business Finance
BUS 230	Small Business Management
BUS 234	Training and Development
BUS 238	Integrated Management
BUS 239	Business Applications Seminar
BUS 252	Labor Relations
BUS 256	Recruitment Selection & Personnel Planning
BUS 258	Compensation and Benefits
BUS 259	HRM Applications
BUS 260	Business Communications
CHM 090	Chemistry Concepts
CHM 131	Introduction to Chemistry
CHM 131A	Introduction to Chemistry Lab
CHM 132	Organic & Biochemistry
CHM 135	Survey of Chemistry I and Lab
CHM 151	General Chemistry I
CHM 152	General Chemistry II
CHM 251	Organic Chemistry I
CHM 252	Organic Chemistry II
CIS 070	Fundamentals of Computing
CIS 110	Introduction to Computers *(Exemplary Course 2011-2012)*
CIS 111	Basic PC Literacy
CIS 113	Computer Basics
CIS 115	Introduction to Programming & Logic
CIS 165	Desktop Publishing I
CJC 111	Introduction to Criminal Justice
CJC 112	Criminology
CJC 113	Juvenile Justice
CJC 121	Law Enforcement Operations
CJC 131	Criminal Law
CJC 132	Court Procedure & Evidence
CJC 141	Corrections
CJC 212	Ethics & Community Relations
CJC 221	Investigative Principles
CJC 231	Constitutional Law
COE 111	Co-op Work Experience I
COM 110	Introduction to Communication
COM 120	Interpersonal Communication
COM 130	Nonverbal Communication

COM 231	Public Speaking
CSC 120	Computing Fundamentals I
CSC 130	Computing Fundamentals II
CSC 134 &134B	C++ Programming
CSC 139	Visual Basic Programming
CSC 151	JAVA Programming
CSC 220	Machine Implementation of Algorithms
CSC 234	Advanced C++ Programming
CSC 239	Advanced Visual Basic Programming
CSC 289	Programming Capstone Project
CTS 125	Presentation Graphics
CTS 130	Spreadsheet
CTS 220	Advanced Hardware/Software Support
CTS 230	Advanced Spreadsheet
CTS 285	Systems Analysis and Design
DBA 110	Database Concepts
DBA 115	Database Applications
DFT 170	Engineering Graphics
ECM 168	Electronic Business
ECM 210	Introduction to Electronic Commerce
ECM 220	E-Commerce Planning & Implementation
ECO 151	Survey of Economics
ECO 251	Principles of Microeconomics
ECO 252	Principles of Macroeconomics
EDU 118	Teacher Assoc. Principles and Practice
EDU 119	Introduction Early Child Education
EDU 131	Child, Family, and Community
EDU 144	Child Development I
EDU 145	Child Development II
EDU 146	Child Guidance
EDU 151	Creative Activities
EDU 153	Health, Safety, & Nutrition
EDU 186	Reading & Writing Methods
EDU 216	Foundations of Education
EDU 221	Children with Exceptionalities
EDU 222	Learners with Behavior Disorders (formerly EDU 147)
EDU 223	Specific Learning Disabilities (formerly EDU 148)
EDU 235	School Age Development & Program
EDU 247	Sensory and Physical Disabilities
EDU 248	Developmental Delays
EDU 261	Early Childhood Administration I
EDU 262	Early Childhood Administration II
EDU 271	Education Technology
EDU 275	Effective Teacher Training
EDU 280	Language & Literacy Experiences
EDU 285	Internship Experience – School Age
EGR 110	Introduction to Engineering Technology
EGR 220	Engineering Statics
ELC 112	Industrial Safety *(2012-2013)*
ELC 113	Basic Wiring I *(2012-2013)*
ELC 115	Industrial Wiring *(2012-2013)*
ELC 117	Motors and Controls *(2012-2013)*
ELC 128	Introduction to PLC *(2012-2013)*
ELC 131	Circuit Analysis I *(2012-2013)*
ELC 133	Circuit Analysis II *(2012-2013)*
ELC 228	PLC Applications *(2012-2013)*

ELN 131	Analog Electronics I *(2012-2013)*
ELN 132	Analog Electronics II *(2013-2013)*
ELN 133	Digital Electronics *(2012-2013)*
ELN 152	Fabrication Techniques *(2012-2013)*
ELN 232	Intro to Microprocessors (*2012-2013)*
ELN 246	Cert Elect Tech Prep *(2012-2013)*
EMS 235	EMS Management
ENG 070	Basic Language Skills
ENG 080	Writing Foundations
ENG 090	Composition Strategies
ENG 111	Expository Writing *(Exemplary Course 2011-2013)*
ENG 112	Argument Based Research
ENG 113	Literature Based Research
ENG 114	Professional Research & Reporting
ENG 131	Introduction to Literature
ENG 231	American Literature I
ENG 232	American Literature II
ENG 233	Major American Writers
ENG 241	British Literature I
ENG 242	British Literature II
ENG 251	Western World Literature I
ENG 261	World Literature I
ENG 262	World Literature II
ENG 273	African-American Literature
ENV 110	Environmental Science *(2012-2013)*
ENV 218	Environmental Health *(2012-2013)*
FIP 120	Intro to Fire Protection
FIP 124	Fire Prevention & Public Education
FIP 128	Detection & Investigation
FIP 132	Building Construction
FIP 152	Fire Protection Law
FIP 220	Fire Fighting Strategies
GEO 111	World Regional Geography
HEA 110	Personal Health & Wellness
HEA 112	First Aid and CPR
HEA 120	Community Health
HIS 112	World Civilizations II
HIS 121	Western Civilization I
HIS 122	Western Civilization II
HIS 131	American History I
HIS 132	American History II
HIS 222	African-American History I
HIS 223	African-American History II
HIT 112	Health Law & Ethics
HOR 112	Landscape Design I *(2012-2013)*
HOR 160	Plant Materials I *(2012-2013)*
HOR 166	Soils & Fertilizers (*2012-2013)*
HSE 110	Introduction to Human Services
HSE 210	Human Services Issues
HUM 110	Technology & Society
HUM 115	Critical Thinking
HUM 122	Southern Culture
HUM 150	American Women's Studies
HUM 160	Introduction to Film
HYD 110	Hydraulic Pneumatics I *(2012-2013)*
INT 110	International Business

INT 210	International Trade
INT 220	International Economics
INT 230	International Law
ISC 110	Workplace Safety
ISC 112	Industrial Safety (*2012-2013)*
ITN 150	Internet Protocols
ITN 250	Implementing Internet Services
LEX 110	Introduction to Paralegal Study
LEX 120	Legal Research/Writing I
LEX 130	Civil Injuries
LEX 140	Civil Litigation I
LEX 150	Commercial Law I
LEX 210	Real Property I
LEX 240	Family Law
LEX 250	Wills, Estates, & Trusts
LOG 110	Introduction to Logistics
MAT 050	Basic Math Skills
MAT 060	Essential Mathematics
MAT 070	Introductory Algebra
MAT 080	Intermediate Algebra
MAT 090	Accelerated Algebra
MAT 115	Mathematical Models
MAT 140	Survey of Mathematics
MAT 151	Statistics I
MAT 161	College Algebra
MAT 167	Discrete Mathematics
MAT 167A	Discrete Mathematics
MAT 175	Precalculus
MAT 175A	Precalculus Lab
MAT 271	Calculus I
MAT 272	Calculus II
MAT 273	Calculus III
MAT 280	Linear Algebra
MAT 285	Differential Equations
MEC 111	Machine Processes I (*2012-2013)*
MEC 180	Engineering Materials *(2012-2013)*
MED 118	Medical Law & Ethics
MED 121	Medical Terminology I
MED 122	Medical Terminology II
MKT 120	Principles of Marketing
MKT 122	Visual Merchandising
MKT 123	Fundamentals of Selling
MKT 220	Advertising & Sales Promotion
MKT 221	Consumer Behavior
MKT 223	Customer Satisfaction (OMT154)
MKT 225	Marketing Research
MKT 226	Retail Applications
MKT 230	Public Relations
MNT 110	Intro to Maintenance Procedures *(2012-2013)*
MNT 111	Maintenance Practices
MUS 110	Music Appreciation
NET 110	Networking Concepts
NOS 110	Operating System Concepts
NOS 130	Windows Single User
NOS 230	Windows Administrator I
NUT 110	Nutrition

OMT 154	Customer Satisfaction
OST 122	Office Computations
OST 134	Text Entry & Formatting
OST 136	Word Processing
OST 137	Office Software Applications
OST 138	Advanced Software Applications
OST 148	Medical Coding, Billing and Insurance
OST 149	Medical Legal Issues
OST 164	Text Editing Applications
OST 184	Records Management
OST 236	Advanced Word/Information Processing
OST 289	Office Systems Management
PED 110	Fit and Well for Life
PHI 210	History of Philosophy
PHI 240	Introduction to Ethics
PHY 110	Conceptual Physics
PHY 151	College Physics I
PHY 152	College Physics II
PHY 251	General Physics I
PHY 252	General Physics II
POL 120	American Government
PSY 150	General Psychology (*Exemplary Course 2011-2012)*
PSY 241	Developmental Psychology
PSY 281	Abnormal Psychology
PTC 110	Industrial Environment
RED 070	Essential Reading Skills
RED 080	Introduction to College Reading
RED 090	Improved College Reading
REL 110	World Religions
REL 212	Intro to New Testament
SEC 110	Security Concepts
SEC 150	Secure Communications
SEC 160	Secure Administration I
SOC 210	Introduction to Sociology
SOC 213	Sociology of the Family
SOC 220	Social Problems
SOC 225	Social Diversity
SPA 111	Elementary Spanish I
SST 140	Green Bldg & Design Concepts *(2012-2013)*
VEN 133	Intro to Winemaking *(2012-2013)*
WEB 110	Internet/Web Fundamentals
WEB 115	Web Markup and Scripting
WEB 120	Intro to Internet Multimedia
WEB 140	Web Development Tools
WEB 210	Web Design
WEB 230	Implementing Web Service
WEB 250	Database Driven Websites
WLD 110	Cutting Processes *(2012-2013)*
WLD 112	Basic Welding Processes *(2012-2013)*

Continuing Education Courses	***Continuing Education Courses***
ANS 3011	Veterinary Assisting
CAT 3100	Computed Tomography
CJC 3100	Law Enforcement: Explosives, Dirty Bombs, & Radiation Response
CJC 3100	Law Enforcement: Weapons of Mass Destruction
CJC 3100	Legal Aspects of Bioterrorism for Law Enforcement
COM 3729	Business Writing Skills
EDU 3000	Lateral Entry – Orientation
EDU 3002	Effective Teacher Training
EGY 2004	Green Purchasing
EGY 3000	Renewable Energy
EMS 3000	Anatomy & Physiology
EMS 3044	Emergency Medical Technician Basic Initial
EMS 3200	Biological Agents of Bioterrorism
EMS 3200	Bioterrorism Awareness for EMS
EMS 3200	Chemical Agents of Bioterrorism
EMS 3200	Decontamination & Transport of Exposed Patients
EMS 3200	Radiological Emergencies for EMS
EPT 3600	Emergency Preparedness – NC Perspective
FIP 3402	Firefighter I (Select Topics)
FIP 3610	Introduction to Fire Pumps
FIP 4728	Introduction to Bioterrorism for Firefighters
FIP 5512	R.T. Hazmat Awareness & Terrorism
FLI 3717	Conversational Spanish for Healthcare Workers
HAZ 3061	Hazardous Materials: Awareness
HEA 3002	Anatomy and Physiology
HEA 3014	Fund. Skills for Substance Abuse Counselors–Core Functions
HEA 3014	Fund. Skills for Substance Abuse Counselors – Ethics
HOS 3060	Meetings and Convention Planning Introduction
HRD 3001	Employability Skills
HSE 3264	Activity Director – Basic
ISC 3036	Principles of Industrial Safety
ISC 3400	Composite Manufacturing
ISC 3500	Tools for Technology
MED 3023	Medical Coding
MED 3025	Medical Billing
MED 3030	Healthcare Billing & Coding
MHT 3100	Mental Health/ Developmental Disabilities Worker
MKT 3438	Customer Service
MNT 3000	NC Manufacturing Certification Level I
MLA 3022	Phlebotomy Education and Clinical Experience
MLS 3808	Leadership
NUR 3235	Medical Terminology
NUR 3236	Medical Transcription
NUR 3240	Nurse Aide Level I
NUR 3241	Nurse Aide Level II
NUR 3279	Gerontology
OSC 3609	Unit Secretary (for hospital or nursing home)
OSH 3300	Bloodborne Pathogens Training
PHM 3250	Pharmacy Technician Training

	Small Business Center Seminars
SBCN-1	How to Start a Business *(2012-2013)*
SBCN-2	How to Write a Business Plan *(2012-2013)*
SBCN-3	Market Research and Marketing *(2012-2013)*
	Adult High School Development Courses
AHS	Algebra I *(2012-2013)*
AHS	Biology *(2012-2013)*
AHS	English I (*2012-2013)*
	Professional Development Courses
COI	Certified Online Instructor – Level I *(2012-2013)*
OCT	Online Course Template (for development of 'VLC Certified Courses')
OCT 2	Online Course Template (for the development of online courses by an individual instructor for their personal use-not 'VLC Certified Courses')
PTOI	Principles and Techniques of Online Instruction

VLC courses are available for download and use, free of charge to NC Community Colleges. Visit our VLC website at http://vlc.nccommunitycolleges.edu. Contact Kathy Davis, eLearning Specialist, at davisk@nccommunitycolleges.edu, to obtain a login and password to download a VLC Course.

Appendix D


NC ExpLORe
North Carolina
Learning Object Repository
New 5.0
ATTENTION ALL NCCCS FACULTY:
Would you like access to thousands of FREE teaching resources you can use in your courses?
The North Carolina Learning Object Repository is the first statewide project designed to create a hub of digital learning content that can be accessed and utilized by all Pre K-20 educational instructors in North Carolina.
Using the NCLOR Faculty can…
Search: Find professional and/or individual created resources.
Use & Adapt: Integrate and adapt these resources for your face-to-face or online courses.
Sharing resources with students is easy using the existing Blackboard & Moodle connections to the NCLOR.
Contribute: Share your resources with other faculty.
Collaborate: Work together with other faculty members from across the state.
The NCLOR has thousands of open educational resources available to view or download. This content includes resources from:
Duke University School of Nursing
Harvard, Yale, MIT, and Princeton Universities
National Science Foundation
Smithsonian Education
And Many More.
The NCLOR has a new portal interface that lets users customize what they see.
If you would like to learn more about the NCLOR or find information about how to access the repository, visit …
http://explorethelor.org
Find us on facebook
Follow us on twitter
NC ExpLORe
The North Carolina Learning Object Repository (NCLOR) is a collaborative effort between the North Carolina Community College System (NCCCS), UNC system, DPI, NC Virtual Public School, and Independent Colleges and Universities but is managed by the NCCCS.

Appendix E

OER Content in the NCLOR

The mission of the North Carolina Learning Object Repository (NCLOR) is to provide a centralized location for the acquisition, collection, sharing, and management of quality learning resources for all teachers in North Carolina.

To access any of the resources listed below or find more information about the NCLOR, visit www.explorethelor.org.

Open Educational Resources

The following is a list of K-14 grade level resources that are completely free and open materials available to anyone logged in as guest to the NCLOR.

- **CK-12 Flexbooks** - This resource series is a collection of free Flexbooks (eBooks) offered by the CK-12 Foundation. This series includes resources on **Algebra, Biology, Physics, Calculus, Chemistry, Engineering**, and **Statistics**.
- **Flat World Knowledge** - This resource is an open e-textbook series that includes resources on **Algebra and Chemistry.**
- **Harvard Open Learning Initiative** - The series from Harvard University is comprised of complete video courses in disciplines such as: **Computer Science** and **Mathematics.**
- **Khan Academy** - This series includes thousands of **Math, Biology**, **Chemistry**, and **Physics** videos tutorials.
- **Math Open Reference** - This **Geometry** resource series includes interactive animations explaining a variety of geometry topics.
- **MIT Open Courseware** - This series is a collection of the Massachusetts Institute of Technology OpenCourseWare materials that include **Biology**, **Physics**, **Computer Science**, and **Chemistry**.
- **National Science Foundation -** This video resource series includes topics such as: **Physics** and **Chemistry**.
- **NC School of Science and Mathematics** - This is a series of resources including graphics, interactive animations, videos, lesson plans, and professional development made available by the North Carolina School of Science and Mathematics. The STEM subjects included in this series are: **Biology, Physics, Calculus, and Chemistry.**
- **NC BioNetwork –** This is the collection of the official items used by NC BioNetwork. This series includes topics such as: **Laboratory Technology**, **Career and Technical Education**, and **Engineering.**
- **Open Course Library** - The Washington State Board for Community and Technical Colleges (SBCTC) has created this collection of expertly developed educational materials for 42 of the state's highest-enrolled college courses. The STEM subjects included in this resource series are: **Calculus, Chemistry, Geology, Oceanography, Physics**, and **Statistics**.
- **Periodic Table of Videos** - This **Chemistry** resource series, from the University of Nottingham, is a collection of short video clips that explain all 118 elements.
- **PhET Simulations** - This resource series is made available by the PhET Interactive Simulations Project at the University of Colorado. The subject areas included in this series are **Biology, Chemistry, Earth Science, Math,** and **Physics.**
- **Wisc-Online** - This series is a science, technology, engineering and math (STEM) related resource series. Over 1000 learning objects that includes **Engineering**, **Nanotechnology, Electronics**, **Biology, Chemistry,** and **Physics.**

Like us on facebook or follow us on twitter @NCLOR