

Comprehensive Standard 3.4.12 - Technology Use

The institution's use of technology enhances student learning and is appropriate for meeting the objectives of its programs. Students have access to and training in the use of technology.

Introduction

Technology services for students and academic programs are jointly supported by Information Technology Services (ITS), University Libraries, Undergraduate Studies, the Division of Continual Learning, and information technology support staff employed by academic and administrative units. Other contributors to student and academic program technology services include support units such as the University's Multiliteracy Centers (Speaking, Writing, and Digital Literacy), and the Office of Accessibility Resources & Services for students needing assistive technology assistance.

This narrative describes the charges and services of these technology service units, as well as the use of technology in academic programs as follows:

Part I: Policy, Planning, Organizational Support, and Assessment Background

Part II: Technology Support Services Available to Students and Academic Programs

Part III: Technology Use by Students and Academic Programs

Part I: Policy, Planning, Organizational Support, and Assessment Background

UNCG and UNC System policies charge the University with promoting technology use in its academic programs, both on campus and for distance learners, and with providing adequate support for the use of technology. The *UNC Board of Governors Policy Manual, Chapter 1400.1: The Use of Information Technology*

(http://www.northcarolina.edu/policy/index.php?pg=vb&node_id=299), requires that each institution

[provide] the appropriate instructional tools, faculty development, and support services to enhance and maintain teaching and learning inside and outside of the classroom... [and provide] planned and cyclical rotation of information systems and components so that campuses do not operate obsolete systems

For distance learning, *Chapter 400.1.1.2: Guidelines for Alternative, Online, or Distance Education Delivery of Approved Degree Programs*

(http://www.northcarolina.edu/policy/index.php?pg=vb&node_id=3769) states that

[t]he institution must ensure that the technology used is appropriate to the nature and objectives of the programs... provide appropriate faculty support services specifically related to distance education... [and] provide appropriate training for faculty who teach in distance education programs

The institution must also

ensure that students admitted possess the knowledge and equipment necessary to use the technology employed in the program and provide aid to students who are experiencing difficulty using the required technology

The **[UNCG Distance Education Policy](http://provost.uncg.edu/publications/academic/depolicy.asp)** (<http://provost.uncg.edu/publications/academic/depolicy.asp>) supports the system-wide policies and further defines the responsibilities for the University, departments, and faculty.

Additional University policies relevant to resources and support for technology used in academic programs include, but are not limited to, UNCG's **Blackboard Use Policy** (http://policy.uncg.edu/blackboard_use/), **Learning Management System Policy** (http://policy.uncg.edu/learning_management_system/), and **Web Accessibility** (http://policy.uncg.edu/web_accessibility/). These govern the administration and use of the Blackboard Learn learning management system (LMS) and other LMSs, including operation and security, content management, support, and training; and requirements related to scheduling and communicating system maintenance, outages, and upgrades. The **Web Accessibility** policy covers issues related to compliance with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act.

UNCG Technology Support Organizations Overview

To provide appropriate instructional tools and support services, several campus units offer University-wide technology support services relative to their areas of expertise.

Information Technology Services

Information Technology Services, UNCG's central information technology service provider, is charged to provide University-wide services as follows:

ITS Mission - Information Technology Services (ITS) is UNCG's central technology organization, providing computing, communications, and data services. ITS is responsible for planning and management of the transmission and utilization of data, voice, and video, in support of the university's academic and administrative goals. ITS promotes best practices, efficient procurement, and overall cost-effectiveness in the use of IT resources across the entire University.

To provide high-quality technology services that are aligned with the needs of students and academic programs, ITS actively engages clients and department/unit technology staff support in technology planning and priority-setting. Committees and groups engaged in technology decision making include the ITS Student Advisory Group and three academic committees comprised primarily of faculty and academic administrators. These are the Academic Computing Committee (ACC), a Faculty Senate committee that focuses on academic/instructional technology issues; the Academic Technology Coordinating Committee (ATCC); and the Research Advisory Committee (RAC). The ITS Director of Learning

Technology is specifically charged to work with the ACC and ATCC to identify needs and promote high-quality technology services in support of student learning.

Each year, ITS's annual plan includes new and enhanced services to support student access to technology and use of technology in academic programs. In addition to the annual planning process, ITS's multi-year plan, summarized in *Statement of Direction: Toward a Value-Added Computing Model for UNCG, 2013-2016*

(http://its.uncg.edu/About/Value_Added_Computing_Model.pdf), emphasizes its commitment to continued growth and enhancement of academic technology services that are sustainable and affordable in a time of shrinking resources. The 'value-added' approach includes making services as mobile and platform "agnostic" as possible to meet the needs of all UNCG learners. Strategic efforts have included adding resources for mobile application development, investing in campus-wide licenses for mobility-enhancing products such as Blackboard Mobile Learn and Mobile Central, and moving to services that are as easily accessible from off campus as on (e.g., campus-wide implementation of iSpartan Google Apps, Box pilot for cloud-based file storage).

Other Support Areas

University Libraries provides technology services and support, especially those related to promoting information and digital literacy, and providing access to online information resources. Library technology services include access to information and media resources, availability of public/lab computers within Jackson Library, printing and scanning services, operation of a Digital Media Commons (opened in Fall 2012), technology checkout programs, and distance education services. A full discussion of learning resources is available in CR 2.9, CS 3.8.1, and CS 3.8.2.

Within Undergraduate Studies, several areas have responsibilities for different aspects of technology support, focusing on technologies that enhance both in-class and distance learning. The mission of Undergraduate Studies includes implementation of "innovative technological practices" (<http://undergraduate.uncg.edu/about/mission.php>) and the *Undergraduate Studies' Strategic Plan for 2009-2012* included a goal to "[p]rovide UNCG faculty and staff instructional technology support services, trainings, and maintenance for university classrooms." Areas within Undergraduate Studies that support student learning and faculty instruction through technology include the Classroom Technology Support Group, Faculty Teaching and Learning Commons, and the Multiliteracy Centers.

The Classroom Technology Support (CTS) Group is responsible for maintenance of computing equipment in over 250 campus classroom spaces. Responsibilities include installation of instructor workstations and a/v equipment, as well as control panels that allow those using the classroom to quickly request technical support or to call for assistance in the case of an emergency or safety concern. Some classrooms include additional equipment such as SMART Boards and document cameras.

Responsibilities of the Faculty Teaching and Learning Commons (FTLC) focus on instructional technologies, especially as related to instructional development and faculty support. Topics for which the FTLC provides consultation and guidance to faculty and staff include assistive technology and universal design, classroom response technologies ("clickers"), instructional

design for online and hybrid classes, multimedia design and development, and integration of web conferencing and web video solutions into online course design. The FTLC also organizes orientation for new faculty members, with events that include brief introductions from ITS and other technology-support providers, as well as subsequent opportunities to obtain more in-depth information on specific topics. A full discussion of the FTLC role in faculty development exists in the response to CS 3.7.3.

Within the Multiliteracy Centers, the Digital ACT Studio is charged as follows:

The Digital ACT (Action, Consultation, and Training) Studio supports students, faculty, and staff in their effective creation or incorporation of digital media into projects. Consultants act as a trained, engaged audience, providing feedback on slide presentations, video projects, podcasts, digital photography, websites, and blogs by offering collaborative, dialog-based consultations.

The ACT Studio is located in Jackson Library, within the Digital Media Commons, representing a collaborative effort between University Libraries and Undergraduate Studies.

Technology responsibilities of the Division of Continual Learning (DCL) focus on online course development for academic programs across the University. DCL staff also offer consultations to faculty regarding the effective use of educational technology to promote learning (http://online.uncg.edu/marketing/web/fac_resource.php).

To supplement centrally available technology support resources, the College of Arts and Sciences and UNCG's professional schools have local technology support staff. These staff both augment central technology services (e.g., local unit hardware and software support staff) and provide specialized services that may not be available from central technology support units. Unit support staff members include at least one Instructional Technology Consultant for the College and each professional school. Each professional school also has a least one unit-level staff member dedicated to computer hardware and software support.

Within the largest academic unit, the College of Arts & Sciences, several departments have additional technology support staff with specialized areas of focus to meet discipline-specific needs. In some cases, these resources are shared across multiple departments with similar needs. For example, Art and Interior Architecture share a Digital Director whose responsibilities include maintenance of computing labs with special resources for those disciplines. Similarly, the Computer Science and the Department of Mathematics & Statistics share a System Administrator whose responsibilities include the maintenance of specialized student computer labs for those departments. Additional departments such as Chemistry & Biochemistry and Geography also have specialized technical staff whose responsibilities include support of technology used by students for coursework.

Student Technology Services Satisfaction

Student input collected through surveys assists technology support units in planning and providing services that are accessible and well utilized, and that enhance learning. ITS and other

central technology support units either administer or participate in a variety of ongoing surveys that collect feedback from students, academic program faculty, and staff regarding technology services. Examples include ITS's participation in the TechQual+ survey of technology services in higher education, UNCG's Spartan Experience Questionnaire, and the UNC system's survey of sophomores and graduating seniors. Participation in the LibQUAL+ survey allows University Libraries to gather feedback on technology issues related to library services.

Surveys results are used to inform planning, resource allocation, and service improvements. Most recently, Spring 2012 results of the TechQual+ survey indicated that, for UNCG's undergraduates, their minimum expectations were met on all 22 evaluated service items, including technology services overall. Among graduate students, however, the survey revealed two areas where their ratings of perceived levels of service did not meet their minimum expectations – the ability of the Blackboard Learning Management Systems to meet class and campus organization needs, and the ability to access technology services from off campus.

ITS has developed plans to address both areas of graduate student concern, working with other technology service units and key stakeholder committees and individuals as appropriate. The response plan includes a major study of LMS options as described in [Learning Management System \(LMS\) Study Underway](http://itsnews.uncg.edu/2013/07/12/learning-management-system-lms-study-underway/) (<http://itsnews.uncg.edu/2013/07/12/learning-management-system-lms-study-underway/>). Details of UNCG TechQual+ survey results are available in the *UNCG ITS 2012 TechQual+ Survey Report* (<http://its.uncg.edu/About/Survey/TechQual/>).

Regarding other multi-campus surveys, UNCG typically meets or exceeds the UNC System 16-campus average for technology items assessed on the periodic Sophomore and Graduating Senior surveys. These include items related to training and technology services overall. For University Libraries, Fall 2012 LibQUAL+ survey results indicated that students' minimum expectations were exceeded on technology-related items, including usability of the Library website and accessibility of electronic resources.

ITS has also used locally administered surveys such as the Spartan Experience Questionnaire (SEQ) to inform major changes in student technology services. For example, in August 2008, following a successful pilot, ITS moved all students from Lotus Notes email to the new iSpartan Google email service. Satisfaction with email services jumped from 63.4% on the 2007 SEQ to 90.3% on the 2009 SEQ.

System and Application Performance Reviews

In addition to using client feedback to identify service improvement opportunities, ITS uses system and application performance metrics to monitor the effectiveness of University technology services. ITS strives to make UNCG's major technology services highly available, with a goal of 99.900% annual uptime, excluding planned outages for maintenance. This translates to a goal of less than 8.76 hours of unplanned downtime per year.

In FY 2011-2012, four of the six major services that were recorded for uptime metrics met this goal. Actual FY 2011-2012 uptime results were as follows:

- Banner System (“ERP”/Administration) - 99.993%
- Blackboard Learn (LMS) - 99.826% (goal not met)
- iSpartan email (Gmail) - 99.961%
- Enterprise Authentication (Novell e-Directory in FY 11-12) - 99.864% (goal not met)
- Network (overall) - 99.974%
- Voice (VoIP) - 99.965%

Because high availability is essential to providing student access to technology, any deficiencies should be addressed expeditiously. On July 1, 2012, ITS moved from Novell e-Directory to a new Enterprise Authentication solution (iSpartan ID) built on Microsoft’s Active Directory services. For FY 2012-2013, ITS achieved 99.989% uptime for the Authentication service, exceeding the 99.900% goal. Because Blackboard Learn relies on Enterprise Authentication for access, Blackboard Learn reliability improved as well. For FY 2012-2013, Blackboard Learn uptime was 99.943%, also exceeding the goal.

The study of LMS options is an example of ITS using both client feedback and performance measures to identify areas of needed improvement. Details of ITS metrics, including uptime and survey results, can be found on the ITS metrics website at [https://sites.google.com/a/uncg.edu/its-metrics/home.\[01\]](https://sites.google.com/a/uncg.edu/its-metrics/home.[01])

Part II: Technology Support and Training Available to Students and Academic Programs

Information Technology Services (ITS) provides support and documentation for technology services and products available to the University community. Support is provided online through [6-TECH Online](#), a self-service Web application that allows students, faculty, and staff to search for answers to technical questions, submit a 6-TECH ticket to the ITS Service Desk if searching does not produce an adequate solution, and view previously submitted 6-TECH tickets. 6-TECH (336-256-8324) is the University telephone help line providing the University community with a single point of contact for technology support. In keeping with the [ITS Vision Statement](#), students, faculty, and staff can call 6-TECH to get immediate technical support or be directed to the proper support personnel on campus. The help line operates Monday-Friday from 7:00 a.m. - 10:00 p.m. and on Sundays from 1:00 p.m. - 10:00 p.m. during the academic year. When the help line is not staffed, the 6-TECH phone menu provides an option for after-hours reporting of major technology issues.

Walk-in support is also available. The [Technology Support Center](#) (TSC), located in 101 Forney Building, offers walk-in support to students, faculty and staff. Services include help installing and troubleshooting University-provided software, assistance connecting computers and mobile devices to the UNCG wireless network, malware scanning and removal, and email configuration for handheld devices. Comprehensive hardware support services, including warranty repairs, are available to students who purchased a laptop through the Student Laptop Program (SLP). Limited hardware repair services are available for computers not purchased through the SLP.

The [SuperLab](#), located in Jackson Library, offers walk-in support to students, faculty, and staff any time the lab is open, including late nights and weekends. Normal (non-summer) operating hours are:

- Monday – Thursday, 7:30 a.m. – 2:45 a.m.
- Friday, 7:30 a.m. – 9:45 p.m.
- Saturday, 10 a.m. – 9:45 p.m.
- Sunday, 10 a.m. – 2:45 a.m.

The SuperLab staff provides help with many services, including

- computer account activation, troubleshooting, and support
- basic software support
- assistance connecting to the UNCG wireless network
- printing support
- assistance with computer lab reservations

If the SuperLab staff cannot resolve a technology issue, a 6-TECH ticket is submitted on the client's behalf so that the appropriate technology support staff member can provide assistance.

Workshops and Other Training Opportunities

ITS and other support units offer free training to students, faculty, and staff through a combination of online and in-person training. Offerings range from introductory workshops to more specialized training.

Workshops

ITS offers instructor-led workshops on a variety of topics including:

- an introduction to UNCG technology services and resources
- web-development software tools and services such as WordPress and web hosting
- data analysis software such as SAS, SPSS, and Qualtrics (web surveys)
- Photoshop
- Blackboard Learn and Collaborate
- iSpartan including email and calendaring, Google +, Groups, Sites, Docs/Drive

In academic year 2012, ITS offered workshops on 26 different topics, with 567 total registrations. Four of the workshop topics were new in Spring 2013 and had 109 registrations through June. ITS also provided five in-class workshops requested by instructors.

Instructors frequently request University Libraries' information literacy sessions for their classes. In academic year 2011-12, Library staff offered 681 such sessions to classes, an increase of 3.7% over 2010-2011. Also in 2011-2012, the Library staff offered seven Endnote workshops, six face-to-face and one online, with a total attendance of 150. Library training opportunities also include workshops in support of distance learning, information/digital literacy, and specific information-management software packages. Some units, such as the FTLC, provide training

only for faculty and staff, but such training supports the use of technology in instruction (for example, Blackboard Learn training for faculty and staff developing online courses).

The Fall 2012 opening of the Digital Media Commons (DMC) added another venue for technology training. Examples include consultations provided by Undergraduate Studies' Digital ACT Studio staff and University Libraries' DMC staff, as well as collaboration with other University departments to offer training within the DMC. For example, the May, 2013, three-day **Power Up for Online Learning** workshop included instruction provided by faculty and staff, including those from University Libraries, Undergraduate Studies/FTLC, DCL and ITS. Designed for faculty new to online instruction, such workshops benefit both distance and on-campus learners by better preparing faculty to integrate technology into their classes. Additional information on support from the Library can be found in CR 2.9 and CS 3.8.1 and 3.8.2. The FTLC support for faculty and staff is described in CS 3.7.3.

Online Training Resources

Some instructor-led workshops are made available for remote participation using synchronous online collaboration tools such as Blackboard Collaborate. These may also be recorded for future viewing. Other instructor-led workshops are held entirely online, such as University Libraries' online [Workshops from the Library](#) series. This online series covers a variety of technology tools and services that may be integrated into student learning experiences. Topics include social and mobile technologies, such as Evernote, Pinterest, and Twitter, as well as workshops on major UNCG technology offerings, such as Google Docs.

Additional training resources that are entirely online include:

- **LearnSmart:** LearnSmart online training is available to students, faculty, and staff. The training topics covered include end user desktop computing, general technical training, Microsoft certification training (MCSE), and web development. [Information Technology Training Opportunities](#) [04] includes a list of training modules available to UNCG.
- **Google Apps Education Training Center:** The [Google Apps for Education Training Center](#) [05] provides online training modules for Google services available through iSpartan.
- **Microsoft E-Learning:** UNCG students, faculty, and staff are eligible for free Microsoft E-Learning accounts with courses covering Microsoft Office as well as other Microsoft topics. More information regarding this service is available at [Training With Microsoft E-Learning](#).
- **Other Library-provided Resources:** University Libraries' [Research Tutorials Repository](#) includes service and subject-specific tutorials/podcasts such as how to use online applications, like SimplyMap, and online databases such as PubMed.

Part III. Technology Use by Students and Academic Programs

UNCG Standard Computer Accounts (UNCG Login)

Most UNCG technology resources require a computer account and password for access. Students are eligible for a default computer account when they are admitted or enrolled to the University. These accounts remain active for approximately six months after the last semester attended. The default student computer account (UNCG login) provides access to most ITS centrally-managed technology services, though some services require special accounts. To facilitate access to technology services across campus, ITS works with other departments to help them implement the standard UNCG login for any systems that are able to use it (for example, University Libraries' Online Services, "SpartanCard" ID system login).

Students, faculty and staff receive 5 gigabytes of individual network file storage. Each department also receives 250 gigabytes of storage shared among all members of the department. Faculty with appropriate permission from their departments may choose to share folders within the department space with their students for course-related file storage and file sharing. The network file space is automatically backed up and includes file recovery services in the case of accidental deletion or corruption of files. The file space is accessible from off campus through a web browser, and, therefore, available to distance learners as well as local students. Students login at <https://studentfiles.uncg.edu>.

Network Connectivity

Most technology services require network connectivity, so a robust, high-speed campus network is critical to the successful use of technology in academic programs.

Wired Network

Wired (Ethernet) access to the UNCG campus network is widely available across campus. Students may use computers attached to the wired network in campus computer labs, Jackson Library, classrooms (instructor/presentation stations), offices (campus organizations and graduate student offices), research labs, and in the many kiosk computer locations that exist to provide access to specific services (for example, service department kiosks and print kiosks). Students using wired University-owned computers are attached to the University's Gigabit Ethernet network, which has a high-performance, high-availability design able to withstand the loss of one of the two campus data centers. To reach beyond UNCG's local network, UNCG has redundant connectivity to the North Carolina Research and Education Network (NCREN). UNCG is also a full member of the Internet2 advanced networking consortium. This provides high-speed connectivity from UNCG to other member institutions around the US and beyond, as well as other services of potential interest to students, faculty, and staff.

Notable uses of the University's high-performance network include work that the School of Music, Theater and Dance (MTD) is doing to provide live streaming of UNCG Band concerts, and work, in conjunction with ITS, to support remote live musical interaction. For example, MTD, with ITS support, has used the advanced videoconferencing software LOLA (Low Latency Audio/Video Conferencing System) to enable real-time performances of duets with one local and one remote performer. Developing services to support such advanced technologies increases the opportunity for UNCG students and faculty to learn from and collaborate with instructors and colleagues at other institutions. More information about LOLA is available at

<http://itsnews.uncg.edu/2012/11/09/musical-performance-demonstrates-groundbreaking-lola-low-latency-audiovideo-technology-at-recent-internet2-meeting-2/> . [06]

Wireless Network

Wireless access to the UNCG campus network is widely available across campus in all academic buildings, Elliot University Center, the Library, dining halls, residence halls, outdoor common areas, and some administrative buildings. The wireless network designed for student use is the secure (encrypted) UNCG-Faculty/Staff/Student network. The network is available via login with the standard UNCG username and password. Bandwidth (speed) is restricted to 7Mbps (~7,000 Kbps) per user, and no firewall (access) restrictions are imposed beyond those already in place for security purposes on the wired network. While students are also able to attach to the unencrypted Guest wireless network (UNCG-wireless), that network is slower (768 Kbps limit per person) and access is restricted to basic internet usage only (web browsing, for example).

Though much use of the wireless network by students occurs outside of the classroom, the wireless network is also used within the classroom by academic programs. Some academic units, such as the School of Education and School of Health & Human Sciences, provide laptop carts or other wireless technology for classroom use. Schools use these carts in a variety of ways.

Use of two laptop carts within the School of Education includes the following:

- Undergraduate Secondary Math Education students use laptops to access mathematics applications such as Geometer SketchPad, Fathom and Tinkerplots.
- Undergraduate Special Education students create eBooks using software applications such as PowerPoint, VoiceThread, iMovie, etc.
- Undergraduate/Graduate Elementary Education students create digital stories using tools that include VoiceThread, PowerPoint, Animoto, iMovie, Movie Maker, and YouTube.

Across multiple School of Education departments, the laptops and wireless network are used for activities such as course evaluations, digital projects, Google (iSpartan) applications, and technology orientations.

Within the School of Health & Human Sciences, academic programs use the laptop cart and wireless network for activities such as course evaluations, technology showcases, technology training (for example, iSpartan/Google Sites, software such as SPSS), hands-on technology application (for example, students in Public Health Education programs use the laptops for statistical problem-solving work), and proctored computer-based exams in class. Laptop carts and the wireless network are also used for student support activities such as advising within the School of Nursing.

In many cases, classroom use of the campus wireless network relies on technology devices supplied by the students. For example, in some School of Health & Human Science programs, students perform small group work on projects with their own laptops rather than using the

School's laptop cart. Within the Bryan School of Business and Economics, extensive use is made of personal laptops within the classroom. Examples include:

- Students taking Introduction to Business, a required course for the BS in Business Administration, routinely connect wirelessly with the laptops in the classroom, doing group work, multimedia projects, and activities from the MSSL database.
- Operations Management classes, required for the BS in several programs, and the MBA program's Operations for Competitive Advantage course make regular use of laptops connecting wirelessly in the classroom. Students routinely employ laptops to access textbooks' online websites, and utilize this technology to analyze different managerial problems in class and also during exams. Results are sent to the instructor via email as part of class instruction and as part of the testing process.

A small number of programs have laptop requirements, and faculty in those programs may require students to bring their computers to class. For example, within the College of Arts & Sciences, the BFA and MFA Interior Architecture programs have a laptop requirement for their students. The laptops, with particular applications either installed or accessible via the internet, are considered a critical part of the students' tool set for design. Software that students are required to have includes Adobe Design Suite, Autodesk Suite, and Rhino.

Email, Messaging and Related Collaboration Services (iSpartan)

Ease of communication and collaboration for classroom experiences as well as academic support services are imperative for student success. To facilitate communication among students, faculty, and administrative staff, UNCG supports both students and employees on a single messaging system that is part of iSpartan, UNCG's implementation of Google Apps for Education (GAFE).

GAFE includes a collection of web-based collaboration tools, including email, chat, calendaring, website creation/hosting, videoconferencing, and document creation and storage. Google Apps collaboration features include the ability to share and collaboratively edit documents and Google websites, and to participate in multi-participant videoconferences and content sharing through Google+ Hangouts. These tools work through a web browser and are hosted by Google, equally accessible by on campus and remote students. In addition to the core GAFE software, the iSpartan account provides access to [additional Google services](#) [07] that are not part of the Google Apps suite of tools. These include popular online content publishing and collaboration tools such as Blogger and YouTube.

To facilitate use of iSpartan's Google technology, ITS provides setup and use assistance on laptops and mobile devices (iPads, iPods, netbooks, and other handheld devices). Walk-in assistance, which provides an opportunity for one-on-one training, is provided in the Technology Support Center. ITS also offers instructor-led iSpartan introductory workshops to students, faculty, and staff.

A variety of iSpartan Google tools have been used by academic programs across the campus. Examples include:

- In Human Development & Family Studies (Health & Human Sciences), students in the Professional Development and Supervised Professional Experience classes use Google Sites to develop electronic portfolios to highlight their professional growth and experiences during internships.
- In the Community and Therapeutic Recreation BS program (Health & Human Sciences), students taking the Program Planning in Recreation & Parks Management course complete a group service learning project that requires development of a Google Site. These Sites include content that demonstrates, in a creative manner, the students' experiences with the planning and implementation of a recreation program. Technologies and electronic resources that are used include Google Sites, Creative Commons, YouTube, dictation tools for creating closed captioning, as well as photo and video editing software.
- PhD students in the Bryan School of Business and Economics' Information Systems program use tools such as iSpartan Google Drive for collaboration in research and teaching, and as backup storage.

Blackboard Learn (Learning Management System)

The Blackboard Learn learning management system (LMS) is widely used by UNCG's academic programs. Whether used for in-class or distance learning, Blackboard Learn allows instructors to both deliver learning content and provide collaborative experiences to students. Blackboard Learn is also used for information sharing and collaboration by campus groups and committees and for some online training opportunities. Blackboard is accessed using the standard UNCG login.

The primary use of Blackboard Learn is for course-related purposes. A course "shell" is automatically created for each course section that exists in the Banner ERP system. For the Fall 2012 semester, a total of 5,210 course shells existed in Blackboard Learn. At mid-semester, 2,320 (45%) had been made available by the instructor for student access. Because many courses that exist in Banner are dissertation/theses registration sections, internships, independent studies and similar "courses" that typically do not use an LMS, the data suggest that a majority of 'regular' UNCG classes use Blackboard Learn. In fall 2012, Blackboard Learn also contained 1,111 organizations whose leaders had made them available to members.

ITS provides support for Blackboard in partnership with The Faculty Teaching and Learning Commons:

- ITS provides Blackboard Learn support and training for students, while the Faculty Teaching and Learning Commons trains faculty and staff on pedagogical issues related to Learn. Each organization provides instructor-led workshops pertaining to their respective areas of responsibility.
- Blackboard Mobile Learn is an app that provides mobile-device friendly access to Blackboard Learn. ITS supports Blackboard Mobile Learn for all students, faculty, and staff. One-on-one assistance with Mobile Learn is provided in the Technology Support Center in the Forney Building.

- Blackboard Collaborate is integrated into Blackboard Learn to provide a forum for virtual classrooms with online synchronous collaboration (real-time video, content sharing, etc.). For more information regarding Collaborate, see the section titled Virtual Classrooms and Meeting Spaces.

From Spring 2011 to Fall 2012, the most frequently used Blackboard Learn features based on “item counts” were Discussion Board Posts, Course Documents (including eReserves), and Grade Center Columns. Examples of use within academic programs include:

- In the Sociology BA and MA programs (College of Arts & Sciences), classes use Blackboard Learn collaborative functions such as blogs and discussion forums to provide opportunities for in-depth discussion of topics beyond the limited time available in the classroom. This provides students with more exposure to varying points of view, as well as more opportunities to refine and better articulate their own opinions.
- In the Human Development & Family Studies BS program (Health & Human Sciences), professors and students make extensive use of tools in Blackboard Learn. This includes sharing course syllabi, schedules, grades, Powerpoint slides, and study aids; and participating in discussions boards and interactive practice quizzes. For example, in one class students are asked to submit, to the discussion board, news items from popular media that relate to class topics, which the professor then uses as part of her lecture for the day.
- The BA in Social Work (Health & Human Sciences) program makes extensive use of Blackboard throughout its courses including several classes that use Blackboard assessment functionality. For example, in the Introduction to Social Work Data Analysis (SWK250) class, assessments are posted on Blackboard Learn during the class period for students to access from any computer with internet access. Once the quiz or exam is submitted, the items are automatically graded and posted in the Blackboard grade book.

Beyond the standard components of Blackboard Learn, UNCG has integrated additional services used for academic instruction and support. These include instructional tools such as McGraw-Hill Connect, WebAssign, clicker/response system technologies, and the Starfish EARLY ALERT early warning and student tracking system. UNCG has locally developed some add-on tools for Blackboard. For example, the Faculty Teaching & Learning Commons and University Libraries collaborated to build an e-Reserves service.

While UNCG provides Blackboard to all faculty, its use is not required and some faculty choose other options for online delivery of course materials. Within the School of Health & Human Sciences, many courses use MOODLE as an open source alternative to Blackboard. Functions performed by MOODLE are similar to those in Blackboard. For example, in the BS in Community Therapeutic Recreation program, a course in Client Assessment in Therapeutic Recreation (RPM 338) is offered entirely online. Students are required to upload all of their assignments and take all quizzes online.

Virtual Classrooms and Meeting Spaces

For in-class instruction and online classes, virtual classrooms (web-conferencing or webinar systems) are often used for both formal instruction and informal educational support and collaboration, including faculty office hours. ITS supports two services, Blackboard Collaborate and Google+ Hangouts, for the hosting of synchronous classes, workshops, webinars, meetings, office hours, and one-on-one consulting sessions. Needs of the class/student activity help to determine whether Blackboard Collaborate or a Google+ Hangout is the more appropriate solution. Instructor-led workshops as well as online documentation and training resources are available for both products. The Faculty Teaching & Learning Commons works in conjunction with ITS to provide Collaborate support for faculty, especially in regard to the use of Collaborate from within Blackboard Learn.

Collaborate and Google+ Hangouts are essential tools for some academic programs and classes. Examples include:

- With the School of Education, classes for the MEd in Birth-Kindergarten: Interdisciplinary Studies in Education & Development are taught primarily using Blackboard Collaborate. Activities include live presentations made by students in the virtual classrooms.
- The Conflict & Peace Studies MA program (Health & Human Sciences) uses Blackboard Collaborate to teach hybrid classes in which some students are located physically in a classroom, while remote students join the class through a Collaborate session. This allows the program to deliver the same instruction to students in multiple locations.
- All students in the Masters of Arts in Liberal Studies program (Division of Continual Learning) take courses where formal, technology-enhanced group presentations are required, employing tools such as Google+ Hangouts and Blackboard Collaborate. This teaches students to make formal presentations of research findings, and helps them to learn how to better organize presentation material.
- Within the Department of Languages, Literatures, & Cultures (College of Arts & Sciences) students in several French classes have the opportunity to improve their language skills and gain a deeper understanding of French culture through language practice with students in France. Instructors use Google+ Hangouts and ITS lab computers equipped with webcams and headphones to pair UNCG students with students in France.

Video Conferencing Facilities

Although the increased availability and ease of use of client-based web conferencing tools has allowed videoconferencing for instructional purposes to occur more broadly and from more locations (including students' homes), traditional "room-based" videoconferencing services remain in use as well. Benefits of "room-based" services include access to professional quality video and audio devices that provide exceptional room coverage (for example, speech of all in-class students audible to remote participants), and, for some rooms, live monitoring and assistance by a room operator. This includes real-time control of camera angles/zoom and audio level adjustments as well as troubleshooting with remote sites.

ITS offers operator-assisted video classes and conferences from the TeleLearning Center. The TeleLearning Center includes a 40+ seat Telelearning Classroom, a smaller Teleconference Room, and a backup location when the Classroom and Conference Room are both scheduled. Supported videoconferencing platforms include H.323, as well as PC-based tools such as Google+, Blackboard Collaborate, and SKYPE. Students and faculty also use the TeleLearning Center to participate in webinars using alternative products such as Adobe Connect and Cisco WebEx. Beyond videoconferencing and webinars, the Center's services include high-quality audio-only conferencing, event recording, and video playback services. Connections to others across the globe are frequently made in the TeleLearning Center. Classes and meetings have connected to distant locations including Brazil, Italy, and South Africa.

Several programs use the Telelearning Center for distance learning or hybrid (in class + online) classes. For example, the Conflict and Peace Studies MA program uses the Center as its first choice location for blended on-line and in-person classes. School of Music, Theater & Dance uses have included a professor, who was located in Italy, using Skype to teach music theory to students located in the Center. The Center has also assisted remote participation by graduate students or their committee members in thesis and dissertation defenses.

Some academic units also have their own room-based videoconferencing systems. For example, the Lloyd International Honors College classroom in North Spencer is outfitted with special videoconferencing technology that allows the Honors College to run real-time international classes with connections around the world. Recent examples of use include videoconference connections to Lebanon by an Honors 300 course. The Honors class used the videoconferencing equipment for a joint guest lecture by an Associate Professor of History & Cultural Studies at Lebanese American University - Byblos. The videoconferencing equipment allowed the display of a PowerPoint presentation on one screen, while a second screen displayed the guest lecturer and a class from the American University of Beirut. Students later used this videoconferencing technology for final presentations with their classmates in Lebanon. Jointly controlled Prezi presentations were displayed on one screen and group members from both Greensboro and Beirut were visible on the other.

Banner Administrative Support Services (UNCGenie)

Banner is UNCG's central administrative system. Though not used directly for instruction, Banner is necessary to provide functions that enable students to enroll and remain successfully enrolled. These functions include applying for Financial Aid, registering for classes, paying bills online, and checking grades and academic status. Students access Banner through the UNCGenie web interface. Students are trained in the use of UNCGenie through programs such as SOAR (Spartan Orientation, Advising, & Registration) and through interaction with the various campus service and support offices that use UNCGenie to deliver services.

In addition to providing direct student services, Banner also feeds required data to many additional systems used by students, faculty, and staff. These include other administrative systems such as the Room Management System (RMS) for campus housing and the student health system (Medicat), but also data feeds to academic systems used directly in classes. For example, course and enrollment information (add/drop) is automatically fed from Banner to

Blackboard Learn. Appropriate rights are automatically granted to enrolled students and instructors. Automatic course creation in Blackboard Learn increases adoption of the technology by instructors and reduces the overhead/personnel time commitment that would otherwise be required for instructors (or technology support staff) to manage this process.

Computer Labs

Including centrally-managed and department-provided labs, UNCG has over twenty computer labs. Outside of the labs, additional clusters of computers are available for student, faculty, and staff use throughout Jackson Library, and in some other campus locations. ITS provides eleven open access/instructional labs and two training labs, containing more than 400 total computers. An additional 60-seat ITS lab will open in Graham 313 in Fall 2013. ITS Superlab has staff available to provide basic troubleshooting and consultation for issues with logins, software, and equipment. Other ITS labs are staffed on an as-needed basis, including most evening hours and when requested by a faculty or staff member who has made a reservation. Lab staff members are able to troubleshoot problems, and escalate them as necessary, allowing classes and other lab activities to better focus on their work rather than technology issues. In addition to a telephone, all ITS labs are equipped with a two-way intercom to request technical support when a lab staff team member is not present.

ITS lab computers are primarily Windows OS computers, but Macintosh computers are available in the Superlab (located in Jackson Library) and in the ITS Training Labs (Bryan 209 and Forney 112). Open access/instructional labs may be reserved for classes for an entire semester or on an ad hoc basis for specific events, such as exams. ITS Training Labs may be reserved for specific events, but are not available for semester-long class reservations.

The ITS-managed open access/instructional labs are most frequently reserved by academic departments for instructional use. Reservation data from Fall 2011 through Summer 2012 for nine of these labs shows that they were reserved by almost 60 different campus departments for a total of 3,168 reserved sessions. Of these, the vast majority of sessions were for academic programs or academic support units such as the Library or Student Academic Services.

The top five departments that made reservations are shown in the table 3.4.12-1 that follows. All are departments with academic programs. The session counts are of specific events (date & time) for which the department had reserved an ITS lab. These are typically class sessions, but may include sessions for other department events, such as workshops or placement testing.

Table 3.4.12-1 Top 5 Departments Requesting Reservations for ITS Open Access/Instructional Labs (Fall 2011 – SS II 2012)

Department	Count of Reserved Sessions				Total
	Fall 2011	Spring 2012	Summer Session I 2012	Summer Session II 2012	
Psychology	295	316			611
Economics	219	101			320
Kinesiology	138	85			223
English	94	92	21		207
Info Systems & Supply Chain Mgmt	89	65		15	169

Examples of lab use by these departments include:

- For Research and Statistical Psychology II (a required class for the BA in Psychology, College of Arts & Sciences), students have twice-weekly lab meetings in a computer lab space. Students use online research resources, word processing software, and most critically, statistical software to analyze data in these lab meetings. These tools allow for the application of issues and concepts learned in the course and are a critical component of this required capstone class.
- As part of the undergraduate program in Economics (Bryan School of Business & Economics), ITS labs are used to teach a Business Statistics class that requires Microsoft Excel. Some instructors use additional lab software such as Net Op, which allows the instructor to monitor students' work and also allows screen sharing so that students' work may be dynamically presented to other students. Some courses also use the web-based version of the TurningPoint classroom response system to enhance engagement. Students submit responses to polling questions, which are then tallied, viewed, and incorporated into the class discussion.
- Writing in the Professions (ENG 327) is one of several courses in the English BA program (College of Arts & Sciences) that relies on the ITS-managed labs for instruction. This class makes extensive use of the Microsoft Office Suite of Apps for in-class writing, exercises, and evaluations. For in-class presentations, students use Powerpoint, Prezi, videos, and other applications to present at the instructor's station, while the class records their evaluations through immediate, electronic submissions. These are submitted in an open forum to allow for discussion and group assessment. The instructor describes ENG 327 as "one of those courses that simply can't be delivered as effectively in a face-to-face environment without access to lab support or substantive re-design." She adds, "Since most of the students have had training before they get to my class, we can focus, as we should, on the rhetorical strategies of written, oral, and digital communication."
- The BS in Information Systems & Supply Chain Management (ISSCM) program (Bryan School of Business & Economics) makes extensive use of the resources available in ITS-managed labs. Introductory classes held in the labs focus on the basics of the operating environment, email, and the internet, as well as on primary applications like the MS Office Suite of Apps. These prepare students for the integration of technology into the

learning process in later courses. For example, one course emphasizes the use of PowerPoint and various integrations of Office software to produce team-based and individual presentations and improve communication skills. At the master's level, ISSCM students use some of the more advanced software tools available in the labs, such as MySQL, Dreamweaver, PHP scripting tools, SAS, and Microsoft Project.

Each fall and spring semester, ITS updates the ITS-managed instructional/open access labs with new/upgraded software as requested by faculty and staff for classes and other University activities. To facilitate consistent access to technology for students and instructors, ITS keeps available software as uniform as possible across the open access/instructional computing labs. This allows flexibility in scheduling classes into labs and in providing student access to the software they need regardless of which lab they are using. ITS also provides late-night lab availability in the SuperLab during regular fall and spring semester sessions, Sunday through Thursday, until 2:45 AM. This facilitates student access to specialty software needed for coursework that they may not have access to on their personally owned computers.

Some exceptions to ubiquitous software access exist. For example, the ITS-managed lab in Stone 127 contains specialized design software, Lectra, used by Consumer, Apparel, & Retail Studies (CARS) courses. Vendor licensing only permits the software to be available to students in this particular lab. All CARS students in the Apparel Product Design concentration use Lectra software, including Kaledo, Diamino, Modaris, and U4ia in a variety of design classes. This enables them to develop skills in technology used in commercial design and production of apparel products.

The ITS Superlab includes some specialty equipment such as scanners and a color printer, while other ITS labs have black and white printers. Some labs currently have or are being upgraded to have special equipment for videoconferencing and interactive whiteboard collaborative activities.

ITS offers printing access to students, faculty, and staff in ITS labs, at printing kiosks, and via web-based printing. In addition to printers in ITS labs, print kiosks are currently located in the EUC (lower level), the Bryan Building Food Court, and the 2nd floor of the Bryan Building. Print jobs may be submitted directly from ITS lab computers or through a web interface accessible to any computer attached to the UNCG network, including personally owned computers using the UNCG (non-Guest) wireless network. Each semester, a free baseline allocation is provided to each student. Printing costs are charged per page after the allocation is exhausted.

University Libraries provides students with access to computers, printers, and other technology both in Jackson Library, which is open 24/5 during the Fall and Spring semesters, and in the Harold Schiffman Music Library. Within Jackson Library, University Libraries provides the Electronic CITI lab as well as computers in the Information Commons, Digital Media Commons, and other public Library spaces for a total of over 200 Library-managed computers available to students, faculty, and staff. Other technology resources that all students, faculty, and staff may use in Jackson Library, include 6 scanners, 2 copiers, scanning and copying for microforms, and public printing services. The Music Library provides access to 24 public computers, 1 copier, and 1 scanner.

In addition to ITS labs and Library computers, several academic departments manage one or more of their own computer labs. This is especially common for departments with extensive or highly specialized technology needs. Examples of departments that manage their own labs (or may have specialized labs shared between departments or within a School) include Art, Computer Science, Geography, Honors College, Interior Architecture, Mathematics & Statistics, Music, and several labs within the School of Education. Uses of department or school-managed labs to enhance student learning include the following:

- Computer labs managed by the Department of Geography facilitate many classes that fulfill degree requirements of Geography programs at all levels—bachelor’s, master’s and doctoral. Many of the classes are conducted entirely in the labs and make extensive use of specialized software, including Arc/Info, ArcView, ERDAS Imagine, ArcGIS, Surfer, AtlasGIS, MapInfo, ER Mapper, Adobe Photoshop, and Illustrator. They make use of other resources, including color and black-and-white printers, scanners, oversized cartographic plotter, GPS equipment. These facilities and resources provide extensive hands-on training and experience on a wide-range of GIS, cartography, and remote sensing technologies, as well as a variety of other specialized, locational analysis programs for both instruction and research.
- Interior Architecture’s Digital Design Studio in the Gatewood Building includes specialized equipment, such as the HP DesignJet large format plotter used by students to print design projects. Within the lab, students use industry-standard software, such as AutoDesk’s CAD suite, desktop publishing design software such Adobe InDesign, and other design products to complete projects. While only a few classes in the BFA and MS Interior Architecture programs are formally scheduled in the labs, almost every class depends on the labs, their equipment, and software tools for completing assignments and projects.
- Computer Science and Mathematics & Statistics share a computer lab that provides access to software that cannot immediately be made available in ITS-managed labs. Examples include newer versions of Magma with the latest Numerical Analysis and Abstract Algebra algorithms; Google AppInventor for programming Android mobile devices; Blender, Qt, and UnityPro graphics engines for virtual environment rendering; and any software that might be needed for small-set testing. The lab serves as a host lab for many departmental projects and events, including sponsored computer programming contests and summer events. During the regular semester, the shared lab is used by the Computer Science department as the location of the Java programming language tutoring offered for computer science courses.
- The Music Computer Laboratory serves as a resource for students of all levels and in all musical fields of study. The lab houses 25 state-of-the-art iMac computers with a wide range of software, from Microsoft Office to the Logic Pro audio production suite. Classes are often taught in the lab to utilize the specialized software available. Examples include:
 - Within the Music Education program, the undergraduate Marching Band Techniques (MUE 357) class uses Pyware v7.

- Making Music with Computers (MTD 220) uses GarageBand and Apple’s Logic Pro software.
 - Technology for Musicians I and II (MUS 107 & MUS 108) courses utilize Audacity, iMovie, and Finale/Sibelius notation software.
 - Within the Music Performance program, Jazz Ear Training (MUP 304) classes use Auralia software to assist with ear training.
- Within the Lloyd International Honors College, the North Spencer residence hall includes a computer lab outfitted with six computers, as well as a printer for which the Honors College provides free printing to its students. Students use the lab to write papers and do other computer-related coursework.

University-provided Software

Computer labs and other common area computers are one means by which UNCG students can access the University’s broad array of software. Some software may only be accessible through a UNCG-owned computer such as one in a lab, office, or other campus area. Other software is available via remote access, or for student installation on a personally owned computer.

ITS provides access to software through a variety of methods including:

- the UNCG Citrix-based App Store available through virtual.uncg.edu (remote access for faculty and staff only, currently piloting for students in the ITS Superlab)
- the Run Advertised Programs utility on the General Computing Network (UNCG-owned Windows computers only)
- the MacApps software volume (UNCG-owned Macintosh computers)
- Linux software in the Instructional Linux Environment (ILE) and the High Performance Computing (HPC) Linux cluster (both remotely available to students, faculty, and staff)
- UNCG’s “Virtual Computing Lab” implementation (VCL allows remote students, including distance learners, to access select software packages they might otherwise need to purchase or travel to campus to use)
- Web-based and mobile app software (e.g., Blackboard Learn, UNCG Mobile, iSpartan Google Apps, Qualtrics web survey tools, as well as curricular-specific web-delivered software)

The **Software@UNCG website** at <http://its.uncg.edu/software> [08] includes a list of centrally-delivered software available at UNCG. This site also includes resources for discount purchasing opportunities, including student discount purchasing programs. The Technology Support Center assists students, faculty, and staff with installing software acquired through ITS-supported discount purchasing programs.

Web-delivered Content and Applications

Some classes require alternatives to Blackboard Learn and iSpartan Google services for web and multi-media content delivery and functionality. For these cases, ITS offers a variety of solutions for developing, publishing and maintaining websites and web content that may be used for

classes and other student educational activities. Examples of services include interactive web applications such as blogging tools, streaming audio & video and other multi-media solutions, web-based surveys, and web platforms on which University web developers may develop and run customized web software.

Website Hosting

ITS provides web hosting services in UNIX , Windows, and an Apache/Linux LAMP environment. Each environment may be used by faculty for classes or other educational purposes as long as applicable rules regarding data protection and privacy are followed (such as compliance with FERPA). Academic programs that use hosted web environments include the Information Systems & Supply Chain Management online MS program. In this program, students engage in web development and database administration work within the hosted environment. Students use Dreamweaver and PHP scripting tools to develop web-based applications. To help students understand database design, management, and queries, the open source relational database management system MySQL is used as a primary tool.

In other programs, students do not perform web development or database work themselves, but benefit by using UNCG-hosted web applications designed specifically for their course of study. For example, an online course in Economics (ECON 201: Principle of Microeconomics) is taught using an award-winning online game developed by UNCG's Division of Continual Learning and hosted in UNCG's Windows web server environment.

Web Streaming, Video, Audio, and Multimedia Publishing

ITS and University Libraries also provide support services for web streaming and multimedia publishing, including the delivery of educational material to students and providing opportunities for student interactive learning experiences. ITS support includes overall project consultation, file compression, and publishing assistance to faculty members seeking to incorporate streaming/multi-media into their classes and to students working on projects with faculty oversight. Web audio/video content delivery is supported through a Flash streaming media server, iTunesU @ UNCG (podcasting), and UNCG's YouTube Channel. Short video clips may also be posted directly into Blackboard Learn, and multi-media recordings may be made through Blackboard Collaborate and Google+ Hangouts On Air. ITS's [Web Streaming and Multimedia Publishing Support](#) [09] website provides more regarding these services.

Through the Digital Media Commons in Jackson Library, University Libraries provides assistance with strategies for capturing audio/video content and editing existing content, as well as preparing presentations, creating posters, working with images and creating Google Sites. Available resources include support staff on-site in the Commons, and equipment for media editing and document scanning. Also through the Commons, the University's Digital ACT Studio offers consultations on how to craft and effectively communicate messages through digital media. More information is available on the [Digital Media Commons](#) [10] and [Digital ACT Studio](#) [11] websites.

Examples of streaming and multimedia use by academic programs include:

- The Office of Academic Outreach, in the School of Health & Human Sciences, uses the ITS streaming media service in several departments and programs to deliver videos that enhance course materials and provide visual demonstrations on specific topics. The videos were recorded by lecturers in the field and then edited through services provided by the Office of Academic Outreach. Programs that use the videos include:
 - Public Health - BS in Public Health (Community Health and Health Studies) and MPH
 - Kinesiology - Continuing Education
 - Gerontology - MS in Gerontology and Continuing Education
 - Community & Therapeutic Recreation - BS in Recreation & Parks Management, and Continuing Education
 - Communication Sciences and Disorders - BS in Communication Sciences & Disorders
- Instructors in the BS in Community Therapeutic Recreation (Health & Human Sciences), BS in Human Development & Family Studies (Health & Human Sciences), and Curriculum & Instruction MED (School of Education) programs are examples of faculty who have engaged their students in video/multimedia creation activities, and have referred students to the Digital Media Commons for assistance.

Use of Widely Available Websites, Applications and Social Media

Widely available web applications and social media tools are often used to enhance student learning. Examples include use of agency and professional organization websites, online GIS applications, and the US Census and other US Federal Government websites. For example:

- In the Recreation Area & Facility Development (RPM 342) course, students in the Community & Therapeutic Recreation BS program (Health & Human Sciences) use online GIS software that allows students to view aerial photography, contour lines, and soil information for their final project site. Students also learn to retrieve demographic data from specific geographies using the interactive US Census website (Fact Finder).
- In the BA in Hospitality & Restaurant Management program (Bryan School of Business & Economics), students in HTM 251 explore numerous federal government agency websites and access online training materials from the EEOC, Department of Homeland Security, and Department of State relevant to cultural competence, immigration, and diversity management. Accessing online websites permits students to check their intended responses to case studies against primary sources of legal code.
- All MS in Accounting (Bryan School of Business & Economics) students take a professional research course that requires the use of online electronic financial and tax authorities including CCH IntelliConnect, RIA Checkpoint, FASB Accounting Standards Codification, International Financial Reporting Standards, and the SEC Edgar database. Students use these authorities to analyze the facts and circumstances of cases and gather support for their conclusions. These activities help develop critical decision making skills and prepare students for careers in both the public and private accounting sectors.

Twitter is a popular social media tool used for instruction. In the BS in Kinesiology program (Health & Human Sciences), Twitter is used in the Biomechanics of Sport and Physical Activity (KIN 376) course to engage students in meaningful learning outside the traditional classroom. When students see a biomechanical concept outside the classroom (for example, a person stubs his/her toe, yet regains his/her balance), they are asked to Tweet about how the activity they just witnessed in the real world relates to a concept taught in class (keeping the center of mass within the base of support to maintain stability), using a class-specific Twitter account.

Masters, Post-Masters Certification, and Doctoral programs within Educational Leadership & Cultural Foundations (School of Education) make use of a wide variety of web 2.0 tools to enhance student learning. Examples include the use of Edmodo, a social-networking environment similar to Facebook, and Animoto for online video creation. In some programs, such as teacher education, students use TaskStream to create ePortfolios.

Specialized Computing Platforms/Servers

For those with advanced computational and other specialized technology needs, ITS offers an Instructional Linux Environment (ILE), as well as access to and support for parallel computing through Henry 2, a high performance computing (HPC) Linux cluster. ITS also provides hosting services for departments who need to manage their own specialized servers.

Instructional Linux Environment

The Instructional Linux Environment (ILE) is a Red Hat Enterprise Linux environment provided for those who require specialized computing resources running on the Linux operating system. ILE provides operating system command-level access using standard Linux utilities and provides access to popular Linux software packages. This includes compilers for programming languages and popular mathematical/computational/statistical analysis software including Matlab, Maple, Mathematica, SAS, SPSS, and many others. ILE is most commonly used in programs with specialized technology needs such as Computer Science and Mathematics.

High Performance Computing (HPC)

HPC clusters are useful when problems being analyzed require greater computational power than typically available through individual desktop computers. ITS provides access, support, and training for use of the Henry 2 HPC Linux cluster through a partnership with NC State. For student learning, HPC access is typically most important for graduate students' thesis and dissertation research. For example, a PhD student in Educational Research, Measurement, & Evaluation (School of Education) is saving months of analysis time by using Henry 2 to perform Monte Carlo simulations using R and JAGS software.

In addition to HPC resources available through central ITS, some departments manage or have access to specialized HPC resources that are used by students, faculty and research staff in particular areas of study or classes. Within the College of Arts & Sciences, the Department of Chemistry & Biochemistry manages its own HPC Linux cluster, which it uses for courses both at the undergraduate and graduate levels.

Department-managed Specialized Servers

Academic departments that manage their own servers typically do so to fulfill functions and achieve flexibility of usage that would be more difficult with centrally-managed servers. Within the College of Arts & Sciences, several departments manage servers for student use including Computer Science, Mathematics & Statistics, Media Studies, Geography, and Chemistry & Biochemistry.

Classroom Response Systems ('Clickers')

Classroom response systems (or 'clickers') allow faculty to perform real-time assessments of student learning in the classroom and to better engage students in classroom activities. For some classes, faculty provide 'clickers' to their students by checking out Turning Point systems from Undergraduate Studies, or by using school or department-owned systems. In other cases, students acquire their own personal clicker, such as through the University Bookstore. Alternatively, some faculty use web-based versions of classroom response systems. In these cases, a lab, personal computer, or mobile device may be used instead of a dedicated clicker. When the Graham 313 lab opens in Fall 2013, classes will also have the opportunity to use the Prometheus Active Response System and ActivBoard that will be installed in the lab.

Student Hardware Acquisition and Support Services

Student access to technology is also promoted through hardware access and support programs, such as ITS's Student Laptop Program and the University Libraries' Technology Checkout Program. The ITS-managed Student Laptop Program assists with personal student computer purchases and support, including the selection, purchase, setup, installation, support, and repair of computing hardware. ITS also promotes technology access by managing the Campus-wide Hardware Procurement program for departments to acquire discounted, enterprise-class computers for use in student labs and re-purposing of older computers for placement in student offices.

University Libraries provides technology checkout services that promote student access to technology. Based on academic year 2011-12 counts, items available for checkout in Jackson Library include 20 laptops, 26 iPads (25,234 laptop and iPad loans), 30 Camcorders, 13 voice recorders, 18 calculators, and 124 other instructional/AV equipment items such as tripods, projectors and screens (15,433 loans). Additional technology includes VHS players. Technology available in the Harold Schiffman Music Library includes 9 laptops, 2 iPads, 2 digital voice recorders, 2 camcorders, turntables, boom boxes, and DVD/VHS players.

While central technology services do not provide assistance with personal printer support or repairs, personally owned laptops attached to the UNCG wireless network may print to ITS computer lab printers and print kiosks. This provides a reliable means for students to print homework or other assignments/documents that are required in hard copy.

Specialized Technology Use and Training

As demonstrated in examples above, academic programs have adapted technology to meet the needs of the students in their programs, and to ensure students have updated skills and knowledge to help them in their fields of study. Technology training for students by academic units and departments most frequently occurs within the classroom. The training is often provided by the course instructor, but may also be delivered by local technology specialists, such as the Instructional Technology Consultants working in each academic unit, who are asked to provide workshops and presentation for classes.

Some units and departments have also provided online training materials for their students. For example, within the School of Health & Human Sciences, the Office of Academic Programs has created a website with extensive links to instructional technology resources at <http://www.uncg.edu/hhs/oa/>. [12] Within the Bryan School of Business & Economics, technology support staff have created online tutorials to meet the specific training needs of their academic programs.

UNCG’s academic programs use an extensive variety of specialized equipment and software. Examples of technology use and training for each academic program are included in *Appendix A: SACS 3.4.12 Technology Use Examples for Academic Programs*. Table 3.4.12-2 that follows highlights some uses of specialized equipment and software within academic programs.

Table 3.4.12-2 Examples of Specialized Equipment Use

School & Department	Description
Bryan School of Business & Economics – Consumer, Apparel & Retail Studies	Students in the BS Apparel Product Design concentration use CAD systems to create digital presentation boards, fashion graphics, woven and print textile designs, as well as garment patterns, etc. Specialized Lectra suite software used includes Kaledo, Diamino, Modaris, and U4ia.
Bryan School of Business & Economics – Information Systems & Supply Chain Management	All students in the Healthcare Information Technology Management post-baccalaureate certificate program take a course in Health IT applications. Students use Practice Fusion, a Health IT sandbox, to better understand use and management of data in healthcare settings.
College of Arts & Sciences – Chemistry & Biochemistry	Highly sophisticated instrumentation and associated software are incorporated throughout the curriculum to train students on technologies and techniques such as Mass Spectrometry, Nuclear Magnetic Resonance, HPLC (high pressure liquid chromatography), FPLC (fast protein liquid chromatography), UV-Vis (ultraviolet-visible spectroscopy), FT-IR (fourier transform infrared spectroscopy), and PCR (Polymerase chain reaction) thermocyclers.
College of Arts & Sciences - Geography	Beyond software packages supported by ITS, students in the Geography computing labs have access to a full complement of specialized software. To name a few, students may use ESRI ArcGIS10, Erdas Imagine, Geographically Weighted Regression (GWR), ArcGIS Server, Census Transportation Planning Package (CTTP), Archeosurveyor, IrfanView, MapProjector, TopoMapCD, Saguario Tools, MapCruncher, Microdem, MultiSpec, RADAN 7, Open GeoDa, TransCAD, and HEC-RAS (the Hydrologic Engineering Center’s

	River Analysis System).
College of Arts & Sciences – Media Studies	Media Studies programs require use of special equipment for capturing, editing, and producing audio and video content. All graduate students are required to take courses in advanced image and sound recording, making extensive use of industry standard technologies.
Joint School of Nanoscience & Nanoengineering - Nanoscience	One of the US’s first Surface Plasmon Resonance Imaging (SPRi) machines by Horiba Scientific resides in the Nanoscience department, where is it being used to research measurement of traumatic brain injury biomarkers in the blood. A graduate student, who is the primary user, is using nanotechnology to enhance the limit of detection of SPRi, so it can be sensitive enough to detect very low amounts of biomarkers.
Joint School of Nanoscience & Nanoengineering - Nanoscience	The Zeiss Orion Helium Ion Microscope (HIM), an advanced charged particle microscope, is a new technology, of which there are currently only approximately 25 available world-wide. Students at the Master's and PhD level have received hands-on education about charged particle microscopy components, imaging methodologies, and advanced fabrication techniques through laboratory rotation classes, research experiences, and the core Nanotechniques course taken by all Master's and PhD students in the program.
School of Education – Educational Research Methodology	All MS and PhD students are exposed to and trained in using relevant measurement and item response theory software, including Winsteps and IRT-Pro. This includes importing data, converting data files between *.txt and *.dat formats, managing program output, and saving output in appropriate word processing documents.
School of Education – Specialized Education Services (Professions in Deafness Program)	Students taking American Sign Language courses use the Sign Lab to complete video assignments using QuickTime on MAC computers, listen to audio files, and watch videos for sign language practice. As part of American Sign Language III (SES 203), they are required to use the videophone in the Lab to complete their Sign Language Proficiency Interview (SLPI) as part of their progression requirements in the concentration.
School of Health & Human Sciences – Communication Sciences & Disorders	Students enrolled in the Speech and Hearing Science (CSD 307) lab use specialized software such including WaveAspects, Audacity, and online applications such as Stringwave and the “interactive sounds from pipes” webpage created by the Division of Continual Learning. Students use these software tools, along with headsets and microphones, to record speech stimuli and identify characteristics of vowels and consonants on a spectrogram.
School of Health & Human Sciences - Kinesiology	The graduate-level Rehabilitation Techniques (KIN 641) course includes use of advanced computerized diagnostic technologies of musculoskeletal ultrasound and electromyography to help students better understand and directly see how rehabilitation exercise selection impacts the use of different muscles.
School of Music, Theater, & Dance – Music Performance	Students in all levels of music programs have access to equipment such as MIDI keyboards which are used in conjunction with music-creation software. Jazz Ear Training (MUP 304) classes use the Music computer lab and Auralia software to assist with ear training. Composition Students regularly use specialized software such as Finale, Sibelius, Logic, and ProTools when composing and recording their music. Many performance majors use Smart Music in daily practice.
School of Music, Theater, & Dance - Theater	Students working toward the BFA & MFA in Drama engage in hands-on work with lighting and sound technology, and with power tools in the department's scene shops. They also use computer design programs such as AutoCad and Vectorworks. MFA students, particularly in the area of Design, use other

	advanced specialized software for design and technical theatre work as well.
School of Nursing - Nursing	Simulators are used in BSN and post-baccalaureate certificate courses to enhance students' clinical decision-making skills. Streaming videos, purchased by Nursing and converted to an online format, are also used to demonstrate proper procedures for a wide variety of topics.
School of Nursing - Nursing	Specialized equipment used by MSN and PM certificate students enrolled in the Nurse Anesthesia Program (Raleigh School of Nurse Anesthesia) includes iStan 336 human patient simulators; airway, CVP & regional task trainers; glide scopes, fiber optic laryngoscopes, oxygen tanks, advanced airway equipment, and anesthesia delivery systems. Students also use assessment systems such as ExamSoft, Medatrax, and Prodigy Review..

A summary list of technology used by academic programs and support units to enhance student learning is included *Appendix B: SACS 3.4.12 List of Commonly Used and Specialized Technology for Enhancement of Student Learning at UNCG.*

Conclusion

ITS, in cooperation and collaboration with various departments across campus, devotes significant resources to support technology-enhanced student learning and to provide training opportunities to students, faculty and staff.