

Duke Digital Initiative Report Fall 2010

The Duke Digital Initiative (DDI) is a multi-year program of experimentation, development and implementation of new and emerging technologies to explore their effective use in support of the university's mission. In Fall 2010, DDI sponsored programs in four main areas:

- iPads
- Poll Everywhere
- 3-D Exploration
- Waterproof HD Video Camera

Overall Findings

- iPads generated substantial interest from both faculty and students; these devices were used in wide range of disciplines, and many uses were successful. Users found many academic applications, particularly for online content, and felt that it fit a clear niche between a smart phone and a laptop. **[page 2]**
- Multimedia equipment available at the LINK continued to meet a broad range of needs for hundreds of students and faculty across all discipline areas, particularly in video production needs for language and humanities courses. Over 2000 loans were made; new additions to this pool included iPads and “slide” HD Flip devices with longer recording capability **[page 6]**
- Poll Everywhere (interactive classroom polling without clickers) was successfully used to increase student engagement, particularly in large science classes. Most faculty reported that the value of the tool outweighed the potential for distraction from the devices. Cellular connectivity issues were the most significant barrier encountered. **[page 7]**
- Early investigations into consumer technologies for producing and displaying 3-D video and did not yet generate much interest among faculty, but several directions for continued exploration and investigation were identified **[page 9]**
- A new rugged waterproof high definition camera was used with great success in an Engineering student project to film underwater robotic devices; the lack of a remote trigger or viewfinder resulted in limited success for other projects with this camera **[page 11]**
- Support for WordPress for flexible web publishing was greatly expanded as “sites.duke.edu” was opened up for broad campus participation; course use of WordPress increased 80% from Spring to Fall **[page 12]**

Exploring the potential of the iPad at Duke

In Fall 2010, Duke furthered its exploration of the use and potential of the iPad through a walk-up loaner program offered by the Link and a course pilot led by the Center for Instructional Technology.



iPad walk-up loaner program in Fall 2010

A small pool of 10 iPads was made available via the Link equipment pool for one week loans to enable faculty and students the opportunity to experiment with its use.

iPad walk-up loaner program findings

Eleven iPads with wiFi were purchased (10 for circulation and one for staff testing). Initial enthusiasm was extremely high; the equipment was in high demand and circulated constantly, with 140 loans made. Students and faculty cited a wide range of subjects and courses for their planned use of the iPads and a variety of planned uses (see Table 1, below). Some students and faculty were frustrated that the iPads were always checked out when they inquired.

Goals of iPad walk-up loaner program

- Provide access to iPads as a tool for students and faculty to experiment
- Gather feedback as available on usefulness of iPad for academic use.
- Provide feedback on loaner pool maintenance and procedures to internal and external customers.

Table 1

Discipline areas (Subjects)	Planned Uses
<ul style="list-style-type: none"> • Science and Math (Math, Physics, Engineering, Statistics, Neuroscience, Chemistry, Environmental Studies) • Social Sciences (Economics, Education, Public Policy, Sociology, Cultural Anthropology) • Humanities (Art, Music, Theater, Documentary Studies) • Languages (Chinese, Asian & Middle Eastern Studies) 	<ul style="list-style-type: none"> • Class notetaking • Mobile file access, in place of a laptop • Reading articles and other PDF files • Personal/recreational use • Lab work in Chemistry, Biology • Reviewing online lecture slides • Language practice and presentations in non-Roman character languages (Arabic, Japanese, Chinese) • Tracking student progress (instructor use)

iPad course loaner program in Fall 2010

In addition to the walk-up iPad loans supported by the Link service desk, a separate program offered semester loans of iPads to faculty for fall 2010 course use or planning, in order to learn about the most effective uses of and drawbacks or limitations of iPad use in varied disciplines.

Activities of iPad course loaner program

Twenty devices were purchased using DDI funds for this program (fifteen 32 GB WiFi and five 32 GB 3G capable iPads), along with cases and necessary peripherals. CIT purchased an additional 32 WiFi iPads to expand the reach of the program. Availability was advertised through the CIT email list/newsletter, DDI web site, and via a Duke Chronicle article in late August. Nine active course projects were supported in Fall 2010 along with six projects to plan and develop Spring 2011 courses. At monthly user group meetings, iPad borrowers were invited to share stories and discuss their experiences. CIT created online "profiles" of DDI iPad projects (*see box at right and examples at <http://bit.ly/dExnIL>*).

Active course or academic iPad use in Fall 2010

- Russian 1, JoAnne Van Tuyl (20 students) - 1 faculty loan; 6 short-term iPad loans for in-class use
- French 101, Deborah Reisinger (12 students) - 1 faculty loan; 6 short-term iPad loans for in-class use
- Hindi 183S, Satendra Khanna (2 students)
- Writing 20, "Sounds of the field", Jonathan Dueck (12 students) – 1 faculty loan; 12 student loans
- Religion 20S, Youshaa Patel (2 students)- 1 faculty loan; 2 student loans
- Pratt Machine Shop, Linda Franzoni/Steven Earp (3 devices) – *see feature box, right*
- Medical residents iPad trial, Brad Perez (12 devices)
- Psychology 115, Cheryl Lin (6 devices for a class of 32 students)
- Independent undergraduate student programming project for 3G mobile devices (supervised by Richard Lucic)

Goals of iPad course loaner program

To learn about:

- a variety of types of uses of iPads by faculty and students, and create short "case studies" or vignettes about what faculty and students are doing
- the impact on student learning or on course activities/efficiencies of using iPads (particularly about comparisons between using iPads and completing the same activities in a non-iPad mode).
- what types of course projects and activities 3G access is beneficial, and where it's unneeded
- faculty needs for support and training to best use iPads, and to try to coordinate that support with other relevant groups on campus as needed.

iPads facilitate training in the Pratt student machine shop

Three iPads were used by students to access short how-to videos demonstrating proper use of the machines at the point of need. Machine Shop Manager Steve Earp and camera operator Kaicheng Liang, Pratt Biomedical Engineering Graduate, created almost 50 videos for students, along with an iPad-accessible resource guide to help students find shop materials.

"The lathe guide videos ...allow us to see the machine and rewind to reanalyze things ... we can watch the video while being close to the actual machine in the lab to better understand how to correctly operate the machine before turning it on. It really helps in regard to making the lab safer." – Pratt Student

Additional faculty iPad use to plan Spring 2011 teaching

- Writing 20, "The Art of Grant Writing," Denise Comer
- Public Policy 120S, "Newsriting," Kenneth Rogerson
- Environmental Science 105S, "Ethical Challenges in Environmental Conservation," Rebecca Vidra
- Music 49S, "Bach, Beethoven and Brahms," Brenda Scott
- Computer Science 196, "Software for Mobile Devices," Richard Lucic
- Music teaching and librarianship, Laura Williams

The Global Health Initiative was granted an additional 9 iPads from CIT for Jen'nan Read's Fall 2010 course to use as a loaner pool within GHI in future. David Johnston (NSOE) was granted funding for exploring development of interactive textbooks for iPads, which included funding for 3 iPads.

Findings of iPad course loaner program

A feedback survey was sent to all semester-long borrowers of the DDI or CIT iPads (n=30); 20 responses were received (7 faculty, 1 grad student instructor, 1 staff, 11 undergraduates).

Generally, faculty and student reactions were positive; most found the device useful for academic work. Students and faculty observed some benefits of the iPad versus a computer, citing advantages such as the form factor, weight, portability, and quick on/off compared with a laptop. Users felt that the device fit a niche between a smart phone and a laptop (easier shared viewing of materials, for example). Borrowers found the iPad most useful as an internet access device, but not as useful when trying to fully replace a laptop. Based on comments, a majority of borrowers would like to use an iPad as a laptop-replacement if they felt it worked smoothly enough. The majority of student and faculty respondents (75%) reported needing no tech support. Those who did used Lynda.com, Google, CIT consultants, or OIT support. Drawbacks or concerns cited by one or more participants that negatively impacted their use included:

- difficulty or confusion in how to transfer files between the iPad and personal computer
- lack of 3G (most loaners were wifi only)
- lack of Flash as a problem in using some web sites
- not wanting to purchase apps (students) or invest time learning how to use the device (faculty) because the devices were only on loan
- limited options for projection, since only some apps project
- lack of a physical keyboard / difficulty using on-screen keyboard due to size or feel

Duke reactions to the iPad

"A laptop favors the individual user; the iPad favors a small community of sharers."
– Faculty comment

"It was very portable and easy to use to check something fast without having to turn on a computer." – Student comment

"I could sit at the kitchen table and look something up real quick and set the iPad back down, without feeling that I had to get a lot of computer work (checking e-mails, looking up things online) done all at one sitting." – Faculty comment

"I enjoyed the access to news and email without the weight of a laptop." – Faculty comment

Academic use of iPads

In terms of course impact, feedback from faculty using them actively in classes suggests they worked well for their intended purposes such as grading student papers, helping students learn to write in Russian, displaying and allowing interaction with videos and other media, and supporting note taking and recording observations (Table 2). In addition to academic uses specifically suggested on the survey, faculty and students identified many other academic uses (Table 3), and also reported exploring the device for other personal uses.

Table 2 – Reported iPad classroom use in Fall 2010

	Students (n=11)	Instructors (n=4)
Presenting (connected to projector)	36% (4/11)	50% (2/4)
Viewing materials on the device with one or more people	73% (8/11)	50% (2/4)
Viewing materials on the device alone	82% (9/11)	n/a
Course-related communications (tweeting, discussion boards)	64% (7/11)	0%
Non-course-related or personal communications	64% (7/11)	25% (1/4)

Table 3 - Other academic uses

By instructors	By students
<ul style="list-style-type: none"> viewing educational videos teaching students to write in cursive (non-Roman foreign language) creating ethnographic field notes grading papers with iAnnotate keeping track of homework and attendance reviewing media (videos, online news sources) to prepare for class meetings 	<ul style="list-style-type: none"> Finding other apps relevant to course topics Creating mind maps (Mental Note, MindNode) Recording audio assignments Viewing web content Reading news sources Taking notes Looking at documents/ebooks/articles for other courses Looking at Blackboard

Personal uses noted by instructors and/or students

- Using the internet
- Viewing videos
- Reading documents (Good Reader, Dropbox)
- Checking news, weather, email, calendar
- Entertainment (games, music)
- Social networking (Facebook)

Multimedia equipment loans

In addition to iPad use, the multimedia equipment offered by the Link continued to support a wide range of course, co-curricular and personal needs.

- Nearly 2000 equipment loans were recorded (*Table 4, right*)
- Duke undergraduates continue to represent the majority of users and loans (69%), although loans to graduate students also make up a significant percentage (22%) .
- November was the peak month for equipment loans, with nearly 600 circulations recorded. Flip cameras continue to be very popular; approximately ½ of all loans were some type of Flip video camera, including the new slide Flip HD (*image, right*)

Table 4 - F2010 Equipment Circulation Summary

Equipment Type (# available)	# loans
iPad (10)	141
Mini DV Digital Video Kit (80)	118
Flip High Def Video Camera (177)	346
Flip Standard Def Video Camera (132)	389
Flip Slide HD Video Camera (45)	79
Hard Drive Video Kit (10)	33
Headset w/ mic (50)	309
High def video kit (25)	76
Tripod	230
Web camera (100)	24
5 th Generation iPod	228
total	1973



Figure 1 - DDI Equipment Loans by Role

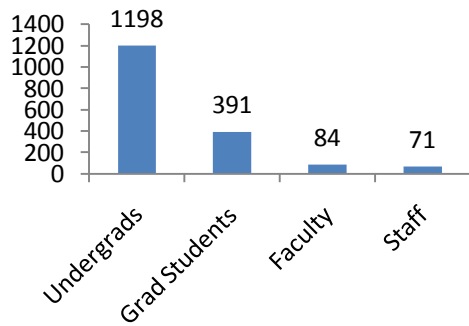
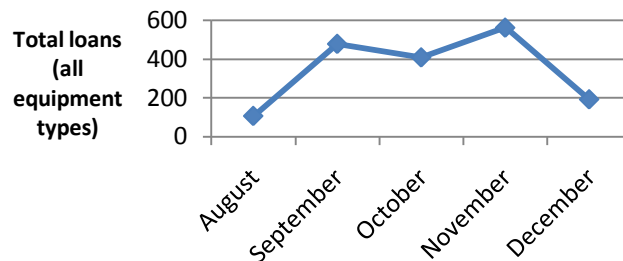


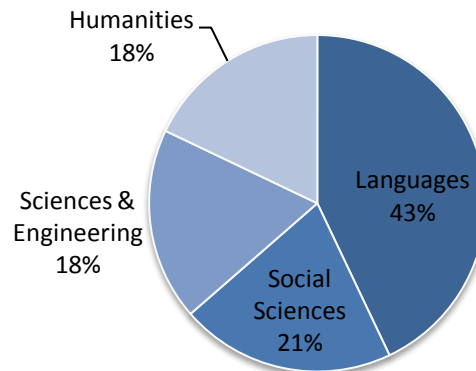
Figure 2 - DDI equipment loans by month, Fall 2010



Uses of multimedia equipment, Fall 2010

Students and faculty continue to use this equipment to support academic work across all discipline areas; over 70 academic programs across all major discipline areas were cited by students when asked if their use of the equipment was connected to an academic course or project (Figure 3). Table 5 contains a brief summary of the most common uses of different types of video equipment.

Figure 3 - Multimedia equipment
Fall 2010 course support by discipline area



	Flip cameras	Mini-DV cameras	Hard drive kits
Create video for class assignments & projects	●	●	●
Record self-presentation and practice interviews for review/critique	●		
Film high quality content intended for editing (news stories, documentaries)		●	
Capture sporting events, professional conferences,			●
Record interviews for class assignments, research	●	●	●
Capture club activities, campus life use	●		
Record lectures, presentations	●		

5th generation iPods continued to be used (primarily by students) to audio record lectures, interviews with subjects, and for oral practice assignments in language learning. No new DDI support is being provided for these devices. In the future, audio recording needs will be met through centrally-supported web-based options (such as Wimba Voice tools), student-owned devices, and departmental budgets.

Exploring Poll Everywhere – student response without clickers

Using Poll Everywhere, an online alternative to PRS or clickers, an instructor can present a question (multiple choice or free text) via a slide either on the web or through PowerPoint or Keynote. Students can then respond via text messaging or online using a variety of devices (computer, smartphone, iPod touch or iPad). Through this program, faculty were offered licenses to use Poll Everywhere. The service is free for up to 30 responses; this DDI program provided licenses for faculty



with more than 30 students. Licensing (vs use of the free tool) also permits faculty to set up a keyword to respond instead of requiring students to use a number.

Goals of the Poll Everywhere program

The program aimed to learn how useful Poll Everywhere is for Duke faculty, and whether this tool or a similar service should be supported by Duke.

Poll Everywhere activities in Fall 2010

Licenses were distributed to 5 faculty; of these, 4 were actively used.

- Keith Whitfield (Psychology)
- Chris Grimes (Psychology)
- Lee Baker (Cultural Anthropology)
- Craig Roberts (Duke Institute for Brain Sciences)
- Karen Murphy (Psychology)

Due to time constraints, Poll Everywhere activities were not tested in the Cultural Anthropology course.

Poll Everywhere Findings

Faculty participants responded to a survey about their experiences in the pilot. Due to difficulty with cellular reception in at least one of the classrooms in Biological Sciences, none of them used Poll Everywhere to track individual student responses. Faculty asked students to respond to polls using laptops / classroom computers, internet-enabled smartphones or iPod touch devices, or texting. Uses described by the faculty (n=4) included:

- Gauge and openly share student opinion on topics discussed in class (n=4)
- In-class surveys (n=2)
- Impromptu ungraded quizzes to assess understanding during class (n=2)
- Initiate conversation among students (n=2)
- Informal mid-course evaluation [e.g. assignments / tests / course organization] (n=2)

Faculty expressed a wish to use the tool for taking attendance in large classes, if the connectivity were more reliable so all students could easily participate. Faculty were asked if the devices students used to respond to polls created a distraction. Although they acknowledged this as a concern among colleagues, they all disagreed with this statement. All but one of the faculty felt that the tool helped them achieve their teaching goals of increasing interactivity and assessing student understanding; the one who did not

Goals of the Poll Everywhere program

- to identify issues with using student-owned devices as clickers.
- to determine the percentage of students who can participate (i.e., do all students have a phone with a text plan, and are the classrooms dead zones for particular phone service providers).
- to determine if using phones or other devices distract students in class.
- to find out if faculty are tracking individual student answers (for quizzes or for attendance), and if so, how difficult it is.

feel that his/her goal was met was due to low student participation that s/he felt was a result of the poor cellular connectivity in the room. This limitation on student participation was the biggest obstacle and concern during the program. Cost of texting was not specifically cited as a faculty concern as long as the tool was used for optional course activities. All of the participants stated that they would recommend the tool to colleagues as a way to promote discussion and interaction (particularly in large classes) if connectivity were not an issue. OIT has an ongoing project to work with major cellular carriers to enhance coverage; some improvements are planned for the first quarter of 2011.

Spring 2011 Poll Everywhere activities

Three faculty wish to continue their licenses - Chris Grimes, Karen Murphy and Craig Roberts. In addition, Mohamed Noor and Kathleen Donahue will share a license for Bio 102. The remaining available license will be used for the Froshlife viewers choice awards. Although Craig Roberts' course is small, Roberts plans to continue to use a license since this gives the option of texting a user-chosen keyword rather than a number. CIT also plans work with faculty using the tool to blog about their use of Poll Everywhere. A student survey is planned for Spring 2011 to gauge students' attitudes about the potential cost impacts of course-related texting.

Investigating 3D video and computer visualizations

DDI investigated the potential applications of 3D video and/or 3D computer models on consumer level 3D displays in the Duke community. During Fall 2010, the project leads investigated four areas with an eye toward potential future pilot projects:

- General level of interest in faculty and students in creating and viewing 3D video.
- Interest among specific faculty who currently work with 3D computer models in using a consumer 3D display in the Link and/or having their students work on models on 3D displays in the Multimedia Project Studios.
- Technical capability of consumer 3D displays to work with 3D modeling software for viewing 3D models in a monitor in the Link, and use of a consumer 3D video or computer display to work on 3D models in the Multimedia Project Studios.



Faculty perspective: Does laptop and cell phone use in class cause too much distraction?

"...I have debated [this] with other faculty... By restricting the opportunity for students to [use the internet in class], I don't think you're changing the student's motivation to learn in your class. This needs to come from the course content, structure, delivery, etc. ... and for those students who are motivated, you will be limiting their ability to enhance learning using their laptops / cell phones. Bottom line, in some cases it is definitely a distractor, but I don't think removing it will make those students more motivated to learn." – *Poll Everywhere* faculty participant

- Technical capability to create and edit 3D video using consumer 3D through in the Link and equipment and software in the Multimedia Project Studios.

Fall 2010 3D video investigation findings

- Standards for displaying video have been agreed upon by manufacturers and some consumer cameras for shooting 3D are emerging, along with consumer-level software; however, no standards have yet emerged for display of 3D computer content
- Some faculty in Visual Studies are interested in display of 3D models and computer content, primarily working with historical models and similar content. Two faculty members have expressed particular interest in using 3D video.
- Little pre-existing 3D content is available specifically for the educational market; what exists is primarily focused on the Health Sciences. Experimentation with 3D video in Medical education has been going on for some time.

3D applications in the Neuroscience classroom

Beginning in Fall 2010, Craig Roberts (Duke Institute for Brain Sciences) will lead a project to create 2D and 3D movies of scientists' performing and explaining advanced neuroscience techniques for use in Neuroscience Methods (NEUROSCI 184, Spring 2011). The videos will complement discussion with a scientist who practices the technique (and has produced the video), bringing the laboratory experience into the classroom. Funded by a CIT jumpstart grant and loan of 3D cameras, the project will enable students to view virtual experiments in 2D or 3D, and will compare student engagement and learning using the two types of visualization.

Future 3D investigations planned for Spring 2011

- Explore interest in Flip-type 3D consumer camcorders and feasibility of eventually offering them in campus equipment pools.
- Explore student and faculty interest in using 3D video through camcorders and posting of in YouTube's 3D format, along with the feasibility for offering multimedia support for these activities.
- Explore consumer-level software for processing and managing 3D video (Final Cut Pro plug-in).
- Identify educational content that is available in computer model or video form for demonstrating to faculty and set up a 3D display station for faculty to gauge interest in permanent 3D display in Link or elsewhere on campus for course use.
- Continue studying the feasibility of using 3D modeling on 3D displays and monitoring the 3D marketplace and developments with displays, standards and hardware/software.

Testing applications for a rugged high definition camera

DDI funded a small program to investigate the usefulness of a new mountable waterproof rugged HD camera for teaching and learning. The program solicited ideas from faculty and targeted faculty in specific departments to test this camera (NSOE, Evolutionary Anthropology, Biology, and Engineering). In one case, the camera facilitated a student group project, and produced high quality underwater video easily. Both the various mounts and waterproof features were useful. In two cases, the absence of a view finder and remote trigger impeded the use of the camera.



The GoPro HD camera

- In ECE 142, Engineering student Shame Chikoro and his student team successfully captured the work of two underwater remotely operated vehicles (ROV) used for cleaning and biofilm removal on underwater surfaces [for details, see feature box, right]
- In Evolutionary Anthropology 244, Ken Glander has used camera traps for many years to capture shy or wary animals, but always on the ground and in still frames. The GoPro HD camera was tested for recording the activities of the Duke Lemur Center lemurs high in the canopy of the forest. The camera was mounted on aluminum poles of varying heights (6' to 66') to create high resolution motion recordings for stop frame analysis of locomotion, feeding behaviors, and previously uncaptured activities. In this case, the lack of motion sensor or remote activation severely limited the usefulness of the camera.
- In Daniele Armaleo's Biology 184 course, the camera was mounted on the head of a participant (the TA, one of the students, or the professor) to record class dynamics in a non-static fashion (as opposed to using a tripod). The goal was to test the ease of mounting and overall ease of use. Effectively mounting and aiming the camera was found to be difficult given that the camera does not enable reviewing the recordings in real time. Armaleo plans to try again in Spring 2011.

Filming underwater robots in ECE 142

Using the waterproof camera, students were able to capture video recordings of robots at work for their final project presentation and demonstration. They successfully captured high quality video footage of our robots in action both in and out of the water. In addition to a student diving underwater with the camera, they also were able to mount and position the camera at a wide range angles using the mounting tools that came with the camera kit. Although primarily interested in the video, they were satisfied with the audio volume and sound quality as well. Students found the camera as very easy to use, even during long diving sessions underwater. They condensed their footage into a five-minute video <http://www.youtube.com/watch?v=iS1L6QDFE3A>

Future ideas and planned explorations with rugged video equipment

- **Environmental studies field work:** Charlotte Clark (NSOE) plans to use the camera in her Gulf of Mexico DukeEngage project to document student work; the first three weeks of the 8-week program will be wetland restoration work in Terrebonne Parish. (Summer 2011). Another NSOE faculty member, Doug Nowacek, envisioned some uses for this camera, having used a similar camera in Antarctica, mounted to a tagging pole, among other things.
- **Performing arts:** Andrea Woods Valdes planned to use the equipment in, "Dance For the Camera" (Dance 106s) to film dance/movement underwater in a Duke swimming pool for video installation projects, with an emphasis on how water changes/impact movement and how to capture that visually. The class did not have time to use the camera as planned, but the instructor hopes to try again during the spring semester.

Additional faculty projects will be solicited throughout the Spring semester.

Transitional DDI programs

VoiceThread and WordPress programs formerly supported by DDI in 2009-10 are currently in transition, with one phasing out and the other scaling up.

VoiceThread

VoiceThread, a third-party application previously licensed by Duke, allows users to easily add text, audio or video comments to images or video media. Based on prior assessment of this tool in 2009-2010 as not being a good candidate for broad support at Duke, VoiceThread is a transitional DDI program for the fall 2010 and spring 2011 semesters. In fall 2010, faculty who previously used this tool were supported in their transition to either the use of a free VoiceThread account or with one year paid access to VoiceThread Pro, if needed. Consultants worked with faculty to determine if they could use the free VoiceThread account for their course activities or if they needed to apply for funding for a VoiceThread Pro account. Out of approximately 12 faculty who contacted the CIT for consulting, four decided that an upgraded Pro account was necessary. Because VoiceThread is no longer a Duke-supported tool, some faculty plan to stop using VoiceThread in their courses and are actively looking for other options that provide some of the same functionality. Other faculty were easily able to transition to using a free account at www.voicethread.com. DDI and the CIT will continue to assist faculty using VoiceThread by supporting general use of the tool and working with faculty to adapt VoiceThread activities to be completed with the free account. Spring 2011 is the final semester that DDI will fund VoiceThread Pro accounts for faculty.

WordPress at Duke

WordPress MU was identified as a good candidate for broad Duke support after a highly successful pilot during 2009-2010. As of Fall 2010, Duke WordPress has moved from pilot to production, and a major version upgrade was also completed in December 2010. Approximately 250 sites were created in Fall 2010 to support courses and course-related activities, an 80% increase over Spring 2010 use. CIT staff will work in conjunction with OIT to establish this tool as a flexible publishing platform that can be used for teaching and learning activities as well as a broad range of other uses. Participation is limited to course sites for the Fall semester, with plans to open up the project to non-course uses in early Spring 2011: see <http://sites.duke.edu/about/roadmap> for future planning information.



WordPress is now widely available for Duke course use - see sites.duke.edu for more information