## DDI 2011 Report

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. The goals of DDI are to promote innovative and effective teaching, to use technology in support of curriculum enhancement, to develop our technology infrastructure and to share knowledge about effective instructional technology strategies.

Summary findings

1. **iPads were the most intensive area of exploration.** Ten devices in the central multimedia equipment loaner pool augmented a CIT-sponsored iPad exploration program, enabling 18 courses across a wide range of subjects and all disciplines to explore iPads, as well as supporting individual loans to an additional 400 faculty, staff and students.

2. **Technologies for creating and displaying 3d video and/or computer models are still in the early exploration stages.** Several faculty began testing easy-to-use equipment for capturing 3d video, and over two dozen faculty, staff and students explored educational content on a new 3d TV display at public interactive sessions this Spring.

3. **A pilot of interactive classroom polling without clickers was a success for promoting active learning in several large-enrollment courses.** Over 700 students in three large courses participated in a pilot of PollEverywhere. Feedback from faculty and students was positive; however, technical issues with unreliable cellular signals due to limited or unreliable reception in some classroom areas limited the scope of the faculty's exploration of potential uses.

4. **Usage of the multimedia equipment loaner equipment pool increased 26%.** Over 4000 loans were made from the centralized multimedia equipment pool in the Link. The highest volume of loans came from various models of Flip and other video cameras which represent the bulk of the equipment pool, although the small pool of iPads were in greatest demand. At peak times, nearly 500 students, faculty and staff per month relied on this equipment for a wide range of academic, co-curricular and personal needs.

Equipment loans from the Link Service Desk

Year	Loans
2008-09	~1750
2009-10	~3200
2010-11	~4100
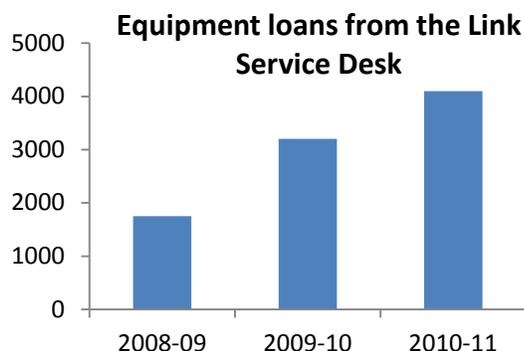
Links to online content are embedded throughout this report for online readers. A list of referenced URLs for print readers is included at the end of the report.

iPad Explorations in 2010-11

To learn how useful iPads are for academic and co-curricular use, DDI sponsored both course-based and individual loaner programs to provide the opportunity for faculty and student exploration of these mobile networked multimedia touch-screen devices.

Ultimately, 100 iPads purchased using DDI or CIT funds were made available for exploration. Ten devices were made available on a first-come, first served basis for simple one week loans via the Link Service Desk; these iPads were checked out over 300 times during the academic year. The remaining devices were reserved for official course loans, curricular exploration, or faculty exploratory use in a pool managed by CIT. Eighteen course and curricular exploratory loans were supported (*see box, right*). Over 100 faculty and instructional staff also borrowed an iPad for individual exploration or planning for use in a future semester.

Program Goals

- gather information about uses of iPads by faculty and students, and create short "case studies" or vignettes
- gather information about impact on student learning or on course activities/efficiencies using iPads; if possible, generate comparisons between using iPads and completing the same activities in a non-iPad mode
- determine for what types of course projects and activities 3G cellular data plan access is beneficial
- learn about faculty needs for support and training, and how to best coordinate that support with other relevant groups on campus

2010-2011 iPad Course & Curricular Use

- African & African American Studies 199: Digital Blackness (Mark Anthony Neal)
- Biology 127: Marine Megafauna (Dave Johnston)
- Computer Science 196: Software for Mobile Devices (Richard Lucic & Robert Duvall)
- Environmental Studies 105S: Ethical Challenges in Environmental Conservation (Rebecca Vidra)
- French 101 (Deborah Reisinger)
- Global Health 321: Global Health Research Design (Jen'nan Read)
- Hindi 183S (Satti Khanna)
- Literature 255: Mapping the Technologies of Resistance (Negar Mottahedah)
- Medical Residents (Brad Perez)
- Music 49S: Bach, Beethoven & Brahms (Brenda Neece-Scott)
- Psychology 115: Psychology of Consumers (Cheryl Lin)
- Public Policy 120S: News Writing (Ken Rogerson)
- Public Policy 196S: Politics, Religion & Radical Democracy (Adam Hollowell)
- Pratt Machine Shop (Linda Franzoni & Steve Earp)
- Religion 20S: Muhammed and Prophecy (Youshaa Patel)
- Russian 1 (Joanne Van Tuyl)
- Writing 20: Money Matters: Grant Writing (Denise Comer)
- Writing 20: Sounds from the Field (Jonathan Dueck)
- Writing Studio (Vicki Russell)

Findings

iPads were actively used in a variety of courses across all discipline areas. Areas of iPad exploration are listed below, including links to CIT blog articles describing specific projects in more detail:

- The iPad's impact on student's reading and writing practices
- Viewing and annotating multimedia resources, such as maps or videos
- Exploring the potential of sketching and stylus use
- Editing and annotating documents within and outside of class time
- Exploring iPad applications in discipline-specific context, such as interdisciplinary field research (*image, right*) or in music education by combining digital scores, annotation and digital audio
- Viewing and creating social media content
- Displaying video and audio content created by students
- Showcasing student project work
- Developing a digital textbook with Duke multimedia resources
- Testing out applications for annotation, peer feedback, and grading assignments
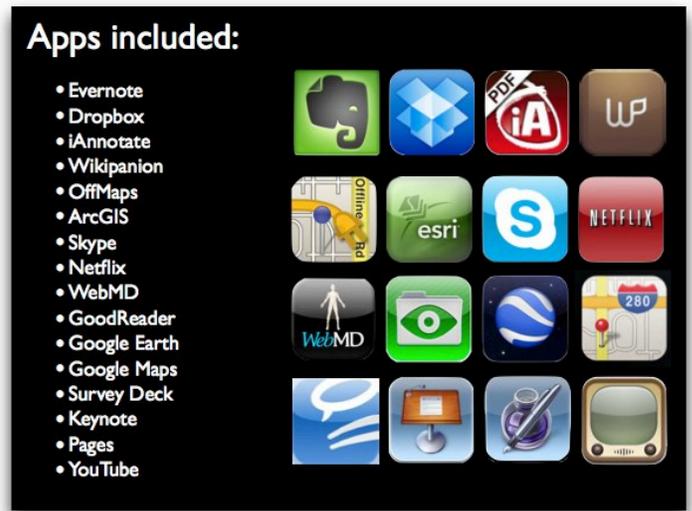- E-reader use for text-based course materials

Figure 1 Jen'nan Read's global health students tested a suite of iPad applications for global health field research. Read more about this project on the CIT blog.

Feedback provided by faculty and students through CIT's course loaner programs is summarized below (Table 1).

Table 1: Faculty & Student feedback on the iPad for academic work	
Benefits	*Drawbacks*
Ease of use	Difficult / awkward to type on it
Portable	Lack of Flash support
Large screen	Projection limitations
Long battery life	Cost (particularly 3G models)
Fast boot-up / overall speed	
Useful for….	*Not so useful for…*
Notetaking (with external keyboard)	Notetaking (using on-screen keyboard)
Surfing / browsing online / checking email	Annotating student/peer work
Dictating (using speech-to-text app)	Projecting
Watching online videos	Sharing among students
Recording audio*	
Reading e-books / PDFs	
Sketching with stylus	
Social media	
Brainstorming	

* iPad 2 with photo and video capture capability was not available during 2010-11 academic year

Case Study: Measuring the impact of iPad use on student learning

Jonathan Dueck's Fall 2010 Writing 20 course "Sounds of the Field" investigated several ways the iPad might impact student learning, including direct comparisons of iPad use vs. non-iPad use. Overall, Dueck found that students using iPads were better prepared for class discussions (having all their materials readily at hand) and made better use of specific software (Mind Mapping brainstorming software), due to the stylus and touch screen capabilities. Dueck's students also explored the use of iPad technology for recording ethnographic observational data. At sporting events, students experimented with technology as a means of recording and communicating observations.

His students compared the effectiveness of using Mental Note to capture rich multimedia observations (including audio, photos, videos, and sketches) with traditional paper-recorded observations taken by students in another section of the course. In the first experiment, Dueck and his students found the technology to be more of a barrier than an enhancement, making sharing easier but not enhancing the quality of the observations. At another game, the faculty member "followed" students on Twitter ahead of time, capturing students' observations along a particular theme during the game. This second experiment was more successful, resulting in high quality real-time observations (by aggregating across the students); the faculty member found that the activity significantly enhanced the class discussion and understanding of key concepts. "For my work in teaching ethnographic writing, the collaborative, social dimensions of these devices were more useful than their (admittedly lovely) media capabilities," said Dueck in his CIT blog post about his experiences using iPads in his course.

Jonathan Dueck is Duke's 2011 winner of the Writing 20 Award for Excellence in Teaching Writing

Additional case studies of iPad course use at Duke

- Dante's iPad (Kenneth Rogerson, Public Policy)
- The iPad: A Teaching Technology (Mohammed Noor, Biology)
- iPads as a tool for media comparison (Satti Khanna, Asian and Middle Eastern Studies)
- Potential ethical challenges of the iPad (Rebecca Vidra, Nicholas School of the Environment)
- Facilitating class discussions with an iPad (Jessica Otey, Romance Studies)
- Teaching (Russian) handwriting (Joanne Van-Tuyl, Slavics)

Lessons learned about supporting iPads as teaching tools

Support needs were higher for faculty than students, based on survey reports. One key element of the successful faculty exploration program was advance work done by CIT consultants and other staff to identify an initial suite of promising apps to load onto devices; this was particularly for faculty with no specific ideas of what they wanted to try who primarily wanted a sense for the range of possibilities. Providing faculty with a diverse (but not unlimited) set of applications enabled them to explore and provide feedback without investing too much time identifying and loading applications. When faculty had specific ideas for applications (or functions of

apps) that they wanted to try, CIT would load particular apps on request and/or research apps for exploration in advance of the loan. These investigations, although time consuming for staff, enabled the faculty to focus their experimentation.

Most faculty reported that a short "training" or office visit from CIT was necessary. Projection (or lack thereof) was consistently an issue for faculty, although some were not aware of the existing options, so iPad training for faculty should include detailed information about how to project, and which apps will project (updated as models and capabilities change).

> "I was (and remain) not so much interested in advocating for or against a technology, as thinking about how to define and understand the impact this technology might have. The most rewarding aspect thus far, then, for me has been that students and faculty across disciplines have been engaging in thoughtful reflection about their writing and reading practices, and about the nature of writing and reading, and differentiating between various occasions for writing and reading."
>
> > -   Denise Comer, Thompson Writing Program
> > [The iPad and Reading and Writing Practices](#)

iPad program plans for 2011-2012

For 2011-12, DDI will purchase 20 iPad 2 devices for general exploratory use in undergraduate classes. Currently, CIT plans to accept applications from instructors at Duke for two types of iPad use in courses for fall 2011 or spring 2012:

-   *first generation iPads (without cameras)* to allow students to access online interactive materials, etextbooks, iPad applications such as Inkling, or other new media sources in place of traditional textbooks, coursepacks, and other printed materials. Examples of such content and materials include: etextbooks from Kno.com, Flat World Knowledge or published through CourseSmart; e-content from Connexions; or Inkling interactive textbooks.
-   *second generation iPad 2s (with cameras)* for undergraduate course uses involving use of the camera, such as videoconferencing, or students creating mobile multimedia.

3D Explorations

DDI continues to sponsor investigations into the possibilities of capturing, creating and displaying 3d video and/or 3d computer models on consumer level 3d displays, and to what extent academic work with 3d is feasible with this consumer equipment. The three main areas of DDI 3d investigations and our findings in each area are summarized below.

	Activities/findings in 2010-11	Exploration for 2011-12
Capture *video camera options for shooting 3d content*	Purchased several "flip-style" 3d cameras capable of shooting side-by-side mid-quality footage **Aiptek 3D cameras were made available for two-week checkout**	The market for prosumer cameras still emerging. For 2011-12, explore a basic model (i.e. Sony Bloggie hi-def 3d) as well as a higher end model (i.e. Sony full hi-def two lens camcorder) to compare the workflow of capturing different quality 3d footage.
Creation *computer setups necessary for modeling and viewing 3d content*	Creating a 3d production workflow is still a pretty daunting task, given the fluid state of the technology and lack of clearly defined use cases. Many variables and options exist with hardware (computer, graphics cards, etc), software (3d creation software, Maya), and displays.	As the technology begins to converge on a workable solution, create a proposal to purchase a system. The display system (below) will help gauge interest and ideas from potential users.
Display *Enabling the Duke community to explore how 3d might impact the educational experience, including exploring the market of existing 3d content with educational value*	Purchased a 46" 3dTV ; arranged educational content from a 3rd party vendor. Promoted exploration and gathered feedback at the CIT showcase *Steve Toback (OIT) demonstrates the 3D TV to Patrick Daniels (A&S) at the 2011 CIT Showcase.*	Bring the 3d display TV to other locations for further user exploration. Set up a second system for display using different technology (active vs. passive glasses) or a different form factor (fixed projection or flat panel).
Go online	**Neuroscience Methods in 3d – Craig Roberts** Craig Roberts created 2D and 3D movies of scientists' performing and explaining advanced neuroscience techniques and tested their relative educational effectiveness in his Spring 2011 Neuroscience Methods course.	

Instant class feedback without clickers

Poll Everywhere is a web-based alternative to "clickers" or student response systems. In some Duke classes, students are required to purchase clickers in order to vote during class. With Poll Everywhere, students use whatever they have with them: a phone capable of sending text messages, or a smart phone or computer using wireless internet access. A DDI program explored whether PollEverywhere represents an easy to use, scalable alternative to hardware-based classroom polling technology currently in use at Duke.

In 2010-11, the Poll Everywhere program aimed to:

- Identify the pedagogical benefits and drawbacks to this technology, for instance, to determine if using phones or other devices distract students in class
- Test the desirability and feasibility of tracking individual student answers (for quizzes or for attendance) with student-owned devices
- Identify logistical and technical issues with using student-owned devices as clickers, including
  - the percentage of students who can/are willing to participate
  - the technical feasibility of this solution (e.g. cellular reception for different phone service providers)

Licenses purchased by DDI were actively used by 3 faculty teaching large courses; the total enrollment across these three was over 700 students. One additional faculty member used it periodically. Faculty found that Poll Everywhere could be successfully used to support the following teaching goals:

- **Spurring class discussion**: question prompts are projected onto the screen during class, with students voting their response by text message, via their smart phone web browser, or via web browser on a laptop. The aggregate responses are displayed in realtime back to the students.
- **Assessing student understanding**: question prompts enable students to respond to an in-class ungraded quiz question, assisting the instructor in gauging what proportion of the students understand the concepts being discussed
- **Promoting active participation**: periodic interactive polling helps to engage students and avoid passive classroom environments
- **Surveying student opinions**: faculty used questions to provide a way for students to anonymously voice their opinion on a controversial topic and let the class as a whole view these results

In addition, Faculty reported that about 70% of the students in PollEverywhere classes respond to polls, although if used too frequently (>1 or 2 times per class session), they observed that this proportion declined to roughly 50%. Faculty estimated that about half of students used smartphones, about one quarter used feature

phones, and the remainder used laptops, iPads or iPod touch devices. Faculty stories of their classroom use of can also be found on CIT's web site: Instant class feedback without clickers. Poll Everywhere was also used for FroshLife (Froshlife used Poll Everywhere – should you?), enabling the audience (who could view either in person or via webcast) to vote via text message or web browser for the "People's Choice" award. During the ten minutes voting was open, 230 people responded.

Whether Poll Everywhere represents a viable alternative to hardware-based clicker solutions has not been answered definitively. Recent infrastructure improvements may enable more thorough testing of this technology; current plans will extend this program for one additional year to determine whether removing technical barriers will enable a broader range of uses (including required student use).

Multimedia equipment pool

Over the past several years, the multimedia equipment pool managed by the Link service desk has grown in both size and popularity. What began as a way to provide access to loaner iPods and Flip cameras has now grown to be a diverse multimedia equipment resource with over 1100 individual items available for loan including various types of video cameras, iPads, iPods, web cameras, headsets, USB speaker phones and tripods (*see chart, right*). The equipment in this pool is used by thousands of faculty, students and staff from all parts of the Duke community every year.

Multimedia Equipment Pool # devices available by type, 2010-11	
Flip Video camera (various models)	352
Digital Video Kit (minidisc storage, standard definition)	100
Hard Drive Video Kit (internal hard drive storage, standard definition)	10
HD (high def) video kit	25
Headset w/ microphone	71
Tripod	112
Web Camera	100
Web Conferencing Kit	10
iPad (version 1)	12
iPod (5th gen)	341

Initially it was thought that this pool might ultimately fade away as more local departmentally managed resources became available; however, recent budget constraints and efforts to seek greater ways to efficiently share resources across campus have increased reliance on this equipment by departments and schools across campus. Users have been satisfied with the convenience and quality of this centralized resource, and many more faculty, students and courses have benefitted from this shared community resource. DDI funding to update and refresh the equipment pool as a central resource has been approved through 2014.

DDI 2010-11 Report Web links by section

iPad Explorations

- The iPad's impact on student's reading and writing practices
  http://cit.duke.edu/2011/06/ereading-pilot-project-the-ipad-and-reading-and-writing-practices/
- Editing and annotating documents within and outside of class time
  http://cit.duke.edu/2011/01/using-the-ipad-to-edit-and-annotate-documents/
- Interdisciplinary field research in Global Health
  http://cit.duke.edu/2011/03/ipadread/
- The iPad in Music Education
  http://cit.duke.edu/2010/09/the-ipad-in-music-education/
- iPads for ethnographic field research
  http://cit.duke.edu/2011/03/ipads-for-course-field-research/
- iPads as a tool for media comparison
  http://cit.duke.edu/2010/10/ipads-as-a-tool-for-media-comparison/
- The iPad: A Teaching Technology (Mohammed Noor, Biology)
  http://cit.duke.edu/2011/06/watch-dr-noor-explain-why-and-how-he-teaches-with-an-ipad/
- Potential ethical challenges of the iPad
  http://cit.duke.edu/2011/06/the-potential-ethical-challenges-of-the-ipad/
- Facilitating class discussions with an iPad
  http://cit.duke.edu/2010/10/facilitating-class-discussions-with-an-ipad/
- Teaching (Russian) handwriting
  http://cit.duke.edu/2010/10/teaching-handwriting-with-the-ipad/
- Dante's iPad
  http://cit.duke.edu/2011/06/dantes-ipad/

3D video explorations

- Neuroscience methods in 3D
  http://cit.duke.edu/2010/09/neuroscience-methods-in-3d/

Instant class feedback with Poll Everywhere

- Instant class feedback without clickers
  http://cit.duke.edu/2011/04/instant-class-feedback-without-clickers/
- Froshlife used PollEverywhere - should you?
  http://cit.duke.edu/2010/03/froshlife-used-poll-everywhere-should-you/

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