

Cultivating Change in the Academy

50+ Stories from the Digital Frontlines
at the University of Minnesota in 2012

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Cultivating Change in the Academy



*Ann Hill Duin
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It's mid-April 2012, and spring is in the air. It's time to cultivate change.

This collection of 50+ chapters showcases a sampling of academic technology projects underway across the University of Minnesota, projects that we hope will inspire other faculty and staff to consider, utilize, or perhaps even develop new solutions that have the potential to make their efforts more responsive, nimble, efficient, effective, and far-reaching. Our hope is to stimulate discussion about what's possible as well as generate new vision and academic technology direction. The work underway

is most certainly innovative, imaginative, creative, collaborative, and dynamic.

As a collection, these chapters are about cultivating change at the University of Minnesota. Each team has worked in their patch of land. Each team has prepared the soil, chosen the seed, applied a small amount of fertilizer, and tended the garden with great care. It's not all corn and soybeans. Some planted bulbs and flowers, others planted vegetables, and a few planted acorns in hopes a huge oak will emerge in time.

When seen together, they represent a new landscape, a new academy.

So, what needs to change?

We need increased focus on student success. Here's why:

In a recent article in the *New England Journal of Higher Education*, Butler (2012) shares the current reality regarding the state of American higher education:

- *Once the U.S. had the highest college completion rates in the world, we now rank 12th among 25-35 year-olds in developed countries.*
- *The U.S. is ranked 14th out of 34 other OECD (Office for Economic Co-operation and Development) studied countries for reading skills, 17th for science and 25th for mathematics*
- *Only eight countries have a lower high school graduation rate than the U.S.*
- *Fewer than four in 10 (36%) entering freshmen obtain a bachelor's degree within four years. Within six years of entry, that proportion rises to just under six in 10 (57%).*

The official University of Minnesota 2012 Report to the Minnesota State Legislature states that graduation rates in 2012 at the University of Minnesota, Twin Cities campus, were 54% (4 year), 69% (5 year), and 70% (6 year). This indicates increased success, as in 1997 the four-year graduation rate was 15%, and in 2007, the rate was 41%. While the past decade has focused largely on increasing graduation rates by increasing the academic profile of entering undergraduates, we contend that the projects in this collection represent the change needed to continue this increase. These projects need continued cultivation as we focus on effectiveness throughout the academy; note the evidence of improvement in learning, research, and outreach/engagement.

Second, while online activity is clearly at the core of the academy's future, we need to challenge the assumption that we need a big, expensive program to get things to happen. These projects do just that.

Most recently, Harvard and MIT have committed \$60 million to offer free online courses, and two Stanford professors along with U. Michigan, Penn, and Princeton have formed a company, Coursera, to offer interactive courses. Key to these massive initiatives is a focus on a big investment in mainstream courses.

Consider the theory of the Long Tail (Anderson, 2012) and that our culture and economy is shifting away from a focus on mainstream products and toward a huge number of niches in the long tail. As the use of academic technology in these chapters attests, we can move well beyond traditional and even online "one-size-fits-all" thinking. A faculty or staff member does not need to be a superhero to get things to happen. Most projects herein were realized with limited (if any) support. These projects illustrate that everyone at the University of Minnesota has access to an outstanding set of digital tools to cultivate change in the academy. What's missing may be the critical connection with others who are already using a myriad of digital tools to cultivate change.

Therefore, we need to connect faculty with innovative work in academic technology across our academy, and we need to then extend this work throughout our state and world. These projects are a good beginning.

Earlier this year, the Office of Information Technology (OIT) faculty fellows presented a roadmap titled Engaging Faculty as Catalysts for Change: Transforming Education through University-Wide Faculty Development in Teaching with Technology. They ask, “What would it take to bring about a learning revolution at the University of Minnesota? To enable faculty to develop the skills, adaptability, and resilience they need, not simply to persist through the challenges facing the University of Minnesota, but to be catalysts for creating the future of the academy?” They call for a university-wide approach, “a coordinated, sustained, and holistic approach to faculty development in technology-rich teaching and learning” as a means toward fostering “a renaissance in learning” at the University. While most faculty and staff will not be able to devote 18 months to a faculty development program, most are excited when hearing about the innovative work underway next door, and most quickly identify ways to create similar opportunities to inspire and energize their students.

eBook organization

The majority of these chapters come from contributors who were part of the Academic Technology Showcase 2012 at the University of Minnesota <http://www.cehd.umn.edu/Showcase/>. Inspired by their posters and passion for cultivating change, we invited presenters to contribute to this eBook. Based on our work with faculty and staff across the University, we extended additional invitations as well.

The importance or relevance of these efforts may be gauged in some part by the response to our eBook invitation. Although we gave a short deadline of less than a month for submission of these chapters, a month that included the last week of class and finals week, all but a couple of those invited said yes!

We have clustered the 50+ chapters into four sections: Changing Pedagogies; Creating Solutions; Providing Direction; and Extending Reach.

1. Changing Pedagogies

While all chapters throughout this eBook are about cultivating change through the innovative use of technology, those in this first section focus on the use of academic technology to transform pedagogy. Contributors address aspects of pedagogy that have seldom (if ever) fully been addressed, moving decidedly beyond memorization to explicit attention on problem solving and interactive coaching.

These innovative pedagogical approaches remix and flip the classroom; the imaginative uses of technology emulate the behavior of expert teachers and allow students to be creative in how they explore and address critical problems. Students access computer coaches and 3D simulations, work in teams to design their own experiments, and engage in course evolution. Contributors share processes they follow, definitions and theories which influence them, challenges they face, the impact on accreditation, and the “new landscapes” that emerge.

As John Bryson states: “I certainly understood cognitively why the redesign might be good for the students. What I had difficulty taking on board was that the redesign would have me doing something less of something I actually like doing—being the major focal point of the class... My role changed to being more a designer of learning occasions, a coach, and an advisor... I came not only to accept the new roles, but to welcome them, since my students clearly were benefitting from a course in which their learning was front and center.”

2. Creating Solutions

The chapters in this section focus on how to create solutions to very specific problems:

- How do you increase student engagement in online courses?
- How do you move from a course that students perceive must be “gotten through” to a course that motivates learners and transforms learning?
- How do you help students maximize their “learning” time and concept mastery?
- How do you compensate for the lack of visual “presence” in an online course?
- How do you provide project management assistance?
- How might students better develop technological and scientific literacy?
- How do you foster independent learning and lifelong learning skills?
- How has the evolution of technologies opened up new options for research and customized assessment?

The solutions shared in this section indicate how the innovative use of academic technologies add value and increase efficiency and effectiveness. The solutions include imaginative uses and development of videos, podcasts, vodcasts, and simulations; they indicate how faculty and staff are using GoToMeeting, Moodle, Blackbag, iPads, Camtasia Relay, Skype, Ning, and Google Apps. Those on the digital frontlines at the University of Minnesota are indeed focused on student success.

3. Providing Direction

The chapters in this section illustrate how innovative leadership – at system-wide, campus, collegiate, and departmental levels – has stepped forward to provide direction and support for cultivating change. These contributors challenge the assumption that we need a big, expensive program to get things to happen. In contrast, they illustrate the power and potential of strategic, focused investments. As Claudia Neuhauser states, “A small investment in additional analytical capabilities to develop individualized education could allow the University to develop a sophisticated tool kit that would produce reports and predictive models that are tailored to each college and coordinate campus, thus turning data into actionable knowledge at a local level... This new approach to analyzing student data would lead to the development of tools for advisers and students to personalize the educational experience...thus realizing the vision of individualized education.”

For example, the University Digital Conservancy (UDC) provides free, worldwide access to research and scholarship contributed by faculty and staff at UMN, currently hosting over 23,000 works that have been downloaded over 1.5 million times. Growing exponentially, the UDC provides the permanent URL for this eBook collection: <http://purl.umn.edu/125273>. And in another Libraries initiative, with no budget but armed with great social science expertise, the authors used a free resource—Dataverse <http://www.economistsonline.org/>— as a solution for making data available.

Likewise, the Center for Writing, with an investment of \$12,500, created suites of videos that now provide support for multilingual writers across the University. And in the College of Veterinary Medicine, they “counterbalance” the scarcity of direct support with strong collegiate and departmental support for innovative teaching technologies.

These chapters are also unique in the level of faculty and student influence in providing direction: Across the University, the visionary U-Spatial project leverages expertise in the spatial sciences, eliminating duplication and providing a framework of data, equipment, expertise, and resources that benefit all researchers. At the collegiate level, the School of Pharmacy is using a suite of cloud-based resources to diversify the conversation and speed up their curricular revision process. Those providing

support for the iSEAL course management system at UM Rochester emphasize that it is the faculty's responsibility to request new features and enhancements and provide development direction. And at UM Morris, as a result of listening sessions with students, IT support is moving forward with mobile computing and mobile learning.

4. Extending Reach

While all chapters in this eBook represent the University's Land Grant Mission in action, the chapters in this final section most explicitly indicate our expanded engagement via innovative uses of technology.

These programs use technology to reach well beyond the fences of the academy. For example, the Ambit Network has trained 240 mental health providers from 43 agencies in Minnesota, screening 1,300 children for trauma and post-traumatic stress. Programs in Nursing and in Clinical Laboratory Sciences share lessons learned as they changed their course delivery to accommodate distance students' needs and to provide equitable instruction on other campuses. These new online programs work to meet impending shortages of clinical laboratory personnel and to provide in-service training for clinical affiliate preceptors throughout our region.

The innovative use of iPads extends the reach of teacher education through supporting the assessment requirements in the field; iPads likewise assist field scientists with 25 unique studies across 50 experimental sites in 30 locations across the state. Digital storytelling deepens engagement and cultural awareness for students studying locally as well as preparing for and studying abroad, and online training modules raise the visibility of children's needs among battered women's shelter advocates. Researchers are changing strategies to meet the needs of a social and mobile population; they are collecting data via texting, transitioning computer courseware to mobile web apps, and building mobile technology training for response to disasters.

Conclusion

This collection of innovative stories from the digital frontlines is about evolutionary, incremental transformation. It's about springtime where the earth around us changes; it's about the importance of the ecosystem in cultivating change. When taken one by one, the overall changes are strategic, but when taken in the aggregate, they represent significant change in the academy.

This collection of innovative stories is a reminder that we are a collection of living people whose Land Grant values and ideas shape who we serve, what we do, and how we do it. Many of these projects engage others in discourse with the academy: obtaining opinion or feedback, taking the community pulse, allowing for an extended discourse, and engaging citizens in important issues.

Last, consider the seed savers exchange where gardeners collect and distribute thousands of rare seeds to others (<http://www.seedsavers.org>). When my beets grow better than yours, I give you some seed. I'm glad to share it with you. Our hope is that as you read these chapters, you'll think, "I could do that!" And you know that when you contact a contributor here, the person is ready to share, ready to help, ready to envision the future together, ready to cultivate change.

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Ann Hill Duin is a professor in the Department of Writing Studies where her research focuses on shared leadership and the impact of digital technologies on communication and collaboration. Having pioneered the University's first online course, she continues to teach hybrid and online courses on information design and plans to develop a MOOC.



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Farhad is in Academic Technology at the Office of Information Technology. Since the days of the fledgling Internet to our now pervasive network and ubiquitous mobile devices, he has worked to bring new applications of digital technologies to Higher Education.



Annotated Table of Contents

(alphabetical by author)

Creating Custom Learning Assessment and Student Feedback Applications with Google Apps Script. *Abram Anders.*

The Google Apps for Education platform offers a wide range of tools and opportunities for pedagogical innovation. These services can be even further extended through the use of Google Apps Script to automate repetitive workflows across Google services. This chapter offers a case study and rationale for using apps scripts to facilitate assessment of student learning and to automate the creation of individualized student feedback reports.

Podcasting: Learning On-the-Go. *David Arendale.*

Podcasting technology allows students to learn on-the-go by downloading audio files to their iPods and smartphones and listening to them when they want. The audio podcasts were cocreated by the course instructor and the enrolled students. This chapter describes how podcasting and other Web 2.0 technologies have been used in an introductory history course during the past five years. Research indicates podcasting helped some students earn higher grades and was a positive factor with course satisfaction.

Reaching Out: Making Graduate Nursing Education Accessible. *Melissa D. Avery.*

Access to graduate nursing programs can be difficult for practicing registered nurses who reside in communities geographically distant from traditional university programs. This chapter documents the redesign of face-to-face graduate specialties in midwifery, public health nursing, women's health and psych-mental health nurse practitioner, and systems leadership to a blended hybrid distance methodology as well as important scholarship resulting from this work. As educational technologies advance through the use of cloud computing and mobile technology, we continue our partnerships with educational and technology design professionals and library staff to continue finding the best ways to support students and faculty in online teaching and learning.

Digital Technology for Feminist Pedagogy: A Useful Method for Learning Key Concepts in a Changing Academic Landscape. *Katie Bashore and Jigna Desai.*

This project emerges from the intersection of feminist studies and technology education. We developed digital learning modules that both explain and expand concepts foundational to feminist thought, which then serve to supplement in-class learning. The modules provide students an out of the classroom opportunity to practice key concepts that increase their fluency in feminist theory, while allowing instructors to develop individual learning outcomes.

The 'WRIT VID' Project Incorporating Multimodal Components into Text-Only Online Writing Instruction. *Lee-Ann Kastman Breuch, Barbara Horvath, Shannon Klug, Dawn M. Armfield, Kimberly Thomas-Pollej, and Laura Pigozzi.*

This chapter describes the development of instructional videos for use in an online writing course, WRIT 3562W: Technical and Professional Writing. This project incorporates multimodal components to support student engagement in online courses. Also, the project reinforces recent scholarship in writing studies towards multimodal writing. The team, supported by a Course Transformation Program (CTP) grant at University of Minnesota, developed storyboards and videos on topics such as writing instructions, analytical reports, peer review, plagiarism, visual rhetoric and document design, and choosing online courses.

The Drive to Digitize. *Mauri S Brueggeman, Cheryl Swinehart, Janice Conway-Klaassen, and*

Stephen M Wiesner.

In response to programmatic expansion with limited physical assets, microscope slides were digitized and made available to students via the Internet. Data demonstrate that students utilizing the digital slides outperformed traditional students. A deliberate, thoughtful review of curricular components that can be delivered digitally will facilitate effective implementation of distance education strategies.

These strategies are most successful when the digital environment is designed for the content being delivered. Cumbersome modifications made to adapt content to the digital environment often results in a less effective learning experience for the student.

Stimulating Strategic Thinking and Learning in a Strategic Planning Course. *John M. Bryson.*

This chapter reports on the redesign of a popular Humphrey School of Public Affairs course called “Strategic Planning and Management.” The course was redesigned to more authentically replicate strategic planning and management in practice and make better and more constructive use of educational technology. The course redesign has addressed the challenges that prompted it, and student course evaluations are higher than ever.

The River in the Classroom: Digital Storytelling that Fosters Community, Deepens Engagement, and Cultivates Global Awareness. *Linda Buturian.*

Each undergraduate student creates a digital story as a capstone project in a writing intensive seminar on water that integrates disciplines representing both the sciences and the humanities. The 6-10 minutes stories, which feature interviews with relevant specialists, are shared on a public university website, and serve as models for future students. This chapter highlights the impact of the digital story assignment on the students, and assesses the role of technology, in terms of both form and content, in teaching and learning.

Repairing the Break -- An Anatomical Saga. *C. E. Clarkson and Kimerly J. Wilcox.*

Veterinary gross anatomy, a course taught early in the four-year veterinary program, is an interactive, technology-rich course primed for success. However, there is a critical problem: a deficiency in students’ anatomical knowledge retrieval when problem solving clinical cases during the fourth year clinical rotations. This chapter summarizes current technology within the course and describes the addition of Moodle-based clinical cases for anatomical problem-solving (teaching in context) as an important step toward healing this knowledge “break”.

Using Online Instruction and Virtual Laboratories to Teach Hemostasis in a Medical Laboratory Science Program. *Janice M. Conway-Klaassen, Stephen M. Wiesner, Christopher Desens, Phyllis Trcka, Cheryl Swinehart.*

Because of significant changes in clinical practice and the need to provide equitable instruction at a distant coordinate campus; our program had to develop a new method of delivery for the Hemostasis course. Working with an instructional design team versed in online education, we created five virtual Hemostasis laboratory exercises and web-based lecture modules. Evaluation of these new course materials showed that students in the virtual delivery format performed significantly better on course exam questions compared to the traditional delivery method group, but there was no significant difference on their performance on the national Board of Certification exam.

Development of Online Conferencing and Web-based In-service Modules for Clinical Preceptor Training. *Janice M. Conway-Klaassen, Patricia J. Brennecke, Stephen M. Wiesner, and Donna J. Spannaus-Martin.*

As our allied health program increased enrollment, we were faced with the need to drastically reshape our clinical instruction format to provide for the additional numbers of students and yet not interfere with the primary purpose of our clinical sites; patient care. After revising our clinical experience program we also needed to provide in-service training for all clinical affiliate preceptors throughout the region. We

developed a combined delivery approach including web-based conferences and teleconferences, self-tutorial modules in Adobe Flash, and resource materials in our course management system. This has proven to be an efficient and effective method of communication with our clinical affiliates.

Video Podcasts (Vodcasts) Add Life to General Zoology! *Sehoya Cotner, Joseph Kleinschmidt, and Michael Kempnich.*

In Spring 2011 and Spring 2012, 211 students in General Zoology at the University of Minnesota participated in a new project—small-group production of five-minute video podcasts (or “vodcasts”). We introduce these vodcasts, discuss project assessment, and offer suggestions on how this activity could be incorporated into other classes.

iSEAL: An Integrated Curriculum in its Natural Habitat. *Linda Dick, Andy Franqueira, and Jeremiah Oeltjen.*

iSEAL (intelligent System for Education, Assessment, and Learning) is the unique curriculum management system and assessment tool developed for and used by the faculty at the University of Minnesota Rochester. The project has two main goals: to deliver the highly integrated curriculum for the Bachelor of Science in Health Sciences degree program and to facilitate the faculty’s collaborative research in teaching and learning.

Everyone's a DJ: Defining the Instructional Remix. *Joel Dickinson and Sara Hurley.*

In this modern age, everyone’s a DJ – whether they know it or not. DJs create new meaning by blending records, samples and other aural elements together, just as instructors and instructional designers blend content together in new ways to create learning experiences that are engaging and innovative. These include a combination of ideas, cultures, and areas of knowledge in interdisciplinary work and the mingling of identity between our academic, personal, and professional selves.

Chemistry, Creativity, and Curricular Experiments. *Michelle D. Driessen.*

This chapter describes the transformation of large enrollment general chemistry laboratories from verification to project-based. The critical role of technology in managing the large student population and TAs is described.

3D Simulation and the Apparel Design Curriculum. *Lucy Dunne.*

Although 3D simulation technologies in combination with CAD-based drawing tools are well-established and have generated important changes in working processes in many design fields, apparel design has resisted integration of such technologies both in education and industry. The advantages and challenges of adopting 3D simulation technologies to augment or replace components of the design and development process are not the same for academia and education as they are for industry. This article discusses experiences integrating 3D simulation technology into the apparel design curriculum and explores the benefits and challenges for apparel education.

Looking for Connections: Pulling Together Collegiate Initiatives to Create a Concept for High Impact Experiential Learning Experiences in Environmental Sciences, Policy and Management. *Leonard C. Ferrington Jr.*

On-line social media will be used in a high impact Experiential Learning Experience for freshmen studying Environmental Sciences, Policy and Management. The concept integrates a freshmen seminar with a study abroad component and a service commitment (i.e., not for credit). We will use a technology enhanced classroom so every student will have access to the internet during each class period. Social media will facilitate real-time discussions with students studying similar issues in Environmental Sciences of target country, Iceland, before departure, and is expected to substantively enhance the learning abroad experience through internet-facilitated discussions of how differing national policies serve the conservation of similar resources in different countries.

Increasing Access to Mental Health Care. *Heidi Flessert and Abigail Gewirtz.*

In an effort to increase access to evidence-based treatments for high-risk families and children, Ambit Network partnered with community mental health agencies across the state to train mental health providers on Trauma-Focused Cognitive Behavioral Therapy (TF-CBT). In this chapter, we address barriers to community implementation in the mental health field and discuss the low-cost innovative solutions employed that led to the successful implementation of TF-CBT across the state of Minnesota.

Transitioning Computer Courseware to Mobile Web Apps. *Thomas F. Fletcher.*

To exploit the learning potential of mobile devices, we are converting existing web based computer courseware into mobile web apps. The conversion necessitates screen redesign and the selection of a new development platform. Screen redesign is discussed in the context of particular courseware: Neurobiology Concepts Checker. An overview of the jQuery Mobile development platform is presented.

Weaving Research, Policy, Practice, and Technology: Building a Community of Practice across Early Childhood Partners Using CLASS™. *Rosemary Frazel and Vicki Hawley.*

The mission of the Center for Early Education and Development (CEED) at the University of Minnesota is to improve developmental outcomes for children through research, training, and outreach. We are a gateway for community members to access the research resources at the University. This article describes CEED's use of online tools to support practitioners in the field of early care and education.

Use of Screen Capture Technology to Record Student Presentations Promotes Active Learning in a Large Classroom. *Kathryn Fryxell, Patricia Goodman-Mamula, Martin Wolf, and Rebecca Merica.*

We have introduced student presentations into our curriculum using a screen capture technology, Camtasia Relay, in order to promote active learning in an undergraduate Microbiology class of 240 students. The use of this software was a novel approach to record student presentations since the majority of our students reported never having used screen capture technology. We believe this led to a sense of ownership, which improved the quality of student projects. Working in small groups, students engaged in active learning by using skills necessary for teamwork, communication, organization and technology.

R U Up 4 It? Collecting Data via Texting: Development and Testing of the Youth Ecological Momentary Assessment System (YEMAS). *Carolyn Garcia, Gyu Kwon, Rachel Hardeman, Therese Genis, Sonya Brady, and Bonnie Klimes-Dougan.*

To address challenges associated with traditional ecological momentary assessment (EMA) methods, we developed a University-based system, Youth Ecological Momentary Assessment System (YEMAS), to facilitate secure, automated, momentary data collection via SMS/text messaging. In this chapter we describe the system development process, the system features, and the benefits to researchers and professionals seeking to collect real-time data from individuals using text messaging or other e-health/mhealth tools.

The Survey Research Project: Technology and Research with Introductory Level Undergraduates. *Tabitha Grier-Reed and Emily Karp.*

Creative use of technology has made it possible to implement pedagogy in which students in 60 person introductory level psychology courses engage in the process of knowledge production through original research. As part of a research team, including a project manager, data collector, programmer, analyst, report writer, and editor, students work together to develop a research question of interest, hypothesis, and survey. They collect and analyze data, and then summarize their study in a scientific report. The technology is multi-faceted.

Writing, Speaking, and Digital Technologies: Multimodality in the Classroom. *Laura J. Gurak.*

Digital writing technologies are ubiquitous for today's students. The challenge for university teaching, where writing undergirds almost every assignment, is how to engage these students so as to leverage their digital talents in ways that redefine traditional academic forms of production. This chapter describes the experience of having students research, write, produce, and publish podcasts as the major assignment in a class called "Writing with Digital Technologies."

Brave New World: M-learning and Beyond. *Jim Hall.*

As students increasingly bring mobile devices onto campus, colleges and universities need to develop new strategies to support them. With the widespread adoption of these mobile devices, e-learning quickly shifts to learning on the go. With mobile learning, or m-learning, students continue to interact with e-learning systems throughout their university career, but they increasingly do so via mobile devices such as tablets and smartphones. This radically changes the new model of e-learning and how students access e-learning systems. Jim Hall reviews the mobile trend, and discusses its impact at the Digital Frontlines of college campuses.

CEHD iPad Project: Learning Anywhere, Anytime. *Amanda Hane.*

The College of Education and Human Development (CEHD) within the University of Minnesota has the largest experiment for usefulness of the iPad by any college of education in the nation. Nearly 30 faculty members in the Department of Postsecondary Teaching and Learning (PsTL) received iPads and training to integrate them into the first-year classes. This chapter presents an overview of one faculty member's motivation for using the iPad, implementation of the iPad in his courses, evaluation methodology, and key findings from the study.

U-Spatial: Support for the Spatial Sciences and Creative Activities. *Francis Harvey, Len Kne, Steve Manson, and Kris Johnson.*

U-Spatial networks data, equipment, and expertise to benefit all researchers working with spatial science and creative activities at the University of Minnesota. U-Spatial advances the central mission of a 21st century land-grant research institution because it enables new modes of inquiry that are crucial to addressing complex problems and opportunities.

The Cloud Curriculum: Using Web-based Technology to Diversify the Conversation and Build Consensus Toward Curricular Revision. *Jude Higdon and Charles Taylor.*

The administration in the College of Pharmacy at the University of Minnesota leveraged low activation energy, cloud-based tools to reach out to our faculty, engage them in discourse, diversify the conversation, and build consensus for our curricular revision effort, with heartening results.

Nimble Instructional Design: Using Instructional Assets for Derivative Works for More Learner-centered Instruction. *Jude Higdon, Annette McNamara, and Mark McKay.*

In an increasingly fast-paced, quick-changing technological landscape, it can be difficult to know what tools to develop in to meet learners' needs. At the University of Minnesota College of Pharmacy, we have found that the investment in good instructional design can pay rich dividends by allowing us to quickly and easily create derivative works in new formats, such as online games and eBooks.

Creating and Incorporating an Online Simulation to Teach Antibody Identification in the Clinical Laboratory Science Curriculum. *Jason Hill and Joanna George.*

Clinical Laboratory Science (CLS) program expansion to a second site at UMN necessitated the development of an interactive computer program for teaching antibody identification via distance. This program was implemented in CLSP 4501 in March 2012. This module was demonstrated at the Clinical Laboratory Educator's Conference in February 2012, and 36 CLS programs from around the country have expressed interest in the product as a continuing education and cross training tool.

Web-based Problem-solving Coaches for Physics Students. *Leon Hsu, Ken Heller, Qing Xu, and Bijaya Aryal.*

The ability to solve problems is a major goal of education, yet helping students to acquire effective problem-solving skills is a difficult task. We are using computers to provide students with individualized coaching in the decision-making process inherent to expert-like problem solving. These computer coaches are being developed within an apprenticeship framework in the context of an introductory physics course.

STREET: Where Simulation Meets Reality. *Arthur Huang and David Levinson.*

Simulations and games are receiving increasing attention in teaching in higher education. In this context, we developed a series of simulation modules (STREET) in transportation engineering education and applied them in teaching undergraduate and graduate transportation courses at the University of Minnesota. After several years, we contend that they represent an effective pedagogical tool in transportation education. In this chapter we describe our motivation for this work, the program's development process, dissemination and impacts, and our future work.

Mobile Technology Training for a Public Health Response to Disasters. *Sara Hurley, Amy Scheller, and Debra K Olson.*

The Centers for Public Health Education and Outreach at the School of Public Health have been working with public health emergency responders for many years. As mobile technologies and social media usage have proliferated, it has become necessary for public health emergency response training to adapt integrate these concepts and tools into their culture so that they are ready to address emergencies and crises. We discuss our path to finding out what opportunities and barriers exist with this population, how to act as advocates for education and organizational change, and all of the intersections that encompass building networks, empowering users, and creating mobile trainings.

Technology Across Borders: Online Resources to Support Multilingual Writers. *Kirsten Jansen, Debra A. Hartley, Kimberley A. Strain, Zachary Pierson, Daniel Balm, Johanna Mueller, Katie Levin, Maija Brown, Huy Hoang, Farha Ahmed, Linda Clemens, and Mitch Ogden.*

This project was designed to strengthen the Center for Writing's support for multilingual student writers by developing online tools that targeted their needs and showcased their skills, strategies, and experiences with learning American academic writing conventions. Our "Technology Across Borders" team (1) created two "class visit videos" to replace our popular in-person informational class visits; (2) interviewed multilingual writers and instructors from around the globe and across the disciplines to learn about their experiences developing fluency in American academic English; and (3) developed an instructional module to support the teaching and learning of when to use articles (a/an, the, or no article) in English.

University Digital Conservancy: A Platform to Publish, Share, and Preserve the University's Scholarship. *Lisa Johnston, Erik Moore, and Beth Petsan.*

The University Digital Conservancy (UDC) is a web-based tool that provides free, worldwide access to research and scholarship contributed by faculty and staff at the University of Minnesota. The UDC software provides searchable, full-text access to deposited work that will rank highly in web search engines (like Google) and also ensures long-term access to content with permanent urls (no more broken links). This library-run repository began in 2007 and now contains (as of May, 2012) over 23,000 digital works that have been downloaded over 1.5 million times.

Opportunity Knocks: Dataverse as a Solution for a Small Economics Data Archive. *Julia Kelly and Amy West.*

Preservation and reuse of data are topics of growing interest among many disciplines. The AgEcon Search repository is experimenting with using Dataverse, the free software developed at Harvard for

hosting social science data, as a solution for a small professional society that is seeking an inexpensive option to offer its members and the authors submitting to its journal who would like to make their data publically available.

Using Technology to Highlight Children's Experiences of Domestic Violence. *Ericka Kimball, Hoa T. Nguyen, and Jeffrey L. Edleson.*

The Honor Our Voices online training module presents children's perspectives of domestic violence using an online diary format. The use of technology assisted in bringing these experiences to life using visual and audio technology. Much of the success of the project is related to the working relationship between the funder, research content, and web design teams. The project has been well received nationally prompting MINCAVA to develop other online learning modules.

Costa Rica Digital Exploration. *Connie Magnuson.*

Students created digital stories that depict particular topics related to our travel to Costa Rica. These brief videos are informative and incorporate first hand accounts using research, expert interviews and actual photos and footage shot during our travel. Their projects are posted on our website and on YouTube to share with the public.

Supporting the Technical Requirements of the Teacher Performance Assessment Protocol.

Pete McCauley and Elizabeth Finsness.

The Teacher Performance Assessment (TPA) is a nationally available assessment of teacher candidates' readiness to teach, focusing on the impact the teacher has on student engagement and learning. How could we provide resources, support, and instruction in order to help facilitate the teacher candidates' recording and submission of videos for the TPA without asking them to become video production experts? We found our answer with Apple's iPad 2 product.

Avenue: Innovation and Transformation in World Language, Reading, and Writing e-Assessment. *Charles Miller, Lucas Lecheler, and Susan Rose.*

The Avenue platform, designed and developed by faculty in Learning Technologies, Educational Psychology, and the LT Media Lab at the University of Minnesota, is an innovative e-assessment system for learner performance evaluation, specifically in the contexts of language performance, reading, and writing development.

How Moodle, "Ladders", "Flipped Classrooms" and "Change-up" Created Value-added Redesign in the Medical School. *Anne G. Minenko.*

This chapter is a 'can do' story of how Rheumatology, a small medical school division, used education technology to operationalize 'ladders', 'flipped classrooms' and 'change-up' models to deliver integrated, interactive and independent learning activities, as part of a major curricular revision, without compromising the patient care mission.

Adventures with Clickers in Veterinary Medical Education. *Laura Molgaard, Deb Wingert, Al Beitz, and Dave Brown.*

The University of Minnesota College of Veterinary Medicine has been on a 10 year journey with the use of "clickers" (wireless response systems) in a professional curriculum. Early experiences were frustrating with limited adoption but more recent experiences with a radiofrequency WRS have proven to be rewarding for faculty and engaging for students.

Synchronous Online Teaching as a Component of a Fully Online Course. *Helen Mongan-Rallis.*

This chapter describes the evolution of an instructor's teaching using a variety of emerging educational technology tools, experimenting with different flipped classroom approaches to maximize student

learning time both in and outside of class. The author shares how her choices of technologies and pedagogical approaches have been shaped by the changing needs and skills both of her students and herself. She describes how she has developed an approach to teaching a fully online course with a synchronous component using Adobe Connect and Moodle, and reflects on lessons learned and hopes for the future.

Pedometers and Paragraphs and Social Online Writing Networks. *Joe Moses.*

This chapter asks how social online writing network (SOWN) designs that include project-management tools to compensate for lapses in traditional classroom instruction can improve the timely completion and quality of students' writing projects. I share three stories that overlap in time during spring semester of 2012 and conclude with directions for research on the impacts of SOWN designs on teaching and learning.

From Academic Analytics to Individualized Education. *Claudia Neuhauser.*

Academic analytics is an approach that benefits from the same methods that are currently being developed in bioinformatics to advance individualized medicine. Academic analytics holds the promise to turn the deluge of educational data into actionable knowledge to guide resources to where they have the biggest impact on student success. It also provides the methodologies to develop individualized education where students can take control of their education, and advisers can base their advice on evidence extracted from a large and growing data set.

"Flipping" the Classroom in a Sensation and Perception Course. *Cheryl Olman, Stephen Engel, and Thomas Brothen.*

Traditionally, a Psychology department's Introduction to Sensation and Perception is a survey course presented in a large lecture hall. However, the course teaches about a such wide variety of sensory experiences that it is bristling with opportunities for active learning. The large class size makes this a challenge, but flipping the classroom enables this goal. Basic lecture material is provided in the form of online video segments with integrated slides; students watch this basic material on their own time and come to small discussion sessions once a week prepared to learn about new scientific developments and participate in a wide variety of perceptual experiments with their classmates.

Online Emergency Risk Communication Simulation. *Jeanne Pfeiffer and Nima Salehi.*

This chapter describes the development of an emergency risk communication simulation activity from an in class to a fully online activity. The challenge was in how to make this activity effective online, and determining what technologies would be the most efficient in facilitating each step of the activity in a user friendly manner. Pre and post survey results indicate that the activity raised students confidence levels for emergency communication.

"But I'm Giving Up Lecture Time!" Alternative Teaching Methods for Pathology. *Rob Porter, Erik Olson, and Deb Wingert.*

We created an interactive cooperative learning poetry wiki project in an attempt to enhance engagement and understanding of selected gastrointestinal pathology topics in second year veterinary students. Veterinary students were given a pre-test on pathology and then randomly placed in one of 23 wiki groups, each corresponding to a specific pathology topic. Students used their wiki sites and followed a rubric to research and build a list of key words and phrases. From this list they created an online poem on the specific topic, with the understanding that this poem would be used to educate their peers. Poems were collated with brief notes on alternative pathology topics and shared with the entire class. Students studied both poems and notes before taking a post-test. Results indicated that all students scored significantly higher on post-test ($p < 0.01$) than pre-test; however, scores on post-test questions were higher regardless of whether the topic was taught by reading poems or notes. An online survey of student opinions indicated that the cooperative learning poetry project engaged most

students and enhanced learning through the required research to satisfy the construction rubric.

Finding NILMO: Integrating Curricular Development, Technology, and Educational Research.

Amy J. Prunuske and Jacob P. Prunuske.

The amount of information delivered in medical education curricula has expanded rapidly in recent years. New and innovative curricula must cover advances in scientific knowledge, technology, and expanded core competencies in medical education, and must do so with the same or even less curricular time than in the past. When the course director for Neurological Medicine asked us to develop a series of online modules for the course, we were intrigued by the opportunity and challenge. We believed restructuring this part of the curriculum from in-class lectures to independent learning could foster lifelong learning skills in our students. We developed seven modules that we called NILMOs (Neurology Independent Learning Modules Online).

Technology in the Field. *Andrew Scobbie.*

The use of technology in the agricultural field has provided many tools for producers to perform their job, both applying and collecting information. These tools are also of great value in providing new methods to carry out our research. The adoption of this technology has increased our use of and dependence on electronic communication. This has provided a relatively easy step in adopting the iPad to help communicate the necessary information to perform our job. With an ever expanding workload and personal to perform it, the iPad has performed well in keeping us current with the information and needs required to complete our tasks. While email and web access is more efficient the primary benefit is from the automatic update of information files through several apps. It certainly has proven to be much more a tool than a toy.

From Synchronous to Asynchronous: Researching Online Focus Groups Platforms. *Alfonso Sintjago and Alison Link.*

After conducting focus group for over 30 years, Dr. Richard Krueger, with the help of Dr. David Ernst, CE+HD Director of Academic Technologies, organized a course around the idea of testing various online platforms' strengths and weaknesses for hosting focus groups. The project involved 10 other co-investigators at the University of Minnesota, all with a strong background in conducting focus groups and using technologies in innovative ways. The group analyzed potential platforms for online focus groups in terms of their cost, information privacy, administrative requirements, ease of navigation, hardware requirements, data capturing process, and other criteria. Our goal was to come up with cost-effective solutions for translating the anatomy and the essence of a face to face focus group to an online environment.

Creating Productive Presence. *Bill West.*

Using technology to create presence in the online classroom is an ongoing project that is designed to contest pedagogical theory while testing it. Two different instances of presence creation are described. The first creates a presence that students know is fading. The second is attempting to automate presence.

Changing Pedagogies



While all chapters throughout this eBook are about cultivating change through the innovative use of technology, those in this first section focus on the use of academic technology to transform pedagogy. Contributors address aspects of pedagogy that have seldom (if ever) fully been addressed, moving decidedly beyond memorization to explicit attention on problem solving and interactive coaching.

Web-based Problem-solving Coaches for Physics Students

Leon Hsu

Ken Heller

Qing Xu

Bijaya Aryal

<http://groups.physics.umn.edu/physed/pscoaches.html>

Introduction

The ability to solve problems in a variety of contexts is an essential skill for all citizens of a modern society and is a major goal of education. Problem-solving skills are particularly important to scientists and engineers and because introductory physics is a gateway course for study in nearly all science, technology, engineering, and mathematics (STEM) fields at the postsecondary level, it is an ideal venue for teaching problem solving. However, although most introductory physics courses have the appearance of emphasizing problem solving, studies have shown that the majority of their students make little progress towards developing good problem-solving skills (Reif, 1995).

Researchers have shown that it is possible, through targeted efforts, to improve students' problem-solving skills (see Maloney (1994) and Hsu, Brewe, Foster & Harper (2004) for overviews). The common thread running through these efforts is that they are all explicitly or implicitly based on the cognitive apprenticeship model (Collins, Brown & Newman, 1989). Two key features of this approach are that the cognitive processes necessary for solving problems are made explicit and that students practice using those processes to solve problems while receiving guidance and feedback. In contrast, traditional forms of instruction are less explicit about the strategic problem-solving process and do not include explicit coaching, instead focusing on tactics for a specific type of problem. One significant difficulty with implementing coaching however is that the opportunities for students to be coached are, at best, limited. Under such conditions, the advantages of any carefully designed curricula are diluted or can even be lost.

One possible solution to providing students with effective coaching lies in the creation of computer coaches, programs that can provide students with individualized guidance and feedback at the students' convenience. Besides being available at all hours, computer coaches have a number of advantages, including infinite patience and being perceived as less judgmental than a human tutor. They are economical to operate and cost very little to maintain. Finally, computer coaches provide reproducible instruction that can be improved incrementally.

The coaches we envision and have been developing go far beyond the many web-based homework systems available for introductory physics that either check only the correctness of a student's answer and offer very limited feedback, do not emphasize or coach the general decision-making processes involved in all problem solving, or are not easily adaptable by individual instructors to their own preferences. Although the task of creating an effective computer coach that can help students acquire better thinking skills is a difficult one (as evidenced by the fact that such coaches are not already a common component of education), we believe that using computers in this way has the potential to dramatically transform the nature of education.

Theoretical framework

The overall theoretical framework of these coaches is Cognitive Apprenticeship (Collins, Brown & Newman, 1989). Although human learning is complex and individual-specific, one type of pedagogy, apprenticeship, has been extremely successful for human learning throughout history and across cultures. Cognitive Apprenticeship analyzes the pedagogy of apprenticeship and applies that pedagogy to the intellectual processes usually taught in a classroom. Within this theory, the necessary functions of teaching include the actions of modeling, coaching, and fading, supported by temporary instructional tools called scaffolding. Essentially, modeling is showing students precisely what you want them to do by making all the intellectual processes visible. Coaching is giving students real-time feedback as they attempt the task by following the model in their own way. Fading is giving students the opportunity to do the task themselves without guidance or real time feedback. Scaffolding is temporary supports, or “training wheels,” that are removed as students become more proficient. All of these actions must take place in what is called the environment of expert practice where tasks include a meaningful context that have a meaningful outcome.

Teaching problem solving via a cognitive apprenticeship requires that the instructor model an organized problem-solving process that can be understood by the student, taking care to make the invisible thought processes involved visible and explicit. Interspersed with the modeling, the students need to be coached by being given guidance and feedback based on their own inclinations as they practice solving problems. The amount and focus of the coaching changes as the students become more competent at solving problems. Scaffolding such as the use of a specific problem-solving framework and problems designed to encourage expert-like behavior are introduced and removed throughout the process.

Computer coaches

The computer coaches are designed to emulate the behavior of expert teachers, incorporating the Cognitive Apprenticeship modalities of modeling, coaching, and fading. In particular, the computer coaches rely on the instructional strategies of reciprocal teaching (Palincsar & Brown, 1984) and learning from well-studied examples (Zhu & Simon, 1987). Reciprocal teaching is an instructional method consistent with Cognitive Apprenticeship in which students and teachers take turns playing the role of the teacher. To accomplish this we use two types of coaches which employ extensive scaffolding. A third type of coach emphasizes the fading part of the Cognitive Apprenticeship paradigm. Examples of the coaches can be found at <http://groups.physics.umn.edu/phyped/pscoaches.html>.

In a type 1 coach, “Computer coaches student,” the computer models an organized decision framework for physics problem solving, making the numerous automated decisions of an expert visible. The student is asked to make those decisions and the computer assesses each decision as it is made. This feedback helps the student diagnose any errors and guides them to make any necessary corrections before moving on to the next decision in the process.

Section One: Focus the Problem

Focus the Problem

- Picture
- Important Objects ✓
- Kinematics Quantities ✓
- Position ✓
- Velocity ✓
- Acceleration 2
- Time ✓
- 2** Dynamics Quantities ✓
- 6** Forces ✓
- Other Quantities
- Questions
- Approach
- Physics Principle
- System
- Relevant Times
- Relevant Info
- Describe the Physics
- Plan the Solution
- Execute the Plan
- Evaluate the Solution
- Summary

Forces

What is the direction of the normal force **3** on the puck by the ramp?
 Select the correct answer from the list below. Use the scroll bar if necessary.

↑ **4**

↗

→

↘

↓

↙

←

↖

None/0

Problem

At the State Fair you see people trying to win a prize at a game booth. They are sliding a metal disk shaped like a puck up a wooden ramp so that it gets near the top of the ramp before sliding back down. You estimate that you can slide the 'puck' at 8.0 ft/sec, but would that win the game? The two boundaries of the zone appear to be at 10 and 10.5 feet from the bottom of the ramp where you release the 'puck'. The ramp appears to be inclined at 37° from the horizontal. You happen to remember that between steel and wood, the coefficients of static and kinetic friction are 0.1 and 0.08,

Picture **1**

$a_i = a$ $a_f = a$
 $v_i = 8.0 \text{ ft/s}$ $v_f = 0$
 $t_i = 0$ $t_f = ?$
 $W = 2.5 \text{ lbs}$

5 No. The normal force exerted on an object by a surface is perpendicular to the surface and opposed to the object's motion through the surface.

Problem

Fig. 1. Screenshot from a type 1 module (computer coaches student). The display shows a partially completed picture (1). The computer has decided on a step (2) and asks the student to specify the direction of a force (3). The student's decision on this step (4) is incorrect, and the computer provides feedback (5). A red number to the right of each step (6) indicates the number of incorrect responses the student made during the implementation of that step, while a checkmark indicates that the step was implemented correctly the first time.

In a type 2 coach, "Student coaches computer," the roles are reversed. The student chooses the decisions to be made, assesses the computer's decisions, and makes any necessary corrections. Because some of the computer responses are designed to reflect incorrect student behavior, this coach also gives students practice in the important problem solving process of debugging. In this coach, the computer also acts in an oversight mode, assessing and giving feedback to the student's responses.

Section One: Focus the Problem

Focus The Problem
 Draw a Picture
 Decide on the Question

Decide on the Question
 What do I do now?
 Choose the answer from the list below.

Choose an approach to use
 Draw a physics diagram
 Write down quantitative relationships **②**

Problem
 Your company is designing an apparatus for an ice skating show. An ice skater will start from rest and slide down an ice-covered ramp. At the bottom of the ramp, the skater will glide around an ice-covered loop which is the inside of a vertical circle before emerging out onto the skating rink floor. For a spectacular effect, the circular loop will have a diameter of 30 feet. Your task is to

Picture

Question
 How high should the skater's starting point be so that the skater just barely loses

③
 No. Before you can write down any equations, you need to decide which approach(es) are appropriate for solving the problem.

Fig. 2. Screenshot from a type 2 module (student coaches computer). The display shows a completed picture (1). The student, acting as a coach, has decided on a step for the computer, in its role as a student, to do (2), but it is not an appropriate step at this point. The computer, in its oversight role, gives the student feedback (3).

In the type 3 coaches, “Student works independently, computer gives feedback,” the computer presents a problem to the student, who is asked to solve the problem on paper, without any help. After the student enters an answer, the computer asks follow-up questions to verify the correctness of the student’s solution process, gives appropriate feedback, and if necessary, gives the student appropriate coaching. A student who cannot reach a solution on his or her own can ask for help. The coach helps the student to determine the point of difficulty and gives targeted coaching before the student resumes solving the problem.

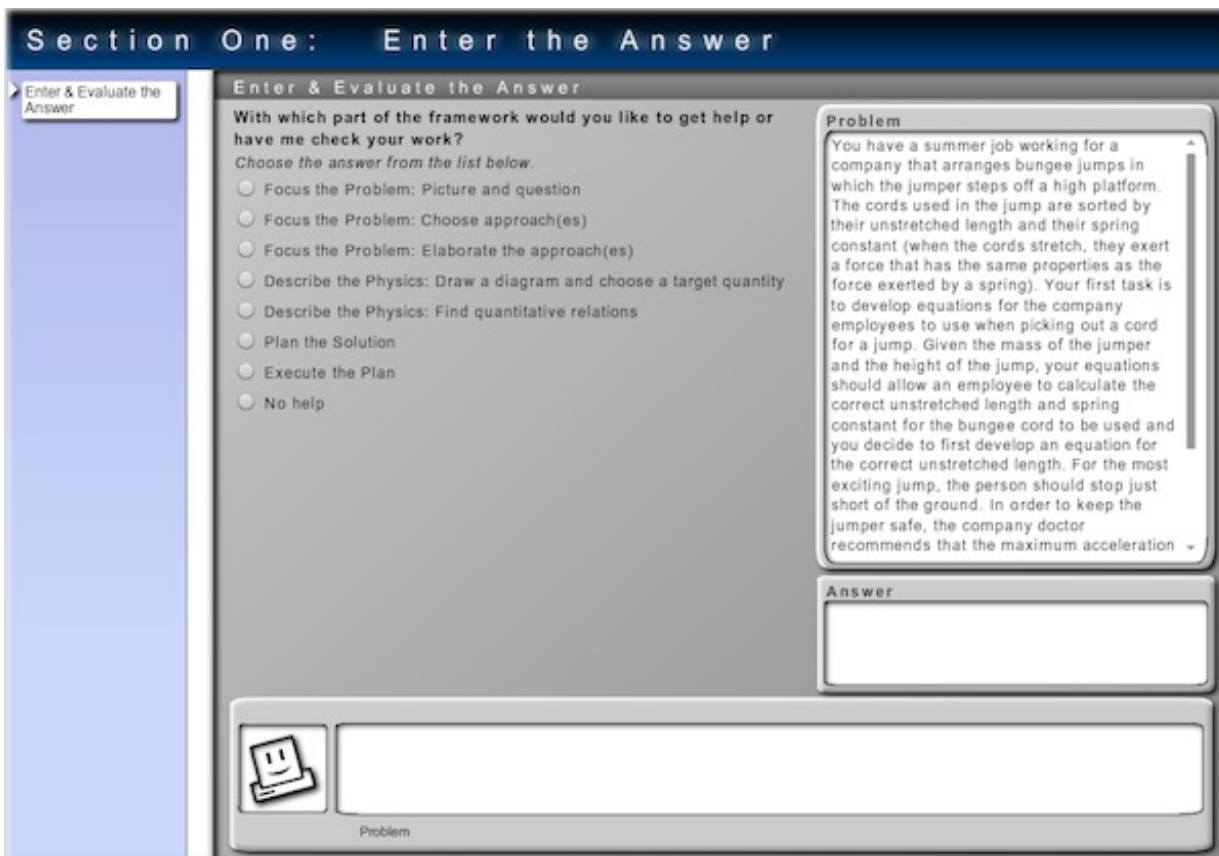


Fig. 3 Screenshot from a type 3 module (student works independently, computer gives feedback). If the student gets stuck solving a problem or enters an incorrect answer, the computer asks the student to decide where in the problem solving process the difficulty might occur.

The physics problems addressed by the coaches help establish the environment of expert practice in the Cognitive Apprenticeship pedagogy. These problems place the student into a situation which is concrete enough for them to imagine and gives the motivation for desiring a solution. In addition, they are designed to encourage expert-like behavior. This type of problem, known as a Context-rich problem, was developed by our research program to aid students in learning both physics and problem solving (Heller & Hollabaugh, 1992). They are currently used in physics and other disciplines as disparate as oral biology and economics. Each of the computer coaches at our website features a Context-rich problem.

Current work

We are presently developing the coaches through a continuous cycle of testing, assessment, and revision. The testing is being performed in the introductory physics classes at the University of Minnesota, both on the Twin Cities and Rochester campuses, and we hope to soon include some Minnesota high school physics classes. Assessment of the coaches' educational impact is performed through an examination of the problem solutions that students produce on in-class exams, as well as standard assessments of students' conceptual physics knowledge, mathematical skills, and attitudes and beliefs about physics.

Because the ability of individual instructors to adapt an educational tool to their own preferences and local conditions is critical to its use, we are also developing a graphical interface that allows typical physics teachers, without any programming experience, to modify the computer coaches themselves, generating new problems and problem types, new supports for their students, and new coaching

methods that align with their own curricular preferences.

Potential impact and vision

Because problem solving is central to STEM courses, the coaches have the potential not only to become widely used, but also to spawn similar efforts in other STEM fields, and across multiple disciplines. Our work demonstrates how technology can be used to improve education by providing students with (1) more interactive and individualized instruction based on research from education and cognitive psychology, as well as from a STEM content area, (2) opportunities to integrate effective instruction outside with that occurring in the classroom, and (3) access to alternative forms of instruction, and we hope that it will provide a foundation for others on which to build and to improve. While not replacing human instruction, computer coaches can be a cost effective supplement to our educational system. This can be especially important to students for whom standard instruction is insufficient, such as underprepared students or students underrepresented in science. Computer coaches may also be an essential element to an effective distance learning application.

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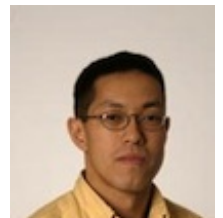
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Chemistry, Creativity, & Curricular Experiments

Michelle D. Driessen

The following entry is written in the same format as our new project-based laboratories in general chemistry. The first two pages represent the information that student teams receive when first planning and executing an experiment. The remaining pages represent my approach to an educational problem and how I would answer these questions in the format a student would in our laboratories. Please note that technology plays a huge role in managing this curriculum and the TAs involved. Its usage and descriptions are italicized throughout this document.

Imagine that you are the instructor in charge of a very large general chemistry laboratory program that utilizes about 60 teaching assistants (TAs) to teach 4,000 students each year. Currently students use verification (cookbook) experiments to learn laboratory techniques and reinforce chemistry concepts. Unfortunately, they leave the course(s) with little practice in critical thinking, a belief that all questions in science have known answers, and that chemistry is prescriptive, stressful, and boring. In this project, you are to design and test a method to teach general chemistry students about the creativity and excitement of “doing” science on a large scale while still covering basic lab skills.

Criteria for completing project:

- Demonstrate creativity involved in experimental science
- Keep workload manageable for novices
- Concepts utilized should coordinate with lecture course
- Students must learn common laboratory techniques
- Students should develop problem-solving skills
- Students should learn how to design an experiment
- Faculty in the department should be supportive of the method
- The hazard level should be minimized as much as possible

Safety notes:

- Frustrated students are volatile.
- Untrained or unsupervised TAs are dangerous.

Waste collection:

- Verification (cookbook) labs can be placed in the trash

Equipment, techniques & concepts you may find useful:

- Project-based labs [1]
- Team-based learning [2]
- Clemson general chemistry program [3]

- Assessment of lab notebook pages
- Assessment of individual work versus group work
- Oral presentations and discussions

Available chemicals/materials/support:

- *Laptop computers & wireless access*
- *Course management system*
- *Google forms and docs*
- *Office of Information Technology – Faculty Fellowship Program [4]*
- *Support of department chair and/or curriculum committee*

Attempt 1 Planning Questions:

Outline a plan for teaching experimental chemistry to general chemistry students. Your plan must meet the “criteria for completing the project” listed above. Keep the answers to the following questions in mind as you formulate your plan.

1. Can you modify a verification lab to make it open-ended? How?
2. How will you give students enough information to be successful, but not too much so as to inhibit their creativity?
3. How will you fairly assess student work to assign a grade?
4. How can you use technology to support or facilitate this work?
5. How will you get the faculty and TAs invested in the success of the project?

Attempt 1 Summary Questions:

Summarize what you learned during your first attempt at this experiment. Make sure to include both successes and failures.

Attempt 2 Planning Questions:

Make sure to point out what you will do differently, and why, during your second attempt.

Attempt 2 Summary Questions:

Summarize what you now know about your lab course, and any changes that you would make if a third attempt were available.

Attempt 3 Planning Questions:

Make sure to point out what you will do differently, and why, during your third attempt.

Attempt 3 Summary Questions:

Summarize what you now know about your lab course, and any changes that you would make in your next attempt.

Michelle Driessen, Spring 2011

Attempt 1 Plan:

The science education literature was searched for materials that support the development of lab technique and critical thinking skills in general chemistry students. While it was first thought a new lab manual would have to be written from scratch to support these goals, a complete lab manual that

supports the open-ended or guided-inquiry model of learning was identified [1]. “Cooperative Chemistry”, the lab manual used at Clemson University, was chosen for the summer 2011 pilot semester and full transition year. In short, the lab manual reworked verification labs with well-understood chemistry, and shortened them to around 2 pages of information, as opposed to the 20 pages of instruction that students normally get. These 2 pages of information are identical to the format shown in the first 2 pages of this document. Students get a short list of goals for the project, a list of available chemicals, a list of concepts or techniques that they may find helpful, and several framing questions to get them started developing their own experiments. An additional strength of this lab manual is that it requires students to work in permanent teams of four throughout the semester.

Two days were spent talking with the Clemson lab director [3], and observing their students directly in the lab. Clemson students commented that the strengths of the program were designing their own experiments (you can't fake your way through an experiment that you had to design) and working in teams (you never feel completely lost or stupid when you are working with a group of your peers). A small group of Clemson chemistry TAs served as a focus group to share the pros and cons of the lab curriculum from their point of view.

Once observation of the Clemson program was completed and the lab manual chosen, a meeting with the department chair and curriculum committee was called. The meeting was necessary to discuss the goals of the new lab curriculum, identify faculty concerns, and request committee approval to implement the new lab curriculum. After a discussion of faculty concerns (lowered standards for learning chemical concepts, reduced lab technique coverage, student confusion, etc...), the committee approved a multi-year test of the new lab curriculum.

The first semester pilot of the new lab experience was slated for summer 2011. The student numbers were capped at 112 and required 4 teaching assistants (28 students per TA). Several high-quality TAs⁶, committed to education, were recruited to assist with the planning and implementation of the new lab curriculum. These TAs were willing to help plan the new labs in advance, provide feedback during the pilot, and available to mentor the 60 general chemistry TAs during the following fall and spring semesters. The four “mentor” TAs participated in planning meetings every few weeks during the spring 2011 semester to think through and discuss all aspects of the upcoming lab curriculum implementation, including grading and pedagogy.

A lab WebVista site was created prior to the start of the semester and contained items such as the syllabus, lab safety information, MSDS (material safety data sheet) search function, and short tutorials on the use of lab equipment specific to our laboratories.

Michelle Driessen, Summer 2011

Attempt 1 Summary:

Overall, the summer pilot test was successful. Students were told that they were participating in a pilot of a new lab curriculum. This wasn't done to scare them, but to prepare them for the inevitable glitches throughout the semester. Students were assured that any issues encountered would be dealt with swiftly and fairly.

Each TA collected student information such as gender, native language, class (freshman, sophomore, etc...), and willingness to bring a personal laptop, on index cards at the start of the first lab meeting. These cards were used to form permanent heterogeneous teams of four. The lab teams were tasked with planning a short experiment to find the density of a plastic item. This experiment was planned at the end of the first lab meeting in preparation for execution in the next lab period. As most students are

quite familiar with density when they come into this lab, it allowed them to see how the projects would work and experience the process involved with minimal stress.

Most of the remaining projects were two to three lab periods in length. This allowed students to spend the first lab period discovering unforeseen issues and reformulating their experimental plans. While some students struggled with the open-ended nature of these projects and lack of a “correct answer”, most acclimated quickly. Each project culminated in a short presentation by each lab team that summarized their experimental approach, data, and conclusions. In addition, each student turned in a carbon copy of their lab notebook entries for the project for grading.

Students were assigned a total of four projects in the lab manual during the semester. While the lab manual was a good starting point for us, we found many details that were not relevant to our institution. It was also our experience that the wording in some of the projects caused our students confusion. In response, each project and its framing questions were adjusted immediately using student and TA feedback. *The reworked projects and any supporting material that students needed were posted in the lab WebVista site as the semester progressed.*

Graded peer evaluations were completed by each student to assess the contributions of their team members, following each of the 4 projects. These were completed in lab using paper forms during the pilot semester. We found that students didn't feel they could honestly evaluate their team members while in their presence. In addition, handling paper and grading the evaluations became tedious and time consuming for the TAs.

One area where students needed more detailed information involved the work that they handed in and how it was to be graded. Students needed more concrete grading guidelines and a list of deadlines for specific assignments. We considered posting detailed grading rubrics for each graded item, but did not implement these due to the short time scale.

The only other problem encountered during the pilot was student absences. When each team of students is creating a unique experiment, it is impossible for a group member to miss a lab period and then somehow perform the “missed” experiment.

The projects and how students complete them are heavily dependent on technology. The planning process requires students to search for information online. The collection of data often requires the use of computer-interfaced probes. Groups are encouraged to utilize Google presentations to collaborate and prepare their presentations outside of lab. This allows the group to work together without being in the same place, and allows the TA to see who contributed to the presentation if there are complaints about equitable workloads.

The laboratories are outfitted with enough wireless hubs to support a large number of devices accessing the internet at the same time. Students were encouraged to bring their own laptops, but have the opportunity to check out a departmental laptop if needed. We found that a majority of our students own laptops and were willing to use them, decreasing our need to stock and maintain departmental laptops. Group presentations were given using permanently installed projectors and screens.

Michelle Driessen, Summer/Fall 2011

Attempt 2 Plan:

Prior to the beginning of the first full-semester implementation of the newlab format, we: 1) modified lab projects for clarity and consistent formatting, and posted to the lab WebVista site, 2)

created and posted more specific instructions describing University of Minnesota lab equipment and procedures, 3) posted additional external links to lab technique explanations and videos, 4) created and posted detailed grading rubrics for each graded item, 5) created digital peer evaluations using Google Forms, and 6) created TA training module information and posted it in a TA Google site to help prepare TAs to teach in this newformat and to develop their coaching abilities.

Michelle Driessen, Fall 2011/Spring 2012

Attempt 2 Summary:

The modification and posting of all lab projects, detailed grading rubrics, and lab equipment instructions seemed to give students a much more consistent experience. The fact that all of this information was posted in the same class website made it convenient as well. The TA training prior to the start of the semester was helpful, but only a good start. Weekly TA meetings throughout the semester proved invaluable in keeping the TAs consistent in their approach to teaching and keeping me informed as to where lab improvement was needed.

Attempt 3 Plan:

Four new lab projects were created from “old” verification labs and posted to lab website for live trial testing during the spring 2012 semester. Grading rubrics were modified by adding much more detail for both students and TAs. Group discussions to wrap up each project were tested in place of standard oral presentations.

Detailed TA tips and suggestions for each project were created and posted in the TA Google site. These tips included commonly encountered areas of student confusion and several possible methods for a TA to assist without giving away an answer.

Michelle Driessen, Spring 2012

Attempt 3 Summary:

While there will always be areas of the lab curriculum to improve and tweak, overall I believe the first-year implementation has been successful. There aren't any hard data to show this, but there is anecdotal evidence. I was heartened by the scientific conversations I overheard while groups were planning, executing, and analyzing their experiments. Rather than worrying about the right result, more students were concerned with finding the best way to perform an experiment and what their results meant.

It is worth emphasizing that without the use of technology, a program of this type and size would not be possible. The ability to rewrite a lab project and post digitally, or add student resources at the point of need to the lab website made this project successful. Creating a digital repository of all of the information needed to teach the course using Google sites made managing the TAs a tractable task.

Conclusions

You have just read through a curricular experiment, one possible solution, and the changes made during each subsequent trial. This format is identical to the general chemistry projects that are presented to teams of students every few weeks in our laboratories. As you can see from the format, there are many different ways to satisfactorily meet the requirements of the project, leaving room for students to be creative in how they explore and answer a given question or problem. This format emphasizes the development of critical thinking and problem-solving skills [5]. The format also emphasizes the iterative and experimental nature of both chemistry AND teaching.

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 4. The author participated in the University of Minnesota, Office of Information Technology – Faculty Fellowship Program while transforming the University of Minnesota general chemistry laboratories. The fellowship provided monetary support in addition providing access to a team of educational innovators as a sounding board.
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 6. The four TAs instrumental in making this transition successful were David Boyce, Amanda Maxwell, Kaustubh Mote, and Emily Pelton.
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Michelle Driessen is currently an assistant professor and director of the general chemistry program. She continues to innovate in both the classroom and teaching laboratories, with the goal of getting and keeping students interested in science while teaching basic scientific and laboratory skills.

Stimulating Strategic Thinking, Acting and Learning in a Strategic Planning Class

John M. Bryson

The Course

For a number of years I have taught a popular Humphrey School of Public Affairs course called Strategic Planning and Management. The course examines the theory and practice of strategic planning and management for governments, public agencies, nonprofit organizations, collaborations, and, to a lesser extent, communities. The course mainly enrolls graduate students in professional degree programs such as public and nonprofit management, planning, social work, business, and public health, but doctoral students and advanced undergraduates also take the course.

A major purpose of the course is to improve students capabilities for strategic thinking, acting, and learning. Indeed, I argue that the main purpose of strategic planning is not to create a strategic plan, but to stimulate strategic thinking, acting, and learning on the part of individuals, groups, and organizations. Strategic plans can help, of course, but what really matters is the thinking, acting, and learning that go into formulating and implementing the plan (Bryson, 2011).

What is *strategic thinking*? I define it as thinking in context about how to pursue purposes or achieve goals. This also includes thinking about what the context is and how it might or should be changed; what the purposes are or should be; and what capabilities or competencies will or might be needed, and how they might be used, to achieve the purposes. *Strategic acting* is acting in context in light of future consequences to achieve purposes and/or to facilitate learning. *Strategic learning* is any change in a system (which can be a person) that adapts it better to its environment and produces a more or less permanent change in its capacity to pursue its purposes (Bryson, 2011, pp. 14–15).

The Challenges

The course has always been well-subscribed and well-received. Unfortunately, I was concerned about what I believed to be a number of shortcomings, including:

- Students not prepared to discuss the readings
- Students not prepared to discuss the strategic planning cases that are a key focal point for teaching about strategic thinking, acting, and learning
- Students not getting enough experience facilitating dialogue and discussion a key strategic planning skill around important topics
- Students not seeing enough parallels between their student team projects and a strategic planning process
- Me talking too much about strategic thinking, acting, and learning and not giving students enough experience with, and feedback on, their own engagements with these phenomena.
- Not making enough use of technology

An Office of Information Technology Faculty Fellowship helped me completely redesign the course so that it:

- More authentically replicates strategic planning and management in practice
- Gives students more actual experience with what it means to think, act, and learn strategically

- Makes better and more constructive use of educational technology
- Better integrates theory, scholarly research, and practice

Perhaps most important, the fellowship helped me understand my own goals for the students in this course. Basically, I wanted the students to become more expert than they were at strategic thinking, acting, and learning whatever their individual starting points (Bransford, Brown, and Cocking, 2000, pp. 31–50.) This meant the course needed to create what Fink (2003, pp. 7) calls significant learning experiences in which students are deeply engaged in their learning in a high-energy way that results in significant and lasting change having a high potential for being of value in their lives after the course is over. The fellowship also helped reinforce the view that producing these significant learning experiences wasn't primarily about educational technology, but instead was about the design of the course in which technology would play a significant role. Technology had to be viewed as a support, not as the main focus.

The Response to the Challenges

Effectively addressing the challenges required a multi-pronged strategy. The newly designed course involves:

- **Creating facilitated dialogue and deliberation forums (DDFs) as a part of many classes.** Each DDF has approximately six students enough to provide a variety of opinions, stimulate a good dialogue, and give each student an opportunity to facilitate a conversation. Students are required to fill out online on the course Moodle site a one-page response to readings-related questions two days before a class in which a DDF will occur. Students assigned to be forum facilitators summarize, compare and contrast the readings in two pages and then either post their review online prior to class or else bring it to class. They then help facilitate a forum discussion of the issues. Students now come to class prepared to engage with the readings in a serious way. Peer pressure that develops within the groups enforces the norm that students should come to class prepared.



A dialogue and deliberation forum

- **Requiring students to prepare a one-page response to questions online about each**

case prior to our discussion of the case in class. As a result, students come to class prepared to engage in a deep and thoughtful discussion of the case at hand.

- **Paying far more explicit attention to the parallels between a strategic planning efforts and the student team projects.** Students are required to develop an initial contract to govern their work in much the same way as a strategic planning process would be set up. They are also required to reflect at several points along the way on how their team project process mirrors (or not) a strategic planning process.
- **Providing more hands-on instruction in, and reflection on, the skills and tools of strategic planning and management.** The class involves a number of small- and large-group activities that take up far more of the class time than they have in the past. The activities provide an experiential basis and data for reflecting on strategic thinking, acting, and learning including what they are, how they work, and how they might be made to work better for individuals, groups, and organizations. In one exercise groups develop strategy maps that link mission, goals, strategies and actions (Bryson, Ackermann, Eden, and Finn, 2004).



A strategy map developed by a group

- **Doing less lecturing and more coaching, filling in gaps, raising questions, and providing feedback.** As a result of these changes, my role changed significantly. I now do far less lecturing and am far less the center of attention. The focus is now much more on the students own learning. I am now more an advisor and coach, helping students compare and contrast in-class and out-of-class experiences so that they can sharpen and qualify the lessons to be drawn from these experiences and consider how the lessons might be applied to new situations. Said differently, strategic thinking, acting, and learning are craft skills, the acquisition of which require more of a master-apprentice relationship than a traditional lecturer-student relationship (Scott, 1998; Sennett, 2009).
- **Using Moodle, Basecamp, Refworks, PowerPoint, in-class Internet connections to important videos and websites, and email.** Technology now plays a more prominent role in the class, but is clearly in a supporting role. Class communication and management are helped by a fully developed Moodle site. Lectures involve PowerPoint, as they always have, but in-class Internet connections to videos and websites are featured much more. Student teams make use of Basecamp (or another project management software, if they prefer) and Refworks (or Zotero, if they prefer) to manage their projects. Students also make use of a wide range of technologies in required student team presentations.

The Results

As noted, the course has always been well received, but the evaluations for Spring Semester 2011 the first semester the newly designed course was offered were outstanding. The results on a six-point scale (with six denoting the highest rating) were as follows (based on 33 of 35 possible respondents):

- The instructor was well-prepared for class Mean: 5.68, Median: 6.00
- The instructor presented the subject matter clearly Mean: 5.39, Median: 6.00
- The instructor provided feedback intended to improve my course performance Mean: 5.39, Median: 6.00
- The instructor treated me with respect Mean: 5.80, Median: 6.00
- I have a deeper understanding of the subject matter as a result of this course Mean: 5.55, Median: 6.00
- My interest in the subject matter was stimulated by this course Mean: 5.52, Median: 6.00

A study is being pursued during Spring Semester 2012 to determine more clearly what aspects of the course work best, what should be modified or dropped, and what changes occur in students cognitive skills related to strategic planning.

Conclusions

The main conclusion to be drawn is simply that the course redesign seemed to work, at least in terms of student course evaluations, which are higher than ever. The course redesign also seems to have worked in addressing the challenges that prompted it. However, fuller details and any qualifications regarding these conclusions will have to await completion of the study mentioned above.

In theoretical terms, the success of the redesign is rooted in the presumed benefits of experiential learning (Kolb, 1983; Fink, 2003). The learning cycle of experience reflection abstraction testing experience was used repeatedly throughout the course. It is hard to imagine craft knowledge being built by any other means.

Finally, an important feature of the course involved my coming to grips emotionally with the changes. I certainly understood cognitively why the redesign might be good for the students. What I had difficulty taking on board was that the redesign would have me doing less of something I actually like doing being the major focal point of the class and talking about something I really like talking about and instead moving more to the edge of the class much of the time. My role changed to being more a designer of learning occasions, a coach, and an advisor, and less of a front-and-center professor. In time, however, I came not only to accept the new roles, but to welcome them, since my students clearly were benefiting from a course in which their learning was front and center.

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3D Simulation and the Apparel Design Curriculum

Lucy Dunne

Introduction

Apparel design as a discipline and industry has often been characterized as highly resistant to change in processes. This is in no small part due to the extremely short product cycle (traditionally 3-4 months, and shortening every day) and ever-increasing pressure to reduce costs and produce faster. Other product-producing industries such as consumer products or automobiles embraced 3D simulation and visualization technologies decades ago and have reaped the benefits in shorter and more accurate design and product development processes. By contrast, the apparel industry has been much slower to adopt even 2D CAD-based drawing systems for garment patternmaking, never mind full 3D simulation technologies.

An additional not-insignificant challenge is the difficulty of simulating and modeling apparel and textile products. Hard goods are much more stable than flexible, supple fabrics, and the physics of hard goods are consequently simpler and more easily simulated. As a result, simulations of apparel products are less accurate and reliable than hard goods, and this factor has indeed contributed to the reluctance to adopt 3D apparel simulation technologies in the product development process.

However, although such technologies may be only almost mature enough for industrial practice, as teaching tools they offer unparalleled advantages in shortening the trial-and-error feedback loop and enabling more effective visualization of the relationship between the 2D pattern and the 3D body/garment relationship. This chapter will discuss efforts and experiences integrating 3D simulation technologies (3D body scanning and 2D/3D garment simulation) into the apparel design curriculum.

Background

Traditional garment patternmaking methods

In traditional practice, garment patterns are created by drafting methods on paper (plotting body measures to arrive at a basic shape and manipulating that shape into a garment design) or by draping fabric directly onto a body form to capture a 3D shape. These patterns are then refined and subsequently cut from inexpensive test fabric or from fashion fabric, sewn into garments (either unfinished test garments or fully-finished garments) and fit onto a dress form or body. The cutting/sewing process is time-consuming, even for unfinished test garments, and especially for inexperienced students. In most cases, it is only at the fitting stage that the student is able to fully see the effects of their choices in the patternmaking process and to discover errors or inaccuracies that were overlooked. This effect is again magnified for inexperienced students, who are not yet aware of common pitfalls or of the necessity for precision/accuracy in specific areas. Similarly, because these errors are often by nature unexpected, students do not always leave adequate time for what can be very significant revisions (which may mean essentially starting over with the project.)

Lastly, because the fitting process must happen in 3D, students are generally prohibited from making patterns/garments for their own body (because it is prohibitively difficult to effectively fit a garment on one's own body). While this may seem like a minor issue, for new apparel students, designing for themselves can be a particularly passionate undertaking and can stimulate increased dedication to

and engagement with the learning process. Similarly, actually wearing their own patterns can add an additional layer to the understanding of fit, as the student “feels” the fit of the pattern in addition to visual assesment.

3D simulation of Garments

3D garment simulation technologies are becoming more widespread, and are available from several different sources [REFs]. Some approaches seek to create a visually realistic rendering of a garment on a 3D body or avatar (without necessarily using a specific 2D garment pattern. Such systems are more common in gaming or virtual environments such as Second Life, and in online shopping applications. Other approaches use the actual 2D garment pattern to generate the 3D shape, “sewing” the pieces together and applying physics models to simulate the fall, fit, and drape of the garment on a specific body. It is the latter system that is of interest to apparel design, as it preserves the very specific relationship between the 2D garment pattern and the 3D garment, as depicted in Figure 1. The system we have adopted in our teaching practice is the OptiTex PDS system, one of the most advanced and mature 3D garment simulation systems used in the apparel industry today.

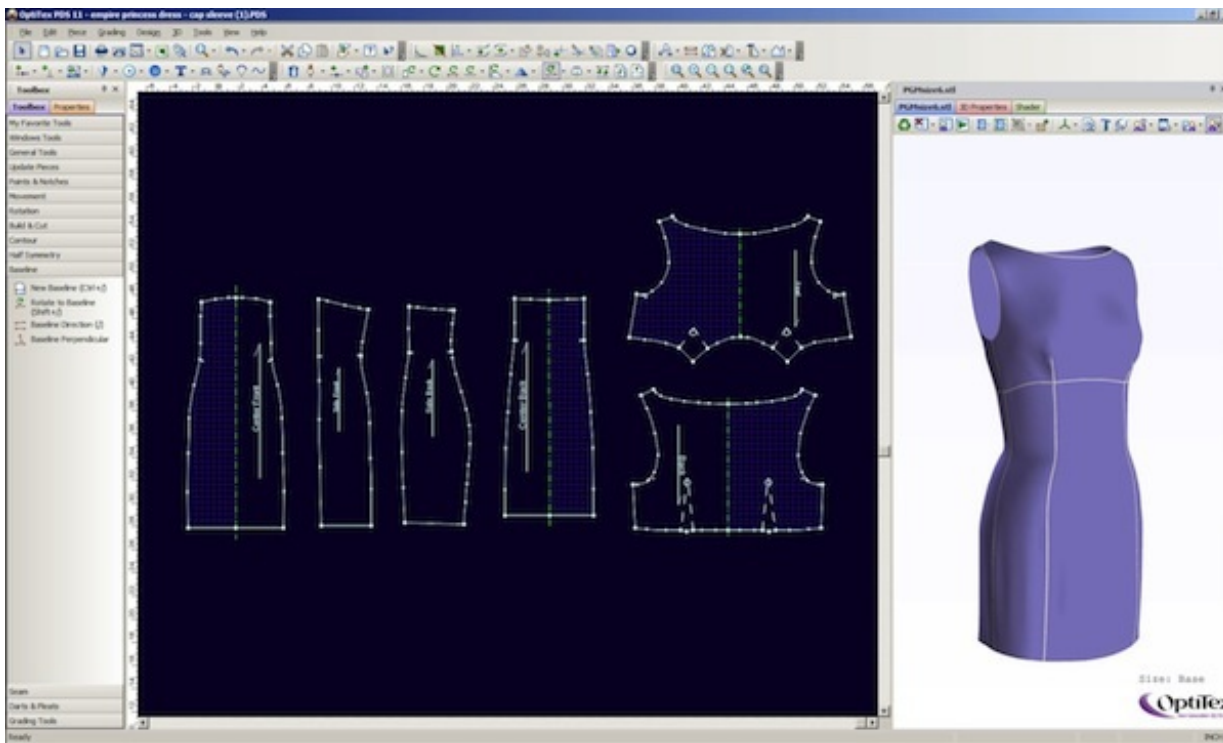


Figure 1: 2D garment pattern and 3D simulation

3D body scanning

While the relationship between the 2D pattern and the 3D garment is crucial in teaching patternmaking through 3D simulation, the success of the 2D shape is judged by the relationship between the 3D garment and a specific 3D body. Most 3D simulation software packages come with body avatars, either with fixed dimensions or with adjustable/customizable measurements. Customizable avatars can be adjusted to some extent but often rely on certain dimension relationships or placements, and fully customizing a very complex 3D shape can be a difficult undertaking.

3D body scanning offers the ability to quickly (in about 7 seconds) capture the 3D surface of almost any object or person. A scanned body can then be imported into the virtual environment to serve as the fitting avatar in simulation. 3D scanners are expensive and not extremely common, but have significant potential for customization and adaptation of garment fit.

3D Simulation in the Curriculum

In 2009, we began integrating the OptiTex 3D simulation software into a sophomore-level apparel design studio course. This is a required course, the second studio course in a series of 5 that make up the backbone of our apparel design curriculum. This studio is the second course in which students study patternmaking: in their first course, they are introduced to the basics of flat patternmaking (drafting) and draping techniques. In the second course, they explore more advanced patternmaking including more complicated shapes, and are introduced to the CAD-based patternmaking system.

In the second patternmaking course, it becomes increasingly important that students understand how a 2D shape transforms into a 3D garment, and the ways in which changes to the 2D shape manipulate the 3D garment. Many students struggle with visualizing the 2D-3D spatial transformation, which makes it considerably more difficult to problem-solve and determine where changes need to be made in the fitting and pattern design process.

In the course discussed here, students interact with the 3D simulation environment in two major projects. In the first project, students are required to design, pattern, and make a pair of trousers of their own design. In the second, students are required to design and pattern a mini-line of 4 garments that expand upon the concept and aesthetic explored in one of their previous course projects. Students may elect to sew up their patterns as unfinished test garments (fitting muslins) or as 3D simulations. For the sake of space, the trouser project is detailed below. Similar advantages and challenges exist for the line project.

Trouser project

In the trouser project, students first learn to draft a trouser block (basic trouser shape with no styling) using the 2D drafting program. They then fit this block onto their body scan or avatar, “perfecting” the fit as far as they are able in the 3D simulation environment. They then print their fitted pattern and cut it from muslin or test fabric, which is sewn and fitted on their physical body. Fitting changes from the fabric iteration are made to the digital pattern before that pattern is used to create the pattern for their own trouser design. This garment is then fitted digitally and (optionally) in fabric, before it is cut and sewn into the final garment.

In total, students fit two pairs of trousers in this project, and both pairs are fitted both digitally and physically. While the same iterative process could have been achieved on paper before the integration of the simulation environment into the course, iterations would have taken considerably longer. Particularly in fitting trousers, there are many adjustments to the pattern that would necessitate re-cutting the pattern from scratch (for example, changes to the crotch curve often involve shifting the contour into an area that has been previously cut away).

An example of the trouser project process (digital and physical block, digital and physical trouser design) is shown in Figure 2.



Virtual block fitting/ Physical block fitting/Virtual design fitting/Physical design fitting
Figure 2: Trouser project process

While we currently do not have data capturing the number of fit iterations possible using the traditional method, we observed over 10 iterations of complex areas such as crotch curves using the digital tools.

Challenge and Advantages of 3D Simulation

We see the 3D simulation technology as offering the following advantages in learning patternmaking and fit:

- Dramatic decrease in time required for 3D pattern tests
- Augmented visualization of the transition between 2D and 3D
- Enhanced visualization of the relationship between garment and body

However, we see the following drawbacks of the 3D environment versus patternmaking in the physical world:

- Discrepancies between visualized fit and actual fit
- Adoption of a “trial and error” mentality in problem-solving
- Inability to touch, pull, and pin the fabric in fitting
- Necessity of perfect digital copies of physical “bodies” (human or mannequin) in the digital environment

Advantages

The most obvious advantage of the 3D simulation technology (as discussed previously) is the decrease in time required to cut and sew test garments. However, there are other significant advantages that may be less obvious initially but equally powerful in the educational process.

One of the more powerful aspects of the 3D simulation process for education is perhaps an

unintentional feature: the frame-by-frame animation of the 2D pattern wrapping around the 3D body. Because this happens slowly enough to be observed, it allows students to more fully visualize how a 2D pattern becomes a 3D garment (and to localize areas where pattern changes may need to occur, and map them from the 3D garment back to the 2D pattern.) This wrapping process is shown in Figure 3.



Figure 3: Wrapping 2D garment pattern

Finally, 3D simulation offers the ability to visualize garments in unique ways. For example, one of the fabric parameters that can be adjusted is its transparency – perhaps originally for the purposes of realistic visualization transparent fabrics. Importantly for fitting, this feature allows students to set their simulated garments to some degree of transparency, allowing them to explore in 3D the distance between the garment and the body in various areas. Seeing areas of tightness or compression can be challenging in the visualization, but this feature offers an alternative sensing modality. Similarly, fabric properties can be adjusted in shininess, changing the reflectance of the garment surface. This enhances the appearance of wrinkles and pulls in the garment, helping the student to see more dramatically where problem areas are occurring. Transparency and shininess properties are illustrated in Figure 4.



Figure 4: Using transparency and shininess to illuminate and explore fit issues

Challenges

While there are distinct advantages to using 3D simulation for apparel patternmaking education, there are also areas of significant challenge. The 3D simulation is not a perfect representation of the real world, and this gap must be navigated by the student in order to fully leverage the technology. Fit in the physical world comes with certain sets of indicators (wrinkles, tightness, balance and hang of the garment) that the student must learn in the course of their patternmaking and fit education. The 3D simulation environment also comes with fit indicators, but they are not necessarily exactly the same as the indicators in the physical environment. The simulated garment has a tendency to behave more like “clay” than fabric would be – wrapping to fit the body when in the physical world the garment would be too small to close or fit around the body. It’s important to note that “bodies” in the virtual environment

also don't share the same physics as bodies in the physical world – most importantly, they are rigid shells that are not able to compress in the same way as flesh.

The virtual environment offers different indicators that may replace some or all of the missing physical fit indicators. Transparency, as discussed above, is one such example. Another example is tension mapping, as illustrated in Figure 5, which can depict the areas in which the simulation calculates greater or lesser tensions in the fabric.

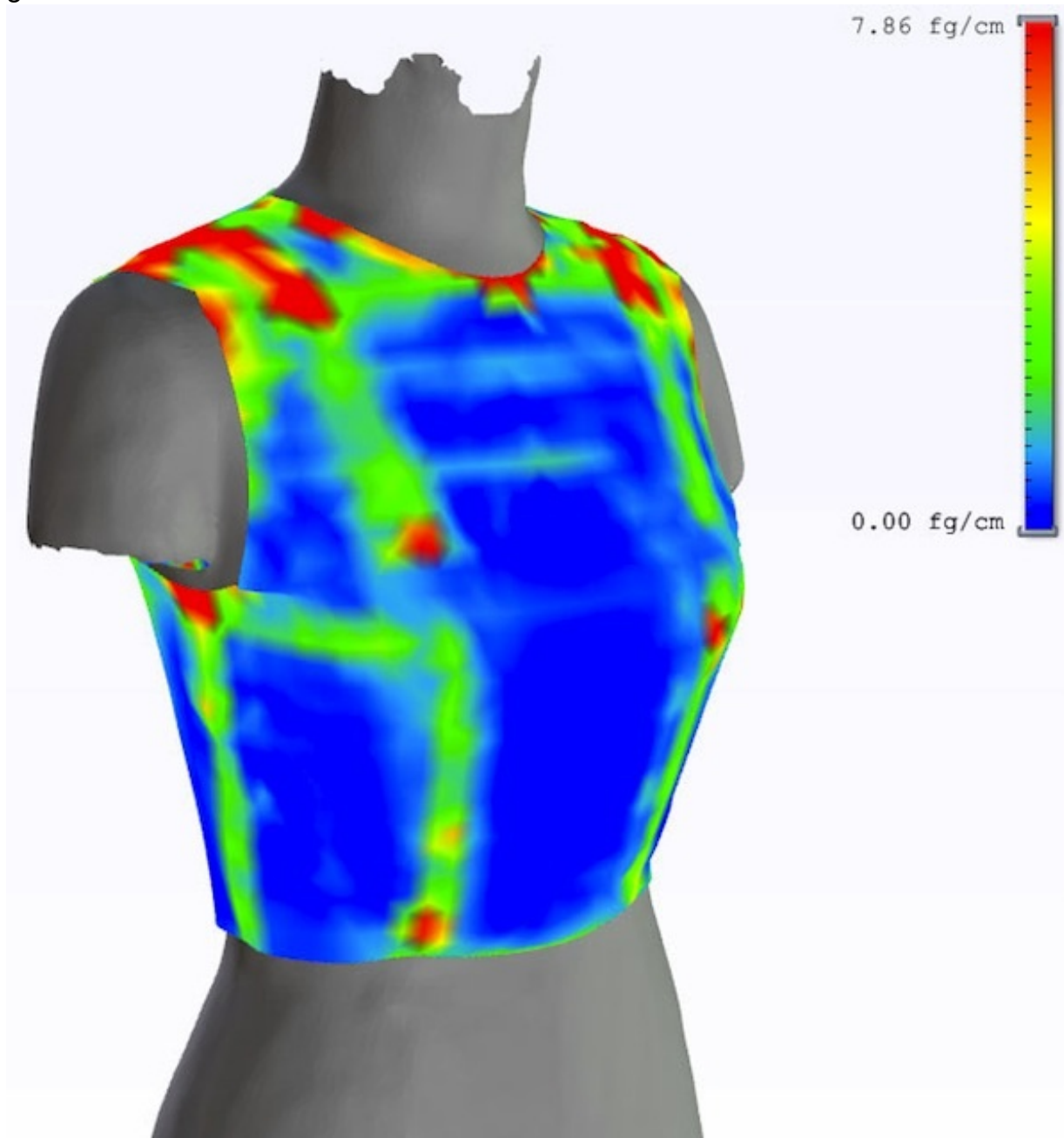


Figure 5: Tension maps for illustrating fit

Another challenge of integrating the 3D environment stems from one of its chief advantages: the decrease in time required to “sew” a test garment to see the effects of a pattern change. While this certainly eliminates significant amounts of time for the student, it also can have the effect of encouraging “trial and error” approaches to problem-solving, where the student invests less time in the cognitive labor of understanding a problem and devising a solution, and instead simply moves contours until something works. The trial and error approach can be deceptive – in our experience, it often leads to far more time-intensive fitting processes than deliberate changes would.

An immediate drawback to the virtual environment is the inability to manipulate the “fabric” on the avatar. In the physical world, fittings are mainly performed by pinning excess fabric and releasing too-tight seams. This direct manipulation can help the designer to “debug” the pattern or localize problem areas. Without the ability to manipulate the fabric, the pattern correction process is necessarily more abstract.

Finally, a logistical challenge. We have discovered the utmost importance of having perfect or near-perfect digital copies of the physical bodies that students are working with, in order to prevent unexpected and lengthy correction processes when the digital pattern is transferred into the physical world. This has illuminated the necessity of access to 3D scanning technology, both for human bodies and for mannequins or dress forms. We have scanned all of our studio dress forms so that students may work on perfect copies of their selected forms in the digital environment (Figure 6). This process is time-intensive and expensive, but once digital copies exist they are easily transferred and duplicated. An open-source approach to sharing these files may facilitate more wide-spread use of efficient processes.



Figure 6: Physical and digital versions of studio dress forms

Conclusion

As with most new technologies, there are advantages and drawbacks to implementing 3D simulation in the apparel curriculum. We have discussed advantages in student engagement (through facilitating patternmaking and fitting on the student’s own body), efficiency and speed of generating garments to test patterns and fit, augmenting the ability of the student to visualize the transition from 2D pattern to 3D garment, and augmented ability to explore the fit relationship between garment and body.

However, there are also drawbacks and challenges to implementing this kind of technology as compared to traditional processes in the physical world. Many of these drawbacks stem from immaturity or development opportunities in the technology itself, and others may be more difficult to

overcome. These challenges as discussed here include inability to touch, feel, and manipulate the garment on a body; encouragement of a trial-and-error mentality in problem-solving; discrepancies in fit indicators between the physical and digital world; and necessity for perfect digital copies of fit bodies in the digital environment (which often requires access to expensive 3D scanning technology).

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How MOODLE, 'Ladders', 'Flipped Classrooms' and 'Change-up' Created Value-added Redesign in the Medical School.

Anne G. Minenko

Sections of this paper were previously presented at EDULEARN11 Conference, July 2011, Barcelona, Spain [11].

Introduction

Medical education in North America has been influenced by Carnegie Foundation sponsored studies twice in the last one hundred years. The first study was conducted in the early 19th century by Dr. Abraham Flexner, who visited all 155 US and Canadian medical schools operating at that time [1]. A '2+ 2' medical school curriculum subsequently emerged, whereby two years of classroom instruction in scientific foundations were followed by two years of clinical experience. Recognizing that knowledge has grown, systems have changed and understanding of learning has advanced since 1910, a more recent study of 11 medical schools was conducted, culminating in the report Educating Physicians: A Call for Reform of Medical School and Residency [2].

This 2010 report heavily promotes integration, habits of inquiry, and formation of professional identity, while acknowledging the quality-maintaining role of accrediting and licensing bodies, such as the Liaison Committee on Medical Education (LCME). Coincidentally, Call for Reform was issued just as the University of Minnesota Medical School (UMNMS) prepared for a 2012 accreditation visit by the LCME. Motivated by the report's vision of medical education of the future and "intrinsically...by the desire to improve student learning", UMNMS set out to revise its curriculum to prepare its students to practice 2nd millennial medicine.

Challenges

Per (backward) course design [3],an examination for salient situational factors is the critical first step, and indeed, designers and developers of the revised UMN curriculum identified several challenges.

To meet accreditation standards. To be granted full accreditation status for an eight year cycle, medical schools must meet over 120 standards. But accreditation is more than a quality assurance process. Accreditation has implications for both school and student, as full status establishes medical school eligibility for federal grants and is a condition for medical student licensure upon graduation [4].

In other words, there would be consequences should the UMNMS not maintain its accredited status.

To preserve a lifetime of work. Standards ED 5A [5] and ED 33 [5] are central to this story. ED 5A specified opportunities for active learning and independent study whereas ED 33 specified content integration within and across periods of study. Meeting standard ED 5A posed a challenge, as per the conventional '2+2' model, the Years 1 and 2 scientific foundation UMNMS courses have been isolated from clinical experiences and dominated by lectures. In spite of the known advantages of active learning, such as longer knowledge retention [3], faculty were reluctant to discard their lifetime of work and source of pride. Having invested years to iteratively develop reusable lecture slide decks and faculty authored primers, there were concerns about 'starting from scratch' to develop new instructional materials for independent, integrated and interactive learning i.e., if there was a call to abandon lectures, it would cause a shock wave. Finally, to integrate content between the basic and the clinical

sciences and between single organ specialties, the challenge would be to break through organizational 'walls' separating divisions and departments, reinforced by decades of independent habit carried over from the clinical world.

To make room in the schedule. To date, the Years 1 and 2 UMNMS calendars had classes / laboratory sessions scheduled daily, from 0800 h to 1730 h, with one hour for lunch and ten minute breaks between classes. To promote student independent study, and preparation in advance, the UMNMS curriculum scheduled 3 half days of Independent Student Learning Time (ILT) per week into Years 1 and 2, effective August 2010 (Figure 2 – red arrows). This meant reducing the number of hours available for classroom-based instruction from 40 to 20 hours per week.

To optimize limited facilities and faculty numbers. Interactive small group seminars can be an effective strategy to shift classroom focus to application of knowledge. But to offer these to a class of ~180 students, in place of lectures, more trained faculty facilitators and more small group rooms would be needed. Seminar rooms with wireless upgrades, however, are in demand by the other six health-oriented UMN Academic Health Center schools, also advocates of active learning in the pre-clinical years of training.

Basically, we had our work cut out for us, as to introduce new active learning activities for more effective learning into a reduced 20 hour weekly schedule using limited resources would require optimizing ILT and finding other non-small group seminar instructional methods.

How it was done

Starting at the curriculum level, and focusing on Year 2, Medical School curriculum leadership regrouped the original 18 Year 2 subjects into four Human Disease (HD) blocks to promote the integration of basic sciences with clinical subjects (Figure 1). This rearrangement included scheduling of 'study weeks' after each of 4 HD blocks instead of after every subject course, sparing individual subjects from having to sacrifice instructional time as a result of the restructure.

HD1	HD2	HD3	HD4
Cardiovascular, Respiratory		Endocrine, Renal, Reproduction	GI, Hematology, Oncology
	Rheumatology		
	Orthopedics		
	Psychiatry		
	Eye		
	Ear, nose, throat		
	Infectious Diseases		
	Pathology		
	Pharmacology		
	Neurology		
	Dermatology		

Figure 1 (above) shows the arrangement of 18 pre-existing subjects into 4 subject- integrated Human Disease blocks. Ten weeks in duration, HD2 was the longest course but also the most diverse, creating an optimum situation to integrate ten medical and surgical subject areas. HD2 was also the most administratively effort intense among the HDs, as 100+ instructors were involved, spanning 10 different Medical/ Surgical departments.

Next, we zoom in on Human Diseases 2 (HD2) block, the primary goal of which is to prepare the student for the heavily clinical 3rd year of their medical school training in the HD2 member subject areas. Drawing upon the lessons and experience as an Education Technology Faculty Fellow and leveraging the relationship between the author/ HD2 course director and the UMN Collaborative for Academic Technology Innovation [CATI] were key to the transformation of challenges into opportunities and to the design of a course that achieved its primary goal. [CATI consultants](#) have

- An expertise in educational technologies emerging both within and outside of the UMN,
- An expertise in the pillars of adult learning and instructional design and
- A long track record of faculty development offerings (e.g. OIT Education Technology Faculty Fellowship Program).

Next, these principles to guide the design of HD2 were established:

- Eliminate duplication of material that appears in more than one subject area within HD2,
- Goals and objectives to be learner-centered; instruction to respect the students' baseline level of knowledge and skill,
- Identify faculty development opportunities and educational technologies matched to faculty/ staff skill levels and to instructional needs and where suitable, upgrade existing materials for long term use,
- Accept initial imperfection, but iteratively improve by welcoming and incorporating program evaluations.

The result is a collection of examples showing how education technology operationalized models and

frameworks to meet the new curricular requirements of integration, interactivity and independent learning.

Example 1: MOODLE + ‘ladders’. MOODLE (or Modular Object Oriented Dynamic Learning Environment) is free, open source, web based and intuitive to learn to use by students and faculty developers alike. UMN hosting provided password protection and technical support. This learning management system helped make the ‘temporal integration’ rung on Harden’s integration ladder [6] more interactive: the nine instructional weeks of HD2 became a series of ‘theme’ weeks, each week bracketed by MOODLE based electronically scheduled, autocorrecting, readiness/ formative questions (Figure 2) based on learning objectives for the respective week.

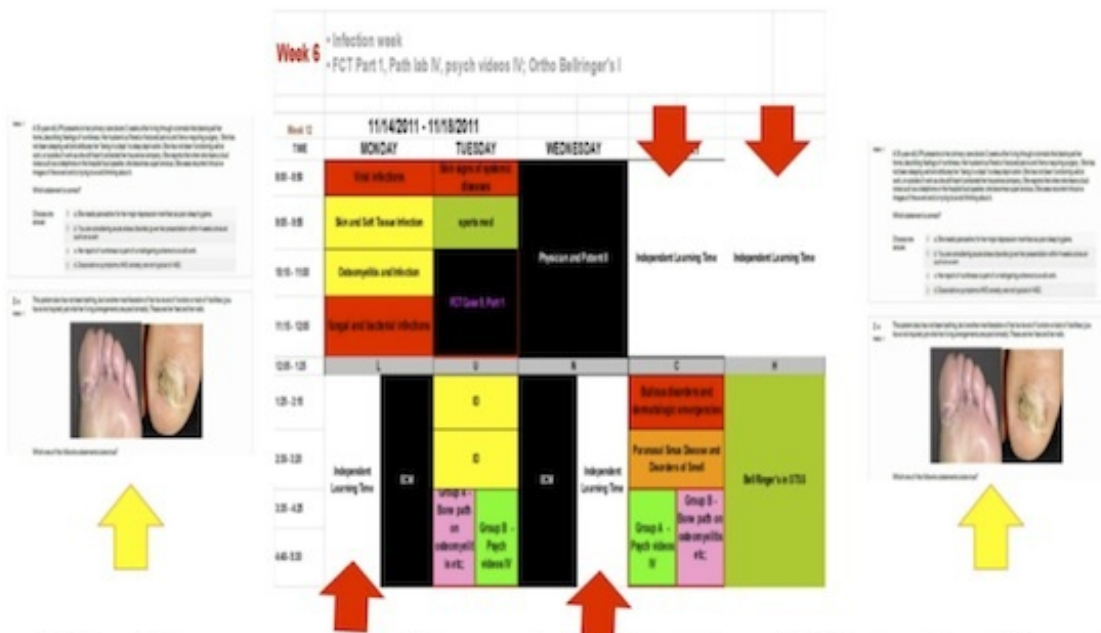


Figure 2 (above) shows a representative theme week – Infection week - , within the new Human Disease 2 block. 3 – ½ days per week (red arrows) for student independent learning are unavailable for faculty scheduling of learning activities. Infection related topics from among the 10 different subjects of HD2 are temporally scheduled into this week. Each week within HD2 starts and concludes (yellow arrows) with scheduled, autocorrecting subject integrated readiness/ formative assessments, housed onto UMN password protected Moodle Learning Management system.

Finally we zoom in further to the level of the Rheumatology subject, within HD2. In the broadest sense, Rheumatology is the specialty that a) diagnoses and non-surgically manages joint damage (e.g. osteoarthritis) and b) investigates and manages diseases where the process of raging inflammation (e.g. lupus, vasculitis....) can damage any organ (brain, lungs, eyes, kidneys, skin...). The medication arsenal a rheumatologist uses varies from steroid injections into inflamed joints to immune system taming antimalarial drugs to organ salvaging chemotherapy, even if cancer is not the diagnosis. These potent medications also have potential side effects, likewise not limited to any one organ. In other words, integration is not a challenge to the rheumatologist, as their thinking is not limited by ‘silos’. Rather, small divisions, such as Rheumatology, do not have the luxury of recruiting the few clinical faculty away from patient care responsibilities in order to do what they also love, teach, especially when patient appointment backlogs exceed 3 months. For the faculty rheumatologist, the challenge of introducing new active learning activities for more effective learning into a reduced 20 hour weekly schedule using limited classroom resources has significant patient care implications. Fortunately and once again, educational technologies came to rheumatology’s aid to operationalize models and frameworks and ensure that new curricular requirements of integration, interactivity and independent

learning are met, without having to cancel patient appointments.

Example 2: MOODLE + ‘flipped classrooms’. Working within faculty time and scheduling constraints, but still guided by the learner centered design principles, Rheumatology boldly did the unthinkable, abandoning lectures and ‘flipping the classroom’ [7]. The 3 – ½ days per week of Independent Learning Time were leveraged to “free up... class time for experiential ...activities, (and became an) alternative way of introducing students to the key information and ideas of the course, i.e., the content.” [3] Rheumatology elected to repurpose its original 7 – 1 hour lecture slide decks into a faculty authored student self- study Companion Guide, posted onto MOODLE. Assigning students to read sections of the Guide in advance of scheduled Rheumatology sessions and to answer MOODLE based readiness questions pre-class [Figure 3 a) and b)], is an example of an education technology based strategy not infrequently used whereby “online quizzes with immediate feedback and the ability to rerun lecture segments may help clarify points of confusion” [7].

Example 3: MOODLE + ‘flipped classrooms’ + ‘change-up’. With Rheumatology lecture slide decks repurposed as MOODLE posted Companion Reading Guides, paired with MOODLE readiness questions, the 7 individual hours of class time were now available for active learning, clinical reasoning and knowledge application exercises. Rheumatology chose to follow the 3 part ‘change –up’ model [8] as each step served important educational purposes.

Part 1 was an abbreviated lecture, to establish a baseline of key learning points from the Companion Guide assigned readings.

Part 2 was an interactive exercise. Rheumatology chose a variation of Team Based Learning (TBL) [9] whereby students groups used recently learned concepts to solve increasingly ambiguous clinical cases and to justify their answers to one another.

Part 3 is a debriefing by the instructor for the purposes of clarifying and confirming the key lessons from parts 1 and 2.

To deliver the TBL variant, the three part learning activity took place in the technology rich Active Learning Classrooms (ALC) within a newly constructed 5 level, 115,000 square foot building on the UMN campus. <http://www.classroom.umn.edu/projects/ALCOverview.html>. The 9 student x 10 table arrangement of the ALC, with 3 microphones per table, multiple flat-panel projection screens, a centered teaching station, and a 360-degree marker board perimeter allowed a single faculty to facilitate 90 students at one time, and engage them in intra- and inter-group clinical problem solving. [Figure 3 c)].

The appeal of ‘change-up’ is that any interactive activity can take place in Part 2 , one is not limited to Team Based Learning in Active Learning Classrooms. The term ‘change – up’ , from baseball, is aptly chosen, as the purpose of throwing an unexpected pitch is to bewilder the batter, keeping him/her constantly sharp and alert for what is next to come. The timing of the interactive ‘change-up’ activity in this model [8] is not random, as introducing an interactive activity 15 – 20 minutes into a session, is timed with when lapses of student attention have been demonstrated to occur [10]. Part 2 is therefore, intentionally scheduled about 20 minutes into the hour, to promote student engagement.

What are the skin features of SLE?

Do I have SLE specific or SLE non specific skin features, any of these fulfill other conditions or carry a differential.

I. SLE specific skin features:

- the most recognized skin feature of SLE is the butterfly rash, a red, elevated, itchy, and at times painful lesion in a malar distribution (over both cheeks and the bridge of the nose)
 - often the butterfly rash is confused with acne rosacea
 - TIP: you will not see the butterfly rash on the face "where the sun doesn't shine" ie in the arctic tundra
- chronic discoid lupus is a thick red plaque that often scales and is centrally hyperpigmented and scarred



II. and SLE non specific (i.e. do not only occur in SLE) skin features:

- vasculitis, Raynaud's phenomenon, oral ulcers, leg ulcers, alopecia, hives/urticaria

(a)

- Raynaud's is an exaggerated (or color white, blue, red) vasoconstriction response to cold or emotion of the extremities, 10% of young healthy women have Raynaud's
- oral ulcers over the palmar nasal ulcers are usually painless
- alopecia can be non-scarring or scarring (discoid lupus affecting hair follicles), diffuse or patchy
- e.g. of skin vasculitis include digital ulcers, palpable purpura
- hives/urticaria is a redness (wet - like) allergic manifestation of the legs, arms, trunk pronounced in the cold

(b)



Independent Learning Time: Lecture slide content converted into pre-class self-study Companion Guide **(a)** and auto-correcting self –assessments **(b)** both on MOODLE

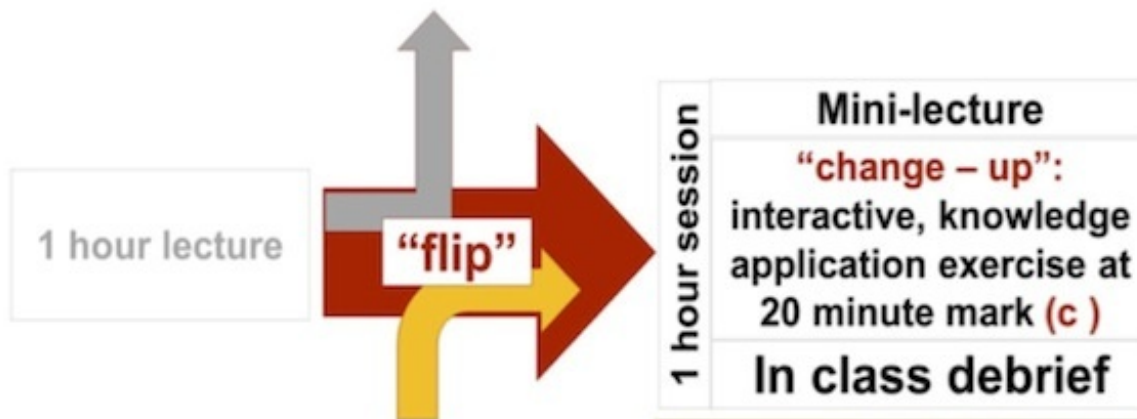


Figure 3 (above) maps the transformation of a Rheumatology lecture via "Flip" and "Change-up" into **[A and B]** an electronic self- study Companion Guide, created by repurposing lecture materials and slides, MOODLE based electronic readiness assessments and **[C]** a 3 part "Change-up" activity which took place in Active Learning Classrooms. The classroom photo shows two groups of students engaging in discussion, having selected two different answers to a clinical case question.



Reflections

The Carnegie Foundation 2010 call for medical education reform, LCME accreditation standards and necessary curricular revisions posed educational, operational and resource challenges for the UMN – Medical School. Rheumatology, a small medical school division of committed educators, met the external and internal challenges head on. Had Rheumatology resorted to lecture-replacing conventional small group seminars, in order to meet the requirements of interactivity and independent learning, 320 – ½ hour patient appointments would have had to have been cancelled, an unacceptable

option. But instead, guided by principles to be learner centered, and to respect past faculty labor in the development of instructional materials, informed by situational factors, and with goals in sight, this resource constrained division delivered new active learning activities scheduled into a reduced 20 hour week without having to recruit clinical faculty away from patient care responsibilities.

Upon reflection, it is not simply MOODLE ,as the faculty suitable and student usable education technology, or the individual 'integration ladder [6] ', 'flipped classrooms' [7] and 'change-up' [8] models that made this possible. This experience is an inspiring example of how a collection of carefully chosen frameworks and their operational integration with education technology, can transform classes and courses in both the virtual and the classroom worlds. True to the definition of redesign, the transformation of Rheumatology instruction within HD2 added value, as resources were optimized, and waste and inefficiency reduced, without requiring clinical faculty to put student preparation for 2nd millennial medicine before the patient care mission.

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Everyone's a DJ: Defining the Instructional Remix

Joel Dickinson

Sara Hurley

<http://www.sph.umn.edu/facstaff/resources/dlg/>

Introduction

In this modern age, everyone's a DJ – whether they know it or not. DJs create new meaning by blending records, samples and other aural elements together, just as instructors and instructional designers blend content together in new ways to create learning experiences that are engaging and innovative. These new pieces are “instructional remixes,” but there are also other forms of remixing happening within the academic world. These include a combination of ideas, cultures, and areas of knowledge in interdisciplinary work and the mingling of identity between our academic, personal, and professional selves.

Using remix concepts as a springboard for developing curricula and instruction led to valuable and interesting results. In the School of Public Health, we have begun using terminology borrowed from remix theory and DJ culture to inspire faculty, connect with students in new ways, and challenge our personal identities and their intermingling.

Remix History

All of us are inspired by the ideas that came before. We use these previously existing ideas and concepts as foundations upon which to add, edit, and reconfigure, as well as to create new pieces of art, computer programs, languages, and architecture. Throughout history, we have celebrated remixers even before the term was coined. Many see remixes as devoid of originality or creativity, when, in actuality, they may require more originality than seen at first glance.

Some famous remixes include Judy Garland & Barbra Streisand's “Get Happy/Happy Days Are Here Again” medley; nearly all of Walt Disney's fairytale films, including “Cinderella,” “Beauty and the Beast,” “The Little Mermaid,” and “Tangled”; Thom Yorke's lyrics for Radiohead's “Kid A” album (which used the cut-up technique); the Marilyn and Campbell's Soup prints by Andy Warhol; and Andrew Lloyd Webber's musical “Cats,” which adds music, dance and a plot to the classic poems by T.S. Eliot.

Definitions

To begin using the concepts of remixing in education, we must define key terms that sometimes may carry different implications when applying them to different disciplines.

- **Remix:** A new juxtaposition of content that relies heavily on previously-created material, although it may contain new material as well.
- **Mashup:** A new juxtaposition of 100% previously-created content; often this involves two sources (i.e., an instrumental of one track and an acapella of another); creator is a “remixer” – but not content owner. In computer science, a mashup is defined as a website or web application that uses content from more than one source to create a completely new service (Sahin, 2008).
- **Read-only culture:** A culture where information disseminated to the masses is produced only by a few; public is restricted from interacting with information/media/knowledge and encouraged to absorb it (Lessig, 2008).

- Read-write culture: A culture where the public is encouraged to interact with information/media/knowledge and create their own derivative works.
- Derivative: A creative piece that incorporates elements from other sources (may also include new material).
- Folk derivative: Works created from a read/write culture. Often, this is used to describe remixes created in pre-copyright law cultures.

Remixing in Education

When we apply the concept of remixing to education, there are a number of different forms this can take. Remixing could refer to a new combination of instructional materials, a new mix of concepts and ideas, or a combination of identities and expertise.

Remixing materials

The Scenario

For PubH 6560: Operations Research and Quality in Healthcare, a fully online course, Dr. Sandra Potthoff was concerned about students losing interest with nothing but lectures. She wanted to find creative ways to remix a traditional course lecture. To do that, she found real-world multimedia that she could use to ground explanations of some course concepts. The challenge was how to truly incorporate these multimedia components, rather than just posting a link to the external multimedia resources. How would we remix the multimedia components with lectures, assignments, and case studies?

Identifying the Remix

The first step was to identify the different components to be included in these instructional remixes and their sources. What we came to see as both a good remix and a good use of time was to incorporate a Father Guido Sarducci (of “Saturday Night Live” fame) video from YouTube, combining that with some traditional lecture with PowerPoint, and creating screen capture videos. This combination of media seemed especially effective, since it would provide students the traditional lecture segments which the School of Public Health uses in a variety of other courses. By integrating the short external video with Father Guido Sarducci, students wouldn’t leave the course for very long – just enough for a short break. Since the Father Guido Sarducci video had already been produced, this instructional remix only required the lectures and screen capture videos to be developed by an in-house production team.

Arranging the Remix

Next, we worked to sequence these components in a meaningful way that would guide students through each lesson. In order to give students a context for the video, we decided it would be important to have a brief introduction that would place the video in context and then follow that up with more detailed instruction. This instruction would further explain how Father Guido Sarducci’s 5 Minute University concept can be used in modeling practice. The next step was to select the most appropriate technology for delivery and presentation of these components. It was determined that Moodle books, with its ability to sequence the items as chapters, but also provide flexibility to incorporate a wide range of multimedia types was the most appropriate and readily-available technology.

In the first chapter of the lesson, Dr. Potthoff introduces the “Father Guido Sarducci Principle of Modeling.” This component is a traditional online lecture video that combines images and narration, recorded and produced in TechSmith Camtasia. Once this video portion is completed, students gain access to the next chapter of the Moodle book, which contains an embedded YouTube video where Father Guido introduces his “5 Minute University” concept. After completion of this video segment, Dr. Potthoff returns in the next chapter to explain how Father Guido’s “5 Minute University” concepts can be used in real-world modeling problems using Excel.

Finally, students are challenged with a real-world problem where they must apply this principle on their own using Microsoft Excel skills, their own experience, and prior knowledge. The student work using Excel is submitted as a traditional assignment.

Instructional remixes, such as the remixed lessons using existing multimedia (i.e., the Father Guido video clip), new lectures, and screen capture videos allow faculty to explore new ways of teaching that incorporate non-traditional and traditional elements. Students react positively to these experiences, some because the humor of Father Guido is a welcome break from traditional academic material; others because the concept is unique and more memorable.

Remixing Interdisciplinary Concepts

The Scenario

In “Business Continuity Planning for Disasters and Emergencies,” a continuing education module, we mixed theories and practices from different disciplines combine to create a new process for developing a continuity plan for businesses. This process incorporates principles of risk communication, disaster preparedness, public health considerations, and business practices in a way that makes this process valuable for a variety of audiences. This new process is itself a remix of pre-existing ideas from a variety of disciplines and new ideas and bridging content to create new discourse.

Identifying the Remix

A key component of this remix was showing students the differences and similarities between disciplinary approaches to the subject matter. To capture the differences and similarities between experts in these fields, we interviewed experts and directly asked them about their experiences. These interviews were conducted with a small business owner, a manager from HMS Host at Minneapolis-St. Paul International Airport, a director from the Minnesota Department of Health, and a disaster preparedness expert. These interviews are used to illustrate specific components of the business continuity planning process in practice from different perspectives. The production team decided the best way to draw these comparisons was to ask the experts identical questions and use editing to illuminate the similarities and differences in perspectives.

Arranging the Remix

The interviews were recorded separately and in addition to the predetermined questions, we also asked experts to share a story about how they have used business continuity planning principles in their roles. After the interviews were conducted, a script was developed. This script was the map for the remix; including pre-existing content (business continuity practices), new content (perspectives and stories from field experts) and new ideas (the proposed multi-disciplinary business continuity planning strategy). The expert narrative stories were used to “set the stage” and emphasize the importance of pre-disaster planning. A particularly moving segment comes from the manager of HMS Host as he speaks about how their pre-disaster planning was essential in allowing them to function in the aftermath of the September 11, 2001 terrorist attacks that crippled airports immediately. The questions are presented in a relatively straightforward manner with each expert having an edited response. This remix allows students to consistently see the difference in approaches, knowledge and strategies in the same context. The new business continuity planning strategy proposed by this training module is examined at the conclusion of the edited interview segment. During this portion of the learning material, subject matter experts and faculty refer back to the expert interviews to draw connections between disciplines.

Bringing these disciplines together seamlessly allows participants with different educational objectives and backgrounds to gain a deeper appreciation and understanding for not only business continuity planning, but also how their planning can impact and affect other disciplines. This module has received

praise from business people, public health officials, and risk communicators for its holistic and unique approach to this complex issue.

Remixing Identities

Remixing can also be seen in how faculty, students and staff see themselves within the context of the academy. For example:

Joel
I am a music producer/remixer/DJ in addition to my role as instructional designer here at the University. My work to connect DJ culture and terminology with educational concepts as a means to enhance understanding of the pedagogic foundations of instruction is a clear example of a mingling of identities to create a new identity – that of the “instructional remixer.” When my identities clash, they challenge me to refine and rethink my pedagogical approaches. When I can draw parallels from these two areas of expertise, I find a stronger connection to my work and the context around it.

Sara
I am consistently surprised at how profoundly my work teaching first-year writing has informed the rest of my career. Though I haven’t taught in that field for several years, the philosophies that underscored my pedagogical perspectives have carried over into my role as an instructional designer. Teaching is fun, it is frustrating, and many faculty get enjoyment from those in-class interactions and feel worried that they won’t have that experience anymore. One thing I ask of the faculty I work with is to consider their passions—what do they enjoy about teaching in the physical classroom? Can they bring their passion for their research into their teaching? As adept as I am with coding and making things work technologically, it is my perspectives on passion and empowerment in education that inform conversations about course structures and strategies.

Conclusion

The use of remix culture and DJ terminology can be invigorating and refreshing. It can also be inspiring and challenging. But, through inspiration and challenge, we grow as instructors, students, and staff. As we look toward the future, we continue to think creatively about education, interdisciplinary work and our identities within the academy. We’re all DJs – creating our own remixes, mashups and other configurations of new and existing ideas.

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Joel Dickinson is recognized for his work with the Digital Learning Group at the School of Public Health which includes design of custom modules and interfaces to enrich the student experience; course transformation, adaptation, revision and Moodle expertise. Joel is also recognized for his educational project planning and management experience, stakeholder relationship building and drive to achieve the highest levels of customer satisfaction. He is also an accomplished music producer with numerous productions that have been featured in the top ten on the Billboard dance charts.



Sara Hurley, MFA, Ph.D. Candidate <hurley@umn.edu>

Sara Hurley has over 10 years of experience working in technology and education. Her current work focuses on engaging with faculty to develop new strategies for online pedagogy, online course design, and technological innovation. Sara has taught at the University of Minnesota's English department and School of Public Health, in the MLIS program at Saint Catherine University, and in English departments at Brooklyn College and Kingsborough Community College. As a Ph.D. candidate in the Curriculum and Instruction program at the University of Minnesota, Sara is researching social media, public pedagogy and the "It Gets Better" Project.



“Flipping” the Classroom in a Sensation and Perception Course

Cheryl Olman

Stephen Engel

Thomas Brothen

Introduction

Our task in this chapter is to report an effort to change an intermediate psychology class by utilizing digital technology and an instructional technique known as flipping the classroom. In this model of instruction, described in outlets such as the Chronicle of Higher Education, instead of coming to class to have content delivered at them, students come to work with it. In that model, most of the content is delivered “outside” of class through a combination of written material and online lectures. Our project united technology and flipping to deliver course material that many students find more technical than they expected.

Narrative

In this report, we describe our project to change Psy 3031: Introduction to Sensation and Perception from a lecture format to one that allows for increased small-group discussions and hands-on experiments utilizing computer technology. The major content of the course covers sensory physiology, organization of the sensory nervous system, and the role of our own experience and awareness in shaping our perception of the world around us. Key concepts include mechanisms of neural activation, neural networks, logarithms and non-linear functions, and the importance of accommodation for individuals with loss of sensation. Central themes include developing an understanding that our sensory physiology extracts only some of the available information about the external world; that prior experience and expectation (top-down effects) play as large a role in perception as our sensory experience (bottom-up effects); and that attention and awareness play an important role in controlling what we see, hear or feel.

Delivering this course to its intended audience of freshmen and sophomores presented three major problems that were a major impetus of this project: student preparedness, the expense of technology required to provide an active learning environment, and the need to expand enrollment to serve a growing student population. As described in the following paragraphs, the flipped classroom addresses each of these problems by allowing the instructor to meet with small groups of students who have had a chance to prepare at their own pace for the week’s material.

First, many enrolled Psychology majors do not have enough background in math or physiology to easily understand the course material. Experience has shown that the class divides into two groups – the half that intuitively understands concepts such as the use of logarithms to understand sensory coding, and the half that is intimidated by math and biology to the point that they do not even attempt some of the assignments. Online delivery of lecture content allows students to learn material at their own rate, and review challenging concepts multiple times before coming to class. The online format also makes it easy to provide links to other resources – tutorials on neural anatomy or logarithmic functions – for students who have not had the relevant course work. Finally, breaking the class into groups of 6–8 students and giving them time to work out problems collectively addresses the problem of heterogeneous backgrounds beautifully as the students readily engage in teaching each other how to solve problems.

Second, we faced a difficult challenge to provide the resources for technology-based small group work in courses that seat more than 100 students. Many of the most meaningful demonstrations of laboratory techniques and psychological/physiological principles, particularly in the study of auditory and visual perception, require computers. Examples of in-class exercises are: working with partners to measure tactile acuity and plot corresponding psychometric functions, serving as psychophysical observers to perform an auditory masking task, or working in groups to develop neural network models that explain a visual illusion. One innovation in this project was to use the flipped classroom to allow the instructor to meet with a third or a fifth of the students at a time, so the purchase of just 6 computers would give all students access to computer technology through which the demonstrations could be experienced. Not only is this small group work vital for students to experience laboratory techniques, but success in these demonstrations requires students to work together and learn by doing and teaching.

Finally, the class size needed to expand to meet the needs of a growing number of psychology majors. The class covers introductory concepts and is intended for freshman and sophomores, but juniors and seniors register first and take 95% of the seats because they still need the class to fill graduation requirements. In addition, an increasing number of students, including those in the burgeoning Psychology BS program, will need access to the content of Psy 3031 in order to be successful in required advanced courses in the Cognitive and Biological area of psychology. We were therefore looking for a way to make the small-group learning environment accessible for larger enrollments. Accommodating larger enrollments while continuing to give students access to meaningful discussion with instructors requires increasing the number of instructors. The flipped classroom allows us to do this by removing the burden of lecture preparation for faculty in the Cognitive and Biological area. Instead of spending the average of 100 hours per semester required to prepare lecture material for an introductory course like this, instructors can spend a fraction of that time preparing meaningful exercises for students and directly interacting with the students about content. The flipped classroom is a much better use of the expertise of faculty members, producing a more rewarding experience for student and teacher alike.

Our practical goals for delivering the course were achieved by having students complete weekly readings, view lectures, submit online responses to in-class exercises, contribute to a discussion forum, and take exams. We integrated technology into each of these goals. First, to assess reading completion, we had students complete an online quiz covering the reading material before coming to the class based on that material. Second, to access a week of lecture material, instead of coming to a large lecture hall, students watched recorded lectures online and studied the corresponding slides (12 8-minute modules per week; modules were recorded during the Spring 2011 offering of the course and are scheduled for replacement at the rate of 12/year). Third, after completing a computer-based or other "hands on" activity during class time (during which the instructor and TA circulated through the classroom checking on progress, offering helpful hints, and answering questions), students entered short-answer responses on the course website, which were graded for accuracy and completeness. Fourth, a portion of the student's grade is derived from providing thoughtful contributions to discussion for each of the week's topics. Fifth, students completed three computer-based multiple-choice exams throughout the semester. Only 50% of the final grade in the class is derived from the multiple-choice exams, emphasizing for the students the fact that learning requires participating in discussions and articulating new ideas as they are absorbed.

The above format has clear advantages and effectively reduces the student/teacher ratio without increasing instructional staff. Students spend more time with faculty and instructional staff engaged in research-like activities where students learn from each other during discussion, and the additional scheduling flexibility of online lectures makes the material more accessible to non-traditional students.

However, the above format also presents significant logistical or technological challenges, and we worked this year to find solutions to some of the obvious ones. For example:

- How will exams be administered? In order to avoid devoting 2 of 15 discussion sections each semester to proctoring exams, we needed to identify resources for proctoring online exams in a way that is fair to all the students and accurately assesses knowledge. We worked cooperatively with the staff of the introductory psychology (Psy 1001) class who had created a computer testing center where our exams are now delivered.
- How can the captured lectures and slides be presented online in an integrated fashion that makes the lecture experience optimal for the student? We recognized that the Psy 3031 transformation would only be successful if we could present the online material in a motivating and meaningful way. One advantage we had was a lecture capture format developed in our department for 1001 that presented video of the instructor integrated with the lecture's PowerPoint slides. The interface is beautifully intuitive but will lose its appeal if it appears dated. For future offerings of the course, we are working on recruiting other members of our area faculty to record lectures and take on the role of instructor.
- How can computers be provided in class for the students? We purchased a set of 6 Mac Minis, which are affordable and portable, but still difficult to set up before each class period because of the time it takes to attach peripheral devices and boot up/log into equipment. As fully functional computers become less and less expensive, we hope the University will be able to equip active learning classrooms with workstations, instead of requiring students to bring their own computers (which have unpredictable capability) to class.
- Can web-based demos of visual psychophysical experiments be hosted on the course website for students to complete as part of their homework? There are certainly dozens of experiments that we could envision presenting to the students and we continue to work on the logistics of this.
- Are we developing students' analytical and writing skills? Their written reports of the class activities are central to that development and we need to create ways to provide good feedback to increasing numbers of students without increasing staff. The Moodle "Workshop" feature facilitates student peer review of writing and may be an effective and efficient way to meet this challenge.
- How can we encourage students who are uncomfortable with new technical terms and concepts to participate more openly in class? The group dynamics that evolve in different sections are markedly different, with some being reticent and others being willing to ask questions. The thing that makes students most willing to discuss is the excitement of a sudden insight, and we are working to structure in-class activities to build knowledge progressively, so students discuss more openly as they learn.

As we began planning for the hybrid online/discussion course described here, students hearing about it expressed dismay because their experiences had been that it is hard for them to stay motivated to follow online material. This hybrid format with the flipped classroom removes the stigma of online classes by offering a technology aided course that presents the material to the students in an engaging manner while optimizing their classroom experiences to receive real-world training using research-relevant computer-based technologies. We did this first by making everything we did consistent with the content and goals of the course. Content was first and "technology" secondary to our development process, but judicious incorporation of technology gets students working and helps them learn more as they are actively engaged with the course material. In sum, we advise others to remember that technology is not the most important—what students do and learn is.

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"But I'm Giving Up Lecture Time!" Alternative Teaching Methods for Pathology

*Rob Porter
Erik Olson
Deb Wingert*

Clostridial Enterotoxemia type D

*C. perfringens is nothing strange
In the guts of animals that live on the range.
But sheep and goats that eat far too much
Will have GI tracts full of mush.
Normal flora will multiply
Releasing toxins that cause small ruminants to die.
What will you find on necropsy?
Hemorrhaged GI and pulpy kidney!
Bloody diarrhea and animals that can't stand,
You know that Clostridial enterotoxemia type D played a hand.
On histology you'll find rods that are gram positive.
If it wasn't for that bacteria on culture that sheep might have lived.
How do I keep my animals movin'?
Prevention is the magic solution.
Vaccination and stopping gluttons
Will keep sheep from becoming mutton.*

What?!? Poetry in Pathology?

Can students create pathology poetry in wiki groups to help them understand complex systemic pathology concepts? Preposterous. But...then again, there is growing evidence that student engagement enhances understanding, thus supporting active approaches to teaching and learning (Michael, 2006). So we decided to put the research to the test: how could we engage 95 second year veterinary students to master highly complex pathology concepts and avoid serious injury? Traditionally, all teaching in CVM 6299, including the topics listed in this project, had been conducted by didactic lecture and on rare occasion presented in the laboratory portion of the course. Based on demonstration of variable and sometimes poor retention of pathology information by fourth year veterinary students, we considered other options to teach this information in an active learning format during the second year. We pondered, and ultimately decided to create an interactive cooperative learning poetry wiki project, designed to enhance both student engagement and understanding of selected systemic pathology topics.

Why Wiki Groups?

A wiki, which is simply a website, allows selected visitors (our students!) to actively participate and create or edit site contents without any special technical knowledge or tools. The advantages of using wikis abound. Anyone using a computer with an online connection (and permission from the coordinator of a given wiki) can participate on a wiki from any location, face-to-face or from any distance. Wikis promote collaboration with a small or large number of participants (students!) on

projects such as: sharing online information, including technical product information, research data, development programs, or other collaborative projects. More open in structure than blogs or e-mail, wikis allow participants to build upon each other's input (Evans, 2008). Information created on wikis can be continuously updated, rendering it highly conducive as an active collaboration tool for creating and sharing a myriad of projects, especially with groups of students (Lamb, 2004).

Cooperative learning formats, long recognized as a highly effective learning tool, allow students to collaborate in groups and actually teach each other (Johnson et al., 1998). As effective and often superior to classroom lecture, cooperative learning engages student interest and promotes information retention (Felder, 1993; Cooper et al., 1990).

Given the convenient accessibility of working with wikis and the feasibility of integrating cooperative formats to engage student groups, we embarked on creating a project, holding students responsible for learning the assigned material and sharing with wiki group members to complete project requirements. We hypothesized that: 1) students reading poems on pathology topics would be more engaged and retain more information than notes alone, resulting in higher test scores, 2) students working in groups to plan and construct a poem on a particular topic would demonstrate higher scores on questions corresponding to that topic, and 3) students would enjoy the experience of creating and reading poems as an alternative to notes.

Launching Operation Wiki Poetry Groups

To hatch this student project, we created wiki sites, a student rubric, online exams (pre- and post-test) and a student project survey as part of a cooperative learning laboratory in CVM 6299 Systemic Veterinary Pathology (Information Technology Unit, 2011). All project components - wikis, tests and surveys - took place on restricted-access Moodle sites, a software package for producing internet-based courses and websites, operated by the University of Minnesota.

Ninety-five second year veterinary students completed an online pre-test to assess their base knowledge of specific topics on gastrointestinal (GI) pathology. The pre-test consisted of 15 questions randomized from a pool of 46 questions. Students were then randomly placed in one of 23 wiki groups (4-5 students per group), each of which were assigned a specific GI pathology topic. The rubric clearly delineated project expectations and criteria for mastery (Figure 1).

Figure 1. Rubric criteria for construction of gastrointestinal (GI) pathology poems.

Criteria:	Yes	No
Does your poem include the following?		
History: Typical outline of medical background of the patient- (<i>e.g., an obese cat with hepatic lipidosis with a history of anorexia or diabetes mellitus.</i>)		
Signalment: Most common species, age, sex, breed.		
Etiology: Infectious agent, abnormality of development or nutritional origin, toxin, or other cause of the disease.		
Clinical signs: What are the clinical signs associated with <u>each</u> disease or condition? (<i>e.g., vomiting, anorexia, bloating, etc.</i>)		
Predisposing factors: What conditions enhance the likelihood of an animal developing the disease? Why is a particular animal susceptible?		
Gross lesions: What does the condition look like? Organs affected, lesion distribution, color, consistency.		
Histopathology: What organ(s); what type of stain, morphology, color, distribution, type of inflammatory cells are observed in lesions?		
Pathogenesis: How does an agent or condition produce the disease in question?		
Clinical outcome: What happens to an animal with this disease?		
Diagnostic tests: What tests might be used to make a final diagnosis in the living and dead animal? (<i>Virology, bacteriology, histopathology, serum biochemistry, CBC, cytology, imaging, hematology, etc.</i>)		

Students gained points by participating in wiki discussions to list key words and phrases on the assigned topic (Figure 2) as directed in the rubric.

Figure 2. Gastrointestinal (GI) pathology subject topics.

1. Copper toxicosis of Bedlington terriers	13. Necrotic enteritis of chickens
2. Canine parvovirus	14. Crop mycosis of poultry
3. Johne's disease	15. Portosystemic shunt
4. Salmon poisoning	16. Swine dysentery
5. Ruminal lactic acidosis	17. Gastric ulcers of swine
6. Gastric dilatation volvulus	18. Acetaminophen toxicosis
7. Avian mycobacteriosis	19. Exocrine pancreatic insufficiency (EPI)/juvenile pancreatic atrophy
8. Ovine contagious ecthyma	20. Pancreatitis
9. Lumpy jaw	21. Copper toxicosis of sheep
10. Clostridial enterotoxemia	22. Fatty liver
11. Potomac horse fever	23. Cirrhosis
12. Coccidiosis of chickens	
Poems in Trial 1 and Notes in Trial 2	Notes in Trial 1 and Poems in Trial 2

Each of the 23 cooperative learning wiki groups assembled their key word list, which they subsequently used to create their poem (prose, haiku, limerick, standard, rhyme or non-rhyme). If any group

experienced significant difficulty creating a poem, they could choose to create a paragraph or bullet points. As required, each group addressed at least 5 of 10 rubric categories in their poem. Instructors monitored student participation by accessing each wiki group site.

Student groups 1-12, also referred to as Trial 1 Group, and groups 13-23, referred to as Trial 2 Group, read poems on separate topics. Trial 1 poems (12 poems) and Trial 2 poems (11 poems) were collated separately; all students also received abridged notes covering all GI topics. Students were given 5 days to review their notes and assigned Trial Group poems, before completing the online post-test.

The post-test, comprised of 20 random questions from a pool of 46, covered 20 of the 23 GI topics. Both pre- and post-test questions came from the same pool of 46 questions. All students answered 10 questions corresponding to poems read and 10 questions corresponding to the notes read. Following the post-test, students also completed an online evaluation of the poetry project to assess their preferences and perspectives of this overall project.

Back to Our Hypotheses: What We Discovered

Were students more engaged and would they retain more information with poetry than notes alone? Engaged yes. More retention? Not consistently. Although results in Trial 1 and Trial 2 indicated significantly greater post-test scores as compared to pre-test scores (Table 1), data also indicated marked differences between trials in test scores on topic questions corresponding to poems read and scores on topic questions corresponding to notes read (Table 2). Survey results showed that 84% of the students reported that sharing wiki GI poems is a more effective tool for learning if combined with lecture or notes (Table 3).

Table 1. Evaluation of pre-test scores versus post-test scores in Trials 1 and 2.

	Pre-Test Score	Post-Test Score
TRIAL 1	46.4 % ± 12.1	53.6 % ± 14.1*
TRIAL 2	46.2 % ± 13.4	54.9% ± 14.1*
		* = p < 0.01, Student's t-test

Table 2. Effects of poems and notes differ between trials.

	Percent of Poem Questions Answered Correctly	Percent of Notes Questions Answered Correctly	Percent who answered their own poem question correctly
TRIAL 1	61.4 % ± 17.8*	45.7 % ± 12.1	61.5 %
TRIAL 2	43.8 % ± 20.5	61.2 % ± 17.2*	49.1 %

* = p < 0.01, Student's t-test

Table 3. Wiki poetry project student survey results.

	Strongly Agree	Agree Somewhat	Neutral	Disagree Somewhat	Strongly Disagree
I ENJOYED working on the WIKI project	38 40%	45 47%	10 11%	2 2%	0 0%
Reading GI poems did NOT help performance on tests.	11 12%	23 24%	27 28%	28 29%	6 6%
Researching GI topic and working in groups helped to learn that specific topic.	49 51.5%	38 40%	3 3.2%	5 5.3%	0 0%
I LEARNED additional topics by reading poems that were shared between groups.	16 16.8%	49 51.6%	11 11.2%	15 15.8%	4 4.2%
I LEARNED more from a poem than from reading standard notes.	16 16.8%	21 22.1%	17 17.9%	24 25.3%	16 16.8%
I ENJOYED reading the GI poems whether or not they improved my learning or retention.	40 42.1%	38 40%	7 7.4%	6 6.3%	2 2.0%
I PREFER to learn the GI topics either by didactic lecture or by reading a book.	10 10.5%	19 20.0%	19 20.0%	32 33.7%	15 15.8%
Sharing Wiki GI poems is a more effective tool for learning if combined with lectures or notes.	37 38.9%	43 45.3%	6 6.3%	8 8.4%	1 1.1%

Black = number of students
Red = percentage of students

Did students demonstrate higher scores on questions corresponding to the poems they read? Yes and no. Trial 1 students scored significantly higher on questions corresponding to the poems they read, while Trial 2 students scored significantly higher on questions corresponding to the notes they read. In other words, in both trials students scored highest on the same questions whether or not they were taught by poem or notes. Additionally, depending on the trial approximately 50-60% of students correctly answered the exam question corresponding to the poem they created (Table 2). Regardless, survey results showed that over 90% of the students reported that researching a specific GI topic and working in groups helped to learn that specific topic.

Did students enjoy the experience of creating and reading poems as an alternative to notes? Yes. Approximately 87% of the students agreed or somewhat agreed that they enjoyed working on the wiki group poetry project. Likewise, 82% of the students enjoyed reading the GI poems whether or not they improved learning or retention. Examples of student comments include:

“It gave my brain another method to interpret and understand the material and gave me the opportunity to express more creative skills.”

“Writing and reading the poems helped me learn the information. It was ‘learning in disguise’.”

“I liked the opportunity to throw ideas around with other classmates in order to obtain a full, comprehensive understanding of our topic.”

So, Where Do We Go From Here?

Students, particularly millennial students, often learn effectively in cooperative learning environments that promote interaction, engagement and accountability. Although the contrasting results in Trial 1 and 2 Groups did not support our hypothesis that cooperative learning and poem creation and sharing would improve exam scores, student comments indicate an overall positive response to group learning and a change of pace from traditional lecture. Comments support that the overall cooperative learning poetry project engaged most students and enhanced their learning.

Even though post-test scores were consistently higher than pre-test scores, this may not be attributed solely to the use of cooperative learning and wiki poems. We also remain uncertain as to why test scores were significantly lower on a particular set of topic questions (right column in Figure 2). The study was fully randomized in terms of assigning students into groups, the topic assigned to each group, the order of the questions and correct letter answer in individual exams. Additionally, the questions were written as baseline pathology information that a second year veterinary student would be expected to know. Although test item difficulty level ranged between the knowledge and comprehension level on Bloom’s Taxonomy of the cognitive domain, we will check for potential difficulty aberrations that might explain the specified lower scores. Another factor that might implicate this scoring discrepancy relates to student comments revealing frustration over attempting to answer several test questions that contained content not covered in some of the poems. This problem might be addressed by examining the difficulty of the test questions and also by requiring the students to utilize more of the rubric items/criteria in each of their poems.

Based on our findings, we assert that post-test scores could likely improve by: 1) assigning course points based on extent of wiki participation; 2) applying test scores to the overall course grade; 3) requiring students to meet all 10 criteria delineated on the grading rubric; and 4) requiring students to work in groups on multiple pathology topics.

Our project revealed significant benefits for both students and instructors. For students, the wiki site minimized the time required for face-to-face meetings and allowed for real-time engagement and learning outside of class, from the convenience of one’s own computer. For instructors, although instructor set-up time was substantial, the online tests and surveys streamlined the instructor time needed to monitor projects, grade exams, provide feedback to students and collect research data on the project. Additionally, the poetry project, as a result of the electronic format is easily transferrable for reuse in years to come. The implications of improving both student learning and condensing instructor time provide significant incentive for future work in these areas.

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Deb serves as Director of Educational Development at the College of Veterinary Medicine, and Preparing Future Faculty Co-Coordinator and Early Career Teaching Program Facilitator at the Center for Teaching and Learning. She facilitated the design and development of the overall project and seeks to further engage both faculty and students in meaningful, interactive teaching and learning.



Repairing the Break – An Anatomical Saga

C. E. Clarkson
Kimerly J. Wilcox

My gaze was fixed upon an egg-sized swelling near the left shoulder of this beautiful golden retriever. The client said her dog had intermittent left forelimb lameness but the referring veterinarian's radiographs showed no abnormalities. Obviously something was not normal. What was causing the dog's lameness? Hmmm. Think! Think!

"Well? So what structures are in this area?" repeated the attending clinician. I knew everyone was waiting for my words of wisdom to break the now deadly silence; after all, fourth-year students should know their anatomy. Several years ago I could have recited all the bones, muscles, ligaments, and nerves in this region. At the time, I knew I needed to remember everything for the test, but now I realize that this is the ultimate test. If only I could remember...

Imagine a class of first-year veterinary students, bombarded with massive amounts of material. Ultimately, without any context to give it significance or immediate reason to retain the information, it quickly fades from their memories once the semester is over. This is the "anatomical saga" - a body of knowledge destined to fade. Or - can we intervene to transform this scenario? Can we repair this knowledge break?

A "Success" Story

Over all, the veterinary gross anatomy course has been quite a success story, since first-year students do well on exams (final grade averages of 84-86%), suggesting that this course is an effective learning experience. But, is this really true?

CVM 6100 Veterinary Gross Anatomy is a core course within the first year of a four-year graduate level program, culminating in a Doctor of Veterinary Medicine degree. This will be the first course in anatomy for most of our students, since it is not a required prerequisite for entry into the program. We cover developmental and gross anatomy rapidly: carnivore (dog and cat) and developmental anatomy for eight weeks, followed by six weeks of ungulate (horse and cow) anatomy, totaling 28 hours of lectures plus 129 hours of laboratory dissection. Two instructors (Clarkson and one other) teach the carnivore and developmental material and a third instructor is responsible for the ungulate portion; all instructors teach laboratories. The combination of lectures, student dissections, and optional web-based materials (Table 1) provide students with a large variety of learning experiences.

Moodle site:

- Mediasite Lecture Capture (recordings)
- Image Gallery (repository for faculty and student dissection images/videos)
- Clinical Cases for Anatomical Problem-Solving

Veterinary Anatomy Website (<http://vanat.cvm.umn.edu>)

- Carnivore Dissection Lab Introductions (with images)
- Embryology Highlights (Camtasia screencasts)

Self-assessment Tests:

- Veterinary Anatomy Concept Checker
- Carnivore Muscle Identification
- Developmental Anatomy quizzes

Table 1. Selected Veterinary Gross Anatomy Digital Assets

The course's digital assets are listed in Table 1. The Veterinary Anatomy web site, an extensive, rich resource developed by the College of Veterinary Medicine's Dr. Thomas F. Fletcher, has been a tremendous resource for our students as well as students from all over the world. In particular, the "Carnivore Dissection Lab Introductions" section (<http://vanat.cvm.umn.edu/carnLabs/>) is the most heavily utilized with over 42,000 visits in 2011 (Google Analytics). This particular component provides a condensed lab dissection summary, anatomical terms list, instructor commentaries, and actual dissection images with labels that can be toggled on or off, allowing students to test their knowledge. These lab introductions parallel the required dissection guide textbook (Evans and de Lahunta, 2010) and are commonly used by students to prepare for or review the lab material. Other resources from the Veterinary Anatomy site listed in Table 1 provide unique ways to learn and options for student self-assessment.

Along with other content and resources, the course Moodle site provides recorded lectures for review, and an image gallery that allows both faculty and students to upload and share their digital images and videos from the labs. Also listed in Table 1 are the "Clinical Cases for Anatomical Problem-Solving," a new asset and the focus of the following discussion.

Focused Disconnect

Teaching is an extremely gratifying experience; anatomy in particular is fun (I think) and, as mentioned, students perform well in our class and learn the material. However, the opening scenario exposes a serious deficiency in anatomical knowledge retention and retrieval when it is needed most: while problem-solving clinical cases during fourth year clinical rotations. Are we doing something wrong?

Halpern and Hakel (2003) provide a brief overview of research in the area of teaching for long-term retention and transfer. They very logically state that the underlying reason we teach is so that students can transfer their learning to situations they encounter after they leave the educational institution; in this case, so that they can apply their knowledge to the practice of veterinary medicine. For our students, it is easy to lose track of this perspective – the "big picture" - when immersed in the early basic science teachings of year one. Then, each course is focused on content helpful toward understanding the material of a particular discipline - with perhaps little consideration of how students will need to use that knowledge in the future. The "future" begins for most students in the fourth year clinical rotations. As a former practicing veterinarian, I (Clarkson) have been bothered by this approach, but conformed to the prevailing, accepted sentiment that we (basic science instructors) all do our individual parts and it is up to the clinicians to teach the clinical components. In other words, we should remain focused on "our" content and on task. But, is our focus too narrow? How will our students ever develop a bigger picture? In isolation there is some logic to providing a discrete body of base knowledge and some comfort to many who teach the basic sciences that they are not expected to apply the clinical bridge to their material. However, there is a huge flaw in this reasoning, typified by the opening scenario - the students are not transferring what we teach to the clinical patient. In response, this project represents a model in development to facilitate students' transfer of anatomical knowledge to the patient, by teaching in context.

Teaching in Context

In this project, teaching in context involves a guided approach to problem-solving clinical cases that feature anatomical abnormalities. These cases serve as a critical first step toward the transfer of anatomical knowledge to actual clinical patients.

During the eight-week carnivore anatomy portion of the course (Clarkson's main teaching component), three anatomical problem-solving clinical case scenarios are posted and responded to entirely within the course Moodle site. Key questions guide students' case processing, requiring them to (1) recognize the problem (a critical first step to problem-solving), (2) recall the anatomy of the region (knowledge retrieval), and (3) justify how an alteration of that anatomy could contribute to the clinical signs, thus applying anatomical knowledge within an appropriate future context. Answers and explanations are posted in Moodle following a pre-determined deadline for each case.

Case example:

A two-year-old intact male Labrador retriever is brought to your practice with a history of acute disuse of the right rear leg. The owner is unaware of any traumatic precipitating cause for this lameness. On examination of the right knee the joint feels "loose," - the tibia (lower leg) can be pushed slightly forward (past the end of the femur), and the knee can be pushed slightly outward (laterally). Neurological examinations were within normal limits.

After reading the case, students are prompted to respond to the following questions without consulting outside resources (for your reference answers are provided in parentheses):

- 1. List the problems. (Right rear leg lameness and laxity of the right knee joint.)*
- 2. List the anatomical structures you would consider as you try to determine the cause of the reported symptoms. After each item briefly explain how it could relate to the clinical case. (Based on the information given in the scenario, abnormalities detected in the right knee are a potential cause for the observed lameness. Damage to the following ligaments could contribute to the abnormal knee movement noted in the scenario: (1) a cranial cruciate ligament tear would allow the tibia to slide forward with respect to the femur and (2) a tear in the lateral collateral ligament would allow the knee to be pushed more laterally than normal.)*

Cases are staged to correspond to students' current knowledge of carnivore anatomy, with each case increasingly more difficult; they earn up to one bonus point per case for correctly identifying the actual "problem" presented by the patient and the anatomical structures that might be involved. At the time of this writing, 200 students (two consecutive student cohorts) have had the option to respond to the clinical cases; the majority of students chose to participate. The case scenarios are designed for student practice and self-assessment as they apply their knowledge of anatomy within the context of a clinical case. The current text-based cases will be expanded in the future to include radiographs, MRI, CT scans, and patient images to demonstrate anatomical abnormalities that the students must then identify. The commonality of all these interventions will be to offer insight to the student regarding their abilities to (1) identify problems and (2) recall anatomical structures relevant to these problems in a clinical context.

Findings

Problem identification within the cases has resulted in an interesting set of student responses that seemed dependent on the exact phrasing of the question. For example, Case 1 asks the following question: What is the problem(s)? Case 2 provides the following prompt: List the problem(s). Student responses to Case 1 often resulted in an attempt to conjecture a diagnosis, while Case 2's statement,

“List the problem(s)” produced the desired student response of listing the clinical problems, e.g., lameness, swelling, etc. This was an accidental question variation that may unintentionally have led to different kinds of student responses, although it is difficult to determine if the difference is due to learning what was expected after the first case. Future iterations will provide clearer instructions to avoid misinterpretations.

The **recall of anatomical structures** item (the second question related to the clinical cases) has also resulted in some interesting findings. For example, one case scenario describes a dog with intermittent pain on extension of the right shoulder plus a soft swelling in the cranial (towards the head relative to the) shoulder region. When prompted to list potential anatomical structures that may be involved with the clinical problem, the majority of students named specific muscles in the shoulder region. Very few students mentioned the muscle tendons, tendon sheaths, or ligaments as potentially involved structures. The answer in this case was in fact a torn biceps brachii tendon sheath that resulted in leakage of synovial (joint) fluid, hence the soft swelling cranial to the shoulder. Why were students so focused on muscles, even though very little muscle tissue is present in this specific region? This may be explained by the many hours spent dissecting and identifying muscles; although a muscle’s tendon attaches it to the bone, often students don’t take great care in uncovering these attachments.

In summary, these findings and others, drawn from student responses to the clinical case scenarios, will be used to inform future course interventions (e.g., additional targeted Moodle-based clinical cases, web-based learning exercises, and improved lab instructions) to reinforce learning the important structures that students are unknowingly overlooking. In addition, the cases provide students with critical opportunities to learn their anatomy in context, facilitating the retrieval of that knowledge within a similar, future context, the real-life anatomical problem solving of clinical patients. It is our hope to follow these students and assess their performance in the fourth year clinics.

Acknowledgement

I would like to thank the Faculty Fellowship Program (Office of Information Technology) and the individuals involved for providing the needed support and guidance to begin to understand this problem and work towards better long-term student outcomes.

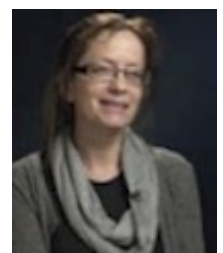
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Christina E. Clarkson, DVM, PhD is an Assistant Professor in the Department of Veterinary and Biomedical Sciences, I teach several courses within the veterinary curriculum. Within these efforts my ultimate goal is to optimize the student learning experience; pedagogical research and technology continue to provide intriguing ways in which to strive for this outcome.



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I am an academic technology consultant in OIT's Academic Technology Professional Services and also work in several OIT faculty development programs. I have been involved in managing the Faculty Fellowship Program since its inception and continue to be delighted to be able to work with talented instructors such as Tina Clarkson.



Digital Technology for Feminist Pedagogy: A Useful Method for Learning Key Concepts in a Changing Academic Landscape

*Katie Bashore
Jigna Desai*

Technology has a complicated history in feminist studies. It has been critiqued as a tool of oppression and appropriated as a means to empowerment. New scholarship suggests a reality beyond this bifurcation. Technologies are not “bad” or “good,” but become embedded within particular social, cultural, and political relations. The challenge is to pay attention to how technologies function in specific contexts while also exploring their potential to help create dynamic ways of thinking and interacting. Our work on technology and education emerges from this dual desire to use academic technologies for feminist pedagogies and to situate the digital turn in higher education within a broader context of institutional change.

We would like to provide a little background on our department and curriculum to lend some context for the development of the modules. GWSS (previously Women’s Studies) has been a department at the University of Minnesota for nearly 40 years. It has grown immensely during this time and offers undergraduate major and minor in GWSS as well as an undergraduate minor in Gay, Lesbian, Bisexual, and Transgender (GLBT) Studies. We are one of a handful of departments in the United States where one can pursue a PhD in Feminist Studies. While we have wonderful and dedicated undergraduate majors and minors, most of our students come from a wide range of colleges including College of Liberal Arts, Carlson School of Management, College of Education and Human Development, and the College of Science and Engineering. Our six introductory 1xxx level courses and fifteen intermediate 3xxx level courses draw approximately a thousand students in a given year. Our class sizes range from 20-120 students. We use a variety of technologies in our courses to engage students (e.g. blogs, video annotations, clickers, and interactive modules). During Spring 2012, four classes employed the modules as part of their mandatory or optional class assignments.

We face a dilemma many interdisciplinary instructors understand. Given that the majority of Gender, Women, and Sexuality Studies (GWSS) courses do not carry prerequisites, our classrooms are composed of students with highly uneven exposure to the field. We believe that this interdisciplinary space is both the strength of GWSS as well as a challenge that demands thoughtful negotiation. Our priority as educators is to ensure that all students are equipped with the basic tools necessary for engaging course material. To achieve this under such circumstances, instructors end up reviewing the same set of concepts at the beginning of every course, which is both tedious for more advanced majors and overwhelming for those who are new to the specific language and terminology of the field (Some content abstracted from a small technology grant, co-authored with Diane Detournay.) .

Our project, “Technology for Feminist Pedagogy: Learning Key Concepts Through Interactive Modules,” uses innovations in digital learning to teach key feminist concepts. We worked with members of the CLA-OIT staff to use Soft Chalk to create online, interactive learning modules that supplement material covered by our undergraduate curriculum. They are made available to our instructors through a university password protected MOODLE and are intended to enrich, not replace, in-class learning. Each module introduces one feminist theory, such as intersectionality, or area of study, such as whiteness, that pertain to multiple course offerings. Thus the modules do not correspond to any one

particular class but instead represent concepts that recur throughout our undergraduate curriculum.

All modules have a main content page, from which users can move chronologically or otherwise. This feature is in place so that users less familiar with a given theme can move progressively through the content while those more comfortable with the material can self-select the areas around which they need greater clarity. Numbered pages appearing at the top and in the sidebar of each screen also allow users to move at will, as shown below.

The screenshot shows a web page titled "Whiteness" with a navigation bar at the top containing "Contents" and "Page: 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15" and "score print all". The main content area is titled "Introduction" and contains a quote by Richard Dyer: "As long as race is something only applied to non-white peoples, as long as white people are not racially seen and named, they function [T]here is no more powerful position than that of being 'just' human. The claim to power is the claim to speak for the commonality of do that—they can only speak for their race. But non-raced people can, for they do not represent the interests of a race. The point of to dislodge them/us from the position of power, with all the inequalities, oppression, privileges, and sufferings in its train, dislodging authority with which they/we speak and act in and on the world". Below the quote is a small image of three people. To the right of the image is a paragraph of text: "This module explores the politics of whiteness, paying specific attention to the structure of white supremacy and white privilege in everyday life. Discussions of whiteness grow out of critical race and whiteness studies. Scholar fields examine the cultural, social, and historical politics of persons and phenomena defined as white. A large part analysis includes an interrogation of whiteness as an ideology linked to power as well as a critique of whiteness as a category. The study of whiteness does not celebrate or denigrate white subjects but rather engages the politics of a broader field of power. The study of whiteness is an essential component of Gender, Women, and Sexuality Studies, especially as it enriches feminist critiques of dominance, privilege, and oppression." To the right of the text is a sidebar navigation menu with a "Contents" button at the top and a list of pages from "Page 1" to "Page 15" with left-pointing arrows next to each page number.

In each module, explanatory narrative and excerpts from key scholarly texts are accompanied by examples from films, media and popular culture. These multiple forms represent ideas as complex while they also respond to different learning styles (auditory, visual, etc.).

The screenshot shows a web page titled "Woman as Image, Man as Bearer of the Look" with a navigation bar at the top containing "Contents" and "Page: 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14" and "score print all". The main content area is divided into two columns. The left column contains text: "The presence of woman is an indispensable element of spectacle in normal narrative film, yet her visual presence tends to work against the development of a story line, to freeze the flow of action in moments of erotic contemplation. This alien presence then has to be integrated into cohesion with the narrative." Below this is a quote by Budd Boetticher: "As Budd Boetticher has put it: 'What counts is what the heroine provokes, or rather what she represents. She is the one, or rather the love or fear she inspires in the hero, or else the concern he feels for her, who makes him act the way he does. In herself the woman has not the slightest importance.'" The right column contains a film still showing a man in a dark uniform and a woman in a light-colored dress standing together. Above the film still is a button that says "Click for audio (will open in a separate page)". To the right of the film still is a "Contents" button.

By working through examples that are familiar and relevant, students learn to apply theoretical tools to everyday life and see how they are useful for analyzing the world around them.

At the end of each module is a quiz, which is automatically graded. Users may make multiple attempts at answering correctly, and when complete, explanations of correct responses are provided. This feature allows users to both test and apply their knowledge of the material covered by the module. Instructors are able to maintain a record of quiz scores, making it a useful class assignment.

The modules address our dilemma by allowing students to engage with core concepts at their own pace. Focused on developing a conceptual “toolbox” and providing an introduction to key issues and themes, the modules establish a shared knowledge base that functions as the starting point for or synthesis of in-class lectures and discussions. Instructors have used the modules at various points in their classes: some have assigned the modules to students during the initial first weeks as a way to provide an introduction to critical concepts, while other instructors have assigned them at the midpoint or end of the semester to assist students in solidifying their knowledge about the concept over the semester. Furthermore, the modules offer different avenues into these topics than a traditional lecture allows, and thus foster multiple forms of engagement with the material. As students advance through their GWSS course(s), they can return to the modules for reference when writing papers, or as a review for quizzes and exams. Students frequently cite lecture notes and modules together in their essays, indicating that they see them as compatible and complementary sources that help them understand class materials.

The modules seem to be effective tools for teaching students what we think are critical concepts. But like all technologies and learning tools, they have their limitations and constraints. Several issues we have confronted already are the flexibility and sustainability of the project. Like all curricular materials, the modules reflect the intellectual perspective of their creators. We understand that instructors may want to teach a concept from a different historical or theoretical vantage point that is not currently reflected in the module itself. We hope that this will inspire others to want to create additional materials for modules as well. For example, it would be ideal to have several modules on the concept of whiteness that approach the concept from a variety of feminist approaches. In order to ensure the sustainability of the module project, we have to keep the current modules “fresh” and create new modules. This can be a labor-intensive endeavor.

But we want to make clear that our turn to technology is to aid feminist praxis and is not merely an effort to “keep up” with the demand for innovation qua innovation’s sake nor is it a simple salve for the many challenges within higher education. Institutions of higher education are undergoing structural and ideological changes that include the commodification of knowledge production, the commercialization of learning, and the privileging of consumer interests in pedagogy and curricular design. The digital turn in higher education must be understood in terms of these broader institutional changes, which have been especially challenging for smaller liberal arts departments, like GWSS, to negotiate. By digitalizing aspects of our curriculum, we do not intend to make our courses larger and more appealing or to devalue the labor of our instructors. Moreover, we remain sensitive to issues of access and consider the limitations that arise when complex and often “triggering” material is not presented in “real time.” Nevertheless, we remain hopeful in light of these challenges and continue to be excited about the new directions in feminist learning and potential for trans-disciplinary collaborations this project might engender.

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Nimble Instructional Design: Using Instructional Assets for Derivative Works for More Learner-centered Instruction

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Introduction

One of the brass rings of eLearning has been the idea of reusable content to create derivative works. One of the central ideas of eLearning standards such as AICC and SCORM, for example, is the idea of a “shareable content object” (SCO) that can be used as an independent learning asset, separated from the presentation of the learning itself. In brief, by a “learning asset” we mean a discrete resource used as part of the learning ecosystem: for example, a course reading, a narrative bit of text written by the instructor explaining an idea, a course lecture, an interactive “widget”, an assignment, a mastery question or a series of mastery questions, or all or part of a quiz might each be considered a learning asset. The individual learning assets, in theory, can be used flexibly in a variety of presentation models, such as in a course web site, in an online book, or in an online game, in a semi-flexible manner. Online repositories such as MERLOT and more recent entries into the market such as SOPHIA and the much-touted KhanAcademy are, arguably, based upon this premise: that individual, discrete lessons can be used flexibly and nimbly as an integrated part of a broader curriculum in a variety of ways, in a variety of presentation formats, from synchronous face-to-face courses to fully online, asynchronous learning environments (Crisp, et. al, 2003).

As part of the eLearning initiative at the University of Minnesota College of Pharmacy launched in 2010, we developed advanced electives for students across the health-care curriculum including those in PharmD, medicine, nursing, dentistry, veterinary medicine, and public health. The team determined early that we would use a modular design approach focused on discrete learning assets that could be sequenced contextually within the course, but that could also stand somewhat independently, as described above. The goal was to create a robust instructional ecosystem to meet the teaching needs of faculty and the learning needs of students that could work within our learning management system (Moodle), but that would also be able to reformulate in a variety of new future formats to provide additional learning formats, such as eBooks, for students in a quick, efficient way. Details of the design approach are outlined below.

Design Sensitivities

As the team began to engage faculty in the process of designing their courses, we determined early a set of shared design sensitivities, some of which included the following:

- minimize intrinsic cognitive load (Schnotz and Kurschner, 2010; van Merriënboer and Sweller, 2005), both for instructors during the production cycle and for students during the teaching of the course (Goldstein, 2010);
- design with modularity in mind; we operationalized this with two basic sensitivities:
 - create assets that were developed to be technologically “agnostic,” or deliverable to learners using standardized web-based protocols and technologies, AND
 - keep learning assets “chunked” into discrete conceptual units, tying them together

contextually during lesson sequencing rather than nesting context within a given learning asset;

- create high-quality learning assets, using cutting edge methodologies and innovative tools when possible;
- develop in a rapid-development, low-cost production metaphor;
- produce highly-accessible course materials focused using principles of [Universal Design for Learning \(UDL\)](#);
- use administrative resources for production and development work, and keep faculty subject matter experts focused on designing the course using vetted instructional design methodologies, emphasizing consistent mapping back to learning goals for the course (Anderson, et al., 2000).

Overall, the team articulated a broad goal of being able to create a development environment for online learning where faculty could dream big about how to teach effectively to achieve their learning goals, and our support team could find innovative ways to use cutting-edge tools to help power those faculty dreams and better meet individual learners' needs.

Challenges to Developing Online Learning and the Three-Phased Design Process

Our historical experience within our instructional design team, as well as our experience in developing these specific courses for the College of Pharmacy, has borne out a simple truth of instructional design that was somewhat in conflict with our stated goals: that while faculty may have big plans and dreams for their courses, the difficult work of creating “version 1” of an online course is truly in the details of building the basic learning assets of a course. “Dreaming big” often falls by the wayside as the need to do more nuts and bolts instructional construction work takes precedent. The types of activities that often require more immediate attention in the initial construction of a new online course include, but aren't necessarily limited to, thoughtfully articulating learning goals, identifying and constructing some of the core learning activities such as course readings, students' projects, assessments, and assignments, creating thorough rubrics, creating well-designed and executed lectures, writing well-articulated quiz and exam questions, and ensuring that all of these items are designed, developed, executed, sequenced, mapped and aligned back to the original learning goals. This process is often foreign to instructors and doing just the basic work of helping to design and create basic learning assets, such as a course lecture, that is well-designed and can be delivered online, can be a difficult challenge for a faculty member not used to teaching online. Asking the instructor, as part of that process, to begin thinking about advanced interactive learning assets, such as interactive multimedia or games, we have found is often a bridge too far, at least in the initial design and delivery of the course.

Realizing this, we decided to have a three-phased instructional design process. The first phase would be to design, create and deliver the basic course structure with the types of assets that the instructor was most organically drawn to (in our case, this was often course readings, lectures, writing exercises/reflective papers, quizzes, and exams), ensuring that good online design principles were adhered to as part of this process, and carefully aligning all of these activities to the course learning goals. If we could do this effectively using the course LMS (Moodle) as a delivery platform, we would consider version 1.0 of the course a success, at least instructionally.

Phase two of the instructional design process would be the initial offering of the course. The instructional designer stayed active in the delivery of version 1.0 of the course, collaborating directly with faculty and students to redesign problematic assignments and assessments formatively. The side benefit of this “side-by-side” teaching process was that instructional designers could use the **delivery** of the course as an opportunity for faculty development, guiding the instructor in the teaching and

delivery of the course to help her or him understand the nuances of teaching in an online environment.

The third and final phase of our design process came after the initial offering of the course. We have found that in the design and delivery of the first offering of a course, instructors begin to learn and understand the possibilities available to them far better than they ever would if we simply lectured at them. Not only do they become better teachers through this process, but they also begin to “dream big” again, and to understand what would be involved in the process of executing on those big dreams. That being said, if we’ve done our jobs successfully in the first phase of the process, the basic learning goals, as well as the basic “narrative” of the course, will often not change appreciably. Specific assignments, activities, and delivery models may evolve significantly, as the instructor better understands the art of the possible, but the overall learning goals of the course often remain intact. The hard work of designing a well-structured course in phase one sets us up for an easy deuce of derivative works in phase 3. Below we provide two examples of this: translating a course quiz into an RPG game and creating a course eTextbook from the course LMS web site.

Assessment Through Gaming: Rapid Development WYSIWYG RPGs

Educational gaming has the potential for a host of constructive outcomes, including (but not necessarily limited to), affordances that allow instructors to scaffold the process of learning, to scale mastery and “level-up” in a self-paced way for learners, to provide ongoing, continuous feedback, to motivate students to learn by increasing time on task (or, as we like to think of it, focused, protracted mental effort), to allow an “infinitely patient” tutor for learners, and to promote both a mastery and a performance goal orientation among learner players (Summit on Educational Gaming, 2006, (1, 2). Until recently, however, the boutique technical and design skills required to develop games of any appreciable complexity have kept them largely beyond the reach of standard instructional designers and faculty (Higdon, et. al, 2009). The advent of the design methods such as “gamification”, or using gaming sensitivities and design principles in a range of learning activities that would not traditionally be considered a game (see, for example, Meister, 2012) as well as the introduction of a range of rapid development WYSIWYG development tools for constructing more traditional games, such as role-playing games (RPGs), has made the idea of gaming more realistic and increasingly within the reach of everyone.

As part of a course titled “Fundamentals of Pharmacotherapy” PHAR 3700, we worked with the instructor, Dr. Amy Pittenger, to translate a traditional quiz into a role-playing game (RPG) using the [Thinking Worlds](#) development platform. The Thinking Worlds platform comes with several nice affordances, including a series of standard locations (including a hospital and a library), stock characters (including doctors, nurses, and other health care professionals), and a range of stock objects in their libraries, allowing developers to move quickly to create scenarios and characters without the expense of hiring 3-D graphics designers and programmers. The environment allows for WYSIWYG programming, making the generation and scoring of basic interactions among game characters and the learner player fast and easy for novices with little to no programming background.

During game-play, learner players in our game are required to conduct an interview about a patient with a health care professional in a HIPAA-compliant way, successfully diagnose the patient based on the identified symptoms, prescribe an over-the-counter medication to treat the diagnosis, research the diagnosed disease state in the medical library, and provide a patient-consult indicating dosing recommendations and letting the patient know about possible side effects and how and when to follow up with the doctor (see Figures 1 - 3).

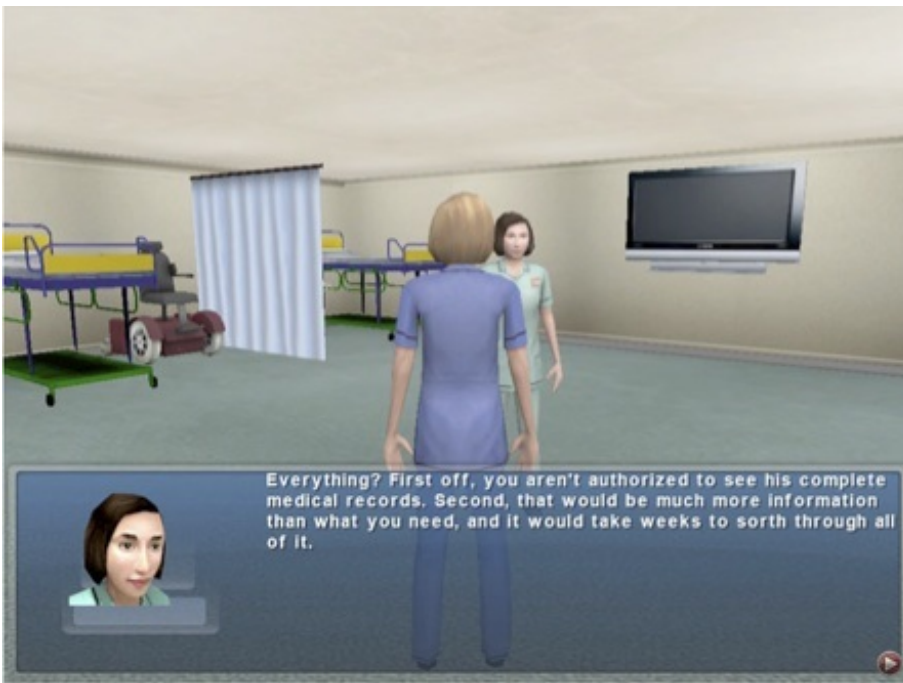


Figure 1: A request for information not compliant with HIPAA gets a strong rebuke from the attending physician.



Figure 2: Diagnosing the patient is critical step in the game, as well as a learning goal for the instructor.



Figure 3: Researching medication therapies and possible side effects at the Medical Library allows learners to demonstrate an ability to conduct additional research on their own.

The game has a series of elegant benefits over a traditional quizzing environment. First, we are able to provide just-in-time feedback on student responses, guiding them immediately when they offer correct or incorrect responses. In our game, the students are graded based on their initial responses, and then offered the option to change their responses (or not) based on dialogic clues from the game characters. They don't realize this, but we offer them partial credit for a second "right guess." Through dialogue with the game characters, we offer students scaffolded, soft feedback guiding them to consider their previous response without giving them the correct answer. Second, while we do score (and record, via SCORM integration, their score in the Moodle gradebook), learners are welcome to play the game multiple times, trying multiple paths to completion, exploring different learning pathways. We have considered creating multiple versions of the game, allowing learners to play in novice or expert modes to level up and down the amount of feedback they receive. Those choosing to play in expert mode could receive extra credit, or might be penalized less harshly for wrong answers.

We have not yet used the game in a class, but the plan is to do so beginning fall of 2012. We will perform an evaluation of the game as a learning tool at that time. However, in terms of development, we can report that, using the well-crafted quizzing tool that Dr. Pittenger had already developed for this purpose, we were able to develop the game very quickly and at a very low-cost threshold. We were able to develop the entire game in approximately 30 hours using almost entirely undergraduate development resources, making the total production cost for the game around \$300. We believe this model holds great promise for the future, both in this development environment and in others.

Ultimately, we believe that it was the careful work of instructional design and scaffolding that Dr. Pittenger had invested in during the development of the original assessment that enabled us so fluidly to translate her online quiz into a game scenario. By carefully structuring the questions to build one upon the next, a narrative began to emerge quickly that would allow the individual multiple choice questions to become dialogic options in the RPG.

This particular development environment has some obvious and non-trivial limitations. First, development is Windows-only, and we have found that the development doesn't work properly on

Windows running on an Apple computer. Similarly, game play works best on a Windows-based machine; while there is an iPad export option, several key features, including SCORM integration, are lost in this version of the game. No Apple player for desktops/laptops is available as yet, and the Thinking Worlds feature roadmap does not include this. To address these platform issues, we will likely offer learners the option of playing the game or taking a traditional quiz in the near-term. Longer-term, we will continue to evaluate other development environments to determine ways of delivering in a more platform-neutral model.

iBooks and eBooks: The next generation course “site”

Experience tells us that faculty and students frequently find learning management systems, such as Moodle, to be overly restrictive and to constrain their ability to create the type of immersive, interactive experience that they envision for their courses. This makes intuitive sense; as researchers, our faculty are often drawn to more narrative forms of knowledge-sharing, such as academic papers and books. With the advent of rapid development environments in eBooks, we have begun to look to ways in which some of the work that has, or might be, done in the development of course materials in an LMS might be delivered in a more narrative eBook format for our students.

To pilot a proof of concept in this space, we looked to our eLearning courses, as they are often the courses in which the most thoughtful instructional design and the most thorough production work has already been invested. We determined, initially, to focus on development in iBooks Author because of the ubiquity of the iPad among our student body and because of the media-rich nature of the development and delivery ecosystem. The limitations of this decision were that the output iBooks would only play on an iPad.

Two courses specifically stood out as being well-structured for this type of delivery: a course in Pharmacogenomics, which focused on personalized medicine based on an individual’s esoteric genetic makeup, and a course in Clinical Toxinology, which focused on the diagnosis and treatment of venomous and toxicologic snake bites, spider bites, and scorpion stings. We believed that the instructional methods for these courses lent themselves to the iBooks format for several key reasons:

- They were media rich -- the instructors had worked with our development team to create a number of short, conceptually-discrete, HD-quality course lectures which presented well on the iPad in HTML 5 format;
- They were sequenced thoughtfully and the instructors had spent the time to develop text-based, narrative context bridging the individual mini-lectures; and
- They were rich in self-assessment questions that followed all or nearly all of the course mini-lectures, including multiple choice questions and open-ended, free-text questions, providing learners opportunity for mastery-focused feedback as they progressed through the course site/book.

Using the iBooks author environment, we set about creating these two pilot books (see figures 4 - 7). Because our instructional designers had spent the time working with our faculty to create well-structured course assets, such as high-quality lectures in our studios and mastery-based “self-check” assessments that followed each lecture, we found that a clear and coherent narrative began to write itself. These books each took about 30 hours to produce and were created, with the exception of some guidance from the instructional design and development team, entirely by a student worker. All told, each book cost less than \$1000 to produce, and now that the process is established and we have created a style guide and a series of templates for use in our iBooks development, we expect that future development should be significantly cheaper.

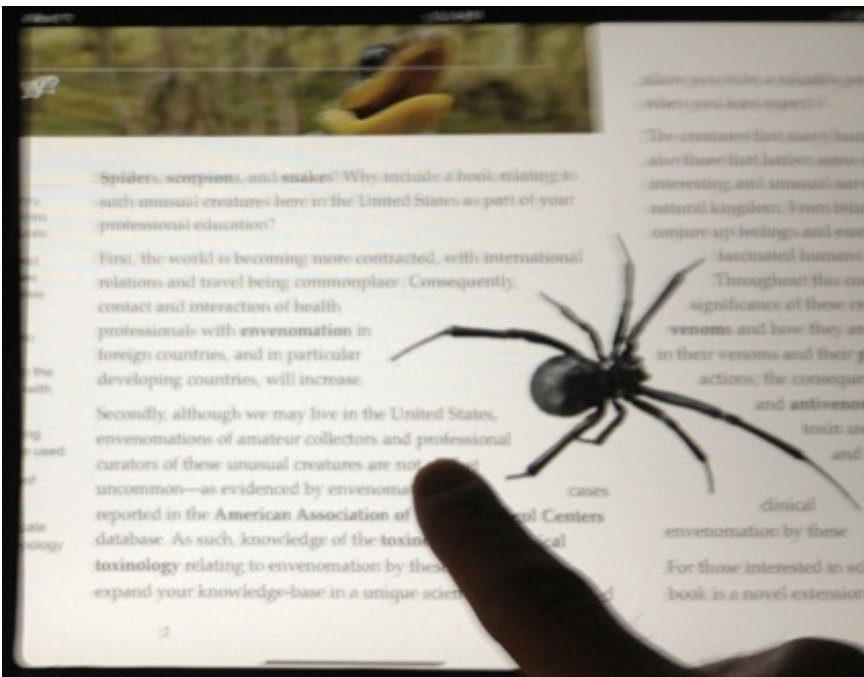


Figure 4: Navigating the Clinical Toxinology eText with a finger.

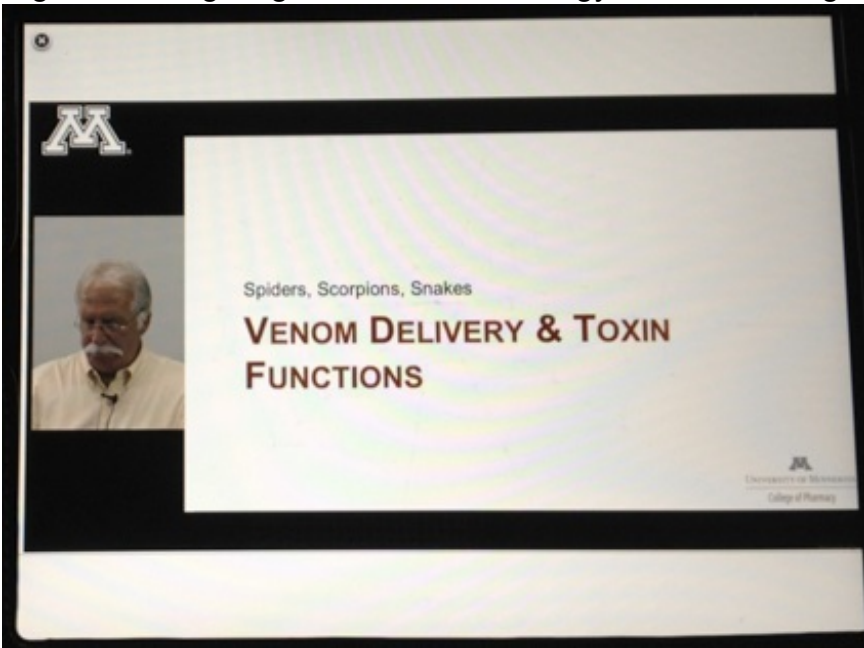


Figure 5: The HD-quality lectures that were previously captured for our online course and displayed in Moodle were beautiful as HTML 5 video on the iPad.

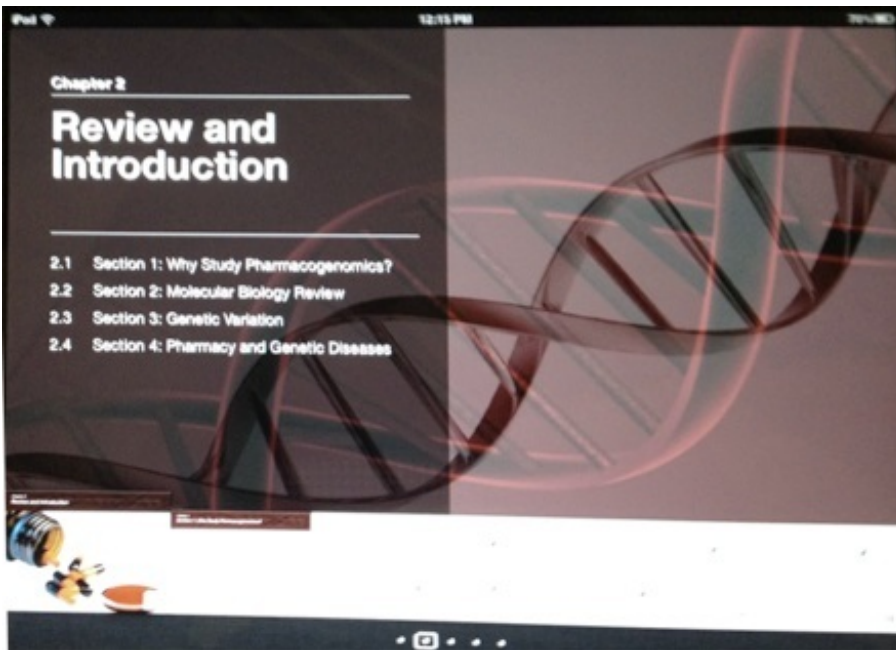


Figure 6: The iBooks authoring environment made it trivial to create beautiful chapters out of our Moodle lessons.

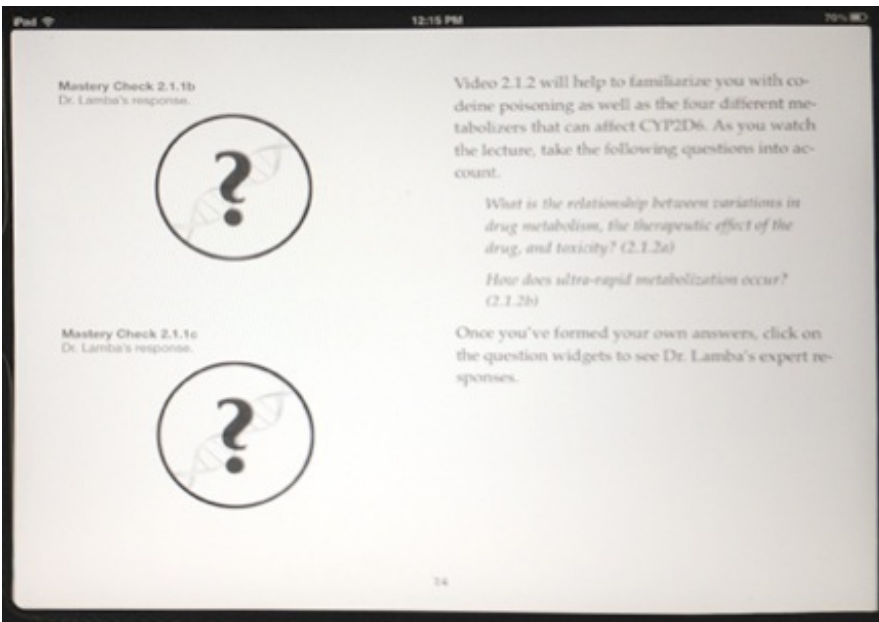


Figure 7: Using Hype, an HTML 5 WYSIWYG editor, we were able to translate our free-response questions from our Moodle sites into the iBooks environment as .wdgt files.

There are obvious limitations to this approach, the most notable being that the books can only be viewed on an iPad. We are currently looking into two additional development platforms, Sigil and WordPress, which are more platform-neutral and which each have various benefits and limitations of their own. However, we are encouraged by our initial forays into this space, and by the facility with which we were able to create more interesting, derivative works based on the heavy lifting of the initial instructional design and production efforts that we made early in the process.

We have only shared the books with a limited number of students, but response has, to date, been overwhelmingly positive. Students seem excited by the idea of having an eBook version of their course materials that they can take with them to review offline, as well as to have for posterity. Faculty are cautious, as they have legitimate intellectual property concerns but on the whole seem extremely enthusiastic about the potential. The questions are now shifting from “can we” to “how will we”?

Conclusions

The idea of sharable content objects and derivative works has been discussed for years, but in our experience, it has remained an elusive goal for most instructional designers. We believe that a convergence is nearing when good instructional design and standards-based production models will begin to serve us well by allowing us to be nimble and responsive to the quickening changes occurring in the technological landscape. As learners bring new computing metaphors with them, the basics of how people learn will not change; humans have evolved to learn through focus and protracted mental effort, and we don't believe that that basic truth of human learning is likely to change any time soon. What will continue to change quickly is how learners choose to "consume" their learning and learner expectations for utilizing new types of devices and computing metaphors to make learning work for them personally. The effort that we invest in putting together well-crafted instructional assets can, we believe, pay rich dividends in allowing us to remain nimble in utilizing emerging technical metaphors while still engaging learners in the hard work of learning.

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Writing, Speaking and Digital Technologies: Multimodality in the Classroom

Laura J. Gurak

The rapid rise of computer-mediated communication (CMC) from its unfolding in the early 1980s to today's ubiquitous use of writing technologies has caused a number of shifts in lexical, paralinguistic, and socio-linguistic behaviors and patterns. These shifts have been heightened by the blur that CMC seems to afford (or cause, depending on your perspective) between spoken and written discourse. Much of today's "writing" often looks and reads like typed speech; researchers (e.g. Baron 1984; 2000) have referred to this as a "mixed register," with many observers noting that we have entered the world of Ong's secondary orality--a world where the dominance of written text gives way to a blend of features based in both writing and speech. Add to this the rise of the visual in digital discourse, and, to use Kress and Van Leeuwen's (2002) widely cited concept, multi-modality becomes the norm, not the outlier, for most forms of workplace, academic, and of course everyday communication.

The challenge for college and university teaching, where writing undergirds almost every discipline and assignment, is how to engage students--digital natives who were born into and live with world of multimodality--in a manner that leverages their natural abilities and talents rather than forces them into the tightly scripted forms and genres that make up most academic assignments. Even in fields where the form is not the traditional essay but, rather, a discipline-bound form such as lab report, feasibility study, or scientific paper, these modes are rapidly changing to incorporate images, video, and sound. For instance, many scientific journals, such as Nature, now provide digital versions alongside the print/PDF versions, because the digital versions can contain video, animations, interactive graphs and charts, and so forth.

Yet although our students come to college with innate technical abilities, they often lack a critical awareness of the relationship of the form to the affects the form may have on the shape, size, and scope of information. For them, these are not technical abilities, they are just normal behaviors of everyday life. Having grown up with cell phones, Facebook, texting, and Skype, they rarely stop to consider deeply the relationship between these technologies and their professional and everyday interactions with the world. (Elsewhere, I have written about this topic more generally; see Gurak 2001.)

In an upper-division undergraduate class called "Writing with Digital Technologies," the title implies a focus on the digital. Yet digital does not always mean multimodal. Many forms of digital writing lead only toward electronic versions of print documents, the most familiar being PDF documents that may include some level of interactivity but in the end are designed to resemble printed books, right down to the use of page numbers.

Therefore, my approach in this class was to teach students about the affordances of various communication modes, with a focus on what kind of behaviors each mode inspires. Here, I will describe two assignments that in combination offer a markedly different approach to writing.

Assignment 1: creating instructions in various modes

Modifying a classic activity from technical writing 101, I asked students in teams of three to assemble, photograph, then disassemble some item of their own creation using Tinkertoys. In the typical technical writing activity, the next step would be for students to write an instruction manual (with text and perhaps

a few pictures or illustrations); however, for this class, I gave each student a different set of conditions: text only; text with visuals; visuals only; online video with narration; sound only (podcast). Students then returned to class with their bag of Tinkertoys and their document/video/podcast, and we observed as a group of two other students attempted to assemble the item using only the provided instructions.

Set against the backdrop of having read *The Victorian Internet* and a few other readings on the notions of technological affordance and determinism, students observed the affordances of the five conditions:

- Text only--is slow, allows for rechecking of steps (redundancy), requires good use of analogy and metaphor to help users create a mental map and picture of the final product.
- Text with visuals--is quicker than text only but still provides something tangible to recheck; users prefer to use the visuals but appreciate the text as back-up; text and visuals work best when they are mutually reinforcing.
- Visuals only--visuals are far quicker for users than text or even text with visuals. So long as the visuals are simple and accurate, users sped through the process.
- Video with narration--as with visuals, this medium was quick and easy for users, but the pace needed to be just right, especially since we did not allow users to pause. Users could not look back and review.
- Sound only (podcast)--sound was the most challenging. There is no written text, and there are no pictures. Spoken words require users to create their own images and to keep track of steps in the process. Meta-discourse--words like "first, second, third" or "next, thus, in conclusion" are required.

All five conditions invoked a discussion about memory. In the case where information is written down, where pages (paper or digital) can be turned and referred to, less is required of human memory. All five conditions also stressed the underlying importance of writing: users do best when the prose, whether written or spoken, is clear, easy to understand, compact, and direct.

Assignment 2: creating podcasts

The next assignment built on the previous one; it involved researching, writing, producing, and publishing a podcast as part of the University of Minnesota's iTunesU channel. In this assignment, students took the lessons learned about text, images, video, and sound, and used these as the basis for creating a 3-5 minute podcast. Typical long forms of writing, such as essays, legal documents, and the like, are less and less likely to be what one encounters in digital space. Instead, short, compact, modular forms of information are the norm, and as any writer knows, it is more difficult to compress information into a short form than write for dozens of pages.

Besides media affordances and short form, students were also required to learn the art of interviewing a subject-matter expert and writing this information in a manner suitable for a more general audience. Since much of the information one encounters online is read by a wide audience, this assignment also required students to consider this feature as well.

Students began by thinking about a professor they had for a class, someone where the topic caught their attention and raised interesting questions they might wish to explore. Students then worked in teams of four to begin roughing out a topic and some basic interview questions. After the interview, students worked on a script, in which a student would narrate with key portions of the interview inserted. The idea was for the team to shape the information, not simply dump the interview into a sound file.

Students learned how to do the following:

- Write a strong introduction--in most digital environments, users will skip to a different experience if not caught early by a strong introduction that appeals to their interests, questions, or current events. With a podcast, you have about 15 seconds to catch someone's attention.
- Use the Internet to do background research on your topic--doing research on the Internet is a topic most students have already encountered in other classes, but it does not hurt to cover this again.
- Write interview questions and conduct an interview--students learned that the best laid plans of an interview can take a turn when your subject-matter expert starts talking about something you didn't plan on (and that this can be the best part).
- Write a script with a strong opening and closing--bookending the podcast is important, because listeners have no other cues as to the start and stop.
- Create a theme and ensure internal coherence to the narrative--again, because there are no printed cues, the theme must resonate throughout, and the narration and interview clips must be cohesive and flow (we work on the use of transitional phrases).
- Compress information into a 3-5 minute time frame--as noted, in a digital environment, there are very few long forms.
- Use metaphor and analogy to create visuals in the listener's mind--the previous assignment demonstrated the power of visuals; without any pictures, students needed to create images for the reader.
- Find copyright free or Creative Commons licensed music for the opening and closing--copyright in the digital age is a big subject; this assignment gives students a hands-on activity around which to learn.
- Pick a narrator--all voices are not created equally; students practiced with a "trial run podcast" to see whose voice was most suitable.
- Use Audacity, GarageBand, or other software to record and edit sound files--in each team, one student was typically the "techie," but all students learned about the ease and the difficulties of using sound editing software.
- Publish a podcast--students learned to turn their sound file into a podcast file suitable for uploading to the University site.

(To listen to a few, go to iTunesU UMN, then look for the series called "U in Focus: Students and Scholars" in the public section.)

The podcasts were the final project in a class called "Writing with digital technologies"--but how much of it was about writing? All of it, I would argue. Writing in this digital age is about multimodality. It is about understanding the relationship between text, speech, images, and sound on the one hand and audience, purpose, scope, medium, and behaviors of digital readers/listeners/users on the other hand. Students always comment on several features of the class:

- It takes much longer to create a 3-5 minute podcast than they ever could have predicted. This observation allows students to reflect on how much time, money, and effort goes into the never-ending stream of digital information they encounter 24/7.
- Working in teams can be enhanced by using collaborative writing software, such as Google docs, and by layering their meetings to match the media affordance with the tool (e.g., using a video chat when a richer medium is needed). But in the end, face-to-face is still an important way to collaborate.

This activity could easily be modified for any discipline, not just a writing or even writing-intensive class.

Students are far more engaged when working across media and not stuck with yet another blank screen demanding that they type and type pure text for hours on end. Today's students are engaged and active; we should find ways to allow them to take advantage of their natural skill sets while still meeting the course's learning objectives.

On the importance of writing

Despite all of the above, strong writing skills (audience awareness; genre conventions; concision; coherence; use of transitions; clarity; grammar and style) are key, even if the wording is brief. Both the podcast and the Tinkertoys assignments stress the need for clear, concise, grammatically correct text that focuses on audience and purpose. There is a popular misconception that digital technologies are somehow to blame for poor student writing; that the world as we (faculty) knew it is rapidly coming to an end what with smiley faces being interjected into student essays or, worse yet, the demise of the apostrophe. Yet as a 2008 survey by the Pew Internet & American Life project (Lenhart) demonstrated, students are well aware of the difference between everyday writing and writing for school or work:

“Teens write a lot, but they do not think of their emails, instant and text messages as writing. This disconnect matters because teens believe good writing is an essential skill for success and that more writing instruction at school would help them.”

Those teens in 2008 are today's college students; if anything, they have become even smarter about this understanding. What they often lack is a critical framework for harnessing their everyday writing habits into activities that are helpful for school and work. For instance, the kind of free association that takes place with a text message or chat window may be useful for brainstorming; the focus on audience, even if fuzzy, that happens when someone writes a Facebook post, provides a basis for teaching students about audience considerations when choosing ideas, words, or constructs to write about.

In fact, I have found that today's students are sophisticated writers, simply because they are writing more than ever before. They get excited to talk about topics like writing for particular contexts and particular audiences, and they want to learn about everything from the mundane (the series comma and the apostrophe) to the complex (creating cohesion between ideas; considering word choice and tone in recrafting scientific and technical information for different audiences). They are encountering written language in more places and spaces than ever, and they want to learn. In turn, I learn about their “writing ecologies” by listening deeply to their ideas and observing their behaviors.

Furthermore, language is not static but rather highly adaptive and ever-changing. As Baron (2000, 2008) and others have shown, today's adaptations are just the latest in a series of changes that have come before and will continue. The book students read in class (Victorian Internet, noted earlier) demonstrates changes in language in relation to the telegraph. In this context, we spend time talking about tone and style: the informal when writing to friends, and the formal or semi-formal when writing to your boss or your professor, and whether/if the technology “causes” you to do one thing or another.

In closing, how do we keep up?

This semester, students suggested that next time, I adapt the assignment to look at the same topic but over a podcast, a video, Twitter, and a Facebook page. My podcasting assignment, cutting-edge four years ago, is already a bit dated for them (at least it's not email, something that only their parents' generation uses!)

That's the trick with a course like this or with any course with digital media at its core. We as faculty keep getting older, but our students stay the same age (18-25). Today's digital natives are not the same

as next year's and the year after and the year after that. So, what to do? Do we, as instructors, keep adding new technology, trying to keep up, peddling as fast as we can? In an interesting take on the technological development process known as participatory design, I believe that we need to include student perspectives and input in our course planning, engaging in a kind of co-learning not just while in the classroom but also before the course, to ensure that we are keeping pace with the literacies and practices of each incoming class of students.

Fundamental rhetorical principles about writing and socio-technical theories about technology do not change much, but the tools and stages on which communicative acts play out are changing rapidly, and we have much to learn by working with students in active ways during the course development phase and throughout each semester.

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Avenue: Innovation and Transformation in World Language, Reading, and Writing E-Assessment

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The Avenue platform, designed and developed by faculty and staff in Learning Technologies, Educational Psychology, and the Learning Technologies Media Lab at the University of Minnesota, is an innovative e-assessment system for learner performance evaluation, specifically in the contexts of world language, reading, and writing development. In this chapter we challenge designers, researchers, teachers, and students to re-envision the value of technology-mediated feedback by exploring the design of two contemporary e-assessment environments: 1) AvenueASL, an e-assessment system for postsecondary American Sign Language learners, and 2) AvenueDHH, a progress-monitoring environment for reading, writing, and language development with deaf or hard-of-hearing students in grades K-8. For each design we share a brief overview of the instructional problem, audience, and design challenge, followed by a description of the e-assessment environment and system integration.

AvenueASL: Postsecondary American Sign Language E-Assessment

American Sign Language (ASL) has evolved into the third most widely used language in America preceded only by English and Spanish (Welles, 2004). Currently, more than 500 colleges and universities in the U.S. offer ASL instruction as a world language (Wilcox, 2004). Between the years 1992 and 2006, the rapid increase in demand for postsecondary ASL instruction and linguistic study created a wide range of instructional challenges, including 1) assessing, measuring, and documenting learner progress; and 2) providing formative feedback through an efficient, effective, and technically-valid means (Miller, Hooper, Rose, & Montalto-Rook, 2008).

AvenueASL design overview

The most widespread practice for assessing ASL fluency involves evaluating video recordings of interviews with individual students (Newell & Caccamise, 1992). Prior to 2006, approximately 1,800 ASL students per semester at the University of Minnesota completed mid-semester and final-exams by renting a video camera from the program office, recording a 15- to 20-minute conversation with a fellow student, and submitting the videotape for evaluation (Miller, Hooper, & Rose, 2005). Instructors then reviewed the video (a process often lasting 45 minutes per videotape, due, in large part, to fast-forwarding through incomplete edits, false starts, and 'redos' of the exam), assessed the performance, and recorded a single-digit evaluation score with brief textual feedback comments on a note card. Ultimately, these assessment and examination practices proved burdensome for both students and instructors (Hooper, Miller, Rose, & Veletsianos, 2007). Instructors noted that evaluation time averaged three to five weeks per course, delaying learner feedback and limiting valuable reflection opportunities for students. Students noted that 'meaningless' scores on a 10-point scale and abbreviated feedback comments provided little to no guidance in improving actual ASL signing expression. Furthermore, the feedback delay made it difficult for instructors to modify classroom instruction based on evaluated deficiencies in learner performance.

To enhance the nature of postsecondary ASL instruction and assessment, we developed AvenueASL, an integrated e-assessment system to capture, evaluate, and manage ASL learner performances. The

system enhances the efficiency of the existing assessment process using innovative solutions that are reliable, valid, cost-effective, and efficient. The online environment enables students to capture videos of sign-language assessment tasks and individually build online portfolios for monitoring the progress of their performances over time. These portfolios allow students and instructors to establish learning objectives, document language proficiency, and demonstrate maturing communication abilities, ultimately encouraging students to be more reflective regarding their ASL communication skills (Lupton, 1998). Furthermore, instructors can efficiently provide multiple forms of evaluation feedback (e.g., text, numeric, video, etc.) based on the needs and learning styles of individual students.

Furthermore, the *AvenueASL* environment utilizes an emergent assessment system known as Curriculum Based Measurements (CBM) (Deno, 1985). CBM were initially designed as a “yard stick” to measure progress in reading, writing, and mathematics. They are easy to implement, cost-effective, and sensitive to student progress, yet valid and reliable (Fuchs, Fuchs, & Hamlett, 1989; Frank & Gerken, 1990). Although CBM have been used in K-12 settings, little research has validated the process for ASL in higher education (Allinder & Eccarius, 1999). To this effect, we have developed standardized CBM assessments to promote continuous progress monitoring in ASL instruction at the postsecondary level (Miller et al., 2008).

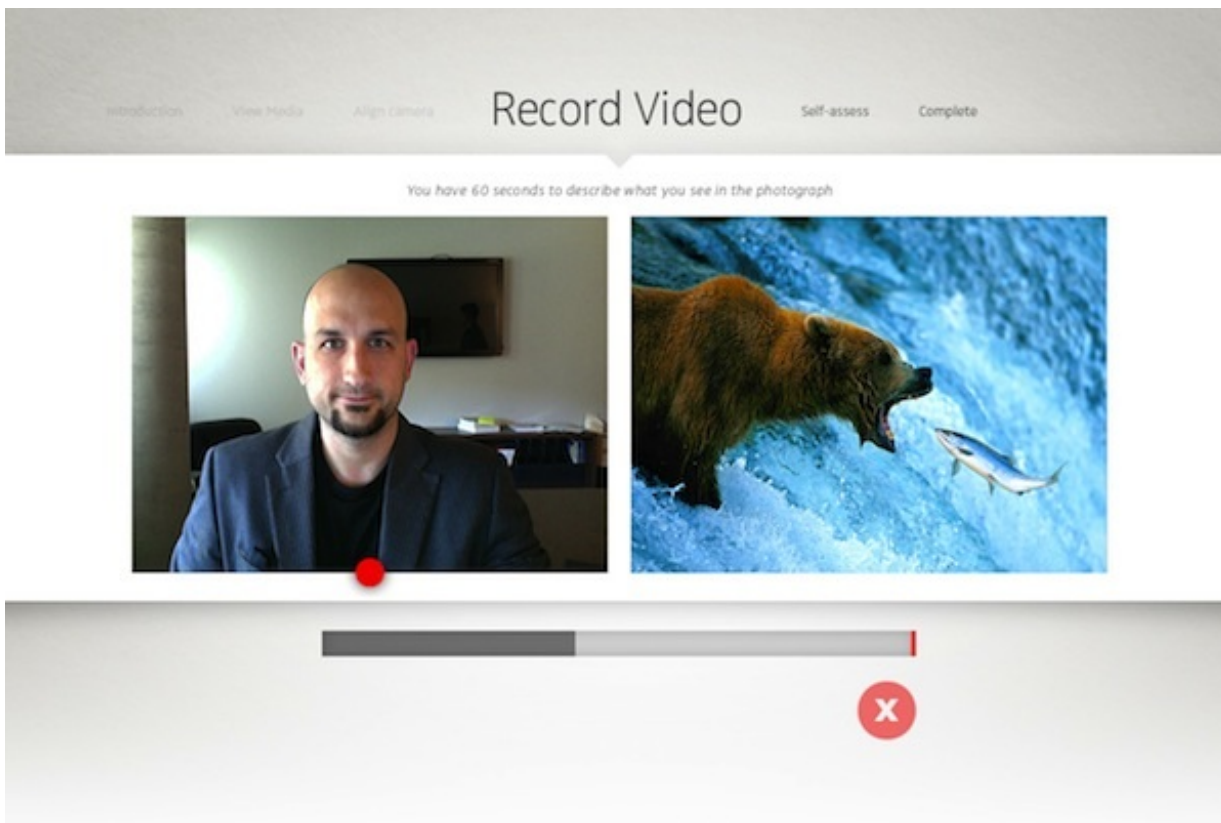
These innovations solve an important practical problem and create significant instructional potential for postsecondary ASL education. Together, the methods used to assess student performance and the techniques used to gather, store, and deploy progress data create a system that is technologically sophisticated and pedagogically sound, resulting in improved ASL learning and instructional assessment (Miller et al., 2008).

The *AvenueASL* e-assessment environment

The *AvenueASL* e-assessment environment was designed to establish three cohesive layers of interaction: (a) Capture, a platform for students to capture, submit, and archive ASL video performances, (b) Evaluate, a setting for instructors to evaluate and report student performance and feedback, (c) Portfolio, a visualization tool where students can monitor their personal performance and feedback, and (d) Manage, an administration component to coordinate all student demographic and feedback data.

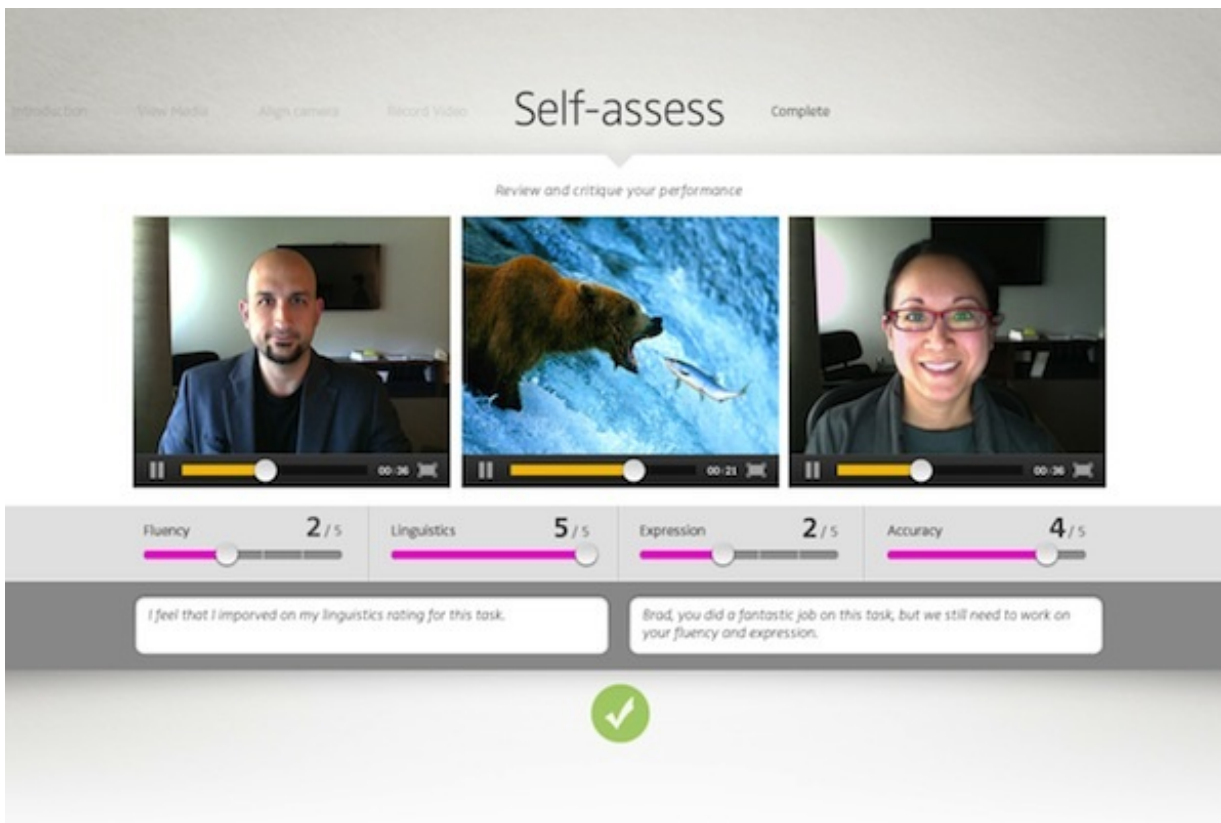
The first layer, the Capture layer, is used independently by students to record ASL performances with a webcam (see Figure 1). Students from each level of the ASL program complete three CBM fluency assessments designed specifically for this environment: Picture Naming, Photo Description, and Story Retell. The capture component eliminates existing financial and organizational obstacles of recording, submitting, and managing several hundred videotapes each semester. Content appropriate to each ASL level is dynamically integrated into the environment and individualized for each student (i.e. content is generated randomly from over 1000 testing videos, photographs, and illustrations to maintain testing security and objectivity).

Figure 1. Student recording screen with the student’s performance video on the left and the task media stimulus video on the right.



The second layer, the Evaluate layer (see Figure 2), is a networked assessment instrument used by instructors to evaluate student performance videos recorded in the Capture layer. In addition to submitting evaluation scores based on the four ASL CBMs (e.g., fluency, linguistics, expression, accuracy, etc.), instructors have the ability to modify feedback based on individual student needs by using various feedback modalities (i.e. text, numeric, and recorded video). In other words, instructors can record video evaluations, in addition to traditional numerical and textual feedback, for students who require further assistance with their expressive and communicative skills. This feature provides students with a feedback package covering all aspects of their performances, both quantitative and qualitative. Furthermore, the Evaluate layer creates opportunities for instructors to monitor and adapt to students' evolving needs. For example, by gaining immediate access to students' performances (rather than the present three to five week delay), instructors can identify current learning problems and modify personal teaching practices in the classroom.

Figure 2. Student and instructor feedback screen displaying the task video, student performance video, student self-assessment data, and instructor feedback video, in addition to numeric/textual evaluation data.



Assessment data are often used to assign grades rather than to improve performance. However, the third layer, the Portfolio, is an environment where students view their evaluations and feedback, monitor personal progress as they advance through the ASL course-sequence, and reflect upon and set personal goals. The Portfolio layer is an environment where personal histories are developed in a setting that encourages students to compare and contrast personal and model performance. In addition, integrated performance and feedback visualizations were designed to allow students and instructors to visually display language proficiency gains and demonstrate maturing communication abilities. Students can view their progress over time, compare and contrast with other students in their class or across their level of ASL study, and click on tests to view the individualized feedback package for each performance, providing on-demand reflection and self-assessment. Further, students can compare their self-assessment scores with instructor feedback to enhance their understanding of the expected CBM-based outcomes. The goal of these feedback packages and performance portfolios was to encourage students to be more reflective regarding their ASL communication skills (Lupton, 1998; Miller et al., 2008).

AvenueASL current and future integration

Currently, more than 25 instructors and 2,000+ students at the University of Minnesota use the environment each year, in addition to thousands of students and instructors from universities and institutions nationwide. During the 2011-2012 academic year, students completed in excess of 450,000 performance tasks in the environment. At present, more than 3.5 million video performances have been captured and evaluated by students and instructors in the environment, amounting to what is believed to be the largest collection of ASL e-assessment performances ever captured in an online environment.

Based on the widespread success of the AvenueASL environment, we focused our recent development efforts on placing even more power in the teachers' hands in order to promote integration in other world language domains. To this effect, the current version of AvenueASL (v3.0) now incorporates the new Test Builder component, which allows teachers to create fully customizable testing

experiences, including the ability to construct personalized evaluation matrices and record or upload unique testing stimulus media tailored to the daily needs of the classroom. This feature has created the opportunity for Avenue to be integrated successfully into any K-20+ world language instructional environment. In the fall of 2012 we will be piloting the new environment with more than 100,000 secondary and postsecondary Spanish, French, German, Chinese, and ESL students and instructors.

AvenueDHH: Reading, Writing, and Language Development for K-8 DHH Learners

A century of research supports the negative impacts of hearing loss on the development of English language skills (i.e. reading and writing) between hearing children and children who are deaf or hard-of-hearing (DHH) (Marschark & Harris, 1996; Rose, McAnally & Quigley, 2004; Marschark, Lang & Albertini, 2002). Progress-monitoring systems currently used by teachers of DHH students are typically unreliable, complex, and time consuming (Esterbrooks & Huston, 2007), provide little functional information for feedback and instructional decision making, and do little to promote learning (Ewoldt, 1987). Likewise, standardized tools designed for the general population are insensitive to DHH students' progress, lack validity and reliability (Kelly, 2005; Luckner & Streckler, 2007; Odom et. al., 2005), and are difficult to interpret (Yoshinago-Itano, Snyder, & Mayberry, 1996). Furthermore, available paper-pencil measures (e.g., grade level MAZE passages) are insensitive to small increments of growth exhibited by beginning DHH readers (Rose, McAnally & Quigley, 2004).

AvenueDHH design overview

Research suggests DHH teachers have difficulty using the results of existing progress-monitoring measures to determine if their instruction, assessments, and feedback lead to improved student progress in reading and writing (Yoshinago-Itano et al., 1996). Therefore, teachers of DHH children typically resort to subjective impressions and anecdotal information, often resulting in feedback and assessment information that is unused, misused, or misunderstood. This is the challenge we are addressing in the development of AvenueDHH, a universally-accessible e-assessment environment for DHH teachers, students, and parents.

The AvenueDHH e-assessment environment

The goal of AvenueDHH is to transform the assessment, feedback, and progress-monitoring strategies in reading, writing, and language development for DHH students in grades K-8. The system is comprised of seven categories of assessment tasks (i.e. picture naming, photo description, word slash tests, MAZE passages, signed/oral reading, story retell, and story completion) and supports the digital capture of multiple communication modalities (i.e. oral, signed, and Cued Speech) and languages (i.e. ASL and English) common to children with hearing loss in the U.S. The three primary assessment tasks that have been developed to date are MAZE, Word Slash, and Real-Time Reading. These tests are described in the following sections.

Maze Test. Cloze tests, which have been used for decades to monitor literacy performance, are created by removing every seventh word from a text passage. Students complete the tests by writing into blank spaces the words they think were deleted. The MAZE Test in AvenueDHH is a modified Cloze procedure. The student selects the appropriate word from three available choices to move it into to the blank space in the passage (see Figure 3). Each blank space contains three words (i.e. the missing word and two distractors) that appear under the space; distractors are from a different part of speech than the correct word (e.g., if the missing word were a verb, the distractors must not be verbs). Figure 3. A student completing an automatically graded MAZE passage in the AvenueDHH software. Level goals are represented by various characters at the bottom of the screen.

Frogs in the Pond

Frogs live near ponds. They swim in the water. In winter the frogs **sleep** in the soft mud in the **pond**. In spring the frogs wake up. **They** swim in the water. They play **will** the grass by the pond. The **mother** frogs lay many soft eggs. The **eggs** look like balls of jelly. In **usually** ten days tiny tadpoles come out **black** the eggs. They look like tiny **fish**. In the summer the tadpoles eat **bring** plants. They grow big and fat. **Soon** tiny back legs begin to grow. **Then** tiny front legs begin to grow, **too**. The tadpole's tails get shorter and **shorter**. Soon they don't have any tails

at all! This animal is not a **tadpole** now. It is a frog!

DONE



We experimented with the look and feel of the MAZE passages to maintain visual appeal, to address programming issues, and to create a positive user experience. The blank spaces had to be styled to make them large enough to contain any word in the database, small enough to avoid visual imbalance, and visually appealing. To maintain fluid interactions and smooth transitions the process of selecting/deselecting words was carefully choreographed and the opacity of each word was animated to its final state.

Slash Test. Slash tests are text passages, displayed in upper case, in which the spaces between words are removed to create a continuous flow of characters. In print, students draw vertical lines where they believe word breaks should be. On the computer, the student clicks between words to insert (or remove) word breaks between the characters. Throughout the Slash Test design process we focused considerably on the experience of a young child interacting with the text. Characters to the right of a word break animate horizontally to emphasize the selection, and a vertical line appears between the words. Rolling the mouse over successive characters introduces a 'temporary' vertical line—a visual cue suggesting how a word break would appear if selected. By using different lengths, widths, and colors to draw vertical lines between characters and carefully timing each animation, we were able to increase usability by reducing inaccuracy and frustration, and create a fundamentally different aesthetic experience from what is possible with paper and pencil.

Real Time Reading. The real-time reading test (RTR) measures sign-language or oral text fluency. The student is presented with a passage on the screen and prompted to read the text within a set time frame (i.e. 1 to 3 minutes depending on passage length and difficulty). The student reads the text orally, in sign language, or both. Similar to the capture layer in AvenueASL, the student's performance is recorded by a webcam then stored online for teacher assessment. Separate interfaces are used for

spoken and signed performances. Assessing oral reading involves tracking the number of words read correctly and incorrectly. Sign language is assessed using a rubric with descriptive qualitative measures for fluency, linguistics, accuracy, and expression.

Finally, a unique design challenge in the development of AvenueDHH was how to present performance data for multiple students on multiple tasks to teachers in an easy-to-understand manner. Figure 4 illustrates a potential solution to this challenge that we are prototyping with current instructors. Here, teachers are able quickly see how students are performing on each task. Performances can be placed in three general categories that correspond to the color of the circles: successful performance (green), performance that requires intervention (red), and performance that is within 10 % of average (blue). The final category is particularly useful for teachers who aim to modify the difficulty of subsequent tests in order to ensure a student is neither struggling nor insufficiently challenged. These types of static and interactive visualizations are currently being developed and integrated into both the teacher and student sections of the AvenueDHH environment. In addition to authentic classroom use of the system, these features will serve as a foundation for our future implementation research.

Figure 4. Teacher visualization of current student progress and goal proximity on the Word Slash test.



AvenueDHH current and future integration

Currently, more than 1,000 DHH educators and students across several states are using the AvenueDHH environment in their classrooms. We recently received U.S. Department of Education Stepping Stones Phase II funding for a 3-year period (spring 2012-spring 2015) to scale-up state-level evaluation and nationwide dissemination. Phase II involves research on the effectiveness of AvenueDHH in diverse K-8 DHH classrooms throughout the nation, as well as a design-based research exploration of the evolving theoretical foundations, design principles, and integration models for the e-assessment environment.

As we move forward our implementation research design will focus on: a) validating the assessment measures and tasks employed throughout the system, b) monitoring the growth patterns of students in the academic areas of reading and written expression, and c) analyzing teachers', students', and

parents' use of data generated by the system. We will employ rigorous field-based research to determine the effectiveness of the AvenueDHH system on the literacy performance of students who are DHH and students with learning difficulties. In addition, we will continue to use a design-based research methodology integrated with classical quantitative studies to modify and improve our design using data regarding the relative effectiveness, usability, and performance of the system for teachers, students, and parents.

To complement our future research, we are redesigning the entire system from the ground up using several new technologies. The current versions of AvenueDHH were developed primarily using the Adobe Flash and Flex authoring environments, with the online environment itself running in the Flash Player of the browser. However, many of the teachers we worked with over the past few years have experienced problems with getting the latest Flash Player installed in their classrooms, or have noted their technology staff does not allow use of the webcams in a Flash-based environment (for security and privacy reasons). Therefore, we have decided to make use of modern web technologies and redevelop the system using a combination of HTML5, jQuery, and AJAX. These technologies are both device and browser agnostic, which means the new version of AvenueDHH will be able to run on all platforms regardless of Flash, aligning with many of the security protocols these schools implement. We are also developing custom iOS AvenueDHH Apps for the real-time and story-retell reading tests. Students will be able to use their camera-enabled iPad or iPod Touch to read and record a real-time video of their performance, which will then be submitted to their teacher and accessible either through the AvenueDHH online environment or the AvenueDHH iOS App.

Ultimately, we believe that future design, integration, and evaluation of the AvenueDHH e-assessment environment will 1) increase language, reading, and writing proficiency for DHH students in grades K-8; 2) achieve widespread integration of a flexible technology-based system that requires only minimal external maintenance and is scalable to diverse institutions; and 3) improve the nature of research and instructional decision-making by teachers in the DHH reading, writing, and language development community. Furthermore, we anticipate the theoretical, pedagogical, and technological evolution of the AvenueDHH environment will have significant implications for contemporary assessment methodologies in secondary DHH language development, as well as other K-12 world language development and assessment.

Designing Forward for E-Assessment

Through considering the AvenueASL and AvenueDHH e-assessment environments at a macro-level, we understand that the key to their success is the recursive and informative roles of pedagogy, design, feedback, learner experience, and research in each environment's design. From each environment's conception, to its first iterations, to its final design, theoretical and practical perspectives on pedagogy, feedback, and research were omnipresent and continually infused in each stage of the development process – nothing was an add-on. We believe that the recursive loop of these elements throughout the entire design process is at the heart of developing effective learning environments.

For more information on using AvenueASL in your world language classroom today, please visit <http://lt.umn.edu/ave>. For more information on the AvenueDHH project, please follow <http://lt.umn.edu> for future details.

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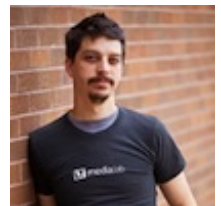
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Creating Solutions



The solutions shared in this section indicate how the innovative use of academic technologies add value and increase efficiency and effectiveness. The solutions include imaginative uses and development of videos, podcasts, vodcasts, and simulations; they indicate how faculty and staff are using GoToMeeting, Moodle, Blackbag, iPads, Camtasia Relay, Skype, Ning, and Google Apps. Those on the digital frontlines at the University of Minnesota are indeed focused on student success.

The 'WRIT VID' Project Incorporating Multimodal Components into Text-Only Online Writing Instruction

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Introduction

In this chapter, we discuss the development of instructional video modules to enhance an undergraduate course in our Writing Studies curriculum, WRIT 3562W: Technical and Professional Writing, a multi-section course in our department that routinely enrolls between 315 and 350 students across the university each semester. The course is taught through several sections of 24 students per class; about one-third of the sections are offered in an asynchronous online format. The online offerings of the course have grown in popularity and in number over the past six years, resulting in two distinct challenges: (1) maintaining consistent student engagement with the course and content; and (2) constructively adapting students to technological tasks required for assignments such as designing data documents and data displays.

The major content, concepts, and themes of WRIT 3562W address technical and professional writing (or workplace writing) that communicates technical or scientific information to readers or users who need this information to solve problems or to complete tasks. The course defines technical communication or workplace writing as “persuasive texts that influence the decisions and actions of humans inside and outside of workplace settings.” Major assignments in the course include a variety of workplace communication documents created through a variety of technologies: a letter of complaint and reflective memo, an email message about an analytical report, a technical definition and reflective memo, a data display and reflective memo, a set of instructions and reflective memo, a progress/activity report, an analytical report, and a PowerPoint presentation. Exercises and activities include online editing quizzes, peer review activities in which students respond to peers’ drafts, and online discussion forums on topics related to readings, such as workplace case study examples and textbook exercises.

Learning Challenges

According to survey results from WRIT 3562W students over the past three semesters, students have a good understanding of the written genres that are the basis of this course. They also report a solid understanding of how to conduct rhetorical analysis of writing situations, and how to provide constructive feedback to other students through peer review activities. However, students seem to struggle with writing technologies in production tasks such as creating a multi-page report using MSWord, creating visual displays of data using Excel, creating audio narrated presentations using VoiceThread, or using collaborative writing programs such as Google Docs.

Additionally, students in the online sections reported dissatisfaction regarding community and interaction with their instructors and peers in a format consisting of only text documents. Students complained of delayed responses from instructors, absence of peer feedback in review groups, and

dislike of online forum discussions. The course currently uses a Moodle course management system with modules that include overviews of assignments, readings, and required activities. Students are asked to participate in Moodle forums for class discussion and regular peer review sessions—in this text-only format. Faced with these challenges, we considered the following research questions, which guided our project:

1. How can we help students better understand how to use and critically evaluate writing technologies in WRIT 3562W Technical and Professional Writing?
2. How can we better reach online students in the class?

WRIT VID Project and Process

To address these questions, we proposed a project and received funding from the Course Transformation Program (CTP) in the College of Liberal Arts' Office of Information Technology. This program supports efforts to transform large enrollment courses through innovative uses of technology. Through the generous support of CTP, we were able to meet with consultants and work with specialists who helped us think through options to address our challenges. We hoped that using the video modules in the online course would better illustrate writing tasks and the technologies students are required to use while increasing their interest and engagement in the online course format.

We assembled a team of eight Writing Studies instructors and support staff and generated a list of topics around which we would create video modules. All topics addressed WRIT 3562W: Technical and Professional Writing course content in some way, but many of the topics would also apply to a variety of writing courses. Topics include writing analytical reports, avoiding plagiarism, conducting peer review, writing instructional documentation, applying visual rhetoric and document design, creating writing project schedules, writing presentations, and choosing online writing courses.

Each team member selected a topic and then created a storyboard to outline the content of the video and to offer an idea of the visual components and audio narration; therefore, each topic / storyboard brought in a different instructor voice. As a team, we reviewed the storyboards several times and generated a style guide to establish consistency with video elements such as colors, fonts, opening and closing slides, length, and use of visuals. We also learned the importance of UMN branding and consulted the university style guide for video production. Once we completed video storyboards, each team member set up a time to meet with a member of the Office of Information Technology (OIT) to set up a production schedule. Production was organized in collaboration with each video content author.

As an example, our video on “writing analytical reports” included content describing the types and purposes of different analytical reports (activity reports, feasibility reports, recommendation reports) as well as the typical components of such reports (front matter, introduction, methods, results and discussion, back matter). This information was included in text form but supplemented by visual examples of report components in actual student and professional reports, which was explained and narrated by the video author. Visuals were used to explain the contexts and purposes leading to the student reports, which better illustrated the rhetorical situations leading to report writing. In other videos, authors used screen capture software to illustrate writing tasks and techniques that involve technological literacy. In each case, we found that the combination of written, visual, and audio narration provided a helpful illustration that may resonate with students more readily than text-only formats.

When finished, each videos will have a URL and will be part of a larger WRIT VID web site that will be open to the public. Video modules will also be linked to our online WRIT 3562W course.

The Video Revolution

Our choice to focus on video modules happily coincides with another strong movement in writing studies to embrace multimodal forms of composition. As Anne Wysocki articulates in *Writing New Media*, several writing scholars already embrace the value of combining visual, oral, written, and digital compositions; however, Wysocki adds that “new media needs to be opened to writing” (5). What she means by this is that writing instructors offer a valuable perspective on new media texts; she also states that thinking about new media texts means considering the “range of materialities of texts” and that design and production shape each other (15). Wysocki’s perspective informs our WRIT VID project in that, as instructors, we are thinking about the range of options for sharing information with students about writing. In composing videos, we are trying to break free from text-only formats for online instruction by combining visual, audio, and written components. This effort, we believe, addresses some of the documented challenges of teaching in text-only environments. For example, results from a national survey of online writing instructors mentions that while many online students enjoy the flexibility and convenience offered by asynchronous online writing courses, many also find the volume of text somewhat tedious and time-consuming (10 “Initial Report”).

We find support for our efforts as well from Gunther Kress, who articulates the value of multimodal communication for everyday communication; in *Multimodality*, he studies multimodality in terms of social semiotics and the cultural reach of communication (8). Kress has provided a vocabulary to think about the ways visual components contribute to composition and communication (see also *Multimodal Discourse and Reading Images* by Kress and van Leeuwen). Thinking through these scholarly influences, we coincidentally were able to host a guest visit from Anne Wysocki and Dennis Lynch, who discussed their experiences of new media writing and shared many student examples of multimodal composition. We were so inspired that we began to think of ways to visually depict our WRIT VID project; these discussions (and the talents of designer Mike Pigozzi) led to the icon depicted in Figure 1.



Figure 1. WRIT VID Logo
Courtesy of Mike Pigozzi, April 2012

Aside from these treatments of multimodal composition among writing studies scholars, we noticed that our project is in good company with other national projects that use video instruction. Precedents include MITOpenCourseware <http://ocw.mit.edu/courses/audio-video-courses/>, Coursera from Stanford University <https://www.coursera.org/>, and Khan Academy <http://www.khanacademy.org/>. These projects include video tutorials from faculty and instructors on a range of topics—all open to the public. The appeal of these materials is round-the-clock access to complex topics from credible faculty and instructors.

Our plan for WRIT VID was similar; we wanted to make our videos on writing topics accessible to the public beyond WRIT 3562W. Such video lectures and educational materials are fodder for what Glenda Morgan terms “free-range” learners, or learners who search for online educational content beyond required course materials. Based on findings from focus-group interviews of students at a variety of colleges, Morgan, an e-learning strategist from University of Illinois Urbana-Champaign, was surprised to find that students would actively search the web for video lectures when they were dissatisfied with their instructor’s content (Parry, para.5). Depending on the field or topic, students regularly searched for content with reputable or “branded” content such as through a university or organization (Parry, para. 5). As we embark on our project, knowing that our videos will be branded with University of Minnesota, we hope our videos will reach “free-range” learners beyond our university.

Potential Impact

Whether or not students outside the University of Minnesota access our video modules on writing, there is still the question of impact on student learning. We intend to develop short evaluation surveys to accompany each video. When all videos are complete, we plan to integrate them into pilot sections of WRIT 3562W along with accompanying evaluation surveys to see how the videos enhance understanding of learning objectives in the technical and professional writing course. Our hope is that the videos will provide online students with deeper engagement in course material.

Additionally, we are hopeful that the WRIT VID project will spur instructors to use more video in their online writing courses. Now that we are aware of the video composition process and our available resources, we have a process for encouraging instructors to create videos on additional writing topics. We also hope that instructors begin to experiment with less formal multimodal avenues, such as using Wimba to share voice messages with their students, podcasts on a variety of topics, or simple videos of instructors talking to enhance instructor presence in the online writing course. And who knows, we may increase comfort level of instructors enough to encourage students to create videos in their online writing courses as well.

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Video Podcasts (Vodcasts) Add Life to General Zoology!

Sehoya Cotner

Joseph Kleinschmidt

Michael Kempnich

<http://umnzoology2012.posterous.com/>

What motivated change?

General Zoology is offered each semester as part of the required curriculum of many pre-professional and natural sciences students. Because Zoology is typically rooted in classic Linnaean taxonomy (Kingdom, Phylum, etc.), it can seem like a relatively uninspired march through the animal groupings, or clades. The traditional lecture-style offering, compounded by student perceptions of the material as stale, have created a course that must be “gotten through,” rather than one that motivates and transforms. And while the instructor (SC) attempted to educate and entertain, she did not typically involve the students in the process of science. Thus, she sought ways to make the course more about questions and process, spending less time in class focusing on discrete bits of information. From this search, and with the support of the Office of Information Technology’s Faculty Fellowship Program, the Zoology Vodcast Project emerged.

The Vodcast Project

Project Overview

Students were tasked with generating mini vodcasts (“Science Friday” style; see <http://www.sciencefriday.com/videos/watch/10266> for an example) to present contemporary work in zoology. Now that technological constraints are less of an issue (anybody with Powerpoint or Keynote can make a short, simple movie to share online), students can focus on their message (illustrating the process of science as it pertains to topics in animal evolution) while at the same time using “hip” new media.

With the explicit use of the term vodcast (or video podcast), we want to stress the use of video without confusing the content with audio-only podcasts. Moreover, video projects may represent live-action video. With vodcasts, students can create any combination of PowerPoint slides with accompanying narration, live-action video shot by students, and live-action video from approved sources on the Internet. But what really identifies the vodcasts is the overarching narration with every video, whereby a story is conveyed through multimedia.

Project goals were for students to: (1) realize the dynamic and ongoing nature of zoology research, (2) participate meaningfully in the communication of science, (3) appreciate how our understanding of animals has been, and is being, constructed, and (4) engage their peers in the process of science, as it relates to zoology.

Project Specifics

In Spring 2011, 105 students in General Zoology at the University of Minnesota participated in a new project—small-group production of vodcasts—worth 10% of their total grade for the semester. Each vodcast was designed to communicate recent primary research (using current journal articles) in one of the animal clades. Students were charged with choosing a topic (by animal group and date discussed in class), reviewing contemporary literature, and selecting a journal article that is understandable,

relevant, and informative. A grading rubric was provided *a priori*, so students began the project with a list of expectations. Projects were evaluated on technical aspects (e.g., “audio is understandable and appropriately timed” and “graphics and written words are legible and remain onscreen long enough to be read”), timeliness, and vodcast content (e.g., “makes clear connections to class material” and “conveys understanding of the scientific processes involved.”).

Beginning in week five of the semester, a new vodcast was premiered in each class, for three new premieres each week. These five-minute premieres complemented lecture material by focusing on the zoological vignettes the students found most interesting, and were the highlight of many of the class sessions. Vodcasts were posted on a public blog space along with questions to guide the viewer. Students could—and were encouraged to—revisit their peers’ videos from the blog in preparation for exams.

In Spring 2012, 106 students in General Zoology participated in the vodcast project, redesigned based on experiences and feedback from the 2011 pilot project.

Project Assessment

The Vodcasts

Vodcast evaluation was based less on the technical capabilities of the students and more on the video’s ability to communicate the science. Vodcasts showcased content in a variety of methods ranging from simple slide shows with added narration to more complex video production (visit <http://umnzoology2012.posterous.com/> to see vodcasts from Spring 2012). Students used prezi, Keynote, Powerpoint, QuickTime, Windows Movie Maker, iMovie, or a combination of tools. Every video included a “hook,” or simple attention-getting device, the most salient features of the scientific article, and finally the broader implications of the research.

In the 2011 pilot, the vodcasts ranged in quality from exceptional to weak. Some themes emerged in the early vodcasts that led to a clearer description of expectations in 2012. Specifically, many of the vodcasts were too long, relied too much on external media (typically gathered from youtube), and seemed disorganized. These problems were addressed by implementing a time restriction (suggesting vodcasts be between 4 and 5 minutes long), allowing no more than 20% of the vodcast to be from external media, and requiring a storyboard one week ahead of time. As a result, the 2012 projects were consistently good—neither too long to keep the students’ attention, nor too short to convey a story about the science, constructed largely with original material (e.g., simple animations, video shot by the students, voice-over narration), and clearly planned in advance.

Student Surveys

In both semesters, students were surveyed about various aspects of the vodcast project—specifically, the project’s perceived utility in helping them learn course material and understand how science is conducted. Also, pre-course and post-course survey items assessed student confidence in their scientific abilities (e.g., to interpret tables and graphs, make a argument using scientific evidence, and discuss scientific concepts with friends or family).

Student response to the vodcasts themselves has been very good (Table 1). On the post-course survey, students rated their level of agreement with several statements related to the vodcast project (e.g., “Developing my vodcast encouraged me to think about how science is communicated,” and “I enjoyed watching other vodcasts in class”). Most items averaged between 1 (“Strongly Agree”) and 2 (“Agree”):

- For the item, “Developing my vodcast encouraged me to think about how science is

communicated,” the average response was 2.00.

- For “Viewing the vodcasts—my own and others—helped me realize how our understanding of animals is constructed,” the average response was 1.86.
- For “Viewing the vodcasts helped me make connections between contemporary research in zoology and textbook material,” the average response was 1.81.
- For “I enjoyed watching other vodcasts in class,” the average response was 1.63 (however, for “I enjoyed watching other vodcasts outside of class,” the average response was 2.37).

A sample of student comments follows:

- The vodcast was a really great way to learn about other organisms and studies going on around the country/world.
- I enjoyed the project. I think that it would be beneficial for more classes to have a similar opportunity.
- I think the vodcast project was a great idea! My favorite part of class was watching them and learning about awesome new research in the animal kingdom.
- The vodcasts helped spark an interest in organisms that one might not think about on a daily basis. It really broadened my knowledge of many different animals.

On all of the nine science-confidence metrics, the students’ self-reported confidence improved significantly over the course of the semester. For example, students reported a pre-course average response of 3.58 (where 3 = “Somewhat Confident” and 4 = “Highly Confident”) to the item “Make an argument using scientific evidence;” the average post-course response was 4.11 (where 5 = “Extremely Confident”), with a pair-wise difference of means that is significant at the $p < .0001$ level. Students showed similar gains in their confidence to do all of the following:

- Discuss scientific concepts with my friends or family
- Think critically about scientific findings I read about in the media
- Determine what is—and is not—valid scientific evidence
- Determine the difference between science and “pseudo-science”
- Interpret tables and graphs
- Pose questions that can be addressed by collecting and evaluating scientific evidence
- Understand scientific processes behind important scientific issues in the media
- Understand the science content of this course

It is impossible to imply causation from the vodcast project, however it was the only course element in which the students were primarily responsible for describing scientific concepts, interpreting data, evaluating claims, and relating scientific findings to a “bigger picture.” Thus, it is logical to assume this project played a role—major or minor—in the increase in student confidence from the beginning to the end of the course.

Advice

Based on our experiences with the Zoology Vodcast Project, we highly recommend a similar activity for those seeking novel ways to engage their students in reporting the work of their disciplines. These projects have several potential benefits for students and teachers alike, namely

1. Most of the work is completed outside of class, but showcased in class and shared with their peers. In this way, the intellectual burden is similar to that of many paper-writing assignments, however students enjoy premiering their work in an efficient, engaging manner.
2. Grading is straightforward, especially when based on a specific rubric such as the one we provide.

3. Science is dynamic and memorable with video storytelling.

With such an open, student-driven project, quality varies considerably without some restrictions and clearly defined expectations. Thus, we recommend the following strategies to improve the student and teacher experience with vodcasts.

1. Assign the project early in the course, and provide a means for students to collaborate. On open-ended comments, students remarked that, as this is a time-intensive project requiring group-work, having plenty of lead-time was helpful. A few groups initiated their dialogue *months* ahead of their final deadline, and used moodle's group feature to discuss possible papers, meeting times, and storyboarding.
2. Model the entire process. In the second week of the semester, we assigned a scientific paper that we then discussed in the context of vodcast production. As part of our class dialogue, we addressed possible attention-getting hooks, which features of the paper were essential to communicate, a possible take-home message from the work, and how exactly to translate this information to visuals and sound. Then, we used their input to construct a vodcast ourselves. By specifically transferring their thoughts to the video, and using a familiar paper, we were able to clarify expectations and reduce much of the confusion about the project.
3. Make everybody accountable for every vodcast. There are many ways to store and organize video online (we used the blog-space, posterous.com), and students have access to numerous devices for retrieving these videos. Each group was tasked with supplying a few questions to accompany their vodcast, and we drew upon these questions on lecture exams, iClicker quizzes, and class discussions. All vodcasts premiered to an attentive audience, which may be partly due to the knowledge that they (the students) would somehow be accountable for the material.
4. Be as specific about expectations as possible. Between the pilot year and the second year of this project, we refined the project description and the grading rubric to be clearer about expectations. These revisions appear to have paid off, for the year-two vodcasts were consistently better than those from the pilot year.
5. Acknowledge extra effort. Some groups exceeded expectations, producing vodcasts featuring local experts (at the University of Minnesota or neighboring institutions), generating their own simple animations to illustrate complex experimental procedures, or communicating directly with the primary investigators to obtain images, video, etc. We often shared these vodcasts with the investigators, colleagues in related fields, or the administration, thereby letting students know that they had excelled. We know, based on anecdotal student response, that this type of acknowledgment is meaningful and memorable.

Concluding remarks

By investing time and energy in the construction of these vodcasts, students were able to (1) realize the dynamic and ongoing nature of zoology research, (2) participate meaningfully in the communication of science, (3) appreciate how our understanding of animals has been, and is being, constructed, and (4) engage their peers in the process of science, as it relates to zoology. An evaluation of the vodcasts themselves, as well as student data on perceptions of the process, lead us to conclude that the Zoology Vodcast Project is worthwhile. We encourage interested teachers in other disciplines to consider similar projects, whereby students not only consume, but also generate, the media designed to facilitate their learning.

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Sehoya is an Associate Professor of Teaching in the Biology Program, with interests in evolution education, and the use of technology to engage students in scientific storytelling. The work described in this chapter formed the basis of her work as an OIT Faculty Fellow for the 2010-2011 academic years.

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Podcasting: Learning On-the-Go

David Arendale

podcasting.arendale.org

Students often maximize their time due to responsibilities for school, work, and personal lives. Around 2005, I noticed more students listening to their mobile media players like iPods or iPhones. I thought it would be a way to reach them while they are walking on campus, standing at bus stops, and multi tasking other things. It allows them to learn on-the-go. It also makes critical course review sessions open for all.

A podcast is like an Internet radio show except it can be listened to when and where a person wants. Podcast episodes are automatically downloaded to the student's computer and can be listened to there or synced to their iPod, iPhone, or other mobile listening device. There are thousands of podcasts that can be subscribed to for free. Some are rebroadcasts of programs from television or radio. Others are independently created. Nearly all can be subscribed through Apple's iTunes online, <http://itunes.com>.

I have been teaching college history courses for several decades. While I have worked to include media as a component of the learning experience, working at the University of Minnesota has afforded me more learning technology tools and opportunities for training to use them. For the past five years, podcasting has been an important course component. More than 200 episodes have been produced thus far. My learning objectives for my students with the iPad Project include: (a) Increase engagement with the learning process through direct involvement with producing and sharing course information; (b) Stimulate learning through emerging technology-based learning venues; (c) Build community by involving students in teaching one another; (d) Empower students to co- produce their learning process and the outcomes; and (e) Increase outcomes such as lower rates of course withdrawal and higher final course grades.

Podcasting is part of the learning experience for students in my history course. For the past five years in my class, podcasts have been delivered automatically to them through their computer, iPod, or smartphone. I named the podcast "Then and Now" since it helps to connect historical events in the past to today's headlines. An important early decision was to involve the students in the production, on-air voice, and the content of the Then and Now podcast.



Students and I co-create weekly audio podcasts to review course material, interview history informants, review potential essay questions, and connect today's news headlines with the course content. The history course podcast is called Then and Now, <http://thenandnow.org>. Weekly podcast episodes provide a review of class topics, exam preparation, and interviews with people with life experiences related to class history events. Students also contribute special music shows devoted to a country or region of the world, interviews with community experts on historical issues, and special exam preparation episodes. Having the students serve as the on-air voice allows them to share in their own words that communicate effectively with their classmates.

A simple route for creating podcasts is using the computer you probably already have. Most laptop computers come with built-in microphones. I recommend downloading the free software program "Audacity" (<http://audacity.sourceforge.net/>) to do the recording and editing of the audio podcasts. Free print and video tutorials are available at the Audacity website (<http://audacity.sourceforge.net/manual-1.2/tutorials.html>). Each audio segment of the larger podcast described in the previous paragraph is recorded separately. Copyright free music is available for use on podcasts at Music Alley (<http://www.musicalley.com/>). The finished podcast episode could be placed on a course Moodle page, uploaded to the University's iTunesU service which makes it available to all (<http://itunes.umn.edu/>), or uploaded to a blog page created by an instructor where episodes could be downloaded or the entire series could be subscribed through an RSS feed (<http://blog.lob.umn.edu/uthink/>) through the blog page.

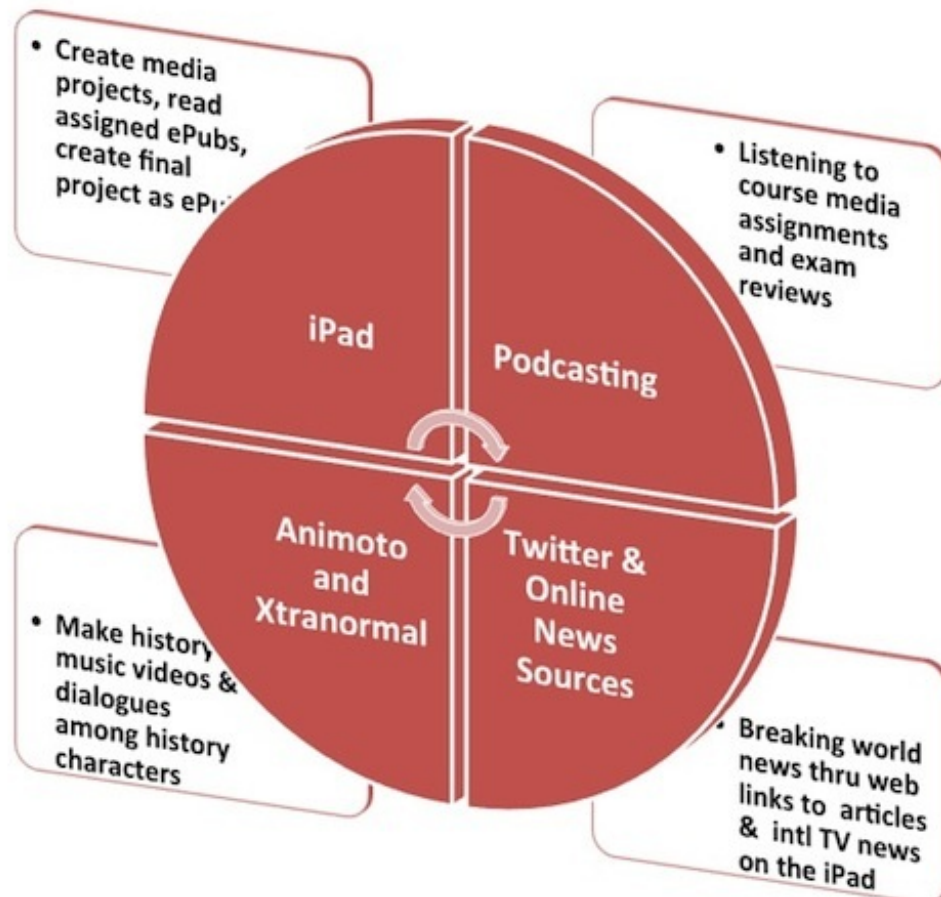
I took a more complex route in creating the podcast. Maybe it was because I was a former radio station DJ during my college years. I received a small grant to purchase equipment that helped to produce a nicer sound. I recorded the audio segments in my office using an audio mixer and professional-level microphone from BSW for \$250 (<http://www.bswusa.com>). I used Apple's GarageBand (\$14.99) audio editing software on my Apple MacBook laptop (<http://www.apple.com/ilife/garageband/>). I bought several instruction manuals for the software at a bookstore and attended the free training workshops held at the Apple computer stores. I also bought several books on podcasting. Other resources on podcasting are available my web page, <http://podcasting.arendale.org>.

The best help I received was from my students. Erik Tollefsrud and Brian Fredrickson volunteered to organize "Apple Technology Camps" on several Saturday mornings. They developed tutorials, and we created the podcasts together. I hired Erik for the first year to edit the podcasts while I continued to

learn how to edit. Erik also created our logo for the podcast “Then and Now” displayed earlier in this chapter. I finally took over responsibility for editing after a year. Now it takes me about 90-minutes to produce a 30-minute podcast episode.

The podcast episodes are uploaded to the Internet using a blog page through the University (<http://thenandnow.org>). Listeners can go to the blog page, click on the web link, and listen to the episodes they like. Or, they can subscribe to the podcast through Apple’s iTunes, <http://subscribethenandnow.info>. The free iTunes software can be downloaded from <http://itunes.com>.

In addition to podcasting, several other complimentary learning technologies are embedded within my history course, providing opportunities for students to co-create their learning experience.



1. iPad. First-year students use iPads to complete readings (paper textbook eliminated), listen to audio and video files including the course podcast, and create a group visual history project .
2. Animoto. <http://animoto.com/education> I use the free online music video software to create summaries of my class presentations.
3. Xtranormal. <http://www.xtranormal.com/> I use the free online animation software to create short dialogues among historical characters.
4. Twitter. I alert students to relevant news stories related to class topics. The history course Twitter feed is <http://twitter.com/pstl1251>
5. iPad TV apps. Free apps permit watching TV news stories produced in France (France24), Middle East Al Jazeera), and England (BBC).
6. Wiki Web Page. Students create an exam review web site before major exams. UMN Google Sites is used to host the web site, <http://myworldhistory.org>

7. UConnect. <http://www.oit.umn.edu/umconnect/> I use the service provided through the University to host study review webinars before exams.

Quantitative Analysis of Podcasting with Student Outcomes

I have conducted several studies with students enrolled in my history course. The following is a brief overview of results from Fall 2008. Sixty-seven students were enrolled in the class. Several factors were statistically significant ($p > .05$) for higher student satisfaction with the course learning experience through listening to the Then and Now podcast: less academically prepared and more skillful in use of the Internet. Factors related to higher final course grade achievement included listening to the course podcast (approached statistical significance ($p > .05$), better academically prepared ($p > .05$), and more skillful in use of the Internet ($p > .05$).

The students most likely to have higher satisfaction levels with the class were those less academically prepared. This accomplished one of the purposes of podcasting as an effective academic support system for students in a large class without an assigned tutor. A mitigating factor both with higher satisfaction with the course as well as higher final course grade was higher student skill level with use of the Internet. There is a learning curve for subscribing and syncing podcasts to mobile devices such as iPods, and related technical issues are a barrier for some students. As a result of these findings, I have spent additional time as the class instructor with in-class demonstrations and creating short video tutorials. Since 2008, the listenership of the course podcast has nearly doubled. Listening to the podcast contributed to higher mean final course grades, but the statistical impact appears to have been overshadowed by the powerful pre-entry academic preparation level of the students. The professional literature documents the most highly predictive factor in grade achievement is the previous academic success of the student. As I conduct future research studies, I will use more sophisticated statistical treatments to help separate the influence of the variables to more clearly identify the contribution of podcasting.



Suggestions for Exploring Podcasting

I have learned many lessons over the past few years. The quality of the podcasts is essential for students to value them enough to insert them into their lives. It is important as the class instructor to provide sustained awareness of the course podcast and also demonstrate how to locate, subscribe, and listen to them. I spend some class time throughout the semester and have developed short video tutorials. One should never assume that students by instinct intuit how to do things. More general information about podcasting and our Then and Now podcast are at <http://podcasting.arendale.org>.

I have four suggestions for next steps for people new to podcasting.

- First, subscribe to podcasts of high personal and professional interest. Listen to them while sitting at your desk or exercising. Talk with your children or grandchildren. They will be happy to help. Talking with them is much quicker than going through the learning curve by yourself.
- Second, learn how to podcast. Talk with some technology users at your institution. Pick up a book on podcasting at the bookstore.
- Third, experiment with the technology. Don't wait to be perfect or think you need to know everything. Involve students in your class with the project by placing their voices on the podcasts and involving them with the audio production. Remember it is the value of the podcast content and not the production values that will attract your students and others to listen.
- My final word of advice is to keep going and it will get better and better.

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I am an Associate Professor in the Department of Postsecondary Teaching and Learning in the UMN College of Education and Human Development. I will continue the podcast project in my history class and develop new categories of audio and video podcast episodes. More at <http://arendale.org>

Creating and Incorporating an Online Simulation to Teach Antibody Identification in the Clinical Laboratory Science Curriculum

Jason Hill
Joanna George

Introduction – doing more with less

The Clinical Laboratory Science (CLS) program at the University of Minnesota is an upper division professional program that teaches the knowledge, critical thinking, and bench skills necessary for graduates to enter the clinical laboratory workforce as technologists, supervisors, or managers (primarily in hospital, clinic, or central reference laboratories) or to enter graduate programs in order to continue their education. The program is housed in the Center for Allied Health Programs within the Academic Health Center, awarding a B.S. degree in Clinical Laboratory Science upon completion.

This is an extremely rigorous curriculum during which undergraduate students in their fourth year or post baccalaureate students complete two semesters of intensive lecture and student laboratory coursework, followed by 12 weeks of clinical experience rotations. After successful completion of this curriculum, students are eligible to take a national certification exam. One of the primary disciplines within the clinical laboratory is transfusion medicine (blood bank). An important aspect of transfusion medicine is the immunology of red cell antigens and antibodies as they relate to providing safe and compatible blood products. The “type and cross” procedure familiar to so many through TV programs like ER is actually a much more complicated process of screening every potential blood recipient for antibodies they might possess to one of the more than 500 different red cell antigens, much more than just ABO and Rh. If these unexpected antibodies are detected, they must be identified so that donor blood lacking the corresponding antigen can be provided.



Reagent cells used in antibody identification

The blood bank is not highly automated as are other clinical laboratory departments. The actual "tests" performed are quite straightforward, but critical thinking and problem solving skills are paramount to competently performing the job. Analyzing antibody identification tests to determine the antibody or antibodies present is a technique that requires a lot of practice and exposure. Teaching this skill in a traditional setting requires one-on-one instruction to demonstrate the rules of crossing out those antibodies that are not likely, and the subsequent analyzing of those that are not crossed off to determine the next steps to take in the process. In the classroom setting, this instruction was historically done by the instructor demonstrating the process via pen on overheads which still required extensive tutoring as students experienced confusion over the rules when they actually did the work for the first time. Voiced over PowerPoints using fly-in strikethroughs for crossing out were only marginally better in that the student could replay the instructions at their leisure.

A better teaching tool was needed in which the student could make all of the decisions right from the start, correct or incorrect. This idea was conceived several years ago as a dream project with the intended goal of having students understand and master the process on paper in the lecture course before they came to the laboratory session to perform the actual testing and analysis. This project was given its impetus when the current program expanded to the University of Minnesota Rochester site, presenting the need to deliver the lecture material in an online format. Along with that expansion came an increase in the number of students in both the laboratory and lecture courses with fewer faculty. Now instead of four instructors guiding 20-25 students, two instructors were guiding 35-42 students on the Twin Cities campus alone. Logistics didn't allow us to bring the students to the required competency level fast enough.

The Solution

Content experts do not typically have the expertise necessary to develop an interactive program with this level of complexity. When an instructional designer was brought on board to help develop the program-wide online curriculum, the opportunity arose for this project to take shape, but other projects took precedence. When the instructional designer left, the work being done came to a halt for a couple of years until a multimedia educator/designer was contracted to again assist in the development of these projects. This was the opportunity to fulfill the dream and the content expert and designer began meeting to plan and implement the project.

This material was definitely not a candidate for a "text and graphics" or even a "movie" type instructional methodology. Instead, students needed to make the same hundreds of choices and receive the same contextualized feedbacks as if they were with an instructor. We also couldn't "break it up" onto a large number of pages as that would not reflect the actual experience students would have in the field where they were required to do all of the crossing out on a single page and come up with a conclusion or requirements for further testing.

One of the extraordinary parts of this project was the determination by both members of the team to come up with the "right solution" rather than just putting something online to assist the students. The instructor (content expert) did not want to sacrifice the quality of the one-on-one instruction. This instruction was seen as having the potential for wider application within the field and was identified as software that should be created at a commercial level. The designer had experience creating commercial educational software so the bar for the final product was set exceptionally high. The initial planning stage required a full exploration of the instructional goals as well as the exact methods used within the classroom and the difficulties students encountered with the concepts. In order to have the highest degree of transference to actual clinical laboratory work, the paper page model was retained

along with the hundreds of interactions required in order to complete that page.

After defining the parameters for a successful end product, the requirements needed for successful implementation were determined. This included the details and specifications for how a student would work through the process, and the feedback received. One of the components of one-on-one instruction is that students can make hundreds of potential mistakes and the instructor has to ensure that the feedback is tailored to the exact mistake and sample being investigated. This was one area where flexibility would need to be built into the process. While the initial goal was clear, the exact degree and nature of the feedback would require fine tuning as the process continued. Peer reviews were solicited during various stages of the process, resulting in additional layers of functionality and feedback modifications being implemented without breaking existing functionality.

Only after the goals and specifications were determined did we look at what technology solution to use. Fortunately this project was part of a larger body of work which allowed us to leverage existing code so we could spend more time on the customization required to meet our goals rather than starting from scratch. Though it worked for us, the technology should not determine the educational activity. Had it not met our needs, a different technology would have been evaluated and selected.

The technology utilized for this product was a flash based xml controlled engine delivered via standard web browser. This engine had been created from scratch previously by the developer in order to deliver online interactive modules and was quite robust. It required minimal changes to the engine in order to have all of the features required for the student interactions. Once these changes were made the actual content for the course was defined in text files which the engine parsed and then dynamically created all of the interactions and retrieved all of the images. This allowed us a great deal of flexibility and ensured that edits were able to be done with no programming (which was key for maintainability) as the text files were actually controlling what content was loaded and how the interactions functioned via instructions which the engine loaded once a user accessed the URL. Edits were able to be made via simple text edits and as the images were not embedded new images could be referenced or existing images replaced without programming impact.

The Final Product

The finished module starts out with an introductory lesson that teaches the basics of antibody detection and identification. The rules for successful navigation of the module and those used in the industry for this “exclusion method” of antibody identification are laid out. The antibody problems are then presented in a series of three case based scenarios, each highlighting a patient with a picture and an overview of their diagnosis and laboratory data. The patient information and testing results are presented in the order in which they would occur in the actual laboratory. Once students navigate to the page with the actual antibody testing results and antigenic profiles, they can begin the crossing out exercise at their leisure. The exercises are self-paced and each mouse click results in a strike out of an antigen when appropriate, with immediate feedback as to why the answer was right. Incorrect mouse clicks do not result in a cross out, but immediate feedback is also given as to why the choice is wrong.

Blood Transfusion Antibody Typing **Clinical Laboratory Sciences**

2. Case 1 | Sections | About


Our 50 year old patient Sarah Bellum has end stage renal disease and requires dialysis three days per week. Because of kidney disease and dialysis, her hemoglobin and hematocrit often drop, requiring transfusion. She has received multiple transfusions over the last four years. Currently she has a Hgb value of 8.0 g/dL and her physician has ordered one unit of red cells for transfusion. Her type and screen resulted in a positive antibody detection test, showing a 2+ reaction in the PEG antiglobulin phase with screening cell II, shown below. She was last transfused four months ago at which time her antibody detection test was negative.

Patient Name Sarah Bellum Identification Number 32657815 Location KDU
 Specimen Collection Date MM/DD/YY Time 0700
 Phlebotomist Jolly Goodfellow Ordering Physician Dr. Strangelove
 Patient Diagnosis End Stage Renal Disease

SEROLOGICAL HISTORY: A positive, ADT neg Tech: JG

CURRENT TESTING: A positive, ADT pos Tech: JG

ABO				Rh				Antibody Detection Test PEG		
Forward Type		Reverse Type		Anti-D		Control		IS	IgG	CCC
Anti-A	Anti-B	A: cells	B cells	IS	37C	IS	37C	Cell I		
4+	-	-	3+	4+		-		Cell II	-	2+



A panel of red cells was subsequently tested with Sarah Bellum's sample, again using PEG as the enhancement additive. This panel is shown on the next page, where you will begin the crossing out exercise.

Page 1 of 15

Case presentation of patient data and results

Blood Transfusion Antibody Typing **Clinical Laboratory Sciences**

2. Case 1 | Sections | About

Red Cell Panel
For Antibody Identification

Step 1. Rule out each antigen IN ORDER, left to right, top to bottom. Then click **DONE below when complete.**

PATIENT NAME: Bellum, Sarah
 PATIENT ID: 32657815
 ABO: A Rh: Pos Date: MM/DD/YY Tech: JG
 History: Renal Disease/Multiple Transfusions
 Most Probable Antibody: _____
 Can't Rule Out: _____

Lot No. 255690 Exp. Date: MMDDYYYY

		Rh-Hr								MNSs			P	Lewis		Lutheran		Kell				Duffy		Kidd	Xg	Patient Results PEG								
	Rh-hr	D ⁺	D ⁻	c	E	e	f	V	C	M ⁺	N	S	P ₁	Le ^a	Le ^b	Lu ^a	Lu ^b	K	k ⁻	Kp ^a	Kp ^b	Js ^a	Js ^b	Fy ^a	Fy ^b	Jk ^a	Jk ^b	Xg ^a	IS	IgG	CCC			
1	R1R1	+	+	0	0	+	0	0	0	+	+	+	+	0	+	0	0	+	+	0	+	0	+	+	+	+	+	+	+	0	-	-	2+	1
2	R1R1	+	+	0	0	+	0	0	0	+	0	0	+	+	0	0	0	+	+	0	+	0	+	+	0	+	+	+	+	-	-	2+	2	
3	R1R1	+	+	0	0	+	0	0	0	+	+	0	+	0	+	0	0	+	+	0	+	0	+	0	+	+	+	0	-	-	2+	3		
4	r'r	0	+	+	+	+	0	0	0	+	+	+	+	0	+	0	0	+	+	0	+	0	+	+	0	+	0	+	+	-	-	2+	4	
5	r'r	0	0	+	+	+	+	0	0	0	+	+	+	0	+	0	0	+	+	0	+	0	+	0	+	0	+	0	+	-	-	2+	5	
6	R2R2	+	0	+	+	0	0	0	0	+	+	0	+	+	0	0	0	+	+	0	+	0	+	+	+	0	+	0	-	-	2+	6		
7	R2R2	+	0	+	+	0	0	0	0	+	0	0	+	+	0	0	0	+	+	0	+	0	+	0	+	+	+	+	-	-	2+	7		
8	rr	0	0	+	0	+	+	0	0	+	+	0	+	+	0	0	0	+	+	0	+	0	+	0	+	0	+	0	-	-	2+	8		
9	rr	0	0	+	0	+	+	0	0	0	+	0	+	+	W	+	0	+	+	0	+	0	+	0	+	0	+	+	-	-	2+	9		
10	rr	0	0	+	0	+	+	0	0	0	+	+	0	+	0	0	0	+	+	0	+	0	+	0	+	0	+	+	-	-	2+	10		
AC	Auto Ctr																												-	-	2+	AC		

Correct. s can be ruled out because the antigen is present in the homozygous state (S-s+).

DONE

Page 2 of 15

Print Center for Allied Health Programs UNIVERSITY OF MINNESOTA

Student has progressed midway through line 2, with correct feedback at bottom

After a preliminary identification of the most probable antibody present, the student is taken through additional steps to validate their answer and determine the statistical reliability of the answer through methods commonly used in the industry. Once the antibody identification exercise is complete, the student is again taken back to the patient and given a conclusion to the case, including outcomes of the transfusion. This case based approach is intended to simulate an actual laboratory situation as closely as possible.

The Challenges

This project presented both challenges and opportunities regarding timeline. Initially all seemed

reasonable as the end product would be demonstrated at the Clinical Laboratory Educators' Conference, more than a year away. Unfortunately, while this project was a personal priority for both project members, neither was able to give it full priority over their other work so the project had to fit in around existing full time commitments. A constant effort was made to coordinate these openings to allow the various stages of development to proceed requiring both parties to evaluate, revise, and give feedback at each step. As is often the case, the project came down to the wire, requiring many nights and weekends in order to incorporate last minute feedback before the conference. Ideally a project of this scope would be assigned a dedicated appointment with other duties temporarily removed, but that is rarely the case within our budget and time strapped departments, so embarking on this type of work requires a great deal of flexibility and dedication.

It should be noted that this type of project really isn't possible for many departments. It requires a degree of expertise and coordination that is not normally given to the "online transition", where the bar is often set much lower and interactions are limited to those that can be simply accomplished. The "PowerPoint transfer" mindset is strong during these transitions, and while a good deal of material can be translated it is crucial to look at the curriculum and identify those areas which would benefit from more extensive student interaction and deviate from a passive delivery model where it would be beneficial.

Calculating the Impact

The interactive module was used in CLSP 4501 during spring semester 2012. The module is just one component of a semester long course. 61 students on two campuses were randomized into two groups. One group viewed the traditional voiced over PowerPoint module with the instructor doing the crossing out with fly-ins followed by student analysis of a set of three paper antibody problems. The second group used the new interactive module. All students completed a wet lab exercise after completing their respective module. Both the traditional and interactive modules were linked in the course Moodle site, accessible by the appropriate group any time during a one week period preceding the laboratory exercise in which students performed antibody identification on an actual sample. Select laboratory performance parameters were recorded to compare the laboratory success of each group. Both groups also completed a written assessment and survey. The intent is to determine the efficacy of the interactive module in terms of both student performance and satisfaction compared to the traditional delivery method. Both modules were then opened to all students and a subset of students who viewed both modules was blindly selected to be interviewed for a qualitative study. While data has not yet been analyzed, feedback from the students has been very positive. Originally, the hope was to develop a second "mastery" level module but budgetary constraints and the efficacy of this first module will dictate the future direction. The administered survey resulted in student comments indicating the desire for additional "antibody problems".

What's next?

The finished product was enthusiastically received at the Clinical Educators' Conference in February 2012 and many educators signed up to receive information about purchasing the product for their institutions. It is hoped that this product may receive further customizations to meet the specific needs of these institutions to account for the analytical variations in practice within the industry and teaching programs.

The product has an application as a refresher course for those clinical laboratory scientists who have not worked in a blood bank for some time and are being cross trained for such.

While the CLS curriculum must retain hands-on laboratory sessions to insure competency of its graduates, modules such as this one have a place. Online education can help us teach and train more

students to enter the profession if we can provide quality online simulations that supplement and put into practice the didactic material while demonstrating the laboratory techniques. One paradigm shift in our curriculum is to provide these preparatory educational tools that students can work through in order to reach a level of comfort and competency prior to entering the lab to do “the real thing”. CLS is an expensive program to teach and when the student is successful the first time in a wet lab situation, money is saved, the program is more sustainable, and time can be spent on refining skills rather than teaching the basics. More simulation tools are envisioned in this course but will require that a technology expert be included in the budget.

Jason Hill, MS <hill0243@umn.edu>

Jason Hill is a multimedia educator with a Masters in Scientific and Technical Communication who designs, architects, and programs online modules for various departments within the University of Minnesota and the State of Minnesota. He is currently seeking to work with a new department due to funding cuts. His role in the project was to sit down with the subject matter expert and work out the full details of the instructional goals and then find and implement a technology solution to deliver these goals online. His goals are to continue to support innovative instructional solutions at the University of Minnesota.

Joanna George, MPS, MT(ASCP)SBB <georg008@umn.edu>

Joanna George is an instructor and course director of CLSP 4501 Transfusion Medicine Lecture and CLSP 4502 Transfusion Medicine Laboratory as well as an instructor in Microbiology. She is the content expert for this module and in addition to being a Clinical Laboratory Scientist, has a professional certification as a Blood Bank Specialist.

STREET: Where Simulation Meets Reality

Arthur Huang

David Levinson

www.street.umn.edu

Simulations and games are receiving increasing attention in teaching in higher education. In this context, we developed a series of simulation modules (STREET) in transportation engineering education and applied them in teaching undergraduate and graduate transportation courses at the University of Minnesota. After several years, we contend that they represent an effective pedagogical tool in transportation education. In this chapter we describe our motivation for this work, the program's development process, dissemination and impacts, and our future work.

Motivation

As simulations and games have been increasingly assimilated in classroom teaching for a variety of disciplines, transportation-related courses are still mostly taught with the chalk-and-talk lectures and paper-and-pencil problem solving method [1, 2]. Unlike some other areas of engineering, it is difficult to do traditional laboratory work in transportation, and agencies are rightly reluctant to allow students to affect live traffic or test new road or transit route configurations. There exists a wide gap between understanding new transportation knowledge from the classroom and applying it in a real environment for learners. Therefore, we developed STREET (Simulating Transportation for Realistic Engineering Education and Training) to fill this gap by allowing students to apply new knowledge in a simplified, low-cost and risk-free environment through simulations. These simulations actively engage students in the learning process, where students can take the initiative to set up the experiment, propose their hypotheses and strategies, and test these hypotheses by themselves or working in groups in silica. These simulation modules are particularly useful for applied subjects in transportation such as traffic signal design and transportation infrastructure planning.

Funding and the development process

Led by Professors Henry Liu and David Levinson at the University of Minnesota, the STREET Program was funded by the National Science Foundation's Division of Undergraduate Education with match support from the ITS Institute at the University of Minnesota, and seed grants from the former Digital Media Center at UMN. This program developed web-based simulation modules to improve undergraduate teaching in transportation engineering to create an "active textbook" [3]. Several other modules are applied in graduate-level transportation courses at the University of Minnesota. The program currently consists of nine online simulation modules, with each module focusing on a particular subject (Table 1). The subjects include: roadway design, signalized intersection simulation, travel demand and assignment, road network design, retail location choice, origin-destination estimation, and the growth of transportation infrastructure.

Specifically, we create an assignment for each simulation module which can be found on each module's webpage. In these assignments, students are required to play designated scenarios as well as scenarios they propose on their own. Their final product is a report summarizing findings from the investigated scenarios. To facilitate teaching, we further provide online students' background survey and evaluate survey for each simulation module, based on which instructors can assess its effectiveness.

A remarkable feature of the development process is the integration of research and teaching. Some simulation modules are derived from the researchers' existing research projects which engender opportunities for match funding. The modules are tested and evaluated in the course offerings of the Civil Engineering program at the University of Minnesota.

Table 1 Simulation modules in the STREET Program

Name	Topic
ROAD (Roadway Online Application for Design)	Roadway geometric design
OASIS (Online Application for Signalized Intersection Simulation)	The control logic of an actuated signal controller
ADAM (Agent-based Demand and Assignment Model)	Travel patterns on a road network
SONG (Simulation of Network Growth)	Transportation network growth
SAND (Simulation and Analysis of Network Design)	Transportation network design
SOFT (Simulation of Freeway Traffic)	Traffic flow theory
CLUSTER (Clustered Locations of Urban Services, Transport, and Economic Resources)	Retail location choice
ABODE (Agent Based Model of Origin Destination Estimation)	Matching origins and destinations using employment job search method
ANGIE (Agent-based Network Growth model with Incremental Evolution)	The growth of road networks and the Minneapolis Skyway network

Dissemination and impacts

We share the produced program with the civil engineering education community in the US and around the world. The simulation modules are web-based and are open sourced. The source code, surveys, and related papers are available for download here. In addition to the University of Minnesota, faculty members from 17 universities have integrated STREET modules into their curricula. To further disseminate it to the general public, we have demonstrated the program in different exhibitions such as the Minnesota State Fair and Academic Technology Showcase at the University of Minnesota.

Applying the simulation modules in transportation courses at the University of Minnesota also spawned publications. Six research papers on using simulations in transportation education have been published or presented at the Transportation Research Board Annual Meetings. A full list of papers can be found here. Our research results indicate that such modules not only improve students' understanding of critical concepts in transportation, but also enhance their interest in the subjects they study. For example, after playing the CLUSTER simulation module, students are asked to write upon how transportation cost, demand, and supply would influence retail location choice, the theory of which has been taught in lectures. Students' feedback reveals that their understanding and interest in this topic has been deepened with the aid of visuals and fun game process. Overall, we find that the STREET Program well complements traditional classroom teaching.

Future work

Our future work will take several directions. We will continue to develop online simulation modules related with ongoing research projects and further evaluate their efficacy in lab teaching. It is of interest to use the modules or derivatives for other educational purposes. Examples include educating the general public on traffic and planning and integrating modules into high school extracurricular activities

to attract students into the transportation field. This calls for collaborative work with public agencies, schools, and private sectors.

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Online Emergency Risk Communication Simulation

*Jeanne Pfeiffer
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Online Emergency Risk Communication Simulation

Professors Jeanne Pfeiffer and Cynthia Peden McAlpin co-developed an online course called Nursing 6938 Emergency Preparedness for Public Health Nursing Leaders using content developed from a previous in-class curriculum. The online course development was supported by the Learning Mostly Online Program (LMOL) through the Provosts office; directed by Bob Rubinyi. The School of Nursing instructional designer, Nima Salehi, assisted with course design.

When this course was taught in the classroom students would participate in a timed emergency risk communication simulation. This activity would typically be done during the last third of the semester as a culmination of content and skills learned on team planning and emergency communication standards.

The two-hour simulation involved the following components:

- Students were provided with an emergency risk scenario
- They worked in teams to develop a message for one of the following audiences
 - Public message
 - Inner agency message
 - Outside agency message
- They had to write up their message and then present it to other student teams
- They had to provide peer feedback on the messages created by other teams
- The instructor would then review activity results with the entire class and provide feedback on messages created

The challenge was how to take this activity online, what information should be included in the assignment guidelines and what technologies would be the most efficient in facilitating each step of the activity. The instructor wanted to complete this activity within a two hour synchronous timeframe to make this more authentic to the quick turnaround and decision making undertaken by a health risk communication management team.

Assignment guideline and rubric

During the first week of class students were provided with guidelines for all assignments in their online Moodle course site. Course materials and assignments in week 1-7 provided them with additional materials and skills practice needed for successful completion of the simulation activity. Follow up activities and assignments extended analysis of how emergency risk communication might be implemented at each person's own agency.

The Emergency Risk Communication guidelines (full guidelines in index) provided a description of the purpose, the process, and criteria on how messages and peer feedback would be graded. Guidelines included a timeline in table format detailing what would happen during each step of the simulation. This also let them know what technologies would be used during each step of this process. Table 1 outlines the timing of various activities over the course of the two hours.

Timeline/Activities Table (7:00 – 9:00 PM)

Time	Activity
6:50 PM	Log in to GoToMeeting early - https://www3.gotomeeting.com/join/982938942 Check audio connection and troubleshoot any technical difficulties with GoToMeeting online help
7:00 PM (10 min)	Meeting begins - Agenda Clarification
7:10 PM (40 min)	Each group will develop messages using personal phone communication and their assigned Group Wiki in the online Moodle course site in Module 8.
7:50 PM (10 min)	Break
8:00 PM (30 min)	Each student will then have 30 minutes to go to the course site, review other messages, and prepare talking points for the debriefing session. Post your talking points as feedback to the other groups in the discussion forum under each wiki. When we stop to debrief. If you have not posted all your talking points by that time, you can do it after the session ends or the following day.
8:30 PM (30 min)	Finally your instructor will facilitate a debriefing session in GoToMeeting where all participants will view completed assignments in the course site while discussing them. From this debriefing session, we will determine the gaps in communication that might be the focus of the exercise for the next training interval in your jurisdiction.

Team message document collaboration

Initially Google docs was considered as an option for students to write up their messages in teams. Each document would have been linked in the Moodle course site for peer feedback purposes. However School of Nursing (SON) students have had access issues with Google docs due to blocks for the Academic Health Center. So we decided to use the Moodle wiki instead; wikis having been used successfully by students for other online SON course activities.

While both Moodle wikis and discussion forums allow grouping we decided not to use the group function for this activity. We instead created 3 separate wikis and forums and indicated the group title on each activity link. This was because student teams would all be editing their wikis simultaneously during the simulation and we had some concerns about student editors being blocked due to multiple users. In addition we felt that having 3 wiki links with each peer feedback forum link directly under it helped to visually represent the scope of the task being undertaken. With a small class this was possible. For a larger class with more teams, we might use group settings for both wikis and peer feedback forums in order to avoid a long line of wiki links.

The set up of the content module, wikis (where each message was created) and discussion forums with student feedback within Moodle is illustrated in Figure 1.



Figure 1: Instructions, wikis, and student feedback groups in the Moodle LMS

Brief directions for how to begin editing wiki page content were included at the top of each wiki in large bold font. Students had no technical issues with using the wiki during the simulation.

Online Meeting Framework

GoToMeeting, an online conferencing tool, was used to frame the online session activity. Students were asked to attend a test GoToMeeting session 3 days before the assigned date using the computer they planned to use during simulation to troubleshoot any technical difficulties ahead of time.

On the assigned date, students logged in to the GoToMeeting session, reviewed the task, then met with their teams by phone (2 people per team), then typed up their assignment in the course site wiki and provided peer review through discussions. The instructor used GoToMeeting to review and summarize the simulation activity with students. Through GoToMeeting the instructor was able to share her desktop view of each message in the course site, view peer feedback provided, and then provide her own analysis and advice.

Due to the careful planning and preparation of the activity (and maybe some luck) we had no technical difficulties during the session. The entire technical landscape for the project mapped to each simulation activity can be found in Table 2.

Technologies used to facilitate simulation preparation and completion:

Simulation Activities	Technology used
Pre-task preparation	Moodle course site support documents GoToMeeting test session
Begin Session: agenda clarification	GoToMeeting
Team message creation	Phone and Moodle course site wiki
Peer feedback	Moodle discussion forum
Simulation Debriefing	GoToMeeting

Table 2: Simulation activities and technologies used.

Assignment guidelines and preparatory activities addressed the scope of the task to help ensure that students were able to understand exactly what was expected of them.

Students reported that this activity was integral in helping them understand the amount of preparation and planning needed to effectively respond to emergency risk conditions. They appreciated conducting this simulation activity within a restricted time period as this approximated the challenge they may be required to face in a “real life” situation. Students appreciated the candid feedback they received from peers who responded as key stakeholders within a health community. They also reported being pleasantly surprised at how smoothly they were able to use multiple technologies with minimal difficulties and with the focus on the content rather than the process. Several students commented that they planned to apply these types of communication technologies in their own agencies.

A pre and post course assessment survey was administered. One of the questions asked was on their rate of confidence in “Methods used between agencies in your jurisdiction to communicate when usual sources fail to operate.”

Numerous activities were undertaken to improve student proficiency in risk communication. This activity was one among others that led to a significant improvement in student confidence levels for risk communication skills.

This course activity has been presented at faculty meetings and workshops and will serve as a model that can be modified by other faculty to facilitate innovative simulation exercises within hybrid or online courses.

Index:

Below complete assignment guidelines have been included (without the timeline). A risk scenario situation was also provided in a separate document to students right before the exercise was undertaken.

Emergency Risk Communication Exercise Guidelines

Exercise Purpose

You will participate with your classmates and faculty in a synchronous virtual table-top exercise at the pre-arranged time. This exercise will last approximately 120 minutes. Grading (S/N).

The aim of this exercise is to practice developing and articulating key basic critical, accurate and timely messages to your audience. You have each been assigned to develop emergency risk communication messages for 1 of 3 typical audiences:

Group I - Develop messages for inter-agency (public health agency) staff communication about this event

Group II - Develop messages for intra agency (between agencies) staff communication dealing with this event in your community, region or state.

Group III - Develop messages for the public who may or may not be affected by this event.

Message Components

Your messages should contain the following components being consistent with the CERC principles you have learned about on the Webinar and course resources.

1. Target audience
2. Six strategies (be first, be right, be credible, be empathetic, promote action, show respect)
3. Test the message with stakeholders
4. Evaluate the results

When you give feedback on this assignment to your classmates, consider whether these components have been addressed.

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Synchronous Online Teaching as a Component of a Fully Online Course

Helen Mongan-Rallis

Introduction

I remember as a small child being completely confused by the saying, “You can’t have your cake and eat it too!” as I couldn’t understand the point of having cake if one couldn’t eat it. I was adamant that it was possible to have it both ways, or when there were more than two ways, to combine the best of all options (like having French fries, ketchup and ice cream on the same plate!).

My rebellious tendencies growing up prepared me well for my work in teacher education and educational technology, guiding me to seek ways to mediate what I see all too often as a false dichotomy between choosing only one approach to teaching or one technology over another – as if there are only two ways and as if we are allowed to pick only one. An example is the face-to-face vs. online teaching debate, with proponents of each arguing heatedly in favor of their preferred approach over the other. In this chapter I share how my own approaches to teaching have evolved as I have experimented with using a variety of different methods of teaching and using different educational technology tools all within one course – seeking to maximize the best of all possible worlds. My experience has culminated in my teaching a fully online course with a synchronous component (what I call a fully online hybrid model of teaching, or FOHM).

Since I first began teaching at the university level over two decades ago I have been an early adopter of emerging technologies. I have been fascinated by the possibilities each new tool has brought in helping me improve my teaching and my students’ learning. Inspired by the encouragement of different department heads over the years to try new approaches, and supported by our university’s academic technologists, I have learned not only how to use new and emerging technologies, but also how to make informed choices about which technologies and teaching approaches to use in different situations. The principle that has guided me throughout is that technology is never the point – learning is.

In the early days of the Internet I learned the value of supplementing my teaching by creating course websites on which I provided links to online resources (including electronic copies of course materials). As these online resources increased in quality and with the emergence of Web 2.0 tools, my teaching evolved so that I had my students increasingly engage in online work as a core component of their preparation for our face-to-face classes. This meant that when they came to class we could spend more time on various types of active learning situations in which they applied and discussed what they learned outside of class. I also found myself using online tools, such as asynchronous discussion forums, wikis, and blogs to have students engage with one other after class to extend and deepen the conversations that they began in class.

When my university transitioned to using Moodle as a learning management system, I abandoned using my own course website as I found that Moodle provided an easy-to-use means of integrating many of the tools that I had previously used. I also changed the designation of my classes so they were listed as hybrid classes, with some seat time being replaced by online learning; this enabled me to expand the outside-of-class learning experiences that I had students do both in preparation for our class time and as a follow-up to class. This approach, now known as “the flipped classroom,” has become increasingly popular both at the pre-college and college level. In a flipped classroom, there is a shift in the role of

both the instructor and the students. Instruction is “delivered” online outside of class, and class time becomes more like a workshop where students are actively engaged in hands on learning and in interacting with each other, while the teacher serves more as a facilitator (Educause Learning Initiative, 2012).

The catalyst for the next step in my teaching-with-technology journey came when I had to return to my home country, South Africa, in the middle of the semester due to a family medical emergency. Rather than cancelling class while I was gone, I decided to teach from South Africa to my students in the United States, using Adobe Connect. I had previously used Adobe Connect to participate in online meetings and also to attend virtual conferences. I had also used both Skype and Adobe Connect on a limited basis to enable students to join my classes from home when they were too ill to come to campus (especially helpful during the H1N1 flu outbreak). This gave me the confidence and background to attempt synchronous classes from across the ocean (and from a time zone seven hours ahead of Duluth MN!).

My plan was to have my students attend class on campus at their regularly scheduled class time and place, and I would join them online from South Africa; I would use Adobe Connect so that they would be able see and hear me via webcam, and also see the PowerPoint slides that I had uploaded. A colleague on campus helped by setting up the podium computer in the classroom, connected to a projector and speakers. Although my teaching was primarily lecture based, I still engaged students by having them work together in small groups and then report to me using the microphone on the podium computer. This worked adequately, and the students were excited by the experience of learning from a teacher who wasn't even in the same time zone or country as them. If I had taught in this way for more than a couple of weeks I think the novelty would have quickly worn off because of my very limited repertoire of skills in teaching using Adobe Connect. What this experience did, however, both for my students and for me was help us to discover a whole new side of teaching that I hadn't previously considered -- namely synchronous online teaching.

When my department head asked if I would consider teaching one of my two class sections of my Teaching in a Diverse Society class entirely online, I agreed, provided that I could make this a hybrid online class using what I called a fully online hybrid model (FOHM) -- rather than the face-to-face hybrid model (FFHM) that I used for the second section of the class. What I proposed was that in the FOHM, the synchronous component would be in the form of an Adobe Connect online weekly class session, with the remainder of the course being fully online with students accessing learning resources and engaging asynchronously with each other using a variety of tools posted on my Moodle course site.

The synchronous session would be offered outside of the usual class schedule times, thus enabling students to take day and evening classes and also attend to family or work responsibilities before coming to class. Based on input from students I scheduled the synchronous class to run from 8:15 - 9:30 p.m. on Monday evenings. This time was advertised in the class schedule so that students would know when they signed up for the class that it was fully online but had a required synchronous component.

Design of the Moodle course site

The Moodle course site was laid out so that students could see exactly what was expected each week of the semester. The first week they were assigned different tasks to help them to learn their way around the course site. They were also required to engage in a variety of asynchronous activities designed to help them get to know one another, to build a sense of community, and to learn to use some of the key tools on the course site. During this first week I analyzed their responses to survey questions and their self-introductions (in their first Moodle online forum). I used what I learned about the students to put them into heterogeneous groups for upcoming synchronous and asynchronous

discussions and online group activities. They stayed in these same groups for the first half of the semester, and then a switched the groups for the second half.

The Moodle site was set up so that there was a separate section for each week of the course. Each section provided the following:

- What students should to do in preparation for the weekly synchronous class session: Required tasks varied each week, but typically included a combination of readings, watching online videos, listening to podcasts, taking part in online simulations, and reporting on observations or field-based activities at the students' practicum sites (in K-12 schools).
- Optional resources (for use both before and after the class session for enrichment)
- A link for students to access the synchronous Adobe Connect class session at the designated time. I recorded these weekly synchronous class sessions, and immediately after class I deleted the link to that week's class session and replaced it with a link to the recording of the class so that students could watch it later (for review or if they missed the class).
- Follow-up tasks to be completed after the synchronous session. These included asynchronous discussion forums in which I asked students to build on what we did during the class session as well as to synthesize what they had learned from their practicum, readings/viewing/listening, and their own personal experiences.

Figure 1. The screen shot below shows two of the weekly sections of the Moodle site with annotations describing key elements of the course:

The screenshot displays two weekly sections of a Moodle course. The first section is for the week of January 23 to January 29, titled "Week 2: What does it mean to teach in a 'diverse' society? What is 'culture'?". The second section is for the week of January 30 to February 5, titled "Week 3: Exploring underlying concepts: prejudice, privilege, achievement gap, social justice".

Annotations in red boxes describe key elements of the course:

- Before the synchronous class session students link to readings, videos, podcasts and other types of activities to prepare for class**: Points to the "Do in preparation for class on Monday" section of Week 2, which includes links to a TED talk, a video, and a video about Earth.
- After class students are assigned tasks that build on what we talked about in class and on earlier work**: Points to the "Do as a follow up to our Jan 23rd class" section of Week 2, which includes a task to analyze diversity in a 4100 class.
- Immediately after class each week I post a link to the recording of that week's Adobe Connect session**: Points to the "Link to recording of our UMConnect session from January 23rd" link at the top of Week 2.
- Links to resources that we use during the synchronous class session**: Points to the "In class resources" section of Week 3, which includes a graph of diversity survey results, a survey, and song lyrics.
- After the synchronous class session students participate in asynchronous discussion forums. They post initial responses by a set date, and then return to respond to the posts of their group members.**: Points to the "This week's discussion forums" section of Week 3, which includes a task to share photos and a discussion on concepts of culture, prejudice, privilege, social justice, and the achievement gap.

Design of the synchronous class sessions

In addition to being very intentional about building community and creating trust among the students and with me through the Moodle site activities, I also had to be sure to develop their skills and

confidence in using the synchronous online tools in Adobe Connect. To do this I created detailed guidelines with screen shots showing students how to access Adobe Connect, what each of the components is and what it does, how to respond in chat forums and polls, and how to use the emoticon tools to engage non-verbally in class (e.g. raising their hands, indicating agreement or disagreement, applauding, laughing, asking me to speed up or slow down, and letting others and me know if they had stepped away from their computer).

During the first synchronous class session I guided students in learning how to use each of the Adobe Connect tools, being playful in doing so (e.g. having them applaud me, laugh at me, and telling me to speed up/slow down) so as to develop their confidence and skills before moving on to the course content. Then each week, at the start of every class, I would always do a sound check, asking them to raise their hand if they could hear me. If students didn't raise their hands, I'd type in the chat window to ask them if they could hear. Thankfully students always could hear me - I didn't ever have any technical problems - so I didn't have to trouble shoot. However, I did have my phone number listed on the site so they could call me if they needed help.

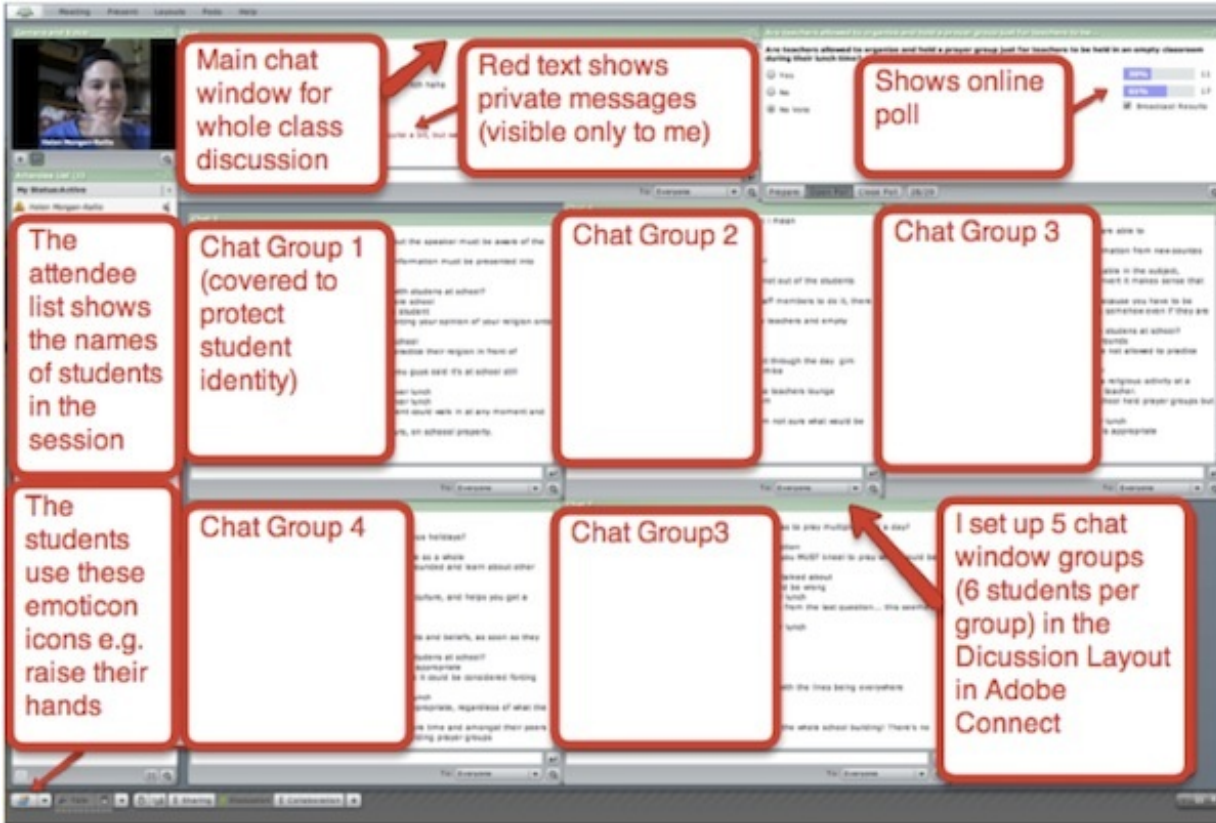
At the start of class each week, when students logged into the session, they would see a PowerPoint slide in the main window (called a pod) indicating the topic of the class, the agenda, and a "Do Now" task asking students to respond in the chat window to a question designed to get them thinking about the topic as well as engaging with each other before the formal start of class. I would be logged in so students could see me in the video pod and hear my voice. Once class started, I would "freeze" the video so all that showed was a still picture, but they could still hear me (I did this as we found that the sound quality was better if I didn't have the video running as well).

The purposes of the class sessions were for me to introduce new concepts, to frame the topic of the week and the tasks that students would do following class, and to have students begin to share their thoughts on that week's topic. I used a variety of strategies to do this, including:

- Providing short explanations of ideas and concepts using PowerPoint slides as a visuals
- Having students respond to polls soliciting their opinions or seeking to find out what they understood about questions I posed
- Getting students to share their thoughts in response to questions I posed (e.g. in response to work they had done in preparation for class, to what I shared using the PowerPoint, or to the poll results). Sometimes I had students respond in the main chat window – similar to having a large group discussion with a whole class. Other times I would divide them up into discussion groups, with each group having their own chat window so they could respond within their group. They could still see the responses posted in other groups, but for the duration of the discussion I asked them just to follow and participate in their own group discussion. I would then ask them to pause and take a set amount of time (usually 5 minutes) to read other groups' ideas. Then, using the main chat window, I'd ask for volunteers to share highlights of what they learned from reading other groups' discussions. Alternatively I might have them return to their base groups and follow-up with observations from what they noticed other groups had discussed.
- As students typed responses in the chat windows, I would sometimes comment as the discussions evolved. For example, "Thanks Jane for getting the discussion started. You raise a key point about.... I wonder what others think about this – if you had the same reaction as Jane or if you interpreted this in another way?" or "I am seeing a number of people who found... while others have suggested... What about ...?" I would encourage, redirect, paraphrase, and clarify as needed.
- I also used break-out sessions where students could see only their own group's chat responses. Sometimes I had them use the whiteboard tool within break-out sessions to draw a concept map

as a way of brainstorming ideas on a topic. When they returned from their break-out groups I would ask the group's appointed reporter to summarize key points their group had raised.

Figure 2. The screen shot below shows the discussion layout of the Adobe Connect "classroom":



- Findings and reflections on my experiences teaching using this fully online hybrid model:
- Students were very active in sharing ideas and questions with each other within their small-group chat windows. Although the nature of synchronous online chat limits the depth of these discussions, I found that these chats provided a valuable starting point to introduce a topic and give me the opportunity to clarify misconceptions. Students then followed up after class by engaging with their same small group members in much deeper, more thoughtful discussions within the asynchronous online discussion forums. The asynchronous discussions required them to synthesize what they had learned from their work in preparation for class, during the class, and as a result of follow-up tasks and practicum based assignments. This combination of synchronous and asynchronous discussion led to real depth of analysis, certainly equivalent to the quality of discussions from my face-to-face hybrid class.
- Interestingly, group work in chat groups enabled students to “hear” all voices in a way that is not possible in a face-to-face class discussion. In my face-to-face class (the other section of this same course), when I asked student to discuss the same kinds of questions with their groups, some students tended to dominate the discussion and others would not get a chance to share (or might be reluctant to do so). Online, however, students could all compose their thoughts at the same time after I posed the question. Usually there would be a minute or so where students would be typing and no posts would appear, and then responses would start appearing and the chat window would fill with ideas. I would give students time so that they could read and respond to each other’s comments. I would then ask students to take five minutes to read the discussions of all the other groups, looking for new insights, themes and commonalities. By contrast, in my other

section of this same class, which met face-to-face, after small groups discussed, I would ask for a reporter from the group to share key points from her/his group. Even though groups took notes and decided what they wanted the reporter to share, inevitably the reporter tended to give her/his own interpretation of the group discussion. While the face-to-face class sharing allowed the reporter to elaborate in detail, this approach to group reporting is more of a “dipstick sampling” of ideas. Online, by contrast, all students (and I) could read everything that everyone had said, without our access to what others said being filtered through a group’s reporter. I could then also ask all students to do the analysis of themes or highlights.

- Student feedback has been overwhelmingly positive about the FOHM approach that I have used in my online classes. In spring 2012, 25 of the 29 students completed an anonymous online survey asking for feedback on the course; of these, 23 responded that they would take a course like this again. In the open-ended responses about the course they reported that they much preferred having an online hybrid class to an online class with no synchronous meetings. They said that they liked having to attend class synchronously each week, as this helped them to feel more engaged, to feel like a member of the class, to keep on track and not fall behind, and to be able to receive immediate help and feedback. They also like the flexibility of being able to attend class from anywhere and not having to come to campus, especially if they lived far away or had family or job responsibilities.
- I still prefer to teach face-to-face hybrid courses rather than fully online hybrid courses, because of the personal connection with students in a face-to-face environment. However, I have found that I really enjoyed the fully online class too, and felt that I got to know my students quite well through our online interactions. I would feel a real sense of loss if I taught only fully online, but am happy to have this be a part of my teaching load.
- The most important finding in both semesters of teaching this fully online hybrid model at the same time as teaching a second section using a face-to-face hybrid model was that, according to my analysis of student grades, there was no apparent difference between FOHM and FFHM class sections in student performance in all formal measures of student work (Moodle asynchronous discussion posts, group course projects, individual final course projects, and final exam scores). Additionally, student evaluations of the course and of the instructor on the end-of-semester official university evaluation form were very similar for both the FOHM and FFHM sections.

Advice on teaching synchronously online

- When setting up the Adobe Connect session, have a task displayed on a PowerPoint slide (as a “do now”) to get students engaged right away as soon as they log in (even before you formally start class). This directs them to begin posting their response to the Do Now in the chat window while they wait for class to start.
- Start class by using the video pod so students can see you as you speak, giving a more “live” feel in order to engage students. Then freeze the video so there is just a still picture of you but keep the audio going, as this improves the sound quality for the students. If the class includes a student who is deaf and who uses a sign language interpreter, then the video pod can be used to show the interpreter. Although this does work, the quality of the video is such that it isn’t easy to clearly see the interpreter’s hand movements.
- It is really important to have students actively engaged throughout the class, rather than merely sitting passively listening to you and watching PowerPoint slides. Students reported that it was hard for them to concentrate for long periods of time if they just listened to me and watched the slides. If you want to give a lecture, record it and post it in Moodle as a video or podcast; otherwise post lecture notes (in place of the lecture) prior to class. This way students can

watch/listen/read these before class.

- When you do lecture, use the main screen with text slides to highlight key points and ideally also have engaging visuals. Change slides more often than you might normally in a face-to-face class so as to keep students' attention and focus. Also engage them by asking them to respond to what you are saying and to what you are showing them on the screen.
- Ask students to respond often through the class period, for example by raising their (virtual) hands, by indicating agreement or disagreement, responding to poll questions, sharing comments or reactions in the chat window, or going to a break-out session to engage privately with their group without others seeing their discussion.
- Create small group chat windows (in the discussion layout), with groups pre-determined. Post group member's names in each chat window so students know which group they are in. These small groups should be the same as the asynchronous discussion forum groups, so that students build trust in each other and also so they can continue to expand on their synchronous chat once they move to the asynchronous discussion after class. Change the groups every few weeks so students benefit from other perspectives.
- Have students use private messages if they want to ask each other questions and also if they want to tell you or ask you something in private. What I did when students sent me a private message or question was to share my response out loud to the class so long as it wasn't something personal and if it was of value to the whole class to hear my response. I'd preface my response with, "I'm responding to a question raised as a private message about..." In a case like that I never indicated who sent the message. If my response needed to be confidential, then I would type a private response to the student. When I did this I would say to the class, "Just give me a moment here, I'm typing a private response to someone. While I'm doing this, you can..." (I'd give them a task to do).
- Although you can give students the option of using the microphone to share their responses orally, I found that this was not worth doing, as students had problems getting their microphone to work and we wasted valuable class time trouble shooting while the rest of the class had to wait. Having students participate by typing responses seemed to work well and enabled a more equitable level of participation among students (particularly with a class size of around 30 students). I still gave students the option of using their microphones if they indicated to me (in the survey that I give out in the first week of class) that they would have difficulties for any reason in being able to type responses in the chat window.
- It is very important to practice ahead of time and acquire a level of comfort in using Adobe Connect (or in whatever synchronous conferencing tool you choose for your class). It is better to use fewer of the Adobe Connect tools until you become comfortable both with the tools and with the pedagogy involved in teaching synchronously. It is more effective to keep it simple, rather than to try be too ambitious and become overwhelmed so that you aren't able to have things work as they should. The good news is the technology in Adobe Connect usually works just fine. I have had hardly any problems as long as I have kept things simple and used only the tools that I am comfortable using. Usually the limiting factor is the instructor's skill in using the technology and in synchronous online pedagogy, and not the technology itself.

Hopes for the future

Teaching using a fully online hybrid approach to my courses has opened a whole new world of teaching and learning possibilities for me, and has been a revitalizing experience. I realize that I have just begun to scratch the surface of what is possible when I let go of the notion that my students and I have to be in the same place and/or always together at the same time. When we see beyond the physical confines of brick-and-mortar classrooms and beyond the constraints of real time, so many more learning opportunities are possible. I think about the richness and depth that could be brought to learning

experiences if we could have students in our classes not only from around our own country, but from around the world. We can also bring in guest speakers to our classes by phone, Skype, or other synchronous means from other places near and far. We can have students engage with these speakers in real time and have them post questions for the speakers on wikis or blogs, or engage with them in real time chat online. We can even have parts of courses – or even entire courses – taught by professors who live in another part of the country or world.

Also a wonderful dimension that is made possible is having the teacher be able to teach from locations other than on campus – whether that be from home, from travels around the country, or even from traveling around the world. For example, Donald Rallis, a geography professor from the University of Mary Washington in Virginia, teaches geography classes from around the world to his students in the USA. He takes his laptop and his web camera out onto the streets of Phnom Penh in Cambodia so that students in the synchronous component of his online course can see and hear what life is like there. They also look at this location in Google Earth and begin to pose questions about what intrigues them from all that they are seeing and hearing. Rallis teaches about the importance of location by pointing the camera out of his hotel window in Indonesia at the Strait of Malacca, so students can watch the shipping traffic on what is one of the most strategic shipping lanes in the world. He also makes short videos of scenes from this travels around the world and integrates these into his classes and also into his Regional Geography Blog (Rallis, 2011).

If we break down the walls of our classrooms and of our thinking even further, to go beyond the real world to the virtual world, even more becomes possible. In virtual worlds such as Second Life students can explore, learn about, and interact with others and the environment in simulations of real and imaginary places.

With the advances in technology the possibilities are endless, but what is so important is that we let go of seeing teaching and learning only in terms of the models used in the twentieth century. There is great value in the traditions of the past, but we can do so much more by also embracing emerging technologies to engage in truly transformative learning.

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Use of Screen Capture Technology To Record Student Presentations Promotes Active Learning in a Large Classroom

Kathryn Fryxell

Patricia Goodman-Mamula

Martin Wolf

Rebecca Merica

We have introduced student presentations into our curriculum using a screen capture technology, Camtasia Relay, in order to promote active learning in an undergraduate Microbiology class of 240 students. The use of this software was a novel approach to record student presentations since the majority of our students reported never having used screen capture technology. We challenged teams of four students to create an educational presentation on a specific topic in Microbiology knowing that their video may be chosen for viewing during class time. Since our course enrollment is large, it is logistically difficult to accommodate student presentations as a group activity. Screen capture technology enabled us to efficiently record and evaluate numerous group projects with the goal of selecting several representative videos as teaching tools. A majority of students reported that they were hopeful their presentation would be selected and shown in class. We believe this led to a sense of ownership, which improved the quality of the projects. Working in small groups, students engaged in active learning by using skills necessary for teamwork, communication, organization and technology.

In order to explore recording options, we contacted the Office of Information Technology (OIT) at the University of Minnesota, and found that the screen capture software, Camtasia Relay, was available to faculty and staff for teaching purposes. Camtasia Relay allows for audio capture synchronized to a PowerPoint presentation. We adopted this technology and had student groups use it to produce short educational digital presentations.

Since most of our students are pre-allied health professionals, we used this project to increase their knowledge of clinically relevant microorganisms and associated disease states. The students researched information on a given topic and used their basic knowledge of Microbiology to create a Camtasia Relay presentation. The instructors guided the students through the process of creating their videos, and a well-designed rubric defined the criteria for evaluation and scoring of the projects.

A significant challenge that we faced teaching a large class was the logistics of having small student groups create presentations. The laboratory component of the course was an ideal environment for this project since students work in small groups of four to conduct laboratory exercises. These same small groups were given a screen capture project to complete. Students were enrolled in one of three laboratory sessions, each consisting of approximately eighty students. Fifteen different microorganisms and associated disease states were assigned as topics. Each topic was worked on by four different small groups, which totaled sixty presentations.

Student groups were assigned a date to record their project in a quiet room using the instructor's computer. The groups were encouraged to have a script prepared and rehearsed for the audio portion of the presentation as well as having a completed PowerPoint file. Using a high quality microphone, students narrated their short presentations, which were five to seven minutes in length. The recording sessions involved all group members, with individual members reading portions of the script during the

screen capture by Camtasia Relay.

Projects were evaluated by a panel of instructors and graded based on adherence to the rubric guidelines. One video from each of the fifteen topics was chosen by instructor consensus and shown during each laboratory session. The videos stimulated group discussions, which were accompanied by a worksheet or quiz. By showing student presentations, we accomplished one of our teaching goals, which is to reinforce key Microbiology concepts. Many students reported that their understanding of clinically relevant microorganisms was enhanced upon completion of this project.

Screen capture technology, therefore, has been a natural fit as a way to record, evaluate, and present student projects in a large class.

We would advise instructors interested in conducting this type of activity to choose one reliable recording method. Initially, we gave students the option to record their project either in-class using Camtasia Relay, or on their own using a similar technology of their choice. Our intention was to provide not only flexibility to the students, but to also reduce in-class recording time. Many students reported that they preferred to record with the help of an instructor. This surprised us since we assumed most students would be familiar with various recording software. We also did not save time by having students record their presentations outside of class. Handling these separate projects required a significant amount of additional effort to process them. The Camtasia Relay software, provided by OIT, had its own set of limitations with recording, editing and uploading. An updated version of this software will soon be available for use, which we hope will resolve most of these issues. In the future, we will record all student presentations using a single type of screen capture technology installed on the instructor's computer.

While managing the technical challenges of this project, we were surprised to discover an advantage to having students meet with an instructor to record their projects in-class. Students benefited by having a chance to interact directly with the instructor. Since they had researched a topic, they were confident in discussing their assignment with the instructor. This provided an unforeseen opportunity for conversations with the students about an infectious disease and its importance in human health. We plan to dedicate more time to future recording sessions since students seemed to benefit from this interaction with the instructor.

We also advise instructors to provide an effective grading rubric, which clarifies project expectations and is essential to the success of student performance. When asked to comment on the usefulness of our grading rubric, students gave it high marks for its clear and well-defined instructions. We were pleased that most of the presentations were of high quality and that students had very few questions concerning the assignment. We attributed this to the completeness of the grading rubric. We plan to modify the rubric to include additional suggestions on how to create a video that not only meets certain criteria, but also is educational, insightful and interesting. We will remind students to direct their presentations to their target audience, their classmates, rather than the instructors.

We will continue to use screen capture technology to record small group presentations in order to promote active learning in our large class. Some future goals of this effort are to streamline the recording process and to interact more with the students during the preparation and recording of their presentations. Although, at present the incorporation of technology in the classroom is time consuming and not without pitfalls, if used appropriately, it can greatly enhance the student's learning experience.

We believe that the future for technology in the classroom is bright, and we plan to explore and incorporate various technologies into our curriculum.

Link 1: "Pelvic inflammatory disease caused by *Chlamydia trachomatis*"

Link 2: **"*Neisseria meningitidis*"**

<http://mediamill.cla.umn.edu/mediamill/embedqt/155449>

Grading Rubric for Student Presentations Spring 2012:

You will work in a small group to create a captured presentation that describes a disease caused by a microbial pathogen. Your group project will consist of Powerpoint slides that are captured along with narration.

You may choose to create an iMovie on your own computer, or you may sign up for a time to record your presentation using Camtasia software on the instructor's computer.

There are 20 points possible for this project, and each group member will receive the same number of points. Presentations that best depict a topic will be posted on the Moodle site and viewed by all students. Several in-lab pop quiz questions will be based on these selected presentations.

Accuracy (5 points)	<ul style="list-style-type: none">• Presentation includes title of project and names of team members.• Team provides an accurate explanation of key concepts.• Reference material, such as data or graphs, is correctly interpreted.• Legitimate references are cited on Powerpoint slides.• Terms are spelled correctly.
Completeness (5 points)	<p>Team covers all major aspects of the following key concepts:</p> <ul style="list-style-type: none">• Description of the disease and of the bacterial pathogen• Risk factors for acquiring the disease• Common scenario for infection (or presentation of case study)• Current methods for control and prevention of the disease• Future directions for control and prevention of the disease
Organization (5 points)	<ul style="list-style-type: none">• Team presents information in a logical and interesting sequence that can be easily followed and understood.• Content flows in a coherent manner that ties together key concepts.• Presentation reflects group's effort to work together.• Project meets time requirement of 5 to 7 minutes.• Team comes prepared to recording session with presentation on a flash drive and a printed copy of script.
Visual/Sound (5 points)	<ul style="list-style-type: none">• Team's graphics depict and explain written and verbal communications.• Speaker's voice is poised, articulate and confident.• Speaker has the proper volume and a steady rate.• Presentation has been rehearsed by all members and flows smoothly.• All terms are pronounced properly.

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Patricia Goodman-Mamula, PhD. is currently an instructor and laboratory coordinator for the Microbiology teaching laboratory (VBS 2032) at the University of Minnesota. She was an active participant in the implementation of this project and plans to continue support of this project in the future.

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CEHD iPad Project: Learning Anywhere, Anytime

Amanda Hane

<http://www.cehd.umn.edu/mobile/About.html>



The College of Education and Human Development (CEHD) within the University of Minnesota has the largest experiment for usefulness of the iPad by any college of education in the nation. Dean Jean Quam committed the college to a multi-year experiment by providing an iPad to all 450 incoming first-year students to CEHD beginning in Fall 2010. Nearly 30 faculty members in the Department of Postsecondary Teaching and Learning (PsTL) received iPads and training to integrate them into the first-year classes that new CEHD admits enroll in during the fall and spring semesters. David Arendale, Associate Professor of History, was one of these faculty members who integrated the iPad into his Global History and Culture course and the learning community called History Stories that linked his history course with one focused on international literature. As a graduate research assistant with a background in program evaluation and qualitative research methods, I worked with Dr. Arendale to analyze qualitative findings from a survey of students in his course about their experience with the iPad. This chapter presents an overview of Dr. Arendale's motivation for using the iPad, implementation of the iPad in his courses, evaluation methodology, and key findings from the study.

Why Interest in the iPad?

Dr. Arendale's interest in use of the iPad was an extension of his personal use of the device he purchased when they went on sale in April 2010. There were four features of the device that intrigued him in the six months before the iPad was used in his class.

- Due to its slim design and modest weight, mobility was a key feature. He uses it in different places: email reading from bed, access information while watching television, reading news

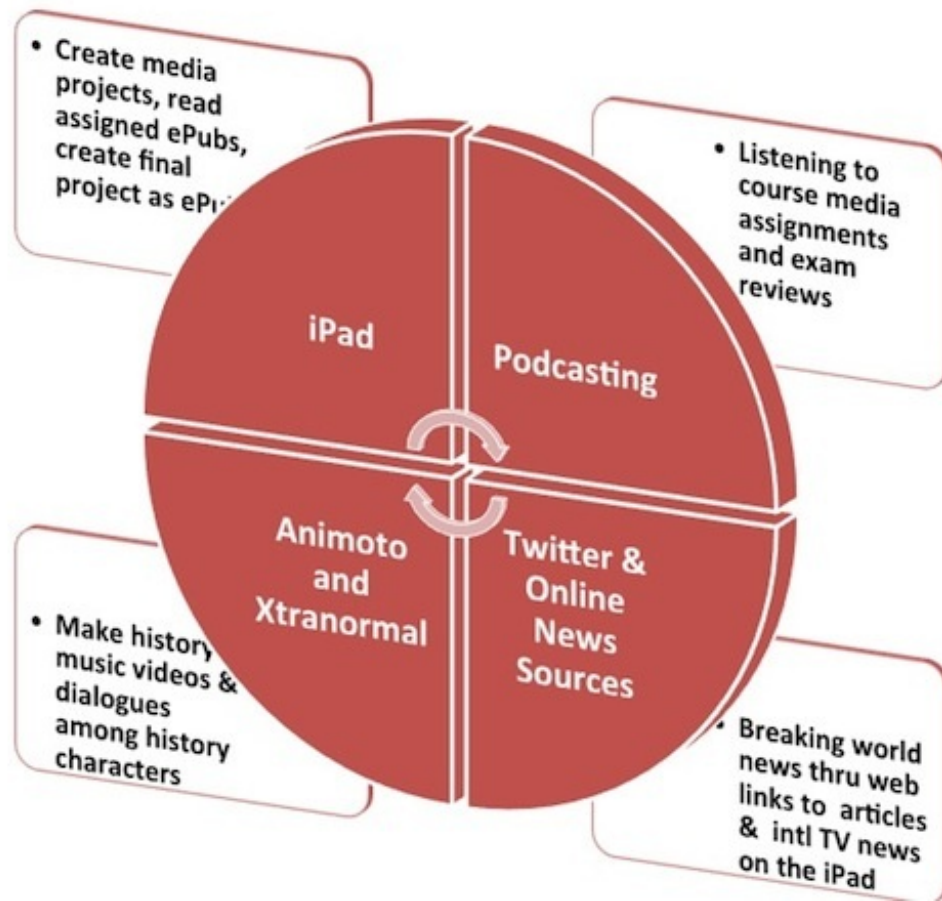
- publications in the living room, and catching up on personal reading from his front porch.
- For him, the touch screen with the iPad is an enjoyable way to interact with the device. This tactile interaction with the iPad is different from use of a traditional keyboard and a mouse.
 - Ease and enjoyment of reading has been increased since Arendale can use the touch screen easily with his fingers to enlarge the image or text to increase readability and focus attention. While the pinch and zoom feature is not available through all apps, nearly all of them allow easy increase or decrease of text size as well as changing the font and the background color of the publication.
 - With over 500,000 apps to select from, there is an app for nearly everything. The app store through Apple provides a very democratic way for people to widely share their work with others. Arendale created his own personal annotated guide to his favorite 300+ iPad apps, <http://z.umn.edu/davidipadapps>

Integrating the iPad into the History Course

The iPads were distributed to the CEHD entering students in early Fall 2010. The PsTL faculty had received their iPads in summer 2010. The Fall 2010 academic term was designated as a time for students and faculty members to experiment with the devices for personal and academic purposes. Some students used them for Facebook and other forms of social media. In addition, some began to use them for class session note taking and accessing resources from the Moodle and WebVista course management systems. Faculty experimented with displaying web pages accessed through the iPad, presented their slide shows using the Apple Keynote software program, and accessed audio and video programs that were displayed using the video projection systems in the classrooms.

The first priority for Arendale was to replace the traditional expensive paper textbook with PDF documents using the GoodReader app, which allowed students to manage and annotate articles and is also accessible without a WiFi connection. This allowed him to significantly reduce the cost for the students. The iPad also expanded his horizons for new audio, video, and print materials for the students to review for in class discussions. Students were able to access media related to current events through the New York Times, BBC, France 24, and Al Jazeera TV apps. These strategies were a modified version of “inverting” the class so that students prepared for class sessions with a larger portion of class time devoted to guided discussions and activities to apply the material. Eventually other social media channels and small group media projects were integrated into the class, illustrated with the following graphic.

More information about how he is transforming his class sessions is available through his personal web site <http://arendale.org>, and he can be contacted via email at arendale@umn.edu



Successes and Surprises

At the end of the spring semester, Arendale distributed surveys designed by the CEHD iPad Project team to his students in his Global History and Culture Course. The surveys consisted of both forced-choice and open-ended items related to students' usage and views of the iPad during the academic year. The four open-ended items were the focus of the present study, which were coded by Arendale and his graduate research assistant using an inductive analysis scheme for qualitative data. Twenty-five students were enrolled in the course: 15 females and 10 males. Four were recent immigrants from East Asia, two were immigrants from Southeast Asia, and one from Euroasia. The remaining 17 were of European ancestry but not recent immigrants. Data was collected from 19 of the 25 students enrolled in the course.

Dr. Arendale and I engaged in a qualitative analysis of student responses to the open-ended items on the survey. Because of Dr. Arendale's interest in technology and investment in incorporating the iPad into his courses, I believe it was useful to have a second researcher who had not directly observed the use of the iPad in the classroom to provide an outside perspective on the results. Accordingly, the analysis revealed several positive themes regarding the student experience with the iPads, but a few unanticipated ones emerged. Whereas the complete results of the qualitative study will be reported in a separate publication, one theme will be analyzed for this chapter.

Distraction resulting from the iPad emerged as a salient theme for many of the respondents. 80% of respondents described the iPad as "distracting" or "somewhat distracting" in the classroom, or in group or individual work, with 20% reporting that it was "not distracting" (see Table 1). For example, one participant responded, "It actually was a distraction to a certain extent. There are a lot of games (free too) that you can download for iPad, so me and most classmates would just use it as one big toy sometimes."

Students most frequently reported using the iPad as a distraction during classroom lectures. One respondent noted that the iPad was “very distracting. I would rather play the games on my iPad than listen to lectures, and sometimes I did just that.” However, students also found the iPad to be a source of distraction outside of class. Another respondent stated that because he/she could not do work on the iPad due to its limited word processing capabilities, “it helps me procrastinate [instead].” For other respondents, the iPad did not individually sidetrack them, but other students’ use of the technology for non-academic reasons could prove distracting. One student noted that it was “Somewhat [distracting], because some students play games or Facebook during class.” Another respondent described how it could be distracting during group-work activities. “I know it was a distraction for others. Sometimes frustrating in group work situations.” The availability of free apps, in addition to easy access to the internet, appeared to divert attention for many of the students in the sample.

Table 1. Frequency of responses to item measuring the extent to which the iPad is distracting

Response	Frequency	Percentage
Distracting	6	40%
Somewhat distracting	6	40%
Not distracting	3	20%

Implications and Vision for Future Uses with Students

Using the iPads for more student collaboration and production of media is a priority in Arendale’s history class. The most frequent uses of the iPads by students have been reviewing assigned readings and media, taking lecture notes, accessing current events through international news venues, and creating history music videos and interviews. However, with these innovative uses can come downsides of integrating new technology into the classroom, such as added distractions for students. Although distraction is not a recent trend among post-secondary students, technology can provide a new, easy and engaging target for students’ attention.

These findings also have key implications for classroom management in post-secondary settings, as researchers and practitioners explore ways to maximize utility of the device while minimizing distraction. Possible strategies might include guidelines or open discussion with students of appropriate technology use in the classroom, greater monitoring of device use, or setting aside specific times during class sessions where iPads or laptops are not used.

For Arendale, the next stage is to have students collaborate with each other through Google documents. Some colleagues in PsTL have experimented with students working in small groups to edit online documents and share those with the entire class. He and I continue to work on evaluating the student experience with the iPad in his courses as faculty become more familiar with the device and find new and innovative ways to incorporate them into their classes. This study also suggests the value of including faculty, staff and researchers directly involved in the project, as well as outside evaluators or stakeholders in research on technology in the classroom. The iPad has great opportunity to move beyond its typical use as a media consumption device into a knowledge generation venue with the built-in camera and even more powerful and featured iPads. That has the potential to transform the student learning experience.

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Creating Productive Presence: A Narrative

Bill West

Seven years ago, the Department of Rhetoric (now Writing Studies) and the School of Nursing collaboratively created an online class. It was an adaptation of a course on Technical Writing that focused on the genres of communication in nursing using medical content. The decision to create the course completely online was made for two reasons. Students were on two separate campuses (Minneapolis and Rochester) and the students fit a profile for successful online learning. We had conducted a study to find if there were differences between traditional classroom students and online students. We also wanted to explore learning styles that led to success in the online environment. There were no significant demographic differences between the two groups. Old assumptions about distance learning were not verified. The students were not older, and were not employed full time. We asked them to supply us with zip codes. With the exception of one student serving in Bagdad, none were distant. Students who thrive in the online classroom tend to do better than their traditional counterparts and also tend towards a semi-independent cognitive learning style.

As predicted, the nursing students performed very well in the class. It was a writing intensive course with major assignments due each week. Papers were returned with comments and suggestions. They could not be re-submitted for a change in grade, but more often than not, changes were made and suggestions acted upon and the papers were re-submitted anyway. (The resubmission rate varied from 10-35%.) There were up to 80 students in the class and interaction with the instructor was done via email. The first time the class was offered, we noticed frequent and odd email styles. Some of the emails were written all in caps, others seemed to demand immediate response to a question. We called some of the students and asked if they meant their emails to come across as angry and demanding. They sincerely said that that was not their intention. We looked to the online environment for an explanation. The online classroom lacks the subtle cues of tone, inflection and intent. Emoticons, in other online contexts, were developed to fill this gap. We realized that without the signals and human cues, the students couldn't fully read the intent or interpret cues. Presence had to be established, but there was a confounding factor.

In the traditional classroom instructors are constantly giving subtle cues about what is or is not important in the textbook and other readings. Absent these cues, the student, particularly a motivated one, might read the entire textbook and determine what is important. Students doing better in online classes may be a function of teachers not getting in the way of a motivated and semi-independent student. The trick would be to create presence without thwarting this potential benefit.

The course was designed to take advantage of online features. It was not text heavy; it provided the information that was needed to do a task at the point that it was needed. Robust interactive features were built in, so that some exercises were instructive games. The assignments built on one another. A proposal defining a disease process that the student wanted to research was addressed to the instructor. An online presentation that created the major paper's outline in power point had other nursing students as the audience. The major paper was to be written for a nursing instructor who specialized in the field of the disease process. The final assignment was to design a brochure providing the information a newly diagnosed patient suffering from the researched disease process would need to know in a manner they could absorb. A sophisticated animation was provided prior to

this last assignment. It illustrated the month of anguish of a newly diagnosed HIV patient before he stumbled upon the one thing he needed to know immediately after diagnosis: where to find a support group.

Early each semester the class was offered, a student envoy would contact me and ask for a face to face meeting to discuss a problem she was experiencing in the class. Each time an envoy visited it became apparent that the 'problem' was an excuse to meet and judge what I was like. The students were placed in editing discussion groups where they peer reviewed each other's papers. Invariably, when I would review the discussion groups, I would find comments passed on through the envoy that described me in general beneficent terms: "He doesn't seem so bad."

A variety of techniques were employed to provide the presence in the class that would make an envoy's trip unnecessary. Weekly postings to the class discussing upcoming assignments and general news were instituted. Student evaluation comments indicated that these posts were viewed as hovering: a presence that repeated an already available schedule. Extra online office hours were added as well as extended regular office hours. Three Breeze presentations were added to supplement the material on APA citation and to add an actual voice to the classroom. The envoys continued to visit.

At this point we convened a focus group of interested students. They told us what they liked and what they found wanting in online classes. They valued the liberty of asynchronous work, but found available instructor advice advantageous. While they valued comments on their work, they valued independence even more. Because the students were a cohort, knowing each other from several other common classes, they did not feel the need for community building online. They thought that online classes were the future especially as they pursued continuing education credits throughout their careers. While focused on the future, nostalgia for traditional classrooms emerged.

I put on a suit and tie and had two traditional lectures in a classroom-like setting videotaped. Both were on topics that I knew were new to the students. One was on evaluating health care websites for future patients. The second was on health literacy: how to determine it in a patient and how to compensate for critical drops in ability to understand at time of diagnosis. The style of the videos was direct lacking even titles. The visits from the envoys stopped when these videos were added to the class. The presence that they needed was the one they felt they were losing to progress.

Presence is more than showing up. It is a complex term. Given that presence can both help and harm, it is important for each class and student audience type to determine what they need rather than what theory dictates they should have. A case in point can be found in the online version of WRIT 3562W Technical and Professional Writing course. One of the most difficult issues in online teaching is identifying and helping the number of students who stop participating in the class. Sending these students emails reminding them that they were still in the class and needed to participate had not proven to be effective. After interviewing several of these students, two things became apparent. First, students simply forgot about the class. Secondly, they overestimated their ability to catch up which only increased the time before attempting to complete overdue assignments.

Two online sections of WRIT3562 were selected for a pilot to address this errant audience. After an initial adjustment period of two weeks when students had accommodated to the online environment, those students who missed assignments by 48 hours received an email. They were informed of their current grade and the date by which they would lose even partial credit for the assignment and what their current grade would be at that time. When contacted, students reported that this was helpful and motivational. However, at the end of the semester there was no significant improvement in dropout rates or failed grades. Five students were briefly interviewed. All but one acknowledged that the email

alerts were initially helpful. There was a point when the alerts induced a sense that trying to catch up and stay in the class was simply overwhelming. Three students reported being embarrassed when reminded that they were behind schedule. More interviews are planned to try to identify the tripping point between helpful and hindering. It is worth pursuing this vexing problem because more than a nostalgic presence is needed for these students. We are discussing a hypothesis that a simple app could be devised to alert students via Facebook when assignments were missed. At the same time students would receive information on their current grade in the course and the predicted grade if the missing assignments were not turned in by a certain date. If the time of hyper-presence can be determined followed by alternate presence interventions and if the results can be replicated, then we would have a marketable app for various classroom platforms. An app would automate instructor presence thus avoiding student embarrassment.

The two problems addressed in this chapter each resulted in a technological approach to presence. Unlike the traditional classroom, online instructors can project multiple presences to different needs of different subgroups in the class. We anticipate that as we identify these distinct presences we will more exactly define the online classroom identifying needs that can be met with socialized technology.

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Pedometers and Paragraphs and Social Online Writing Networks

Joe Moses

<https://moodle2.umn.edu/course/view.php?id=5169>

The skill of writing is to create a context in which other people can think.

~Edwin Schlossberg

When we consider the meager affordances of the writing classroom versus the complexity of the tasks we ask students to perform while confined there, we might marvel at how low we have been willing to set our sights on behalf of innovative environments for students of writing. When we determined that writing is a social act and sought to reflect that reality in our writing classrooms, we arranged students in circles. In light of a conviction about the power of social forums for writing, and with steadfast determination to infuse college writing with transformative experiences founded on principles of social-epistemic rhetoric, we resolved to move the furniture.

Challenges to the reign of the traditional classroom and its hierarchies of time and space are important for what they can bring to debates about the value of social media, for example, to teaching and learning. They lead to smart classrooms, with their powers of connectivity and visualization and responsiveness. All are steps in the direction of reformation, but in the interregnum before who-knows-what shakes out as a new instructional paradigm, students already have connectivity enough in each of their mobile devices and tablets and laptops to be productive on their own time in environments that may easily be more supportive of their work than a classroom. From within a complex of social relationships we have yet to mine for instructional treasure, students educated in where to look and what to ask can give expression to their developing identities, their knowledge, assumptions, and beliefs—to interrogate who they are and what they know—without traditional interventions doled out to everyone at once in short classroom spurts. We don't yet know what configurations of time and space best support student achievement in writing.

This short chapter asks how social online writing network (SOWN) designs that include project-management tools to compensate for lapses in traditional classroom instruction can improve the timely completion and quality of students' writing projects. In response to the editors of this collection who have asked for stories, I tell three that overlap in time during spring semester of 2012 and conclude with directions for research on the impacts of SOWN designs on teaching and learning.

Paragraphs: writing in the presence of others

In January of 2012, the Center for Writing at the University of Minnesota sponsors a hunker in which a dozen faculty and staff from across the university convene daily for a week to work on individual writing projects during the break between semesters. (To hunker: committing to meet with others for fixed periods of time dedicated solely to writing). A dozen or so people sit at conference tables in front of laptops and tablets, paging through notes and books, typing, staring at screens and, occasionally, out through the twelfth-floor windows of Heller Hall overlooking the Mississippi River, downtown Minneapolis, and points west.

The rules of hunkering are few. Participants agree to show up, talk about writing during AM and lunchtime sessions, and work on writing projects for three-hour chunks in between. Productivity varies but it doesn't matter. We're writing. We're working away from office phones and other distractions. And

we're not writing alone. Unable even to distract ourselves without breaking the tacit pledge to write, we have few choices but to create text (I don't assume all writers approach their writing on the lookout for reasons not to write, but one history professor did confess that during writing time alone at home the spice collection has several times been carefully alphabetized).

Social Online Writing Network Design

During a break between writing sessions, Colleen Manchester, Assistant Professor and honors faculty representative in the Carlson School of Management, discusses a problem common to her honors students: they have a hard time staying motivated to work on their lengthy thesis-writing projects.

Students convene for an 8-week spring-term session in their junior year and a second 8-week spring-term session a year later, and in the interim they are to make progress on their honors research. But they have difficulty taking advantage of the time they have between terms: too many distractions or not enough direction, but certainly (according to informal surveys of junior and senior cohorts) not enough motivation for most students to return to the hard work of research and writing between sessions without some kind of near-term payoff.

Pedometers: setting goals, tracking progress

Meanwhile, the University's Wellness Program kicks off. It's an ambitious campaign designed to get University employees to exercise by offering incentives. Participants earn points for walking, biking, visiting the gym, not smoking, managing diet and weight loss, having cholesterol checked, and lots more. And when participants reach program goals, they save money on next year's health insurance premiums.

In addition to incentives, the program provides ways to set goals and track progress. When commuters ride their bikes by one of the designated spots on campus, an antenna identifies the radio-frequency tag glued between spokes and sounds a feedback beep, and online daily mileage is recorded along with calories burned (the system is not intrusive enough to know where participants have been or where they're going—everyone enters a mileage estimate between home and campus when they register for the program).

My pedometer arrives in the mail and the Step-It-Up program literature says a good goal is walking 10,000 steps. After a few weeks I'm finding ways to reach 10,000 several days per week (at two steps per second, 10,000 steps is eighty-three minutes of walking). Like others, I find that exercise is more palatable when it kills at least two birds, so taking the dog on longer walks has become easier. On occasion we get back to the front door and find I'm in the 9,000-step range, so I walk around the block again. Being rewarded for doing what I already do but better feels perfectly satisfying.

SOWN design for honors thesis writers

Given my interest in online writing instruction and the impact of incentives on teaching and learning, and given Colleen's interest in supporting her students throughout their eighteen-month research process even when she cannot be available to them, we have been working together to create a social online writing network designed to help students on their thesis-writing process. Partnering to devise site architecture and to study the impact of SOWN environments is University of Minnesota Writing Studies Professor Ann Hill Duin. Our work is supported by instructional development funding from the Carlson School of Management.

These are the three primary goals of SOWN designs for the Carlson honors thesis students:

1. To capitalize on the integration of social media in the lives of students by connecting thesis-

writers during the research and writing processes in order to advance progress on their relatively solitary pursuits. Our experience with hunkering has convinced us that social commitments among writers can be powerful incentives to productivity.

2. To provide project-management tools that track student's individual progress in order to provide near-term goals that motivate. Project management of writing tasks is an unexplored area of scholarship that can be explored thanks to efficiencies of learning analytics. If counting steps and tracking daily progress helps exercise the body, how can similar tools be employed to exercise the mind?
3. To network students with resources that help students address problems they face in the writing and research process. How can online social networks impact writing support by and for students?

Course-specific goals, purposes, and metrics derived from existing thesis-writing course design give us project management milestones (progress) and benchmarks (standards of achievement) to use as motivational tools for students.

The first SOWN website will launch in the fall of 2012. Metrics for measuring impact include administrative data on retention rates, third-party assessment of thesis quality in terms of meeting University Honors Program and Carlson learning outcomes, and self-reported quality of honors thesis experience and time use by students.

Why SOWN designs are worth launching and evaluating

The Committee on Best Practices for Online Writing Instruction (Beth Hewett, Co-Chair and NCTE Professional Development Consultant, Scott Warnock, Co-Chair) determined that what students like least about online writing instruction is the struggle to maintain on their own a desire to progress while engaging in online courses (10). As more courses come online, course-specific and assignment-specific tools will be needed to address the motivational need.

Engaging with others throughout the university to deepen an understanding of challenges that undermine faculty support for high-value writing-based projects expands our understanding of the promise and limitations of mediated instruction and student engagement with it.

By trying to address two issues of concern to departments and the wider University—student retention and timely completion of degrees—SOWN designs aim to support institution-wide efforts to infuse writing into the curriculum by providing support to instructors and models for increasing student motivation without increased commitments from faculty. Student support comes from a structured network of peers working in parallel on writing projects and using a familiar tool—social networking—to manage projects.

The impact of technology-mediated writing environments on student productivity have been explored—the use of pseudonyms as a factor in predicting the quantity of written work produced by students (Miyazoe and Anderson) being one case; SOWN design builds on that work by focusing on an unstudied affordance of social media: its potential for supporting productivity on specific writing projects. In an accessible SOWN environment students can locate themselves in relation to each other, to tasks completed, to tasks yet to be completed, and to achievement—all goals derived from recent theorizing about the metaphors we use to describe our relationship to the internet (Gordon 2007, 2011) and what Eric Gordon calls users' impulses to locate themselves in relation to others ("Mapping" 886).

In sum, SOWN designs hope to create project-specific social online writing environments that support timely completion of high-quality writing projects. Its project orientation gives emphasis to discrete

tasks of a writing process designed by course instructors; its social dimensions extend classroom benefits of collaboration, conversation, and peer review, among others, by providing an online environment, using Moodle content management, in which those activities may take place when needed, not only when scheduled.

Research directions

- We intend to measure the impact of SOWN designs on course-level and college-level achievement:
- How can college writers benefit from project management and peer support throughout their college years?
- How might online support and training benefits accrue to the faculty, graduate students, and P&A staff who teach the dozens of sections of university writing each semester?
- How can applications of SOWN designs in graduate courses support improvement of writing skills among graduate students?
- How can SOWN designs support high-value but time-intensive capstone, senior thesis, and other writing projects in part by enabling students to support each other, track their own progress, and self-motivate, thus reducing some of the need for faculty supervision.
- How can writing-specific learning analytics be devised for determining student achievement and effective interventions throughout their college careers?

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The Survey Research Project: Technology and Research with Introductory Level Undergraduates

Tabitha Grier-Reed

Emily Karp

Introduction

The Survey Research Project was prompted by a conundrum in which the first author, Dr. Grier-Reed, was challenged to develop pedagogical practices that allowed students in an introductory psychology course to create knowledge. She brought her dilemma to the inaugural College of Education and Human Development (CEHD) Treks program summer 2010 to see what answers technology could provide. Treks is a professional development program that occurs over one week in the summer to assist instructors with exploring and utilizing academic technologies. During Treks, Dr. Grier-Reed was introduced to many tools and academic technology specialists. This combination of people and technology resources formed a space of generativity, creativity, innovation, and discovery.

Project Development

In exploring the processes of knowledge creation, Dr. Grier-Reed and an IT Fellow honed in on the survey--the coin of the realm in social science research. The accompanying technology tool was an electronic survey program developed by CEHD. The CEHD Survey Tool meets the data security requirements at the University of Minnesota, and it is an easily programmable, efficient, online mechanism for developing surveys and collecting and storing data. With the research tool and the technology in place, the pedagogy began to take shape. All of sudden students conducting original research in a class of up to 60 people seemed possible. There was a means for reviewing, editing, activating, deactivating, and deleting students' electronic surveys. Utilizing the CEHD Survey Tool, Dr. Grier-Reed could securely collect, store, and destroy data across classes. Moreover, using an online survey would eliminate error associated with time-consuming tasks like entering data in Excel from paper instruments. With the CEHD Survey Tool, survey respondents would enter their own data which would be easily retrievable and compatible with Excel.

In Dr. Grier-Reed's introductory psychology class, students would engage in knowledge production through original research based in survey methods using the CEHD Survey Tool. From the act of generating a research question, to the culmination of generating a scientific report, students would gain intimate familiarity with one of the most common methodologies of social science research. The next question was how to make this project manageable across the 120 students enrolling in the two course offerings in the fall. Reviewing, editing, and keeping track of 120 surveys would be overwhelming, especially given the fact that many students enter the class having no background in psychology or research.

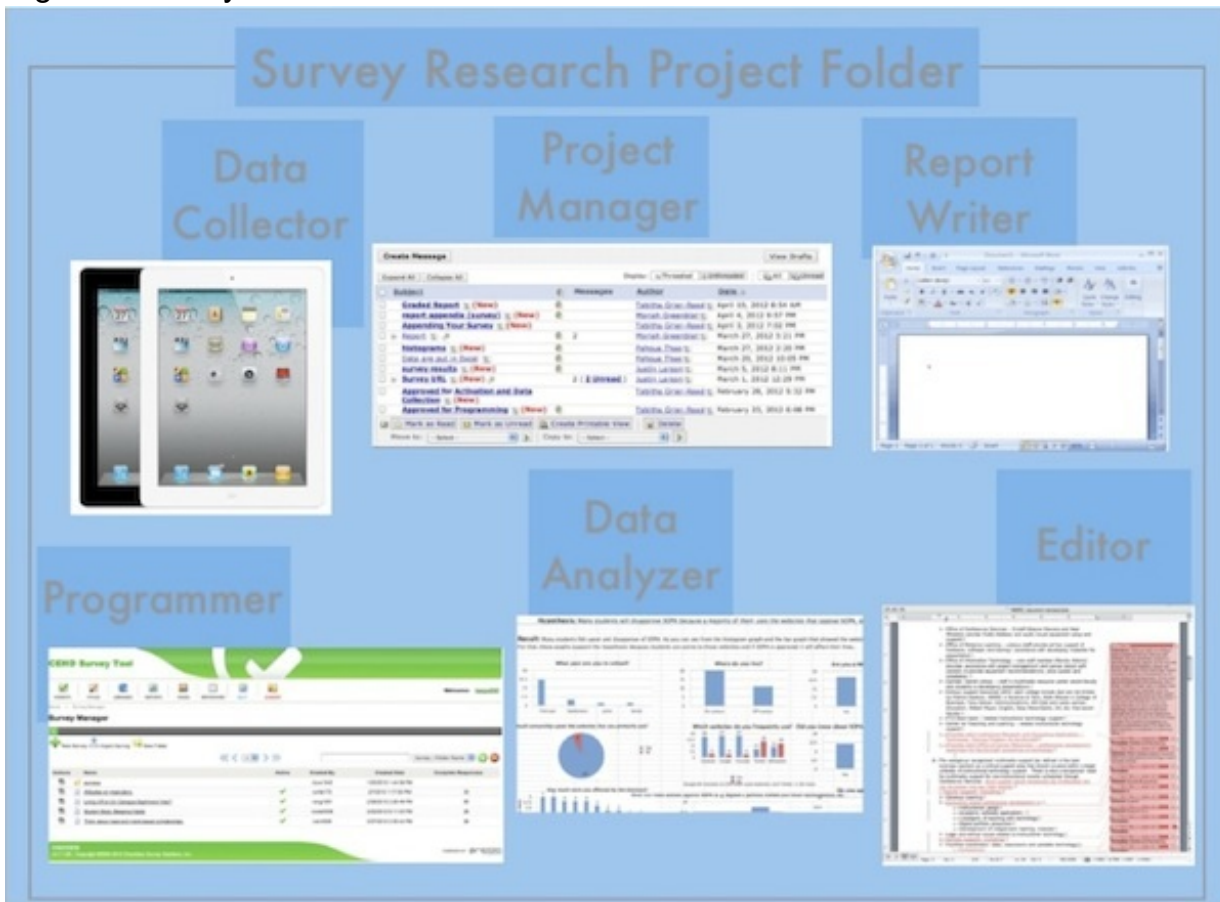
To make the project meaningful and manageable, Dr. Grier-Reed and an IT Fellow worked together to design research teams. Group work offered an efficient pedagogy to make the number of products (e.g., surveys and research reports) manageable. Group work also provided opportunities to develop 21st century skills associated with communication, collaboration, and functioning effectively as part of a team. To construct the student research teams, Dr. Grier-Reed and the IT Fellow first outlined the following research process:

1. Generate a research question and hypothesis
2. Develop a survey instrument to test the hypothesis
3. Program the survey into the CEHD Survey Tool
4. Collect data
5. Analyze data
6. Write a report

Then, Dr. Grier-Reed and the IT Fellow further developed the assignment by identifying roles for students on the research team including: Project Manager (originally called Liaison), Programmer, Data Collector, Analyst, Report Writer, and Editor. Grading was scaffolded so that teams earned points as they progressed along the research process. Grades also included an individual component, where students were evaluated on their ability to effectively perform their role. The roles and responsibilities were clearly defined for each research team member.

For the course website, the IT Fellow designed an electronic Survey Research Folder to contain instruction guides. The Survey Research Folder contained individual folders with instruction guides for editors, report writers, analysts, data collectors, programmers, and project managers.

Figure 1. Survey Research Folder



For the Programmer's Folder, the IT Fellow created a guide for programming surveys in the CEHD Survey Tool. For the Analyst Folder, Dr. Grier-Reed created a guide explaining how to calculate descriptive statistics, histograms, pie charts, and graphs using Excel. She also developed guides for the Report Writer's Folder, including guidelines for writing important sections of scientific reports (e.g., introduction, methods, results, and discussion). The Data Collector's Folder contained the Informed Consent Template. To help team members communicate, the IT Fellow developed the Virtual Workroom which served as a discussion room in the Survey Research Folder where students could brainstorm

and share ideas.

Project Implementation and Evolution

During the summer Treks program Dr. Grier-Reed developed the foundation of the Survey Research Project, and experience implementing it in her classes has helped her improve it. For instance, in the first semester of implementation she discovered that there were other basic technology tools like Track Changes in Word that students were not necessarily familiar with but that greatly improved efficiency in the process of revision. Today she provides students in her classes with guides for how to use Track Changes in the Editor's Folder. She has also added a Guide to Peer Review to help students more effectively edit. As it turns out, this editor's guide could very well be a general guide for how to read and review any research article. Dr. Grier-Reed has also revised the Analyst's Guide. A surprising revelation was that Analysts didn't necessarily have a natural inclination to review their research question and hypothesis before engaging in data analysis. In turn, Dr. Grier-Reed amended the Analyst Guide to include guidelines for how to approach (i.e., think about) data before calculating statistics. This included questions to ask and items to highlight before one begins the process of analysis in Excel.

Further revisions have included changing the role originally labelled as Liaison to Project Manager. Despite having the responsibilities outlined, students didn't know what a Liaison was. Having a clearly defined leader called a Project Manager helped students better self-select for the role and provide the leadership needed on each research team. The Project Manager's primary responsibilities are to help the team meet deadlines and ensure that all research approvals are in place before the team proceeds to the next phase of the research process. Today, Dr. Grier-Reed further supports Project Managers with a checklist that contains all the necessary approvals and project deadlines in the research process. This is located in the Project Manager's Folder.

At this point Dr. Grier-Reed has also eliminated all paper assignments associated with the Survey Research Project, and now uses the Virtual Workroom only. The Virtual Workroom has turned out to be a very efficient way of receiving assignments and providing feedback to research teams. Given that all communications are time stamped and individually identifiable, the Virtual Workroom provides a reliable way to track deadlines and individual students' engagement in the project.

Honestly, the success of this project has been surprising. Across all classes, students have been able to complete the project, conducting original research, writing scientific reports, and creating knowledge as part of reasonably effective research teams. It is clear now how this project engages students in unique aspects of knowledge production by capitalizing on their innate curiosity and perspective to hone in on a research question, develop a hypothesis, and then test it out using the scientific method.

The Survey Research Project intimately engages students with the possibilities, as well as the limitations and heartbreak, of survey research. Right from the start many students get excited about their research questions. Some of the questions are more appropriate for experimental research than survey research. Students must then go back and revise and resubmit—a process academicians are intimately familiar with. Students can also experience the pain of having to throw out data, if, for instance, they have inadvertently collected data from a number of 17 year-olds who can't provide consent despite having signed the informed consent form. And, of course, many students learn the importance of wording a survey question or answer choice clearly, especially when frustrated and trying to make sense of their results. In short, the Survey Research Project utilizes the active learning paradigm to teach students about the research process in a way that only reading about it can not.

Moreover, students develop technological and scientific literacy. As this project has continued, more emphasis has been placed on scientific literacy. Common errors in scientific reports include colloquial

references to correlations in the absence of any reported correlation statistic or students claiming to sample “random” people without actually employing random sampling techniques. These observations are presenting additional teachable moments, and today there are self-check questions in the Report Writer’s Guide to reduce these types of errors.

In fact, students are generating such interesting and quality research projects that the opportunity to present and publish their work is much more of a consideration than when the project was originally conceived. Currently, the institutional review board stipulates that the research is conducted solely for completing course credit and that results will not be published or made available in public reports. In the future this may change, particularly as iPads and other mobile technologies provide students with more freedom to get in the field and survey their subjects. With 2010-2012 CEHD iPad initiatives mobile technologies have greatly improved the Survey Research Project.

Inclusion of iPads

When this project began, students could only post their survey urls to the course website for their classmates. However, in the second semester of the project, CEHD students and faculty were given iPads to enhance the use of instructional technologies. Due to this CEHD iPad Initiative, students have moved out into the field to collect data for the Survey Research Project, where they can now personally provide informed consent and survey their research subjects. This expanded access has also expanded the array of research questions they can pose as they can now survey faculty, staff, and any other adults capable of providing informed consent and interested in participating in their study.

The use of mobile technologies has not only expanded the kinds of research questions students are posing, it has also facilitated increased ownership in the project. We have mentioned a number of surprises, but one major surprise is how much students seem to enjoy and take ownership of the Survey Research Project. They research a variety of fascinating topics ranging from whether scholarships should be based on merit or need to whether college students’ perceptions of romantic relationships seem to vary based on whether their parents are married or not.

Conclusion

All the ways technology has intersected to make the Survey Research Project possible is somewhat surprising—from the CEHD Survey Tool to iPads to more basic technology applications like Word Track Changes, a course website, Excel, and the Virtual Workroom. Creative use of technology has made possible pedagogical practices that allow 1st-year college students to create knowledge in moderately sized 60 person introductory level psychology courses. What may be most surprising is that neither of the authors are “techy”! When Dr. Grier-Reed shared this with one of the academic technology staff during the Treks training, the technologist stated that in her experience openness seemed to be the most important factor in whether and how people integrate technology in the classroom. In that vein our advice to others is to be open! Good pedagogy can drive technology, and technology can also drive good pedagogy. In our journey with the Survey Research Project we have experienced both.

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Finding NILMO: Integrating Curricular Development, Technology and Educational Research

Amy J. Prunuske
Jacob P. Prunuske

Introduction

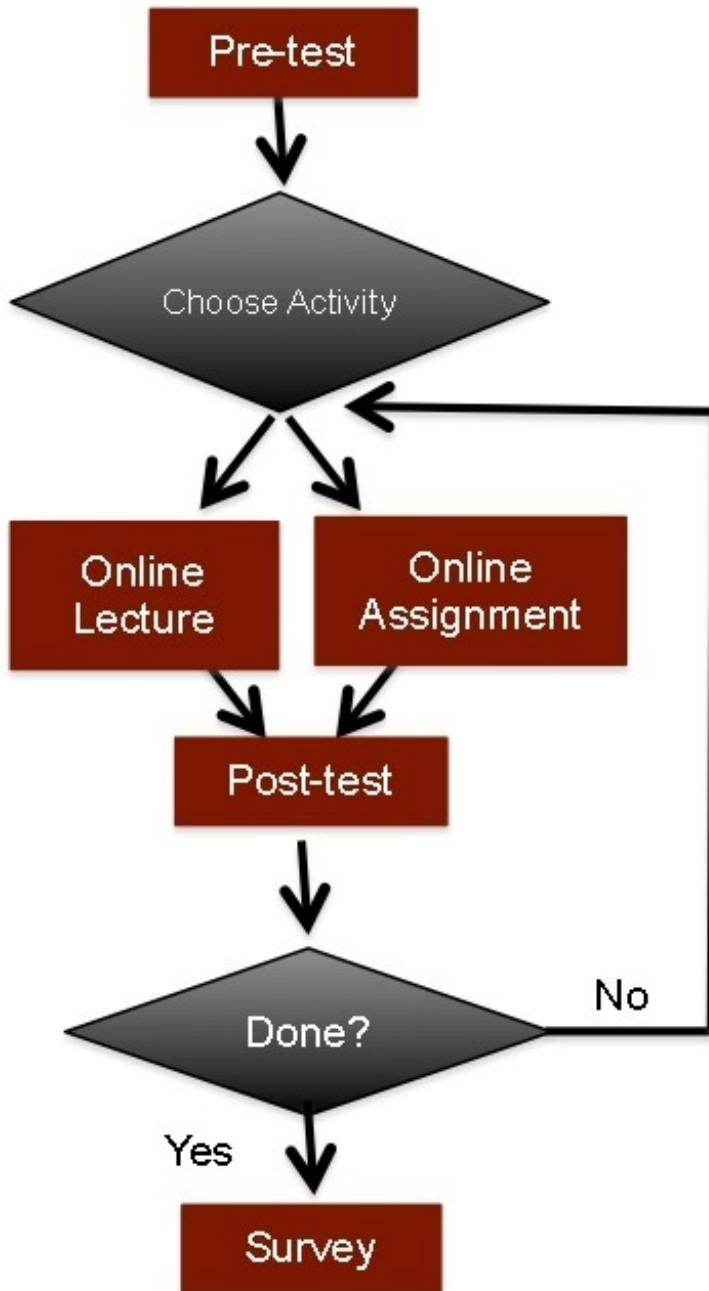
The amount of information delivered in medical education curricula has expanded rapidly in recent years. New and innovative curricula must cover advances in scientific knowledge, technology, and expanded core competencies in medical education, and must do so with the same or even less curricular time than in the past. Our students must develop the knowledge, attitudes and skills to competently care for patients and populations. They must be able to address current health problems and adapt to address the new health concerns of the future. This adaptability requires our students to become adept at independent learning.

When the course director for Neurological Medicine asked us to develop a series of online modules for the course, we were intrigued by the opportunity and challenge. We believed restructuring this part of the curriculum from in-class lectures to independent learning could foster lifelong learning skills in our students. We developed seven modules that we called NILMOs (Neurology Independent Learning Modules Online).

Curricular Redesign

Our past experience with online lectures suggests that students value online curricula for its flexibility(1). Students can access online curricula at their convenience and can pause and review the information as meets their learning needs. We have training in teaching pedagogy and sought to incorporate best practices in learning theory into our curricular redesign. We developed learning objectives for each NILMO and a strategy using pre- and post-tests to measure student learning gains. Our redesigned curriculum included two learning options intended to help students achieve these objectives. The first option was for students to view an online lecture. The second option was for students to use selected online resources to answer a series of questions. Our curricular outline is shown in Figure 1.

Figure 1: NILMO design



Technology Integration

We integrated the NILMOs into Blackbag, a curricular management system developed at the University of Minnesota Medical School Duluth to organize all of the Medical School courses. Blackbag integrates course resources, assignments, objectives, and an academic calendar and is used by students on a daily basis. Students accessed each module by clicking on the assignment in the course calendar. The students' familiarity with Blackbag facilitated the integration of the NILMOs as a new curricular element.

We used Blackbag in an innovative way that allowed us to control student progress through the module in keeping with our curriculum and study design. In most courses, students have access to all of the resources posted for each session. In our curriculum, we wanted students to complete a pre-test before accessing resources for that module. After the pre-test, students chose to view the online lecture or

complete the online assignment. Students then completed a post-test before choosing whether to complete the alternate module option. We used Blackbag to track student choices as they progressed through the modules, record performance results and collect feedback on the students' experiences with the NILMO. The success of this project was highly dependent on our ability to work directly with the Blackbag developer to program the curricular management software to meet our educational and academic needs.

Students had one week to complete each module. Students downloaded the lecture and assignment files from Blackbag. To help students complete the assignments, we included a list of recommended resources and hyperlinks including movie clips and online simulators. Students submitted the completed assignment to Blackbag for evaluation. Blackbag also gave us the ability to limit the amount of time the students had to complete the 5-question pre- and post-tests for each module. At the end of the week, we posted students pre- and post-test scores. The students could use these results to help prepare for the retesting of the information on the course final examination.

Challenges

We experienced a number of challenges implementing our curriculum. With the first module, students did not have enough information to make an informed decision on which module option was appropriate for them. We modified the programming in Blackbag to provide students with a brief description of each module option before they made their decision. If a student chose the assignment but then decided not to complete it, he or she could submit a blank document, take the post-test and then move on to the online lecture option. When students made this choice, we nullified the initial post-test score and counted only the final post-test score that the student completed after viewing the online lecture.

We presented online lectures in PowerPoint format with audio voice commentary. A small number of students were unable to hear the audio, despite working with the Medical Schools information technology support staff to address the issue. In an effort to manage this issue, we included a written transcript in the 'notes' section of each slide for students to read. We also presented one lecture as a .mp4 movie. Feedback from the students was that they preferred the PowerPoint format to the .mp4 movie because the PowerPoint format allowed greater flexibility for moving forward and backward through the material or for searching and reviewing a specific point or slide.

One limitation of using Blackbag was our inability to directly measure the amount of time students spent on the modules. In Blackbag, students downloaded the various lectures or activities and could view or access them at their convenience. We would have preferred that students view or complete the various module components within Blackbag in a way that allowed us to directly measure time on task. Students' self-reported time spent on the NILMO on the survey at the end of the module; however, these self-reports may be subject to inaccuracies or recall biases.

We designed our pre and post-test evaluations expecting that students would use whatever resources they had available to complete the tests. Because students were completing the exam outside of the usual testing center, we assumed they would access both the module activities and other resources available to them through the internet; however, because other student exams using this format were closed resource exams, some students made the assumption that the NILMO evaluations were closed resource as well.

Looking Forward

Our students overwhelmingly chose to watch the online lectures rather than complete online course assignments. Most students cited time constraints as a reason for not completing the assignment and

a few students reported feeling more comfortable with information delivered in a lecture format as reasons for this preference. Several students commented that concepts and material covered in the NILMOs should have been presented in class, rather than the online format. These students believed that the online format should be supplementary or optional rather than used for core content. There is evidence suggesting that online lecture is equivalent to in-class lecture from a learning standpoint (2), however, our students still see the in-class content as potentially more important. We recommend this tension be explicitly addressed with students when incorporating online materials into the curriculum.

We believe that instructors must critically evaluate and assess curricular innovation. There is emerging evidence that interactive online curriculum may be superior to online lectures (3). We had hoped to compare students' learning gains between the two NILMO learning options, however because of students' strong preference for lectures our study lacked the power to make this comparison. For the upcoming academic year, we plan to require the students to do the assignments and test our hypothesis that completing the assignments leads to increased learning gains compared to viewing an online lecture. We will also compare whether there is a difference in number of students completing the module, time spent on the module, and perceived value of the module.

We plan to continue exploring how instructors can use emerging technology to provide innovative active learning experiences, simulation, and audiovisual materials in a way that enhances student engagement, learning and retention of key concepts.

The University of Minnesota IRB Human Subjects Committee determined this project was exempt from review. Study #: 1109E04785

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From Synchronous to Asynchronous: Researching Online Focus Groups Platforms

Alfonso Sintjago
Alison Link

With co-investigators Mary Anne Casey, Sally Dinsmore, David Ernst, Jim Hatten, Richard Krueger, Michael Lee, Caryn Lindsay, Nance Longley, Mary Katherine O'Brien, and Patrick O'Leary

Background and Reason for the Study

The evolution of new networked technologies has opened up exciting new options for focus group researchers. Where “traditional” focus groups require the moderator to bring together participants in the same place at the same time for a face-to-face discussion, networked technologies call this assumption into question in exciting ways. Information and Communication Technologies (ICT) are flattening the world and simplifying communication across large distances (Friedman, 2001). Online focus groups allow for conversations between participants who would otherwise be separated by distance or time constraints. And yet, not unlike online distance learning environments, online focus groups must address the question of how to create productive, information-rich social spaces in novel ways that do not rely on “traditional” face-to-face interactions. Market and social researchers have started innovating in this direction (iTracks.com, Goodmind.net) but much still remains to be discovered about the unique potential online platforms offer to connect focus group participants in ways that were not possible before the advent of Web 2.0. The emphasis of our research, then, was not in replicating a face-to-face environment within an online setting, but to define the situations in which online focus groups would be most appropriate and to modify pre-existing networked technologies in ways that facilitate information-rich social interactions.

After conducting focus group for over 30 years, Dr. Richard Krueger, with the help of Dr. David Ernst, Director of Academic Technologies, organized a course around the idea of testing various online platforms' strengths and weaknesses for hosting focus groups. The project involved 10 other co-investigators at the University of Minnesota, all with a strong background in conducting focus groups and using technologies in innovative ways. The group analyzed potential platforms for online focus groups in terms of their cost, information privacy, administrative requirements, ease of navigation, hardware requirements, data capturing process, and other criteria. Our goal was to come up with cost-effective solutions for translating the anatomy and the essence of a face-to-face focus group to an online environment.

Why/How is this a Focus Group?

“Focus groups [are] a research technique that collects data through group interaction on a topic determined by the researcher” (Morgan, 1997). Focus groups facilitate various forms of information-rich social interactions that are absent from individual interviews and other qualitative research methods. A focus group includes the selection of a small homogeneous group of information-rich participants who respond to a number of focused questions in a non-threatening and permissive environment (Krueger & Casey, 2008). Using a systematic and verifiable analysis, a focus group provides researchers, and their intended audience, with key insights into a series of important questions that can be best answered by small homogeneous groups interacting in a social environment. When constructing a successful online focus group, our process carefully considered the

replicability of key design elements of a focus group and how to best represent them in an online environment. To this end, it was also helpful to examine some of the literature on distance teaching and learning to inform our construction of these online focus groups (see, for example, Aragon, 2003; Beaudin, 1999; Zvacek et al., 2011). Nonetheless, the question of whether these online platforms “feel” like a socially rich focus group environment will rest largely on participants’ comfort level with the technology and the moderator’s ability to facilitate a comfortable virtual meeting space. The savvy online moderator will never stop questioning whether she is creating a sufficiently comfortable and functional virtual space to facilitate rich information exchange.

Our Research Process: Conducting A Series of Online “Focus Groups about Focus Groups”

Exploring focus groups through the use of our own online focus group platforms was an integral element of our research design. Following an initial brainstorming session, the research team categorized various online social platforms based on their strengths and weaknesses. Some tools discussed include: Facebook, Google Docs, Desire to Learn (D2L), Moodle, Free Forums, Co Meeting, Google Groups, VoiceThread, Listservs, Skype, Ning, and Adobe Connect, among others. These tools were then classified according to whether they allowed for real-time (synchronous) interaction, or allowed participants to log in at different (asynchronous) times to participate. Other variables that were considered included: cost, security, data ownership, ease of use, data capture, ability to participate anonymously, additional “bells and whistles,” multimedia capabilities, bandwidth requirements, and the platform’s visual appeal.

The team focused its exploration by settling on a “short list” of online social platforms for further testing, and representing both synchronous and asynchronous options (see Table 1). Research team members divided up the roles of moderator and participants, modified each platform to fit the purpose of a focus group, and used each other as “test subjects” to try out the various platforms.

Table 1. Platforms tested by the research team

Synchronous	Asynchronous
Skype	Adobe Connect
Google Groups	Ning

Synchronous test platforms: Skype and Adobe Connect

Asynchronous platforms that allow for voice and video chat are perhaps the most “literal” translation of what it feels like to be in a face-to-face focus group. Online environments are increasingly capable of supporting voice and video through technologies such as voice over IP (VoIP). Synchronous voice and video chat technologies have the advantage of transmitting relatively nuanced facial expressions and emotional cues, although their success as focus group platforms depends largely on good bandwidth availability and active moderation to set participants at ease.

Skype, one of the best known VOIP companies, has over 663 million users, and has provided various communication services at reduced cost for its users since 2003, with many other applications increasingly working to provide similar feature-rich voice and video chat services (Telecompaper, 2011). As a low cost, multi-platform service, currently owned by Microsoft, our group tested Skype as an example of what a well-permeated, free or low-cost multimedia chat platform can provide to potential focus group researchers. Skype, however, presented some moderation problems, as it is

structured to function as a tool for communication between friends or peers, rather than a more structured conversation, with a pre-defined moderator, as is the case within a focus group environment. Skype's privacy settings were not very transparent to our test participants, and it was not possible to guarantee anonymity through this platform--both factors which can unsettle participants. Skype does offer a range of communication modes: from text chat, to voice chat, to video and file share.

Unfortunately, voice, video, and file share require more bandwidth, and may be impractical or frustratingly slow for participants with limited internet connections. In order to take advantage of the rich visual and emotional cues that video and voice provide, moderators should ensure that participants will have access to high-speed, and preferably hard-wired, connections. With good bandwidth, however, along with a good moderator introduction to set participants at ease, clear details on how communication will take place through Skype, and a good set of questions, Skype can be a useful tool for synchronous online focus groups.

In addition to Skype, we also decided to test a more regulated and "stylizable" environment--Adobe Connect. As webinar software, Adobe Connect allows for different authorizations or rights to be given to different participants, permitting the moderator to remove a non-cooperating member or silence their account temporarily. The environment allows for participants to raise their "virtual hands" before speaking, and allows the moderator to pre-arrange multimedia "pods" into different layouts and guide participants through multiple different user experiences, all within the same virtual meeting space. Adobe Connect features currently include: customizable meeting rooms, breakout sessions within a meeting, meeting recording, screen sharing, polling, notes, chat, virtual whiteboards, sophisticated user permissions management, and audio and video conferencing, among other functions. Our research team started out testing the text chat room feature, but quickly grew frustrated with the volume and speed of the text flow, and the fact that it tended to reduce participant content to trivial answers. We also tested the voice and video chat feature, which required all participants to have their cameras and microphones activated simultaneously and was relatively taxing on bandwidth and resulted in some frustration for participants with slower connections. The whiteboard feature was, perhaps, the most serendipitous and successful discovery: by providing participants with a drawing task and asking them to take turns sketching and narrating their ideas, this feature was perhaps the most richly interactive, but also low-stress element of the environment. Overall, the primary advantages of Adobe Connect are its robust user permissions controls, and the vast amount of control it gives the moderator to stylize the look and feel of the participant experience. At a current cost of \$55/month, Adobe Connect is also still an accessible option for research groups with limited budgets.

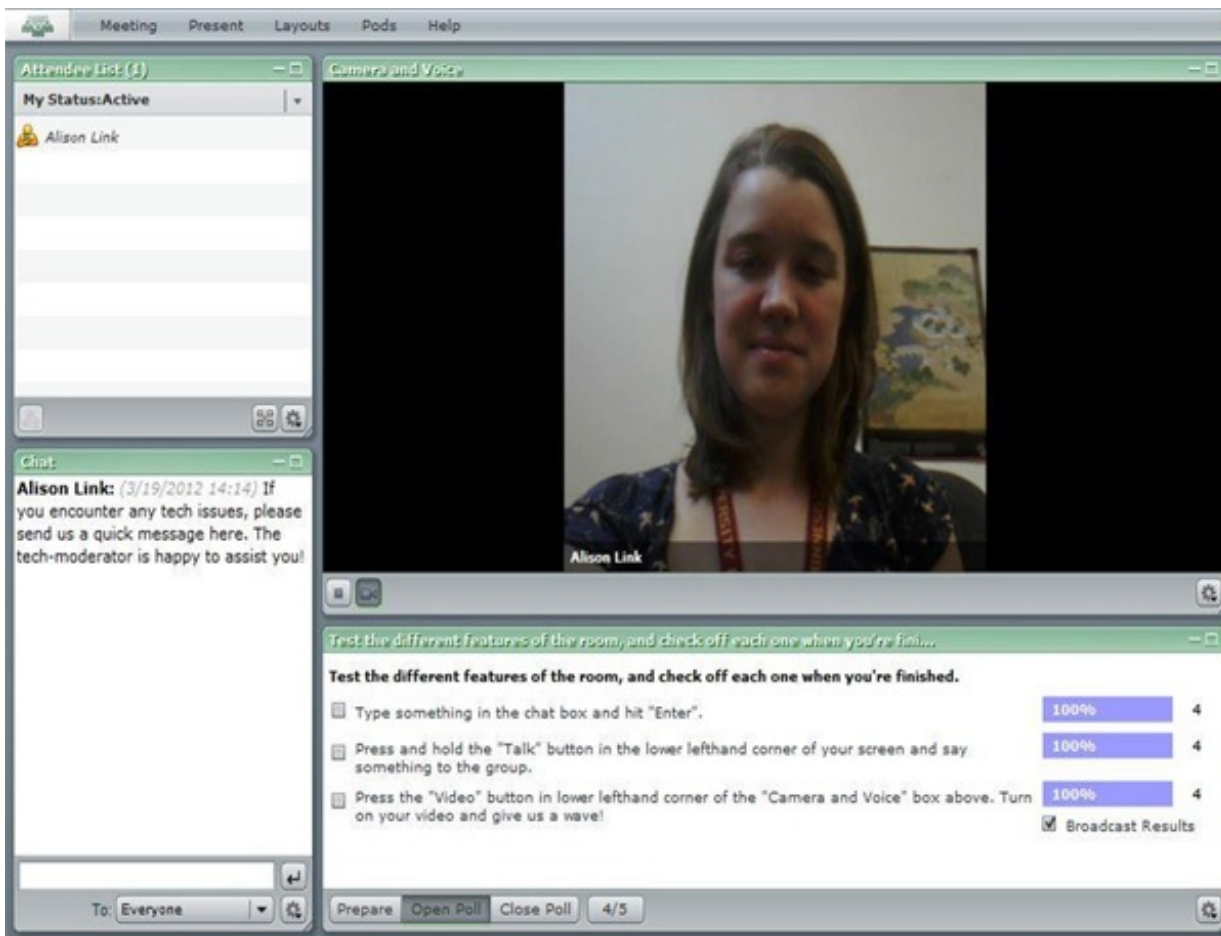


Figure 1. Moderator greeting participants during the start of the Adobe Connect online focus group.

Asynchronous test platforms: Google Groups and Ning

There are a number of useful asynchronous platforms available online, including openly available forum technologies, listservs, and free websites such as Google Groups. Our team settled on Google Groups and Ning as asynchronous platforms, as they allowed for relatively simple modifications to make them suitable for conducting focus groups. At first glance, however, these platforms may not look like focus groups. They do not seek to replicate a real-time, face-to-face interaction in the same way synchronous platforms do. Instead, for our tests, we decided to set up discussion threads in each platform and to share a new question with the participants every day for 3-4 days. Participants were asked to provide answers for each day's focal question, and to comment on other participants' responses as they felt compelled to do so. Bandwidth requirements were negligible in both platforms, and participants were able to post comments at their leisure.

One of the biggest advantages of the asynchronous platforms was that they allowed participants to be more expansive and detailed in their answers, as they had a much longer amount of time to consider and post their responses. The delayed response time can increase the richness of the data when involving highly motivated participants with available time to participate, and can also be more accessible to participants with different native languages and different physical and technological ability levels. Another key advantage is that Both Google Groups and Ning allow participants to be anonymous, if necessary.

One of the biggest challenges of asynchronous focus groups is attrition. The moderator does not have the luxury of having a time and (virtual) space set aside for conducting the focus group. Instead, it falls

on participants to take time out of their own busy schedules to participate and engage in back-and-forth commenting. A skilled moderator online must be aware of the ease of tuning out or ending one's participation, and the time commitment required to read and comment on lengthy comment threads. Especially within an asynchronous environment, it is very important for participants to be engaged by the moderator and encouraged to elaborate on their answers (see also Zvacek, et al., 2011). Without active moderation, an asynchronous, primarily text-based environment may not naturally encourage conversations. This makes it particularly important to keep online focus groups small--limited to about 5 participants.

In our trials, the design of both Google Groups and Ning environments supported a minimalist approach. The team members determined that very clear, minimalist design with limited input options was easiest for asynchronous participants. Google Groups was simple in this regard. The major disadvantage with Google Groups, though, is that it can be tricky to collaborate between participants with regular Google accounts and participants with institutionally-supported Google accounts (such as university-sponsored Google Apps systems). In addition, Google Groups messages typically show up in participants' regular e-mail inboxes, which can be frustrating for participants who prefer not to receive these kinds messages in their inboxes.

The Ning platform, on the other hand, offered bells and whistles that can be distracting when setting up an effective focus group environment. Ning required initial modifications to remove the standard blogging, video, and social media tools it provides. A major strength with a relatively robust platform like Ning, however, is that it allows the moderator to customize the environment to increase its visual appeal. And while Ning is primarily an asynchronous environment, it also allows for some limited synchronous text-based chatting. The chat is not only helpful for including a synchronous element to the focus group, but also for troubleshooting participants technological problems. Ning, then, strikes a good balance between robust, expandable features and a user-friendly, customizable design. Ning does entail a current cost of \$24.95/month, but is still a relatively economical option for research groups.



Figure 2. Focus Group Minnesota, a simplified Ning website modified for hosting asynchronous online focus groups

Lessons Learned

Through a process of conducting several focus groups, the group came up with a list of lessons learned, summarized in the table below.

Environment	Technology
<p>Make it Welcoming – Take some time to think through the way your online environment looks. Is it inviting? Is it user-friendly? Create a brief introductory video to introduce the moderator(s), the purpose of the group, and the features of the online platform.</p> <p>Personalize It – Allow your participants to personalize their presence. Even in an anonymous group, you can have participants pick fun profile pictures or write a brief personal bio.</p> <p>Simple Layout and Design – Make it</p>	<p>Teach the Technology - Participants will come with varying levels of technology expertise and anxiety, and it is important to get them more or less on the same page before starting the focus group. Try creating a “how-to” guide or filming an introductory video that introduces the platform, and ask participants to look at it prior to joining the focus group. Consider incorporating a “test run” or a “warm-up” activity at the beginning of the focus group to introduce and test out the features of your focus group platform.</p> <p>Stay Behind the Curve – Choose platforms and features that participants have the maximum amount of familiarity with. Remember: focus groups are about getting rich information--not about demonstrating the</p>

easy to find things on the site, build in some navigational redundancy, and avoid clutter. Make sure you only have on the site what is necessary for conducting the focus group.

latest technology.

Keep the Technology Support “Quiet” and Omnipresent – Good planning helps the technology remain as invisible as possible. Build in multiple avenues for troubleshooting, and be explicit about how participants can request help if something breaks down. If a participant’s computer breaks down altogether, have a phone number or e-mail address available to participants for “last ditch” tech support.

Participants

Moderator

Keep the Group Small – Somewhere around five participants is ideal. This reduces the amount of reading for asynchronous text-based focus groups, and reduces the bandwidth and troubleshooting issues for synchronous voice/video focus groups.

Know your Audience – Make sure the platform you choose and the features you use will resonate with your participants. There are some generational and even gendered patterns in the ways people prefer to engage with technology that may be helpful to consider when selecting a platform. To get a sense of what you might reasonably expect from participants, you may want to look at the Pew Internet & American Life Project’s work on technology user types (see Horrigan, 2007).

Consider How You Recruit – Recruiting for an online focus group can be very different than a face-to-face group. You have to consider motivations and ability. Do the people you are recruiting like communicating online? What is their level of technology sophistication and will they have sufficient access to the technologies and bandwidth you require?

Furnish the Right Incentives - Incentives help participants stay engaged throughout the online focus group. The incentive could be intangible (e.g. “You are helping the community.”) or tangible (e.g. a gift card from a popular store or a movie ticket). If the incentive is intangible, be sure to describe

Establish Expectations for Engagement – Social norms vary much more online than in a face-to-face environment. Being explicit about how and how much you expect participants to engage will help avoid “culture clashes” and confusion. In synchronous environments, you’ll want to spell out clear expectations of who should talk and when, or even try calling on people in turn. In asynchronous environments, you can communicate guidelines for how and how frequently participants should comment on each others’ contributions. (For more strategies to encourage effective engagement, see Van Patten, 2011).

Be Socially Present – As a moderator, it is important to appear present in the conversations--perhaps more so than in a face-to-face environment. Online environments can feel impersonal, so you may want to make particular effort to address participants by name. In synchronous environments, you may find you need to more actively moderate and “fill in the gaps” in conversation. In asynchronous environments, you can create daily summaries and bullet points to highlight key ideas in the discussion and guide further discussion for participants who don’t have time to read all the posts.

Have Multiple Moderators – Having two or more moderators is important. You may want to divide roles into “talk-moderator” (to guide the discussion) and “tech-moderator” (to help with troubleshooting and tech questions).

the benefit. Don't assume that it is obvious.

Table 2. Summary of lessons learned through testing four online focus group platforms.

Acknowledgements

This chapter would not have been possible without the extensive contributions of every member of the online focus group research team. Led by Richard Krueger and David Ernst, the results of this research team came from the collaborative effort of the authors and co-investigators, and all members of the group provided valuable contributions to the success of this study.

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Creating Custom Learning Assessment and Student Feedback Applications with Google Apps Script

Abram Anders

<http://z.umn.edu/assessAPP/>

[Google Apps](#) for the University of Minnesota system offers a powerful suite of tools for teaching, learning, and collaboration [1]. The Google Apps platform merges the strengths of an integrated, University wide system with the flexibility, connectivity, and collaborative potential of cloud technologies. The basic services offered through Google Apps, including Gmail, Calendar, Docs, Sites, and Google+, offer a wide range of opportunities for pedagogical innovation; however, these services can be even further extended through the use of [Google Apps Script](#). Apps scripts are small bits of programming code that can be installed and executed in any Google Doc or Google Site. Google Apps Script allows users to “automate repetitive processes and workflows” across Google services using a Javascript-based cloud scripting language [2].

This chapter offers a case study for using apps scripts to facilitate assessment of student learning and to automate the creation of student feedback reports. By the end, you will be prepared to create your very own custom assessment and feedback applications. My project website provides Google Docs templates and easy to follow video instructions for creating and adapting a simplified version of my custom assessment application.

Google Apps Script

Google Apps Scripts can be installed and activated from individual Google Docs and Sites. Apps scripts interact with a wide range of Google services including Gmail, Calendar, Charts, Docs, Finance, Maps, and Sites. Consider the following example: Imagine Mary runs a flower shop. She creates a Google Form; a form is web-based survey that reports submitted results to an associated spreadsheet. Through Mary’s form, customers respond to a series of questions that allow them to place orders for flowers, indicate a delivery date, and delivery location. With Google Apps Script, Mary could create and install scripts for her form that would automatically do any of the following:

- Email the customer a copy of the information they submitted;
- Schedule an appointment for delivery on Mary’s calendar;
- Generate delivery directions from Google Maps and email them to the driver;
- Add the order details and due date to the flower shop work schedule spreadsheet.

Uses of Google Apps Script like these are being implemented by small business and large businesses alike. In one case study, the company “Dito” uses apps scripts to automate an approval workflow: an employee submits an approval request using a Google Form; a supervisor receives an automatically generated email and approves or denies the request directly in the email; the employee receives an auto-generated email notification of the supervisor’s decision; the final results are recorded in a central Google Spreadsheet [3].

The Google Apps Script site hosts a series of examples, tutorials, reference materials, and case studies for learning to program with scripts. Yet depending on previous experience, the learning curve for writing scripts can be significant. Fortunately, many apps scripts have already been created for a

wide range of applications. For example, [Flubaroo](#) is a well-established apps script tool that supports “automated grading of quizzes and assignments” with integrated analytics features [4]. Educational apps scripts abound thanks to the continuing adoption and innovation for Google Apps for Education by a wide range of teachers and educational designers across K-12 and Higher Education institutions.

Perhaps, one of the most straightforward but most useful classes of apps scripts are those that facilitate mail merging. The mail merge function has long been a part of Microsoft Word and other desktop processing applications. Mail merge refers to the production of multiple documents from a template and structured data source. The mail merge function is often used to generate form letters. Recipients’ names and addresses, saved in a spreadsheet file, are merged with the letter template, saved as a word processor file. The mail merge function generates a new copy of the letter for each entry in the spreadsheet. Apps scripts for mail merging are even more powerful than traditional mail merge functions. Through integration with Google Docs and Gmail, apps scripts for mail merging can facilitate automated workflows for a variety of educational tasks including learning assessment and student feedback reporting.

Assessment and Feedback Challenges

For learning objectives not easily measured by multiple choice or true/false questions, assessment and evaluation can be time-consuming and difficult. Critical thinking, collaboration and communication skills are some of the most important but most challenging skills to teach and assess. For these skills, individualized student feedback is both essential and highly contextual. While assessment, evaluation, and feedback are incorporated into a wide variety of software applications and services, even the most robust solutions tend to have limited options for individual customizability, localized integration, and discipline specific criteria.

One especially challenging and widely used communication assignment is the oral or multimedia presentation. Oral and multimedia presentations are frequently assigned across a wide-range of university courses. Evaluation criteria can vary widely depending on the disciplinary context and learning focus. Furthermore, presentations pose unique physical and material challenges to assessment. Presentations tend to be relatively brief and evaluations require close attention to oral communication, body language, visual aids, in addition to content and organization. While making these observations, the instructor also needs to be able to evaluate and record scores for overall performance and open-ended individualized student feedback.

An ideal presentation assessment application would combine the efficiency and convenience of an enterprise, mobile computing solution with the flexibility, adaptability, and disciplinary specificity of instructor-created materials. When extended by apps script, the Google Apps platform provides the foundation for modular, shareable, and customizable tools for a wide range of assessment and feedback challenges including evaluating student presentations.

The Custom Assessment and Feedback Application

My application evolved from the use of Google Forms as tools for peer evaluation and self-reflection in my Business Communications courses for the [Labovitz School of Business and Economics](#) (LSBE) at the [University of Minnesota Duluth](#) (UMD) [5, 6]. My courses meet in a computer classroom, which facilitates the use of web-based tools during class. Google Forms can support a variety of activities. My students have used forms to complete self-reflections for in-class exercises and activities; share topics, examples, or questions for group discussion; submit responses to planning and audience analysis heuristics; and, complete both anonymous and public types of peer review.

For presentation assignments, Google Forms provide an essential tool for audience engagement and

peer evaluation. Following each student presentation, the class completes an “audience poll” reflecting on the rubric criteria and evaluating presenter performance. For group presentations, the “audience poll” also evaluates overall group performance. Peer evaluations serve several pedagogical aims:

- Presenters and audience members are more engaged during the presentations;
- Assignment learning objectives are reinforced and internalized through repeated application of assignment criteria to the evaluation of peer performance;
- Peer feedback supplements and supports instructor evaluations and comments.

Each presenter receives both quantitative scores and open-ended comments from the audience polls for their individual and group performance. For group assignments, students also evaluate the performance and contributions of each member of their group. Peer evaluation of contributions to the group the process and final product encourages individual accountability and contributes to positive group morale. Overall, my students are more motivated and attentive during course activities and more successful at attaining course learning objectives when they give and receive peer to peer feedback.

My custom assessment and feedback application builds on these uses of Google Forms by automating the creation of reports that integrate both student and instructor feedback. In my primary case example, the instructor uses a Google Form on a tablet computer to enter and submit evaluations of student presentations (see Figure 1). The submitted results are collected and stored in the associated Google Form spreadsheet. From the spreadsheet, the instructor can review and edit the final scores and comments before using Google Apps Script to create mail-merged reports. The custom apps script merges student results with a report template and generates an email for each student with the individualized evaluation report attached as a PDF file (see Figure 2). The final report includes the results of peer evaluations (also submitted with Google Forms) in addition to instructor evaluations and comments (see Figure 3).

Ultimately, the automation and convenience of an apps script assisted workflow makes it possible to provide students with confidential, individualized feedback from multiple sources including both instructor and peer evaluations. Creating similar feedback reports manually, even with the use of Google Forms for data collection, would be prohibitively time-consuming. Furthermore, the accessibility and convenience of web-based forms makes these tools useful for a wide range of classroom, student, and instructor technology configurations including those employing mobile devices.

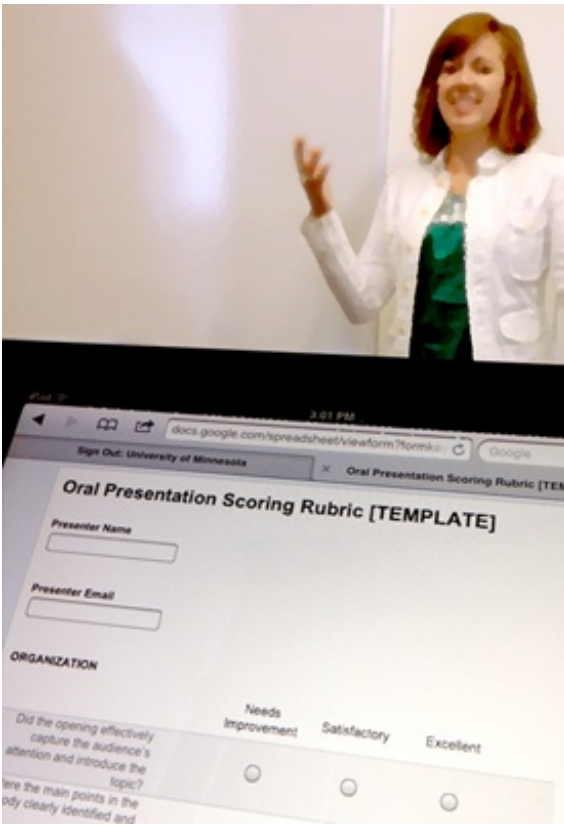


Figure 1: While a student presents, the instructor enters scores and records comments using a Google Form on a tablet computer ([see larger image](#)).

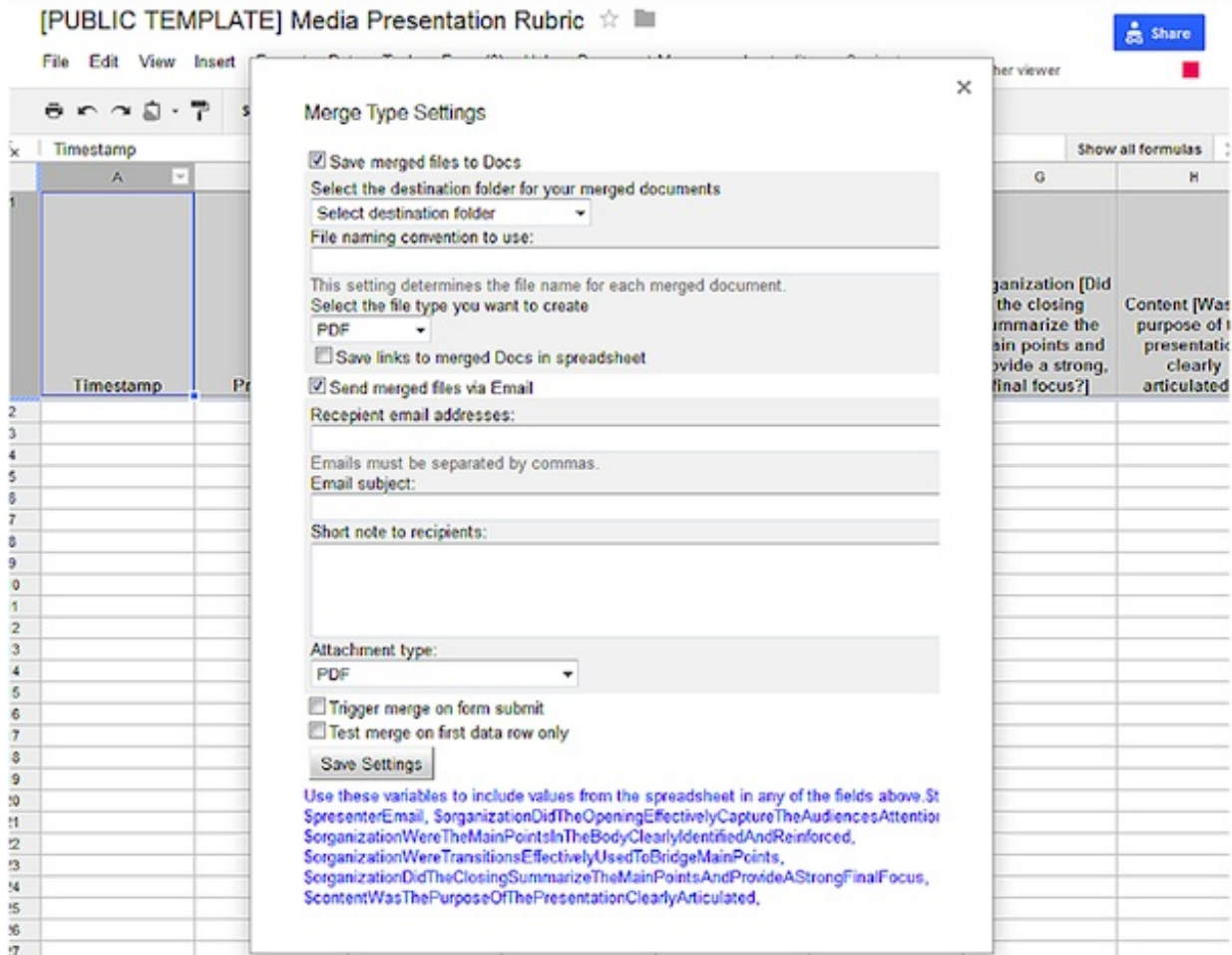
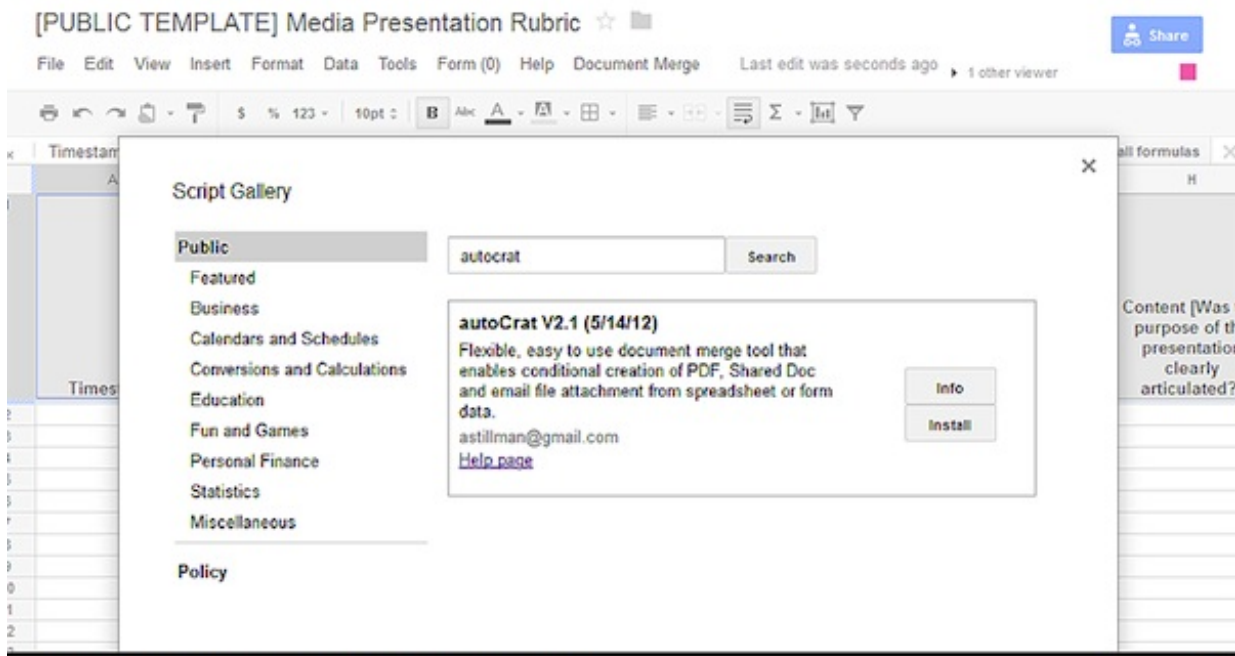


Figure 2: Upper window: The “Script Gallery” is accessible from the tools menu in any Google Doc. Lower window: The “Autocrat” script installs an additional menu which provides options for mail-merging spreadsheet data with a Google Docs template (see larger images).

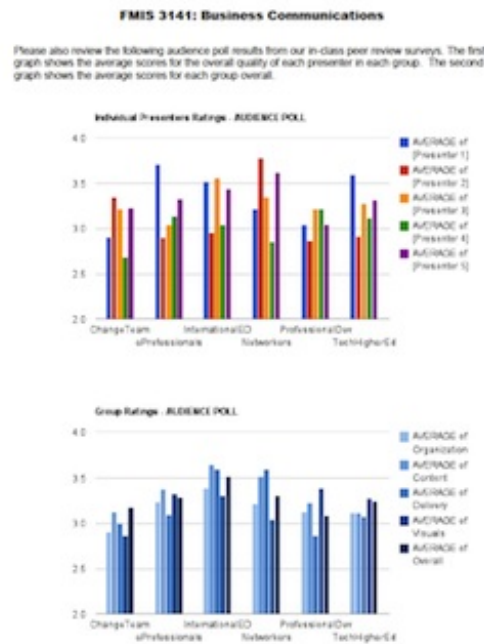


Figure 3: The mail-merge report template combines rubric-based scores by the instructor on the first page and peer evaluation results on the second page ([see the Google Doc](#)).

The assessment rubric for my application is adapted from a rubric shared by [Lisa Gueldenzoph Snyder](#) as part of webinar presentation titled “Document Assurance of Learning in Business Communication for AACSB” [7, 8]. The rubric was created for the business school at North Carolina A&T State University following a review of Association to Advance Collegiate Schools of Business (AACSB) best practices at accredited schools and institutions. Further documentation for Snyder’s work on this rubric is available from the Proceedings of the 2007 Association for Business Communications Annual Convention [9].

Through several iterations of the application, I have employed a number of apps scripts both self-authored and adapted from the public gallery. My current implementation uses the “Autocrat” apps script created by educational technology designer, [Andrew Stillman](#) [10]. “Autocrat” is an extremely polished and user-friendly script. It can be installed directly from the script gallery, accessible from the “Tools” menu in any Google Doc. Additional information about the script is hosted at YouPD, a peer driven professional development web community: <http://www.youpd.org/autocrat> [11]. The site includes a video tutorial and other documentation.

Adapt and Use the Custom Feedback Application

You can make a copy and adapt a simplified version of my custom assessment and feedback tool for use in your own courses. I have shared all the necessary materials in a public Google Collection (folder) including the Google Form assessment rubric and Google Doc report template. The collection also includes step-by-step video instructions for copying the templates, installing the apps script, and running the mail merge to create and send feedback reports. You can access the video instructions and collection materials at this address: <http://z.umn.edu/CREATEassessAPP/> [12].

While my custom assessment and feedback tool is designed for multimedia presentations, the rubric and report template could be revised or even completely rewritten to reflect other evaluation criteria or learning objectives. For further information, my blog hosts a “prezi” slide presentation and video overview discussing the evolution of my assessment and feedback tool through several iterations and

uses of different individual scripts. The video and slideshow are available at this address: <http://z.umn.edu/assessAPP/> [13].

Future Directions

My plan for continued development of Google Apps Script applications addresses LSBE Strategic Plan goals for improving student learning for communication and collaboration skills [14]. In the initial phase of my project, I plan to create a series of peer-review and instructor evaluation rubrics for communication and collaboration learning tasks and assignments. These rubrics will be publicly shared as a resource for LSBE faculty. Each rubric will have integrated custom assessment and feedback applications like the one described in this chapter. The rubrics will be shared as Google Form templates with associated apps scripts and report templates enabling automated mail merge reporting functions. Use of these tools will facilitate refined evaluation and assessment of key learning objectives while also providing support for pedagogical “best practices.”

In the second phase of the project, LSBE Technology Program staff and Management Information Sciences (MIS) students will be enlisted to help create additional script-based functionality. For example, scripts could be created to collect usage statistics from the shared assessment and feedback applications. When an instructor would use an evaluation rubric-form and execute the reporting script, the script could also report usage statistics for the application and anonymous data for student learning outcomes. The data generated from rubrics and assessment applications could be hosted in central spreadsheets and contribute to course and school-wide learning analytics and assessment initiatives. The evolution and quality of student learning around communication, collaboration, and other targeted and measured skill sets could be monitored via real-time learning analytics data feeds powered by apps scripts and hosted on a Google Site.

Tools and applications created for Google Apps can be shared, adapted, and further developed in any number of novel directions. Through Google Apps Script, the Google Apps infrastructure can be the foundation for open education and open innovation that moves beyond the development of open content. Practically speaking, open innovation tools like Google Apps Script mean that the efficiency, convenience, and power of cutting-edge technologies can increasingly be informed and directly shaped by the disciplinary expertise and needs of individual instructors, researchers, and programs. Through user-friendly coding and application development tools, the technological interfaces through which we work and learn are becoming ours to engage and transform.

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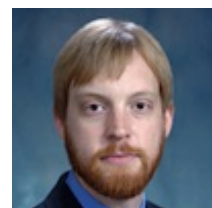
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Providing Direction



The chapters in this section illustrate how innovative leadership – at system-wide, campus, collegiate, and departmental levels – has stepped forward to provide direction and support for cultivating change. These contributors challenge the assumption that we need a big, expensive program to get things to happen.

From Academic Analytics to Individualized Education

Claudia Neuhauser



A New Campus

The University of Minnesota Rochester (UMR) was established in 2006. I got involved in the new campus in Fall 2006 while I was department head of Ecology, Evolution and Behavior on the Twin Cities campus to establish research and academic programs in the field of biomedical informatics and computational biology jointly with Professor Kumar, Head of Computer Science and Engineering. Less than a year later, in September 2007, Dr. Stephen Lehmkuhle came to UMR as the first chancellor. After his arrival, I started to spend more time on the new campus to help with the establishment of academic programs. Over the ensuing months, it became clear that I had to decide between being department head and developing a new campus. Chancellor Lehmkuhle was (and continues to be) passionate about higher education. His vision about “creating the future university today – one that has a sustainable cost structure, shaped by a new approach to learning that prepares all students for the future, and values partnerships in the creation of new knowledge,”[1] resonated deeply with me, and, neglecting the fact that Rochester is about 90 miles from where I live, made it easy for me to accept the position of Vice Chancellor for Academic Affairs in July 2008.

Building a new campus affords the opportunity to develop innovative ways to tackle some of the most pressing issues in higher education: learning versus teaching, cost, retention, and graduation. A mandate to address these issues also comes through the accreditation process. Post-secondary educational institutions in the North Central Region of the United States, which includes Minnesota, are accredited by the Higher Learning Commission (HLC). Over the past several years, the HLC revised its criteria for accreditation. The new criteria were adopted by their Board of Trustees in February of 2012 [2]. The new criteria reflect the ongoing shift in accreditation from teaching to learning. As one of its criteria for accreditation, it states that “[t]he institution demonstrates responsibility for the quality of its educational programs, learning environments, and support services, and it evaluates their effectiveness for student learning through processes designed to promote continuous improvement.”[2] To fulfill this criterion, an institution must not only clearly state its goals for student learning and have “effective processes for assessment of student learning and achievement of learning goals,”[2] but also “demonstrate[...] a commitment to educational improvement through ongoing attention to retention, persistence, and completion rates in its degree and certificate programs.”[2] Specifically, an institution is asked to “collect and analyze information on student retention, persistence, and completion of its programs,” [2] and “use information on student retention, persistence, and completion of programs to make improvements as warranted by the data.” [2]

For many years, studies across institutions have tried to identify factors that explain retention and

attainment. For instance, a study [3] by Cowart in 1987 focused on improvements in academic advising, orientation programs, and early warning systems. More than 15 years later, freshman seminars, tutoring programs, and advising with selected student populations were added to this list (Habley and McClanahan, 2004) [4]. Many institutions have implemented these and other strategies to help students succeed on their campuses. A more recent survey [5] of public 4-year colleges and universities identified additional factors as the most important in student retention: level of student preparation for college-level work, adequacy of personal financial resources, and student study skills. Despite the large body of research and significant efforts at institutions, the 6-year graduation rate across the nation has hardly changed over the past decade, hovering barely above 55% for bachelor's students (Figure 1).

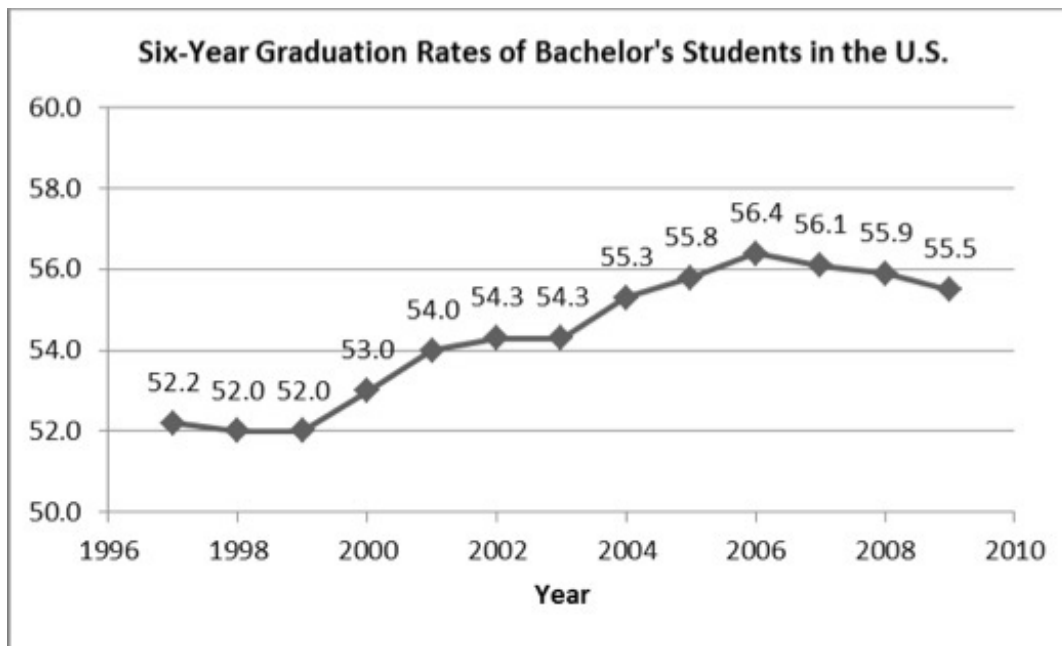


Figure 1: Six-Year Graduation Rates for Bachelor's Students in the U.S. (Source: The National Center for Higher Education Management Systems)

Despite the overall lack of significant improvements, some institutions have seen substantial increases in retention and graduation rates. For instance, at the University of Minnesota Twin Cities, the 6-year graduation rate increased from 61.4% in 2005 to 70.4% in 2010. Different factors are thought to have contributed to these gains. The traditional approach to identifying the importance of each factor relies on sound statistical theory, namely multivariate statistical methods that reveal combinations of factors together with the percentage of variability in retention or graduation across a population of students that is explained by these factors. The variables that are included in these studies are based on educational theory and availability of data across the population of study.

Borrowing from Biomedical Research

The types of studies mentioned above are similar to epidemiological studies, which have been and continue to be a staple of medical research. However, with the advent of genomics data, different methodologies needed to be developed to analyze the new types of data. The new methods, collectively known as data mining, extract patterns and correlations from very large data sets. The field of research that advances these methods is called bioinformatics. A consequence of the new methodologies is that they allow us to cluster patients into subgroups with defined characteristics. This opens the possibility of individualized medicine where treatments are tailored to clusters of patients. We can translate this individualized approach from medicine to education.

This relationship between individualized medicine and individualized education became clear to me during a talk on gene expression data in the Biomedical Informatics and Computational Biology Journal Club that I was running in Fall 2007. A few weeks before attending this talk, I had a discussion with Chancellor Lehmkuhle on how to measure student success. He mentioned to me that he would like to have the analog of a medical record for students in our program. When I was sitting in the talk and looking at the heat map of gene expression data, I instead saw the “medical records” of our future students. The pieces fell into place: If we collected detailed data on student learning, we could develop individualized education with a vision that is similar to individualized medicine where prevention, diagnosis, and treatment are tailored to patients. In essence, the tools we use in bioinformatics to extract knowledge out of genomics data could be useful in education where we have become similarly data-rich.

Technology is the key to collecting detailed student data across the curriculum. To implement this we would need a database that collects longitudinal data on student learning. The database would contain learning objects, such as quiz questions, homework problems, reading materials, etc. They would be tagged to be searchable. Learning objects would be combined to form modules, which in turn would be combined and delivered as a credit-bearing course. Over time, the curriculum would be represented by a network of modules, each with its own learning objectives and concepts. As students interacted with the curriculum through a curriculum delivery system that is linked to the database, a rich dataset would emerge that could be mined for multiple purposes. The design of the database was funded through a Howard Hughes Medical Institute professor grant that I had received in 2006. We named the database iSEAL: intelligent system for education, assessment, and learning. Initially, iSEAL was a research project. It is now an enterprise-level project that lives in UMR’s IT unit and has been in use in the curriculum at UMR for the last three years. iSEAL is described in this issue in an article by Dick et al. [6].

The data in iSEAL are the basis of the research of faculty at UMR, which tests the efficacy of pedagogical interventions just as clinical trials test the efficacy of new diagnostic tools or treatments. To test the effectiveness of interventions at a much larger scale, we need to identify variables that are readily available to administrators and that do not involve direct classroom research.

A 2011 article in Educause [7] makes the distinction between the data that is collected in a classroom and the data that administrators have access to, and introduces distinct terms describing the two types of analysis: learning versus academic analytics. “Academic analytics reflects the role of data analysis at an institutional level, whereas learning analytics centers on the learning process.” [7] This distinction is important because different groups engage in the data collection, analysis, and development of actionable knowledge. Academic analytics is at the institutional level and thus the purview of administrators, whereas learning analytics is the purview of individual faculty. Learning and academic analytics work best in tandem: Knowledge gained from learning analytics can validate the variables identified through academic analytics. Knowledge gained from academic analytics can lead to testable hypotheses in the classroom and thus contribute to learning analytics research. The article makes the case for the value of analytics in higher education, draws parallels to personalized medicine, but also points to some pitfalls.

The University of Minnesota, like any other institution, collects data on hundreds of variables on students. Some variables are pre-enrollment, such as ACT scores, others are collected while the student is enrolled, such as GPA. Most of the data reside in transactional databases that are optimized for quickly updating records. Downloading large amounts of data for analysis requires a Data Warehouse. To make data available in a more user-friendly way, the University prepares reports for information that is frequently used, such as enrollment or tuition reports.

A more sophisticated approach to data analysis, however, could go well beyond reports. The biomedical field has dealt with the data deluge by developing bioinformatics methodologies that draw from multiple disciplines, including data mining, visualization, and machine learning. These tools take high-dimensional data and reveal complex relationships or lead to predictive models. These same methodologies can help institutions to turn educational data into actionable knowledge that is accessible across groups, ranging from administrators who need to decide on where to invest resources, to advisers who can help students select a course of study appropriate to the preparation of the student, to faculty who can use the information to improve student learning, and to students who can take control of their own learning.

The following example illustrates the type of information that can be extracted from applying bioinformatics tools to student data. We look at a heat map that is similar to the heat map I saw in the Journal Club presentation. But this time, the heat map is based on student data. It clusters a group of students along 22 indicators, which range from pre-college variables, such as ACT or high school rank, to variables that indicate progress during the first four years of study, such as GPA or status of enrollment (Figure 2). Each row is one of 22 variables, and each column is a student. The colors range from red, indicating high performance, to green, indicating low performance. The heat map reveals clusters where all indicators are high, but also clusters where all indicators are low. There are groups of students who performed well despite low incoming indicators, and vice versa.

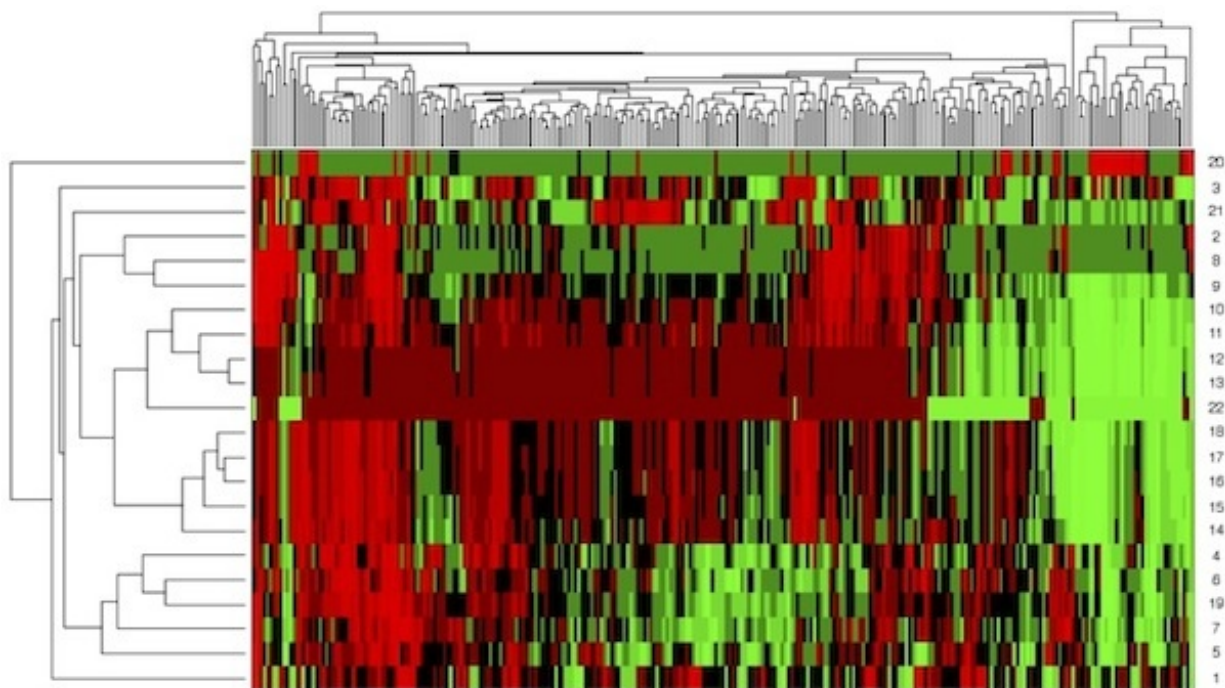


Figure 2: Heat map of student performance

Clustering students as in Figure 2 can help identify students at risk and students who are likely to perform well above average. We may devise different strategies for each of these groups to optimize their student experience. Since these tools are designed to work with smaller samples sizes as well, separate models can be built for each college or coordinate campus to recognize differences among them. While for some colleges the ACT score may be a predictor of student success, for another college the credits completed prior to entering the college may turn out to be a more important indicator. Furthermore, predictive models can be built that make predictions for individual students, leading to individualized education.

The success of translating actionable knowledge into individualized interventions relies not only on being able to identify the group of students for whom an intervention may be particularly effective but also on our ability to communicate intervention effectively to the group. This can be accomplished by developing advising tools that recommend actions to individual students in real time. For instance, when a student registers for courses, the advising tool may warn a student that s/he may have a high probability of not succeeding in a course based on the success rate of students with a similar profile, and perhaps recommend a better path. The same tool can also work to encourage students to take a more challenging course of study if the system finds that students with a similar profile did well with a more challenging set of courses. While the tools will not replace face-to-face advising, they can give students instant feedback and encourage students to take control of their own education by being able to run scenarios that return success probabilities. Similarly, these tools can help advisers identify students early on who need additional help and tailor their advising to the student based on a rich data set. The advising tools will continue to improve with the accumulation of student data over time and as we learn more about which factors are important for the diverse groups on campus.

A Vision for Academic Analytics at the University of Minnesota

Academic analytics has received attention in the past at the University of Minnesota. A 2009 President's Emerging Leaders (PEL) Program project on Academic Analytics [8] listed five key themes, among them the unique needs of colleges and coordinate campuses, the need for better analytical tools, and the need to increase the analytic capabilities within the University. The report built on other reports that addressed similar needs, listed challenges, and made recommendations. With the continued need for evidence-based decision making, the time seems ripe to implement a robust academic analytics framework at the University of Minnesota.

The PEL report took a very broad approach to academic analytics that encompasses all business processes within the University. While analytics can aid decisions across the University, the vision here is focused more narrowly on academics. We define academic analytics as the use of statistical and data mining tools to academic data sets with the goal of revealing trends and patterns, running scenarios, and building predictive models to improve student success through evidence-based interventions. It is important to realize that this vision goes well beyond the type of analysis that is currently carried out in the Office of Institutional Research (OIR). It will not replace this type of analysis, but rather complement it to lead to individualized education.

A small investment in additional analytical capabilities to develop individualized education could allow the University to develop a sophisticated tool kit that would produce reports and predictive models that are tailored to each college and coordinate campus, thus turning data into actionable knowledge at a local level, recognizing that not all interventions are equally effective across colleges and coordinate campuses. In addition to reports and predictive models, this new approach to analyzing student data would lead to the development of tools for advisers and students to personalize the educational experience that goes beyond what is currently available through Academic Support Resources (ASR) Pillar Applications, such as APAS, thus realizing the vision of individualized education. A central resource would be more cost-effective than developing the skill set locally since the same tools can be applied to different colleges even if the actionable knowledge differs from college to college. It would also result in a consistent approach to interpreting the data and sharing information across colleges. A close collaboration between colleges and coordinate campuses and the analytics group would provide the necessary feedback to respond to the needs of individual colleges, and result in software applications that would allow different stakeholders to explore the data.

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University Digital Conservancy: A Platform to Publish, Share, and Preserve the University's Scholarship

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Erik Moore

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Abstract

The University Digital Conservancy (UDC) is a web-based tool that provides free, worldwide access to research and scholarship contributed by faculty and staff at the University of Minnesota, including research papers, pre-prints, presentations and research data - often meeting funding open access mandates (ie. NIH, NSF). It is also a showcase for original student works -- such as dissertations, masters and professional papers, and honors theses -- increasing visibility to our teaching and learning outputs. Finally, the UDC is an institutional repository (IR) built to preserve digital university assets that have traditionally gone to the University Archives, such as department newsletters and administrative reports. The UDC software provides searchable, full-text access to deposited work that will rank highly in web search engines (like Google) and also ensures long-term access to content with permanent urls (no more broken links). This library-run repository began in 2007 and now contains over 23,000 digital works that have been downloaded over 1.5 million times. (Download stats as of May 1, 2012.)

Changing Scholarship in the Academy

Scholarly communication has undergone a rapid transformation in the digital age. Put simply, the intellectual exchange of research and scholarship in academia has exploded in volume and continues to diversify in format. Scholars publish articles as digital PDFs that can virally impact the discipline in a matter of days rather than years, books are formatted for our electronic devices rather than shelves, and researchers produce terabytes of digital data in the amount of time it takes to scribble one line in their old fashioned spiral notebooks. Who could have predicted five years ago that a "Tweet" could make or break citation impact (Eysenback, 2011)? Fortunately with all the advancements in scholarly communications, the library has advanced along with it. No longer does the University Library only house research statically on our shelves but we provide immediate access to the complex digital objects created for teaching and research, such as streaming videos and blogging tools, but also instant access to countless research articles and books from anywhere with a web connection.

All of these advances come at a cost, both technological and economical. Publishers have been the primary driver in these costs which annually rise at a pace that outstrips any market model for inflation - averaging between 7% and 9% (UMN Libraries, 2011). Rather than face a future where the University Library is unable to afford content that our faculty and researchers publish, we and other academic libraries began developing tools, called Institutional Repositories (IRs) to distribute free, worldwide access to the research and scholarship, thus leveraging the shift in publishing with modern digital library approaches (Lynch, 2003). This movement toward open access repositories has grown to include over 2000 digital repositories worldwide (DOAR, 2012).

Introducing the University Digital Conservancy

In 2007, the University Libraries launched the University Digital Conservancy (UDC). Our open access, web-based digital library was implemented with open source software called DSpace, originally

developed by MIT. The UDC contains over 23,000 digital works that have been downloaded over 1.5 million times. There are currently 83 collections in the UDC representing a diverse array of schools, colleges, departments, centers, institutes and programs at the University of Minnesota. Two of these collections are profiled below as case studies to illustrate how the UDC supports the digital frontier of teaching, learning, and research on campus.

The UDC provides three core services for campus:

(1) a venue for faculty to deposit copies of their works (articles, research data, conference proceedings) for long-term preservation and open access;

(2) a showcase for certain categories of student works, such as dissertations, Master's Plan A and professional papers, honors theses, capstone papers, and UROP projects; and

(3) a centralized, searchable mechanism to access institutional digital resources that would have traditionally gone to the University Archives.

Publishing work in the UDC provides many key benefits, including long-term preservation and far-reaching access and discovery. The UDC provides long-term preservation of digital works in several ways, such as a permanent url (PURL) for each item to guarantee no more broken citation links, and, a sophisticated preservation strategy to ensure that our digital objects remain accessible and usable over time. For example, the UDC makes a commitment to preserve PDFs if the format changes and a migration is necessary. Next, to facilitate discovery and access, the UDC allows for full-text searching of all of the digital objects in the repository, whether born-digital or digitized, through the UDC search interface. Our content is also indexed by web-based search engines, like Google and Google Scholar, making these University of Minnesota resources available to researchers around the world.

1. Faculty and Staff Self-Deposit

All university faculty, researchers, and staff may self-deposit their scholarship into the UDC. To deposit published work where the copyright may be handed over to the publisher, faculty and staff are encouraged to use the Author's Addendum (University Libraries, 2007), approved by the University Senate in 2007, to retain the distribution rights to their published works. This allows authors to deposit the full-text article to the UDC after a short embargo period of six months.

The primary value for scholars is the broad dissemination of their work to the widest possible audience, free via the web. Content in open access repositories, like the Digital Conservancy, have long been shown to have greater impact and receive higher citations rates than those articles behind publisher paywalls (Wagner, 2010). Another benefit to researchers, the UDC has been shown to easily meet federal funder's sharing requirements, such as the need to satisfy National Institutes of Health's Public Access Policy for final peer-reviewed manuscripts (<http://publicaccess.nih.gov/>) or the National Science Foundation's Data Sharing Policy of research results (<http://www.nsf.gov/bfa/dias/policy/dmp.jsp>). Other efforts that aim to increase public access to research, such as the Federal Research Public Access Act (FRPAA) which is gaining support in Congress (Joseph, 2012), may provide future needs that the UDC is already prepared to fill.

Case Study: The Minnesota Geological Survey Collection

The Minnesota Geological Survey (MGS) has been affiliated with the University's geology department since the 1880's. Their mission is to research and provide information about the state's geology to the public. Today, as a small non-profit publisher, the agency found it increasingly difficult to support their print distribution of maps and reports. Rather than turn to a commercial e-publishing service to

disseminate their complex digital maps and reports faster and more economically, the MGS approached the libraries to help. In 2007, we began a three-year scanning project, with the help of state digitization grants, that resulted in a digital collection of every map, bulletin, and report published by the MGS. All of the material is available in the Minnesota Geological Survey Collection in the UDC (<http://conservancy.umn.edu/handle/708>) and new publications are added continually thus creating a full-text searchable digital library and publication platform for all MGS publications. Additionally, using the UDC to its fullest extent, the GIS data files for the born-digital map publications supplement the PDF maps for broad reuse potential in research, teaching and learning.

2. A Showcase for Student Work

Student work in the UDC consists of both graduate and undergraduate scholarship. Doctoral students are given the option to publish a digital copy of their completed dissertation as are students completing Plan A masters degrees. Undergraduate scholarship is highlighted through the Undergraduate Research Opportunities Program (UROP) and the University Honors Program. Student work is also available through departmental collections including graduate Plan B theses and undergraduate work associated with research programs such as the Itasca Biological Station & Laboratories.

Case Study: The Graduate School Collection

The Graduate School was an early campus partner with the UDC. The Graduate School decided to provide an option for the depositing of electronic theses and dissertations (ETDs) directly into the repository in 2007. These submissions comprise the official, approved version of these works and serve as both the campus access copy and the permanently preserved local copy. Each ETD is submitted through the Graduate School with permission by the student to include a full-text, open access copy of their work. Submission statistics show that nearly 85% of all students elect to place a copy of their dissertation into the UDC. In many ways, this workflow has re-emphasized the role of the University Libraries in preserving the findings of original doctoral research conducted on campus as well as providing access and dissemination. For the previous fifty years, the Libraries held a physical circulating copy while the preservation copy was kept on microfilm elsewhere. In the digital world, the access copy and the preservation copy are one in the same. Since 2007, nearly 2,000 dissertations have been added to the UDC and since 2009 over 600 Plan A theses have been uploaded. These materials are available in the Dissertations and Theses Collection in the UDC (<http://conservancy.umn.edu/handle/45272>). Use statistics indicate this scholarship is widely sought after and well used. Total downloads of ETDs in April 2012 recorded 27,655 file downloads (Figure 1). This number comprised over one-third of 74,246 downloads from the UDC for the month of April (Figure 2).

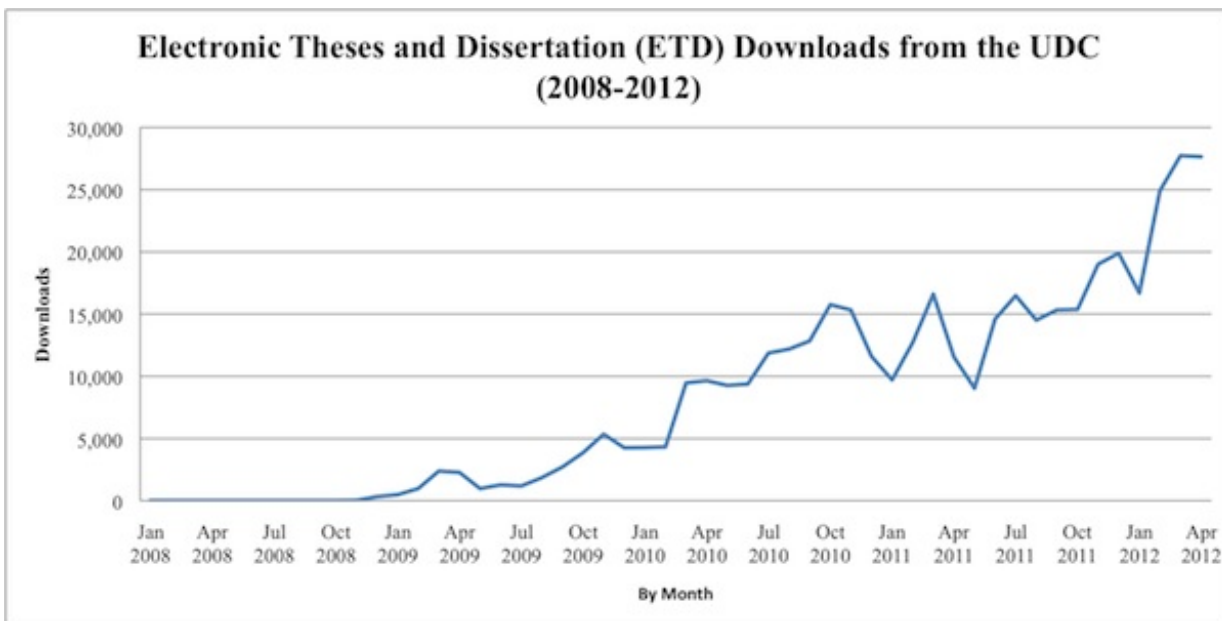


Fig 1: ETD Downloads

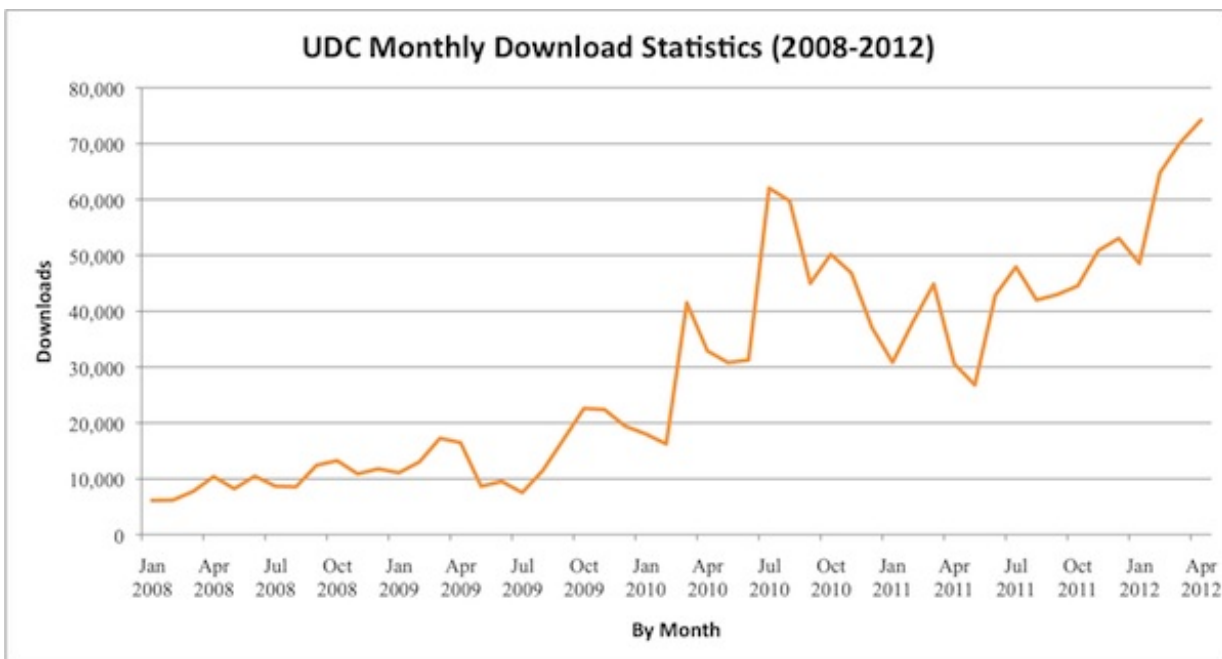


Fig 2: UDC Monthly Download Statistics, 2008-2012

3. The “Digital Arm” of the University Archives

The UDC serves as the digital arm of the University Archives, which is mandated by the Board of Regents to collect, preserve, and provide access to the historically significant and institutionally valuable documentation of University administrators and faculty. The UDC preserves and provides access to core institutional documents traditionally collected by the University Archives in paper format, but now created in digital formats. In 2005 a Presidential Emerging Leaders (PEL) report warned of the growing problem of "little archives everywhere" and their significant threat of loss for institutional records (Dunnam, 2005). The UDC emerged partially as a response to this problem as a way to allow for the distributed nature of records creation to feed into the University Archives. Examples include the direct submission of official University Senate minutes, reports by research laboratories such as St.

Anthony Falls Laboratory, and departmental newsletters and bulletins. The Conservancy also provides a central access point for a selection of high-use historical materials that have been digitized to enhance access and functionality. To date, the University Archives have digitized 800,000 pages of archival material that was previously accessible only by visiting the Archives' reading room. Many of these digitized material are paired with their born-digital counterparts to create a single access point to the institutional content regardless of the original format. The University Archives Collection in the UDC (<http://conservancy.umn.edu/handle/3>) has over 8,500 documents available for use. Examples include digital access to the full run of The Brief, the news digest for faculty and staff, and many long-standing committee minutes.

Future Roles of the UDC

Although most Americans (75%) still think of the library as synonymous with physical books, in academic libraries, e-books and online journals are becoming the norm, and library users increasingly request them over print titles (De Rosa, 2011). Academic libraries are also making more investments in online IRs like the University Digital Conservancy, for content creation as well as preserving scholarship. In a report by the Association of Research Libraries, it is noted that “A new role is emerging—that of digital curation, or attention to the lifecycle management of digital objects and collections” (Walters, 2011). While many library users may not recognize this shift, use statistics illustrate the changes, for example: in 2011 the UDC had a total of 514,973 downloads (Figure 3), while traditional print books and journals from the UMN Libraries had 296,743 checkouts (University of Minnesota Libraries, 2011). And as the UDC collections grow, download stats increase.

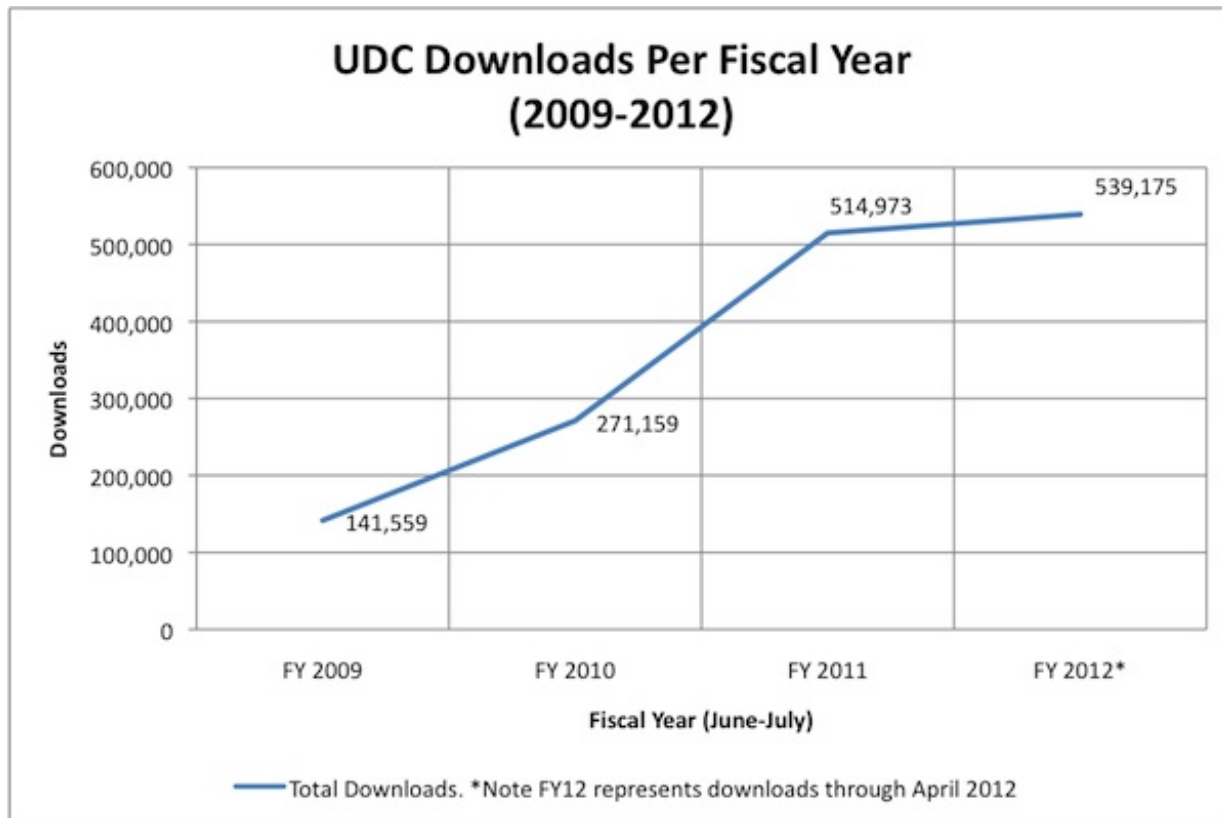


Figure 3. Total UDC Downloads by Fiscal Year, FY2009-FY2012.

As academic research changes and technology evolves, the University Digital Conservancy will take on new roles. The UDC will continue to be an online space for the public to peruse content, a platform for long-term preservation, and a venue to showcase the University of Minnesota's administrative and scholarly works. At the same time, the Libraries will invest in the UDC to provide an improved user

interface, new ways to showcase research, and utilize the latest digital preservation techniques.

Not only the UDC, but IRs all over the world are experimenting with new roles. Some examples of new roles include: research data archiving, open access publishing (at times supporting university-wide open access mandates), interoperability with partner institutions' IRs, and social networking add-ons (Jain, 2011). The UDC is already delving into some of these areas, for example, the UDC contains archived datasets from the geosciences, aerospace engineering, and more. As digital humanities programs take root in academic departments, services like the UDC will become a sought out partner to provide a research sandbox. In addition, a new software platform is in development and the UDC staff hopes to add more capabilities, services, and a more streamlined, intuitive interface.

Tracking Article Level Impact

Another area in which academia is changing, and where IRs are well positioned to contribute, is research impact measures. Impact measures have been used in tenure and promotion for decades. However, many researchers are seeking alternatives. The topic is being discussed at conferences, in journals and online in recent years. The creators of the website Altmetrics.org note that a researcher's influence cannot be shown with H-index or other citation measures alone (Priem, 2010). Research impact should be calculated by including other factors, such as pre-print/post-print download counts; data citation; social media participation; Mendeley, Zotero or other PDF sharing, and more. According to Priem, expressions of scholarship are becoming more diverse.

Articles are increasingly joined by: the sharing of "raw science" like datasets, code, and experimental designs, semantic publishing or "nanopublication," where the citeable unit is an argument or passage rather than entire article, widespread self-publishing via blogging, microblogging, and comments or annotations on existing work.

Altmetrics.org is not the only organization promoting this idea. New tools are gaining popularity, such as Total Impact (<http://total-impact.org/>), Publish or Perish (<http://www.harzing.com/pop.htm>), and Altmetric Explorer (<http://www.altmetric.com/aboutexplorer.php>).

The UDC is the perfect partner to work with academics to provide alternative metrics. First, all visitors to the UDC website, <http://conservancy.umn.edu>, can view monthly UDC download statistics at the individual article level, or collection level, by clicking on the "Stats Display" button. Second, researchers can post certain kinds of supplemental material to the UDC, such as data sets, presentations, and posters, and the permanent URL (PURL) that all UDC items receive will allow citation of the alternative scholarly output. And finally, as an Open Archives Initiative (OAI) (<http://www.openarchives.org/>) compliant IR, the UDC can publish metadata to digital libraries such as Mendeley (<http://www.mendeley.com/>) and other sites that combine use statistics to help track the popularity of the item.

Conclusion

In conclusion, the UDC is well-positioned to supporting a new era of scholarly communication and publishing, one in which libraries are digital, social networking is prevalent, research data is open, and alternative metrics are used for tenure and promotion in academia. With platforms like the UDC, the University Libraries will continue to seek out new roles while maintaining its founding principles of long-term preservation, open access, and dissemination of University of Minnesota research and education output.

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Opportunity Knocks: Dataverse as a Solution for a Small Economics Data Archive

Julia Kelly

Amy West

<http://dvn.iq.harvard.edu/dvn/dv/AgEconSearch>

Prompted by an opportunity

Preservation and reuse of data are topics of growing interest among many disciplines. Much of the discussion initially focused on the large data sets such as those generated by astronomers and computational biologists, where data can easily fall in the terabyte range.

However, there are data sets of all sizes, and many possible solutions to archiving them and making them available for use by others.

Several years ago, users of AgEcon Search, <http://ageconsearch.umn.edu/> a subject repository for full text of conference papers, working papers and journal articles, began to inquire about the possibility of archiving data. AgEcon Search has been in operation since 1994, and covers agricultural, development, energy, and resource economics. Initial interest in data came from instructors who wanted their students to have access to research papers and the related data sets so that they could learn by replicating the work of the authors.

In 2010 we responded a specific request from the Federal Council of the Australian Agricultural and Resource Economics Society (AARES). They asked if we would consider housing the data associated with the articles in their journal, *Australian Journal of Agricultural and Resource Economics*. We agreed to investigate the possibilities and report back.

Unlike some other data-rich disciplines, economists do not have large, well-established data repositories that would welcome their data. A few journals provide a Web site for data associated with the papers that they publish, although the preservation practices are often not terribly robust, and a small but growing number of countries have national repositories that economists can utilize.

An inexpensive solution

As we looked for a solution that would fit our needs, we had no budget, but we did have a librarian with expertise in social sciences data and some staff time to devote to the task.

We considered including the AARES data in the current AgEcon Search software, but this would not be ideal. We optimized our installation for text-based documents and the metadata scheme lacks fields for many elements important for properly describing data, such as time period, frequency, smallest geographic area covered, and population studied. Also, while the data would be archived for the long term, it may not be seamless to reuse it. We also had no way to link records within the software. Since we wanted records for the data which were separate from records for the articles, the ability to link was key.

After investigation, we discovered another economics document repository that had taken on a similar challenge to archive data. Economists Online, <http://www.economistsonline.org/>, based in Europe,

developed a separate site to house the data related to their documents, with links back to the papers, at <http://dvn.iq.harvard.edu/dvn/dv/NEEO>.

The Economists Online data site uses Dataverse, <http://thedata.org/> developed by Harvard's Institute for Quantitative Social Science (IQSS). IQSS maintains both a hosted site that is free to all to use, and organizations may also download and install the open source version of the software.

There are several other economics-related groups that are using the hosted version of Dataverse. They include journals, NGOs, individuals, and research groups. A complete list of those using the hosted Dataverse site is at <http://dvn.iq.harvard.edu/dvn/>

Features of Dataverse include:

- It is hosted remotely
- It utilizes appropriate standards for social sciences data
- Setting up a section in Dataverse does not require specialized knowledge
- Other economics groups deposit in Dataverse, so it is already a destination
- Data sets in Dataverse are ranked highly in Google searches
- It is free of charge, with good tech support via e-mail

Also, although the URL of any of the hosted Dataverse sites does contain the word Harvard, there is no other mention of it on the individual Dataverse sites. A group's Dataverse site may be customized easily, as we did, by adding graphics and links to visually tie the data site to the main AgEcon Search platform.

In an ideal future, large and robust data repositories for economics data may emerge, and we knew that if so, we would want to be able to export the records and data in the AgEcon Search data repository. We felt that Dataverse would afford that possibility. It uses the Data Documentation Initiative (DDI) <http://www.ddialliance.org/> as the scheme for metadata, which is standard practice for social sciences data.

Small beginning for data archiving

Although data archiving is in its infancy in many of the sciences, social scientists have been working on the associated issues for the several decade. There is still much progress to be made, and we hope that the AgEcon Search Dataverse site is a small contribution to that effort.

When we agreed to work with the data from AARES and their journal, we had no idea how large the adoption would be. If the adoption rate was low, then a large investment of time and energy wouldn't have been appropriate. On the other hand, we wanted to get the most out of the work we did do and to find a solution that would be flexible and allow for growth into the future.

The data sets that economists use are not always available to be shared publicly. Some may contain proprietary corporate information or material that would compromise personal privacy. In some cases, they use data that is already in the public domain, such as government-produced data. A few authors that we contacted were not interested in sharing particular data sets yet, since they were planning to do further analysis and publish additional papers. As a result, the adoption rate has been low among AARES authors, but we now have a platform with which we may approach other AgEcon contributors.

With over 250 groups contributing their documents to AgEcon Search, a next step is to offer them the possibility of including data related to their papers in Dataverse. We will be able to note the growing

interest in the reuse and archiving of data as well as the relative ease of making the data ready for inclusion. There is also a growing body of research, including papers by Piwowar and Henneken, that conclude that papers are cited more often if the data behind the work is freely available (1,2).

Figure 1. A record for a document in AgEcon Search

AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

AgEcon Search
University of Queensland
School of Economics
Social Economics, Policy and Development Working Papers

Please use this identifier to cite or link to this item: <http://purl1.uq.edu/123455>

Title: Poverty and Social Deprivation in Botswana: A Rural Case Study

Authors: Moseping, Pelotshweu T., Tiedell, Clem A.

Authors (Email): Moseping, Pelotshweu T. (pelotshweu@gmail.com), Tiedell, Clem (ctiedell@economics.uq.edu.au)

Keywords: Poverty, Botswana, gender inequality, education

Issue Date: 2006-11

Series/Report no.: Social Economics, Policy and Development 45

Abstract: Poverty and social deprivation in Botswana are rising in rural areas while they are declining in urban towns and villages. Revenue from diamond mining is thought to have made a significant contribution to reducing poverty levels in cities and urban villages. However, the benefits from diamond revenue are perceived to have not reversed trends in rural poverty. In this study, contingency tables and chi-square tests are used to determine whether there is an association between the gender, educational status, and age of household heads and whether or not they believe their household is in the 20% of the least well-off households, in their selected rural village, Nshakasthoge. Such less well-off households if not in absolute poverty, are likely to be in comparative poverty. The results indicate that the gender of the household head is associated with household poverty in this village. Furthermore, the age of the household head is; the older is the household head, the less likely is the household to be in relative poverty. The relationship between the level of educational attainment of the household head and whether or not the head stated that their household is in the 20% least well-off in the village is almost the same for those with primary education or less and those who had completed secondary education but becomes significantly different when the household head has achieved tertiary education. Furthermore, household heads with higher levels of education compared to those with less education more frequently said that their economic situation had improved in the last ten years.

URI: <http://purl1.uq.edu/123455>

Identifiers: ISSN: 1442-8563

Institution/Association: University of Queensland-School of Economics-Social Economics, Policy and Development Working Papers

Total Pages: 23

Collections: Social Economics, Policy and Development Working Papers

Figure 2. A record for a data set in the AgEcon Search Database

CATALOGING INFORMATION | Data & Analysis | Comments | Versions

If you use these data, please add the following citation to your scholarly references. Why cite?

Data Citation: Peter Nuthall, "Replication data for: Modelling the origins of managerial ability in agricultural production", <http://hdl.handle.net/1902.1/17844> Australian Agricultural and Resource Economics Society [Distributor] V3 [Version]

Original Publication: Nuthall, P. (2009). Modelling the origins of managerial ability in agricultural production. *Australian journal of agricultural and resource economics*, 53(2), 413-436. doi: 10.1111/j.1467-8489.2009.00459.x

Description: The efficiency of production from a farm's land, labour and capital is critically dependent on the ability of the farm manager. Yet, while there are studies correlating a wide range of manager-related variables with returns, and, therefore, probably ability, little understanding of the basic determinants of managerial ability exists. Questions such as 'what is the importance of a farmer's family experiences and training in determining the farmer's managerial ability?' need answering. The solution to this, and other, questions will enable determining ways of improving farmers' inherent ability developed both in early, and later, life. In that most decisions on a farm are made intuitively, in contrast to the use of a formal analysis, improving farmers' inherent ability will have a significant payoff. The research reported here uses data from a large stratified random survey of 740 developed farmers (29 per cent had tertiary education, 30 per cent had 4 or more years secondary education) to create a structural equation model of the determinants of managerial ability. The results suggest that a farmer's exposure to experiences is a significant factor in ability, as is the farmer's management style and the family influence on early life experience.

Keywords: Farm management, Labor and human capital (AgEcon Search categories)

Topic Classification: M110, Q120, Q130 (JEL Codes)

Time Period Covered: 2006

Country/Nation: New Zealand

Geographic Coverage: All of New Zealand

Unit of Analysis: Individual farmer

Universe: Farmers in New Zealand

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Julia Kelly <jkelly@umn.edu>

Julia Kelly is a science librarian at Magrath Library at the University of Minnesota and the co-coordinator of the AgEcon Search database. Julia initiated the AgEcon Search Dataverse project and hopes to expand it to additional journals that are currently part of AgEcon Search.

Amy West <westx045@umn.edu>

Amy West is the Data Services Librarian at the University of Minnesota Libraries. Amy provided expertise in social science data management tools and metadata schema and hopes to take the lessons from this project and apply them more broadly across the University of Minnesota for other small-scale data management projects.

Technology Across Borders: Online Resources to Support Multilingual Writers

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Debra A. Hartley
Kimberley A. Strain
Zachary Pierson
Daniel Balm
Johanna Mueller
Katie Levin
Maija Brown
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Linda Clemens
Mitch Ogden

<http://writing.umn.edu/sws/multilingual.html>

As increasing numbers of multilingual writers from across the disciplines have sought consultations in the Center for Writing's Student Writing Support (SWS) program, we wanted to ensure that our instructional resources were accessible to as many students as possible. We hoped that student writers would be able to learn about the Center at their own pace; that writing consultants and students could share a common language and set of strategies to teach and learn some of the trickiest aspects of writing in English; and that all members of the university community would begin to see the diversity of writers who brought meaningful skills, strategies, and experiences to the teaching and learning of American academic writing conventions. We chose to capitalize on multimedia and interactive technologies to create new online tools and resources needed by student writers, SWS writing consultants, and other instructors on our campus.

Through consultation with instructors, and after surveying our multilingual clients about their favorite online tools for writing (dictionaries, online handbooks, ESL-focused websites, etc.), our "Technology Across Borders" (TAB) team focused on three projects designed to increase access to SWS:

1. creating two "class visit videos" to replace our popular in-person informational class visits, which we agreed took up too much of our limited instructional time;
2. interviewing multilingual writers and instructors from around the globe and across the disciplines to learn about their experiences developing fluency in American academic English (a project heavily inspired by Oregon State University's powerful Writing Across Borders video); and
3. developing an instructional module to support the teaching and learning of when to use articles (a/an, the, or no article) in English—something writing consultants needed to learn to do better in our one-to-one sessions, and something that requires substantial independent practice on the part of English language learners, especially those writing for academic purposes (Biber, Conrad, and Leech 67; Holt 242; Swales and Feak 289).

Such ambitious and challenging projects were made possible by two summer funding awards, along with the Center for Writing's already strong culture of inquiry, reflection, and collaboration to improve our

practice. Financially, a College of Liberal Arts Student Technology Fee grant of \$12,500 enabled us to purchase basic video and audio recording equipment and, most importantly, to hire three graduate and three undergraduate writing consultants and our undergraduate student technology specialist for the summer. The Department of Writing Studies also provided summer funding for one of the Center's Non-Native Speaker (NNS) Specialists, who holds a Master's degree in Teaching English to Speakers of Other Languages (TESOL). She both provided the necessary expertise to help us address the challenges faced by multilingual writers and connected us to the students and instructors who could help us build relevant resources. We also relied on the Center's many cross-campus collaborations with instructors directly and indirectly involved in teaching multilingual writers campuswide, including those in First Year Writing, Second Language Studies, and the Minnesota English Language Program. Interdisciplinary collaboration was also a major asset within the Center for Writing, where our student and professional technical specialists understood both our mission and the needs of multilingual writers and used their collaborative energy and computer programming expertise to help us fulfill our vision for this project.

Class Visit Videos

Recognizing that most students first access Student Writing Support (SWS) via our website, we knew that video would be a powerful tool to educate our users about what we do and to show our Center as a place for all student writers. As we say in our print publicity, "Everybody Writes!" For inspiration, the class visit video team searched for promotional writing center videos on YouTube and looked at our own "about SWS" handouts and web pages. Initially, we thought we would film a conversation between a consultant and a prospective client, explaining appointments and what to expect during a consultation. It soon became clear, however, that this format would really only be friendly to someone who was already familiar with SWS—not the student writer new to SWS (and perhaps new to the University of Minnesota and to American higher education in general).

Despite the long list of things we hoped to include in the video, we soon realized that the product would have to be short (no more than three minutes long), concise, and carefully focused. When we realized that it was impossible to create one video to do everything, we decided to create a series of brief videos beginning with one offering basic information on how we work with students and a second one specifically for multilingual writers. We began to work collaboratively on a short, carefully-written script using GoogleDocs, simultaneously creating a two-page, single-spaced "wish list" of images for the two videos. For the first video, for example, we wanted to tell the story of a student walking into our main space in Nicholson Hall or our walk-in space in Appleby Hall, so we wanted photos of each space from the hallway and the doorway, of students working with consultants in both spaces (looking at an assignment, at a paper with teacher comments, at a computer screen), of students talking to the attendant in Nicholson, and of a student signing in in Appleby. To capture these images, we staged a "photo shoot" with multiple photographers and videographers and filmed a culturally and linguistically diverse group of students interacting with writing consultants in the Center. This improvisational activity generated hundreds of images, but rather than overwhelming us, these spontaneous images inspired creative connections with the existing script, bringing it to life as a "visual story."

To create the videos, we taught ourselves iMovie, which we discovered to be fairly easy even for novices like ourselves, selecting and arranging video clips and pictures to work with our script. We did a lot of experimentation with the images, timing, transitions, and effects—sharing even our roughest cuts with the entire TAB team for feedback. Our process was clearly not the most efficient from a video editing standpoint, but it was ultimately extremely collaborative and positive, motivating us to improve the videos by taking more photos, capturing relevant screenshots, creating and recreating graphics, and revising to make the videos the best they could be. Once finished, we produced multiple derivative versions (such as embedded flash, quicktime, and other formats) using an in-house media

management tool called MediaMill. They can be seen on <http://writing.umn.edu/sws/multilingual/>.

Multilingual Writers Voices Videos

As the number—and diversity—of multilingual writers at the University of Minnesota has grown dramatically in recent years, our Student Writing Support (SWS) staff has sought to understand these writers' needs and to expand our pedagogy, both to meet those needs and to share their insights and experiences with the wider academic community. Drawing our original inspiration from Oregon State University's Writing Across Borders video project, we decided to interview fourteen multilingual writers across the disciplines and levels at our university, as well as experts in second language instruction and writing, to learn more about their experiences learning or teaching American academic English.

Through personal contacts, we recruited both undergraduate and graduate students and paid each for a one-hour video interview. These semi-structured interviews addressed cultural differences these students experience between writing in their home countries and the United States, their individual writing processes and anxieties, where and how they find support for their writing, professor expectations, and advice for their fellow students on what learning to write in an American university feels like for multilingual writers. Our interviews with experts in second language instruction and writing included a similar set of questions, but with greater emphasis on their experiences teaching and supporting multilingual writers.

Using iMovie's Keywords tool (an advanced tool available in Preferences that enables tagging clips with multiple keywords and filtering by keyword), the Multilingual Voices video team identified and organized the video clips according to our interview topics, as well as some that we had not anticipated when we drafted our interview questions. For example, a lecturer in the Department of Asian Languages and Literatures described for us her own research on writing anxiety and the tendency among Non-Native English Speakers to "pretend" understanding as a way to build social relationships with Native English Speakers. Although the richness of all the interviews made daunting the process of deciding what to edit out, we were able to select what we thought were the strongest moments of each interview as we edited the raw 30- to 45-minute interviews down to five- to ten-minute videos. Throughout the process we sought feedback from the full TAB team during informal screenings. This reflexive process helped us not only to improve our video-production skills but also to revisit the goals of the project and decide what would be most useful to students and instructors who watched the videos. Once the editing process was finished, we transcribed the videos, wrote short biographies and summaries for each interview, and used Media Mill to upload everything to our SWS website at <http://writing.umn.edu/sws/voices>.

Articles Online Tutorial

During the same time we were creating the above videos, several members of the TAB team were busy creating the articles online tutorial—a self-study module in which students learn about "a," "an," and "the," three of the hardest words in the English language for multilingual writers (Biber, Conrad, and Leech 67; Holt 242; Swales and Feak 289)—now available at <http://writing.umn.edu/sws/articles>.

Chapters (approx. 16 minutes)

1. Introduction
2. Proper vs. Common Nouns
3. Common Nouns: Unspecific vs. Specific
4. Common Nouns: Unspecific Countable vs. Uncountable
5. Common Nouns: Unspecific Countable Singular vs. Plural
6. Common Nouns: Specific
7. Review
8. Exercises
9. Common Nouns: Two typical Patterns of Error
10. Dealing with Exceptions
11. Getting More Information about Articles

Play >

Hide captions

Volume:

Mute

GLOSSARY

indefinite article
a word that represents a person, place, or thing but is not the name of that person, place, or thing

non-specific noun
a person, place, or thing that does not have a unique identity or is being mentioned for the first time in a text

specific noun
a person, place, or thing that has a different identity—e.g., it has already been mentioned in the text. It is identified by providing information that makes it specific. It is unique, not so on.

countable noun
a person, place, or thing that can be counted as either singular or plural

uncountable noun
a person, place, or thing that can only be counted as singular, not plural

For additional examples and explanations, visit a grammar handout designed for non-native speakers of English.

Although we had “quicktips” handouts to help teach article usage, we recognized that multilingual writers, SWS consultants, and other instructors needed more explanations, examples, and exercises to learn how to use articles and to teach about article usage. Using articles in English is not something native speakers think about; identifying and explaining the complex set of rules underlying article usage is specialized knowledge that is hard for all of our consultants to teach consistently well, even our NNS specialists. And because there are often larger writing issues—such as purpose, audience, and organization—to address during writing consultations, we wanted to create an articles tutorial that students could use independently and at their own pace. Based on our conversations with colleagues in our regional writing centers organization and through meetings of the Committee on Institutional Cooperation: Writing Centers group, we assumed that instructors and writers outside of SWS and outside of the University of Minnesota would have similar needs.

The creation of the online tutorial involved overlapping stages, marked by periods of full-group brainstorming and planning, intensive small-group collaborations, and reaching out to students and colleagues for help. In the first stage, we assessed our existing quicktips on article usage and revised them extensively after doing research and seeking feedback from campus experts in language acquisition. During that same time, we brainstormed possible instructional animation technologies after seeking inspiration from the writing centers at Walden University, Capella University, and Michigan State University. Based on their research, the technology specialists began learning Inkscape and SVG for graphics; audacity and SoundManager2 for audio; and jQuery + plugins (JavaScript) for webpages. In collaboration with the rest of the tutorial team, the student technology specialist began by storyboarding the tutorial content, dividing it into chunks, or “chapters.” Because the tutorial script was changing as the animation was being created and reviewed, he focused on the visual elements, leaving the audio for later when the script would be finalized.

Recognizing that we wanted the exercises portion of the tutorial to show examples typical of the writing undergraduate and graduate students brought to our Center, we collected actual student texts from previous students and NNS consultants, making sure to document the students’ informed consent. We

also recruited a former writing center colleague who had received voice training with the Guthrie Theater to be the voice in the tutorial and the two SWS class visit videos. She met with the technology experts to learn how to record using the Center for Writing's equipment and worked closely with the team leads to record multiple versions of the scripts.

Once the tutorial script was complete, the NNS Specialist and the student technology specialist began an extensive phase of development, testing, and revision. As the student technology specialist read the script over and over in his process of creating the SVG animation, he was able to point out parts that seemed unclear or needed more information, leading the NNS Specialist to make further modifications in content. The TAB team was brought in to work through content and animation decisions and make sure that there was consistency between the quicktips, the online tutorial, and its exercises. The student technology specialist did painstaking work to sync up the animation, the voiceover, and the closed captions in order to make the tutorial accessible to all users.

Conclusions

Approximately eight months after the team was brought together, all the new online tools created during this project were live and advertised to SWS users, SWS consultants, and to teaching staff and faculty at the University of Minnesota. As of May 2012, analytics showed that they had all been accessed many times:

- General SWS class visit video: 1,278 hits
- Multilingual students SWS class visit video: 363 hits
- Voices of Multilingual Writers videos (11): 1,435 hits
- Articles self-study animation: 470 hits (as of Nov 2011)

Given students' and instructors' positive reception of these online resources, we believe we are meeting their needs and intend to create more resources. Yet we recognize it takes more to convince people to not just browse the web pages, but go deeper by watching the videos and talking about them with others, and by practicing with the articles tutorial. We want to help students figure out how to use the tools with each other and to help teachers figure out how to use them to supplement their own writing instruction.

Although we began our Technology Across Borders project with the goal of supporting multilingual writers on our campus and elsewhere, we found that we learned much more than we could have imagined about writing, our clients, ourselves, and the vast wisdom of multilingual writers. Studying the assessment results from our clients and their instructors helped us to understand and focus on what they really wanted and needed from us, as opposed to what we thought they needed. As media production novices, we gained hands-on experience with iMovie, iPhoto, Audacity, and other useful programs, finding that we could create together something we could be proud of. We were reminded how multimedia composing is similar to writing: it demands our awareness of audience and purpose and requires drafting, seeking feedback, revising, and editing (and editing and editing). Working on the videos and the tutorial led us to reflect on our own practice as we translated our one-to-one pedagogy into visual and verbal texts. And as we listened repeatedly to the interviews we conducted with multilingual writers, we were inspired by the honesty with which they conveyed their experiences and their insights about American academic writing. Having their faces and voices on the Center's website shows explicitly how the Center is a resource for all students, one that respects diverse perspectives and experiences.

Kirsten Jamsen <kjamsen@umn.edu>

Director of the Center for Writing, Kirsten initiated this project by writing the original CLA Student Technology Fees grant, recruiting the team, designing assessments, and securing funding for Center's Non-Native Speaker Specialist to serve as a content expert. She facilitated meetings of the full team and participated as a thinking partner and test audience for all of the online tools.



Debra A. Hartley <hartley@umn.edu>

An Assistant Director in the Center for Writing, Debra is one of the directors of Student Writing Support and is the Center webmaster. She led the SWS class visit video team for this project and put all of the videos online.



Kimberley A. Strain <strai004@umn.edu>

Kimberley, a Non-Native Speaker Specialist, is a senior lecturer in the Writing Studies Department and a writing consultant in Student Writing Support. Kim led the articles project team, recruited undergraduate and graduate multilingual writers, collected writing samples, and consulted as a content expert on all aspects of the project.



Zachary Pierson <piers104@umn.edu>

Zack is a writing consultant and a graduate student in the Literacy Education PhD program in the Department of Curriculum and Instruction. He co-led the Multilingual Voices video project, recruiting participants, conducting interviews, and editing (lots of) video.



Daniel Balm <balmx005@umn.edu>

During this project, Daniel was the Center for Writing's student technology specialist. He mastered Scalable Vector Graphics and Inkscape in order to create an attractive, interactive articles tutorial that did everything the team wanted it to do (even when we didn't know what we really wanted).



Johanna Mueller <muell421@umn.edu>

During this project, Johanna was a writing consultant working on her undergraduate degree in Elementary Education. She participated in both the SWS class visit videos and the Multilingual Voices video project as script writer, editor, student talent recruiter, and interviewer.



Maija Brown <brow0723@umn.edu>

Maija is a writing consultant and a PhD candidate in Theater & Dance History. She was a co-leader in the Multilingual Voices video project, recruiting participants, conducting interviews, and editing video.



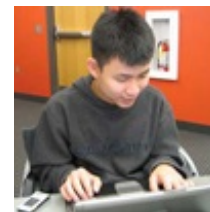
Katie Levin <kslevin@umn.edu>

An Assistant Director in the Center for Writing, Katie is one of the directors of Student Writing Support. Besides participating in initial brainstorming and planning sessions, she worked closely with Kimberley to revise and expand SWS's print resources on articles, and she collaborated with the Multilingual Voices video team to select and organize interview responses.



Huy Hoang <hoang027@umn.edu>

As a College of Liberal Arts technology specialist during this project, Huy advised and educated the team on appropriate technologies to meet our goals. He supported Daniel as he learned new technologies and helped with the technical polishing needed to publish our videos and tutorial online.



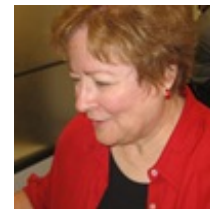
Farha Ahmed <ahmed134@umn.edu>

During this project, Farha was a senior with a major in Linguistics and a minor in Teaching ESL. She co-wrote and co-edited the class visit scripts and videos.



Linda Clemens <cleme017@umn.edu>

During this project, Linda was a writing consultant and a PhD student in the Department of Writing Studies. She was part of the original brainstorming team and lent her expertise in technical writing and instructional design to the articles online tutorial.



Mitch Ogden <ogden@umn.edu>

During this project, Mitch was an Assistant Director in the Center for Writing and the coordinator of the Center's Teaching with Writing program for instructors. He facilitated the initial brainstorming and planning process, helping the team define the project's



pedagogical goals and align them with appropriate technologies.



The Cloud Curriculum: Using Web-based Technology to Diversify the Conversation and Build Consensus toward Curricular Revision

Jude Higdon

Charles Taylor

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Introduction

Particularly in administration, we are often slow to adopt new tools and methodologies, in no small part, we believe, due to the anarchical nature of the academy. We all have a range of activities vying for our intellectual and professional attention, and often our ability to evaluate and implement new tools and techniques is reserved first for our research and, perhaps, teaching. Considering innovation in the administrative activities of our work often takes a distant third place, and therefore tends to stagnate, even in the face of obviously superior models. For a variety of perhaps compelling reasons, we have clung to our increasingly antiquated models for storing, sharing, and collaborating on work in the business of the academy, sometimes despite the seemingly obvious benefits that moving to newer models of collaboration would afford.

As is so often the case, our College of Pharmacy found that necessity was the driver of adoption. In 2011 we found ourselves in the fifth year of a protracted curriculum revision process, and, despite yeoman's work on the part of numerous collegiate committees and individual faculty members, we were continuing to struggle to a path of clarity and implementation. With accreditation demands looming and a broad, general consensus among our more than 100 faculty and our senior administration for the need for curriculum revision, we were struggling less with the "why" questions and more with the "how", particularly among the administrators (of which the authors are two) charged with shepherding this process forward.

A number of common questions and concerns began emerging. First, it was clear that those who did not sit on the committee were struggling to make sense of the huge amounts of information that was being shared with them about the curriculum effort. While individual faculty members had proposed models and then even more detailed specific courses, the sheer amount of data that was being shared, along with the inconsistency of format among the various documents that were being developed by individual faculty or small faculty teams for proposed new courses, made it difficult for people to understand where the process was really headed, overall. Additionally, gathering feedback was an obvious challenge. Lunchtime meetings and large faculty assemblies provided an opportunity to provide updates and to hear concerns and suggestions from a few individual members, but these did not provide a sufficiently robust, interactive, democratic mechanism by which to engage in an ongoing discourse as the revision effort proceeded. People's schedules are busy, and if they were unable to attend the meeting, they missed critical milestones in the process. Similarly, even when they did attend, the reality of a large faculty coming together to discuss weighty issues with plural challenges meant that not all voices could be heard in a full day retreat, let alone in a 90-minute meeting.

We diagnosed these challenges in two major ways. First, we had a cognitive load issue (van Merriënboer and Sweller, 2005). We needed a mechanism by which our faculty could have access to an up-to-date project plan that allowed them easily and relatively effortlessly to get a quick overview of the broad work that had been done, with answers in a readily digestible format to the most frequently


asked questions, but also to have the ability to delve more deeply into specific areas of interest when they felt they understood the broad picture. Second, we had a faculty engagement challenge. We needed a mechanism by which faculty could participate at their leisure, provide their input just-in-time, and engage in an ongoing dialogue to feel confident that their concerns were being appropriately addressed. To use Vroom's (1964) expectancy/valence model of motivation, we needed to create a mechanism where faculty felt expectancy that their participation would have an outcome, and value for the outcome that they expected -- in this case, the expectation that, if they chose to participate, they would be able to understand where things stood and contribute their thoughts for improvement and refinement, and a values belief that their recommendations would improve the overall direction for the new curriculum.

Methods

Step 1: Reducing Cognitive Load: Using LowActivation Energy, Cloud-Based Tools as an Organizer

Our first goal was to set about reducing cognitive load among our faculty so that the work that was done, as well as the work that remained to be done, was clear. To accomplish this goal, the senior leadership of the College, working in conjunction with the Curriculum Revision Steering Committee (CRSC), decided to create an online, interactive web site using a series of Google Docs. Google Docs is a fully online, collaborative suite of tools that allows for real-time, collective work on word processing activities, spreadsheets, presentations, and other types of files. For this project, we used primarily just the "doc" feature, which is analogous to Microsoft Word -- but created and edited online.

First, we created a simple table with four columns for each year of our proposed new curriculum which housed some very basic information about the current state of the proposed new curriculum as a whole (see Figure 1). What courses were being proposed for fall semester of the first year? How many hours were currently assigned to each course? How many total hours were we at for the entire semester? These were some of the pressing, high-level questions that our faculty expressed broad interest in knowing more about.


 UNIVERSITY OF MINNESOTA
 College of Pharmacy
 Driven to Discover™

Curricular Revision Steering Committee
DRAFT Revised Curricular Framework
 * Please note: These courses/modules are lists of topics and are not intended as syllabi
[How do I add comments to a page?](#)

Year 1

Fall Courses	Hours	Spring Courses	Hours
Drug Delivery 1	40	Drug Delivery 2	40
Principles of Biochemistry	45		
Cellular Physiology and Molecular Genetics strategically aligned with Principles of Biochemistry	37	Immunology	28
Foundations of Social and Administrative Pharmacy	35	Medical Microbiology	21
Foundations of Pharmaceutical Care	30	Foundations of Pharmaceutical Care	30
Becoming a Pharmacist	69	Calculations	8
		Principles of Medicinal Agents	35
		Principles of Pharmacology	39
		Introduction to Pharmacotherapy with integrated SA/PH and public health content	48
Pharmaceutical Care Skills Lab	48	Pharmaceutical Care Skills Lab	48
Experiential Education	50	Experiential Education	50
Total Fall Hours:		Total Spring hours:	

*To Include 30 hours of integrated educational experiences from [Domain areas](#)
 50 hours of Experiential Education hours represent 1 credit of experiential education. Framework

Whitman Beak
9:58 PM Apr 11

I am concerned about the lack of time devoted to literature evaluation skills in the first year. A total of 15hrs for both semesters of Foundations of PCare for Drug Information Resources AND Drug Lit Eval foundational skills. This is not enough! We need to increase.

[Show more](#)

whitmanbeak
9:58 AM Apr 18

Hi [redacted] I agree. Is part of this a syllabus writing issue? For example, in the current Med Micro course (still first year in the revised curriculum) the students are given 2 lit review writing assignments. If the same instructors teach this course in the revised curriculum it is likely.

[Show more](#)

Whitman Beak
4:32 PM Apr 18

Hello [redacted] this is a great idea!

Figure 1: College of Pharmacy Curriculum Revision, Overall Framework

Figure 1 shows the constantly evolving overview page for the first semester of the proposed new curriculum. Each course title linked out to another Google Doc page, the Course Detail Page, with both an overview and details about that specific course (see Figure 2).

At the top of each e created a template of some of the most common questions that were emerging through ongoing discussions with faculty and developed a template designed to answer these questions, which

The top of each Course Detail Page included a section titled “Course Name at a glance”, which included a template outlining some of the major questions that were commonly asked by our faculty about each course (see Figure 2). Among these common questions were:

- Who are the faculty “owners” of the course? Who is making the proposal outlined in this page, and how can I contact them with questions or suggestions?
- What topics will be covered in the proposed course?
- How many hours are being recommended to cover each of the topics?
- What competency domains and scientific foundation topics (accreditation-based) are mapped to each proposed topic?
- What prerequisite knowledge (courses or topics) are needed for this course?
- What courses or topics does this course serve as a prerequisite for?
- What, if any, integrated content will be used in this course?

Additionally, the faculty owners of each course were able to provide narrative detail about the course in whatever format they chose, available at the bottom of the page, after the standardized “at a glance” portion of the page.

Introduction to Pharmacotherapy ☆

File Edit View Insert Format Tools Table Help

Normal text Arial 10

Introduction to Pharmacotherapy at a glance

Contact within the faculty: [Dr. John](#), [Dr. Robert](#), [Mark B. Piles](#), [Tim Larson](#), [Sharon Best](#), [Jennifer Gomez](#)

Topics	Hours	Competency Domains	Scientific Foundation Topics
Drug Information Resources	3		
Approach to Drug-Drug Interactions	2		
Interpretation of Lab Values	2		
Assessment of Kidney Function	2	2.0, 2.4, 2.5, 3.5, 3.6, 3.7, 3.8, 6.0, 6.1, 6.2, 6.3.2	
Assessment of Liver Function	1		
Anemia (iron, B12 and folate deficiency anemias)	0	WSP: Could move to second year in Nutrition course; would fit well in with last topic (Vitamins and Minerals as Therapeutic Agents)	
Oral Antibiotics	10		
Vaccines	6		
UTI	2		
Cough-Cold	3		
GERD/PUD & Helicobacter	3		
Diarrhea & Constipation	3		

Sharon Best (PharmD)
3:54 PM Apr 10
Could this course be Introduction to Pharmacotherapy/Becoming an Intern? I like how it focuses on the things they're going to need to know for their first summer. However, what they need to know is bigger than just the pharmacotherapy. We need some [more detail on the lab values](#).
[Show more](#)

Sharon Best (PharmD)
1:29 PM Yesterday
Uden: We (who ever that is) need to talk about where material related to becoming an intern be located. This should not be dropped.

Sharon Best (PharmD)
3:58 PM Yesterday
Agreed. Some of this is currently presented in lab. This year we also added a lecture on the basics of how to be an intern in MN, including legal issues, how to protect themselves, looking for learning opportunities on internships and IPPEs, etc.

John Piles (PharmD)
1:42 PM Apr 10
Agree, the title is a little confusing. I thought the course was going to be more related to how to approach pharmacotherapy rather than community pharmacotherapy conditions. As it is, I am confused by the amount of time

Figure 2: Google Doc, “Introduction to Pharmacotherapy at a glance” Course Detail Page

Step 2: Democratizing the Conversation: Using Online Tools to Engage Faculty

Our second major area of diagnosis for the course was the issue of faculty engagement: that is, creating a mechanism by which everyone could participate in an ongoing, relatively easy way. We have over 100 faculty in our College, so even in the best of circumstances, when we would host required, all day meetings, we got to hear only from a relatively small minority of our faculty.

We were able to use two cloud-based tools relatively effectively to “democratize” the conversation around the Curriculum Revision efforts. First, using the Google Docs site described in the section above, we were able to encourage faculty to visit the course pages at their leisure and to add comments to those pages that they did not “own”. The comments appeared in the right-rail of each Google Doc (see Figures 1 and 2), and created a robust, easy-to-use mechanism to facilitate ongoing dialogue about the courses that were being proposed and the various aspects of the revision process as they emerged.

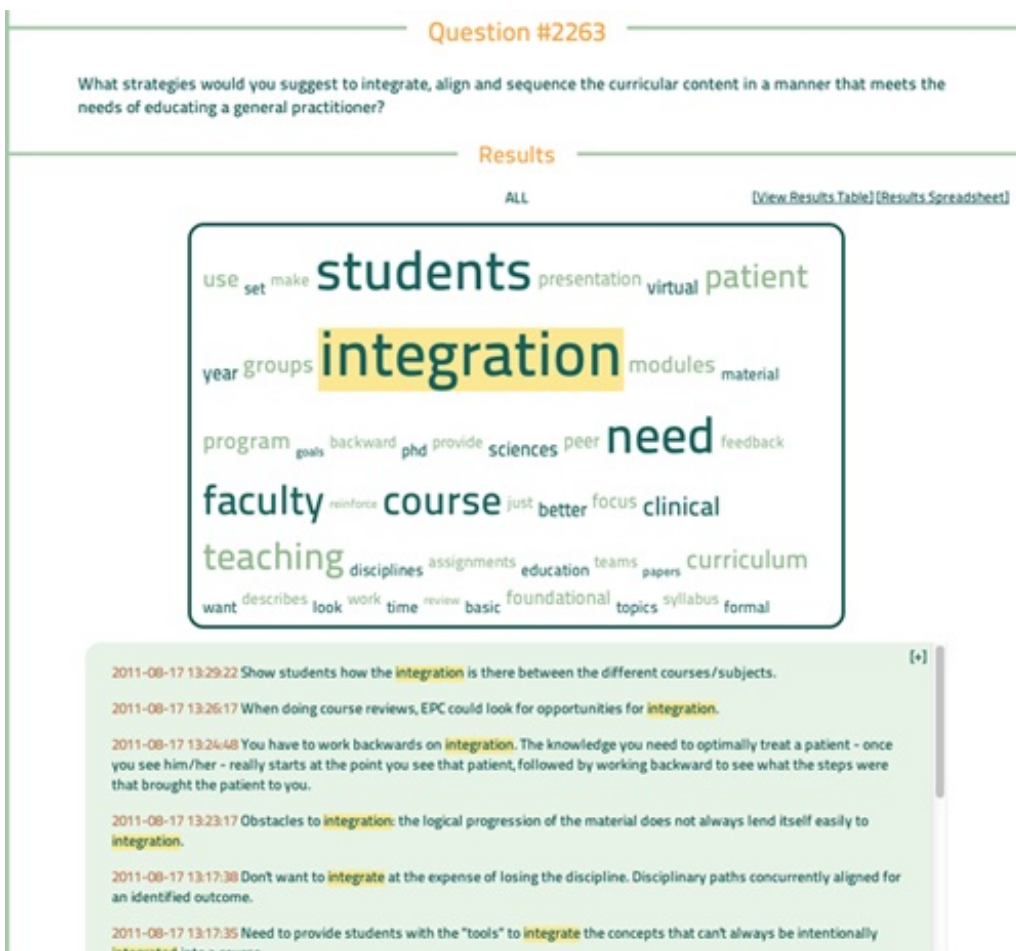


Figure 3: ChimelN Feed from the Faculty Retreat, sorted by word “integration”

We also used a cloud-based tool to add richness and additional points of feedback during our face-to-face meetings. During our summer 2011 faculty retreat, which was focused entirely on curriculum revision, we used a text-based, cloud-based audience response tool called ChimelN to allow faculty to pose questions or make comments throughout the entire day of presentations and discussions, rather than just at specified moments. The ChimelN tool then creates a Twitter-like feed of all of the responses, and also takes all of the responses and creates a word cloud of them (see Figure 3). By clicking on a word in the cloud, one can sort the feed to see just those responses that contained the selected word -- for example, “integrate” or “integration”.

Outcomes

As of this writing we have received more than 220 individual comments made by faculty on courses for which they are not considered the “owners”; many of these include weighty, complex ideas that have led to a rich debate about the nature of the suggested courses. We believe the richness and the sheer volume of this discussion suggests, at least preliminarily, that our approach has been working, at least to some degree, to engage the faculty in an ongoing dialogue about the curriculum revision process.

Similarly, during our faculty retreat, we received more than 350 individual “chimes” or instances of free text feedback from our faculty, which provided us a rich data source to mine both at the meeting and ongoing to get a sense of how the faculty were feeling about the curriculum revision process overall. We believe it is undeniable that this represents significantly more instances of feedback than we could have possibly hoped for without the aid of technology. The chairs of our Curriculum Revision Steering Committee have indicated that they have found the archived chimed data very helpful in guiding their understanding of the major concerns of the faculty, broadly speaking.

Conclusions

Using a cloud-based model to support our faculty in the curriculum revision process has proven efficacious in a number of key ways. First, we believe that it has allowed us to reduce cognitive load by allowing faculty to view the entire curricular plan online in a way where they can follow their paths of interest, ask questions in real-time, and, when appropriate, make changes to the online materials. It has also reduced administrative load; the need for an individual person to serve as the “point” person to collect individual MS Word documents by email and collate the responses is functionally gone in this model, as everyone is working on the same Google document in the cloud. We have also increased the opportunity for providing feedback, thereby, we believe, increasing engagement among our faculty. Rather than having to wait for face-to-face meetings that occur monthly or even semesterly, faculty can go online and join in the discussion at their leisure, taking as much or as little time as they wish to add their thoughts, respond to their colleagues, or make changes to the content for which they are owners.

Finally, while we have no empirical evidence for this, our qualitative assessment is that this approach has promoted a sense of goodwill among the faculty. Tensions can run high during these processes, and we have found that the online discussion has created something of a pressure valve to allow faculty to articulate their concerns in an offline mode. Face-to-face meetings are richer and seem to be starting from a more progressive stance than they were prior to our use of these tools.

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design, 3) assessment and evaluation of performance, and 4) health disparities.



U-Spatial: Support for the Spatial Sciences and Creative Activities

Francis Harvey

Len Kne

Steve Manson

Kris Johnson

uspatial.umn.edu

Building on a rich history of research, scholarship, and teaching related to spatial topics, the University of Minnesota (UMN) has embarked on a visionary project to develop a collaborative consortium that supports the spatial sciences and creative activities. The project, U-Spatial, organizes researchers into an interconnected network of cores (thematic areas) and nodes (physical locations). U-Spatial helps eliminate duplication and fragmentation of scientific resources, and provides a framework of data, equipment, expertise, and resources that benefits all researchers working with spatial related sciences and creative activities. The need for infrastructure support for the spatial sciences and creative activities was registered for some years; the opportunity to build a broad-based infrastructure across traditional disciplinary and college boundaries has come much more recently.

The Need for U-Spatial

What were the factors that motivated the University of Minnesota to support the development of this large and extensive information infrastructure? First we should consider the national and international context. The spatial sciences are a broad and fast-growing field that studies spatiotemporal aspects of people, places, and processes using information technologies. They find wide-scale use in both traditional scientific fields and the humanities, ranging from data-mining climate data and understanding potential global warming impacts, to mapping historical ship registries to illustrate the growth of global commerce. It encompasses technologies ranging from satellite imaging, geographic information systems (GIS), computation technologies and social networks that rely on an infrastructure of communication. The U.S. Department of Labor identifies spatial technology alongside nanotechnology and biotechnology as the three most important industries in the 21st century. Based on information from the Geospatial Information & Technology Association, the Department of Labor predicts widespread and diverse uses, with the geospatial market growing at an annual rate of almost 35 percent (U.S. Department of Labor, 2010).

For over fifty years, the University of Minnesota has been a national and international leader in spatial-related scholarship and application development. Among many contributions, the UMN helped create one of the first geographic information systems, the Land Management Information System in the 1960s; we created the first professional degree program in GIS in the United States; and was where one of the key open-software packages for displaying spatial information was developed ([Mapserver](#)). Along with a long esteemed history in cartography, geodesign, and geography, we have a solid intellectual foundation in core disciplines ranging from computer science to remote sensing. The University has many internationally known spatial research centers, including the [Center for Urban and Regional Affairs \(CURA\)](#), the [Remote Sensing and Geospatial Analysis Laboratory \(RSAL\)](#), the [Spatial Database and Spatial Data Mining Research Group](#), the [Minnesota Population Center](#) the [Geographic Information Sciences Laboratory](#) and the [Polar Geospatial Center](#). A more comprehensive list of the units and people involved with spatial research can be found on the U-Spatial [website](#).

Around 2006, we helped launch several efforts to develop a better understanding of the many uses of spatial technologies at the UMN. A survey was conducted that identified around 80 individuals working with geographic information technologies. A similar survey was conducted by the College of Liberal Arts and established an equally large number of researchers who were using these technologies in the college. Survey respondents overwhelmingly identified needs for training, as well as support with finding and working with software and data. The survey results supported what people throughout the UMN had known for years--there are rich and diverse groups working with spatial research independently of each other.

The Geospatial Consortium, with attendees from various collegiate units and departments on campus, was an important step to the creation of U-Spatial. We began meeting to coordinate GIS software issues, but it quickly became apparent that there are plenty of campus-wide GIS issues that could benefit from greater coordination among units and so we broadened the group's mandate to tackle a broader range of topics. The overarching mission of the consortium was to increase the presence, awareness and use of GIS and geospatial activities on campus. Participation in the Consortium was informal and open to anyone. The goals of the Geospatial Consortium included getting the word out on spatial activities on campus; meeting every semester to share information and discuss concrete steps to improve GIS on campus; and forging informal ties among people on campus. This was accomplished in part through maintaining the geospatial.umn.edu website and contributing to [GIS Day](#), but there were other avenues including spin-off groups that focused on more narrow topics.

Making U-Spatial Real

The momentum to create a broader spatial enterprise at the UMN really took off in 2009. That January, with support from the Office of the Vice President for Research (OVPR), the Minnesota Geospatial Futures Symposium brought together researchers from across the UMN to discuss spatial topics. The Minnesota Futures Symposium was built on the efforts of the Geospatial Consortium and led to the creation of the document [Geospatial Consortium: Collaborative Geospatial Activities at U of M](#). This document created the framework for U-Spatial and got people excited about the possibilities. The only piece missing from U-Spatial was start-up funding.

By 2011, there was a network of over 100 spatial researchers. A call for proposals from OVPR to develop infrastructures to support research and creative activities was the catalyst that mobilized this network. After preliminary discussions, a core group drafted a pre-proposal that was circulated in this network. The pre-proposal was successful and based on comments and many rounds of discussions, a full proposal submitted. The full proposal was successful and U-Spatial began with a combination of matching funds from 20 units and OVPR contribution totaling \$2.5 million over five years.

Year One

U-Spatial is off to a great start in meeting our mission and having a very broad and substantial impact. Because of the size of the project and its need to establish governance practices among the large number of participants, we have taken a "soft-start" approach which involves the gradual development of U-Spatial services, while allowing for a more rapid development of support for existing research.

Collectively, U-Spatial offers four infrastructure cores: (1) Central Core services include technical assistance, training, resource coordination, and development of the spatial science community; (2) Imaging Core infrastructure focuses on data and analysis of aerial and satellite imagery of the earth; (3) Data Core initiatives include development of data discovery and archiving tools, as well as shared computing infrastructure; and (4) Analysis Core centers on spatiotemporal modeling, geodesign, and mapping (see Figure 1).

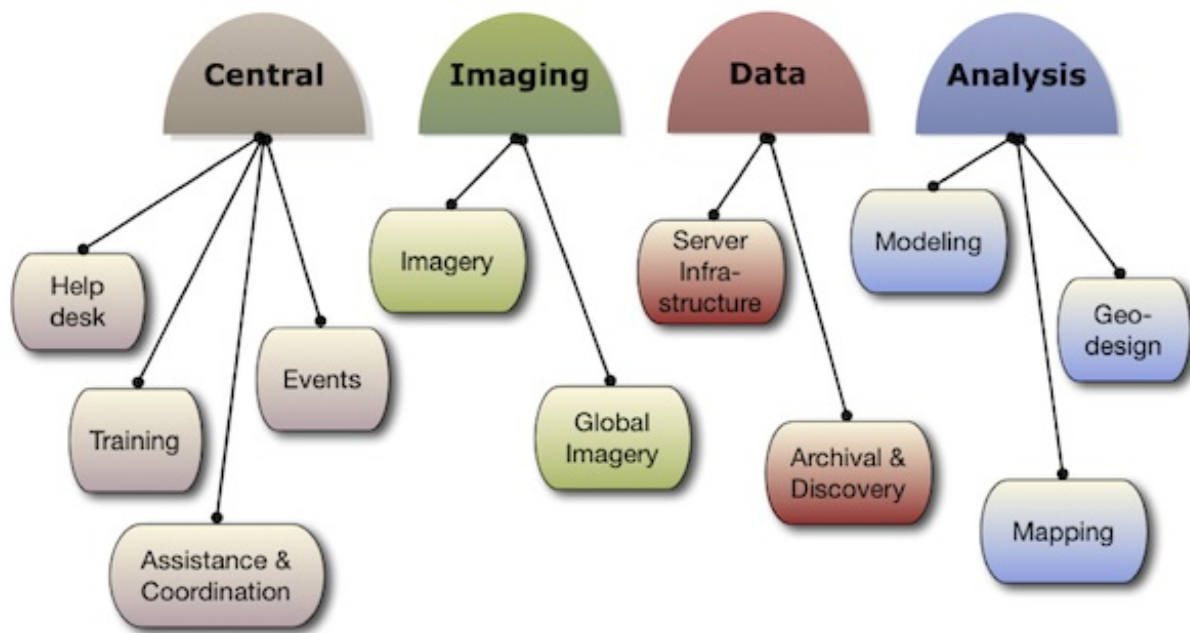


Figure 1: U-Spatial cores with activities

The diversity of projects within the cores is vast. For instance, RSAL is using satellite imagery to provide detailed maps of Minnesota landscapes and lake water quality, sharing this information with the world via a public website. The Geodesign group is creating a portable GIS system that will be used in public participation design and decision making; the system includes recording equipment to evaluate the process and interaction of participants in making decisions. CURA is creating a web map to allow for spatial searching of their projects, as well as providing training to researchers working in the North Minneapolis community. In Computer Science, U-Spatial is funding a graduate student working on the [Planetary Skin Institute](#), an initiative which is developing resource management decision tools.

The Central Core has made good progress in addressing prime needs for a help desk and training. The help desk has assisted dozens of people with questions ranging from locating data to creating interactive web maps. The goal of the help desk is to be the first point of contact when someone needs help with a GIS or spatial technology question. If the help desk cannot answer a question, we can find an expert in the U-Spatial network who can. One example of a recent help desk request comes from [ADAPT](#), a project “to learn about family resilience and to develop tools to support resilience among military families as they cope with the stress of deployment and reintegration.” (Family Social Science - ADAPT) U-Spatial is assisting by creating methodology to help geolocate and find central meeting locations for ADAPT participants; this involves researching appropriate methods, testing the protocols, and teaching ADAPT staff how to use the tools.

The Central Core regularly offers a popular GIS 101 workshop. This free, one-day workshop introduces participants to spatial analysis fundamentals, map making, and working with a popular GIS application. Over 400 people have taken the workshop already, which often leads to contacts with the help desk or further consulting projects involving U-Spatial.

We are also working to build the spatial research community at the UMN. There are hundreds of people working with spatial information at the University; the sharing of information is crucial for people to expand their skill and knowledge. This spring we started a GIS user group for people to get together and share ideas. Having a regular meeting will allow people to learn who else is working with spatial

data on campus and create a network of expertise. Anyone currently associated with the University is welcome to participate in the User Group. That said, the person who will most benefit from the group is someone who regularly works with or supports people using GIS applications or spatial data. In October 2012, we will hold the first annual geospatial symposium based on the [un-conference](#) model to bring together spatial researchers from across the UMN.

A final area where the Central Core has focused effort can best be described as awareness raising, or marketing. The founding members of U-Spatial are highly advanced in their area of spatial research and for the most part, self-sufficient. But there are many colleagues at the UMN who could make use of U-Spatial and resources described above. To make these contacts, we have been attending a variety of seminars and workshops, as well as countless meetings to introduce U-Spatial. Growing U-Spatial participation is a first step towards making it sustainable beyond the five years of initial funding.

The process of developing an information infrastructure requires multiple years and broad involvement. Sustaining the development, in our experience, benefited from a small and dedicated group that was motivated to work through the myriad issues connected to collaboration that arise at any large university. We have also been fortunate to have received significant support from OVPR and the College of Liberal Arts in the stages that led to the successful U-Spatial collaborative proposal. Without their early (and continuing) support, it is not clear if we could have achieved what we have. With the continued and ongoing support of other U-Spatial participants we can still continue to support spatial related research and activities in the coming years.

A Sustainable Vision for U-Spatial

The vision for U-Spatial is the provision of key services to enhance research and creative activities involving spatial technologies. The Imaging, Data, and Analysis Cores have various research activities which U-Spatial helps to facilitate, but the major growth of these support services U-Spatial provides to researchers will focus in the Central Core.

The Central Core provides a help desk, training modules and community building for the University. The proposal for U-Spatial clearly situates these functions as services that allow researchers and scholars to more readily identify the resources they need for their research and allow them to point queries about fundamental issues to the U-Spatial help desk. We currently receive 2-4 queries for help weekly and we have every indication this number will increase, requiring us to recruit more research assistants. With a focus on support, we are soon going to develop resources that researchers regularly need, starting with research related frequently asked questions, universal access to software resources, web mapping capabilities, and help in preparing data management plans.

In addition to providing good help and other services, for U-Spatial to be sustainable, we will need to identify several layers of funding sources. On a large scale, we are actively participating with researchers throughout the UMN on securing outside grants. On a small scale, we provide GIS and remote sensing expertise to a growing number of research projects. Specialized training is also an area U-Spatial can provide excellent value. This diversified approach to funding, along with providing good value to participants within U-Spatial will ensure a sustainable initiative to fulfill its vision and visionary research and creative activities at the University of Minnesota.

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iSEAL: An Integrated Curriculum in Its Natural Habitat

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Andy Franqueira

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<http://r.umn.edu/iseal>

No, Really, We Actually Have an Integrated Curriculum

In 2006, the University of Minnesota established a new coordinate campus in Rochester (UMR) to focus on health sciences and biotechnology. The changing face of health sciences carries many parallels to the current evolution of higher education, including a need for increased personalization, collaboration, and data-based decision making. Like many medical organizations, today's universities are large institutions where change can be difficult and challenges arise from disparate academic departments, a focus on individual courses that can stifle curriculum development, and inefficiencies that increase costs. However, embracing these challenges and changes would produce the following benefits: a streamlined college experience with reduced costs, an opportunity to pioneer and evaluate new educational techniques, and a holistic education that would prepare students with conceptual understanding and abilities that go beyond mere competencies. In the case of health sciences there is a specific need for curricular changes to foster quantitative and analytical thinking, the ability to work in diverse teams, and an understanding not only of the complexity of living systems, but also of the complexity of human behavior and societies.



Of course such grand ideas frequently struggle to ignite in the real world. Fortunately, founding a new campus creates opportunities to try new things. Thus, several key decisions were made during the development of UMR's flagship Bachelor of Science in Health Sciences (BSHS) program:

- UMR has no departments; there is one single academic unit: the Center for Learning Innovation (CLI), a team of faculty members drawn from across disciplines to create a complete and cohesive BSHS program.
- Students in the BSHS program study a common set of lower division classes with a perspective on health sciences designed to prepare students for higher division classes to reduce program costs.
- The CLI faculty is tasked with creating a truly integrated curriculum in which student learning is linked across subject areas to create a unified health sciences curriculum rather than a selection of disparate courses.
- Lastly, as the name suggests, the Center for Learning Innovation was designed with the imperative to investigate the effectiveness of learning techniques and provide data-based

evidence to drive decision making. UMR's Vice Chancellor for Academic Affairs describes this imperative in another chapter of this eBook.[1]

For many educators, an integrated curriculum is a lofty goal that is about as attainable as a unicorn's horn. Coordinating course and module design across an interdisciplinary faculty requires political will, an immense amount of planning, and the right tools. As a new small campus, UMR is able to tailor its organization to facilitate such an endeavor, and UMR has also invested resources to create a technology-rich learning environment from the enterprise to the classrooms. Beyond this, an integrated curriculum requires an immense level of planning and collaboration, often a difficult and messy process. It is here that technology presented an opportunity. In order to achieve UMR's pioneering goal of overcoming the challenges of modern higher education, it was decided that a new paradigm in curriculum management, delivery, and analysis was needed. It was necessary to create something that would support a collaborative, integrated curriculum. Existing course management systems meet their requirements effectively, but moving to an integrated curriculum would require a new and different approach: a system that would facilitate collaboration; support an integrated curriculum, delivery, and assessment; and also capture extensive data for pedagogical research. Thus was born iSEAL, the Intelligent System for Education Assessment and Learning.

This Is One Party Where Technology Brings Something

iSEAL is radically different from traditional course management systems. Because it can provide access to and integration across the entire curriculum, it might be better described as a curriculum management system. Yet that description does not capture all its capabilities. iSEAL is also designed as a comprehensive data collection tool that tracks all student activity to provide a deep data set for learning analytics. In short, iSEAL is intended to support all aspects of teaching and research related to the BSHS program.

Key features include the following:

- Curricular materials (Courses, Modules and Learning Objects) are sharable and reusable, facilitating and encouraging collaboration.
- Assignments and curricular materials can be tagged with concepts and learning objectives, assisting in curriculum development and enabling their connection for analytics and research.
- The entire repository of curricular materials is accessible to all BSHS students at all times, so they can look ahead to courses they might take in the future and also review material they have previously studied.
- An online in-class response system is included: no need for the students to purchase additional hardware; they simply use the laptops provided to them through the BSHS program.



All aspects of iSEAL are designed with sharing, data mining, and reuse in mind. A learning object that is included in course materials may also be referenced in a quiz question which tests the student's knowledge of that course. Additionally, the same content can be included in multiple courses, allowing it to be shared by instructors across disciplines to teach concepts from differing perspectives: in other words, to support the CLI's integrated curriculum. An excellent example of this integration is the Periodic Table of Haiku project, a collaboration between Chemistry and Writing faculty. You may visit <http://r.umn.edu/haiku> to view some of the student work from this project.

Since iSEAL is developed and supported in-house at UMR, the development team is in close proximity to the users of the software. The team is well positioned to respond quickly to support requests, as well as to build relationships with the faculty and to assist them in reaching their pedagogical and research goals. A faculty committee meets regularly with the IT director and iSEAL project manager to discuss future development ideas. Unlike the organizational hierarchy found at most universities, the IT department at UMR is under the umbrella of Academic Affairs, ensuring that IT is fully invested in and understands the mission of the Center for Learning Innovation.

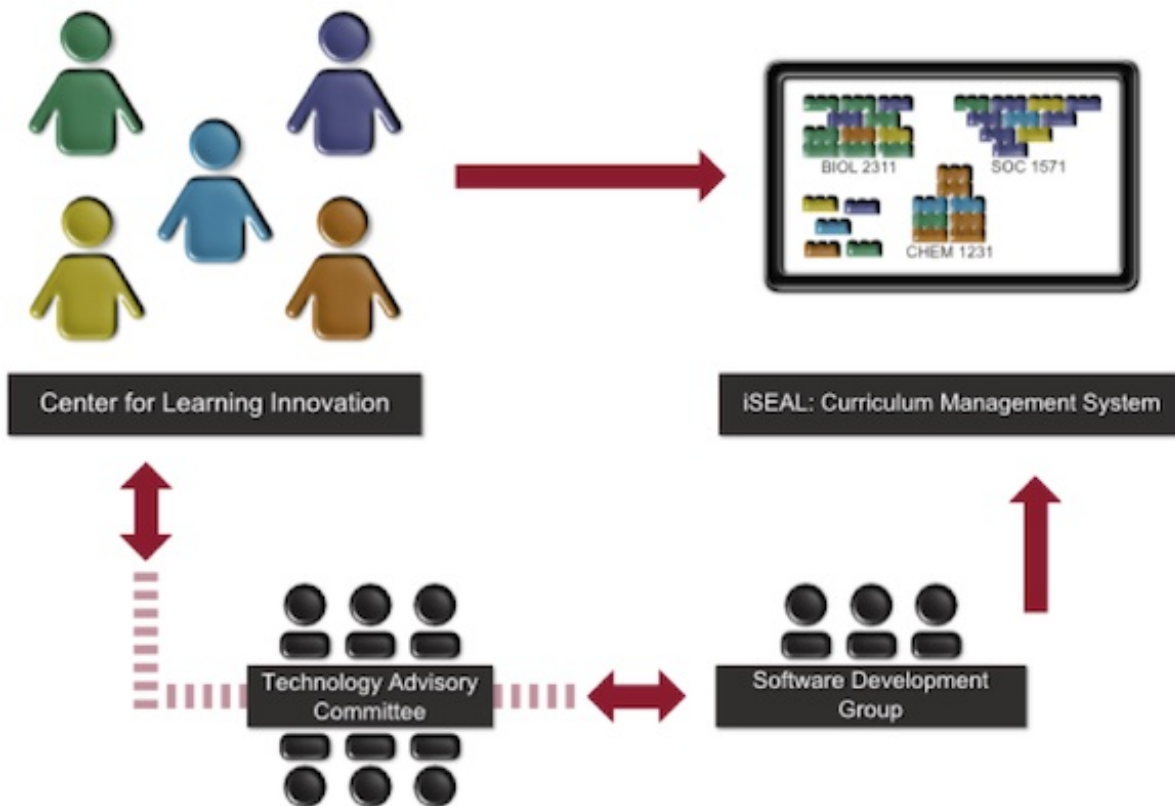
Although used successfully today, iSEAL is still undergoing active development and refinement. Student Affairs staff have begun conversations with IT regarding how iSEAL can be expanded to track additional information about the BSHS program; for example, early alerts could be provided to the student success coaches regarding students who are in need of additional academic assistance.

Pushing the Envelope You May Just Get a Paper Cut

iSEAL is under continuous review and development to keep it a viable cutting edge instruction and data collection tool. The CLI faculty plays a significant role in the development process and ongoing improvement of iSEAL. A formal feature request and review process ensures that the iterative development of iSEAL continues to meet faculty and students' needs. This arrangement offers benefits, but also challenges in the development process.

The development of iSEAL is unique because of the level of influence the faculty have in the development effort. It is the faculty's responsibility to request new features and enhancements that they feel would make iSEAL easier to use and make it a more effective tool for daily use. Since the faculty use iSEAL on a regular basis, making use of every aspect of iSEAL in the course of their teaching and research, they become a perfect "feedback loop" to provide development direction to the development team. This makes iSEAL a uniquely end-user driven product.

iSEAL Development Life Cycle



Collaboration, however, between developers and faculty is not without discord. With a few exceptions, faculty have little experience with software development and, conversely, the development team is not necessarily "in tune" with the academic needs of the faculty. Thus, on the one hand, the faculty's feature requests may sometimes be based on unrealistic expectations of what is possible to accomplish given the limited resources of the development team. On the other hand, the development team is susceptible to making incorrect assumptions about the faculty's needs. This can prove wasteful by spending development time on a feature that "misses the mark" and does not satisfy the requirements expected by the faculty for their instruction or research. To counteract these issues, careful attention must be paid by the Technology Advisory Committee prior to approving a feature request; once approved, open communication between the development team, and the faculty requesting the change is paramount to making the development a success.

With this process in place the future direction of iSEAL can be led by the CLI faculty to ensure that its purpose as both an instructional and a research tool continue to be realized. While the groundwork has already been laid, future development is still required to support the evolving needs of the faculty who use iSEAL in the course of their instruction and research. With the support of the campus administration and through the ongoing efforts of the CLI faculty and the iSEAL development team the

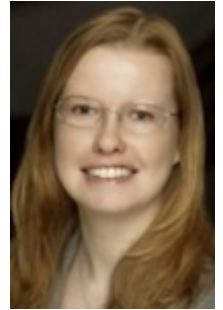
success of iSEAL as an integrated learning and research tool is ensured to support those needs in the years to come.

Reference

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Brave New World: M-learning and Beyond

Jim Hall

"I think there is a world market for maybe five computers" ~ Thomas J. Watson, Chairman of IBM (1943)

"There is no reason for any individual to have a computer in his home." ~ Ken Olsen, co-founder of DEC (1977)

Computing power doubles every two years ~ Moore's Law, named after Intel co-founder Gordon E. Moore

"Access to computers and the Internet has become a basic need for education in our society" ~ U.S. Senator Kent Conrad (2004)

In my role as IT Director, I need to look ahead at what's coming in technology, and how it will affect my campus. Technology changes at a very rapid pace, yet we find it quickly becomes indispensable. Computers are now a necessity for education, yet they were virtually unheard of only thirty years ago.

Universities need to become entrepreneurs, seizing new opportunities to deliver the best value. As stewards of our campus technology, we cannot rest on the accomplishments of the past; we need to continually evolve the technology that we deliver, and adapt those technology services to meet the needs and desires of our students. Too often, institutions spend a year or more to design, select, purchase, build, and implement new technology in service of the teaching and learning mission. But in the interim, the technology landscape changes, and the delivered solution no longer addresses the needs of the community.

Consider how students store and transport their information. The most common scenario: a student is working on her term paper in her dorm room. But it's late, and she doesn't finish it. The next day, she decides to take the paper with her, and finish it in one of the campus writing labs. Not too long ago, in the 1990s, she saved this data on floppy disks. The most common capacity of floppies stored 1.44 megabytes of data.

Now most of our students have never even seen a floppy disk. Technology has moved on. Just a few years ago, this student might have carried a USB flash drive to transport her data from her dorm room to the classroom. In response, campus bookstores now stock a seemingly endless supply of USB flash drives of various sizes, expecting that students will use them. And a few students do, although if my campus is any indication, an increasing number of students won't deign to use something so quaint as storage media to save their files. Even a 16 gigabyte USB flash drive (considered huge only a year ago) is obsolete, especially when students can now save all their files remotely (for example, in the "Cloud"), and access them anywhere using a Web browser.

However, storage is just a symptom of a larger trend. Technology is changing, and changing rapidly. How will students access information in another year, or five years? Or ten years? We cannot continue to rely on old methods. That's why campuses constantly need to look toward the technology horizon and

think about how the academy will respond in the face of new technology.

The next fundamental technological change is how students interface with teaching and learning. To understand this future landscape, let me first provide the context of past methods.

Learning has always been about students sitting in a classroom, pen and paper in hand, taking notes during a professor's lecture. But, in the early 1980s, IBM introduced the IBM-PC, which put individual computing power into the hands of students. Almost overnight, institutions needed to integrate the computer into their pedagogies. Those universities that resisted this change, relying solely on traditional teaching methods, did so at their peril. While enrolled students would remain to finish their degree, incoming students exercised personal choice, and opted to attend universities that successfully integrated computing with teaching and learning. Adopting new technology became a matter of attracting students.

Computing has continued to change how the academy serves its students. Today, every campus provides general computing labs, computer labs focused on writing, and other labs that specialize by discipline and software. My own campus has over 15 computer labs, serving 1800 students. While we are proud of the technology centers that we have established on our campus, we must recognize that increasingly fewer students use them. We built large computer labs that are open 24 hours a day, only to find students prefer to do their work on their own laptops. Our focus has shifted from computer labs to always-on wireless so our students can continue to access campus resources no matter where they are.

In response to this ubiquitous computing, many universities have already moved from a pen-and-paper learning model to electronic learning systems, or e-learning. With e-learning, students access their class notes via a course website, participate in online discussions with other students, download certain class materials, submit assignments, and receive grades and feedback from their professors. Universities that adopt e-learning are taking the first step towards the classroom of the future. But these campuses should not rest on the accomplishment of e-learning. How students interface with e-learning continues to evolve and is the next trend that will hit the academy.

Two years ago, most students preferred laptops for their personal computing device. Slowly, a few students began to bring iPads and other "mobile computers" into the classroom. Today, mobile devices are everywhere, and their numbers are growing. My campus estimates about two-thirds of our students use a mobile device to interact with the university. According to a November, 2011 study by research firm Nielsen, two-thirds is typical of mobile device adoption with 18-24 year olds. Students look to their smartphone to check email, not a laptop or a lab computer. They want to access their electronic learning systems via an iPad.

In a listening session conducted this year on my campus, a major concern from our students was how to access e-learning systems from their mobile devices. With a loud voice, our students demanded that we develop learning interfaces that support the iPhone or Android phones. They want mobile accessibility, with better mobile carrier reception across the campus. Students no longer expect the campus wireless network to be their only means to access e-learning; in effect, they now bring their networks with them in the form of their mobile phone data plan.

This is the new landscape. With the widespread adoption of these mobile devices, e-learning quickly shifts to learning on the go. With mobile learning, or m-learning, students continue to interact with e-learning systems throughout their university career, but they increasingly do so via mobile devices such as tablets and smartphones. This radically changes the new model of e-learning and how students

access the e-learning systems. M-learning is about the mobility of the user, recognizing that students can continue to learn wherever they are and no longer need to be anchored in a classroom. Learning will become increasingly portable, relying on mobile carriers to connect with the university's online systems.

Mobile computing and m-learning will only expand. In the next five years, I expect to consolidate our computer labs and reduce their numbers. Instead of dedicated spaces, students will access software and programs within these labs through a "virtual presence" via a mobile device. Echoing the mainframes of days gone by, students will use a virtual terminal on their tablet or smartphone to provide a window into the computer labs; the real processing will take place on university systems, located in an isolated server room but accessed from anywhere.

Even after we have built this m-learning utopia, we're not done. Students will eventually move beyond m-learning to new technologies that we have yet to discover. That's the reality of computing. And it's our responsibility as stewards of university technology to uncover the new trends, to continue looking ahead, as we serve the campus mission.

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Adventures with Clickers in Veterinary Medical Education

Laura Molgaard

Deb Wingert

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Dave Brown

The Journey

The University of Minnesota College of Veterinary Medicine (UMN CVM) has been on a journey with wireless response systems (also known as personal response systems, classroom response systems, or “clickers”, but for this chapter referred to as WRS) for much of the last ten years. Our initial interest in adopting a WRS was to provide an easy to use method of promoting active learning in the classroom. After initial research, we were also excited about a simple method to take class attendance in courses for which that was appropriate. We also aimed to provide a venue for students to provide their opinions on sensitive topics (e.g. ethical dilemmas). We wanted to engage all learners in discussions rather than just the extroverts.

Phase I: The journey begins (circa 2003)

The context of this adventure is a professional program (Doctor of Veterinary Medicine or DVM) in which students move together in a cohort through a rigorous four-year program, which has been preceded by approximately four years of undergraduate pre-veterinary coursework. Most of the DVM curriculum in the first three years is required coursework in which all students are enrolled. Students sit together in the same lecture hall for much of every day.

This paradigm seemed like a natural fit for the purchase of a WRS. Receivers were mounted in the front of each of the main lecture halls. Students were required to purchase a WRS remote that was registered to the individual student. These were low-cost and were provided through the UMN CVM bookstore. Faculty at the UMN CVM range from basic scientists with a traditional tripartite faculty mission to clinical scientists with a very heavy clinical responsibility and more limited time to teach in the classroom.

Faculty members were offered training and technical support on use of the WRS, including pedagogical approaches for using in-class multiple choice questions. In the initial years using a WRS, the infrared system we chose had several technical challenges that discouraged faculty and frustrated students. For those reasons, utilization of the WRS was fairly limited, which added to the students’ frustration because they were required to purchase a remote unit. After a few years, the WRS fell into disuse and was abandoned.

Phase II: Widespread adoption (circa 2008)

In 2008 a faculty member at the College brought back exciting news that he had been to a national scientific conference and had experienced the use of a newer radiofrequency WRS system (iClicker) and he wanted to purchase a base unit. After further exploration it appeared that advances in technology had significantly lowered the learning curve for faculty and that the student remotes were also quite reliable. We worked with representatives from the company as well as faculty from

neighboring colleges who had already experienced using iClickers. Though previous experience caused some trepidation about going down this path again, there was also significant interest to see if the time was now right to try once more. He piloted this WRS in one of his first year courses and had a very positive experience, including a positive response from students. This success created an interest and willingness in other faculty members who taught in the first year curriculum to experiment with this technology. Over the intervening four years, more and more faculty members have adopted the use of iClickers and this WRS, now in its second version, is widely used throughout the DVM curriculum.

Our students certainly enjoy the active learning component that a WRS facilitates. They report that they appreciate an opportunity to check their knowledge. Faculty have used the iClicker to enhance student learning in a myriad of ways such as: individual and group questions during class sessions, laboratory reviews, formative course evaluations, student presentations, self assessments (knowledge checks), checking student understanding of previous class sessions, and case-based problem learning.

One of the greatest benefits they perceive is that faculty can easily incorporate small quizzes into their course grading scheme by using a WRS to quickly collect data and assign a score for each student. This is popular because it allows faculty to easily spread out the points into smaller “chunks” rather than relying on a very few large exams to assess student knowledge. The ease of using iClickers attracts faculty to try this technology in their teaching and learning settings. Although we have a brief online training link available to all faculty, many have picked up the basics within a few minutes from another colleague already using the system. Faculty and instructional staff using clickers represent diverse areas of the curriculum including, but not limited to: Pharmacology, Toxicology, Pathology, Veterinary Imaging, Nutrition, Behavior Core, Professional Development, Virology, Critical Scientific Reading, Physiology, Clinical Skills, Epidemiology, Parasitology, Organology, Neurobiology, Radiology, Histology, and Anatomy.

WRS Benefits	Ingredients for WRS Success
<ul style="list-style-type: none"> ● Increased student engagement ● Diverse ways to easily check student understanding (self-checks, quizzes, case studies) ● Increased faculty interest in active learning ● Ease of use in large and small educational settings, including classrooms, labs, and clinics. ● Ease of use in diverse content areas ● Increased faculty collegiality in teaching and learning 	<ul style="list-style-type: none"> ● Leadership support ● Faculty champion ● Affordability ● Easy learning curve for faculty application ● Stability/reliability of WRS device ● Ongoing informal faculty conversations as well as seminars to review teaching and learning strategies/applications etc.

Moreover, we find that iClickers alter classroom dynamics, engaging all 100 veterinary students in large classrooms with the power of mass feedback. Clickers ease fears of giving a wrong answer in front of peers, or of expressing unpopular opinions. Importantly for the instructor, one can get an instantaneous graph of the student responses to a particular question and gauge in real time whether the students are grasping important concepts or comprehending difficult material presented in class. On the other hand

use of clickers also compels professors to think about their lesson plans differently and seek to share their challenges and accomplishments with each other, increasing faculty collegiality. We find the use of clickers to be a win/win situation.

Lessons Learned

This has been a very interesting journey and one from which we have learned a lot. Why was the first foray into use of a WRS a disappointment and the most recent experience so successful? One reason is certainly the stability and ease of use of technology. Very busy faculty need a tool that they can easily learn and that can be integrated into their teaching in a straightforward manner. In the first experiment, although initial faculty interest motivated the purchase and installation of the system, many faculty didn't actually attempt to use the system.

Some early adopters made a valiant effort to incorporate the system into their teaching but the barriers mentioned earlier proved to be insurmountable. In addition, the original WRS system we used was an infrared-based system which suffers from a number of problems including the requirement for an unobstructed line-of-sight communication between transmitter and receiver within a specified viewing angle. On the other hand, purchase of the subsequent radiofrequency iClicker system was done by a very motivated faculty champion, who took the time to fully understand the system. He then made himself available for 1:1 training of other faculty. Word of mouth was the primary and most effective method of spreading the word about the utility and ease of use of iClickers. Once student buy-in reached a critical mass, student requests for this WRS motivated other faculty to adopt the WRS.

One of the other factors that set us up for success in our second WRS endeavor was that we had implemented a major shift in faculty development of teaching in the two to three years preceding the purchase of iClickers. We implemented a weekly faculty development seminar series with both formal presentations and informal conversations that provided faculty with an awareness of what others were doing in education and a renewed sense of value of education. Active learning gained more and more popularity over those years and primed the faculty to have a need for and to utilize a tool that facilitated active learning. It is also possible that an article in Science magazine on the use of a WRS, which was published roughly around the time of the second phase of WRS adoption, motivated some faculty to consider utilizing iClickers in their teaching. <http://www.sciencemag.org/content/323/5910/122.full>

Faculty at the UMN CVM rarely have teaching assistants or other support for teaching and need to be very self-sufficient. Until very recently we didn't have any dedicated technology support for teaching either. This scarcity of direct support has been counterbalanced with a strong collegiate and departmental leadership support for innovative teaching techniques and adoption of novel tools. The modest cost of WRS systems has also been essential for early experimentation and later successful adoption.

Our experiences on the WRS journey have been informative in other educational endeavors as well. We are much less likely to embark on a new path without a real faculty champion. We are also more willing to try again even if an initiative fails the first time. Sometimes the time isn't right and it's entirely possible that an earlier "failure" was just an initial attempt at success.

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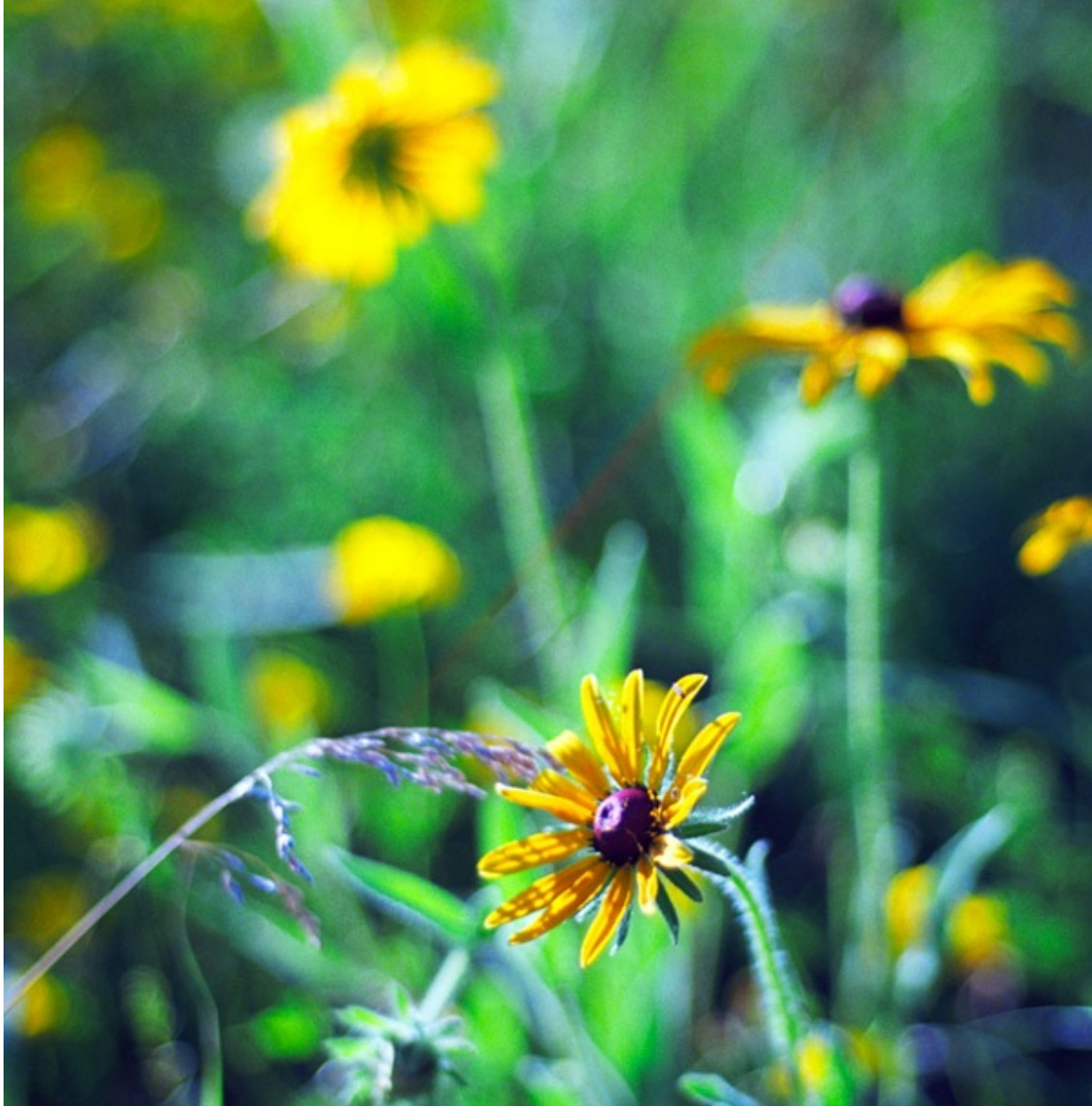
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Al Beitz is Professor and Department Chair of the Department of Veterinary and Biological Sciences at the University of Minnesota College of Veterinary medicine. He is the faculty champion who successfully led the implementation of iClickers, co-leads the Conversations on Teaching, and has spearheaded many other educational endeavors at the CVM.

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David R. Brown is Professor of Pharmacology and Vice-chair of the Department of Veterinary and Biomedical Sciences at the University of Minnesota College of Veterinary Medicine. He teaches veterinary pharmacology and toxicology courses using Moodle 2.0 and iClicker technologies, and currently serves on key CVM educational committees. He is a recipient of the Carl J. Norden Distinguished Teacher award.

Extending Reach



The chapters in this final section most explicitly indicate our expanded engagement via innovative uses of technology. Researchers are changing strategies to meet the needs of a social and mobile population; they are collecting data via texting, transitioning computer courseware to mobile web apps, and building mobile technology training for response to disasters. What better time to share 50+ stories about cultivating change than in 2012 – the 150th anniversary of the founding of the Land Grant Mission!

Increasing Access to Mental Health Care

Heidi Flessert

Abigail Gewirtz

www.ambitnetwork.org

Implementation of Evidence-Based Practices: A Brief Background

In the past two decades, the field of children's mental health has seen a shift from "care as usual" towards the use of evidence-based practices to treat mental health problems in youth. Often used alongside language such as "dissemination" and "implementation," evidence-based practices, or EBPs, are defined as specific strategies, practices, or programs that have been empirically studied or evaluated using a rigorous research design. Results of such studies demonstrate the superiority of the EBP over "care as usual" in treating specific mental health problems in a target population (Drake et al., 2001; Hoagwood, Burns, Kiser, Ringeisen, & Schoenwald, 2001).

Developed and tested in academia, one of the biggest challenges facing EBPs, particularly in children's mental health, is successfully transporting them from the university setting into routine community practice settings (Hoagwood & Olin, 2002). As the use of EBPs grew in popularity, so did the field of dissemination and implementation (D&I). Dissemination refers to the spreading of information about a particular practice, whereas implementation has been defined as "the use of strategies to introduce...evidence-based health interventions within specific settings" (U.S. Department of Health and Human Services, 2005). Both are necessary in the transportation of interventions, but the focus of this chapter is implementation – the work required to install an EBP into a community setting.

Research in the field has begun to identify specific strategies that appear to be commonly utilized across implementation efforts, including in-person trainings, ongoing consultation for training participants, fidelity monitoring to the EBP (or treatment adherence and competence), and evaluation of client outcomes (McHugh & Barlow, 2010). A number of projects are currently employing these strategies to implement psychological EBPs at both the state and national level. Since 2005, one such program – called Ambit Network – has been successfully implementing a trauma-focused EBP in community mental health agencies across Minnesota.

Implementation in Minnesota: Ambit Network

Housed in the College of Education and Human Development at the University of Minnesota, Ambit Network is community-university partnership of government, non-profit, and community mental health agencies throughout Minnesota. Funded in part by the Substance Abuse and Mental Health Services Administration's (SAMHSA's) National Child Traumatic Stress Network and the Minnesota Department of Human Services (MN-DHS), the mission of Ambit is to improve the systems of care that provide mental health services to children and families affected by traumatic stress through the implementation of EBPs into community agencies. To do this, Ambit selected EBPs on the basis of their appropriateness for highly-stressed families, including children experiencing homelessness and domestic violence, refugee and immigrant children, and children in military families. Using the universal implementation strategies identified by McHugh and Barlow (2010) to train the mental health workforce, Ambit Network is able to increase access to empirically-supported treatments and raise the standard of care provided to traumatized children in Minnesota.

Below, we review the implementation across Minnesota of one such EBP: Trauma-Focused Cognitive Behavioral Therapy (TF-CBT). TF-CBT was developed as a time-limited treatment for trauma and post-traumatic stress symptoms in children who have experienced trauma (Cohen, Mannarino, & Deblinger, 2006). A number of studies have documented the effectiveness of TF-CBT in treating not only internalizing symptoms (e.g., depression, anxiety), but also externalizing symptoms of trauma (e.g., anger, inappropriate sexual behavior) in children between the ages of three and 18 (Cohen & Mannarino, 1996, 1997, 1998; Cohen, Mannarino, & Knudsen, 2005; Deblinger, Lippmann, & Steer, 1996; Deblinger, McLeer, & Henry, 1990; Deblinger, Stauffer, & Steer, 2001; Deblinger, Steer, & Lippmann, 1999; King et al., 2000). When compared to “care as usual,” TF-CBT was found to be superior in reducing post-traumatic symptoms immediately post-treatment and in maintaining these improvements one- and two-years after treatment has ended.

To train providers in TF-CBT, Ambit adapted the Institute for Healthcare Improvement’s Breakthrough Series Learning Collaborative training model. The learning collaborative is a long-term training model in which trainees participate in in-person “learning sessions” and out of the classroom “action periods” (Institute for Healthcare Improvement, 2003). Over the course of six to 15 months, trainees participate in two to three learning sessions that alternate with action periods lasting between three to five months. By alternating learning sessions with action periods, trainees can learn the EBP during learning sessions lasting one to two days, and then return to their respective agency during action periods to implement and incorporate the EBP into their daily practice. By the end of the learning collaborative, trainees and their agencies have worked together to build capacity to sustain the EBP long-term and begin the process of implementing the practice across the agency.

The Challenges of Implementing a Long-Term, State-Wide Training Program

Most professionals would agree that learning a new practice or protocol, at the individual or even at the agency level, is difficult enough. From the beginning, Ambit faced the unique challenge of training and supporting large numbers of trainees in multiple agencies across Minnesota - all of whom belonged within different organizational structures that required individualized ways to implement TF-CBT into their organization. Since Ambit’s learning collaborative model only allows for five to six days of face-to-face time with trainees, the majority of the work involved with implementation – consultation, monitoring, and evaluation – had to be done remotely and communicated electronically, as trainees could be as close as a ten-minute drive to as far away as the Canadian border.

At its core, the learning collaborative training model for TF-CBT consists of the following three components to be delivered: in-person trainings, consultation calls, and a practicum period with technical support and assistance from Ambit.

In-person trainings with a certified TF-CBT trainer. These in-person trainings provided hands-on training in the TF-CBT treatment model and in conducting a trauma-informed assessment using standardized clinical assessments. Trainings held in the middle and end of the learning collaborative often included discussions on other important clinical topics (such as dealing with clients’ trauma-related avoidance symptoms).

Bimonthly consultation calls with a certified TF-CBT trainer. Content covered in each consultation call ranged from reviewing the TF-CBT treatment components to case presentations for consultation with the TF-CBT trainer. Trainees who presented on a case were expected to provide results of their client’s trauma-informed assessment and share with the group their client’s progress through (as well as the trainee’s adherence to) the treatment model.

Technical assistance during the follow-up and practicum period. Perhaps the most popular (and

time-consuming) aspect of the technical assistance provided by Ambit during the learning collaborative is the help with baseline and follow-up assessments for clients receiving TF-CBT. A requirement of the learning collaborative is to complete TF-CBT treatment with a minimum number of clients, conducting an assessment at baseline, three-month follow-up, and at the end of treatment. To help fulfill this requirement, Ambit scored clinical assessments and monitored upcoming follow-up interviews for active clients, prompting trainees at three-month intervals to conduct another follow-up assessment until the client had ended treatment.

Agencies that were selected to participate in the learning collaborative entered into contracts with the Minnesota Department of Human Services Children's Mental Health Division. These contracts allowed trainees to be reimbursed at a standard hourly rate for time spent on learning collaborative activities (excluding providing direct services). These contracts held trainees accountable for meeting the learning collaborative requirements. In addition, the primary source of funding for Ambit Network came from a federal SAMHSA grant – meaning either low- or no-cost services needed to be used to meet high programming demands while keeping grant expenditures low. Finally, the addition of the technical assistance and practicum requirements (i.e. to complete assessments) created unique training demands with no prototype for statewide delivery. Faced with these dilemmas, Ambit needed to find a way to efficiently – both financially and operationally – implement TF-CBT in the community.

Finding a Solution: The Innovative Use of Technology for Implementation

While in-person trainings did not present a problem, hosting bimonthly consultation calls and providing high-quality technical assistance during the follow-up and practicum period did. In its first year of implementation, Ambit encountered three major hurdles – primary among them, trainees' limited knowledge of the clinical assessments required of them. Trainees were introduced to the clinical assessments at the first in-person training; the majority had little to no previous experience with the assessment tools. Although trainees quickly became comfortable with using the tools for a trauma-informed assessment interview, almost all trainees were unprepared for interpreting the results and using the information in treatment planning.

A second major hurdle identified in the first year of implementation was finding an easy-to-use consultation call system. A number of different systems were tested – including online phone conference call systems (e.g., FreeConference.com, and the University of Minnesota's Gopher Conferencing) and videoconferencing via Skype. Most systems were easy-to-use with very little technical problems. However, the content covered in each call became an issue; trainees were doing case presentations and asking clinical questions to the TF-CBT trainer, but a disproportionate amount of time was spent conveying information (such as reading off assessment scores) instead of asking clinical questions and addressing the actual case.

The final hurdle was finding the most efficient way of providing technical assistance to trainees during the practicum period while also collecting data on the implementation process. Aside from supporting trainees learning to utilize and incorporate assessments into treatment planning for clients, the practicum period served to collect data and evaluate the process of implementation for key stakeholders. The most significant issue that came to light during the technical assistance portion was tracking assessment submissions and follow-up interviews for active clients. To provide technical assistance, Ambit had to develop a system for tracking and monitoring trainee and client outcomes over the course of the learning collaborative.

Beginning with an Excel spreadsheet, each assessment interview was entered as a new case. Baseline and end of treatment interviews were entered when the appropriate paperwork was submitted; follow-up interviews were entered when paperwork was submitted or if the trainee missed a

follow-up and did not submit assessments. Each interview (submitted or missed, in the case of follow-up interviews) was entered and coded for the following:

- Basic client demographics
- Assessments submitted (sent, not sent)
- Interview status (complete, incomplete, late)
- Follow-up status (on-time, late, missed)
- Reason case closed

This Excel spreadsheet continued to be used into the second year of implementation. In an effort to report to partners the program's progress, a number of charts were created within Excel that would update with each new entry. However, after a year and a half of tracking interview data on almost 50 trainees (and nearing 1,000 interviews), the limitations of Excel became clear: Excel did not have the power to perform the necessary functions needed for tracking and technical assistance. In addition, significant staff time was spent entering data and monitoring client files and interviews – meaning little time could be dedicated to planning and evaluation activities that would allow program growth and expansion. Near the end of the second year of implementation, program staff identified several tools available at no cost to University of Minnesota staff that addressed the above challenges – UMConnect, Gopher Conferencing, and the Microsoft Access database computer software.

UMConnect and Gopher Conferencing

Used in conjunction with one another, UMConnect and Gopher Conferencing created a web-enhanced consultation call system that was both user-friendly and freed time on consultation calls for the trainer to address clinical questions, provide instruction on assessments, and model treatment planning for trainees. Gopher Conferencing, the University of Minnesota's phone conferencing system, provided a convenient online scheduling system and consistently clear phone calls, regardless of the number of individuals on the call. Trainees calling in long-distance incurred minor costs (less than \$40 per year for 18 calls), but scheduling and moderating calls using Gopher Conferencing came at no cost for Ambit Network.

UMConnect is an online web conferencing system that can be used for sharing content in online meeting rooms; UMConnect is free to UMN faculty and staff and uses the Adobe Connect web conferencing software (<http://www.adobe.com/products/adobeconnect.html>). During consultation calls, trainees would call into the conference using Gopher Conferencing; on their personal computers, trainees would enter the UMConnect meeting room using a URL provided by Ambit Network (see Figure 1). As trainees presented on active cases, Ambit Network staff would pull up clinical assessment reports and fidelity monitoring tools onto the meeting room screen. The trainer and trainees would be able to see all clinical scores and fidelity data, removing the need for the case presenter to commit time to reading through this information. This simple web-enhancement created an additional 5-10 minutes of consultation time per case presentation; with an average of two case presentations per call, this meant up to 20 minutes spent on consultation instead of conveying basic information.

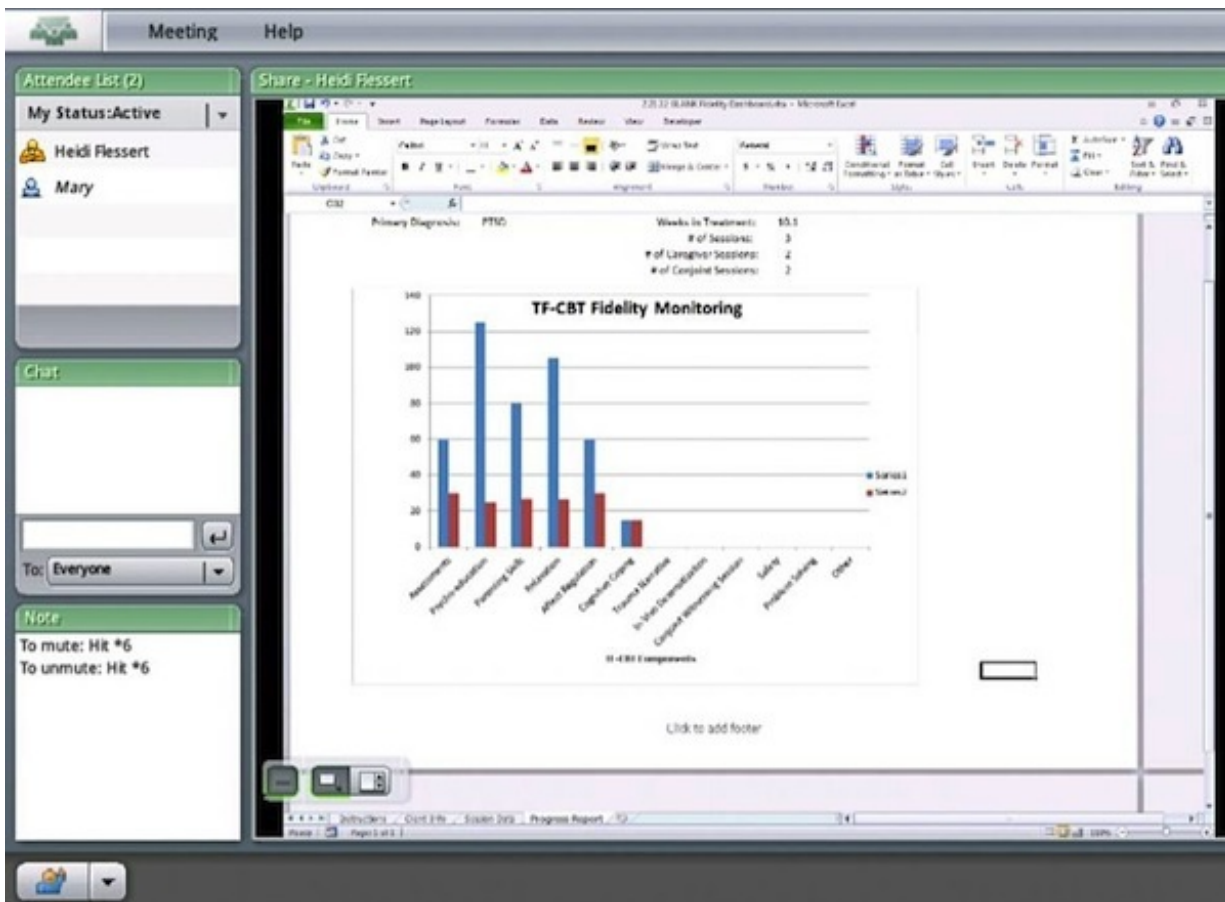


Figure 1: Participant view of a fidelity monitoring tool during consultation call using UMConnect

Microsoft Office Access Database Computer Software

During the second year of implementation, a graduate assistant employed at Ambit Network designed and built a Microsoft Access database for tracking assessment submissions and follow-up interviews for trainees and their active clients. Microsoft Access had the advantage over Excel of being able to create a database that could be easily tailored to meet Ambit’s data management needs. Access was also a more powerful program in terms of data storage, provided a user-friendly data entry interface, and allowed for designing queries that could quickly pull data about a client, trainee, agency, or even an entire learning collaborative cohort. The current database used by Ambit has data stored across 23 tables; a number of queries are used on a monthly basis to update reports designed to monitor trainee progress towards meeting learning collaborative requirements (Figure 2). In turn, these reports are used during supervisor calls to assist in identifying strength and challenge areas in partnering agencies and create discussions about long-term sustainability of TF-CBT. The Access database is also used to provide information for federal quarterly reports and for reporting back to state partners.

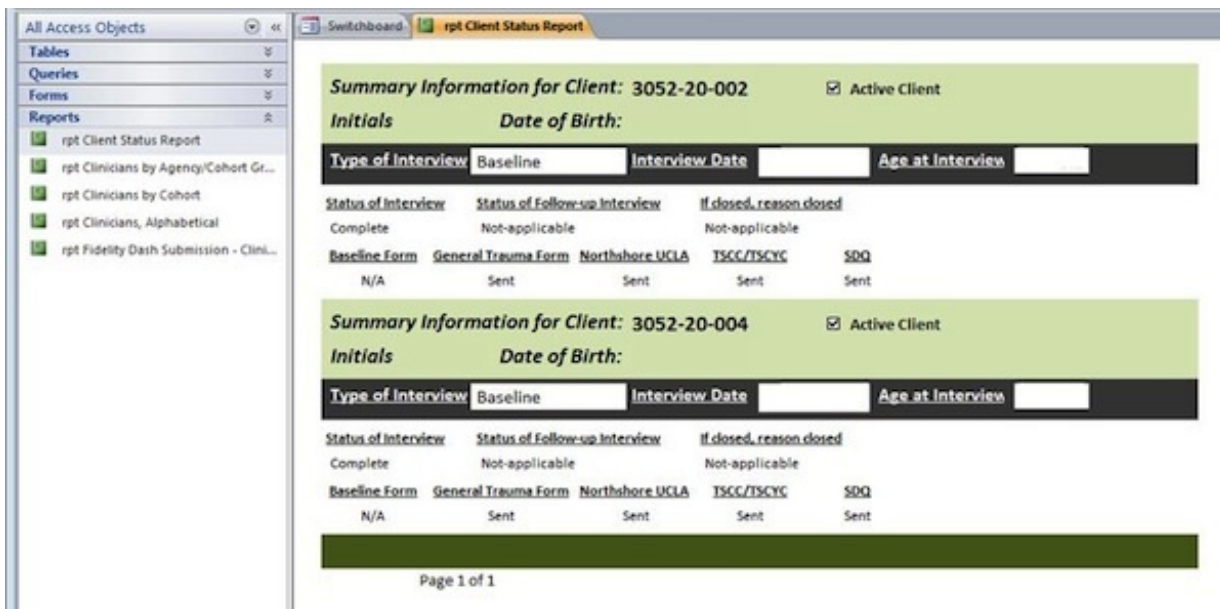


Figure 2: Client status report created in Microsoft Access using queries to populate report fields

Impact in Minnesota and Future Directions

Since 2007, Ambit Network has trained almost 240 mental health providers from 43 agencies across Minnesota using this adaptation of the learning collaborative model. Trainees have screened almost 1,300 children for trauma and post-traumatic stress; these numbers alone demonstrate that successful implementation of an EBP developed for high-risk children into the community is possible. A little ingenuity and access to low-cost technology such as UMConnect allowed Ambit to develop an implementation model that could be easily replicated and adapted to meet the needs for future implementation efforts. It allows for the collection of both outcomes and process data – both of which are necessary for program planning, monitoring, and evaluation, particularly for grant funded programs. The success Ambit Network has had in implementing TF-CBT also highlights another crucial point - addressing a public health issue like childhood trauma requires a systems approach with enthusiastic partners. Over the past five years and numerous successful partnerships, Ambit Network has become a leader in the implementation field, leading the way in increasing access to quality mental health care for children and families across the state of Minnesota.

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Reaching Out: Making Graduate Nursing Education Accessible

Melissa D. Avery

Traditional university education has involved attending regularly scheduled classroom sessions and interacting with faculty and classmates in a synchronous, in-person format. Students would typically need to live in or near a university, or move to the location in order to attend graduate programs. Individuals in rural or other remote areas, as well as geographic areas lacking specific types of programs, have been disadvantaged in attending graduate nursing programs, thus reducing opportunities to educate health care providers needed in underserved areas. Graduate students in nursing are frequently women, have growing families, and typically have employment positions as registered nurses that their families rely on for financial support. Common sacrifices to participate in graduate nursing education include leaving families and loved ones behind, traveling long distances, and added personal and financial cost. A convenient graduate program that did not require weekly travel to campus was an attractive option for our faculty.

During the late 1990s it became much easier to deliver course content online in an interactive fashion, and the faculty in the School of Nursing sought funding to do exactly that. Although the new technology was intriguing and the opportunity to learn new teaching methodologies appealing, the goal driving our work was to increase access to graduate education for nurses who wanted to become nurse practitioners, nurse-midwives and public health nurse leaders, and other graduate-level specialists. Beginning with a small internal University grant, several faculty members partnered with digital technology experts to each redesign a segment of an existing face-to-face course. That opportunity to learn new strategies together in a hands-on environment was followed by funding from the Academic Health Center Vice President to redesign three core graduate nursing courses. Two large federal training grants followed and provided full funding for the redesign of all courses required for the complete transition of five graduate nursing specialties from a traditional face-to-face classroom-based program to a hybrid or blended online learning environment, thus increasing access to graduate education in the upper Midwest.

Our strategy from the beginning was to increase access and flexibility for students by reducing required time in the classroom. At the same time, we believed it was important to interact regularly with students in person to fully develop a learning community and to support professional socialization. Purchasing instructional design, video, and other services within the university, we built courses with an eye to interactivity and flexibility. A format that provided students with a common look and feel to the courses (standard course banners, format to course components, colors, etc.) was developed by our technology partners. Each course was divided into topical modules that included specific objectives, readings, other electronic resources, and guidance from faculty. That guidance was initially provided in the form of notes and study questions with some audio and PowerPoint presentations. As newer technology became available, we have introduced more audio, video and other media rich components. Face-to-face in-person sessions two to three times each semester, where students met with faculty and each other in each of their courses, were essential components in the success of our program.

This work would not have been possible without several other sources of support. Faculty members were the primary content experts and partnered with technical staff and instructional designers to redesign their courses. Administrative support was essential and key to our success. Although the

project focused on a subset of graduate nursing specialties, the core courses required of all graduate nursing students were redesigned and thus affected a broader range of students who may or may not have planned to take some coursework by hybrid distance technologies. Regular interaction with and support from the associate dean for education were instrumental in our success. Biomedical library staff members were other key partners to help faculty make reading materials and resources available to students no matter where they lived. An unexpected outcome after introduction of the online option for required core courses was that the online sections became the first to fill and some face-to-face sections were canceled for lack of registrations.

The primary impact of this project was the opportunity for nurses to return to school in a more flexible and convenient environment, with clinical practicum sites in their home communities where possible. Nurse-midwives, nurse practitioners, public health and other nurse leaders, and psychiatric-mental health clinical nurse specialists are practicing in new geographic locations. These practice sites are primarily in the five state upper Midwest area, and would not have otherwise occurred without our program. Some of our graduates also practice in medically underserved areas, thus expanding the reach of quality health care.

Despite our initial success, insuring long-term sustainability following the federal funding period presented an important challenge to insure continuation of our work. From the beginning, we maintained a list of tips related to course development, interaction with students, learning activities, recommendations for process such as when to open an online course, managing course email and assignments, etc., to help faculty new to this method of teaching. Staff received training to support faculty in building course web sites and loading documents and other resources so faculty were able to concentrate on content development. Staff also participate in ongoing development related to course management systems and have been essential in supporting the faculty through two major course management system transitions. Faculty have developed new skills related to managing online courses, engaging to various degrees in the more technical aspects of creating online courses and materials.

While we worked to create internal systems to maintain and continue our online course development, attention to faculty scholarly productivity through dissemination of our work was of critical importance. Multiple papers, posters and oral presentations were generated as a result of our online learning projects. One of the most exciting was our evaluation project. In partnership with technology staff from the then Digital Media Center in the Office of Information Technology, we conducted an evaluation of 25 graduate nursing courses that had been taught online more than once, thus having had opportunity for revision. Examination of each course web site was conducted by both a technology professional and a faculty member experienced in online teaching using a common tool developed for our project. We developed this tool and an evaluation rubric following a thorough literature review and finding very little available at the time. An interview with the course faculty member was also completed to add detail that would not be apparent from the review of the course web site. The results of that project were shared in the School and published in an online international nursing educational scholarship journal (Avery, Cohen and Walker, 2009).

Significant curricular activities in the School, including a change from the awarding of a master's to a professional doctoral degree for our nursing specialty programs, led to the development of a large number of new courses in a relatively short time period. A hallmark of our progress in promoting accessible educational formats as a School was demonstrated as the new doctoral courses were automatically developed as blended online courses. Students from across the country completed one of the first blended online master's to doctor of nursing practice (DNP) programs in the country starting in 2007. However, as rapid course development proceeded with a much larger cadre of faculty

members, some of the classic look and feel of our courses was lost during the rapid expansion. It was more difficult to remain as current in newer teaching and learning technologies. Completion of new courses for the full bachelor's (or equivalent) to DNP program provides an opportunity for our faculty to step back, reassess our progress, and plan for the future as students use social media, mobile technology and cloud computing to enhance their learning as part of the current technology educational environment.

As the University as a whole examines the best ways to provide support to faculty to teach in technology-rich environments, the School of Nursing is re-examining and redefining our common learning environments with an eye to envisioning the best ways to engage with our students and each other to support learning. We see an opportunity to renew and advance our skills fully into the present technology learning environment following an invitation in 2012 to partner in a new pilot with the Office of Information Technology. Furthermore, use of mobile technology and cloud computing demand a re-evaluation of the best ways to support students and faculty in online teaching and learning. Faculty members continue to ask what tools and techniques can be used to best support their teaching and engage students in learning. In partnership with our colleagues in OIT and the libraries, we continually strive to challenge ourselves in the quest to increase access and improve the quality of student engagement with and within our ever-changing academic learning environment.

Results of our dissemination

<http://mediamill.cla.umn.edu/mediamill/embed/13656> This is a video we made a while back to tell students about our programs.

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The Drive to Digitize

*Mauri S Brueggeman
Cheryl Swinehart
Janice Conway-Klaassen
Stephen M Wiesner*

Introduction

Distance education (DE) has become a popular option for expanding education and optimizing expenses but continues to be controversial. Evidence shows both positive and negative outcomes across educational fields, but the effect of DE in place of classroom instruction (CI) is equivocal (1, 2). Published literature on the subject frequently does not account for multiple experimental factors, such as the type of outcome measured, learner demographics, biased sampling, failure to put in place proper experimental controls, and confounding instructional methods that might affect outcomes, leading to potentially conflicting interpretations [1, 3, 4].

At the outset of this project, the U.S. Bureau of Labor Statistics occupational projections data suggested that employment of medical laboratory professionals was expected to grow by 14 percent between 2008 and 2018, faster than the average for all occupations. It projected that by 2018, the U.S. would need another 70,600 medical laboratory workers, with 20,500 at the baccalaureate level, to fill newly created positions, and 107,000 workers, 53,000 at the baccalaureate level, when considering replacement of retiring staff [5]. Each year, accredited programs graduated fewer than 4,700 laboratory workers, so to meet the workforce needs of the country, the number of graduates needed to increase more than twofold.

Of the more than 1,000 tests performed in the clinical laboratory, about 500 are used daily to help health care practitioners make decisions about disease prevention, assessment, diagnosis, treatment, and management, and provide 70-80% of the data used in clinical decision-making [6]. Clinical hematology is one medical laboratory field where identification of disease states by looking at patient samples under a microscope is critical. The ability to teach this skill has been dependent upon a student having access to both a physical specimen and a microscope with which to view it, each of which represent significant investment in effort and capital. These costs can be prohibitive when considering development or expansion of laboratory scientist education programs because the direct relationship between the number of students, microscopes and specimens is not amenable to new methods of teaching. With the advent of virtual microscopy, this relationship can be changed.

However, the efficacy of teaching microscopy in a digital format has not been firmly established in undergraduate education, thus hindering development or expansion of laboratory science instruction that adopts virtual microscopy; ultimately restricting training to traditionally served demographic populations.

Changing Course Delivery

To address workforce shortage needs, our clinical laboratory sciences (CLS) program has begun to expand its program to one of its coordinate campuses 90 miles away. The expansion of our curriculum to this site created several challenges regarding the educational assets used to deliver the program.

The capacity to teach medical laboratory scientists the skill of identifying disease states microscopically is limited by both the availability of physical samples relevant to laboratory science and

by the lack of an environment in which alternative instructional methods can be objectively evaluated. Traditionally, undergraduate hematology morphology was taught using microscope slides where each student or a very small group of students had an instructional slide set. With our position in an academic health center, our instructional slide sets contain some of the rarest and most unique hematopathologies. However, glass slides can be damaged or broken and stains fade over time resulting in the loss of these precious resources that cannot be replaced. The challenge of delivering an equitable curriculum to distant locations along with the need to preserve our slide collection directed our effort to digitize the slide sets used in our teaching laboratories. We anticipate that this approach will play a central role in the distributed delivery of hematology through DE as new programs are initiated to address workforce shortage needs and expand undergraduate educational opportunities in laboratory science; ultimately increasing capacity to train much needed laboratory professionals and ensure continued quality of healthcare as demand increases with the aging population.

Despite the needs of our program, we were unsure whether digital microscopy would provide equivalent instruction compared to traditional face-to-face (F2F) delivery. The level of personal interaction and guidance provided during regular laboratory sessions seemed essential in developing the ability of students to distinguish subtle morphologic characteristics represented in varying disease states. Nevertheless, we recognized that delivery to alternate performance sites was not sustainable utilizing our limited number of teaching slide sets.

The digital slide library mimics the use of a real microscope and slide set where students can choose a disease entity or case and can view the associated slides at any magnification from 4X to 830X.

These are not still pictures that students view to memorize specific cellular characteristics. Students can zoom in and out and move around, exploring the slides in a manner that assists their learning. Students encounter cells as they scan the slides and have to learn to recognize cells within the context of that particular pathology. Our students enjoyed the flexibility and access to the database that comes with DE and one student comment was that the course design surrounding the digital slide library enhanced their independent learning process. We evaluated the efficacy of virtual microscopy as the primary mode of laboratory instruction in undergraduate level clinical hematology teaching and found that students utilizing the digital slide database performed statistically better than those experiencing traditional face to face instruction [7].

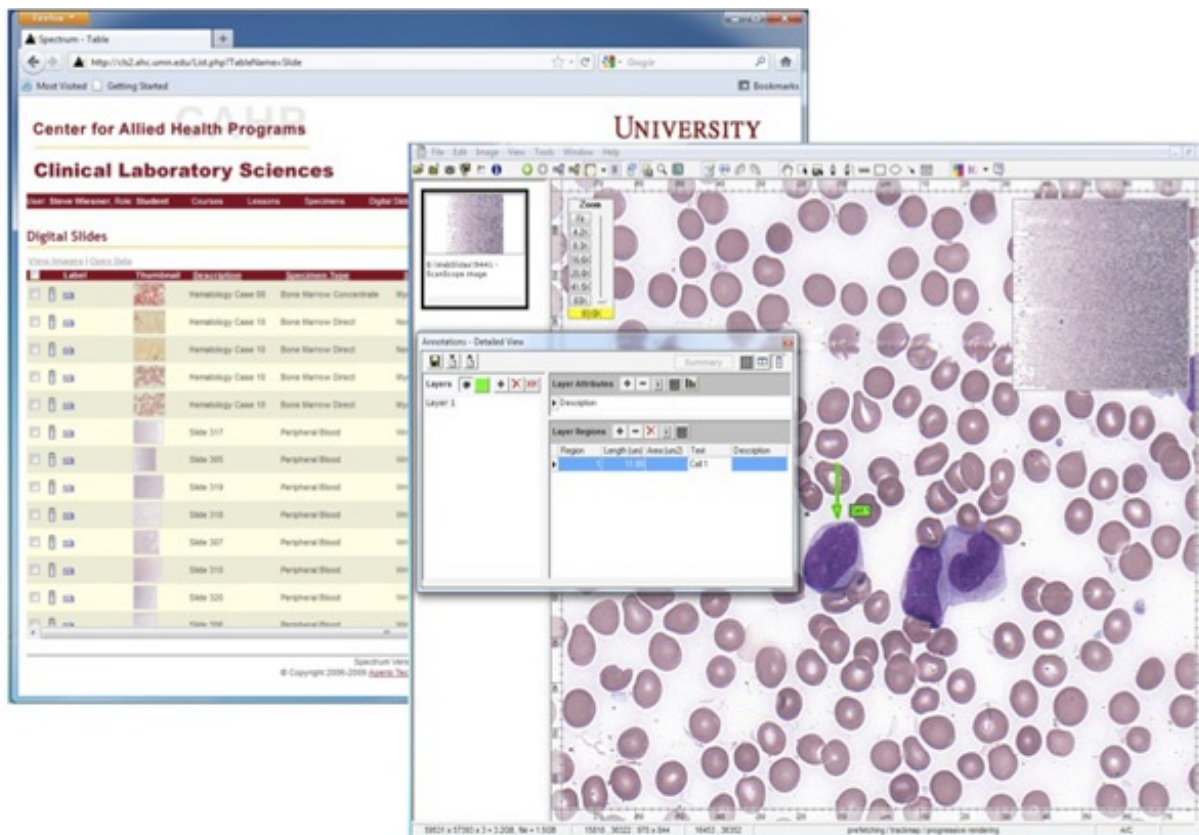


Figure 1. Screen shots of the image database and slide viewing software

Lessons from our experience

At the outset of this project, our program was grappling with the expansion of our curriculum to alternate performance sites without the necessary physical assets required for instruction. While we had done some preliminary investigation into the possibility of digitizing our microscope slide set, we did not have the resources necessary for completion of that task. We were fortunate that the opportunity for funding from the Learning Innovations Council at the University of Minnesota arose shortly after we had begun to consider this endeavor.

Having limited experience in development of digital educational resources, we grossly underestimated the amount of time that would be required to complete the project. This was mostly due to the age of our slide sets and the need to identify the best examples possible from our collection. Slides had to be individually marked to identify the area of the slide that displayed the relevant morphological characteristics. The slides were sent to our vendor for scanning, the files returned to us with the slides, images uploaded to the server and then converted to a format usable by software installed locally on the students' computers. Once uploaded and converted, slides had to be properly identified, organized and annotated for student use.

In retrospect, this project was as much a coincidental confluence of resources as it was a planned effort. The technology was available commercially to enable digital delivery. The funding was available at the time of need. We had the need and desire to complete the project. That said, the single most important factor in the success of this project was the fact that we had identified the content to be delivered digitally before the other factors came into play. The first lesson learned in completing this

project is that we must view our entire curriculum through the lens of digital delivery and identify the content that can be effectively conveyed to the students in a digital environment. The second lesson is that the digital environment used to deliver material must be tailored to the content. Content cannot be tailored to the environment. While tailoring content may be possible, ultimately the mismatch will result in less effective instruction for the student. Inevitably, the accommodations made to enable the content to be delivered in an inappropriate context will cause cumbersome changes that affect student learning. We were fortunate that we were able to take advantage of technology that had been commercially developed for digital microscopy and implement it in education. In spite of that fact, we continue to struggle utilizing digital microscopy software developed for clinical pathology as an educational tool. Limitations of the commercial software have forced us to find ways to work around features that are entirely justified in clinical practice but result in extra effort and wasted time in an academic teaching environment. As a result, some students have expressed frustration with these cumbersome procedures and it has dampened their enthusiasm for distance education. This should be a consideration when undertaking any transition to digitization and best efforts must be made to ensure that technology is not an impediment to learning, but an enhancement.

Impact

To date, eight laboratory science education programs have licensed access to our digital database of hematology slides. The database represents a resource for instructors who have already developed hematology courses and is a repository of learning objects. Future directions will include continuing education modules and the development of a digital curriculum supported by the database for a complete hematology course online.

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Mauri Brueggeman is the Teaching Laboratory Manager and is an Instructor for Hematology. She is a co-investigator on the Clinical Laboratory Science program's digital slide database project and hopes to continue researching pedagogical strategies that promote the learning experience and their effectiveness in the delivery of online education in the Clinical Laboratory Sciences curriculum.

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Cheryl Swinehart is an assistant professor and teaches hematology and hemostasis in the Clinical Laboratory Sciences Program. Cheryl developed laboratory simulations to replace five live laboratory sessions and hopes to be able to distribute them to other CLS programs throughout the country.

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Using Online Instruction and Virtual Laboratories to Teach Hemostasis in a Medical Laboratory Science Program

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Stephen M. Wiesner

Christopher Desens

Phyllis Trcka

Cheryl Swinehart

Background Information

As with all methodologies within the medical laboratory, Hemostasis testing has evolved considerably over the past 50 years. Testing methods in this discipline have changed from the original coagulation tilt-tube methods of the 1960s and 1970s to semi-automated methods (e.g. Fibrometers), and now to fully automated methodologies. However the fundamental principles used in the methodologies have remained relatively static during these same years. Campus laboratories needed to evolve to prepare students for current practice methods, but many semi-automated coagulation instruments that we traditionally used for campus instruction are no longer in production and the expense of current fully automated instrumentation is beyond the reach of many educational programs. Our first concern was therefore lack of funding to provide students with access to the required instrumentation for these tests. The second problem we faced was that our program had also recently opened a second performance site at a coordinate campus. Because we are accredited as a single program, we needed to insure that the education provided to students at the second location was equivalent to the instruction at our original location.

Understanding of reagents and implications of results for patient management are essential for student competency in Hemostasis. For our program's student laboratories, on-campus instruction involves manual or semi-automated methods, so that students can "see" what is occurring during the testing method. It is also essential that students understand what is being done inside the instrumentation as they move from campus, to their clinical experiences, and eventually into the workplace. Knowledge of the methodologies allows them to detect potential errors, troubleshoot instrument malfunctions, validate instrument performance, and eventually evaluate and interpret patient results.

Because the majority of Hemostasis testing in hospital laboratories is currently performed on automated instrumentation, students no longer needed to develop any proficiency in performing the manual method. Nevertheless, visualization of this basic method has instructional value toward understanding the underlying analysis. Many of the hands-on skills used in this discipline were also taught in other portions of our curriculum. We therefore decided to investigate the possibility of developing a virtual experience in this subject area to teach the fundamentals of pathophysiology and diagnostic testing theories without a wet laboratory, while using a technique that allows the student to directly visualize the reactions detected using current instrumentation.

Several factors influenced our shift to virtual laboratory exercises for Hemostasis:

1. lack of instrumentation, reagents, and supplies for student laboratories within our budget
2. the need to provide equivalent instruction at two locations
3. current Hemostasis practice does not require the psychomotor skills associated with manual or

semi-automated coagulation testing

4. the skills that are required are provided in other courses in our curriculum

Developing the Virtual Laboratory Exercises

In 2005, as the CLS Program was reorganized into the Center for Allied Health Programs, we faced the need to replicate our curriculum at the Rochester coordinate campus. Although some funding was provided for this expansion there was not enough to purchase duplicate instrumentation for the student laboratories as well as reagents and supplies. The lead faculty member had also attended a session on campus in which a laboratory course was demonstrated containing similar skills and activities required in our laboratory course. She then began to explore the potential of developing a virtual laboratory course for this topic area.

The target for our online course project was five Hemostasis laboratory exercises traditionally taught using manual methods and their corresponding face-to-face didactic lectures. Before proceeding on this project it was essential for us to determine whether these course units could truly be presented in a constructive manner through online delivery format. Before initiating the project CLS Program faculty met with an instructional designer versed in developing virtual exercises for students. A critical phase of the development was to generate a “storybook” rendition of the didactic content as well as for the steps involved in the laboratory exercises. Faculty acted as the content experts for this process and worked directly with instructional designers to fully outline the course and individual exercises within the course. This took a lot more effort and time than expected but was essential for our success. By working with “non-expert” instructional designers, CLS faculty were forced to reflect in great detail about the steps involved in teaching the material, what was expected from students as they entered this course and what terminal goals were involved. Only then could we develop a strategic process for developing the online modules to help student reach the competencies needed. After agreeing on the basic template the faculty worked with a team versed in online education module development including an instructional designer, videographer, and an Adobe® Flash programmer to develop a virtual laboratory session for each of the existing traditional laboratory exercises and corresponding lectures.

Screen-by-screen module content was developed by our program faculty using PowerPoint® or Microsoft Word®. These screens were then converted to Adobe® Flash by a contracted programmer. Because we had invested a significant amount of time in developing the detailed storybook for each exercise, instructional designers were able to help us align the course materials in an appropriate sequence directed toward the expected student outcomes. For our particular project, this meant rearranging some of the content along with some minor enhancements (more in-depth explanations) but no material was added or deleted from the original course. Based on the instructional goals they helped us develop appropriate assessment tools for the exercise outcomes. The first module took approximately 4 months to develop, however the additional modules took far less time because many of the activities were similar between the modules. The lecture and laboratory lessons were divided into the following virtual lecture/laboratory modules:

1. Prothrombin Time (PT)
2. Activated Partial Thromboplastin Time (APTT)
3. Thrombin Time (TT)
4. Factor V Assay
5. APTT Inhibitor/Inactivator Assay

In each of the exercises, the students went through the entire traditional process including reconstituting

and mixing reagents, confirming water bath temperatures, gathering all testing supplies, etc. Instead of simply watching a video of someone performing the testing, these modules required student interaction. The student had to select the reagents from materials on the screen using a computer mouse, mix the reagents, check water bath temperatures and set up each test tube. The student then performed the clotting test online by starting a stopwatch when reagent was added, watching a video of a clot forming and clicking the stopwatch again when the video showed clot formation. In our current application, students downloaded and filled-in a worksheet for each exercise. Results were submitted through the online course management system for scoring. The instructional designers were extremely helpful in identifying where a picture or video would be helpful, when a knowledge check was needed, or when to have the student demonstrate a skill.

Students were allowed to practice as many times as they wished before testing their specimens and submitting their results. Even after their results had been submitted students could return to the modules for review and preparation for exams. This feature of extended practice was not available to the traditional delivery format students due to need for live laboratory time and the cost of reagents.

Support and Funding

Our educational program is housed within the Center for Allied Health Programs which was developed by the University of Minnesota's Board of Regents in July 2006. The principles that created this new model included non-traditional models of delivery (hybrid education), learner- centered, leveraging technology, statewide access and outcomes-monitoring. The proposed features involved technology learning platform and support to faculty to create a new online and hybrid curriculum. For these reasons, our program had a strategic initiative toward the use of technology in the delivery and enhancement of the educational curriculum. Funding support from the Director of the Center for Allied Health Programs and from the Vice President of the Academic Health Center who oversee our unit was an essential component to its development and implementation.

Comparison of Traditional and Virtual Delivery Student Outcomes

Because we are in an accredited medical program, we needed to verify that the use of this new delivery process was at least equivalent in student outcomes to the previous delivery model. The efficacy of this new delivery format was investigated by evaluating the performance of 272 students from our academic program over six years. A total of 101 students received Hemostasis instruction via the traditional face-to-face lecture and laboratory format (years 2006-2008) while 171 students received instruction via online lectures and virtual laboratory format (years 2009–2011). Exam questions during this six year time period were evaluated for their appropriate use in the study. Over the six-year span of instruction, only 13 questions were unchanged and consistently used on the Hemostasis exam without any modifications (Table 1). Student results were compared based on their course delivery format, using the "percent correct" on the individual test question items and performance on the Board of Certification (BOC) sub-discipline as the expected student outcomes. A comparison of GPA by student cohort year and by delivery format found no significant differences indicating there was no need to control for student GPA in our analysis of student outcomes.

Table 1: Student Performance on Exam Questions (percent correct)

Question	Question Subject	Traditional	Virtual
1	Prothrombin times purpose	73.3	75.3
2	Use of Thromboplastin	84.2	96.5
3	Phospholipid function	87.1	99.4

4	Calcium function	75.3	92.9
5	Non-activated partial Thromboplastin time	91.1	89.4
6	Thrombin time	90.1	91.8
7	Factor VIII deficiency	89.4	95.3
8	Inhibitor/Inactivator study Case Study 1	84.6	83.9
9	An abnormal PTT correction	90.0	87.5
10	Inhibitor/Inactivator Case Study 2	80.6	75.6
11	Heparin Concentration Calculation	75.8	91.2
12	Factor Assay Interpretation	86.2	95.9
13	Factor Assay Procedure	78.0	87.1

The overall mean percent correct on the 13 questions was higher for the virtual delivery student group (M=89.4%) compared to the traditional delivery student group (M=83.7%). The mean percent correct for the traditional delivery student group seemed to remain static while the mean for the virtual delivery student group seemed to be increasing (Figure 1). A t test was performed to compare the number of test items correct on the Hemostasis exams and student performance on the related sub-discipline on the BOC exam. Student cohort scores on the BOC showed no significant differences between the course delivery formats while a significant difference was found for student performance on the on-campus test questions. Since student performance on the BOC was not significantly different we have shown that this method of delivery can achieve the required student learning outcomes supporting continued use of this method of instruction in our program.

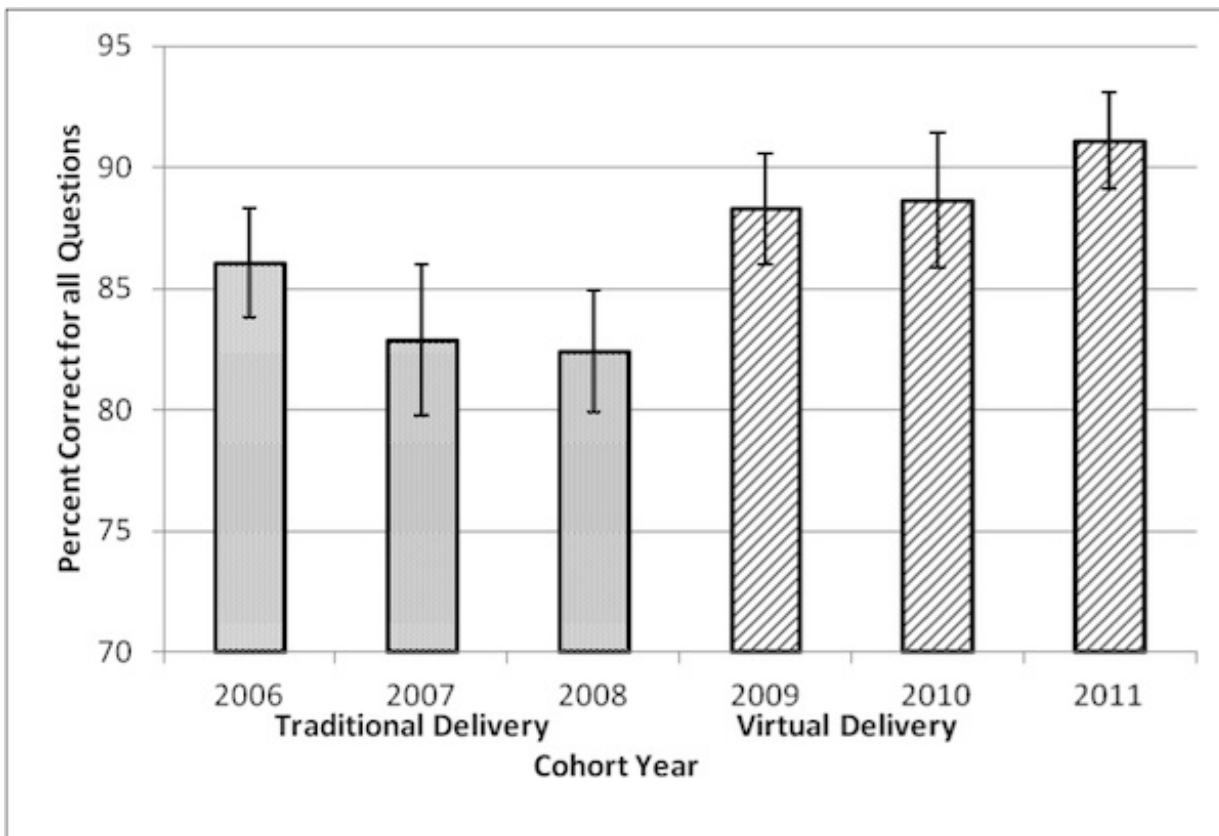


Figure 1: Students' Average Exam Scores (Percent Correct) by Cohort Year

Analysis of Survey Results

Sixty five of the 171 students (38%) in the virtual delivery group completed the optional survey. Four students experienced some technical difficulties such as slow loading or screen freezes, but these students were connected to the Internet via phone modem. None of the students connected by cable modem or via digital subscriber line (DSL) reported having any loading or connection problems.

The vast majority of students (97%) felt that the virtual delivery was effective, provided confidence in understanding, and was easy to navigate. Students stated that they liked the ability to work with the modules at any time of day or night (48%) as well as the ability to repeat the modules multiple times (16%). They felt the ability to repeat the units along with the interactive nature helped build confidence in their understanding of the content and testing method (16%). They also felt that the online modules were straight-forward and concise and helped them focus on the content and purpose of the lesson.

Lessons Learned

During this process there were several lessons learned before, during and after the development of the online learning modules.

1. The work with instructional designers helped set the stage for a student-focused delivery of course materials. It was critical for these individuals to help us strategically align the unit objectives with course materials and in turn the activities and assessments.
2. In spite of having a fully developed course in place it took about 4 months to design the course for optimal student learning and then develop the web based modules. Things that are done in person, perhaps somewhat automatically by the instructor, have to be overtly integrated into an online course because the instructor is not there to add the explanation as students go along.
3. An individual with expertise in Adobe Flash programming who could devote 100% of their time toward implementation, kept us on track toward meeting deadlines.
4. From the student surveys, it became evident that with the conversion of curriculum materials to an online instruction and virtual laboratory exercise format, we not only needed to specify the minimum technical requirements for student computers but how they access the Internet as well. The size of most image and video files were too large for phone modem access, causing problems for some students. This may also limit accessibility to rural areas experiencing critical shortages of trained personnel and thus the possibility of expanding to more rural coordinate campuses in the future until adequate high speed Internet infrastructure is developed. During the last year of the study and for the future, the program required students to have access to either cable or DSL connections to the Internet as part of the admissions requirements.
5. Complete course conversion to a digital simulation format is rarely contemplated years in advance. Lack of anticipation of the availability of funding and expertise to accomplish this project limited the vision of program faculty regarding course redesign possibilities. As a consequence, adequate care was not taken in the collection and preservation of student performance data and we were forced to rely on aggregate data rather than on individual matched datasets. A more comprehensive approach to data collection and storage has been implemented so that studies will not suffer the same limitations at our institution in the future.

Summary

Many universities and health science programs in particular have embraced the development of online education and virtual laboratory experiences to enhance student learning and expand access. In this study we developed a set of virtual lecture and laboratory exercises to replace traditional wet laboratories and face-to-face lectures. Although literature has shown that students in online instructional delivery formats reach equivalent outcomes to students in traditional delivery formats, it

was essential that as an accredited allied health program, we evaluate the efficacy of this new delivery format on our student and program outcomes. The success of this project encourages us to explore other areas of laboratory science education which could be converted or enhanced through application of digital learning models.

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Development of Online Conferencing and Web-Based In-Service Modules for Clinical Preceptor Training

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Patricia J. Brennecke

Stephen M. Wiesner

Donna J. Spannaus-Martin

Introduction and Background

Because of the impending shortages of laboratory personnel, a consortium of laboratory partners including multiple education and industry members, applied for and received a Department of Labor (DOL) grant through St. Paul College: Developing Capacity to Grow Minnesota's Clinical Laboratory Workforce. There were a variety of projects associated with this grant, but all were essentially focused on significantly increasing graduation rates of qualified medical laboratory personnel for the state's workforce. However, the common issue facing us was the limited availability of required clinical education placements. Even before increasing our educational programs' enrollments it was getting harder and harder to find the appropriate quality clinical placements for students. But with the approaching drastic increase in the number of students needing clinical placements, we had to find a new way to provide the "clinical" for our students, to ease the impact on the clinical sites and focus the time in the clinical site to only those skills that we could not teach on campus.

To find a solution for our students and for the clinical sites we looked away from historical models. What did we need our clinical sites to be able to provide and what had we already taught them on campus? We realized that instead of the traditional clinical internship where bench instructors teach students all of the testing methods from scratch, we needed a clinical experience for our students. As you can imagine, this change away from the traditional concept of clinical training was initially difficult for both academic and clinical faculty to accept. We needed to work extensively with our clinical affiliates to develop a concept of what we needed in this partnership. However, since we have clinical affiliates throughout the state (one-third outside the metro area) and into the neighboring states, we needed a way to reach all of these hospital and clinic locations without extended travel for university faculty and time away from work for clinical personnel (Figure 1).



Figure 1: Non-Metro Clinical Training Sites

How could this be accomplished in a timely and consistent manner? We investigated the option of delivery of this information electronically including a web-based approach for preceptor in-service orientation and education. But we were not sure that the clinical personnel who were used to an in-person face-to-face interaction would accept this alternative delivery. We decided to explore three components of delivering an orientation and program specific information to our clinical affiliation sites: online introduction modules, web-conferencing, and the use of a course management system as a repository for relevant materials.

Development of DOL Modules

As part of the Department of Labor (DOL) grant, an online interactive Preceptor Training module was developed along with a companion module for students. The module for Preceptor Training was an extension of the orientation. Screen-by screen module content was developed by our program faculty using PowerPoint® or Microsoft Word®. These screens were then converted to Adobe® Flash by a contracted programmer. This individual also had some experience in instructional design and acted as a reviewer for flow and understanding of the content. The purpose of each module was to provide an overview understanding of this new model of clinical training, how and why this model integrated with our curriculum and with the outcomes expected for accreditation. The modules were designed with an awareness that students and preceptors would go through both modules while preparing for the clinical experience. Each section contains interactive Knowledge Checks to reinforce the stated objectives and the student module also contains Observation Checks where students are asked to observe aspects of their clinical site.

The preceptor training module we developed consists of seven sections. The Introduction describes the rationale for the new model of a clinical experience including our history as a profession, current economic pressures, and the value of clinical education. “Roles and Definitions” describes the interactive roles and responsibilities of the students, clinical preceptors, academic and clinical coordinators during the clinical experience. “What Is Entry Level?” help preceptors understand that they

are not training a new employee to become fully-proficient on their hospital's instruments, but are exposing students to the culture, environment and workflow of the clinical laboratory as well as the laboratory's role in patient care. "Student Affective Domain" discusses the need to describe and define the professional behaviors that are part of the medical culture. So often we forget that these are things we need to teach to the students along with the laboratory science. "Creating A Positive Environment" stresses the need to maintain a positive atmosphere for learning and to provide guidance for students so they can improve their performance. We know how difficult this can be considering the levels of stress typically found with laboratory work. The section on "Student Evaluations" describes the preceptors' responsibilities for providing a quality evaluation on student competencies including the need for constructive feedback as well as encouragement. The "Summary" section refers the preceptors to their Education Coordinator or academic affiliate for additional information.

The comparable student orientation module, called "What To Expect On Your Clinical Experience," was designed to help students understand their responsibilities during the clinical experience. The module contains four sections and begins with "Before You Begin" which reminds them of the need to prepare for this portion of their education. Students are told to plan ahead in finding the location, parking, and determining whether there are additional requirements for that site such as a site-specific orientation. "How the Laboratory Works" follows the path of a patient's sample through the hospital from drawing the blood to reporting out the patients' results, describing these functions in a small clinic setting as well as a large urban medical center hospital. "A Typical Day" follows a fictitious student through a day during her clinical experience, including her interactions with fellow students who are in other laboratory sections and the preceptors. "Making the Transition" describes how students can begin to make the transition from college student to a practicing laboratorian. Part of the clinical experience is the development of laboratory professionals who can exhibit mature interpersonal relationships and appropriate communication skills, adhere to the highest standards of the profession, and exhibit confident and mature use of health care knowledge and skill. Students may enter the profession with competent communication, organizational and ethical skills but need to learn how to apply them to the healthcare setting.

Web-Conferencing Sessions

Although the modules were helpful as an introduction to the clinical experience concept, we needed to provide a more in-depth and specific in-service for the preceptors through a series of web conferences to explain our curriculum in each sub-discipline of CLS. The web conferences utilized a university meeting system that provided two-way audio conferencing along with Internet displays. We needed to use separate teleconference design for audio discussions due to fire-wall security issues at some clinical sites. This provided a synchronous meeting format for clinical sites, especially those at considerable distance from our campus location. It also removed the need for travel and provided consistency in the information delivered to our clinical sites.

We first held a number of sessions where program faculty presented a discipline specific overview of didactic content and student laboratory activities along with a discussion of overall expectations for the clinical experience. Each Course Director outlined the lecture material and student laboratories in a PowerPoint presentation that was uploaded to the Web conference platform. The sessions concluded with a summary of expectations for rotations in light of what was presented. Because most of our clinical training sites take students from many different college program designs, they were not really aware of the extent and depth of our on-campus instruction. These teleconference and web-based conference sessions utilizing UMConnect and GopherConferencing provided the opportunity for campus faculty to have direct discussions with the preceptors in each discipline. The ability to answer questions immediately and to address any concerns from the clinical sites garnered a lot of support for our new model along with constructive feedback for on-going improvement. A second set of web-

conferences were designed for all disciplines which focused on preceptor behaviors and student evaluations processes during the clinical experience. These discussions were then incorporated into the final modules in the online course site.

Course Management System (CMS)

To make all of these materials available to the preceptors, we developed courses within our university Moodle CMS. One course was developed exclusively for clinical site personnel that included access to the DOL training modules, ready access to handouts and other materials from the web conferencing sessions, evaluation forms and instructions. Other sites were developed for students which included access to the DOL modules and other general materials they would need for their clinical experience such as checklists and evaluation forms. The student CMS site also contained resources for students such as information about housing if they were assigned to non-metro sites. Rather than printing out and providing each student with a packet of information the Moodle site acted as a repository for all of the materials they might need while in their clinical training. The student sites also contained addresses, directions, and contact information for their clinical assignment as well as links to hospital specific policies and other requirements. Preceptors and students completed their evaluations through the CMS system creating a paperless process. Since the CMS also contains email and chat capabilities it provided a mechanism for enhanced communication between the program and our clinical affiliates as well as with students. This was particularly helpful since our program has students at many locations throughout the region including a large number of non-metro sites. Students and preceptors both quickly became comfortable using this method of interactive communication.

Preceptor Survey

As part of our on-going program evaluation we wanted to know if our new model was still reaching our program goals for our graduates. We invited all conference and clinical site members to participate in an online survey at the end of the 2011 session. The survey gathered demographics about the preceptors including age, practice level, number of years in the profession and number of years teaching at the bench. We also asked about their satisfaction with the DOL modules, web-conferencing, and CMS Moodle course sites.

Of the 130 individuals involved in our clinical experience for students 73 completed the survey (56%). Twenty three of the respondents attended the live web-conferences. Those that did not participate in the live sessions were either unaware of the offering or they were not able to get away from work to attend the live sessions. Of those responding, all felt that the web conferences (live or recorded) were helpful in explaining their role as a preceptor and increased their knowledge regarding our expectations for our new clinical experience.

The DOL modules, Moodle CMS site and Web Conferences were an efficient means of providing in-service training and communicating with our clinical sites. This was a cost effective use of time and finances minimizing extended travel for university faculty and time away from work duties for hospital personnel.

Lessons Learned

- Because of security limitations at some of our hospital clinical sites we were unable to use UM Connect as the sole process for web conferencing. Personnel using hospital computers have limited access to some programs and web sites. We did not anticipate this issue initially but adjusted by using GopherConference teleconference for the audio portion of the in-service sessions.(Figure 2)
- Some locations had electronic interference during the live chats but were able to access the

recorded sessions easily.

- Clinical personnel easily became adept at use of the Moodle CMS. They liked the centrally located repository of forms and information as well as its 24/7 access.

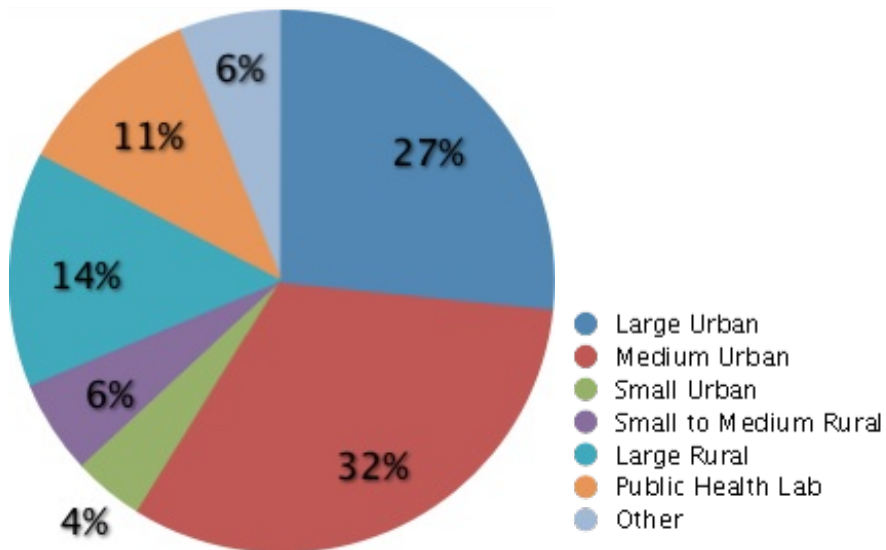


Figure 2: Clinical Training Settings

As part of the DOL grant criteria, the preceptor and student training modules are available for free public use through our program web site.

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Stephen is an assistant professor in the Clinical Laboratory Sciences program and a co-instructor in hematology and hemostasis. He is a co-investigator on this project and is exploring the mechanisms that are most effective in engaging students in online or web-based instruction.

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Donna is a Professor in Clinical Laboratory Sciences, and has taught clinical chemistry, urinalysis, laboratory management, education, research, and professional issues. She developed content, provided images, and edited the completed modules, and she hopes to continue to develop resources to assist students in becoming healthcare professionals.

Supporting the Technical Requirements of the Teacher Performance Assessment Protocol

Pete McCauley
Elizabeth Finsness

Background

The Teacher Performance Assessment (TPA) is a nationally available assessment of teacher candidates' readiness to teach. The assessment focuses on the impact the teacher has on student engagement and learning. The assessment is modeled after the National Board for Professional Teaching Standards (NBPTS) performance assessment for experienced teachers and draws from research on effective teaching. More than 27 states are in various stages of implementing the TPA as an assessment of candidate performance. Minnesota and five other states are national leaders in the adoption and implementation of the TPA in teacher education.

TPA At The University Of Minnesota

Initial licensure candidates complete the TPA as a required part of their teacher preparation program at the University of Minnesota. Teacher candidates experience elements of the TPA throughout their preparation program and then complete the full TPA as a culminating assessment during their student teacher experience. Program faculty and clinical supervisors advise candidates on the expectations of the TPA and support their completion of the assessment. Program faculty consider the candidate's performance on the TPA as one assessment among several that lead to a recommendation from the University for the candidate to obtain a teaching license in Minnesota.

TPA Scoring Process

National scoring of the TPA is conducted by an external agency. Candidates submit their TPA electronically and trained, certified scorers in the candidate's specific subject area assess the performance on 12 five-point rubrics. At the University, the performance will be assessed formatively in courses and as a summative assessment within each program area.

Technology Challenge

The TPA requires that candidates demonstrate how they are "Engaging Students & Supporting Learning". Candidates provide evidence of their ability to engage students in meaningful learning tasks and demonstrate how they facilitate students' understanding of the content. The artifacts submitted include video of teaching and written commentary. Each program discipline (such as English Education, Science Education, etc.) has slightly different video requirements. The challenge, however, in supporting our teacher candidates with technology resources was consistent: How could we provide resources, support, and instruction in order to help facilitate the teacher candidates' recording and submission of videos for the TPA without asking them to become video production experts? We found our answer with Apple's iPad 2 product.

Since September 2010, the College of Education & Human Development at the University of Minnesota has aggressively pursued an iPad Initiative. "By providing iPads to all freshmen, the college seeks new ways of expanding learning beyond the classroom" (<http://www.cehd.umn.edu/Mobile>). In addition, the College decided to make a number of iPad 2 devices available for checkout through the Student Services office, primarily to serve the needs of students taking classes in the College and who

did not have iPads of their own. However, because of the advanced video production capabilities of this device, it also serves as an excellent resource for candidates looking to complete the video portion of the TPA.

Prior to implementing the TPA, the college had already been supporting student teachers in need of recording themselves for peer and instructor review. During the pilot year of the TPA implementation in 2011, we supported candidates using consumer model digital cameras with instructions and hands-on support for editing and uploading using a computer. As soon as the iPad 2 product became available, we considered it as a potentially ideal solution for our candidates.

Supported solution

Elizabeth Finsness, the TPA Coordinator for CEHD, approached the Academic Technology Services unit within the college for help in supporting the candidates' needs for a video solution (<http://www.cehd.umn.edu/ats>). A group convened, consisting of Elizabeth Finsness; David Ernst, the Director of Information Technology for CEHD; Jennifer Engler, the Assistant Dean for Student Services; and Pete McCauley, Video & Media Specialist for the college. The group reviewed three different "package" options before deciding on the iPad 2 kit. The first was a Kodak Zi10 digital camera, and the second was a Canon Vixia camcorder. Both of these options would accept a wireless mic kit, and would require editing / uploading via a computer. However, using the iPad 2 and a wireless mic kit would allow candidates to record, edit, and upload video right on the device itself. The group quickly decided it would be best to support the iPad video kit because of the self-contained nature of the workflow.

A small set of accessories was identified as necessary to aid in the recording of videos using the iPad.

- A stand to support the iPad while recording the teacher candidate in front of the class or collaborating with students
- A wireless lavalier microphone (and necessary adapter) to record clear audio of the teacher speaking while giving them a hands-free experience in order to lead their class appropriately
- A carrying case for the entire kit
- The iPads needed to have the iMovie App installed in order to allow the teachers candidates to edit their videos
- The DropBox app was also required to be installed so that users could upload their edited videos to an online storage system, from which they could then submit the videos for review by their supervisors and Pearson.

Protocol

The teacher candidates can now check out an iPad Video Kit from the Student Services office for up to ten days at a time. The equipment checkout is administered using software called Booking Point (<http://www.hi-voltage.com.au/products/bookingpoint/>), which easily tracks the student checking out the equipment and ties it to their University x500 identification. After the iPad Video Kit is returned to the Student Services office, the iPad is wiped clean and re-imaged, deleting all of the previous users' settings and passwords and preparing the device for the next user.

Support

In support of this system, a dedicated website was published to help the teacher candidates navigate the demands of the TPA requirements (<http://www.cehd.umn.edu/ppg/TPA/>). The overall content for this site was developed by Elizabeth Finsness, with technical support materials developed by Pete McCauley. In addition to contextual information about the TPA itself, the site includes written tutorials on

how to record and share video using a number of different devices including the iPad; a demonstration video on how to set up and use the iPad Video Kit; and links to other University resources for students that need help with recording and video production. We wanted to make sure that we supported the teacher candidates in their pursuit to fulfill the requirements of the TPA as best we could.

Value

The true value of this iPad Video Kit solution lies in the self-contained nature of the protocol. Users can record, edit, compress, and upload their videos all on this one device. Until recently, this kind of requirement would demand that the teacher candidate record using a video camera, tripod, and wireless microphone, transfer the video files to a computer for editing and compression, and then upload the video files to the web as a final step. With the iPad Video Kit, there is no need to learn how to use a video camera; no dependence on another computer for editing the video; and no need for transferring content to another machine in order to share the content. Once the edited video files have been uploaded to the user's personal Dropbox account, they live on "the cloud" in perpetuity until the user decides to delete them. If need be, the user can download them to another device in order to then upload the files to the Pearson evaluation site or other digital portfolio site; or, they can just provide links to the videos on Dropbox as needed.

Obstacles

There are indeed some challenges associated with this solution. For instance, not all users are well versed with the iOS operating system and need a little time to figure out how to use the iPad for recording. Batteries in the wireless mic need to be fresh every time; and there is a special adapter to connect the microphone to the iPad that can be lost easily. In addition, the process of editing and exporting videos in iMovie takes time to learn, as does getting used to the method of uploading video files to Dropbox from the iPad. However, not only do similar challenges exist when using more traditional video production tools, one could argue that there are many more challenges to a novice user.

In addition, users are often faced with the challenge of creating video files that are too big to be uploaded to the evaluation website. We have tried to avoid this by recommending that candidates export their videos using one of the pre-set choices in iMovie, but they don't always follow our recommendations to the letter. In addition, some of the candidates have a lower level of computer literacy, which provides challenges when uploading and downloading video files to a secure storage system, connecting to a wi-fi network, and copying and pasting appropriate URL addresses.

Teacher education at the University of Minnesota currently does not include comprehensive training in the area of computer literacy. There is certainly some; but in many programs, teacher candidates are left mostly to their own devices regarding prerequisite computer skills. Without this familiarity, simple tasks such as downloading and uploading files, connecting to a wi-fi network, and understanding different file types and compatibilities can present significant obstacles when fulfilling the required tasks for completing the TPA. Perhaps the implementation of the TPA will spur the creation of more courses or workshops on computer literacy for teacher candidates.

Summary

The iPad video kit solution became available during the halfway point of submissions for many of our teacher candidates during the spring of 2012. At the time of this publication, candidates were just completing their TPAs, so we have not yet collected formal survey data. Several candidates who were able to pilot the iPad Video Kit voiced satisfaction with the solution. Many of our school districts have invested in iPads as well and they noted that learning how to use the iPad to create video for the TPA inspired them to use this solution in their own classroom with their students when they reach their

career goal – a teaching position in their very own classroom. As of this writing, the total number of candidates that took advantage of this resource has not been tallied, and formal evaluations have yet to be performed. We sincerely hope that the population served by this solution found it a helpful resource for submitting the required materials for the TPA program!

Here is a link to a short video outlining our selection of the iPad Video Kits in support of the TPA video requirements:

“CEHD: Teacher Performance Assessment - Video Support Overview” <https://vimeo.com/42647365>

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Looking For Connections: Pulling Together Collegiate Initiatives to Create a Concept for High Impact Experiential Learning Experiences in Environmental Sciences, Policy and Management

Leonard C. Ferrington Jr.

<http://www.entomology.umn.edu/midge/People/Ferrington/Ferrington.htm>

Looking For Connections

Many, perhaps most, of our pressing environmental management challenges today transcend state, regional and international boundaries. Sustainable solutions require multidisciplinary approaches, communication, coordination, and collaborations across a large number of stakeholder groups representing diverse views and perspectives. In the undergraduate program of Environmental Sciences, Policy and Management (ESPM), our goal is to teach skills that enable our future environmental stewards to conceptualize and work effectively at large spatial scales to create solutions that are implementable in a globalized market place. As such, our program highly values study abroad experiences to broaden the breadth of learning available to our students, and we are committed to helping our students develop and achieve an international experience as part of their undergraduate training.

Our degree program is located in the College of Food, Agricultural and Natural Resource Sciences, and benefits from a variety of on-going and newly developed innovative pedagogical initiatives. The initiatives include well-established participation in the freshmen seminars program, retro-fitting traditional classrooms into technology enhanced classrooms, supporting short-term faculty-led study abroad seminars, and pro-active curricular planning to expand interdisciplinary teaching opportunities and imbed a high impact experiential learning experience (ELE) requirement into our degree programs (CFANS, 2011a, b)

With all of these opportunities it is useful, I think, to ask how we can create even more strategic and effective programs for the future? To me, part of the answer rests with simply connecting the dots and putting these pieces together in a way that makes maximum use of our existing resources. The conceptual framework that I am pulling together is based on the high impact ELE model of Kolb (1984), which includes an initial planning or “preflection” component, a discrete “execution” phase, and meaningful “reflective” period.

Overview Of The Pieces

During the past semester I have coordinated with our CFANS Freshman Seminar coordinator, the IPFANS Office, and the Learning Abroad Center to refine my concept for pulling the pieces together. To my surprise and delight, I learned during the initial discussions that a concept for combining a freshman seminar with a short-term study abroad was already nearing implementation for spring semester in 2013 (for details see: <http://umabroad.umn.edu/programs/fsa.php>). Offered for three credits, this program will consist of one-half semesters of freshmen seminars on a range of differing topics, followed by a study abroad component during spring break, and most will be approved to fulfill a liberal education requirement.

My concept is similar in that it integrates a freshmen seminar with a study abroad component, but it differs in several key points, and is designed to serve the narrower ESPM program and strongly adhere

to the experiential learning initiative in CFANS. Departures from the Learning Abroad Center model are: (1) the freshmen seminar will last the full spring semester and carry two credits; (2) the study abroad component will consist of a 15-20 day trip abroad, also for two credits, in May; and (3) there will be a service component (i.e., not for credit) to be completed either in late summer or during the following fall semester. Structured this way, the program will unfold over an eight to ten month time frame, with activity (1) fulfilling the prelection component, activity (2) the execution phase, and activity (3) being the meaningful reflective period.

Pulling Together The Pieces

Students may enroll for the Freshmen Seminar without committing to the study abroad and earn two credits (however, priority will be given to students that verbally commit to the study abroad). Students not completing the freshman seminar but desiring to participate in the study abroad can be placed on a space-available waiting list, and earn two credits if openings in the study abroad component materialize. This will provide some flexibility to accommodate student schedules if they cannot arrange both the freshman seminar and the study abroad. Students in the ESPM program will be given priority to participate, but students from other colleges across the university can enroll on a space-available basis. However, to fulfill the high impact ELE requirement the ESPM students will be required to complete all three activities.

This program will be marketed via recruiting opportunities to potential high school students during on-campus visits, and during the annual Dean's Welcome for admitted and committed incoming freshmen. Additional marketing will occur during College Day of Welcome Week, and also during Fall Semester in the ESPM 1001 Freshmen Orientation Seminar. The concept is to integrate the service requirement into these last two marketing efforts so that students that are rising sophomores and have completed the freshman seminar and study abroad will provide the marketing to the current incoming freshmen class of a given year through presentations and small-group interactions. In addition, we will attempt to develop a "Study Abroad Ambassadors" program for returning students that want a more formalized reflective experience.

We will use a technology enhanced classroom such as 50A Coffey Hall so that every student will have access to the internet during each class period. We will use Moodle for posting readings, interactive activities, submitting homework assignments and blogs. In addition, we will use social media (Facebook, Facetime and/or Skype) to facilitate real-time discussions with students studying Environmental Sciences in our target country. Our initial target country will be Iceland, however in subsequent years the target countries and environmental topics will vary at the discretion of the faculty leading the seminar. Because of time zone differences, our class meeting time will be from 8-10 AM on Saturday mornings. The intent of integrating social media into the seminar will be to allow the freshmen to independently develop questions and explore concepts that are introduced in class with undergraduates studying environmental sciences in Iceland. The freshmen will be required to develop their own social networks with Icelanders to better understand how landscapes and natural resources influence opinions about managing environmental resources. Efforts will be made to coordinate follow-up meetings with persons met through social media during our study abroad visit to Iceland.



Figure 1: Lake at Reykjarfirði (left) and highlands and alpine stream at Hengladals (right). Examples of natural resources managed for sustainable fishing and hiking activities. (Both photographs provided by Elísabet Ragna Hannesdóttir.)

Integrating the social networks component into the seminar is expected to substantively enhance the learning abroad experience. During the freshman seminar we will focus some of our learning activities on policies that differ between the United States and our destination country, with the intent of trying to understand how the differing policies serve the conservation of similar resources. However, rather than relying fully on readings and our own experiences for contextualizing the information about conservation of particular natural resources, we will be able to hear “first hand” the impressions and judgments of environmentally oriented students in Iceland of their national approaches to stewarding their natural resources. For instance, I will use one example related to differing management approaches related to aquatic resources to illustrate. In Minnesota, most of our management of fishing in state parks and national parks is for recreational sport fishing. I expect that most students in our class that are Minnesota residents may consider sport fishing for walleye that occurs in our parks as a valuable leisure-time resource. By contrast, students from other states may not fully appreciate the social and leisure-time attitudes that have formed the foundation for our complex and lake-dependent rules regarding catch-limits and slot-sizes that govern if an angler can retain a caught walleye for personal consumption. This difference in perspective provides an example of potentially contrasting and even controversial opinions regarding managing the yield of walleye in our lakes over the past several decades.

By contrast, however, in Iceland there is a commercial fishing industry in some lakes of national parks, such as Thingvallavatn, with detailed records of fisheries yields for more than three centuries. This lake is located in Thingvellir, which was proclaimed a national park and national shrine in 1928, and more recently has been the focus of a comprehensive assessment of the local geology, meteorology and natural resources. Although managed as a national park, it continues to support a sustainable commercial fishery. By integrating Icelandic students into our seminar we can potentially expand our discussion of fishing regulations to include the Icelanders’ views on commercial fishing for arctic char in their national park. What differing attitudes and value systems develop around managing yield of freshwater fish when it is leisure-based versus income-dependent? How do these differences translate into attitudes and, ultimately, regulations and rules for conserving sustainable yields? The social networking will provide us with perspective that we cannot provide in a closed classroom discussion.

This will be followed up with a visit to the national park, where we can talk with park managers in more detail and learn about internship opportunities for students to be involved in the commercial fishing industry. Thus the digital technology will give us an opportunity to make these connections prior to the trip, and form a context that will enrich or otherwise enhance the experience when they actually set foot in the country.

Sustaining This Program Over Time

In ESPM we introduce and emphasize the concept of environmentally sustainable resource management, and a program of experiential learning for ESPM majors should, likewise, have a plan for longer-term sustainability. By integrating this program into our recruitment activities, re-visiting it in the Freshmen Orientation seminars, and coordinating the service component so the sophomores completing the experience have the opportunities to describe their experiences to the subsequent freshmen classes, I expect that we can continue to generate sufficient student enthusiasm to maintain enrollments over time. From the perspective of faculty involvement, this framework will be flexible enough to allow interested faculty to select destination countries and environmental topics that are “real-world” and contemporary in content and importance, and can align with teaching and research aspirations of contributing faculty.

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Costa Rica Digital Exploration

Connie Magnuson

<http://www.cehd.umn.edu/kin/recreation/dstories.asp>

Why Digital Stories?

Hands-on or experiential learning is an approach that has been shown to be very effective, and students seem to really like it. Their work shows that they really understand and embrace it and that is what is most important.

Study abroad courses can be viewed as the ultimate in experiential learning. These travel experiences provide tremendous opportunities for exploration, discovery, challenge and personal growth unlike anything that can happen in a traditional classroom.

When determining the academic assignment for the Explore Costa Rica course, it was important to find a way for students to become fully engaged with the travel experience, to connect with the country being visited, to become more immersed in the topic they were researching, to have discussions with locals in the communities and to be able to reflect on their experiences in a meaningful way.



As a photographer, one can experience firsthand the power and insight that comes from being behind the lens. Surroundings are viewed with a more critical eye. Confidence is created when there is purpose while engaging with others. The photographer can see clearly that there is a story to be told from this perspective. From these experiences, it was determined that creating a digital story using images, video footage and research would be the perfect project for the Explore Costa Rica course.

The Process

Two pre-trip meetings are held a few months before the trip. At the first meeting students are given the opportunity to select a topic that is relevant to the course and is of personal interest to them. A list of suggested topics is given along with the option to propose an unlisted topic with instructor approval. Since there are students with various majors in the course, the topic can be somewhat customized to meet the student's personal academic focus. For example, a Recreation, Park, and Leisure student may choose to examine the topic of Adventure Recreation, an Environmental Education student may discover more about the endangered mangrove ecosystems, while a Carlson Business student may explore the difference between Free Trade and Fair Trade coffee production and export.

Students receive the video cameras that are available for the course at the first pre-trip meeting. With the funds from a small grant, 8 Kodak PlaySport video cameras were purchased for the program. These small cameras are about the size of an iPhone, are fairly durable, are waterproof up to 10 ft. underwater and can be purchased for usually around \$150 each at Target, Walmart or Best Buy. Early distribution of the cameras allows students to practice and become familiar with their use and

capabilities. Students may do the project with a partner and many of them choose this option. Since there are only 15 students in the course, there are enough cameras for each pair. If there are several individuals working independently on projects, partners still share a camera but have separate memory cards that they swap out to collect their own images and information. This has worked rather well. A check out system is used for the camera equipment. Students are responsible for returning everything intact and in good condition (camera, case, cables, etc.) or otherwise they must replace the item.



Staff from the SMART Learning Commons along with a Video and Media Specialist from the College of Education and Human Development department of Academic Technology are invited to give a presentation to the class during the first meeting. Information on the resources available to students including equipment, computer software, tutorials, consultations and various other means of support are presented to the class. Students are instructed on creating a digital story, making a plan, designing a storyboard, determining interviews to be done and footage to be collected, researching their topic for supporting information and other steps to produce a quality product. Also covered are various software and programs available such as iMovie, Windows Moviemaker, MediaMill, Animoto and Photoshop. Students with limited or no experience in video work or media production find this presentation extremely helpful. Having these resources available is very beneficial as these guest speakers are the experts in this type of technology.

As students begin to develop their plan of action for their stories, they consult with the instructor about potential interviews that can be arranged while on the trip. The instructor will work with the local guides and contacts to make appropriate arrangements to fit the interview opportunities into our schedule throughout the trip.

Creating Something of Value

It is one thing to work on a project and simply turn it in for a grade. It becomes something else when your digital story is posted for public viewing and reference. Not only does the instructor see your work, but so can the sixth grade teacher that searches Google or YouTube for “Deforestation of the Rainforest” and sees your video pops up.

A great deal of effort goes into the production of a video. When sharing the projects with the public, the students put their best effort forward. They feel that they are creating something informative and interesting for others to enjoy and learn from. It goes beyond just getting a grade. Students are proud of their projects and after all of the hard work and cool footage they collected from the trip they want to share it with others!

Being able to create digital productions and understanding various forms of technology and software programs are valuable and marketable skills that can be very useful for students in future employment.



That's a Wrap

Students have about 3 months from the end of the trip until the World Premiere of their digital stories. At the premiere, all members of the class view the videos with a critical eye for providing helpful feedback on the projects. The projects are critiqued according to areas such as coverage of the topic (clear,

informative, interesting, easy to follow), visual appeal (clear and attractive photos, smooth transitions, fonts, text, relevant footage adding to the story), technical (grammar, typos, pace, music selection) and other suggestions for improvements. Students then have the opportunity to tweak the video before submitting a final product for the course and for posting. The feedback from the students on this project has been overwhelmingly positive. They love the creative control they have to develop their project and the skills they learn along the way. They are very invested in the project and are much more engaged in the experience while we are traveling. They are also appreciative of the opportunity to be pushed a little out of their comfort zone in gathering images and speaking with both experts and locals in the community. It is not something most would even consider doing had it not been for this project.

Given the positive reviews and interest in this innovative use of technology, the creation of digital stories will also become the course project for the newly created “Dive Belize” course and the currently operating “Kenya Expedition” course.

The video cameras will also be used during the Freshman Seminar, “Go Outside and Play”. Students create media projects that show fun outdoor adventures that can be taken by foot, bike or public transit around the Twin Cities as they learn about the incredible natural resources in this metropolitan area.

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Dr. Connie Magnuson is the Director of the Recreation, Park and Leisure Studies program and Gopher Adventure Race at the University of Minnesota. As the instructor for learning abroad courses in Costa Rica, Kenya and Belize she plans to expand the creation of digital stories to all three courses as well as her seminar, “Go Outside and Play”.



Using Technology to Highlight Children's Experiences of Domestic Violence

Ericka Kimball

Hoa T. Nguyen

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www.honourourvoices.org

Domestic violence affects not only women who are abused by their intimate partners but also children living with these adults. In fact, most people assume that adult women are the primary residents of battered women's shelters, but over half of the residents of battered women's shelters in the United States are actually children (National Network to End Domestic Violence, 2010). The presence of so many children argues for greater attention to their needs.

On a visit to Europe, one of the co-authors, Prof. Edleson, noticed how the rights and voices of children were taken much more seriously than in American social services. Upon return, he attended a national summit at which he heard Casey Keene, a national speaker and adult survivor of childhood exposure to domestic violence, speak with her mother about the time they spent in a battered women's shelter. Casey, who works at the National Resource Center on Domestic Violence, read from her diary of that period and then she and her mother reflected on those times. From these experiences emerged the idea of this online learning experience.

Honor Our Voices (<http://www.honourourvoices.org>) seeks to raise the visibility of children's needs among battered women's shelter advocates, volunteers and other professionals such as child protection workers. A major element of the Honor Our Voices project is an online training module that includes the stories of three children exposed to domestic violence as told in their diaries and highlights both the effects of domestic violence on children and the promising practices that may support these children at different ages.

Shelters and domestic violence service programs have developed comprehensive interventions for children exposed to domestic violence, yet with scarce funding and regular staff turnover many programs have difficulty maintaining services and staffing to meet children's needs. In addition, other professionals such as child welfare workers often lack basic information and guidelines for working with children exposed to domestic violence. This lack of information and resources often leads to frustration expressed by children's advocates and points to gaps in our responses to children exposed to domestic violence.

Innovation

In order to fill this gap, the Minnesota Center Against Violence and Abuse (MINCAVA) partnered with the Center for Advanced Studies in Child Welfare (CASW) and Avon Foundation for Women to create the online training module to highlight children's voices. The online training module presents children's experiences through hypothetical online interactive diaries that include audio recordings, drawings, and text and email messages. A two-day national roundtable discussion was held in December 2010 with adult survivors who were exposed to domestic violence as children and key child advocates, to develop recommendations for promising practices. The results of this national roundtable and subsequent consultations with participants guided the creation of the online training module.

The Honor Our Voices website contains three main products: diaries entries of three composite children's stories paired with commentary on promising practices and links to external resources, a comprehensive guide for practice, and a series of brief audio programs covering the same content. In addition, embedded in the online learning module is a list of resources users can explore. The Guide for Practice (Edleson, Nguyen & Kimball, 2011) is a 40-page document presenting key issues and promising practices in working with children exposed to domestic violence as identified by the national round table and through a literature review. The audio programs highlight specific promising practices through the voices of the children. Narrated by Casey Keene each program illuminates a key lesson learned and its potential application to daily work in domestic violence programs.



Figure 1. Screen shot of Honor Our Voices showing the child's diary on the right and the corresponding promising practice on the left.

Impact

The Honor Our Voices website was launched on September 27, 2011, in time for Domestic Violence Awareness Month (October). From September 27 to December 31, 2011, the site was visited 11,720 times. One hundred and twenty-nine Tweets were distributed from our sites' "Buzz" page (<http://www.honourourvoices.org/press.html>), with 913 visitors coming directly from the URL used in Tweets about the site. A variety of listservs, blogs, and print publications reprinted stories about Honor Our Voices (see attached spreadsheet). We have been invited to present this content as well to a number of audiences, including in March and May 2012 to audiences of attorneys for children through the Judicial Council of California and to Guardians ad litem in April and September 2012 in Ohio.

Future Vision

This project built an experienced team that has received new funding to build a similar site for informal social networks, such as family and friends, who are concerned about children exposed to domestic violence. It has also led our Center to plan strategically to go beyond single modules to build a larger, more comprehensive online training system for the tens of thousands of advocates who work with women and children daily through both domestic violence and sexual assault prevention services.

Advice to Others

Choose a web design and development team that has an understanding of your field. A good working relationship with the web design and development team is critical in creating a high quality and useful product. In developing this relationship, it is important to make sure the team understands the theme, tone, and purpose of the final product since this shapes design and usability of the product.

Create a work plan. It is also critical to have a clearly defined work plan that includes responsibilities and timelines for completion of each section of the project in order to get the content information to the web design and development team. There are so many components in the creation of a project like this

that it is important to know what is needed from each team member in terms of content, design, and function and also when those components are needed in order to complete the product on time.

Pilot test. When creating the work plan, do not underestimate the time you may need to pilot test and de-bug the site. This required a surprising two months for Honor Our Voices. Give yourself enough time to pilot test and “soft launch” the product to identify and correct any problems in content, usability, and functions. A product that is visually appealing and functioning lends credibility to the message.

Summary

The Honor Our Voices online training module presents children’s perspectives of domestic violence using an online diary format. The use of technology assisted in bringing these experiences to life using visual and audio technology. Much of the success of the project is related to the working relationship between the funder, research content, and web design teams. The project has been well received nationally prompting MINCAVA to develop other online learning modules.

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The River in the Classroom: Digital Storytelling that Fosters Community, Deepens Engagement, and Cultivates Global Awareness

Linda Buturian

<http://www.cehd.umn.edu/PsTLWater/>

Upstream – the Past

Six years ago I designed a writing intensive seminar that introduces undergraduates to water resource issues from disciplines representing both the sciences and the humanities. I developed a curriculum that scaffolds toward the digital story as the capstone. Each of the initial 15 seminar students chose water resource topics, used cameras my department purchased to film interviews with relevant specialists, and integrated video, research, music, and voiceover in order to develop a 5-7 minute digital story, which we posted to a public website we created.

Navigating that first seminar of digital stories brings to mind the Old Testament verse, “Gird yourselves, yet be shattered” (Interlinear). The technical problems were hydra-headed due to students’ different operating systems and lack of media development support at that time at the University. Due to my own lack of experience and fear of technology, I could only pinch hit between students and my technical support person. As one seminar student described the story-making process, “It was like climbing Mount Everest blind-folded. I never knew where I was, or what to do next, but the view at the top was worth it all.”



On the Mississippi River. First class of water seminar students to create digital stories. Spring 2008. Photo by Linda Buturian. To view their digital stories: <http://www.cehd.umn.edu/PsTL/Water/>

Those initial students' perseverance points to the main reasons I went on to integrate digital media into all of my classes—the level of student ownership of and engagement with the subject matter are unparalleled in my fifteen years of teaching (Sadik 2008). Added to that is the degree to which students work collaboratively, which is a central component of my pedagogy.

Several seminars later, I've come to understand why the digital story is so enduringly powerful: for students to effectively communicate their findings in this multimedia genre, it requires of them a deep integration of knowledge. They must absorb, for example, the concept of virtual water as it applies to consumer goods, or how nitrogen run-off from Midwest agriculture contributes to the Dead Zone in the Gulf of Mexico, and then utilize the elements of technology—still shots, audio, transitions, text—in order to make the topic accessible and engaging to a public audience.

But the digital story assignment is only as meaningful as the context shaping the assignment. Earlier in the seminar I bring in guest speakers including Ram Krishnan, who works with water-scarce communities from Africa to India, helping villagers build water catchment ponds. Field trips include walking along the Mississippi River to practice taking photographs, and to experience the ecology in the urban ecology of their campus. Students complete assignments that isolate narrative writing and analytical writing that incorporates primary sources—both of which help them to create the script for the digital story. Through discussions of ethos, arc, and audience, we analyze the story in digital storytelling. In the context of the seminar experience, students' process of creating their digital stories for a public audience about the environmental impact of the bottled water phenomenon or rainwater harvesting in rural India connects their lives to global communities.

Sharing stories on a public website helps students understand that their academic work is efficacious beyond the confines of the classroom. This repository also serves as examples for current seminar students. In individual conferences, I suggest, "Watch how Peter addresses a complex issue like endocrine disruption due to chemicals in the water," or "For a good example of culturally sensitive choice of music and images, check out Clare's story on microloans and water and women in India." I am also harnessing the positive element of competition. Students watch earlier stories, imagine their own classmates, family, friends, and instructors watching their video, and strive to do better.

"Lead with your pedagogy. The choice of technology will flow from that," my first technical support person repeated to me. Easier said than done. Collaborations with colleagues and technical staff are essential, in my experience. Shortly after that first seminar, I began collaborating with the Smart Learning Commons, which the University created to support students' media projects. Over time I've evolved a winnowing process for selecting appropriate technology informed by my pedagogy, answering these questions: 1) Does the technology foster community? 2) Does it assist students in deepening their engagement with subject matter, and 3) Does the device or software provide a unique way of learning that will familiarize students with technologies that may help them thrive in their futures?

For example, in my literature courses, in order to facilitate an awareness of students' own cultural traditions so they could then appreciate and analyze cultural components in literary texts, I created a digital assignment asking students to communicate a cultural tradition they take part in and what it means to them (Theodore 2010). For more information and examples, see the [Mobile Learning Site](#). I required them to integrate the digital media in a presentation to facilitate discourse rather than replace it. For an art analysis course that is part of the college's iPad initiative, where all incoming freshmen are given iPads, I brought the class to the Weisman Museum in part to help educate them on the aesthetic

and cultural assumptions inherent in image-creating. When faculty ask students to integrate images as part of their academic work, the onus is on us to help students engage in critical media analysis so they don't unwittingly perpetuate cultural stereotypes, and so they can understand images as visual texts. This is not to limit the multivalent power of images, but rather to help students become aware of their signifying power.

When I chose to integrate technology for the students, what I didn't realize is how it would transform my own teaching. Recently I collaborated with a colleague, and we developed a digital story for use in the classroom. With funding from the University, we traveled to the northern stretch of the Mekong River in Thailand, and interviewed community members, organizers and educators about the impact of globalization and development on their cultural traditions and daily lives. When we returned to campus we worked with our college to develop the digital story, [Mekong Mosaic](#) (Buturian, Solheim 2012).

Downstream – the Future

I anticipate I will see more graphic stories, like the first one I've just received from a seminar student addressing Pakistan's water challenges, as it turns out graphic stories are an effective medium for expressing complex issues in an efficient, engaging manner. I am also turning to eBooks, which allows for more textual emphasis. This time around I am working on developing one myself first, and then I look forward to helping students create an eBook they all contribute to.

Increasingly, the discussion of technology will enter the discourse of my classes. The moment we turn on our mobile devices, our lives are bound up with peoples and ecosystems throughout the globe. In the water seminar we calculate the virtual water of goods; for example, a pair of blue jeans requires 1,100 liters (2,910 gallons) of water to produce (Allan 2011). If you calculate the virtual water needed to manufacture, transport, package, power, and dispose of our mobile devices-- (setting aside worker's rights and extraction of rare metals to make them smaller and faster)--just the water used in the life cycle of our mobile devices, the role of technology in our living belongs in our discourse.

The dialectical nature of technology, as it has evolved in western capitalist society, is hard for us to accept. Many share a tacit belief that technology is neutral, benign, even benevolent. On the one hand, technology gives voice to collectives such as Syria and Egypt, while it has caused extreme misery for others. Consider the recent drone strikes in Pakistan that killed members of a gathering of tribal elders ("Eye of Drone" 2012). Higher learning institutions like the University of Minnesota are essential forums to grapple with these at times Gordian questions, from complex issues such as the wise use of technology in light of resource scarcity, to linguistic matters, including helping us think through the implications of the terms we use to describe our tech-bound lives. For instance, the reality of data storage? Large temperature-controlled structures often built close to powerful rivers to harness energy. "Water-gobbling-data-storing-monoliths" doesn't roll off the tongue or assuage the user as does the term "cloud."

In closing, the story, essentially, is why I ushered in technology to my classroom six years ago. Though I've been with the students each step of the way as they choose and research topics, find and interview experts, develop storyboards, and navigate technology, when I view students' digital stories for the first time, I feel a sharp sense of wonder. I am seeing the many stories of water, shaped by the students' unique personalities, all bearing an imprint of hope, and hope is a resource we as a university have a responsibility to kindle. The digital story harnesses students' desire to make a positive difference, and helps them to experience how to actualize that difference. These students will be shaping our future challenges with water.

Digital storytelling, when done well, contains the mythic, primeval power of the story, which has been with us from the origins of civilization, and has evolved with us in caves, around fires, in the hearths of

homes, and schools, and is now beamed throughout the globe. The story contains the silence of lost species, the sound of water coursing through its ancient cycle, the shuffle of environmental refugees, and the surging pulse of hope. The story includes the river of students that runs through our classes, and the river of technology that connects our lives with people and resources across the globe, and the story includes you.



PsTL1906W, "Water, Water, Everywhere? Investigating & Protecting Our Life Source" Screen shot by Linda Buturian. Website can be viewed at <http://www.cehd.umn.edu/PsTLWater/Default.html>

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Weaving Research, Policy, Practice and Technology: Building a Community of Practice across Early Childhood Partners Using CLASS™

*Rosemary Frazel
Vicki Hawley*

The mission of the Center for Early Education and Development (CEED) at the University of Minnesota is to improve developmental outcomes for children through research, training, and outreach. We are a gateway for community members to access the research resources at the University. This article describes CEED's use of online tools to support practitioners in the field of early care and education.

First, a little background about the context for our online efforts: There is increasing interest in creating high quality learning environments for children in preschool. But what is high quality? In recent years, a tool has emerged that helps to identify and measure that quality - an observational tool called the Classroom Assessment and Scoring Tool ("CLASS™"). An observer using the CLASS™ tool typically observes the teacher-student interactions in the classroom during four twenty minute cycles. The observer then sorts the observed interactions into categories around supporting children's emotional development, maintaining children's focus and attention and supporting children's cognitive and language development. Each area of interaction is then given a code indicating that the interaction has met the criteria for either low, medium or high quality teacher-student interactions.

Research has shown that children learning in early childhood environments that meet the CLASS™ criteria for high quality interactions do significantly better in academic achievement regardless of their 'at risk' status. Because of these strong findings, interest in and use of the CLASS™ has grown widely. Head Start programs across the country are now assessed regularly using the tool, with the federal government relying in part on the CLASS™ scores to determine which programs will continue to be funded. States across the country have begun efforts to measure and support the quality of early care and education systems as well, implementing 'quality rating systems' to further that effort. Numerous states are using the CLASS™ as one means for assessing that quality.

Once a site has a CLASS™ score, many programs offer assistance from coaches to support early childhood providers to improve the quality of their interactions as needed. The coaches can use the CLASS™ result as a helpful tool for focusing in on specific areas identified as needing work. Our project offers a variety of web-based tools to support CLASS™ coaches and other users around the state as they work to improve the quality of these important teacher-student interactions. We like to think of it in stages.

Stage One (awareness level supports): Learning about CLASS™

<http://www.cehd.umn.edu/CEED/projects/atc/learningmodules.html>

Teachers will have observers visiting their classrooms, watching them for up to two hours at a time and giving them feedback on their work. We wanted teachers to be able to have a way to learn about what it is those observers are doing in an efficient, comprehensive and uniform manner. So, we created some online learning modules. These have been a wonderful way for practitioners to gain an initial understanding of the CLASS™ tool so they have a framework for moving forward.

Stage Two (application to the "real world" of the classroom): Learning through Video

<http://www.cehd.umn.edu/CEED/projects/atc/classvideolibrary.html>

We wanted to capture the power of using video for professional development. So, we created an online video library that illustrates high quality interactions in a variety of early care and education settings. We shot video in quality early care settings, and with funding from the MN Department of Education, we were able to create video segments that demonstrate high quality interactions. These videos, available through a subscription at the above URL, allow practitioners to access exemplars of high quality interactions to focus their professional development efforts in the most efficient and helpful ways. Although not limited to CLASS™ indicators of quality, CLASS™ dimensions are explored in depth, giving coaches a helpful tool for improving quality. A subscription allows asynchronous opportunities for teachers and coaches to deepen knowledge by viewing examples of best practices.

Stage Three (support for coaches): Online Communities of Practice

To support the widespread use of CLASS™ among teachers and coaches across the state, CEED uses Moodle to host and facilitate online Communities of Practice. These online learning communities are a place for coaches to meet with colleagues from around the state and access additional resources to deepen their understanding and abilities to coach using CLASS™. Questions on different topics are posted monthly offering opportunities for colleagues to exchange ideas and receive advice as needed. Monthly chats are a way for geographically-diverse coaches to meet and learn more about the CLASS™ tool. Resources such as research articles or hands-on coaching activities are posted for coaches' use.

Comments from some of the users indicate the value of the Online Learning Communities (OLCs):
"I really enjoy the forum...you are doing a great job with the activities and questions. It's great to hear from others and their point of view."

"The shared experience of the OLC is positive."

Putting it all together, online resources have increased CEED's presence considerably and developed our capacity to serve as a resource on this important tool that measures quality in early care and education. By offering a number of online tools, CEED has been able to support the ever-growing community of practice of early childhood professionals working to improve quality teacher-child interactions.

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Rosemary is a trainer and CLASS™ observer at CEED. She has worked on design for the online modules and organizing the video library. She co-facilitates the on-line learning communities. She hopes to expand these online efforts even further in the coming years.

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Vicki provides education and training around professional development for early childhood teachers. She has been the guiding force in the development of the online learning communities and continues to provide ideas, support and facilitation to the online learning communities as well as to coaches and other early childhood providers around the Midwest.

R U Up 4 It? Collecting Data via Texting: Development and Testing of the Youth Ecological Momentary Assessment System (YEMAS)

Carolyn Garcia

Gyu Kwon

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Why Data Collection via Text Messaging?

Adolescents text more than they talk. And no one communicates by text messaging more than adolescent females, who average 4,050 texts per month. Boys of the same age average 2,539 and to give context to this magnitude, the next highest texting average is 1,630 texts per month among 18-24 year olds (Nielsen, 2010). Numerous interventions have capitalized on this behavior trend, testing health promotion text messaging to teens on topics such as sexual health, teen parenting, diabetes care, and physical activity (See www.texting4health.org for many study examples; Levine. et al, 2008). For example, Hookup is a new California state-wide initiative designed to provide adolescent subscribers with weekly sexual health information that includes a zip-code clinic referral mechanism to facilitate timely access to care (Braun, 2010). Text messaging thus has great promise to enhance traditional ways interventions are delivered.

In addition to being an intervention delivery mechanism, text messaging is growing in popularity as a strategy for collecting ecological momentary assessment data. Ecological momentary assessments are useful in obtaining real-time data about emotions, mood, and behaviors from adolescents in their natural settings (Shiffman, Stone, & Hufford, 2008; Stone, Shiffman, Atienza & Nebeling, 2007). These data can provide insights with respect to the range of emotions and moods that occur over a period of time during the real day-to-day experiences of adolescents. The challenges associated with recall-dependent data collection methods are well known yet few valid and reliable alternative approaches have been available to date. Those in existence until recently (e.g., direct observation, hand-written diaries) have been costly, time consuming, susceptible to deceptive reporting (i.e. falsified dates of when diaries were completed), and often unsustainable beyond the grant-funded project.

With technological advances, researchers have collected ecological momentary assessment data via electronic diaries completed with hand-held computers (i.e., a Palm Pilot) and more recently, cell phones. Interestingly, most researchers have used cell phones to merely collect and store momentary data but have relied on manual, in-person uploading of data from the phone rather than real-time data transfer. For example, Shrier, Shih, Hacker, and de Moor (2007) collected momentary assessments of sexual health behaviors of adolescents using cell phones that were locked and programmed to probe the teen at random times over a week. The data were stored and later uploaded to a computer when the phone was returned to researchers.

More recently, Dunton, Liao, Intille, Spruijt-Metz, and Pentz (in press) used cell phones to capture real time data from youth about moods and physical activity with responses stored until the phone was returned. Dunton (personal communication, 2010) stated future projects undertaken by her team will

most likely use immediate data transfer protocols (rather than stored and uploaded at the end of data collection) because among other reasons, this approach provides immediate awareness of responses as well as indicators of compliance, which can trigger necessary follow-up or reminder intervention. Building on this concept, one team of researchers has begun using cell phones and text messaging technology to collect and transmit ecological momentary assessments about Australian adolescents' alcohol use via real-time text messaging (Kauer, Reid, Sanci & Patton, 2009). Similarly, Collins, Kashdan, & Gollnisch (2003) have demonstrated the feasibility and advantages of using cell phones to collect real-time ecological momentary assessment data, also regarding alcohol consumption.

Using this available information in the literature, our team undertook a study to pilot an automated system for collecting ecological momentary assessment data from adolescents four times a day for two weeks at a time. This required us to custom build a system within the University setting to securely and automatically send unique surveys to the participants. Our study was the first, to our knowledge, to custom build a short messaging service (SMS) aka texting assessment delivery system for use with adolescents to collect and transfer real-time data about individual- and social-level factors that influence mental well-being. Benefits of this system include ease of data exchange, automation thereby reducing errors related to human effort, real-time understanding of health behaviors, and ability to capture data across numerous data points for longitudinal and trajectory data analysis.

Chapter Purpose

In this chapter we describe the collaborative development of the Youth Ecological Momentary Assessment System (YEMAS), and the specific features, including linkage to a cloud communication service provider, that foster efficient data collection, management, and storage. We highlight the broad ways in which this system can be used and applied in research with diverse populations across the U.S. and globally. We conclude with our vision for future directions, including next steps and advice for future users of our system.

Development of YEMAS

Our multidisciplinary team was comprised of academic faculty (i.e., nursing, public health, psychology), information technology (IT) professionals, and graduate students. Desirable features of the system, from a researcher perspective, were balanced with the realities of technological capabilities, shared by the IT experts. We explored options for maintaining all aspects of the system within the University structure and options that involved a non-academic third party supporting the transfer of texted data. Pros and cons of each scenario were deliberated and carefully considered in the context of security concerns and priorities for protecting research study participants and the data they share via text.

As part of our exploration, we contacted a researcher in the U.S. who was concurrently piloting real-time data collection via SMS with adolescents; his research team outsourced everything to a non-University private entity. Creating a full blown SMS Delivery System requires tremendous financial investment and resources including purchasing the hardware, software systems, and phone numbers in addition to the time intensive development of the application. By utilizing a cloud communication service such as Twilio, a system like YEMAS can offer a very cost efficient way to achieve the primary goal of delivering and receiving content via SMS. YEMAS was developed to leverage this cost-effective strategy. Also, with a University-based system, this enables us to capitalize on internal security and server features, establish the web-based system of Assessment Management System on a university web address, and use secure university log-in systems to control access.

Through numerous planning meetings, the team identified key system features and worked through challenges that were encountered. For example, an early idea was to use the email infrastructure to deliver and receive text messages to study participants; however, it became clear that the scope of

data being collected and the limited capacity of data management and organization via email necessitated an alternative approach. This led to identification of Twilio (www.twilio.com), a cloud communication service provider that could facilitate both the text messaging and a more efficient mechanism for managing and exporting data for analysis purposes. Thus, YEMAS was developed as a Web-based survey application that facilitates the sending and receiving of SMS texts by integrating with a web-service application programming interface (API) solution, Twilio.

YEMAS is a custom built SMS Assessment Delivery System which operates in a Windows 2008 Server environment utilizing Oracle as the database and ColdFusion as programming language. The YEMAS Web System is comprised of five components:

- Questions: This is where all survey questions and corresponding answer lists are entered and stored.
- Surveys: This section houses all of the surveys created from the question bank. Each survey can be configured with the following parameters (See Figures 1 and 2 below):
 - Delivery type (daily or weekly)
 - Delivery time schedule (in 5 minute increments)
 - Question order (random or predetermined)
- Messages: This section has three parts:
 - SMS Queue where surveys are sent once they are assigned a day and time for release and are made active.
 - SMS Results captures each of the individual survey responses, from whom each response came, and the time each response was sent.
 - SMS log displays the real-time delivery log and is connected directly to Twilio.
- Participants: The researcher enters the name/ID, email address and phone number of each survey participant in this section. Participants are assigned to surveys so that the research team can select which surveys are received by some or all study participants.
- Admin: Once a survey is completed, the researcher uses this section to export the data into an Excel spreadsheet.

Figure 1. Screenshot of YEMAS Survey List for Example Project

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Youth Ecological Momentary Assessment System

Gyu Kwon Home Surveys

SURVEYS HIDE

[New Survey](#)
[Edit Surveys](#)

QUESTIONS HIDE

[New Question](#)
[Edit Questions](#)
[Question Types](#)

MESSAGES HIDE

[View SMS Queue](#)
[View SMS Log](#)
[View SMS Results](#)

PARTICIPANTS HIDE

[New Participant](#)
[Edit Participants](#)

ADMIN HIDE

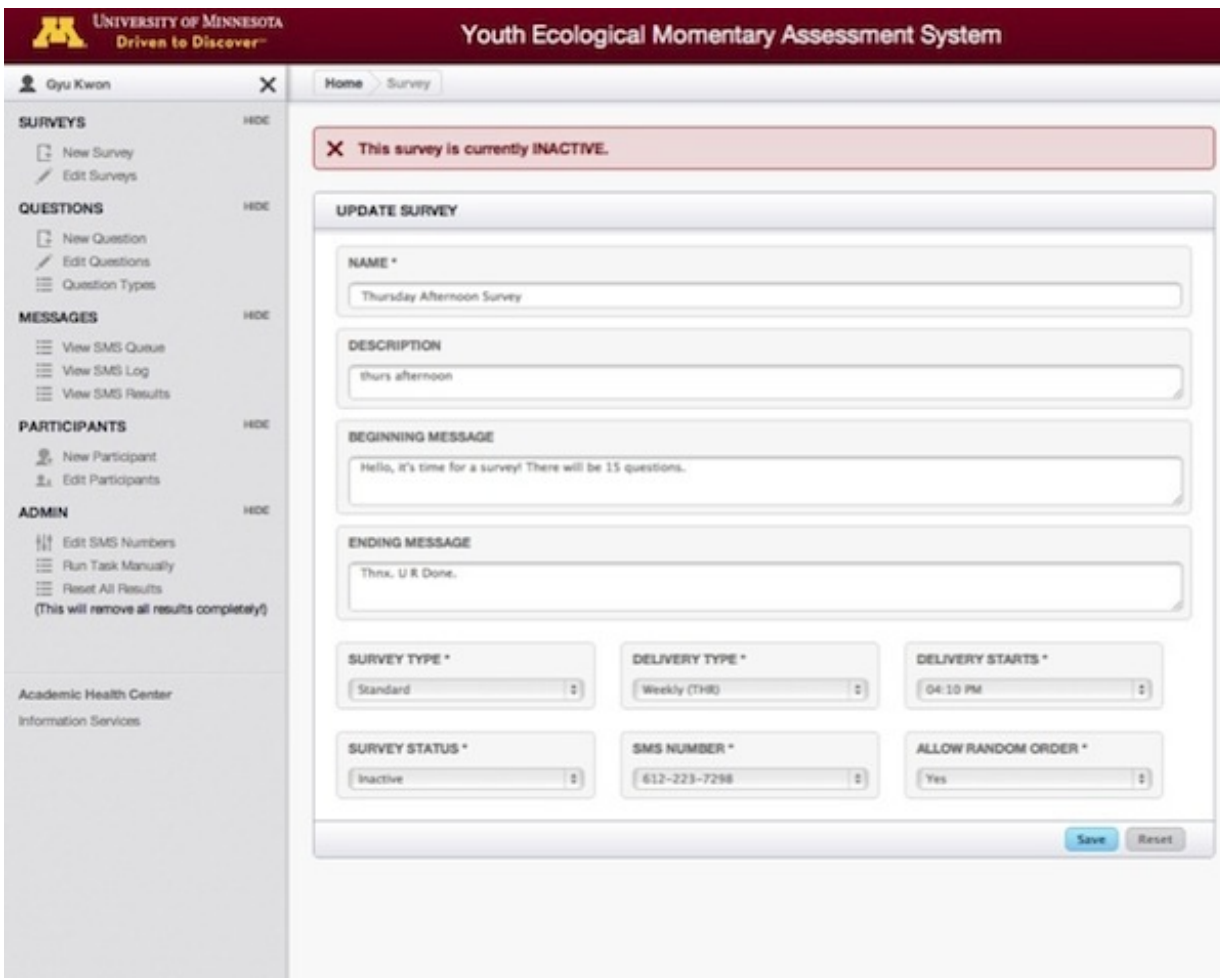
[Edit SMS Numbers](#)
[Run Task Manually](#)
[Reset All Results](#)
(This will remove all results completely)

Academic Health Center
Information Services

SURVEY LIST

Name	Description	SMS#	Random	Type	Period	Reply	Questions	Participants
Wednesday Morning	wed. morning survey	6122237826	Y	wed	06:20	119	13	10
Wednesday Afternoon Survey	wed. afternoon	6122237471	N	wed	14:55	143	20	10
Wednesday Afterschool Survey	wed afterschool	6122237265	N	wed	18:40	101	16	10
Wednesday evening survey	wed evening	6122237815	N	wed	21:20	122	17	10
Practice Survey for Tech Fair	Practice	6122237331	N	wed	13:55	90	4	2
Thursday Afternoon Survey	thurs afternoon	6122237298	Y	thu	16:10	86	15	10
Monday Morning	monday morning survey	6122237366	Y	mon	06:10	90	11	10
Monday Afterschool Survey	afterschool on monday	6122237392	N	mon	18:25	91	13	10
Monday Afternoon Survey	Afternoon evening	6122237290	N	mon	15:35	162	16	10
Monday Evening	monday evening survey	6122237712	N	mon	20:40	134	15	10
Thursday Afterschool	thurs afterschool	6122237823	N	thu	18:15	147	22	10
Thursday Evening Survey	thurs evening	6122237843	N	thu	21:10	82	15	10
Friday Morning Survey	friday morn	6122237342	Y	fri	06:25	92	12	10
Friday Afterschool Survey	friday afterschool	6122237767	N	fri	19:25	135	16	10
Friday Afternoon Survey	friday afternoon	6122237314	N	fri	14:55	146	19	10
Friday Evening Survey	friday evening	6122237718	N	fri	20:40	151	20	10

Figure 2. Screenshot of YEMAS Survey Formatting Screen of Example Project

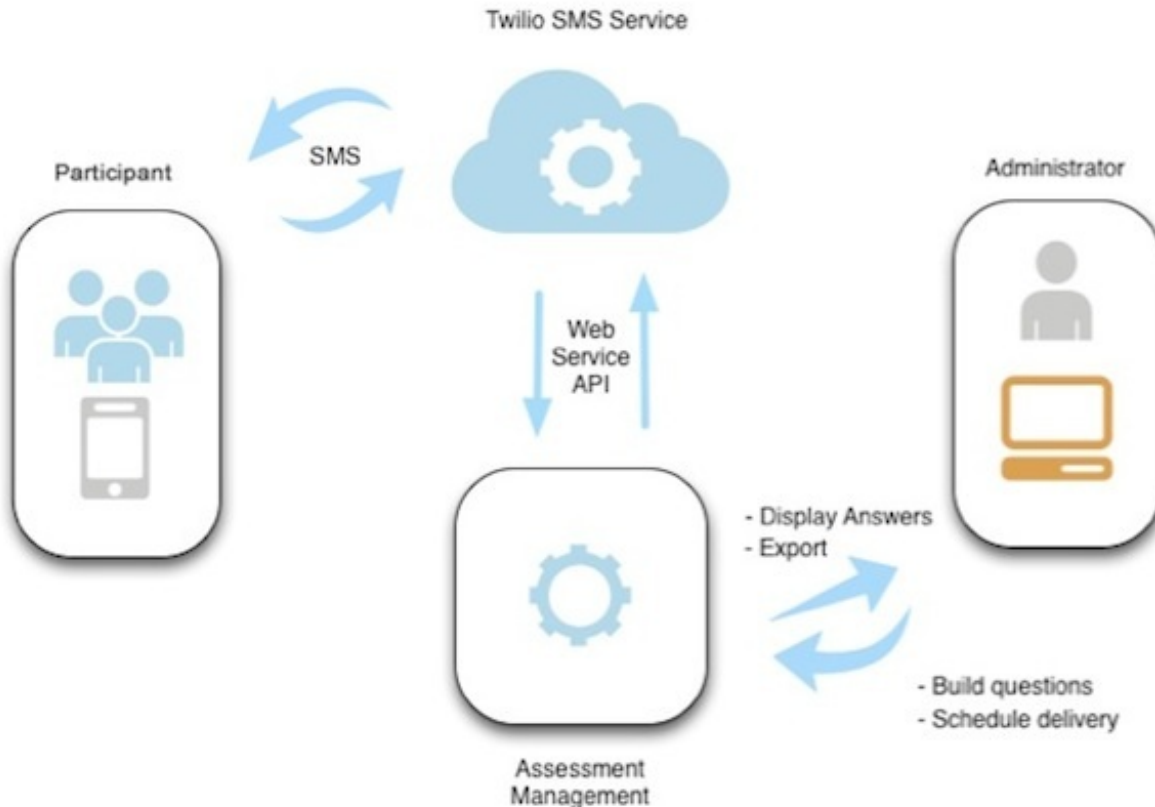


How YEMAS Works

The functional purpose of YEMAS is to send real-time study questions to participants in an automated, scheduled manner and to enable participants to post SMS text messages back to the system (see Figure 3).

Figure 3. YEMAS Process

Youth Ecological Momentary Assessment System



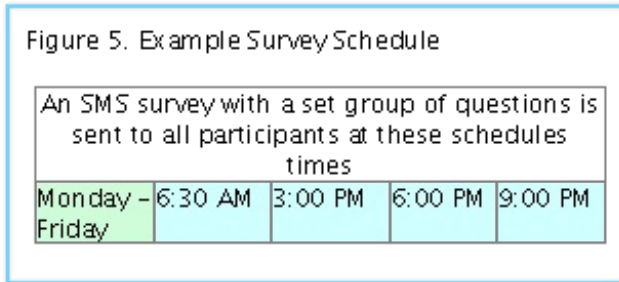
The idea of the process is straightforward: The administrator constructs a survey with a list of questions that are in a SMS friendly format and schedules the survey for a specific date and time to be delivered. Each survey will be assigned to a “rented” SMS number obtained from the Twilio Service (see Figure 4 for an example survey, and Figure 5 for an example survey schedule). Once survey questions are scheduled in the system by the researcher, the YEMAS system completes a server-side schedule task that builds a daily delivery queue automatically. When the survey is due to be delivered, the system sends each question as a SMS text message to the participant’s phone number via the Twilio SMS API. The API is a set of programming standards for accessing a Web-based software application or web services. It is a software-to-software interface, not a user interface. With APIs, applications talk to each other without any user knowledge or intervention. In this way, the YEMAS system interacts with Twilio to effectively send and receive text messages with numerous study participants simultaneously.

When the participant sends an answer as an SMS text message, Twilio takes the SMS text message and posts it via HTTP to the Coldfusion-powered SMS end point in YEMAS. The system then looks at the form data to confirm that it can determine the participant’s phone number (ID number) and the assigned SMS number (which is unique to the survey delivered at a specific time of day and day of the week). Once both phone numbers are confirmed, the SMS end point stores the returned answer to the database. The collected data can be viewed to observe actual responses, response rates and trends, and then can be exported to a spreadsheet file for further analysis.

Figure 4. Example Survey

- How HAPPY were u feeling just before u got this txt?
- How TIRED were u feeling just before u got this txt?
- How ENERGETIC were u feeling just before u got this txt?
- WHERE were u just before u got this txt?
- How SAFE do u feel where u r right now?
- Were u ALONE just before u got this txt?
- Were u with ur MOM or DAD just before u got this txt?
- Describe something stressful u had to cope with

Figure 5. Example Survey Schedule



Uses for YEMAS

There are numerous uses for the YEMAS system as a research tool. From descriptive studies exploring new phenomena to randomized controlled intervention trials, ecological momentary assessment data collected via text messaging have potential to provide new and complementary insights. As a complement to traditional pre- and post-intervention self-report survey data, ecological momentary assessment data offer real-time insights that can be efficiently collected across multiple time points. Prospectively, these data could be useful in describing day-to-day fluctuations in characteristics or variables that might not be as effectively captured in traditional survey approaches, such as one's mood, or feelings. Indeed, momentary sampling is more appropriate for those factors that one would not expect to be as constant over time, and therefore a system such as YEMAS should be used to collect data on those factors, independently, or as a complement to data collected using traditional methods.

Although YEMAS was designed initially for use with adolescent participants, the structure and system that has been created can be used with any research population. The survey questions and frequency of their delivery are factors to be determined by the research team and the research questions being asked. Because texting is so commonly used to communicate, among those of all ages and ethnicities, the YEMAS system in essence, is a web-based tool that can facilitate data collected from any target study population anywhere across the globe.

Future Directions

In developing this web-based system for collecting real-time data via SMS, our project team learned many valuable lessons that have already led to refining the system. As a work in progress, the system will continue to be improved as more researchers use it to conduct ecological momentary assessments with their participants.

Most adults and many adolescents own a cell phone in the U.S., and rates are similarly high in many countries on all continents. With many people opting to have unlimited texting, a SMS-based research methodology is a cost-effective approach (in our pilot, approximately 10% of the participants required

us to provide a phone, and no one requested financial support to upgrade their plan to unlimited texting because that was what those with phones subscribed to).

Future steps for our development team include conducting a larger scale descriptive study to document the day-to-day shifts in emotions, moods, and experiences of adolescents and young adults. We plan to use this system to complement data collected in self-report surveys so that we can optimize opportunities for longitudinal and trajectory data analyses.

With additional resources, we will continue to improve the usability of the system and incorporate additional features that optimize data collected. Future steps include exploration of capacity to sync with geographical information system (GIS) data, and to adapt the system for use in an application format via smart phones or social media outlets. Technology advances in the 21st century necessitate similar advances among researchers in the ways they collect, use, and share data. YEMAS is one of many systems guaranteed to dramatically influence advances in knowledge across disciplines and professions. R u ready?

Acknowledgements

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Carolyn is Associate Professor in the School of Nursing at the University of Minnesota, with an adjunct faculty appointment in the School of Public Health. Dr. Garcia had the initial idea for this SMS project and oversaw implementation; she is committed to advancing technological tools that facilitate the understanding and promoting of health and well-being, particularly among the most vulnerable in society.

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Gyu is a Systems Architect and Application Development Coordinator in Academic Health Center Information Systems, University of Minnesota. Mr. Kwon served as application developer for the YEMAS system including system design, development, and implementation of the business logic.

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Rachel is a PhD Candidate in Health Services Research Policy and Administration at the University of Minnesota School of Public Health. Ms. Hardeman was responsible for the structural functioning and set-up of YEMAS in the pilot study, including data management; she is interested in applying her mixed method expertise in future research that informs policy changes to benefit the health of populations.

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Therese is an Environmental Public Health Graduate student and research assistant in the Department of Nursing at the University of Minnesota. Ms. Genis was the project participant recruiter and outreach person and would like to see texting utilized more with adolescents as a role in public health promotion and risk behavior assessment in the future.

Sonya S. Brady, PhD <ssbrady@umn.edu>

Sonya is Assistant Professor in the School of Public Health at the University of Minnesota. Dr. Brady contributed to YEMAS survey content and other aspects of project design; she is interested in the use of texting and other technology-based tools to collect data and promote health among youth.

Bonnie Klimes-Dougan, Ph.D., L.P. <klimes@umn.edu>

Bonnie is a Assistant Professor in the Departments of Psychology and Psychiatry at the University of Minnesota. Dr. Klimes-Dougan conducts research with adolescents and has been collaborating on the content of the assessment and in this project.

Technology in the Field

Andrew Scobbie

Technology in the field of agricultural nutrient management has made rapid advances due in part to the availability of global positioning system (GPS) services. The ability to map field characteristics coupled with mobile technology has enabled the automation of farmer producer's equipment. This combination is commonly referred to as variable rate technology (VRT) or "Precision Farming". This has impacted the research performed by the Nutrient Management Group (<http://www.extension.umn.edu/nutrient-management/about/>) at the University of MN and, as is often the case, technology precedes research. Current research is focused on issues related to field variability such as seeding rates, varietal selection, nutrient management and others. The technology has also resulted in new tools to perform this research. Real Time Kinetics (RTK) and auto steer (a GPS-based system that automatically steers tractors and other farm equipment) abilities allow sub-inch placement of nutrients and seed. Liquid and dry fertilizer delivery options enable us to apply predetermined fertilizer rates to specific areas of the field. These resources are used for both traditional and VRT type research.

The use of VRT in the field has increased our dependence on computing technology. Rate controllers often function on PC interfaces and data created from field activities is available and prolific. Creation of prescription management maps requires portability and their implementation requires the operation of touch screen controllers. The adoption of this technology along with the rapid advancement of portable devices has highlighted the potential use of the iPad as a useful tool for our group.

We operate as a group of 5 within the larger Nutrient Management Team, with responsibilities for approximately 25 unique studies including 50 experimental sites over 30 locations across the state of Minnesota. The Nutrient Management group has grown throughout this period of advancement and has found communicating the needs of the research projects to be problematic at times. In past years we would use three ring binders to hold all plot plans, maps, protocols, and contact information, one book for each member. Changes to this information were difficult to update to a group and assure that all individuals had current copies. The prolific use of email made the current system obsolete; as changes were requested, hard copies would need to be updated for all.

For several months we have been utilizing the iPad to communicate information regarding our projects. Our group has purchased two new iPads and three iPad 2, noticing no functional difference between the models. All were purchased with the cellular data option, primarily to obtain the GPS ability. Rugged cases (Griffin Survivor and OtterBox) were purchased and have performed well in protecting the iPads. To keep costs down we have explored options to use the iPad without cellular connectivity and thus avoid having a cellular contract and paying monthly fees. Compared to previously available devices the iPad is far more flexible. Traditionally, field ready handhelds have been limited to ruggedized windows mobile computers, and early tablet devices; these were very expensive and typically ran proprietary software.

Following is a highlight of some specific needs and applications used to assist in our communication:

- Data delivery to the iPad is achieved primarily through the use of the DropBox application. The app is available for iOS, Mac and PC and automatically syncs all devices logged into the same account. Use of the files on the iPad requires that the file be marked as a favorite if it is to be used when not connected. The resident viewer performs very well in displaying content from common file types, the files open quickly and the pinch zoom features work well in navigating a spreadsheet. As a group we have been using the shared drive at the University for several years so this was not a new concept. The app displays file structure in a PC type format so information is easily categorized in folders.
- Spreadsheet functions have been performed in both the Numbers and Quickoffice HD PRO. Both operate similarly and have limited spreadsheet functionality sufficient for simple formulas and data manipulation. Files made in Numbers can be emailed as several formats, files in Quickoffice can be saved directly back to DropBox. Spreadsheets with simple formulas have eased some of the field calculations; though mathematically uncomplicated the spreadsheets allow simple data entry into cells to yield pre-programmed results. Currently these spreadsheets are used for equipment calibration. Some field data have been collected using the iPad, but not enough to comment on the ease of use. It is our general experience that data collected on electronic devices is less apt to have errors so we will continue to explore this option.
- Evernote is an application primarily used to share text but does allow the sharing of photos as well. We use it to communicate information for preparation for field activities, from simple lists to items needing specific preparation. We have also used it to photo journal some important paperwork while in the field to protect against loss. The app is also available for iOS, Mac and PC so lists can be generated from any location and viewed by all devices logged on to the same account. In the past we would have a weekly list and make copies for everyone. This app keeps the list current at all times and allows the communication to occur to the group and not just one individual.
- GPS for simple navigation, rough Lat/Lon coordinates and satellite views have been performed using the app MotionX. This app allows the user to download street and/or satellite view maps, which are available off-line. It also easily displays current location and presents it in format to share. While adept at using more accurate GPS devices there are often times when the information does not require a great amount of precision. Importing .gpx files is simple so all our study locations can easily be added to the map. It is nice not to have to rely on hand drawn maps to navigate to remote locations.
- PDF file storage is currently performed using iBooks. The app operates simply with Safari browser to save .pdf files viewed in the browser. Soil fertility extension bulletins, herbicide information, diagnostic tools, and equipment manuals are readily available in PDF format on-line and can be saved on the iPad for off-line viewing. The files are easily shared using the app.
- Many other apps are regularly used as a result of the “instant on” operation of the iPad. Using the calculator, viewing weather or email are all very quick, simple and efficient compared to even a laptop. The ability to view one thousand emails, complete with attachments, off-line is very useful. The photos are usually of sufficient quality for our purposes, mainly to journal information. I expect there are numerous other apps we will find in the future to use for specific needs.

The primary use for the iPad in our group has been to communicate specific information necessary to carry out tasks in the field, and to a lesser extent to collect information. The apps chosen have been successful in replacing the trusty three ring binder approach and have done so without loss of information or integrity. To assist in the adoption process the decision was made to allow all users to

personalize the iPad, I believe the extracurricular use has increased its effectiveness in the workplace. We have not had any durability issues nor have we found any significant disadvantage.

One noteworthy point is the potential security issues associated with the use of a third party service to transfer and house information. We have not used DropBox to house or transfer any research data, personal information, account numbers or any other sensitive material.

We will continue to explore options for use of the iPad and have enjoyed the opportunity to increase our efficiency in the field. There is currently an effort to create some apps similar to the crop calculators, <http://www.extension.umn.edu/nutrient-management/crop-calculators/>, and I believe our familiarity with the iPad will assist in building a high quality and relevant app for the consumer.

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Transitioning Computer Courseware to Mobile Web Apps

Thomas F. Fletcher

vanat.cvm.umn.edu/mNeuroConcepts/

Minnesota Veterinary Anatomy Web Site

Our Minnesota Veterinary Anatomy web site (<http://vanat.cvm.umn.edu/>), which received 97,842 visits from 163 countries/territories in 2011, serves as an umbrella site for accessing over two dozen individual courseware web sites dealing with carnivore gross anatomy, embryology, and neurobiology. We recently added a mobile device courseware section to the web site to accommodate our web app development.

To exploit the learning potential of smart phone and tablet mobile devices, we have begun transitioning our existing computer-based courseware web sites to mobile web apps. This Chapter explains our approach and recommendations regarding web app development.

Mobile Device Web Apps

Mobile devices are becoming a dominant technology with significant potential as learning tools. Because smart phone and tablets are so convenient, ubiquitous, and advantageous for web technology, their utilization by students is rapidly expanding.

To exploit the Veterinary Anatomy learning potential of tablets and smartphones, it makes efficient sense for us to transition our existing computer-based courseware assets to mobile web apps. In contrast to native apps, *web apps* are web sites designed for mobile browsers. Compared to the effort and skills required to develop and market native apps for various device platforms, web apps can be produced, tested and delivered with relative ease.

Screen Design and Development Considerations

In preparing to convert existing web courseware designed for computer screens to mobile device web apps, primary considerations are re-design for small screen size and the selection of the development environment.

Large screen layouts must be redesigned in a meaningful way for the small screen mobile domain. Also, mobile devices use touch screen interfaces that have different requirements than the traditional mouse-driven interface.

Our most interactive existing courseware depends on browsers using the Flash Player plug-in (.swf files) for interface animation and XML processing. Because Adobe has announced that they will no longer support the Flash Player on mobile devices, the development environment that we used for interface animation and XML processing had to be replaced. We chose jQuery Mobile and Dreamweaver as the development environment and we are quite pleased with the results.

The following discussion focuses on the transition of one neurobiology courseware product from a web site designed for a computer screen to a mobile device web app. After which, an overview of jQuery Mobile development environment is presented.

Neurobiology Courseware Description

(<http://vanat.cvm.umn.edu/neuroConcepts/>)

Our existing computer-based courseware, *Neurobiology Concepts Checker*, is a web site that gives students an opportunity to clarify their conceptual knowledge of veterinary neurobiology. As students confirm their conceptual understanding, via self-assessment, they also develop personal reassurance that they know the required subject matter. Overall, the Concepts Checker presents 150 concepts within 14 topical categories. Each concept is associated with four True/False statements and a Concept Explanation paragraph. Concepts are stored as individual XML nodes per XML topic file.

For the *Neurobiology Concepts Checker*, students select from a menu of 14 topics (e.g., Neurons, Cerebellum, Hypothalamus, etc.). Per topic, a series of concept screens is presented randomly. Each concept screen displays a centrally placed concept statement surrounded by four randomly positioned phrases that are either true or false. Random display was used to make repeated questions (XML nodes) appear novel.

Typically, a student would read the concept statement and answers the four questions by clicking **True/False** buttons. When the student clicks a **Show Answers** button, True/False answers are graded and a paragraph explaining the concept is displayed. A **Delete Screen** button (to be used when a concept is sufficiently known) eliminates the concept from the pool of randomly displayed concept screens. A Next Screen button randomly presents the next concept and a **Topic Menu** button presents the menu of 14 topics.

Thus, for this computer-based courseware, the screen is designed to simultaneously present all concept-related information in one view. Students are able to see all four True/False questions at the same time and their answers can be changed based on reconsideration of total screen information. For the mobile web app version of this courseware, re-design to a small screen was necessary (see Fig. 1).

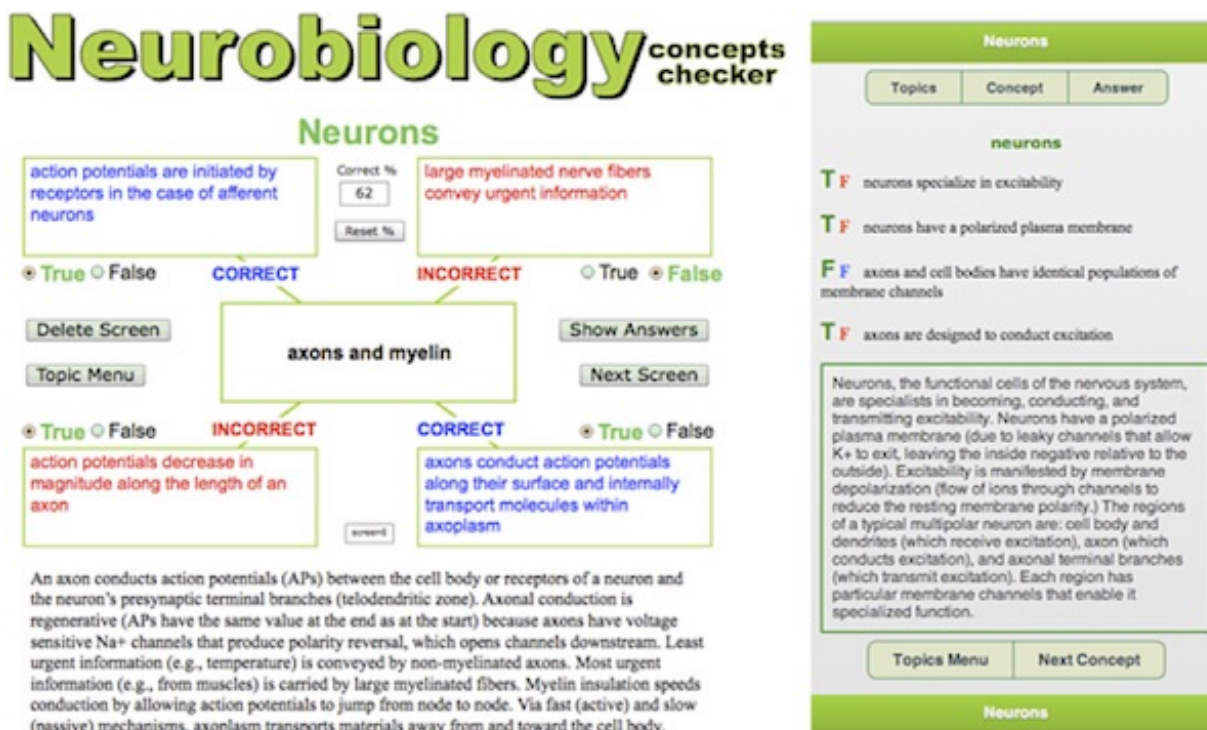


Fig. 1. Comparable concept screens from the computer screen web site (left) and the mobile web app (right). Each screen shows what is displayed after the **Show Answers** or **Answer** button is clicked/tapped.

Mobile Web App Description

(<http://vanat.cvm.umn.edu/mNeuroConcepts/>)

In re-designing the Neurobiology Concepts Checker for small screens, we opted for a chronological approach to conserve screen area. A student sees only one True/False question at a time. The question must be answered immediately and it is graded before the next question is revealed. At any time the Answer button may be tapped to show the questions and their correct answers along with the explanation paragraph.

Concept or Topics buttons can be tapped at any time to view the next concept or revert to the Topics Menu. The Delete Screen button provided for the computer web site was eliminated in the web app to conserve space. For each topic selected in the web app, the concept screen that appears initially is randomly chosen. But, unlike the computer web site, the display order of following concepts and order of True/False questions per concept is not random. Randomness could be added in the future, but the chronological approach makes it easier to have repeated questions appear novel.

jQuery Mobile Overview

(<http://jquerymobile.com/demos/1.1.0/>)

The jQuery mobile framework, along with Adobe Dreamweaver, was chosen as our development platform for web app production, and we are quite pleased with the productivity they offer us. Also, all mobile browsers support HTML5, which offers a consistent browser interface along with additional features such as video and audio tags that we did not use. (HTML5 discussion is beyond the scope of this Chapter).

The jQuery Mobile framework targets a variety of mobile platforms and offers an assortment of enriched interface elements including navigation bars, sliders, accordions, layout grids, buttons, etc. The framework is freely available and well documented. The documentation includes basic page templates that are useful for getting started.

The JavaScript and CSS framework files that comprise jQuery Mobile are automatically downloaded by the browser, when `<script>` tags linking to a public Content Delivery Site are included in the HTML page. The script tags can be copied from template files.

The jQuery Mobile approach is particularly clever. The mobile browser downloads one physical HTML page into memory but it converts that single download into multiple mobile device pages based attributes that the developer can assign to `<div>` tags (e.g., `data-role = page`, `data-role = header`, `data-role = content`, `data-role = footer`, etc.). Also, the developer can assign `data-role = button` attributes to paragraph (`<p>`), list (``), or anchor tags (`<a>`) and the framework automatically converts them to elements that look and behave like buttons.

In other words, the developer only needs to provide a skeleton structure and the framework automatically provides the detailed appearance and behavior of a full featured web app. The framework achieves this transformation by augmenting the developer generated `data-` attributes with a variety of additional class attributes. The additional classes are inserted into the HTML code by framework JavaScript during the loading process before the code is interpreted and displayed by the browser (see Fig 2.) This automatic code generation greatly simplifies interface development requirements for the web app designer.

Finally, the jQuery Mobile web site offers access to a graphic tool (ThemeRoller) which generates a

CSS file that customizes your web app appearance. Web app themes involve font-family, drop shadows, corner radii, colors for headers/footers and backgrounds, color gradients for button states, etc.

If you want to develop web apps, jQuery Mobile will simplify the process!

```
<!-- Start of first page: #one -->
<div data-role="page" id="one">

  <div data-role="header">
    <h1>Multi-page</h1>
  </div><!-- /header -->

  <div data-role="content" >
    <h2>One</h2>

<!-- Start of first page: #one -->
<div id="one" data-role="page" data-url="one" tabindex="0" class="ui-page ui-body-c
ui-page-active" style="min-height: 898px;">

  <div data-role="header" class="ui-header ui-bar-a" role="banner">
    <h1 class="ui-title" tabindex="0" role="heading" aria-level="1">Multi-page</h1>
  </div><!-- /header -->

  <div data-role="content" class="ui-content" role="main">
    <h2>One</h2>
```

Fig. 2. Excerpts from an HTML page as submitted by a developer (top) and as loaded by the browser following automatic attribute edits inserted by the jQuery Mobile JavaScript framework (bottom). The top image shows three attributes inserted by the developer to define a mobile page (underlined in green). The lower image shows the extra content that was added automatically by the jQuery Mobile framework to generate the appearance and behavior of a mobile web app page.

Addendum

Neurobiology Concepts Checker is one of a number of optional courseware web sites that we offer first-year veterinary students taking CVM 6120 Veterinary Neurobiology, which is taught during the first half of Spring semester. We have not tracked usage of optional courseware in CVM 6120, relying instead on anecdotal feedback regarding courseware value to individual students. Because the mobile version of *Neurobiology Concepts Checker* was launched after CVM 6120 ended this Spring (2012), student feedback is not available. (Via Google Analytics we know that the computer screen version of *Neurobiology Concepts Checker* received 544 visits in 2011.)

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Mobile Technology Training for a Public Health Response to Disasters

*Sara Hurley
Amy Scheller
Debra K Olson*

Consider this scenario: A series of storms and the resulting flooding carves an unusually large path of damage. In the disaster's aftermath, the county health department is responsible for ensuring the public's health – overseeing things like clean water, temporary housing shelters, vulnerable populations, monitoring for post-flood diseases, and supporting the psychological health of those suffering particularly difficult losses.

What kind of mobile technology access, content, and knowledge do public health emergency responders need to have in place to effectively address this problem?

Behind the scenes of any emergency response are countless hours of education and preparation, combined with ongoing relationships and collaborations between multiple state and county departments of health, institutions like the University of Minnesota, and funding agencies like the Centers for Disease Control and Prevention (CDC). The work of the Centers for Public Health Education and Outreach (CPHEO) at the School of Public Health, with grant sponsored efforts such as, in this instance, the University of Minnesota Simulations Exercises and Effective Education (U-SEEE) grant from CDC, is to build and deliver education and provide tools for public health professionals.

With the broad and rapidly increasing adoption of mobile technologies and social media, it is important for public health emergency response training and tools to incorporate and adopt these concepts into their culture now so that they are ready to address the immediate emergencies and crises that require immediate response.

Finding out what life is like now

A mistake that is often made on the institutional level is to design the solution before we understand the problems users need to solve. CPHEO programs have served public health emergency responders for over a decade, yet we did not know their day-to-day use of mobile technologies, nor were we sure of what the practices were in their work lives. To find out, we surveyed over 400 Medical Reserve Corps (MRC) volunteers and coordinators from Minnesota, Wisconsin, and North Dakota in the spring of 2011.

We found that over half of the emergency responders surveyed had a smart phone now or would within the next year, and that during an emergency the primary way they use their cell phones are to call other responders (66%) or friends and family (53%); they also text (34%), access emergency-related information on the Internet (26%), use emergency response apps (7%), and tweet emergency information (2%). We were also interested in how they prepared their phones for emergencies. While 91% had updated contact lists, only 19% bookmarked relevant websites and 14% stored reference information. A surprising 8% stored no response-related information. The survey is being conducted again in 2012 to track the rate of change and to continue to inform our work.

What are the barriers?

We know that we cannot understand the potential of a technology if we do not use it. While the use of social media is exploding in society, and social media is a valuable tool for getting communication out during an emergency, 73% of our respondents had these features of their phones blocked by their agencies. Additionally, 96% received no guidance from their organization on what to use. These decisions result in barriers to having the most effective emergency response possible.

“We can’t use our county email addresses on our phones (even our smart phones), they don’t allow us to.”

“[I] end up using my personal cell phone because it has so much better capabilities.”

What do responders want?

Our responders want training and education (71%), the ability to browse the Internet (75%), access to emergency response apps (76%), and to text other responders (82%). In short, they want to understand how to use their devices best, access to the full range of a device’s potential, and the opportunity to communicate with others during an emergency.

Education and organizational change

We are able to provide guidance on how to prepare a cell phone as a response tool and to develop educational resources optimized for mobile delivery, but we have also come into a new role: advocates for technology. If the responders do not have access to the software or hardware on a regular basis, they will not be able to apply these new understandings during an emergency. When we presented at the Public Health Preparedness Summit in February 2012, we advocated in our presentation that organizations change how they treat the full spectrum of technology: social media is not to be feared, technology is not to be feared. Part of developing new tools and trainings for public health emergency responders is advocating for cultural change in the organizations and providing them with examples of why ongoing engagement with technology is important.

Building networks that work

Part of advocacy is understanding what structural barriers exist and providing people with the capacity to create change with compelling reasons for change. Social media, such as Facebook or Twitter, is often seen by organizations as a distraction that is not understood as potentially contributing to work, so they block access. In emergency response and preparedness, part of the job for many people is to understand when, how, and where to communicate when emergencies happen. Social network usage nearly doubled between 2008 and 2010 (from 26% to 59%) [1] and social networking apps are the second most valued feature on smart phones (GPS was the most valued) [2]. Tapping into these networks takes time, however, and building relationships with the public on social sites well before emergencies happen will mean having a powerful means through which to disseminate information and identify areas in crisis.

User as innovator/collaborator

The first barrier that must fall is that organizations must stop blocking features so that responders and staff can use the full power of mobile tools and participate in innovation. When we started delivering trainings and games, we had to make sure they were perfect before they went out the door because they were on CD-ROM. There were no easy updates, quick downloads, or possibilities for rapid feedback loops in those days.

For any outreach effort, the people in the field will always know more about the intricacies of their work lives than we can. The beauty of iterative technology: the ability to update apps, software, training, etc. is that the people who will use our apps or apply the knowledge they gain in our courses can provide

feedback or tell us what they need more of—and we can change and adapt more quickly because of the technology we have available to us.

What we're crafting

After obtaining the encouraging information that half of our survey respondents had or planned to have a smart phone in the next year, we set two goals for the U-SEEE Preparedness and Emergency Response Learning Center. The first was to impact the culture so that our target audience would begin to think of their cell phones as a powerful response tool. To do this, we launched a Mobile Preparedness and Response website (<http://www.sph.umn.edu/ce/perl/mobile>) offering tips on preparing cell phones as a response tool as well as links to apps, news and other resources that connect people's mobile phones and their response duties.

Our second goal is to create a mobile optimized training tool, advocate for its use, and gather feedback on its usefulness. Our first app, a Psychological First Aid Tutorial, is under development for Android, iPhone and as a mobile website. This topic was chosen as it is applicable to a wide range of emergencies and because many responders receive training in advance of deployment, necessitating a just-in-time (JIT) refresher. A mobile phone is capable of delivering a JIT refresher-level training, and making it widely accessible during the hectic time leading up to and during deployment.

It's all about intersections

As we move forward in designing trainings and tools in our constantly evolving mobile and social contexts, we are in a feedback loop between change and improvement and reality. We get to bring people along on this journey, and they remind us of what they need right now and what needs to change. We have always reached well beyond the walls of the University, but it is exciting to change from a model in which we present content and eventually receive feedback on what needs to change. Instead, we have myriad intersections where we stop and check in, potentially changing routes midcourse.

Acknowledgement

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Epilogue



An eBook Adventure



Edward A. Nater
Farhad X. Anklesaria
Ann Hill Duin

It's June 2012, and summer is just beginning. Time to reflect on this eBook adventure.

We hope that you find the stories presented in this eBook to be inspiring and motivating - they have certainly inspired and motivated us! The projects described extend our reach, enhance access, advance our pedagogies, and strive to increase student success. Most represent initiatives developed with little or no support by small teams of dedicated faculty, students, and staff, "skunkworks" projects that, in the aggregate, represent transformative change in the academy.

When we initiated this project we had little knowledge about how to develop and publish an eBook. We all learned a great deal during the course of this, our own "skunkworks" project, as the process developed and evolved. Because we found the process to be interesting and enjoyable, we thought that you, the reader, might also be interested in how it came about and what lessons we learned.

Although we were unaware of it at the time, the process that evolved shares many similarities with the concept of an "unconference" as described in a recent article by Alan Jacobs (2012, *The Atlantic*). He states that "an unconference is 'un' for this very reason: the organizers create a minimal structure, and

once the participants arrive they figure out what they want to learn, what they're able to teach, and what they're interested in talking about. For those who crave predictability, it can be an uncomfortable scene, but for those who are willing to take some risks with their time, it can be immensely rewarding, though you never know in advance what the rewards will be.”

An unconference is less about teaching others something and more about wanting to learn something. Similarly, this eBook is less about our wanting to teach others about technology-enhanced learning and more about us wanting to learn about current efforts in that area and how they might be transforming the University of Minnesota.

Two of us (Nater and Duin) met and talked about how we might, as professors returning from years in higher education administration, learn more about what's happening on the digital frontlines. We also wanted to learn how to create eBooks for use in our teaching, research, and outreach efforts. We decided that we might be able to do both by developing an eBook on the subject of the current state of academic technology at UMN. From attending a digital teaching workshop, Ann knew that Farhad Anklesaria is one of the most knowledgeable individuals on eBooks at UMN. The three of us met and talked about eBook options.

We decided to form a team to develop this eBook, and as a starting point, to delve into the innovation present at the recent (Spring 2012) academic technology showcase. Inspired by contributors' posters and passion for cultivating change, we issued an invitation to many of the individuals or teams who had exhibited at the showcase, and invited other contributors as well, expecting hopefully 20 contributed chapters. To our surprise and great delight, we received over 50 positive responses in just three days!

Because we found the process of developing an eBook to be engaging, we thought others might also be interested in learning about it. So the invitation soliciting contributed chapters also included an invitation to join in the design team: "If you want to learn more about eBook design and development, as a co-designer(s), you will receive an eBook that we are developing on how to create eBooks. You also will be invited to collaborate with us as we explore the dimensions and impact of this work.”

This invitation also received an enthusiastic response, with 10 individuals volunteering to be co-designers. We established a series of biweekly meetings with the co-design team. Approximately half the members met face-to-face in a small conference room, and the others joined in via a Google+ hangout. Right from the start the co-designers encouraged us to have a limited peer review process so that contributors could say that chapters had been “invited and reviewed.” Each person volunteered to review 5+ chapters.

Again, similar to Jacobs' description of an unconference: “The whole scene has a delightfully Woodstocky anarcho-syndicalist feel... The standard model shared by academic and business conferences – in which people who are thought to possess authoritative knowledge speak to people who are thought to know less—just doesn't happen... The purpose is to get people who want to know stuff in the same room with people who do know stuff and give them the opportunity.”

From the start the co-design team meetings were egalitarian and highly engaging; the energy in the room was palpable. Through these biweekly meetings a number of principles evolved that guided most of our efforts. These included:

- the process should be simple and powerful
- the process should be open and transparent
- the eBook should be free and as accessible as possible

- allow everyone to contribute where they feel they can best do so
- be willing to take risks
- share thoughts and ideas and leadership
- keep the process moving; complete the eBook in two months

From these principles, a process was developed to move from conception to finished eBook. The main steps in the process were:

- Invitation, peer review, and open communication
 - We sent email messages to approximately 60 individuals inviting them to contribute chapters to the eBook.
 - We developed a minimal structure (a Google site) to contain information about the eBook and to serve as a repository for contributed chapters, eBook drafts, and other communications.
 - We developed a template for the chapters along with information on formatting and sent it to each contributor.
 - We developed an eBook on "How to develop an eBook" and distributed it to co-design team members.
 - We agreed to have only minimal restrictions regarding the formatting of references and other materials; i.e., contributors could use the style guide most consistent with their disciplinary publications.
 - All contributors had access to all materials on the Google site, including chapter drafts by other authors and notes from the co-design team meetings.
 - We established a very short timeline for submission of chapters (approximately 4 weeks from the initial invitation), and members of the co-design team provided rapid turnaround on reviews.
 - Final chapters were posted on the Google site in the latest eBook draft as quickly as we could format them.
- Licensing, publication launch, and distribution
 - The University Libraries assisted with providing information on Creative Commons licensing and with the gathering of licensing agreements from contributors.
 - The University Libraries acquired and provided a permanent URL for hosting and distribution of the eBook.
 - The eBook was also converted from the ePub format (iPads, Nooks etc.) to the Amazon Kindle format for the widest possible distribution. Accounts were created on iTunes, Google Books, and Amazon Kindle, as well as on public libraries' open source systems (e.g., OverDrive, GOBI, etc.) and databases (e.g., ERIC, Google Scholar).
 - All contributors met together to "launch" the eBook, share in the excitement of this effort, and provide input toward next steps.
- Marketing and social media
 - A marketing and distribution plan was developed and initially implemented by the co-designer team. We connected with University Relations for development of a press release and full marketing and publicity efforts.
 - We established a WordPress site for online discussion and community interaction: cultivatingchange.wp.d.umn.edu
 - A number of social media events are being envisioned; these include the possibility of online and live events throughout the Fall (e.g., "real-time" panels hosted virtually via a Google+ hangout and recorded by using Google Hangouts on Air).

Those involved in this eBook development process exemplified the best qualities of shared leadership. According to Pearce et al. (2010), “Shared leadership occurs when group members actively and intentionally shift the role of leader to one another as necessitated by the environment or circumstances in which the group operates” (151). While the three editors issued the initial invitation, the co-designers who volunteered immediately jumped in to contribute knowledge and lead as necessitated by each stage of this evolving project.

We cannot thank the co-designers enough; this project could not have been done without them. All were fully engaged; as Pearce et al. (2008) note, “Shared leadership involves a process where all members of a team are fully engaged in the leadership of the team... and entails a simultaneous, ongoing, mutual influence process involving the serial emergence of official as well as unofficial leaders” (353). It is “a dynamic, interactive influence process among individuals in groups for which the objective is to lead one another to the achievement of group or organizational goals or both” (Pearce & Conger, 2003, 1).

Indeed, one of the hallmarks of shared leadership is that leaders emerge when needed and as their experience and abilities fit the situation at hand. Everyone volunteered for numerous tasks based on a combination of what they knew (e.g., Jude Higdon and Tom Fletcher each were in the process of doing their own eBooks, Abram Anders is extremely knowledgeable regarding social media) and what they wanted to learn (everyone wanted to learn more about what was happening with academic technology at UMN as well as how to create highly accessible eBooks). Lisa Johnston in her role with the University Libraries provided incredible help on copyright, licensing, and distribution of open source publications; Joel Dickinson and Christina Clarkson developed the logo, cover and flyer design and distribution plan; Anne Minenko contributed a clear focus on academic technology pedagogy; Francis Harvey brought an understanding of U-wide consortia and how to engage faculty in this endeavor; and Joe Moses drafted the initial press release. Of note: this particular interdisciplinary group would have never come together from a traditional formal publication process, yet this interdisciplinary, innovative group was exactly what this non-standard “book” project needed.

Decisions regarding the design, distribution, copyright, and numerous other aspects of the eBook and its development process were reached by consensus of the co-design team. In keeping with the principle of free and open access, we decided that a Creative Commons Attribution-NonCommercial 3.0 license would be desirable, one that allowed end users to utilize materials in the eBook as long as the materials were attributed to the authors, keeping with the egalitarian spirit of the co-design team. To our surprise, all 50+ authors readily agreed to this license without objection.

Likewise, the co-design team decided that the eBook should be readable on as many platforms as possible, including iPad, Kindle, Nook, Android-based tablets, and others by basing it on the ePub open format. One of the consequences of this decision is that video and audio cannot be embedded directly in the eBook. As Farhad explained to one of the contributors: “We are trying to keep the eBook compatible with the largest possible number of different devices (not just iPads). ... Audio/video are not currently sanctioned components of ePub. We could forcibly embed them ... and it would work on iPads, but likely not on many other devices. ... We think that for now perhaps the best middle road is to include a link (url) to your video, and host it somewhere.” The author agreed with this direction.

Drawing from Jacobs’ unconference summary points, to sum up our eBook adventure, here’s what to do:

- Create an environment with a fundamentally democratic ethos, so that no one expects all the authority and energy to come from the front of the room;
- Encourage people to contribute who genuinely want to learn and aren’t too rigid in their

- expectations about such an effort following a “traditional” book publishing process;
- Encourage people to contribute who enjoy sharing what they know and who don’t worry too much about what they get in return;
 - Create simple organizational structures (e.g., a Google site) that let people find one another (all draft chapters were shared on the site);
 - Provide, or just point to, the digital tools that allow people to share what they learn as widely as possible (see community interaction link at the site);
 - Be willing to experiment constantly to find out what strategies, what methods, and what tools best promote the goals of the eBook.

For us, this experience has been transformative. It’s shared leadership in action. And we look forward to the next one. Let us know if you’d like to join in the adventure!

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