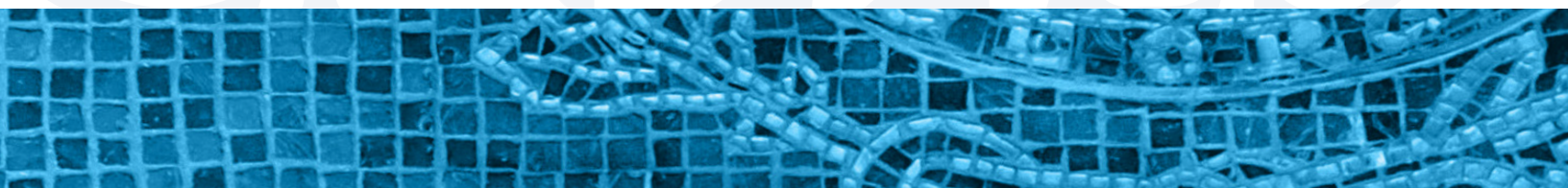# INITIATIVE ON TECHNOLOGY-ENHANCED LEARNING

November 2014
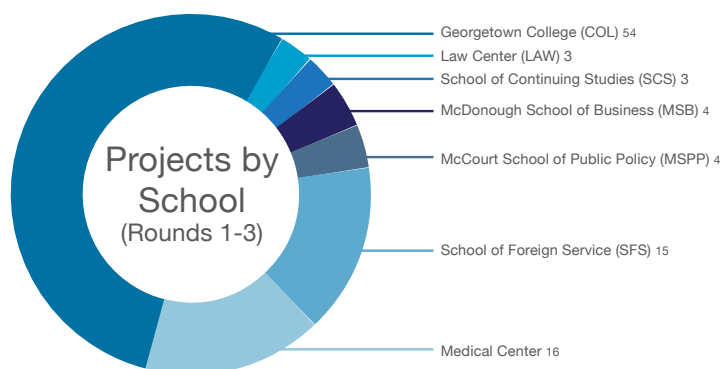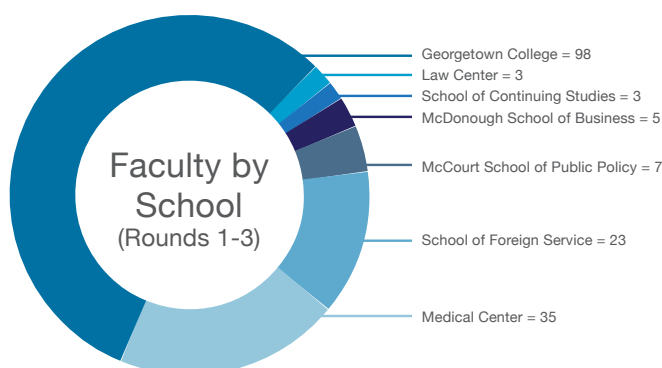
ABOUT ITEL

In the fall of 2012, Georgetown University announced a new Initiative on Technology-Enhanced Learning (ITEL), a three-year, $8 million investment in faculty grants, digital infrastructure improvements, and a partnership with edX. This initiative, one component of the capital campaign *For Generations to Come*, is intended both to strengthen teaching and learning in on-campus programs and to enhance Georgetown's online activity globally. To date, three rounds of project grants have been awarded to Georgetown faculty. In early December 2014, the fourth round of project funding will be announced.

100 PROJECTS

Projects by School (Rounds 1-3)

- Georgetown College (COL) 54
- Law Center (LAW) 3
- School of Continuing Studies (SCS) 3
- McDonough School of Business (MSB) 4
- McCourt School of Public Policy (MSPP) 4
- School of Foreign Service (SFS) 15
- Medical Center 16

174 FACULTY

Faculty by School (Rounds 1-3)

- Georgetown College = 98
- Law Center = 3
- School of Continuing Studies = 3
- McDonough School of Business = 5
- McCourt School of Public Policy = 7
- School of Foreign Service = 23
- Medical Center = 35

5,200+ GU STUDENTS
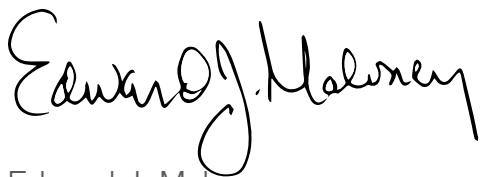
FROM THE EXECUTIVE DIRECTOR

It is with great pleasure that I present results from the first year of the Initiative for Technology-Enhanced Learning (ITEL). In the following report, you will find a list of key findings, summaries of promising approaches, and recommendations for next steps. There were many things that we learned this past year, including:

• the potential for improving student learning through the use of games, simulations, interactive tutorials, and "flipping the classroom".

• the enhancement of on-campus university courses and the extension of Georgetown's global reach through GeorgetownX courses.

• the development of a cost-effective model for scaling support for technology-enhanced learning.

ITEL challenged faculty to take risks and experiment with new ways of achieving Georgetown's educational mission. While many projects yielded gains in student learning or pushed the boundaries of the classroom in exciting ways, we've learned as much or more from the projects that did not meet their initial objectives as from those that did. In some cases where the experiment did not yield the projected results, the goals were overly ambitious or difficult to achieve because of circumstances outside the principal investigator's control. In other cases, the chosen technology may have been the wrong tool to achieve desired outcomes. Based on these findings, we continue to work with faculty to make strategic decisions about how to structure future projects.

As you will see, the evaluations and findings contained in this report are preliminary and based on data from projects that have been completed at this point. We look forward to gathering the findings from future projects, and to sharing additional details about the insight and energy with which Georgetown colleagues have approached these experiments.

Sincerely,

Edward J. Maloney
Executive Director, CNDLS

EXECUTIVE SUMMARY

Data from the first year of ITEL Projects, including individual faculty projects, interdisciplinary cohorts, and GeorgetownX courses, suggest that Georgetown is poised to meet the challenges and maximize the opportunities that we face now and in decades to come. Technology can help enhance our curricular offerings while enriching the student-centered tradition that is at the core of a Georgetown education.

Faculty reports and assessment data from completed projects, as well as initial data from ongoing projects, have led to key preliminary findings, successes, and challenges across the initiative, as well as recommendations for next steps based on promising individual experiments.

Key preliminary findings

The following five findings represent technology-enhanced learning strategies for which we have gathered evidence of effectiveness from ITEL course experimentations. Each of these findings is explained in greater detail in the rest of the report.

- Faculty leading **"flipping the classroom"** projects reported increases in student learning, and student surveys indicated high levels of student satisfaction with the new digital materials created for use in these courses.

- **Gaming and simulation** projects showed potential for improving student learning by engaging students in playful environments that motivated students to take risks and learn in non-traditional ways.

- **Interactive tutorials** offering personalized and targeted feedback, such as those created with the Open Learning Initiative platform, showed promise for improving comprehension and retention of knowledge, as well as increased student satisfaction with their learning environment.

- **GeorgetownX Massive Open Online Courses**, or MOOCs, extended Georgetown's global reach and enhanced our on-campus course offerings with modular materials.

- **Faculty cohorts** proved to be a cost-effective model for scaling support for individual faculty ITEL projects as well as for fostering cross-disciplinary faculty interaction.

Successes and challenges

As expected, we experienced various successes and challenges over the first year. These include the following:

- Faculty gained skills and knowledge in pedagogy, instructional design, and assessment, as well as in technology.
- The impact of many projects went beyond single courses and helped to fuel larger curricular change.
- The original scope of many projects in Round 1 was too ambitious to be successful as originally proposed, yet nearly all projects achieved revised goals.
- Designing and executing reliable and valid measurement of student learning impact of ITEL projects proved challenging.
- The amount of time and resources needed to plan and execute deep and rich projects exceeded initial estimates in almost every case.

Recommendations for next steps

Based on our analysis of the first round of projects, we recommend the following five steps for continuing to support technology-enhanced learning at Georgetown. Many of these are already built into the work of the second year of ITEL.

1. Build capacity to extend knowledge generated and lessons learned from ITEL projects across the campuses.
2. Institutionalize support models for particularly promising technologies and pedagogies (e.g. ePortfolios, simulations, and interactive tutorials).
3. Find additional ways to reuse and spread technology-enabled activities in the classroom, including leveraging faculty ambassadors and creating new faculty cohorts around particular learning technologies.
4. Continue global leadership role in MOOC course design and establish a sustainable support model for Georgetown's MOOCs.
5. Commit additional resources to evaluation to help gather evidence of broader impact.

FLIPPING THE CLASSROOM
Faculty rethink the use of class time

In the first round of ITEL projects, many faculty set out to rethink the way time was spent in their courses, shifting activities outside of class to make better use of face-to-face time. In ITEL courses, "flipping the classroom" encompassed a wide range of approaches in very different class contexts. Overall, faculty leading these projects reported increases in student learning, and student surveys indicated high levels of student satisfaction with the new materials created for these courses. Faculty who felt this approach was particularly effective have begun working with their colleagues to help them implement similar strategies in their courses.

5

new tools and services used in Nora Gordon's course

Nora Gordon (McCourt School of Public Policy) found that online lectures, quizzes, and other materials created as part of her ITEL project **led her Public Finance students to come to class more consistently well-prepared than in the past, and their grades reflected the benefits of this higher level of preparation**. Students also seemed to enjoy the class more than in previous years. Gordon felt that the time commitment and effort to move materials online and prepare engaging in-class activities, while substantial, was well worthwhile. Now, she is extending her knowledge by leading a Round 3 ITEL cohort in which she is working with colleagues teaching multiple sections of an economics course to experiment with lecture delivery technologies.

131

short instructional videos produced

Clay Shields and **Mark Maloof** (Computer Science), faced with rising enrollments in their introductory Computer Science course, hoped to use technology to give students more individualized attention via automated feedback and peer grading, as well as access to practice materials. While the modular resources they were producing as part of their project showed promise for wide use across the department, a major curricular change in the midst of their project development curtailed the work and made existing materials obsolete. **Nevertheless, early student learning assessment results pointed to visible gains in student learning.**

"This (flipping) data includes a rise in the average overall grade in the class (to the point where we had to make exams harder to keep some semblance of a curve); and higher teaching evaluations."
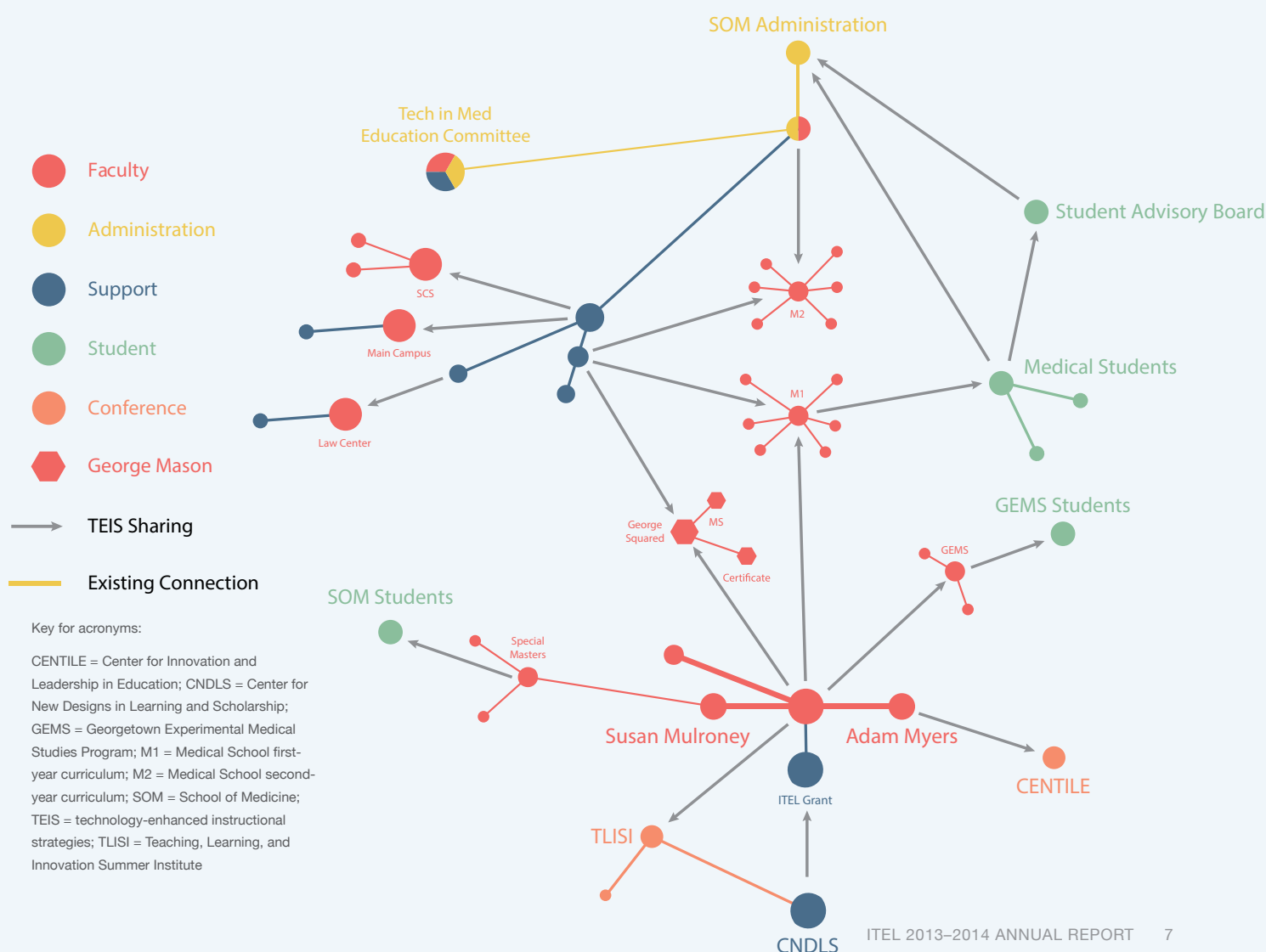—Clay Shields & Mark Maloof

To counteract passive learning in lectures, **Adam Myers** and **Susan Mulroney** decided to experiment with active learning enhancements in first-year courses at the School of Medicine (SOM). Creating online resources that students could access on their own time, such as recorded lectures, interactive tutorials, and practice tests, the instructors freed up class time for participatory activities such as clicker questions and problem-solving sessions.

Early data show that students in these courses earned scores similar to or better than those of students from previous course iterations. Student survey results are similarly encouraging: 8 out of 10 students responded positively when asked about the online resources.

The project's impact has already moved beyond the first-year curriculum and even beyond the School of Medicine. One of the most interesting findings is the extent to which students act as the driving force behind this process. First-year medical students grew so accustomed to lecture capture that they reached out to both the Student Advisory Board and SOM administration to demand that lecture capture be implemented in second-year courses as well. The school responded quickly and began assisting second-year medical faculty in their implementation of lecture capture.

The graphic below (based on preliminary insights) illustrates the spread of this project.

Legend:
- Faculty
- Administration
- Support
- Student
- Conference
- George Mason
- TEIS Sharing
- Existing Connection

Key for acronyms:

CENTILE = Center for Innovation and Leadership in Education; CNDLS = Center for New Designs in Learning and Scholarship; GEMS = Georgetown Experimental Medical Studies Program; M1 = Medical School first-year curriculum; M2 = Medical School second-year curriculum; SOM = School of Medicine; TEIS = technology-enhanced instructional strategies; TLISI = Teaching, Learning, and Innovation Summer Institute

GAMES
Student learning enhanced by game play

Research has identified gamified learning environments as promising spaces for further experimentation in higher education. Using rules, feedback, and rewards, games require students to apply knowledge within increasingly challenging scenarios. Gamified learning environments use this structure to strengthen students' motivation and lead them on a path toward expertise in the targeted area. Although only a small number of ITEL projects have incorporated games thus far, they have sparked widespread interest and have shown potential to increase student learning and motivation. While games are time-intensive to produce from scratch, the platform on which they are built can be highly reusable, particularly when based on a customizable and extensible game framework such as the one built by CNDLS for the projects below. The frameworks of the games described below have been made available to an expanded number of faculty through the ITEL Games Cohort.

85%
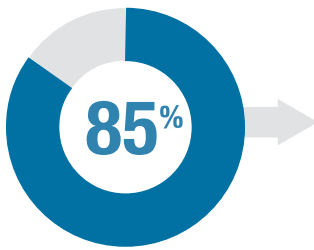
Law Students who recommended that the Evidence Game be used in future courses

Tanina Rostain (Law Center) worked with a CNDLS design and development team to create the Evidence Game, an online card game that simulates the strategic aspects of a criminal trial, specifically requiring the quick critical judgment that is needed around character evidence. Analysis of game play data and student learning outcomes suggests that this type of game is an effective way to engage students and give them practice applying principles to a simulated real-world environment. **The majority of students who played the game scored better than classmates who did not play the game on the character evidence questions on a course exam.**

4,136

Questions answered by 33 students in the Spanish Maze

Another set of problem-solving games envisioned by **Ronald Leow** (Spanish and Portuguese) for use in introductory Spanish courses are currently under development. In the initial game developed, students navigate a Minecraft-style maze that challenges them by presenting grammar items in a way where students have to figure out the grammar rules to advance. **Initial results suggest that students who played the online game showed greater short-term and long-term recall of language concepts than those who did not.**

SIMULATIONS
Students explore the diverse possibilities of real-life conditions

Simulations have long been part of the curriculum for practice-based professions. Moving simulations online allows for a wealth of encounters with the simulated environment that the classroom—with its constraints on time and space—does not otherwise afford. Web-based simulations present highly detailed models of authentic environments, allow for fine-tuned control over variables, and give students the opportunity for repeated, low-stakes engagement with a full range of pathways and experiences. Preliminary results suggest that students who participate in simulations demonstrate increased precision in their responses when tested on concepts practiced in the simulation.

191

possible results in the simulation

Matthew Hamilton (Biology) noticed that his students often lacked the foundational knowledge in quantitative methods necessary to succeed in his Evolutionary Biology class. In order to address this concern, he created a set of web-based simulations that allowed his students to manipulate quantitative data to visualize its impact on various genetic outcomes. Survey results show that students had a roundly positive response to the simulations, with affirmation of the usefulness of the simulations correlating strongly with a self-reported response of enjoyment to the simulation as an educational experience. **Results from a set of pre- and post-tests also evidenced student learning gains—specifically, greater precision in vocabulary and description—from students using the simulation.**

52

student participants in the physician-patient communication simulation

Led by School of Medicine professor **Stacey Kaltman** (Psychiatry), work is currently underway on a set of video-based branching simulations intended to teach students how to navigate emotionally tense moments in physician-patient communication. Using "communication-related self-efficacy" as the baseline measure for those randomized trial students who participated in the simulations, initial results show small but measurable learning gains for those who utilized the simulations versus a control group. **Student survey results affirmed that the web simulations allowed for greater diversity of engagements with the material than are usually possible in the traditional classroom setting.**

"I have been convinced by experience that simulation exercises help students learn and understand. This project has helped me assess that impression more rigorously."

—Matthew Hamilton

INTERACTIVE TUTORIALS
Customized feedback helps students stay on track

A number of Round 1 ITEL faculty developed interactive tutorials to deepen and customize students' experiences with course content. Interactive tutorials, built on an adaptive learning framework, guide students through content at their own pace, offering them customized feedback along the way. Some interactive tutorials utilize "branching", or multiple possible pathways, to customize students' experience of the material. According to early ITEL project data as well as substantial research literature in this area, interactive tutorials are a high-impact technology that can significantly deepen student learning and engagement. Interactive tutorials can be used as a technology tool to allow for a flipped classroom, but their uses are varied, as these examples demonstrate:

100%
undergraduate respondents who agreed that OLI enhanced their understanding

Parina Patel (School of Foreign Service) and **Oded Meyer** (Mathematics and Statistics) reinvented the recitation sections of a large statistics course required for international politics students. By incorporating self-paced modules created with the Open Learning Initiative (OLI) software, they hoped to eliminate problems caused by inconsistencies across recitation sections and to offer students more opportunities for practice and feedback. **While further study is needed, they did see modest gains in quiz scores by students in the OLI sections as compared to the control group, and these were reinforced by positive results from student surveys.** Furthermore, extensive research on the OLI platform indicates that a hybrid model combining face-to-face instruction with interactive self-paced tutorials can be extremely effective.

626
SOM students used interactive modules

Taeyeol Park, Senior Instructional Technologist in the Division of Instructional Technology Design and Development (ITDD) in the School of Medicine's Dahlgren Library, faced an increasing demand from faculty for self-directed learning modules. He worked with a team of faculty members to develop a number of prototypes incorporating multimedia, interactivity, and quizzes with feedback. He and his collaborators succeeded in creating modules that could be adapted for many other courses. **Student feedback was positive, and many students expressed interest in having access to more interactive modules.** However, there was consensus among faculty that creating these prototypes was only possible with the kind of support provided by ITDD.

ON THE HORIZON
Promising approaches from Rounds 2 and 3

As ITEL progresses, faculty are continuing to experiment with a variety of tools and approaches for technology-enhanced learning. The following approaches represent a few of the emerging trends that characterize current ITEL projects.

ePortfolios

Electronic portfolios allow students to reflect on their learning in integrative ways, while building an archive of accomplishments and competencies. The ongoing *Mind the Gap* project sees promise for ePortfolios in the context of study abroad. Because semesters abroad emphasize cultural exploration and experiential learning, this project is finding that ePortfolios help students reflect on their curricular and co-curricular experiences. An upcoming ITEL EPortfolios Cohort will further engage faculty with promising ePortfolio platforms and pedagogies.

Fitness Trackers

By providing physiological feedback, fitness trackers can support student self-awareness. As part of the Teaching to the Whole Person Cohort, Jason Tilan (Nursing and Health Studies) asked his students to track their physical activity with Fitbits, share data with each other, and reflect on their experiences. Through this activity, students gained a better awareness of their physical well-being and a deeper understanding of how homeostasis and physical adaptations pertain to their own physical conditions. As these types of devices become more widespread, course and curricular experiments with wearable fitness trackers will help us understand how data about the whole person can inform learning.

Global Synchronous Tools

Synchronous communication tools such as Soliya Connect and Teletandem focus on intercultural dialogue in higher education and can help facilitate meaningful encounters with difference. A current ITEL project involves a group of language faculty implementing synchronous communication through Teletandem that matches students with partners in other countries to promote authentic language practice. Robust evaluation activities comparing language learning via this medium to traditional classroom exposure are currently underway. Based on Georgetown's commitment to broadening its global presence, interest in synchronous communication tools for intercultural exchange will continue to grow.

GEORGETOWNX
Going global enhances campus resources and blended learning opportunities

Georgetown's collaboration with edX offers us an opportunity to experiment in new learning spaces as well as to both invest in and promote Georgetown's core strengths. Massive Open Online Courses (MOOCs) are most visible outside the campus community, reaching thousands of global learners, but their impact on campus is no less valuable. At Georgetown, lessons learned from building and launching GeorgetownX courses are coming full circle back to campus through impact on individual faculty and their departmental support teams, research findings to share locally and globally, and increased capacity for building public-facing courses on ambitious timelines. Likewise, resources created for MOOCs are being reused in creative ways to enhance on-campus course offerings through a blended learning approach. Lessons learned from video production, assembling online courses, and gathering and analyzing data will inform the next generation of on-campus and online courses at Georgetown.

3,775
GeorgetownX certificates earned so far

115k
STUDENTS ENROLLED

10
MOOCS FUNDED

Globalization

When the initial run of *Globalization's Winners and Losers* ended in December 2013, the International Business Diplomacy (IBD) course team began looking at the future of Georgetown's first MOOC. Theodore Moran observed that he has "become a better lecturer" through the learning design feedback and intensive media training that he received during course production, and the IBD course team is promoting the use of MOOC resources as rigorous study aids to prospective and current students. In addition, outside organizations have contacted the team about licensing the course content. The MOOC was revised and re-launched in October 2014 for a seven-week run, and research on student engagement in the course continues.

Bioethics

The Kennedy Institute of Ethics (KIE) knew that *Introduction to Bioethics* would be the first of many transformations they had envisioned for their modular instructional content. Early plans for reusing MOOC material in blended courses included offering a Continuing Medical Education certificate, sharing interdisciplinary instructional sequences with other schools on campus, and creating a hybrid course. The KIE has already brought their vision of a hybrid course (PHIL 105: Introduction to Bioethics, Fall 2014) to life. Led by MOOC course team member Travis Rieder, the on-campus blended course uses a customized WordPress blog to present a digital textbook containing embedded videos and instructional content. The MOOC version of *Introduction to Bioethics* will be relaunched in April 2015 for a second iteration.

Genomics

With the launch of *Genomic Medicine Gets Personal* through GeorgetownX in June 2014, the course team had already built a flexible course that used optional assignments and "dive deeper" sequences to satisfy an international audience that ranged from novice to expert. Bassem Haddad (School of Medicine) is planning to use both the introductory and advanced material produced for the MOOC to enrich pre-clinical and clinical courses on campus, as well as to supplement Continuing Medical Education (CME) activities at Georgetown.

Terrorism and Counterterrorism

When Daniel Byman (SFS) started planning his MOOC on *Terrorism and Counterterrorism*, he identified an interdisciplinary range of faculty from across the university who would deliver lectures based on their areas of expertise. Several of those faculty have already informed the course team that they intend to reuse colleagues' video segments to bring guest lecture-type expertise into their own on-campus classes.

Dante's Divine Comedy

For the last decade, Frank Ambrosio (Philosophy) has collaborated with CNDLS on conceptualizing and building a tool for contemplative reading. This fall, the tool, MyDante, has become part of a MOOC on Dante's *Divine Comedy*, Georgetown's first MOOC to use a CNDLS-built platform to complement the edX environment. Ambrosio has used previous iterations of the MyDante platform in his on-campus courses, and he intends to use this version of the platform in his upcoming classes. The framework of the MyDante platform is extensible, meaning that any text could be featured in future iterations of the platform, offering opportunities to Georgetown's departments of language, literature, and beyond.

GeorgetownX Releases

SEPTEMBER 2013
Globalization's Winners and Losers: Challenges for Developed and Developing Countries

APRIL 2014
Introduction to Bioethics

JUNE 2014
Genomic Medicine Gets Personal

OCTOBER 2014
Terrorism and Counterterrorism

Globalization's Winners and Losers: Challenges for Developed and Developing Countries

The Divine Comedy: Dante's Journey to Freedom, Part 1

FEBRUARY 2015
The Divine Comedy: Dante's Journey to Freedom, Part 2

AP Introductory Calculus-Based Physics: Electricity and Magnetism

APRIL 2015
The Divine Comedy: Dante's Journey to Freedom, Part 3

RESEARCH ON MOOCS

Globalization is utilizing Remark, a collaborative video annotation tool, to structure small study groups and capture data about the learning support that students in a MOOC need and want to get from peers. *Terrorism* is piloting Interlude, an interactive video simulation tool, to put students in the role of intelligence analysts. CNDLS is analyzing the moves students make in the simulation to better understand student decision-making. Additionally, CNDLS is conducting research on how students build competencies as they move through GeorgetownX modules, which have been designed with an integrative learning approach.

GEORGETOWNX BY THE NUMBERS

Drawn by Georgetown's international reputation for educational excellence, our MOOC offerings have attracted students from every corner of the globe. Using pre-post survey responses and user data from edX, we are tracking course enrollment and student demographics to know more about the learners taking advantage of Georgetown's global offerings.

Table 1: GeorgetownX Demographics

Enrollment	INFX 523-01x: Globalization's Winners & Losers	PHLX 101-01x: Introduction to Bioethics	MEDX 202-01x: Genomic Medicine Gets Personal
Registered students	28,112	26,839	22,580
Active students (low threshold method): *Students who registered at least one click anytime during the course*	10,461	8,136	6,376
Active students (preferred method): Students who registered at least one click on content related to the 2nd week of the course	3,696	3,945	4,239
Certificates earned	1,152	1,385	1,238
Gender (self-reported)	**N=25,930**	**N=24,581**	**N=20,227**
Female	10,254 (40%)	12,534 (51%)	9,950 (49%)
Male	15,583 (60%)	11,921 (48%)	10,198 (50%)
Age (self-reported)	**N=25,930**	**N=24,581**	**N=20,227**
Under 18	434 (2%)	849 (3%)	562 (3%)
18-24	7,374 (28%)	7,001 (28%)	5,793 (29%)
25-34	11,280 (44%)	9,443 (38%)	7,806 (39%)
35-44	3,958 (15%)	3,558 (14%)	3,000 (15%)
45-54	1,813 (7%)	2,002 (8%)	1,702 (8%)
55-64	760 (3%)	1,174 (5%)	917 (5%)
65 and over	311 (1%)	554 (2%)	447 (2%)
Education Level (self-reported)	**N=25,930**	**N=24,581**	**N=20,227**
Elementary	0 (0%)	0 (0%)	0 (0%)
Junior high	426 (2%)	750 (3%)	512 (3%)
High school	4,717 (18%)	5,450 (22%)	3,990 (20%)
Associate	833 (3%)	894 (4%)	559 (3%)
Bachelor	10,338 (40%)	7,650 (31%)	5,982 (30%)
Master	7,933 (31%)	6,912 (28%)	5,996 (30%)
Doctorate	909 (4%)	1,989 (8%)	2,516 (12%)
None/other	774 (3%)	936 (4%)	672 (3%)

ITEL COHORTS
Interdisciplinary cohorts leverage support and spark new ideas

In spring 2014, CNDLS introduced the "cohort model" for supporting ITEL projects in order to achieve two goals with regard to technology-enhanced teaching and learning: 1) to find a more cost-effective way of supporting individual faculty projects; and 2) to develop interdisciplinary faculty communities of practice. Twenty-nine faculty participated in the first set of cohorts, organized around the following three themes: **tablet and mobile computing**, **open educational resources** (OERs), and **using technology to educate the whole person**.

With $2,500 stipend awards for participating faculty and an average of $450 in technology materials support per project, the cohort model was significantly less expensive than the original approach to supporting individual Level 1 projects, which averaged just over $5,200 per person.

Over 75 percent of faculty reported that the major benefit of the cohort was the peer support and interaction that the cohort model afforded. Sharing ideas with fellow faculty members aided them in developing and implementing their ITEL projects and affected their pedagogical practices in general.

Tablet and Mobile Computing

Faced with a wide range of musical abilities in his Jazz History students, **Ben Harbert** (Performing Arts) developed interactive iPad applications to make musical concepts more accessible to students with all levels of musical experience. One of Harbert's iPad applications gave a group of students with lesser musical abilities the opportunity to experience writing and playing their own original jazz music using theory learned in class. Another application played relevant musical concepts during the lectures, letting students hear examples while learning about new concepts. Students reacted positively to both applications, since the iPads gave them better access for listening to, writing, and performing jazz. Due to this success at the cohort level, Harbert has received a Round 3 ITEL grant to design more interactive applications and facilitate the use of iPads in other faculty members' music courses.

"This is a great focused space in which to discuss teaching and to develop our craft. Participation in the cohort helped open me up to new possibilities of using technology in the classroom."

—Ben Harbert

Educating the Whole Person

In her Cultural Psychology course, **Yulia Chentsova-Dutton** (Psychology) designed an online activity for her students to compare their daily lives to those of students at different universities, providing them with deeper understandings of the impact of their own culture. Her class, along with coordinating courses in Montreal and Minnesota, documented "a typical day" on shared blogs, and students across the universities commented on the similarities and differences between their lives.

"I have realized the benefits of engaging in more in-class reflection as part of working on this activity. This semester, I have come to realize that in-class reflection had a lot of value. This was based in part on the feedback I received during our monthly [cohort] meetings."
—Yulia Chentsova-Dutton

Open Educational Resources

Shareen Joshi (SFS) created open educational resources (OERs) for her course *The Economics of Poverty Alleviation* to deepen students' understanding of class readings. From interviews with two authors, Joshi constructed audio podcasts to help students learn more about the authors' experiences, thus situating the course readings in a broader context of scholarly literature as well as sharing the authors' perspectives on their published work. In assessing the effect of the podcasts on her students, Joshi found that 92 percent of students could competently answer the final exam question using content from both podcasts.

3 COHORTS

29 COURSES

722 STUDENTS

APPENDIX A: EVALUATION METHODOLOGY

This section presents findings from the 24 campus-based projects that were granted awards as part of the first round of ITEL. These projects began on June 1, 2013. See Table 1 for project status and expected duration in each of the four Round 1 award categories.

Table 1: Round 1 Projects

CATEGORY	NUMBER OF AWARDS AND STATUS	EXPECTED DURATION	DESCRIPTION
Pilot	4 (3 completed; 1 extended)	1 year	Proof of concept
Level 1: Demonstration Grants	12 (11 completed; 1 extended)	1-2 semesters	To apply proven approaches in new course contexts, or to demonstrate the potential for tools and resources at a modest scale. Expected to have implications for wider impact.
Level 2: Design and Implementation Grants	6 (3 completed; 3 in second year of project)	1 or 2 years	For innovative design of a course module or element, either in blended face-to-face or online distance learning contexts. May focus on a single course or multiple linked courses; expected to address more than one element of a course.
Level 3: Transformation Grants	2 (both in second year of project)	2 or 3 years	Support faculty teams in the transformational design of a course, mini-course, or multiple course sections.

Methodology and data sources

The evaluation was conducted based on CNDLS staff analysis of the successes, challenges, and findings of each project. In addition to CNDLS' initial evaluation, each project was scored by Hanover Research, a third-party, external research firm. By design, each awarded ITEL project had 1) a hypothesis about the effect of the experiment on student learning, 2) collected data that would shed light on this hypothesis, and 3) reported results at the individual project level. Assessment designs varied based on the scope, type of intervention, and disciplinary orientation of the faculty involved. Data included treatment-control groups in a randomized controlled trial, a social network analysis of learning analytics, and faculty-reported grades and student course evaluations, among others. Due to the unique nature and customized assessment design of each project, data used to draw conclusions were not standardized across projects. Many of these projects have found promising results, and faculty and CNDLS staff have begun to report upon the findings at on-campus and international conferences, as well as through research publications. Findings from the most promising projects are highlighted in the main section of this report. Successes, challenges, and a CNDLS recommendation based on what has been learned from conducting each project can be found in Appendix C.
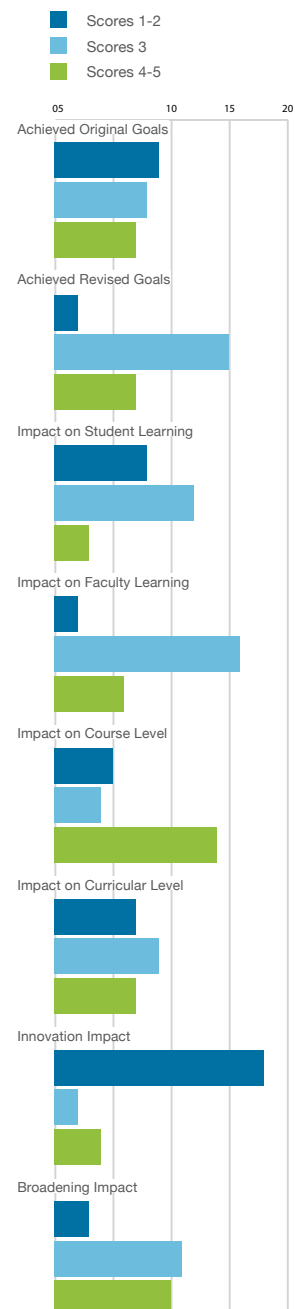
After the initial review by CNDLS, Hanover Research scored all Round 1 project reports on eight criteria in order to provide an objective evaluation of project successes and impact (See Table 2 for criteria descriptions and Figure 1 for the projects' scores). CNDLS continues to investigate institutionally-available data in order to incorporate more standardized metrics into the evaluation of future projects, and is working with edX consortium schools and faculty partners across the university to establish better ways of identifying the impact (learning, teaching, institutional) of these kinds of projects.

Table 2: Evaluation Criteria as Described and Applied by Hanover Research

CRITERIA	DESCRIPTION
The extent to which the project met its original objectives as stated in the project proposal.	This metric was evaluated solely on comparison with the objectives stated in the proposal and does not take into account other factors such as the perceived difficulty of implementation. Throughout the scoring process, this metric was highly correlated to scores for impact on student learning, as maximizing impact in this area was the objective of the majority of proposals. Programs were marked down for failing to roll out the full range of proposed initiatives and in cases where these initiatives failed to support primary objectives. Scores in this metric ranged from one (did not show evidence of having met objectives in any way) to four (met nearly all objectives).
The extent to which the project met a revised set of objectives.	Scores were given only to initiatives that revised their objectives through the course of the project or whose activities described in the final report differed greatly from the initial proposals.
The extent of the project's impact on student learning as reported on in the final report.	Nearly all projects aimed to impact student learning in some way, though evaluation of that impact varied greatly. In scoring, preference was given to initiatives with documented improvements in student performance or knowledge rather than qualitative descriptions by students of the initiative's utility. Scores in this metric ranged from two (struggled to positively impact learning or did not affect it at all) to four (significantly impacted learning).
The extent of the project's impact on faculty learning about teaching practice or assessment as reported on in the final report.	Scoring of this metric depended largely on the degree of reflection and robustness of self-evaluation on the part of the principal investigator. Higher scores were given to PI's who expressed interest in investigating ways to improve technological innovation in the future. Scores in this metric ranged from two (little evidence of faculty learning) to five (project stimulated significant faculty learning and future research interests).
The extent of the project's impact on teaching with technology at an individual course level.	This metric was evaluated based on whether or not faculty intended to use a similar program again in the same course. Higher scores were given to initiatives that would significantly impact or change the conduct of future iterations of the course in question. Preference was also given to faculty that expressed a desire to tweak and improve the initiative.
The extent of the project's impact on teaching with technology at a curricular level (impact on multiple linked courses).	Impact at a curricular level was evaluated strictly on the description of future application in other courses with other faculty and did not take into account the potential for such an innovation to impact other courses.
The extent to which the project explores new territory with technologies for teaching (Innovation impact).	Innovation impact, along with the following metric (broadening application), is not a value-based measurement but rather a reflection of the technology's present use in education contexts. Projects that utilized non-traditional technology in the classroom received higher scores in this area than projects that leveraged known technology and methods, such as flipped classrooms.
The extent to which the project applies a known technology in a new teaching context at Georgetown (Broadening application).	This metric was typically graded as the inverse of the above metric, innovation impact. Initiatives receiving high scores in this area were projects that utilized technologies already common in education contexts.

*Rating scale descriptors developed by Hanover Research for scoring ITEL projects: 1=no evidence at all of having met objective or negative impact; 2=weak evidence for having met objective in a very general sense; 3=met most objectives and documented evidence; 4= substantial impact and strong documentation; 5=transformative impact.

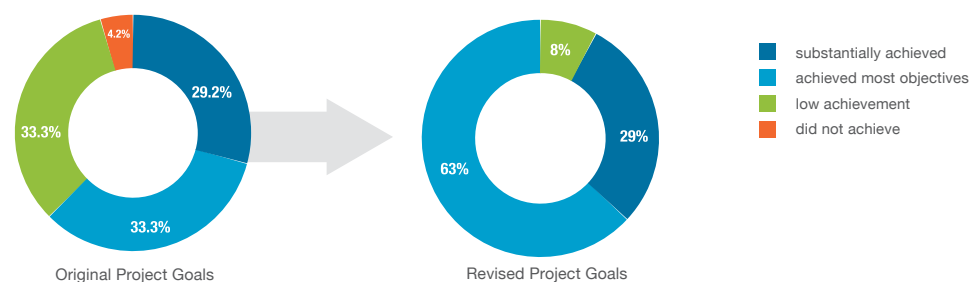Figure 1. Distribution of Scores
- Scores 1-2
- Scores 3
- Scores 4-5

Achieved Original Goals
Achieved Revised Goals
Impact on Student Learning
Impact on Faculty Learning
Impact on Course Level
Impact on Curricular Level
Innovation Impact
Broadening Impact

APPENDIX B: SUMMARY OF DATA

Achievement of project goals

Fifteen (63 percent) of the 24 Round 1 projects substantially or mostly achieved their original goals. Of the remaining projects, eight (33 percent) had low achievement and one project did not meet its original goals (See Figure 1). As CNDLS began working with Round 1 faculty awardees, it became apparent that many funded projects were overly ambitious for their timeline, and faculty had underestimated the amount of effort their projects would take. Much of the initial work, then, included re-adjusting the scope and expectations of projects to be realistic and achievable. **After revising project objectives, 92 percent of projects substantially or mostly achieved these revised goals** (See Figure 1).
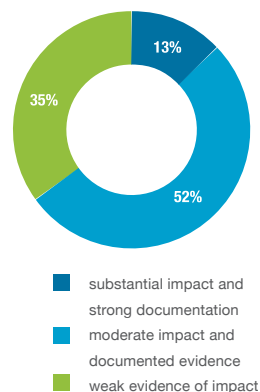
Figure 1: Achievement of Original and Revised Goals

Original Project Goals → Revised Project Goals

- substantially achieved
- achieved most objectives
- low achievement
- did not achieve

Impact on student learning

The Round 1 ITEL projects were specifically structured so as to have hypotheses about student learning and to collect evidence of such learning. **According to the Hanover scores, three projects (13 percent) had a substantial impact on student learning (concluded through strong documentation in the project report) and 12 projects (52 percent) had a moderate impact on student learning (concluded through documented evidence).** For the remaining eight projects (35 percent), there was weak evidence of impact on student learning in the project report (See Figure 2).

Part of the challenge in determining impact on student learning was in designing and executing reliable and valid measurement of student learning. For the most part, Level 1 projects in Round 1 were designed as single-semester or single-course implementations. This limited their ability to collect data over time or to construct treatment-control studies. Some projects also had small course enrollments, further limiting the available data pool. Additionally, a number of well-designed project assessments showed a positive trend but not a statistically significant difference in student performance.

Figure 2. Impact on Student Learning

- substantial impact and strong documentation
- moderate impact and documented evidence
- weak evidence of impact

Impact on faculty learning

In 22 out of 24 cases (92 percent), conducting the ITEL project had a moderate, substantial, or transformative impact on faculty. In two cases there was only weak evidence of impact on the faculty (See Figure 3). According to Hanover Research notes, scoring on this criterion depended largely on the degree of reflection and robustness of self-evaluation on the part of the principal investigator(s). Higher scores were given to projects where faculty displayed acquisition of pedagogical, instructional design, or assessment skills or expressed interest in investigating ways to improve technological innovation in the future.

Impact on course and curricula

Projects were scored on two criteria to determine whether their primary locus of impact was at the course or curricular level. **Eighteen of the 24 projects had either a substantial or moderate impact at the course level. Sixteen projects had either a substantial or moderate impact at curricular level.** It was not expected that each project would score highly in both areas; rather, some projects were selected for their depth and focus on a single course, whereas others were seen as valuable for their potential to affect curricular sequences or decisions. An original expectation for Demonstration (Level 1) Grants, as stated in the Call for Proposals, was that they should have implications for wider impact, but they were not expected to have demonstrated that wider impact during the grant period. Figure 4 presents the number of projects which Hanover Research scored as having a substantial or moderate impact at the course level and at the curricular level.

Figure 3. Impact on Faculty Learning

- transformative impact (4%)
- substantial impact and strong documentation (21%)
- moderate impact and documented evidence (67%)
- weak evidence of impact (8%)
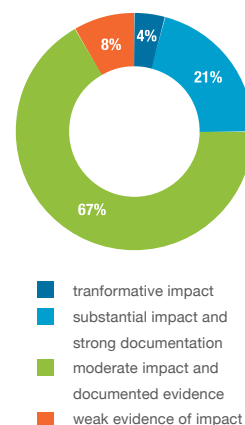
Figure 4: Locus of Impact of Project Designs

Number of Projects

COURSE — substantial impact: 14, moderate impact: 4
CURRICULAR — substantial impact: 7, moderate impact: 9
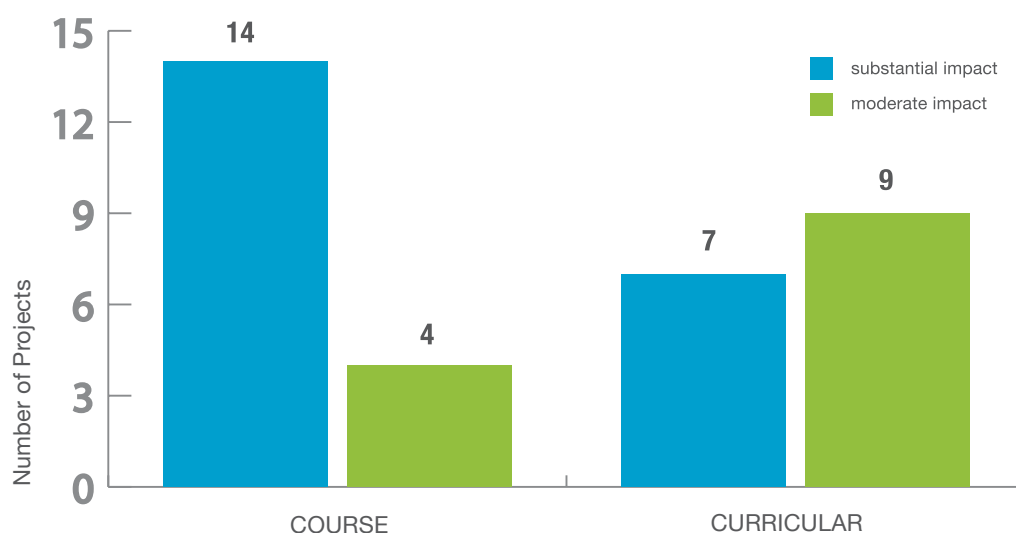
Figure 5. Broadening and Innovation Impact of Project Designs

- 8%
- 17%
- 75%

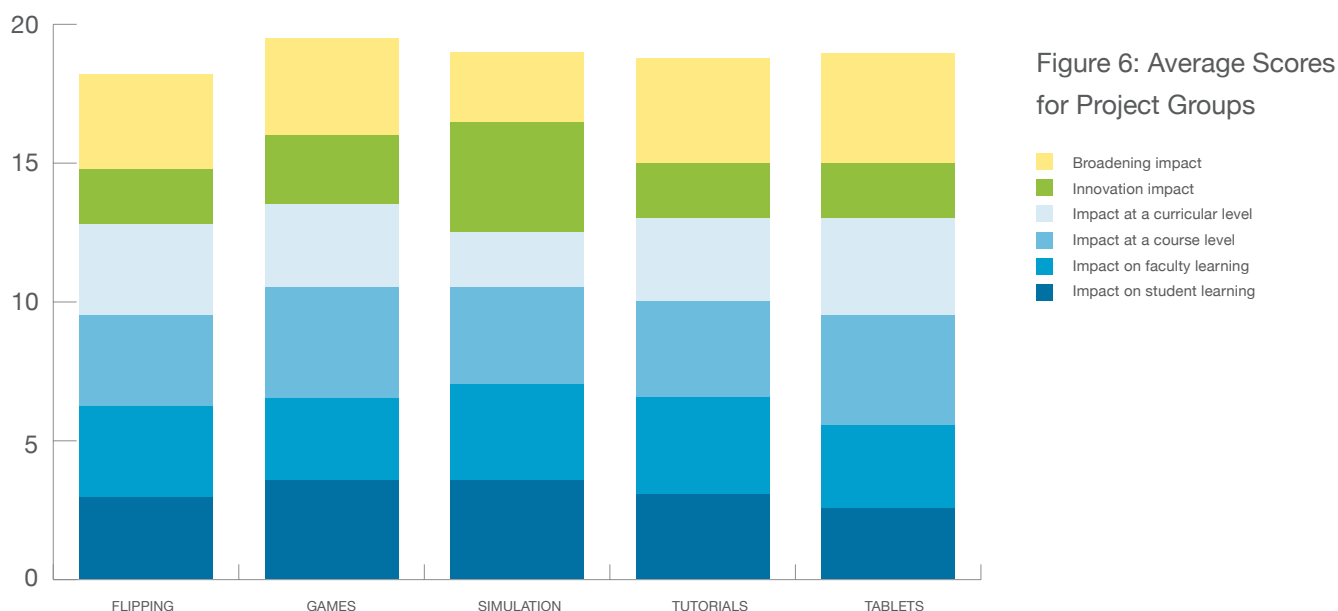■ primarily broadening
■ primarily innovation
■ both
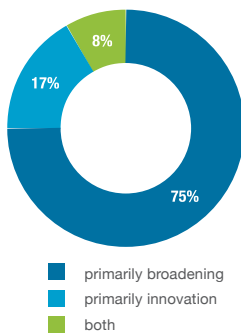
Impact on broadening and innovation

One of the expectations of Round 1 Grants was to apply proven approaches in new course contexts or to demonstrate the potential for tools and resources. Projects were rated on two criteria: The first criterion attempted to determine the extent to which projects had a "broadening impact," meaning that the project utilized a common educational technology and applied it in a new course context, thus adding to our knowledge about how these technologies can be used at Georgetown. The second criterion attempted to determine the extent to which projects had an "innovation impact," meaning that the project utilized a technology uncommon to the educational teaching environment, thus pushing the boundaries of innovation in teaching with technology. **Interestingly, 75 percent of the projects had primarily a broadening impact, 17 percent impacted innovation, and 8 percent impacted both** (See Figure 5). According to Hanover Research, these two criteria were typically scored as the inverse of each other.

Impact by project type

To investigate whether there were any patterns in scores across projects with similar goals, we chose to cluster projects into five thematic groups according to project objective. Groups chosen were "flipping the classroom" (n=7), games (n=2), simulations (n=2), interactive tutorials (n=4), and tablets (n=2). Please note: the small number of projects per group and the fact that some projects are ongoing means we cannot make definitive claims. Figure 6 shows the averaged scores per group across a number of criteria.

Simulations and games, which employed technology to create authentic and motivating learning experiences for students, averaged higher scores for student learning impact. The simulations group also had the greatest "innovation impact," indicating that simulation projects were pushing the boundaries of innovation in teaching with technology by using a technology uncommon to the educational teaching environment. Not unexpectedly, projects utilizing known technologies, such as tablets or interactive tutorials, and "flipped" experiments (typically lecture capture) scored slightly higher on "broadening impact." As the number of ITEL projects grows with each new round of awards, we look forward to increasing the size of these groups and continuing to look for meaningful trends and promising practices for improving the university's teaching and learning environment.

Figure 6: Average Scores for Project Groups

Legend:
- Broadening impact
- Innovation impact
- Impact at a curricular level
- Impact at a course level
- Impact on faculty learning
- Impact on student learning

Categories: FLIPPING, GAMES, SIMULATION, TUTORIALS, TABLETS

PRESENTATIONS OF ITEL PROJECT WORK

Demaree, D. Garr, W., & Church, S. (2014, July). *The intersection of learning design and game design: a robust strategy for creating an effective educational games.* Presented at The Physics Education Research Conference, Minneapolis, MN.

Demaree, D. Garr, W., Rostain, T., McWilliams, M., Salah, J., Gaston, T., & Church, S. (2014, October). *Developing a robust design strategy for creating an effective educational game: A collaboration of faculty, learning designers, and game developers.* Presented at The International Society for the Scholarship of Teaching and Learning Annual Conference, Quebec City, Canada.

Haddad, B.R., Russell, J., Pennestri, S., Demaree, D., Tan, M. & Peshkin, B.N. (2014, October). *Changing the Landscape of Genomics Education Through a Massive Open Online Course (MOOC): Genomic Medicine Gets Personal.* Presented at the American Society of Human Genetics Annual Meeting, San Diego, CA.

Leow, R. P., Janssens, P., Gustafson, C., Garr, W., & Caras, A. (2014, April). *Using CALL for more robust L2 learning: A psycholinguistic approach.* Presented at the Conference on Language, Learning and Culture, Virginia International University, Fairfax, VA.

Lubkin, J., & Screen A. (2014, April). *Effectively flipping an ESL grammar class: An action research project.* Presented at the Conference on Language, Learning, and Culture, Virginia International University, Fairfax, VA.

Maloney, Edward (2014, June). *Experimenting with Technology-Enhanced Learning.* Presented at the edX Global Forum, Delft, The Netherlands.

Meyer, O. & Lovett, M. (2014, July). *Using Carnegie Mellon's Open Learning Initiative (OLI) to support the teaching of introductory statistics: experiences, assessments, and lessons learned.* Presented at the 9th International Conference on Teaching Statistics, Flagstaff, AZ.

Meyer, O. & Patel, P. (2014, July). *Using the Open Learning Initiative (OLI) to support teaching statistics to international politics students.* Presented at the 9th International Conference on Teaching Statistics, Flagstaff, AZ.

Screen A., & Lubkin, J. (2014, March). *Flipping a grammar class: What, why, and how?* Presented at the Annual Convention of TESOL, Inc., Portland, OR.

Stephen, E. & Wardzala, K. (2014, February). *DIVE: A four-step framework for creating meaningful short-term experiences abroad.* Presented at the Workshop on Intercultural Skills Enhancement, Wake Forest University, Winston-Salem, NC.
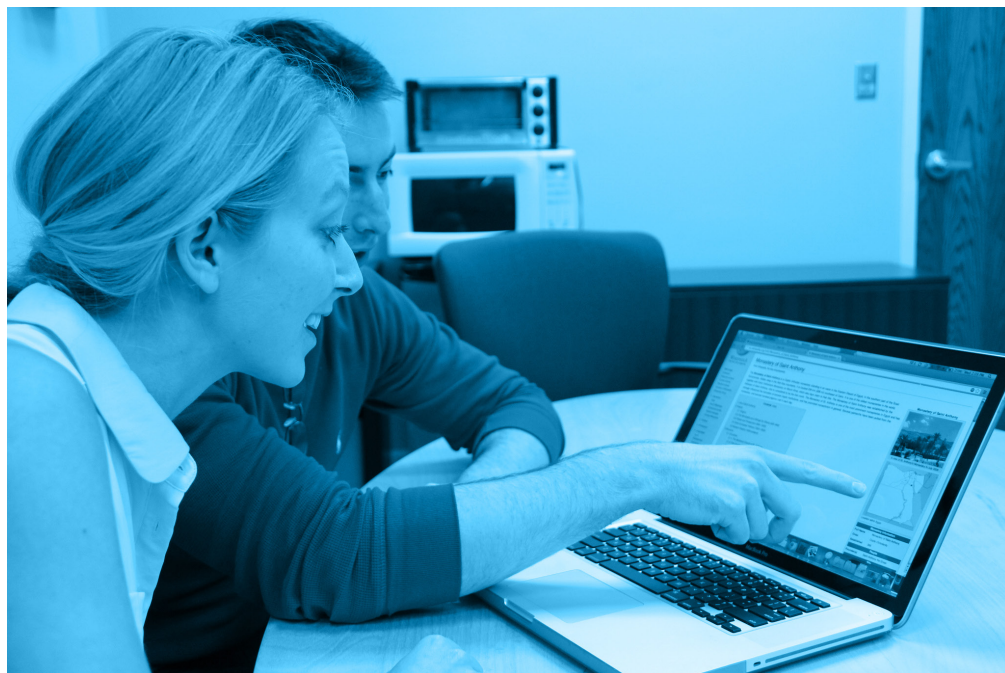
Syverson, E., Russell, J., & Pennestri, S. (2014, June). *Using Video Simulation to Enhance Physician-Patient Communication.* Presentation at the New Media Consortium Conference, Portland, OR.

APPENDIX C

Successes, challenges and recommendations from Round 1 projects

Table 1: Pilot Projects

PROJECT	GOAL	SUCCESSES
Music and Public Policy in the Age of Modern Media Anna Celenza, Performing Arts	To create faculty-curated material to prepare students for participating in the Future of Music Policy Summit, and to deepen students' awareness of contemporary cultural debates.	Student assessments showed that videos were successful in preparing students, but that students would like even more preparation. The project resulted in addition of a MUSC course dedicated to this for Fall 2014. The PI concluded that technology can be extremely beneficial in the "creation" and "practice" process, but is less helpful in the way originally envisioned it for this project in delivering course content about the impact of technology on the music industry and public policy.
Web-based Computer Simulation Exercises for the Study of Evolutionary Genetics Matthew Hamilton, Biology	To construct a series of well- designed and highly produced teaching simulations and to assess their impact on student comprehension of quantitative concepts in evolutionary genetics.	Two simulations were developed which presented richly realized simulations where students could experiment with key quantities related to each concept and visualize the resulting patterns. The results of this project suggest that simulations can improve student comprehension of complex topics in evolutionary genetics and that students perceive such simulations as useful. The faculty PI suggests it would be worthwhile to assess attitudes and learning outcomes for a larger population of students.
Using Technology to Enhance Teaching in Physician-Patient Communication Stacey Kaltman, Medicine	To determine if simulated patient interviews could be used to achieve essential Physician-Patient Communication learning objectives including: applying patient-centered interviewing techniques and applying the NURSE technique in the elicitation of and response to emotionally laden material.	The data provide preliminary support for the use of clinical interview simulations in teaching early medical students crucial communication skills. This novel use of technology greatly expands the opportunities for increasing student exposures to different types of patients and clinical scenarios, likely better preparing them for their clinical practice.
Electronic Testing to Enhance Learning in the School of Medicine Dean Rosenthal, Medicine	To investigate viability of the Global Evaluation Management System™ (GEMS™), a comprehensive, integrated online platform for creating, managing, and delivering examinations, at the School of Medicine (SOM), and whether it could positively impact student learning and facilitate a collaborative test item writing process.	Online testing is a viable option for the School of Medicine. They are now considering expansion in AY2014-2015 to the remainder of the firs- year program modules and possible expansion to the second-year medical school program and to the graduate programs with whom we partner. The goal of collaborative item writing was somewhat successful in that it took place between faculty and module directors, but the ultimate goal is for it to take place between faculty.

CHALLENGES	RECOMMENDATION
Quickly changing industry translates into short shelf life for online content. Creating video materials to serve both a wide audience (MOOC-like) and the specific needs of GU students was challenging.	Georgetown's experience with MOOC development shows that MOOC design can successfully drive modularization of content for use on campus; this project was not completely successful in attempting the reverse.
One challenge was that the small number of students in the class resulted in small sample size. The project results were not easily extensible to other disciplines.	Since development of simulations is costly, further investment in simulations should be structured to affect multiple courses, a curriculum, or to develop modules that can be used in a variety of teaching situations.
The main challenge for this project was to make the simulations as realistic as possible so that they adequately replicate the experience of an actual patient encounter. As technology continues to evolve and improve, this aspect of the simulations will continue to be enhanced.	This project was awarded an extension past Round 1 to complete extensive coding of the an Observed Structured Clinical Exam (OSCE) videos, and to build additional simulations in an additional hosting platform for comparison.
There was a learning curve with the software and time was limited for faculty. The analysis tools embedded within the software were "oversold."	This project is an example of where seed funding is needed to explore an option for systemic change at the school level.

"We couldn't have predicted the extent of professional development in terms of fundamental, if not dramatic, shifts in how we approach technology, teaching, and interactions with students."

—Jennifer Lubkin & Andrew Screen

Table 2: Demonstration Projects (Level 1)

PROJECT	PROJECT GOAL	SUCCESSES
Digital Rome Tommaso Astarita, History & Josiah Osgood, Classics	To explore whether use of an iPad onsite at museums in Rome could help remedy technology access issues when teaching abroad, and whether the substitution of an online exhibition on the Omeka platform for the final paper would enhance students' exploration of what they saw in Rome and their ability to use visual data in making historical arguments.	The iPad was found to enhance students' on-site learning experiences. In examining student work, the faculty found that students engaged more than they do in writing papers with the visual evidence, which is a major component of this class.
Tangible and Embodied Computing Evan Barba, CCT	To provide students with the skills and confidence to approach new computational environments, understand their technical components, and develop real-world applications.	To address the variation in student backgrounds, the instructor and TA developed an individualized course of study for each student to follow. This worked to a surprising degree because each student essentially had a personal tutor. However, this placed an impossible burden on the instructor and teaching assistant to constantly build an individualized scaffold for every student. The solution, while not scalable, did demonstrate the power of meeting students where they are by identifying and leveraging existing skillsets.
The Virtual Bridge Bernie Cook & Lilian Hughes, Film and Media Studies	To connect the academic study and technical work in two film courses; in particular, to foster integrative thinking.	Although the technological innovation itself was not a success, faculty involved in the project report that it led to some important and valuable rethinking of the pedagogical goals of courses and curriculum. One instructor reported, "It encouraged me to see my course as part of their educational trajectory rather than a free-standing course. But again, this was not a benefit of MediaThread specifically, rather the larger project that motivated our grant request."
How Technology Can Enhance Writing Instruction at Georgetown Maggie Debelius & Matthew Pavesich, English	To investigate whether technology could enhance writing instruction in two ways—peer review of writing and understanding library research resources.	Students using online peer review spent more time on the task and earned higher grades than those using face-to-face peer review, which suggests that moving the activity online can both enhance student learning and free up class time for other kinds of activities. The results of delivering research instruction online are less clear and merit further study.
National Security Crisis Law: Automated Problem Sets and Web-based Media Outlet Laura Donohue, Law	To analyze a massive volume of data generated during the course of a simulation to help students better accomplish the pedagogical goals set for them in the class.	The PI was able to successfully use data to quickly and efficiently create an interactive timeline for tracking events occurring during the simulation, mapping student decision-making, and analyzing how cognitive bias presents. The PI used Social Network Analysis to identify patterns of communication behaviors as indicators of leadership, and as a way to understand information flows.
Flipping (Parts of) the Public Finance Classroom Nora Gordon, MSPP	To investigate whether flipping the classroom by putting a combination of lecture captures, enforced close reading, and online quizzes would enable more in-class time to be devoted to problem-solving, and whether this increased time devoted to problem-solving would in fact enhance problem-solving skills.	The bottom tail of the grade distribution on exams in this class was shorter than usual. The PI was unsure whether the additional resources were particularly useful to those students struggling the most, but the instructor hopes that is the case.
Use of Tablet Computer in Large Lecture Classroom Arik Levinson, Economics	To use a touch-screen tablet computer as a portable smart board, to project a combination of pre-posted images and live writing in a large lecture class.	96 percent of students felt their learning benefitted from the way the instructor used technology in the course. 85 percent of students thought it was a better technology than alternatives they had seen or heard about for a large lecture class.
Incorporating Global Dialogue into Writing and Culture Seminars Using Web-based Conferencing Technologies Sherry Linkon, English	To test whether and how participating in online video discussions with Muslim peers from the Middle East would enrich students' empathy and understanding in cross-cultural communication.	Despite not seeing clear evidence that the Soliya Connect platform provided most of the students with deeper insights into cross-cultural communication, the PI was able to work with Soliya to redesign it specifically for first-year writing courses. In final student reflections, despite many comments about difficulties with Soliya, the majority of students described it as a positive experience. The faculty member concludes that Soliya did offer an experience that was personally meaningful for students and intellectually productive.
Using an E-learning Authoring Tool for Developing Self-Directed Learning Modules in the School of Medicine Taeyeol Park, Medicine	To develop prototypes of e-learning design elements, to assist faculty in selecting the prototypes that would be most effective for the learning activities and goals of their self-directed learning (SDL) modules, and to instruct faculty on applying the prototypes to their SDL module design.	The project determined that the SDL module designs were simple enough to be applied without acquiring programming skills and flexible enough to be adapted for a variety of learning goals and learning content. Future SDL modules could be created by the instructors with minimum ITDD support.
Blending an Upper-Division German Course Peter Pfeiffer & Mariana Pankova, German	To help students actively engage with content and promoting argumentative language use by developing a series of prompts for conducting three rounds of online discussions within the second unit of the course.	The project has important implications for the other courses offered in the program. First, the analysis of the questionnaires suggests that the discussion board assignments can provide effective and new ways for learner cognitive and linguistic engagement with the content of the course and at the same time with their peers. Second, including discussion board activities does not require a major change in assignments, but rather a change in venue that offers learners an opportunity for a different kind of participation in the course.
Mind the Gap Betsi Stephen, SFS	To investigate whether the incorporation of student blogs and ePortfolios into formal courses offered at the two Georgetown University Living and Learning Communities (LLCs) abroad—Villa Le Balze (VLB) in Italy and the McGhee Center (MC) in Turkey— improves student learning through reflection, integration, and visibility.	The faculty PI's conclusions included the following: 1) the online museum was an excellent platform for making public the independent projects; 2) the blogs work well for some students and are just plain work for other students; 3) when the blog project does resonate for a student, it gives that person the opportunity to capture experiences and reflection; 4) consistent communication from the faculty member(s) in residence is critical; and 5) there is a need for further preparation and continuation of the blog project on the main campus.
Filling the Gaps Edward Van Keuren, Physics	To create short online interactive modules covering a limited number of topics to free up class time that would have been spent on review and to even out the level of students in some of the more basic techniques needed to master course material.	Four of the modules have been created and tested. These will be made available to all faculty starting in the fall 2014 semester. The other main positive outcome of the project was the development of the tools to create the modules; the main effort in creating the modules is now just building the content.

CHALLENGES	RECOMMENDATION
The PI encountered challenges with the Omeka platform, including difficult, cumbersome, or awkward specifics of the platform, especially in regard to editing draft work. There were also concerns about the visible (public) nature of all projects, even in draft stage.	This project serves as a model for using technology to extend learning outside the classroom as a field-based experience. Where applicable, the university should continue to invest in projects expanding technology-enhanced learning beyond the classroom in a variety of ways, such as this.
The project resulted in good research but had a smaller impact on student learning. Rather than obtaining quantifiable assessments of student learning, a rich qualitative description of student learning was achieved. In particular, the choice of platform and experience of the instructor were the major issues, and better results were achieved in a separate course not funded by ITEL because of the instructor's familiarity with that technology and prior experience teaching the course.	While this project did have important ramifications for both the TA and the instructor, it did not have potential for broad technology transfer due to a discipline-specific and very expensive technology being used. Recommendation is to make only targeted investments in "boutique" and/or small projects that do not have clear indications about how they will have a larger impact.
This project encountered challenges with the technology itself, MediaThread, and its inability to connect to ShareStream.	This project requires a significant additional university investment in video streaming delivery, which we hope to be able to accomplish in partnership with University Information Services. We have started this process.
A challenge for this project was the faculty time required to set up the project and measure its effectiveness in the middle of an effort to build institutional support to revise and expand the first-year writing requirement.	The university will need to continue to invest in supporting more efficient uses of instructional time in first-year writing courses in order to ensure success of the university's current core curriculum trajectory with regards to writing instruction.
Challenges included faculty time and attention needed elsewhere during first half of the project. A delayed start necessitated changed goals and focus.	This project is promising as a model for harnessing big data and data analytics for the purpose of learning. We recommend continuing to invest in projects with this potential.
The instructor found the technology itself relatively easy to deal with, but the pedagogical aspects more challenging. The main challenge was the faculty's time investment.	This project can usefully serve as a cost-effective model of supporting faculty in flipping the classroom. Recommend continuing this type of work.
The amount of time needed to implement the project was a challenge that the PI encountered.	We recommend working with appropriate University Information Services (UIS) and Classroom Education Technology Services units to enable tablet-based teaching in all large lecture rooms on campus. This work has already been started with UIS.
The biggest challenges were the issues and compromises involved in using a package created and managed by others.	If Georgetown is to continue in its relationship with Soliya, we recommend spending some resources to determine the kinds of classes the Soliya experiences can best enhance.
Major challenge: faculty time. All faculty involved indicated this was very time consuming. They would not be able to do it without the help of the ITDD division of DML.	This was an extremely efficient model of support that leveraged an already-existing support unit in the SOM. Recommend looking for other opportunities like this at the university.
Changes in departmental and project leadership resulted in challenges.	This project was effective in helping a department move the needle on technology use in teaching. We recommend continuing to support departmental work like this at a low funding level, where only a small amount of support is needed to create an impact.
Some of the challenges that occurred in 2013-14 were bandwidth limitations, mismatch of assignments and student expectations, and a lack of communication at times between the main campus and the Villas.	This project was awarded a no-cost extension to continue, as it shows preliminary promising results for integrative student learning through ePortfolio and Omeka use.
There were technical difficulties in gathering data from the pre- and post- tests developed in Articulate Storyline, which challenged the pre-post assessment design. The project was a bit too ambitious for the timeline.	This project encountered some delays and difficulties, but it retains potential for long-term impact in the department. We recommend following up with this PI to see how successful this model is eventually, and potentially providing additional support for assessment of impact on students and courses in the curriculum.

Table 3: Design and Implementation Projects (Level 2)

PROJECT	GOAL	SUCCESSES
CLED Flipped Grammar Project Jennifer Lubkin & Andrew Screen, CLED	To explore how flipping the classroom impacts the learning activities that, based on current theory and research, most directly result in language learning; to determine whether flipping the class—moving grammar explanations out of class to make room for more workshopping, conferencing, and interactive practice—creates more favorable conditions for student learning.	The main finding from this study is that flipping may result in faster learning with longer-lasting gains. This conclusion is based largely on teacher perceptions of student performance, recorded daily over two semesters. While this finding cannot in any way be considered definitive and should not be over-generalized, it does suggest that further research in this area would be worthwhile. In order to strengthen the rigor of such research, "flipping" as a term needs to be more clearly defined and the variety of flip in each study needs to be more precisely identified. Consequently, prior to or in tandem with research about the effectiveness or ineffectiveness of flipping, it would be helpful to pursue research identifying key characteristics of different types of flips.
The Evidence Game Tanina Rostain, Law	To determine whether students' play of an online card game that simulates aspects of a trial increases their engagement with the learning process and improves learning outcomes.	Analyses of the game play, exam score, and survey data are in progress. Preliminary findings from the survey indicate that those who played the game responded favorably to it and agreed that the game engaged their attention and helped them apply their knowledge. Most students reported playing the game to study, prepare for the exam and/or increase their learning of the material. Those who played the game scored higher on character evidence questions on an exam than those who didn't. While students had many helpful suggestions for improving the game, 85 percent recommended that it be used for future courses.
Improving Computer Science I Clay Shields & Mark Maloof, Computer Science	To use new technologies to continue to provide individual attention to students despite a rise in enrollment in an introductory Computer Science class.	The PIs found that adding interactive and experiential material to the classroom helped learning and increased student satisfaction. The faculty themselves gained significant individual technical skills for various types of online lecture preparation. These have been proven to be useful already for other classes, e.g. for rapid preparation of material for online use during snow days. The PIs report that they had to raise the curve because the exam scores improved based on their treatment.

Table 4: Ongoing Projects

PROJECT	GOAL	SUCCESSES
LING001 – Introduction to Language Jeffrey Connor-Linton, Linguistics	To create online learning materials that would move some knowledge-building activities out of the classroom, thereby decreasing the amount of teacher-fronted lecture and freeing up in-class time for interactive classroom activities involving practical applications of content.	Preliminary analysis indicates that students find the online materials interesting, engaging, and a valuable supplement to the textbook, but that the materials' connection to what happens in the classroom was not clear. Along similar lines, instructors noted that students who had completed the online modules often knew the content well enough to ask relatively sophisticated questions about it, but that they did not have enough confidence in their learning to participate in the planned expansion and enrichment activities. As a result, class time was spent reviewing material previously covered online.
Toward a Partial Hybrid Curriculum for Spanish Lower Level Courses Ronald Leow, Spanish and Portuguese	To establish a partial hybrid curriculum to shift the formal classroom-based presentation of several problematic grammatical points in Spanish to an online component (including a game) that will provide students the opportunity to process these points at a deeper level outside the classroom setting.	The results revealed that both treatment and control groups significantly improved on both the immediate and delayed (2 weeks later) post-tests when compared to the pre-test. The results also revealed that the treatment group performed significantly better than the control group on the delayed post-tests for both written and oral production assessment tasks and on the immediate post-test for the written production assessment task.
ISIM Online Susan Martin, Institute for the Study of International Migration	To test the applicability of online education to the needs of mid-career professional students interested in international migration in order to ultimately deliver a fully online version of Global Trends in International Migration.	The course has not yet been offered. The faculty PI comments that there is so far a positive return on time investment because in continuing to teach the in-person version of the course she has made significant changes in the readings, lectures, and discussion questions based on the preparations for the online version.
Multifunctional, Scalable Application of Educational Technology to the Teaching of a Core Health Sciences Discipline Adam Myers, Medicine	To design, implement, and evaluate, for the Physiology content of several courses now delivered mainly by lecture, a more active learning curriculum, through a combination of technological enhancements, online experiences, and flipped learning exercises.	Preliminary data analysis show widespread acceptance by students of technological enhancements online and classroom flipped learning. Based on student enthusiasm and use of the practice tests on Blackboard, the project is being adapted for other courses and for other areas of Physiology. Short lecture captures, while appreciated by students, are used less; they tend to view the ones that deal with more difficult concepts.
Using the OLI Platform to Develop Online Materials to Support Teaching Quantitative Methods (Statistics) in International Politics Parina Patel, SFS & Oded Meyer, Mathematics	To design and develop online learning modules for use in TA-led labs. The interactive, self-paced modules are designed to reinforce the lecture material and fundamental statistical ideas in the context of real political science data and engage students in hands-on activities where they can reflect on and test their own knowledge.	The results from the controlled study indicate preliminary, although not statistically significant, positive results for using the Open Learning Initiatives (OLI) modules. No differences were found in the average quiz scores among groups separated by other potentially relevant factors (e.g. majors, prior stats classes). Although these results did not show statistically significant differences among the treatment and control group, the instructors found that students' positive opinion of the project supports the pedagogical effectiveness of the modules.

CHALLENGES	RECOMMENDATION
One challenge was a large amount of student pushback, not centered on Open Learning Initiative (OLI) or other flipped materials, but on the general teaching approach and other related class activities. Student feedback in both the Mid-Semester Group Feedback session and the end-of-course evaluation indicated a strong preference for more explanation, particularly more in-class explanation from the teacher.	Results from this project suggest that flipping can help English language learning. We recommend that the university develop more cost-effective ways of supporting faculty who want to flip parts of their content.
Designing an engaging, "fun" game with graduate-level content was a major challenge of the project. Other challenges include the amount of support and resources needed to create the game itself.	This project was successful at proof of concept for game-playing to improve student learning. It is already serving as a model (both pedagogically and technologically) for subsequent game-playing projects in other disciplines through the ITEL faculty cohort on games and simulations.
The major challenge for this project was that the faculty of the department voted to change the computer language used in instruction, making much of the already developed lectures immediately obsolete for the intended purpose. This was originally intended to be a 2-year project, but was ended after one year.	Since this project suggests a positive impact on student learning from "flipping," components of what was learned from this project should be incorporated into designing and supporting future flipping projects.

CHALLENGES	RECOMMENDATION
The steep learning curve of the technological tools led faculty designers to pay less attention to integrating online and face-to-face components of the new materials, which caused students as well as instructors to see them as disconnected and of unclear relevance to the course more broadly. The project plans to address these challenges in its second year.	Ongoing
It was challenging to create a game from scratch that fulfilled the desire to present learning content within engaging, graphically compelling games. Specific challenges included the need for the faculty member to be able to edit the game actions and the content at will; the need for timestamped accounts of every user action for generating reports; and the need to present very specific prompts, as well as embedded self-assessments, within the game.	Ongoing
Significant time investment and development resources were major challenges. Because this course will be offered world-wide, the principal challenge is delivering content effectively while using a very low baseline for expectations of access to technology and the internet on the part of students.	Ongoing
A major challenge for this project was its significant time investment and the need for development resources.	Ongoing
A major challenge was that the TA-led labs were unable to complete all material in the time allotted, and therefore the TA had to take a great deal of material from the OLI and present it in the form of slides to students in the control group. This could possibly explain why there was not a statistically significant difference between the treatment and control groups.	Ongoing

ITEL TIMELINE

DECEMBER 2012
ITEL ANNOUNCED

MAY 2013
ROUND 1

SEPTEMBER 2013
Globalization's Winners and Losers: Challenges for Developed and Developing Countries

DECEMBER 2013
ROUND 2

APRIL 2014
Introduction to Bioethics

MAY 2014
ROUND 3

JUNE 2014
Genomic Medicine Gets Personal

OCTOBER 2014
Terrorism and Counterterrorism

Globalization's Winners and Losers: Challenges for Developed and Developing Countries

The Divine Comedy: Dante's Journey to Freedom, Part 1

DECEMBER 2014
ROUND 4

FEBRUARY 2015
The Divine Comedy: Dante's Journey to Freedom, Part 2

AP Introductory Calculus-Based Physics: Electricity and Magnetism

APRIL 2015
The Divine Comedy: Dante's Journey to Freedom, Part 3

MAY 2015
ROUND 5

DECEMBER 2015
ROUND 6

ABOUT CNDLS

Since 2000, the Center for New Designs in Learning and Scholarship (CNDLS) has supported faculty and graduate students with tools, resources, and opportunities for new learning environments. We began with a mission to bridge a historic gulf between pedagogy and technological advances, and today CNDLS integrates a teaching and learning center with the latest educational technology. Our team of experienced educators facilitates a broad-based program that promotes discovery, engagement, and diversity in an ever-expanding conception of learning.

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