

Math Impact Grant Project Plan

5/30/2013

Faculty Programs Team; Math Impact Grant

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Executive Summary

The Math Impact Grant project is to improve the quality of the large lectures for Math 151.01 and Math 152.01. We plan use technologies such as Sympodium, lecture capture software, visualization applets, and an audience response system as tools in a restructured instruction format. The goals are to increase student engagement by making the lectures more visually appealing, easier to access, and more interactive. Further, videos lectures will be available to students online, allowing students to review solutions to pertinent problems while studying and doing homework. This will facilitate anytime/anyplace learning.

Faculty efficiency will be increased by creating Sympodium slides which can be used in future quarters and by creating a process by which the use of these technologies can easily be taught to new instructors each quarter. These technologies will be supported in such a way to transform the instructional culture and instructor self-efficacy while not imposing an additional workload, as defined as time overcoming technology obstacles.

An assessment plan will show whether these technologies improve the student experience, the instructor experience, and the learning outcomes. During the Autumn 2010 pilot, we will teach at least two technology enhanced sections and at least two regular sessions of Math 151.01 so we can compare the results. These technology enhanced sections will be taught within the coordinated framework of 151.01 and 152.01 sections.

Problem / Opportunity

Calculus is required for a large number of students, and it is traditionally a very difficult course. Most of the calculus lectures incorporate chalkboard or overhead transparencies. Using technology in lecture will improve the student experience by affording interactivity and engagement.

It can be difficult for students to see and hear from the back of the room when a lecture is being given using a chalkboard. Traditional PowerPoint presentations will not work for mathematics because the instructor needs to be able to write the mathematics while explaining it. This problem could be solved by teaching calculus lectures with a Sympodium.

Students often come out of the traditional calculus class with less conceptual understanding than is desired. Using interactive computer images during lecture could aid students in being able to visualize the concepts. This would help students to be able to think through new problems themselves rather than only attempting to mimic instructor solutions.

Because mathematics is so detailed, and calculus is such a complex subject, it is often impossible for students to take in all the nuances of how an instructor explains a problem and take notes to remember all these nuances while seeing the problem only once in lecture. To help solve this problem, we propose providing partial outlines of the lectures to students before class (to cut down on what the students need to write) and putting lecture capture videos of the lectures online. This way, students could review solutions while attempting their homework. These videos would provide a new pathway for students to learn the material. Also, it is currently very difficult for students who miss a class to catch up because the class moves so quickly. Videos would also help these students.

It is difficult in a large lecture to tell if the students understand what is being presented. It is also difficult for students to pay attention for 48 minutes without any type of active participation. We hope to solve both these problems by making the lectures more interactive, while also providing feedback to both instructors and students about what students do and do not understand. We will explore student response systems which will accomplish the intended interactivity.

Project Goal(s)

The main goal of this project is to improve the student experience in the large lectures of Math 151.01 and Math 152.01. To accomplish this, we expect:

- Increased student satisfaction with lectures.
- Increased student learning from lectures.
- Improved communication/feedback between the instructor and the students without placing an undue burden on the instructor.
- Lectures to be more engaging, interactive, and easier to see and hear.
- Students to be able to access lecture details while doing homework or studying for exams.

Project Objectives

At the end of this project, we will have:

- A new instructor training structure (including video) that does not provide additional burden on instructors. (Burden is defined as time overcoming learning the technology.)
- Sympodium slides for all lectures of Math 151.01 and Math 152.01, editable to fit individual lecture styles.
- Lecture slides that include interactive visualization tools and a student feedback system.
- Screen-capture recordings available online of all the lectures of 151.01 and 152.01 taught by both AU10 instructors.
- A system in place for new instructors to easily create their own lecture-capture videos and place online.

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In-Scope

This project involves using technology to better present calculus lectures in Math 151.01 and Math 152.01. The goals are to make lectures more engaging, to increase student/instructor interaction through technology, to scaffold student note-taking in lecture, and to allow students to revisit the lecture after it is over through lecture-capture videos posted online and access to interactive visualization tools. In particular, this project includes creating lecture slides, creating or obtaining interactive applets, creating or obtaining feedback questions, and creating lecture-capture videos, and packaging these items so they are easily used in the course. It also includes creating a system to train new lecturers in teaching calculus with these technologies, and assessing the impact of these technologies.

Out-of-Scope

This project does not include changes in recitations, course content, course assessments, homework assignments (including online assignments), course management systems, or any other courses other than Math 151.01 and Math 152.01. This project does not include semester conversion concerns. Further LT support for implementation does not occur into Winter 2011.

Success Criteria

The minimum required for this project to be considered a success is that:

1. the students are more satisfied with their experience in the course
 - a. as measured by a student survey asking whether the lectures were engaging, easy to see and hear, whether they enjoyed using the clickers, whether they feel the clickers helped them understand the material, whether they feel the lecture presentation technology helped them better understand the material, etc.
2. the instructors do not find this course more difficult to teach than the standard course
 - a. this includes time spent on the course as well as attitudes about the technology
3. the students learn at least as much as they would learn in the standard course.
 - a. as measured by final course grades

That said, we fully expect that:

4. the students will have a better conceptual understanding of the material after the technology enhanced course.
5. the students will be able to perform better in future courses which heavily use calculus.
6. this course will be easier for instructors to teach than the standard course (after the initial pilot) because the materials are already prepared for them.

As long as the total gains (in student satisfaction, instructor satisfaction, and student learning) are enough to justify the continued cost of the technology coordinator, the technology enhanced lectures would be considered a success.

These criteria will be measured through student surveys, instructor surveys, comparing student class grades to control sessions of 151.01 and 152.01, and comparing student performance in future math classes with students in control sessions of 151.01 and 152.01.

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Project Assumptions

This project assumes that we will be able to get 2 classes of Math 151.01 scheduled in EA 160 or 170 during AU10 and 2 classes of Math 152.01 scheduled in EA 160 or EA 170 during W111. It assumes that Elizabeth Miller will be assigned to teach 152.01 in one of these rooms during SP10, 151.01 in one of these rooms in AU10, and 152.01 in one of these during W111. It also assumes that Dr. Ian Leary will be assigned to teach 151.01 in one of these rooms during AU10 and 152.01 in one of these rooms during W111.

This project also assumes that sufficient numbers of Interactive Calculus Visualization tools which are textbook independent will be able to be found online, purchased, or otherwise obtained. It assumes that Camtasia will be able to be installed in EA 160 and EA 170 and maintained by OIT, and that the Symposium units in these two rooms will continue to operate correctly.

Continuation of this project beyond the grant period assumes that two sections of each of these classes will be able to be scheduled in these rooms each quarter, that a suitable technology coordinator can be hired, and that this project is deemed a success by the departmental Undergraduate Committee. It also assumes that the content in these courses will not change significantly in the near future or in regard to the conversion to semesters.

Projects Risks

Risk Description	How Likely 1=low 2=med 3=high	Impact 1=low 2=med 3=high	Score likely x impact	Mitigation
Symposium not working	1	3	3	1. Identify common issues with the equipment for training 2. Training video 3. Self-help sheet 4. Person to be on-hand for support
Student response system not working	2	2	4	1. Work with Andy Kuhar 2. Talk to heavy customers (e.g., Bill Reay, physics dept. users)
Camtasia not working	1	2	2	1. Two lectures using it, so other lecture may be a back-up
OSU Streaming unable to post videos in a timely manner	1	2	2	1. Consult/communication with streaming server personnel
Math unable to upload videos in a timely manner	1	2	2	1. Hire TA to oversee saving, uploading process
Elizabeth Miller takes an extended leave	2	3	6	1. Identify alternate lead

Obstacles / Constraints

1. Math 151.01 and 152.01 uses Moodle.
2. Remain within the current coordination framework of Math 151.01 and Math 152.01.

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Schedule Considerations / Other Projects / Related Projects

LT

- Two other Impact Grant projects: Chemistry (led by Rob G) and EEOB (led by Gabe Moulton)
- Bridge: an online virtual community project led by Rob G.
- INNOVATE! Planning (mid April to mid May)

Math

- Ian Leary will not be available during Summer quarter.
 - Ian will be one of the instructors teaching during the pilot, and he needs to be able to look over the instructional material for the Math 151.01 pilot and be sure that he is comfortable with them and be trained on how to use the technology before he leaves for the summer.
- Elizabeth Miller will be busy with the Bridge Program (transition from HS to College program for minority students) from Aug 23-Sept 17.

Project Milestones and Major Deliverables

Milestone/Deliverable	Target Week	Responsible	M/D
Student Feedback System Chosen	March 5	Elizabeth Miller, LT	D
Unadorned 151.01 Symposium Slides Reviewed/Edited	March 5	Elizabeth Miller	M
Unadorned 151.01 Symposium Slides Reviewed/Edited	March 29	Ian Leary	M
Survey finalized	April 16	Darry Andrews	D
Interactive Visuals Chosen for 151.01	April 23	Eric Conrad	D
Interactive Visuals Incorporated into 151.01 Slides	May 14	Eric Conrad	D
Assessment submitted for IRB exemption	May 28	Darry Andrews	D
Training video storyboard, <i>including mechanics and best practices</i>	June 1	Conrad, Cindy Gray	D
Camtasia installed in EA 160 and 170, instructors trained	June 4	Elizabeth Miller, LT	M
Final 151.01 Slides Reviewed/Approved	June 11	Leary/Miller	M
Unadorned 152.01 Symposium Slides Reviewed/Edited	June 11	Elizabeth Miller	M
Training video initial draft shot	June 25	Conrad, Cindy Gray	D
Interactive Visuals Chosen for 152.01	July 30	Eric Conrad	D
Unadorned 152.01 Symposium Slides Reviewed/Edited	Aug 1	Ian Leary	M
Website Created for Posting Videos, Outlines, PDFs	Aug 1	TBD, solution dependent	D
Interactive Visuals Incorporated into 152.01 Slides	Aug 20	Eric Conrad	D
151.01 Student Outlines placed online	Aug 20	Elizabeth Miller	D
Final 152.01 Slides Reviewed/Approved	Nov 1	Leary/Miller	M
152.01 Student Outlines placed online	Dec 1	Elizabeth Miller	D
Lecture Capture Videos for 151.01	AU 2010	Math instructors	D

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Document outcomes	Dec. 27	Miller, Rob Griffiths	D
Transition from LT personnel and financial support to self supporting model	Dec 27	Miller, LT	M
---end of support---			
Lecture Capture Videos for 152.01	WI 2011	Math Instructors	D

Project Resource Summary

- Staff Release time for Dr. Darry Andrews: \$3000 (MSLC)
- Staff Release time for Elizabeth Miller: \$6000 (MSLC)
- Staff Release time for Dr. Eric Conrad: \$5000 (Math Dept)
- Faculty Release time for Dr. Ian Leary: \$5000 (Math Dept)
- Provide Symposium for Instructor Training/Practice in CH 240: \$1500 (MSLC)
- Math/Technology Support (might include Technology Coordinator pay during Autumn 2010): \$2300

- Development of Student Feedback System and purchase of needed technology: \$5000 (grant funds)
- Purchasing Camtasia licenses (5 licenses): \$750 (grant funds)
- Funds to purchase/develop interactive figures: \$2000 (grant funds)
- Funds to hire a graduate student to assist on the project (25% appointment for 2 quarters): \$6000 (grant funds)
- Purchase of Smart Notebook Math Software (5 licenses): \$750
- Incentive for students to participate in assessment: \$500

LT total: \$15,000

Math total: \$22,800