Mathematics Impact Grant Report

Project Committee

Math members; Project lead
   Elizabeth Miller, Slides, Pilot Instructor

Math members; Project contributors
   Ian Leary, Clicker Questions, Pilot Instructor
   Darry Andrews, Assessment
   Herb Clemens, Department Liaison
   Eric Conrad, Interactive Figures Advice
   John Heimaster, Technology Consultant
   John Lankals, Technology Consultant
   Jim Fowler, Programming of OSU Math Clicker
   Jesse Parsons, Programming of Interactive Figures
   Sean McNash, Student Helper, Videos

Executive Summary

The Mathematics Impact Grant project restructured the instruction format for two sections of Math 151.01 and Math 152.01. Using the SMART Podium, Camtasia (screen recording software), visualization applets, and a homegrown audience response system, the team was able to increase student engagement and create easier to access, more interactive course activities. Further, the team afforded students anytime/anyplace opportunities to review lecture materials. Findings included students agreeing or strongly agreeing that they preferred the technology-enhanced experience to traditional lecture, they felt the use of technology afforded better calculus understanding, and they have a favorable opinion of the department due to the course experience. Further, there was more time spent looking at supplementary resources, were fewer student “drops,” and best of all, the exam scores were highly ranked compared to control 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. Teaching calculus lectures with a SMART Podium could solve this problem.

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 that 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.
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 that 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.

2010 Impact Grant Pilot Experience

Students affected by pilot:

There were two lecture sections involved in the pilot. One had 120 students and the other had 121 students so there were 241 student directly enrolled in the pilot section. There were 1,599 students who had access to the lecture notes, videos, and interactive figures. The majority of these students were enrolled in non-pilot sections of the same course. Current 151.01 and 152.01 students also have access to the videos, notes, and interactive figures created during the pilot and future students will as well.
Anticipated number of students affected by new course design in 2011:
We are teaching two pilot lecture sections of calculus II (Math 152.01) during WI11. These are each 180-student lectures. We are also tentatively planning to teach two lecture sections of 151.01 using the technology in Autumn 2011.

Approximate time spent by Mathematics faculty and staff on the revision project:

<table>
<thead>
<tr>
<th>Team Member</th>
<th>Approximate Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elizabeth Miller</td>
<td>350</td>
</tr>
<tr>
<td>Ian Leary</td>
<td>100</td>
</tr>
<tr>
<td>Darry Andrews</td>
<td>75</td>
</tr>
<tr>
<td>Herb Clemens</td>
<td>20</td>
</tr>
<tr>
<td>Eric Conrad</td>
<td>20</td>
</tr>
<tr>
<td>John Heimaster</td>
<td>10</td>
</tr>
<tr>
<td>John Lankals</td>
<td>10</td>
</tr>
<tr>
<td>Jim Fowler</td>
<td>26</td>
</tr>
<tr>
<td>Jesse Parsons</td>
<td>55.2</td>
</tr>
<tr>
<td>Sean McNash</td>
<td>107.5</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>773.7</strong></td>
</tr>
</tbody>
</table>

Approximate total cost (not including LT staff time):

<table>
<thead>
<tr>
<th>Resource</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff Release Time for Elizabeth Miller</td>
<td>$7,000</td>
</tr>
<tr>
<td>Staff Release Time for Dr. Darry Andrews</td>
<td>$2,000</td>
</tr>
<tr>
<td>Faculty Release Time for Dr. Ian Leary</td>
<td>$6,000</td>
</tr>
<tr>
<td>Symposium for CH 240 (1/2 of cost)</td>
<td>$1,690</td>
</tr>
<tr>
<td>Development of Clickers (Jim Fowler)</td>
<td>$836.64</td>
</tr>
<tr>
<td>Camtasia Licenses</td>
<td>$358.00</td>
</tr>
<tr>
<td>Interactive Figure Development (Jesse Parsons)</td>
<td>$612.29</td>
</tr>
<tr>
<td>Smart Notebook Math Software</td>
<td>$300</td>
</tr>
<tr>
<td>Student Raffle Incentive (Gift Cards)</td>
<td>$600</td>
</tr>
<tr>
<td>TA assistance for Elizabeth Miller during AU10</td>
<td>$9,812</td>
</tr>
<tr>
<td>Supplies (USB-drives, etc.)</td>
<td>$24.52</td>
</tr>
<tr>
<td>Student Helper for Videos and Clerical Help</td>
<td>$930.54</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$30,188.99</strong></td>
</tr>
</tbody>
</table>

Impact Grant outcome summary:

- 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. During the pilot, technology was used in the lecture to improve the student experience by increasing 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 do not work for mathematics because the instructor needs to be able to write the mathematics while explaining it. We addressed this problem during the pilot by teaching with the SMART Podium, which allows users to write on computer slides with digital ink.

• Students often complete the traditional calculus class with less conceptual understanding than is desired. Interactive figures were used during lecture to aid students’ visualization of the concepts. We believe these helped 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 provided partial outlines of the lectures to students before class (to cut down on what the students need to write). We also posted lecture notes (which included the instructors in class writing) online after class. Additionally, we posted lecture capture videos of the lectures online after class. This way, students were able to review the solutions while attempting their homework. These videos also provided a new pathway for students to learn the material.

• Historically, it is very difficult for students who miss a class to catch up because the class moves so quickly. Videos also helped these students catch up.

• In a large lecture, it is challenging to tell if the students understand what is being presented. Studies have shown that it is also difficult for students to pay attention for 48 minutes without any type of active participation. We attempted to solve both these problems by using clicker warm-up questions at the beginning of each lecture. The goal was to make the lectures more interactive, while also providing feedback to both instructors and students about what students do and do not understand.

Assessment highlights:
There are mid-quarter survey results and end of quarter survey results for each lecture.

• Table 1 shows a sampling of comments from the surveys.
• Table 2 shows a few of the questions for the end of quarter survey with results from both classes.
• Table 3 provides data demonstrating how often the online resources that were created during the pilot were used.
Complete survey results are on the archive page Web site.

**Table 1**: A Sample of Comments from Students

- There is nothing the chalkboard can do better than the Sympodium, especially in terms of understanding. The Sympodium is a great tool and I think every class should use it.
- **LOVE IT!**
- Online lecture note was really helpful for me, an international student who is not familiar with English yet.
- Although the whole lecture video and notes are online, I still think go to lecture is necessary. Because the class' atmosphere is really helpful. Or if I have some questions I can ask professor directly.
- It was too difficult to respond to the [clicker] questions so I stopped. I didn't really like the twitter question and to be honest it rarely helped.
- I would recommend and take another technology enhanced math class in a heart beat.
- MUCH easier to see... the colors are awesome and REALLY help when looking back over the material in my own time
- The videos and notes online are EXTREMELY helpful and should be available to all math classes.
- I absolutely LOVED the online lecture videos. They were such a huge help. I unfortunately am retaking this class this quarter (I didn't do well last year)... and take it from someone who has taken Math 151 in both formats.... THIS IS SO MUCH BETTER. It was sooooo helpful to have the exact lecture on my computer. Having access to the other class's lecture was nice too because teachers have different ways of explaining so sometimes in order to grasp a subject, one would explain more clearly than the other.
Table 2: End of Quarter Student Survey Results

- For my next math course, if I was given the choice, I would choose to take the technology-enhanced section.

- Overall, the technology allowed me to better understand calculus.

- I have a favorable opinion of the OSU math department after taking this math course.
**Table 3:** Total and Average Access Rate for Online Resources

<table>
<thead>
<tr>
<th>Resource Type</th>
<th>Total Number of Uses for each Type of Resource</th>
<th>Average Number of Uses Per Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture Outlines</td>
<td>2134</td>
<td>73.59</td>
</tr>
<tr>
<td>Lecture Outlines for Whole Quarter in 1 pdf</td>
<td>114</td>
<td>114</td>
</tr>
<tr>
<td>Interactive Figures</td>
<td>672</td>
<td>20.36</td>
</tr>
<tr>
<td>Lecture Notes – Miller</td>
<td>5190</td>
<td>162.19</td>
</tr>
<tr>
<td>Lecture Notes – Leary</td>
<td>1617</td>
<td>50.53</td>
</tr>
<tr>
<td>Lecture Videos – Miller</td>
<td>2053</td>
<td>64.16</td>
</tr>
<tr>
<td>Lecture Videos - Leary</td>
<td>425</td>
<td>17</td>
</tr>
<tr>
<td>All Resource Links</td>
<td>12935</td>
<td>65</td>
</tr>
</tbody>
</table>

**Data comparison from control or previous course:**

- **Table 4** gives data for the exam scores and final grade point average for the pilot sections versus the overall average.

<table>
<thead>
<tr>
<th>Exam</th>
<th>Miller’s Median</th>
<th>Miller’s Average</th>
<th>Leary’s Median</th>
<th>Leary’s Average</th>
<th>Course Median</th>
<th>Course Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam 1</td>
<td>66</td>
<td>64.08</td>
<td>77</td>
<td>72.49</td>
<td>70</td>
<td>66.78</td>
</tr>
<tr>
<td>Exam 2</td>
<td>93</td>
<td>85.97</td>
<td>80</td>
<td>77.43</td>
<td>85</td>
<td>80.17</td>
</tr>
<tr>
<td>Exam 3</td>
<td>77</td>
<td>77.14</td>
<td>74</td>
<td>72</td>
<td>76</td>
<td>73.62</td>
</tr>
<tr>
<td>Final Exam</td>
<td>124</td>
<td>124.53</td>
<td>129</td>
<td>123.31</td>
<td>125</td>
<td>123.76</td>
</tr>
<tr>
<td>Final Grade Point Average</td>
<td>B-/C+</td>
<td>2.16</td>
<td>B-</td>
<td>2.071</td>
<td>B-</td>
<td>2.079</td>
</tr>
</tbody>
</table>

In ranking grade outcomes, it is perhaps appropriate to leave aside the lecture sections taught by the course coordinator who prepares the exams. If we do that, then the pilot sections ranked first and third in grade point average out of the seven remaining lecture sections of 151.01 taught during Autumn 2010.

Attendance was not taken in this class in any sections, but attendance in the pilot lecture sections was normal or better than normal based on the judgment of the instructors.

- **Table 5** shows the average number of students who dropped out of recitation sections for the pilot sections and overall for Math 151.01.
Pilot sections had fewer students who dropped than other sections. This is especially significant since previous studies have shown that most students who drop from a section of Math 151.01 move to another section of Math 151.01. This is even true when we only look at students who dropped after classes started. These are students who could have sections because of the type of instruction.

<table>
<thead>
<tr>
<th>Table 5: Average Number of Students who Dropped a Recitation Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Drops per</td>
</tr>
<tr>
<td>Recitation</td>
</tr>
<tr>
<td>Pilot</td>
</tr>
<tr>
<td>All Sections</td>
</tr>
</tbody>
</table>

It is likely that data acquired from the 152.01 pilot currently occurring during Winter 2011 will be even more meaningful for a variety of reasons. First, we had difficulty getting the technology to work for the first 2/3 of the quarter until the computers were replaced. This had an impact on all aspects of the pilot, but would especially impact student satisfaction and instructor satisfaction with the experience. So far, during winter quarter, we have had virtually no problem with the technology at all. Also, in Math 152.01, the exams are graded in common across all sections so exam grade data will be more accurate, without the variable of the individual graders. Lastly, we will be able to compare four groups of students at the end of winter quarter: those who were in the pilot both quarters, those who were in the pilot for the first quarter but not the second, those who were in the pilot for the second quarter but not the first, and those who were always in the standard section.

Reflections on the grant process – what went well:

- Becoming involved in the grant process really helped structure our project, gave us a timeline, and helped define responsibilities. Having to produce the grant application and the project plan was one of the best aspects of the grant. It made sure everyone was on the same page.

- Also, having someone external to the department invested in the project gave the project more visibility and credibility within the department, which helped it to succeed.

- It was extremely helpful and important to the success of this project that we were able to get advice about which technologies to use, how to implement them, and how to address problems with the technology. When we applied for this project, I had a pretty clear idea in my head of what I wanted to do technology-wise, and I didn’t think this aspect of the grant would be that useful. It turned out that actually implementing the ideas all at the same time turned out to be technically challenging and I was extremely grateful for this support.
• The students seemed to be really excited about most aspects of the project. This was reflected in the survey responses, but it was also reflected in the number of emails and face-to-face comments I received by students who went out of their way to tell me how much they enjoyed it, how much it helped them, and who just wanted to express gratitude for the technology enhancements. Students also asked to be able to take the technology course or use the technology resources the following quarter,

• It was really nice to be able to find out about assistance that was available from learning technologies or class rooms services that I would never have known about without going through the grant process. For example, I did not know that anyone could ask for a technology consultant to come to their class for the first week and make sure that the instructor didn’t have any problems with the technology.

• By the end of the year, we had acquired the technology resources and expertise and the course materials that we needed to be able to offer the technology enhanced versions of Math 151.01 and 152.01 without the course instructor having a heavier burden than for teaching a normal course. This was one of the main goals of the project and I wasn’t sure until December that we were going to be able to accomplish this for sure, but we did.

• It was an extremely good idea to create documents for instructors explaining how to use the various pieces of technology and how to teach in the way envisioned in the pilot. We learned a lot while writing these documents that we were able to address before we began the actual pilot, and the documents have been extremely useful to the instructors. They have also been useful for other department members who have taken an interest in the technology because of what we are doing. It will also be a necessary component of the transition to new instructors teaching the technology-enhanced version of the course. I would recommend that creating documents like these be a required part of the impact grant project.

• The successful creation of lecture videos as part of this pilot inspired the math department administration to have more confidence in technology for teaching and to look into using technology in other ways to help with the department’s teaching mission. In particular, the administration is proposing the idea of creating and offering an online version of this course in the future. This is exciting because it is demonstrating a shift the in culture of the department to be more willing to endorse teaching with technology.
Reflections on the grant process – what did not go well:

• The biggest problem, by far, was that the presenter computer in the EA 170 lecture hall was not working correctly. We spent a lot of time over the summer making sure that all the programs we needed could run together and work well on that computer. Then the computer was reimaged right before the quarter started and nothing seemed to work right after that. Even though we reported numerous times that the computer was running significantly slower than it did during testing, it took until more than half-way through the quarter for IT support to try replacing the computer. It seems like it should be standard operating procedure for classrooms like this (where it is nearly impossible for IT support to get access to the machine in the classroom) to set up a replacement machine and test it and then swap out the machine which is not working correctly instead of taking months to troubleshoot the machine in the classroom.

• We also had a problem with media streaming services during our pilot. We met with the Assistant Manager multiple times before the pilot began to make sure we understood the best way to produce and submit videos and to come to an agreement as to the best way for those videos to be processed. We also sent over a test video to make sure that the settings were in place and worked, which processed correctly. Then, when the quarter of the pilot began, the videos were not being processed correctly and it took weeks for the settings to get corrected. Multiple videos had to be re-submitted for processing mid-way through the quarter.

• When we were making the instructions for instructors on using the technology, no one in our department had any expertise on using Camtasia so we decided to use some of the hours of Learning Technology expertise provided in the grant to have those instructions written. They were written by an LT student helper, but never checked by a staff member. We were implementing these instructions for weeks during the pilot before we found out that these instructions did not reflect the best way to be using Camtasia for our needs and were actually causing us problems.

• Creating the IRB application was much more of a headache than we anticipated. It took a lot of time on our part to become familiar with the IRB application process in order to write the application.
Suggestions for future recipients:
Be sure to explain to groups at the beginning about the IRB process. This requires an upfront explanation of the work and timeline involved, which is especially important for people who are not in the social sciences and who are likely to have never created an IRB application before.

Receive assistance in creating the IRB application. The LT staff seemed very familiar with this process and it would have been helpful to have them create the timeline, hand us the specific steps that needed completed, and given suggestions and advice for each step. I do think it is important to encourage future groups to get IRB approval, but there is much that could have been done to make this a less stressful experience.

Ah-ha moment of the grant process:
We had so many “ah-ha” moments that it is difficult to pick just one. We learned a lot through this process. One that sticks out is when we figured out that we needed to replace the video card in the presentation machine so that it could run SMART Notebook and Camtasia at the same time.

Next steps:
This winter we are piloting the same technologies in the second course of the calculus sequence, 152.01. It is going really well. We have had no major technological issues. The only change we made was to set up the clicker questions to be able to be answered from regular text messaging. This has greatly increased the response rate on the clicker questions so far this quarter.

We will compare four groups of students at the end of winter quarter (WI 11): those who were in the pilot both quarters, those who were in the pilot for the first quarter but not the second, those who were in the pilot for the second quarter but not the first, and those who were always in the standard section.

We are not currently planning on running the technology-enhanced sections of 151.01 or 152.01 next quarter. We are hoping to run the sequence again next autumn and winter with new instructors. Before we do that, we will have to present the results of this year’s pilots to the department and get approval.

Working with LT staff:
In three words:
1. Motivating
2. Educational
3. Helpful
Evaluation of working with LT staff during the grant project (Strong Agree to Strongly Disagree):

1) I am satisfied with the communication I received from the LT staff.  
   a. Agree
2) I am satisfied with the project contributions I received from the LT staff.  
   a. Agree
3) I have learned the skills necessary to continue related work on my own.  
   a. Agree
4) I found the LT staff approachable.  
   a. Strongly Agree
5) The lessons learned during this pilot will guide future course design.  
   a. Strongly Agree
6) Additional comments or feedback

The LT staff, especially Rob Griffiths, did an excellent job. This pilot was just extremely frustrating because the technology was not working the way that it had during testing, and it took an extremely long time to get the computers in the lecture hall fixed. The eventual solution was to replace the machines, which could have been tried much, much earlier. Now that the computers have been replaced, everything is going extremely smoothly.

Communication was also an issue. Communication with the LT staff was excellent, but communication from the IT people working on the computers to our group was sporadic and frustrating.

I would like to comment on the scalability of this project. The original idea with the math department for a technology-enhanced lecture was to create a lecture that could be taught in HI 131 or IH 100 to a large number of students (500). This could be done with the technology as it was used in this pilot. The two large rooms, IH 100 and HI 131, already contain Smart Podiums, but the computers in there would have to be updated with the needed software and a new video card.

Chair Statement of Impact

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January 28, 2011

To Whom It May Concern:

I am writing as to express our department's gratitude for the OSU technology 'Impact' grant that we received in early 2010 and to convey my extreme satisfaction with the outcome of its application to the development of a technologically enhanced large-lecture version of our flagship calculus sequence Math 151-52. As part of its strategic plan presented to, and approved by, OSU higher administration in 2008, the Department pledged to pilot technologically enhanced large-lecture sections of the calculus, with the idea of not only improving the quality of lecture presentation and student retention, but also developing a format that could be delivered very effectively to very large classes, thereby enabling us to get our best senior faculty in front of the massive numbers of students in our flagship introductory sequence. We struggled for over a year, considering options, researching what is done elsewhere, reviewing new technologies, etc., to find a viable way to realize our pledge. The Impact Grant and the OSU technical support that came along with it gave us just the right push, on just the right scale, to finally get the job done and produce a viable pilot course. That push and the dedication and talent of project director Elizabeth Miller of our Mathematical Sciences Learning Center, and the team that worked with her, I am happy to report, produced outstanding results!

Briefly, in the pilot course, the lectures are presented using a SMART Podium (where the lecturer writes on pre-prepared slides using digital ink) and include interactive figures specifically created or edited to support these slides. These interactive figures, as well as lecture outlines, lecture notes, and lecture videos are made available to the students online after each lecture. Each lecture also begins with a warm-up 'instant response' question which reviews the material from the previous lecture. The students can respond to these multiple choice questions via the web or by text messaging through a program called OSU Math Clicker (created especially for this project).

As Professor Ian Leary who has taught one of the pilot sections developed under the grant has said, "I think that in 10 years, many lecturers will be writing on touch-sensitive pads like the Symposium, with their writing projected on to a screen, rather than blackboards. I think that the students appreciate being able to look back
at the material covered in lectures using either (a) the slides as I had finished writing on them or (b) the video (consisting of a picture of the screen and my voice-over)."

Of course, in the early days of the pilot, there were difficulties. The technology did not always work properly. Our lecturers took a while to adapt to the technology, and to effectively exploit the possibilities and advantages it offered. However even with these difficulties, which were not fully worked out until the first quarter of the pilot was more than half over, the pilot sections tested slightly better that our traditional sections and student satisfaction with the course was very significantly improved. Also, our lecturers report that demands on their time and energies are now down to a point roughly comparable to those involved in teaching a traditional section of the same size.

The Department will not only continue the pilot in future years; we will work toward making Professor Leary's 10 year estimate not only happen, but happen within a significantly smaller time-span.

Sincerely yours,

[Signature]

Luis Casian
Chair, Mathematics Department
LT Involvement

LT Project lead
Robert Griffiths

Approximate time spent by LT staff on the revision project:
160 hours

Reflections on the grant process – what went well:
The single greatest point of success from this project stems from a very dedicated project team, a strong team lead, and commitment from departmental leaders. They had focus and energy to enhance the course and produce a better student experience. As noted above, there were some technology-related hurdles that had to be overcome, and I am confident that without the persistence and dedication from the mathematics team, the project may not have ended as successfully as it did.

Another factor of the strong leadership team was in the form of ownership of the process and project. The math team had a vision for each meeting, assigned team members to accomplish necessary tasks, and kept making forward progress between meetings. Every meeting we had with the team demonstrated accomplished tasks from the meeting before.

Finding internal (to Mathematics) expertise, in the form of programming the Math Clicker program, allowed for strong collaboration with colleagues and kept progress moving forward for affording interactivity with the students.

Finally, the math team members were excellent communicators regarding the positive and negative experiences they were having through the grant project process. It is tremendously helpful to know what is going well and what needs additional work in an ongoing basis to be the most effective collaborators we can be.

Other general processes that went well were having the Idea Labs with the Chemistry team so Math was able to learn from the IRB experience and expertise of Chemistry team members. The phased funding approach of the grant afforded an opportunity to concentrate on the project goals and objectives, as well as assessment in a meaningful way. Also, during the process, the Math team created how-to documentation for future instructors of the course. That how-to document became essential for our own classroom support colleagues to better know and understand the goals of the instructor’s technology use, which enhanced their support to all instructors using related technology.
Reflections on the grant process – what did not go well:

There were areas of improvement through this particular grant process. While involvement and dedication from the team were essential to the project’s success and the commitment afforded forward progress between each meeting, having so many team members involved during each meeting sometimes impeded decision making during the meeting. The process may have been more effective if team members had an opportunity to provide input after the charter had been completed but left some of the more minor decisions to a smaller project leadership team.

Another area of improvement could have come from determining more back-up choices or alternatives for how to deliver the content in the classroom, especially when the classroom computer was not handling the computing load as smoothly as expected from the instructors.

A lesson learned from our team was to help the recipients work through the official communication channels and procedures for making various requests so the recipients will build self-efficacy to resolve future problems on their own.

Finally, we could have done a better job to learn more about all the products being used in the pilot and investigating them to understand the resources they use and detect how they may work well, or not work well, when used simultaneously in our computing environments.

Generally, some additional lessons learned we gained from the grant process was to define DU blog post deadlines to enhance the transparency of our projects by having more regular posts. Also, we learned about communicating and setting-up instructor expectations about the technology being used and expectations how the instructor could mitigate potential problems. This, in turn, helped us to proactively inform all instructors using an Impact Grant project classroom to understand how all instructors are using the space in order to be sensitive to everyone’s uses and needs.

Working with the Mathematics team:

In three words:

1. Exciting
2. Encouraging
3. Passionate

Changes to OCIO processes from this grant experience:

As shared above, there were technology-related issues during the first half of Mathematics’ implementation phase (AU 10). The OCIO Learning Technology staff learned places where some of its defined processes were not able to quickly and efficiently react to instructor needs. Because of this grant project experience, OCIO processes have been updated and shared among employees so that future situations like what Math experienced in the EA classroom will be mitigated, and instructors can worry about teaching content and not whether technology will be working.