Preparing Future Faculty for the Assessment of Student Learning at Michigan State University

Student Learning Assessment: Where Graduate and Undergraduate Education Intersect!

Final Narrative Report – Council of Graduate Schools

I. YEAR-ONE NARRATIVE REPORT UPDATE

Only updates and/or changes (from the YR1 report) are provided in this section. Therefore, this report should be reviewed along with the report MSU submitted to CGS in November 2013. A comprehensive web site that will showcase all of our accomplishments during the project period (along with Appendices) will be ready for the MSU presentation at the CGS meeting in December 2014.

Staff and Personnel – NO UPDATES

Goals – UPDATES

Overall Project Goal & Accomplishments

The project goal of MSU’S PFF-AFL Initiative was use our institution’s considerable existing infrastructure that supports professional development of teaching excellence to move purposefully towards a more cohesive University approach to the assessment of student learning. Receiving this grant was particularly timely as MSU is preparing for our institutional reaccreditation in 2015-2016 (by the HLC-NCA).

We are pleased to say that our project goals were accomplished. Specifically we:

- Built a comprehensive database (social network analysis to be undertaken and presented at CGS meeting in Washington in December 2014) and mapped the depth and breadth of training being provided to graduate students and postdocs in our decentralized university context. Currently 1,152 graduate students (570 “stem”, 319 “humanities/social science”, and 263 “other”), 37 postdocs (35 “stem”, 2 “humanities/social science”) and 154 faculty and 9 staff have participated. We expect those numbers to grow in the months and years to come.

- Promoted and supported the work being undertaken by faculty, graduate students and postdocs across the institution as they redesign gateway courses.

- Partnered with faculty to develop digital resources for graduate students and postdocs as they start to utilize assessment strategies in their teaching practice now and in the future.

- Redesigned and strengthened MSU’s Teaching Assistant Program to emphasize the importance of assessment of student learning and backward design. These topics are now incorporated throughout all centrally-supported TA training at MSU.

- Identified, built, and facilitated a community of graduate student “assessment leaders” who promote the importance of student learning outcomes assessment to their colleagues, and serve as peer instructors on various student learning assessment techniques.

- Applied for and secured internal funding for “Instruct 2020” – a dynamic web-based system that will: (1) allow for the creation, iteration, and modification of images to support the alignment of course objectives and audience (student) level; (2) use digital badges to recognize the progress of users as they become able to write learning objectives, evaluate assessments, and learn technical skills for developing and modifying images; and (3) provide access to and participation in a system of calibrated peer review, where users can upload and modify high quality visual assessments, which can then be downloaded to the database and used in multiple classrooms. Dr. Melissa McDaniels secured this funding in partnership with faculty members in geology and zoology from MSU Global. McDaniels and her partners will be MSU Global Innovation Fellows (http://msuglobal.com/innovation-fellows/) for the 2014-2015 and possibly 2015-2016 academic years. An expected

1 Details to be provided under the “Activities and Implementation” part of this report.
To achieve our goal of creating a more comprehensive approach to preparing our graduate students and postdocs to be able to assess student learning outcomes we utilized the following change strategies:

- Enlisted in-depth faculty support and participation across approximately 100 graduate programs at MSU.
- Created synergies between and built upon already existing teaching development programs for graduate students and postdoctoral fellows on campus.
- Cultivated graduate student and postdoctoral fellow involvement through the development of communities of practice (led by faculty and graduate students) and initiative-specific programming. We made various “on ramps” available.
- Targeting graduate students who both serve as TAs in “gateway” courses as well as those who are not currently teaching (but plan to do so upon graduation).
- Partnering with the Dean of Undergraduate Education and MSU’s faculty to solidify liberal learning goals (http://undergrad.msu.edu/learning).
- Used MSU’s 2015-2016 institutional re-accreditation to focus immediate attention on the importance of the assessment of student learning.

Activities and Implementation – UPDATES

List and briefly describe the activities and/or programs implemented on your campus with project funding

The funding for this project supported us in our efforts to both: (1) leverage the resources of already existing teaching development programs on campus as they related to the assessment of undergraduate student learning, helping these programs cover student learning assessment in a more robust way; and (2) create new programming. Activities that occurred since the last report are listed below and organized into three sections: (1) general activities and programs (for participants in all disciplines); (2) activities and programs in STEM fields; and (3) activities and programs in the social sciences and humanities.

General Activities and Programs (targeted at graduate students & postdocs of all disciplines)

How People Learn

In April 2014, in partnership with cognitive scientists on-campus and our NSF-funded I3 (Innovation through Institutional Integration award) we brought together a panel of distinguished cognitive scientists to discuss the latest research in learning and memory and to discuss the application of this research to the postsecondary classroom. The panelists included Dr. Dedre Gentner (Northwestern University), Dr. Art Graesser (University of Memphis), Dr. Lindsay Richland (University of Chicago) and Dr. Roddy Roediger (Washington University in St. Louis). Links to the video recordings of these talks can be found at http://pff-asl.grad.msu.edu/general%20resources.

Certification in College Teaching Institute

In May 2014 the Graduate School once again hosted a Certification in College Teaching Institute. This is an intensive two-day program covering topics including teaching with technology, assessment of student learning outcomes, creating effective learning environments through writing, and developing teaching & learning portfolios. Students who complete the program (in partnership with 8 colleges) earn a transcriptable notation. The agenda for the 2014 Institute mirrored the agenda for the 2013 Institute and can be found in Appendix 7 of our YR1 report.

Teaching Assistant Seminar

In August 2014, Dr. Melissa McDaniels expanded upon the changes put in place in 2013 to TA orientation at MSU. As in 2013, one day of the three-day even focused on assessment and backward design. This year, we adjusted the workshop curriculum to focus use of the “lesson” (vs. course or class session) as the context within which to discuss backward design and student learning assessment. We had received feedback last year that some of the TAs didn't find these important topics “relevant” to
them in their role as TAs (with no control over the syllabus or assessments). A second day of the 2014 workshop was spent on creating a classroom environment for high quality assessment. Cooperative and active learning were the focus of this module. The web site that will be completed by the December CGS conference will contain a PDF of the guidebook used in this year’s seminar.

Assessment 101 and Assessment Leaders Forum for Graduate Students and Postdocs

In February 2014, we were fortunate to have Amy Driscoll, consulting scholar with the Carnegie Foundation for the Advancement of Teaching, visit us on campus to run two assessment workshops. The first workshop (“Assessment 101”) targeted graduate students (and faculty) that might not have attended the 2013 PFF-ASL Spring Institute. The second workshop was for graduate students ONLY (faculty that attended were asked to leave) and focused on the skills needed to become an “assessment leader” on campus regardless of the position one holds. The slides for each workshop will be posted on the web site that will be completed by the December CGS conference.

Using the Learning Portfolio to Assess Student Learning & Using the Power of Reflection for Significant Learning

Originally scheduled for March 2014 (cancelled by Dr. Zubizaretta for a family emergency), John Zubizaretta will be coming to campus in November 2014 to run two assessment workshops for graduate students, postdocs and faculty. The first even will offer a framework for thinking about practical uses of a learning portfolio for assessment purposes. The second session will focus specifically on strategies available to help create a classroom environment that supports students’ critical reflection. The slides for each workshop will be posted on the web site that will be completed by the December CGS conference.

Activities and Programs in STEM Fields (570 graduate students, 35 postdocs, and 94 faculty participated)

Engineering

The College of Engineering engaged a total of 146 participants in the two-year grant period. Of those participants, 133 were graduate students, 12 were faculty, and 1 was a postdoctoral fellow. The College of Engineering continued to take advantage of the momentum from this grant to reform its training of teaching assistants in Introduction to Engineering Design (EGR100). Almost all of this year’s 1400 first-year students who declare an engineering major are, or will be, taking this course. This amounts to reaching about one-seventh of all of MSU’s incoming first-year students. Most undergraduate student attrition in engineering is seen during or after the first year of studies; therefore, high quality teaching and a good learning environment are critical elements of the first-year experience.

In 2014, similar to 2013, Mr. Tim Hinds (Academic Director for First-Year Engineering Programs) and Drs. Briedis (Assistant Dean) and Urban-Lurain (Associate Director of Center for Engineering Education Research) conducted a workshop for the teaching assistants of this gateway course. The purpose of the session was to develop consistent grading practices based on objective criteria not only for the purpose of consistency in grading large numbers of student solutions, but also in developing good teaching practice. The professional practices that have been integrated in the TA training include use of grading rubrics for grading consistency and instruction on use of Desire2Learn course management software. This is now “standard procedure” for all TA training.

The most significant accomplishments have been in developing consistency in grading of assignments over multiple course sections (24 sections in FS14) by a) using mutually agreed upon grading rubrics and b) beginning to educate TAs in the concept that delivery methods (positive vs. not-so-positive) make a difference in student learning and the students' ultimate opinions of the course. We believe our students "enjoy" the course more when the TAs have a positive perspective in their teaching vs. just delivering content. The TAs also do a better job of delivering content when we fully explain, and they understand, the purpose and goal of each student task/assignment. Having a set of rubrics supports this goal. We have also implemented mid-semester evaluations (SIRS) for student assessment of TA performance. This has helped to increase our end-of-semester SIRS scores further, validating that we are making strides in improving student performance and course enjoyment. Original rubrics, training slides, TA instructions and EGR 100 project rubrics will be posted on the web site that will be completed by the December CGS conference.

Chemistry

The Chemistry Department engaged a total of 94 participants in the two-year grant period. Of those participants, 89 were graduate students and 5 were faculty. Chemistry students were represented at many if not all university-wide PFF-ASL training events.

• Expanded Training for all First-Year Chemistry Graduate Students

In August 2014, an expanded training for all first-year Chemistry graduate students was launched. Each year first-year graduate students participate in a five-day orientation program in the Department of Chemistry during the week before classes begin. Previously, TA training has been a relatively minor component of this program. In August 2014, TA training
for the 36 new graduate students in the Department of Chemistry was expanded from 1 hour to 6 hours. Prof. Melanie Cooper (http://www2.chemistry.msu.edu/faculty/cooper/index.html), an expert in discipline-based education research who has studied how teaching reformed chemistry courses and laboratories impacts graduate students’ development and undergraduate student learning, conducted the TA training sessions. The training was designed as three two-hour workshops. Appendix X includes a complete overview of this training received by all first year chemistry students.

- **TA Development - Reformed Chemistry Curriculum (CEM 141 and CEM 142)**

As we reported last November, The Department of Chemistry has begun implementing the evidence-based CLUE (Chemistry, Life, the Universe, and Everything) curriculum, which was developed with NSF support, in a subset of the lecture sections for its large-enrollment general chemistry sequence (CEM 141/142). One lecture section (~400 students) of CEM 141 followed this curriculum in Fall 2013, and one lecture section (~250 students) of CEM 142 in Spring 2014 was a continuation of this curriculum. In 2014-2015, there are two lecture sections of CEM 141 following the CLUE curriculum in the fall and two lecture sections of CEM 142 following the CLUE curriculum in the spring.

TAs are integral members of the instructional team for CLUE sections of CEM 141 and CEM 142. They run weekly recitations for groups of 30 students, and they assist in facilitating activities in the large lectures of 400 students. During recitations, the TAs serve as facilitators whose primary role is to help students construct their own understanding collaboratively while working in groups on worksheets that are tightly correlated with lecture content and homework. TAs are regularly asked to reflect on their students’ understanding of the course content and ability to engage in science practices as they complete recitation worksheets and summative assessments. Weekly TA meetings provide an opportunity to debrief on what went well and what didn’t during the previous week’s recitations and to discuss the recitation activity for the upcoming week.

- **TA Development – Traditional Chemistry Lectures and Laboratories**

Teaching assistants meet weekly with the faculty of record and/or laboratory coordinator for the course. Over the past two years, the Director of General Chemistry meets with Lecture TAs once a week and has focused upon cultivating TAs’ awareness of the difficulties that individual students have in learning general chemistry content and the importance of being able to adapt instruction to meet the needs of different groups of students. Inexperienced TAs tend to follow the same approach in all of their recitation sections, not realizing that different groups of students might have different challenges in learning the material. While common worksheets provide a structure for each recitation, The Director has empowered TAs to incorporate extra practice problems when they find that a group of students in a recitation is having difficulty with a concept and to adapt instruction accordingly. A significant challenge in trying to adapt instruction on the fly to meet students’ needs is identification of what students don’t understand. In TA meetings, the Director has dedicated time to discussing how to get students to identify and communicate concepts they find difficult. Instead of asking their students for “questions,” the TAs have been encouraged to ask their students to write a concept on the top of their recitation worksheet that they find difficult. While the students are working in their groups to solve the recitation worksheet questions, the TA can look at the responses while they circulate and determine two or three common concepts that can be addressed later in the session. Teaching assistants also meet weekly with both the laboratory manager and laboratory coordinator. At each meeting there are several common topics including: problems/concerns from the previous experiment, safety issues, the grading rubric and any anticipated issues with the upcoming experiment, and laboratory/classroom management issues.

**Mathematics and Mathematics Education**

The Mathematics and Mathematics Education Departments engaged a total of 63 participants in the two-year grant period. Of those participants, 60 were graduate students, 1 was a postdoc and 2 were faculty. Mathematics students were also well represented at many if not all university-wide PFF-ASL training events. There are two courses for which teaching assistants receive training on assessment of student learning: MTH124 (Survey of Calculus) and MTH 132 (Calculus II). Currently both courses are taught by many graduate assistants, with postdoctoral scholars and faculty members also teaching sections. Both are taught in “small sections” with 30-40 students in most sections. Both courses are coordinated by a faculty member. Literature on assessment (different forms of assessment, alternative assessment approaches, etc.) is provided to all graduate assistants. At regular course meetings this literature is discussed, and methods for using assessment techniques in the specific context of MTH 124 and MTH 132 Calculus classrooms are discussed. As the semester progresses, instructors and course leaders also discuss the assessment approaches they have used in the course, and their successes (and challenges).

Graduate student instructors are provided with the opportunity for mentoring visits to their classrooms, where a trained mentor sits in and, in a follow-up meeting, provides feedback on pedagogy including assessment. Importantly the mentor is not in a position to formally evaluate the student’s teaching, so the visit is focused solely on improvement (vs. evaluation).

**Biological Sciences**

Students from the biological sciences (representing 21 departments) had a total of 257 participants in the two-year grant period. Of those participants, 185 were graduate students, 28 were postdocs and 44 were faculty. The discipline-pedagogy course
(Pathways to Scientific Teaching in Biology) was taught once again in Fall 2014 with an enrollment of 24. Details about this course can be found in Appendix 11 of the YR1 report.

One of the most significant contributions of the PFF-ASL grant was the development of “Biology Transformed”. This website (http://biologytransformed.org/), documents the goals and objectives of a “transformed” introductory biology course focused on students working with knowledge using scientific practices, instead of merely being receptacles and organizers of facts. We describe what students and instructors actually do in a transformed course. We show how to plan for collecting information about what students are learning – and how to use information to build and adapt the next activity. We show how to incorporate scientific practices in every course activity – and how to be smart about time-intensive activities like exam planning and scoring and class meeting design. Finally, we show how to avoid common pitfalls of a student-centered course design by paying attention to scaffolding, pacing, and student feedback. All course activities include examples of our own artifacts, and all are grounded in evidence from discipline-based education research. Diane Ebert-May (http://ebertmaylab.plantbiology.msu.edu/) and Anne-Marie Hoskinson (Postdoctoral Fellow) were principal investigators for this project. Undergraduate learning assistants and graduate students were also involved in the redesign and implementation of the course.

**Future Academic Scholars in Training (FAST Fellows)**

The FAST program is for doctoral students with interests in teaching, learning, and assessment in higher education who are enrolled in programs associated with the Colleges of Natural Science, Agriculture and Natural Resources, Engineering, and Veterinary Medicine and whose college or department has an approved Certification in College Teaching Program. In 2014-2015 11 number of students are participating. Details about this program can be found in Appendix 17 of the YR1 report.

**Activities and Programs in the Humanities and Social Sciences** (319 graduate students, 1 postdoc, 32 faculty)

Graduate students, postdocs and faculty from the humanities and social science disciplines were well represented in our efforts over the past two years.

**RCAH Fellows**

In 2014-2015, the Residential College of Arts & Humanities, in partnership with the graduate school, had 8 students participating in the RCAH fellows program. These fellows meet in groups and have readings and conversations on topics such as rubric development, backward design, learning and learning styles. They have SOTL projects that are the product of their efforts each year and these are presented at an annual on-campus conference with FAST, IIT and FAST fellows. More details about this fellowship program can be found here: http://rcah.msu.edu/people/graduate-fellows.

**Writing, Rhetoric and Composition**

In January and August 2014, the faculty in the Writing, Rhetoric and Composition department implemented a robust training for graduate students who would be teaching writing courses to undergraduate students at MSU. Thirty-six graduate students participated in this training for six days. The curriculum for this program focused on curriculum and assignment design, assessment, and cultivation of peer review in writing. The agenda for this training will be posted on the web site that will be completed by the December CGS conference.

**Political Science**

The teaching assistants in PLS200 (Introduction to Political Science) and PLS201 (Introduction of Methods of Political Analysis) once again took part in the department's annual graduate student teaching workshop, where the topic of assessing student learning was covered(Spring 2014 TAs did this in August 2013; Fall 2014 TAs did it in August 2014). An outline of the topics covered in this graduate student teaching workshop can be found in Appendix 14 of the YR1 report. The instructor of record for PLS200 and PLS201 held weekly organizational meetings where the use of rubrics and ensuring the reliability of evaluation of student work was discussed.

**Interdisciplinary Humanities Professional Learning Community**

In 2014, Dr. Nancy DeJoy (Assessment Director in our College of Arts & Letters) assembled a small group of students to meet regularly to discuss theoretical and practical ideas related to student learning assessment. Books discussed included *Introduction to Rubrics* (Stevens and Levi), *What the Best College Teachers Do* (Bain), and *Assessment Clear and Simple* (Walvoord). These choices were made to provide graduate students with exposure not only to classroom assessment but program, general education and institutional assessment. Dr. DeJoy's pedagogy has concentrated on looking at assessment issues in these four contexts. She chose this path to address the immediate needs of the graduate students, but then to also help them see the larger contexts within which the decisions about teaching and learning take place. Dr. DeJoy hoped to allow them to make decisions--and be able to explain them, within the larger contexts and goals driving their home institutions. Dr. DeJoy wants to empower the graduate students to form relationships across the units within the institutional contexts they find themselves in, and maybe even become advocates and leaders for assessment at those institutions.
If applicable, how did the grant leverage pre-existing or complementary programs and resources to advance student learning assessment (include programs and resources specific to STEM fields and to humanities and qualitative social sciences)?

As we emphasize throughout this report, leveraging pre-existing or complementary programs is a big part of the strategy that we believe led to a successful project at MSU. Our environmental scan allowed us to align our work with that of individual faculty and graduate programs and federally-funded grant programs (e.g., NSF) focused upon improving the quality of undergraduate education. We re-examined all of the programs run by the Graduate School for alignment with the mission and goals of the PFF-ASL grant.

How did this project engage and involve teaching and learning assessment experts and faculty with field expertise?

As we emphasize throughout this report, faculty and outside (to MSU) expert engagement contributed to the success of our project. Over the course of the past several years, the following experts from off-campus were asked to help us reach our project goal:

<table>
<thead>
<tr>
<th>Expert Name</th>
<th>Institution</th>
<th>Grant Year</th>
<th>Nature of Involvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Larry Gruppen</td>
<td>University of Michigan (Chair, Medical Education)</td>
<td>1</td>
<td>Talk: Assessment of and for Learning (PFF-ASL Spring Institute)</td>
</tr>
<tr>
<td>Terry Rhodes</td>
<td>AACU (Vice President)</td>
<td>1</td>
<td>Talk: Why Assessment of Student Learning is so Important (PFF-ASL Spring Institute)</td>
</tr>
<tr>
<td>Dee Pink</td>
<td>Dee Pink &amp; Associates</td>
<td>1</td>
<td>Talk: Designing Your Courses for More Significant Learning</td>
</tr>
<tr>
<td>Brian Coppola</td>
<td>University of Michigan (Professor)</td>
<td>1</td>
<td>Talks: Real Work is Better than Homework Designing Around Real Work</td>
</tr>
<tr>
<td>Amy Driscoll</td>
<td>Carnegie Foundation for the Advancement of Teaching (Consulting Scholar)</td>
<td>2</td>
<td>Talks: Assessment 101 Assessment Leaders Forum for Graduate Students</td>
</tr>
<tr>
<td>John Zubizarreta</td>
<td>Columbia College (S.C.) (Professor of English &amp; Director of Honors and Faculty Development)</td>
<td>2</td>
<td>Talks: Using the Learning Portfolio to Assess Student Learning Using the Power of Reflection for Significant Learning</td>
</tr>
<tr>
<td>Lindsay Richland</td>
<td>University of Chicago (Professor of Comparative Human Development)</td>
<td>2</td>
<td>Talk: Teaching for Higher Order Thinking (How People Learn Symposium, 2014)</td>
</tr>
<tr>
<td>Dedra Centner</td>
<td>Northwestern University (Professor of Psychology &amp; Director of Cognitive Science Program)</td>
<td>2</td>
<td>Talk: Analogical Comparison in Learning and Reasoning: Implications for Education (How People Learn Symposium, 2014)</td>
</tr>
<tr>
<td>Art Graesser</td>
<td>University of Memphis (Professor, Department of Psychology)</td>
<td>2</td>
<td>Talk: Principles of Learning and Conversational Pedagogical Agents (How People Learn Symposium, 2014)</td>
</tr>
<tr>
<td>Roddy Roediger</td>
<td>Washington University in St. Louis (Professor, Department of Psychology)</td>
<td>2</td>
<td>Talk: Cognitive enhancement of education: from the lab to the classroom (How People Learn Symposium, 2014)</td>
</tr>
</tbody>
</table>

At Michigan State, we are also fortunate to have some of the leading education and discipline-based education researchers in the country among our faculty ranks, as well as internationally recognized laboratories and centers with focused work on high quality student learning assessment in postsecondary education. Some the individuals who supported our work include:

Ann Austin (http://edwp2.educ.msu.edu/aaustin/)
Melanie Cooper ((http://www2.chemistry.msu.edu/faculty/cooper/index.html)
Deborah DeZure (http://fod.msu.edu/deborah-dezure)
Diane Ebert-May (http://ebertmaylab.plantbiology.msu.edu/)
Nancy DeJoy (http://wrac.msu.edu/people/nancy-dejoy/)

The Centers and Institutes include:

Center for Engineering Education Research (http://ceer.egr.msu.edu/)
Center for the Integration of Research, Teaching and Learning (www.cirtl.net)
Geo-cognition Research Laboratory (http://geocognitionresearchlaboratory.wordpress.com/)
What skills in learning assessment and teaching methods used to prepare graduate students did your project focus on?

There are an unlimited number of skills that were focused on at the department, college and university levels and across STEM, Social Science and Humanities disciplines. These skills included: backward course design, alignment (institutional, programmatic, and course goals), writing measurable learning objectives, modeling and argumentation, creating a culture of student learning outcome assessment (through active and cooperative learning), taxonomies of cognition/behavior/affet, identifying student misconceptions, peer-assessment of student writing, and assessing understanding of undergraduates in a laboratory (one-to-one) learning context. Resources developed covering these topics can be found later in this document.

II. PROMISING PRACTICES AND LESSONS LEARNED

What has been the most significant accomplishment, unique innovation, or important discovery made as a result of participating in this project?

A comprehensive institutional strategy that will best prepare graduate students and postdocs to assess student learning is most effectively developed using best practices in backward design (!), the very foundation for the assessment of student learning. The “objectives” identified for this strategy depends upon what promising practices already exist on campus, not only in the Graduate School, but also in the graduate programs at the time the project begins. Done correctly, an environmental scan of existing practices can result in shared institutional objectives, improvements in existing practices, and ultimately resulting in an initiative that is truly sustainable. New “activities” will lead to real change when graduate school staff and graduate faculty work together to understand the ecology of existing practices. We found that by applying backward design to each activity, engagement and “buy-in” among graduate student, postdoctoral fellows and faculty participants deepened.

What practices and/or strategies would you recommend to others seeking to develop model programs in Preparing Future Faculty to Assess Student Learning? What is the basis for these recommendations?

In order to develop a model program to prepare future faculty to assess student learning, graduate schools must partner with faculty to understand what practices currently exist at the department-level on campus. Let your departments shine! It is only then that graduate schools will understand where centralized efforts can have the biggest impact. We encourage other graduate schools to partner with faculty to develop a systematic way to map and track these existing efforts, as well as new initiatives on campuses. We also found it extremely effective to enlist not only graduate faculty, but graduate student and postdoc peer-leaders in our efforts. This provides both professional development opportunities for more senior graduate students and postdoctoral fellows, as well as additional human resources to help faculty and graduate school staff broaden the impact of our work. We also recommend that graduate schools rigorously critique pre-existing and complementary programs (especially those run by the Graduate School!) to determine if and how those programs can be altered to contribute to the broader strategic effort related to preparing future faculty for assessing student learning. This will reduce the chances of duplication of effort. Finally, graduate schools should partner with colleagues working to improve the quality of undergraduate education on campus (e.g., AAU Undergraduate STEM initiative) to ensure alignment of graduate student and postdoctoral training and the best practices in undergraduate teaching and learning.

What have been the biggest challenges in implementing this project?

One of the challenges that will always exist in implementing a project like this is the degree to which graduate education is decentralized on our campus. We see this decentralization as less of a challenge and more of a reality to working in a research university. Therefore it was even more crucial to partner with graduate faculty and graduate students themselves to understand existing practices and needs for investment. Another challenge involved defining for ourselves, and others, the boundaries of this project and criteria for success. We realized very early (especially as we fully embraced the importance of completing a more rigorous environmental scan) that the scope of this project would not be entirely transparent to community members until the formal grant period (but not the initiative itself) came to a close. We will be spending the next few months developing a comprehensive digital space that will help us meet this challenge by disseminating best practices at the university, college and department levels. Another challenge we encountered (and we mentioned this in the YR1 report) was the logistical challenge of engaging (and identifying) TAs (from our position in the Graduate school) as they prepare to teach gateway courses. TAs are assigned by the semester and are often not assigned a course until days before classes start! Having recognized this, the Graduate School expended its resources cultivating communities of practice over the course of a semester to provide professional development opportunities to both TAs and other interested graduate students and postdocs from departments across the institution. And, of course, we engaged faculty as often as we could.
III. IMPACT AND SUSTAINABILITY

How did the grant facilitate scale-up of promising practices?

As we have stated repeatedly throughout this report, preparing future faculty to assess student learning did not start with this award from CGS. What this grant allowed us to do was both “scale up” existing practices and make strategically and fiscally sound decisions about where to invest money to support new initiatives. One of the primary accomplishments of our project was a complete “environmental scan” of all of the already existing activities related to developing the student assessment skills of graduate students and postdoctoral fellows. We (as a graduate school) are now much clearer about where these activities are occurring at the department and college levels. Newly funded initiatives may be resented on campuses when stakeholders who have been engaged in the work of the grant in question for years are not recognized for their work. The support from this grant helped us get to a place where we are well positioned to continuously collect, promote and disseminate best practices at the department, university and college levels.

We also used PFF funds to develop an Assessment Leaders program. Working with Amy Driscoll, consulting fellow with the Carnegie Foundation for the Advancement of Teaching, we started an initiative whereby graduate students who love teaching and learning assessment can be positioned in roles to teach their peers about this important work. The existence of peer assessment leaders will extend the reach of faculty and graduate school administrators in their efforts to disseminate promising practices to future faculty, as well as change current practices on campus.

Finally, we tried to ensure that knowledge generated from the different activities supported by the PFF-ASL grant was documented for use by participants and other stakeholders. This primarily took the form of full-length video and clips but will be extended by the launch of a web site to celebrate the accomplishments of our grant (under development to be finalized by CGS meeting – www.pff-asl.grad.msu.edu).

How did you share sharing promising practices with others on campus (and beyond)?

We are just beginning the process of sharing practices with others on campus and beyond. As was mentioned above, we made video recordings of the sessions at the 2013 PFF-ASL Spring Institute and at the How People Learn panel in April 2014. As we describe in the “Resources” component of this report, we have posted these videos on the Graduate School YouTube channel (https://www.youtube.com/user/MSUGradSchool). The number of “views” each video varies but we have been impressed with the 798 hits for What is Backward Design, 543 hits for Writing Effective Learning Outcomes and Objectives and 203 hits for Applying Backward Design in a Cell Biology Course. Further, our colleague Rique Campa is a PI on a recent NSF award that supported the development of a Coursera course called “An Introduction to Evidence-Based Undergraduate STEM Teaching” (https://www.coursera.org/course/stemteaching). This course has over 4,000 people registered and 50 voluntary learning communities in 6 countries. One of the PFF-ASL videos (What is Backward Design) will be required for viewing later in the fall 2014 semester. We look forward to seeing hits for this video to expand significantly! It is important to note that almost all of these videos are applicable ACROSS disciplines (not just STEM-related).

How will discipline-specific learning assessment activities enrich centralized PFF programming and/or institutional undergraduate learning assessment plans?

The ongoing environmental scan will allow us to keep assessing and supporting existing programs at the department level ensuring non-duplication of efforts. Graduate students and faculty continue to partner with the Undergraduate Dean to create assessments that can be modified for faculty interested in directly assessing general education outcomes at the course or program levels. Also, the growing number of graduate students who are “assessment leaders” will continue to be a part of centralized PFF programming. The disciplines already represented by these leaders include: urban planning, political science, human development, pharmacology, chemistry, history, art history, mathematics, English, neuroscience, anthropology, engineering, fisheries and wildlife and others.

Are you well positioned to institutionalize the best practices that you have found to emerge from this project?

As described above, we are not only positioned to institutionalize and disseminate best practices that emerged from this project – we now have a mechanism (database and reporting network) to continue to institutionalize and disseminate new practices as they are developed. The Graduate School will continue to support and expand the peer-leaders initiative. We will use the MSU Global Innovation Fellow and the NSF award supporting the MOOC to keep assessment of student learning at the forefront of our efforts in the Graduate School. Preparing for institutional accreditation will also serve to focus our efforts.

What resources did you develop as a result of this project? Please attach or link to relevant materials in an appendix. These resources will be made available online in the CGS Best Practice Resource Library for the PFF program.

Many materials were developed as a result of this project. The most visible and usable at this stage are the video recordings and clipped previously mentioned.
Here are the links to sites containing a list of the videos.

http://pff-asl.grad.msu.edu/general%20resources
http://pff-asl.grad.msu.edu/stem%20resources
http://pff-asl.grad.msu.edu/SS%20H%20Resources

Additional materials will be able to be developed and readied for “prime time” from the extensive materials submitted to us by individual departments (in many attachments). We will work to put those in an appropriate format for citation and dissemination prior to the CGS meeting in December 2014.

Another significant resource developed with direct support from this grant (described in more detail under “Activities”) is Biology Transformed. This web site (http://biologytransformed.org/) is designed to “share … experiences, materials, and outcomes for an introductory, large-enrollment course in cellular and molecular biology”.

Finally, the MSU Global Innovation Fellow project (described on page one of this document) will also have its own web site as the project progresses.

**How many direct participants did this project’s activities engage?**

<table>
<thead>
<tr>
<th>PARTICIPANT STATUS</th>
<th>TOTAL</th>
<th>STEM</th>
<th>HUMANITIES &amp; SOCIAL SCIENCES</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduate Student</td>
<td>1152</td>
<td>570</td>
<td>319</td>
<td>263</td>
</tr>
<tr>
<td>Postdoctoral Fellow</td>
<td>37</td>
<td>35</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Faculty</td>
<td>154</td>
<td>94</td>
<td>32</td>
<td>28</td>
</tr>
<tr>
<td>Other Staff</td>
<td>9</td>
<td>3</td>
<td>0</td>
<td>6</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td>1352</td>
<td>702</td>
<td>352</td>
<td>298</td>
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### IV. FINANCIAL REPORT

**Personnel**

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
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<tbody>
<tr>
<td>Salaries and benefits</td>
<td>$19,418.84</td>
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<tr>
<td>Consultants</td>
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<td><strong>Total personnel</strong></td>
<td><strong>$20,418.84</strong></td>
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**Travel**

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**Meeting Expenses**

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<td>Publications, Dissemination</td>
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**Other Direct Costs**

<table>
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<th>Description</th>
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<tr>
<td></td>
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**Total**

<table>
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<tr>
<td></td>
<td><strong>$45,208.24</strong></td>
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Please note: Indirect costs are not allowable on CGS subawards.