PROVOST’S LEARNING INNOVATIONS GRANTS

2016 CALL FOR PROPOSALS

The Provost’s Learning Innovations Grants (PLIG) program was developed to broaden and enrich the learning experience of RIT students by funding faculty-initiated projects that enhance student learning. More than 200 RIT faculty projects have received funding since the program was initiated in AY 2000-2001. (Examples of previously funded projects are available at the PLIG website, rit.edu/ili/plig).

The launch of the Innovative Learning Institute (ILI) in 2012, and its charge to assist in the creation of exceptional learning experiences for students, led to an evaluation of PLIG and a revitalization of the program to:

• Better support dissemination of individual faculty learning to the wider faculty population
• Provide funding for the implementation of successful pilot projects
• Integrate funding with Institute priorities
• Support the scholarship of teaching and learning

The 2016 Application Form is found on page 3 of this document.

I. ELIGIBILITY

The principal applicant(s) must be tenured or tenure-track RIT faculty. PLIG 2016 projects can include visiting assistant professors, lecturers, adjunct faculty, staff, students, and other contributors.

II. PLIG TYPES

There are two types of grants—Exploration and Focus Grants—for PLIG 2016. Full details are available at rit.edu/ili/plig.

III. USE OF GRANT FUNDS

Provost’s Learning Innovations Grants for 2016 may range from $1,000-$5,000.

Examples of the use of PLIG funds include:

• Course release (reasonable, actual replacement costs for full-time, tenure-track or tenured faculty members removed from teaching)
• Development of new technology-based learning tools and/or environments
• Technologies or equipment required by the project that are not normally provided by the department/college
• Resources for research design and consultation, data collection and aggregation, instrument development and/or purchase, secure data storage, data analysis, and report generation
• Travel to support research activity and/or meet with potential funding sources

IV. PLIG TIMELINE
The grant timeline assumes that most recipients will use Summer 2016 to plan and develop their PLIG funded project for delivery or implementation during the Fall 2016 and/or Spring 2017 semester(s). The full timeline is at rit.edu/ili/plig.

V. SELECTION COMMITTEE AND EVALUATION CRITERIA
Applications for PLIG funds are evaluated by the PLIG selection committee according to the following criteria:
• Utility (solves a defined problem, has potential to benefit many courses/faculty)
• Creativity (is a novel approach or application, represents a new paradigm)
• Efficacy (uses an evidence-based approach, impact to student learning and/or the student experience can be demonstrated)

Details on proposal evaluation and selection committee membership is on the website (rit.edu/ili/plig).

VI. QUESTIONS OR COMMENTS
Please email plig@rit.edu with any questions or comments.
PROVOST’S LEARNING INNOVATIONS GRANTS
2016 APPLICATION

INSTRUCTIONS

Complete this form in its entirety and email it to plig@rit.edu no later than January 27, 2016. Please note to save and rename this document substituting your name (in place of “NAME”) in the file name.

Ask your Department Head to complete the Department Head Certification and return the signed copy along with your application. Note: the signed copy may be scanned and emailed.

If you have any questions about completing this application, please email them to plig@rit.edu or call Michael Starenko at 585-475-5035.

APPLICANT INFORMATION

This application is for a:

☐ FOCUS GRANT
☒ EXPLORATION GRANT

Principal Applicant Name: Bonnie Jacob ______________________________ Email: bcjntm@rit.edu

Faculty Title: Tenure-Track Assistant Professor ___________________________ Phone: 475-2275

(Full-time, tenured and tenure track only)

College: National Technical Institute for the Deaf _____ Department: Science and Mathematics _____________

Department Head name: Matthew Lynn ______________________________ Email: malntm@ntid.rit.edu __

Proposed Project title: Proof in sign: communication of abstract discrete math content to students who use ASL ____________

Total funds requested (requests of $1,000 to $5,000 will be considered): 5,000.00

Others involved in the project (if any): Carol Marchetti, COS SMS________

Jobby Jacob, COS SMS

Jackie McClive, NTID Science and Math ___________________________________
**BUDGET**

There is a fillable PDF worksheet to calculate your budget. You can download the worksheet at rit.edu/plig.

- The total shown on this worksheet must match the “Total funds requested” in the Applicant Information section of this application form.
- If awarded, additional funds will be provided to cover any benefits and ITS expenses associated with the salary budget requested.
- Note that any equipment or other materials purchased with grant funds are the property of your department and revert to the department after your project is completed.

**TIMELINE**

Please indicate any variances to the planned PLIG 2016 schedule and your reasons. If you do not intend to deviate from the schedule, you may leave this section blank.

<table>
<thead>
<tr>
<th>Task</th>
<th>Date</th>
<th>Proposed variance and reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full project plan submitted</td>
<td>Aug. 24, 2016</td>
<td></td>
</tr>
<tr>
<td>Preliminary findings submitted</td>
<td>Jan. 25, 2017</td>
<td></td>
</tr>
<tr>
<td>Summary of final findings submitted</td>
<td>Aug. 23, 2017</td>
<td></td>
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<tr>
<td>Final budget accounting submitted</td>
<td>Aug. 23, 2017</td>
<td></td>
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<tr>
<td>Faculty Teaching and Learning Commons posting (a summary of findings, examples of teaching designs or materials, etc.) due</td>
<td>On or before Oct. 24, 2017</td>
<td></td>
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<tr>
<td>Participation in Teaching and Learning Services PLIG dissemination event</td>
<td>On or before Nov. 17, 2017</td>
<td></td>
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</table>
STATEMENT OF UTILITY (two pages maximum)

Using the proposal evaluation criteria outlined in the Evaluation section of the website (rit.edu/ili/plig), please provide an overview of the project you are proposing, including:

- Project objectives
- An explanation of the teaching/learning problem(s) it is designed to address
- An explanation of the significance of the project to student outcomes and/or the student experience.
- A brief description of how the project integrates with activity already underway at RIT in the priority area and/or how this approach has been successfully used at RIT already.

Objectives:

1. Make a video tutorial that combines formal proofs from discrete mathematics courses using English writing ("Khan-style") with American Sign Language (ASL) explanations. The video will also make use of visual tools to demonstrate abstract concepts involved in proof writing.

2. Develop a system for selecting content from abstract mathematics and computer science courses to make videos with ASL explanations, as well as a procedure for creating these videos that is comfortable for students who are deaf or hard-of-hearing.

3. Through the video, help students begin to construct a "toolbox" for proof-writing: different techniques to try when faced with writing a mathematical proof.

Problem:

Many students, whether hearing, hard-of-hearing, or deaf, struggle when they first take abstract mathematical courses, even if they have been successful in mathematics in the past. In particular, writing formal proofs is an intimidating new skill for students. For students who are deaf or hard-of-hearing, this problem is compounded by a lower comfort level with the writing process in general, and a lack of access to video tutorials or other materials that hearing students commonly use as resources. Wording such as “at least,” “for any integer,” or “there exists a positive integer, N” may be less transparent to some deaf students than to their hearing peers. While some limited resources are available, the resources rely on a relatively high level of English, and many video resources do not have adequate captions. Needless to say, few of these resources are very visual in nature, and there are no known resources on proof-writing that are available in ASL. This impacts many deaf and hard-of-hearing students, not only mathematics majors but students taking courses such as Discrete Mathematics, a requirement for many non-theoretical computing majors at RIT. Last semester alone, there were 29 NTID-supported students enrolled in discrete mathematics courses at RIT. This course is a critical course for students starting out in computing and mathematics majors.

Significance:

Students who are deaf or hard-of-hearing will have access to videos that provide visual, deaf-friendly explanations of how to write some common proofs from discrete mathematics courses. ASL will allow students who are more comfortable with ASL than written English to have full access to the information in the videos.

Integration:

Universal design, the concept of making products, facilities, and ideas inclusive to all people regardless of hearing or disability status, is a growing movement. RIT, in many facets including its unique culture of combining a college for deaf and hard-of-hearing students with a large university, is a leader in universal design. This project will add to this culture: ASL explanations of abstract mathematical concepts are currently non-existent, and this project will begin to fix this fact and make abstract mathematical material available and accessible for students comfortable with ASL. This is in keeping with the inclusive environment at RIT.
In addition, on our team is Dr. Carol Marchetti, PI of a statistics project funded by the National Science Foundation (NSF DUE-1432566). While the statistics project has fundamental differences to the project we are proposing, it also involves making videos that use ASL with the goal of making statistics content more accessible to students who are deaf or hard-of-hearing. We will apply knowledge gained through the statistics project. First, we will include students in the creation of materials, not only because the experience is empowering for the students but also because their input can be extremely valuable. We will also employ an iterative process in the creation of videos. Rather than assuming that we can plan for and make a final product in one big step, we will produce a prototype, and then investigate in what ways it can be improved before trying again. Also, instead of making one long video that viewers are expected to watch at once, we will make short segments to break material into more manageable pieces, as from the statistics project, Dr. Marchetti and her team learned that viewers are less likely to watch a long video. We will incorporate the idea that there should be only one visual input at a time to be deaf-friendly. For example, while in conventional Khan-style videos, the narrator writes and talks at the same time, we will separate writing, signing, and visual examples such as diagrams so that viewers who are deaf or hard-of-hearing will have full access to the content.
STATEMENT OF CREATIVITY (three paragraphs maximum)

Provide a brief description of how this is a novel approach, or a new application of an existing mode or model of teaching and learning, and/or research about how teaching and learning represents an entirely new paradigm. (Please note that special consideration will be given to proposals that demonstrate a new use/application of a model, system, or technology already in use at RIT.)

While there is some mathematics content available on the Internet in ASL, there is little to no content in discrete mathematics. In fact, regardless of language, there are few resources about writing proofs that are visual in nature and provide clear explanations of abstract concepts. Therefore, the existence of this video content will be new and novel.

More generally, committing resources to developing ASL-based, deaf-friendly materials about abstract mathematics is a new endeavor. In addition to using ASL, we will make our video as accessible as possible to viewers who are deaf or hard-of-hearing by allowing only one input at a time. For example, rather than showing writing of the proof and signing simultaneously, writing will appear, followed by sign, etc.

We will also use visual examples to demonstrate abstract concepts. For example, students often find the concept of mathematical induction too abstract, even strange. The idea is that we can prove a fact for all natural numbers (1, 2, 3, …) by proving that if the fact is true for 1 (usually called the "basis" or "base case"), and then proving that if we assume the fact is true for a number --- this assumption is called the "inductive hypothesis" --- , then it must work for the next number as well (the "inductive step"). Students are often baffled by this: when we come to the inductive hypothesis, they wonder why we are assuming the exact fact that we would like to prove. One visual way to demonstrate this concept is with dominos. Assuming we set up a line of dominoes correctly, then if one domino falls (the induction hypothesis), then the next domino in the line will also fall (the induction step). So we can conclude that all the dominoes fall (the fact we are trying to prove), but only if we have the basis: that is, someone must push the first domino. This simple example helps students see the idea of induction. Each part of an induction proof (basis, induction hypothesis, etc.) has a piece within the analogy of dominos. Simple tools that can be demonstrated visually such as these are relatively unusual in resources about proof writing.
STATEMENT OF EFFICACY (two pages maximum)

Provide a brief description of the experiment/research design, methodology, and methods of data collection you will use to gauge efficacy.

We will develop instructional materials and assess students’ reactions of them.

1. Developing Materials: We will develop a video that demonstrates a type of mathematical proof, mathematical induction. The video will combine written English (and mathematical symbols) with ASL explanations of the formal steps of the proof. These two will not happen simultaneously to allow students to focus their attention on one visual input at a time. Also, the proof will be handwritten to give students the understanding of the formal proofwriting process: making use of white space, proceeding one line at a time, etc. In addition, we will create a brief video combining ASL and written English (one input at a time) that briefly introduces mathematical induction as one tool of many in mathematical proof writing. Our intent is to use this first video to seek external funds to support the creation of more videos.

To accomplish the "Khan-style" parts of the videos, we will need to be able to capture writing as it is happening on video, that is, we will need an electronic whiteboard. We will use a writing tablet and stylus available from, for example, Wacom. We will also use a software such as Camtasia to make this portion of the videos. Then, we will edit this together with the signed portions of the videos. We will use an external hard drive to back up the video content.

2. Evaluation: We will recruit students to view videos, take pre- and post-assessments, and participate in focus groups to provide feedback on the resources.

3: Engaging students in the project: We will involve two students in the fall and two students in the spring in the project. Students will help with development of materials in the fall, and assist with evaluation in the spring by leading focus groups and helping with dissemination.
DISSEMINATION PLAN (optional)

Provide details about the journal, conference, show, or other external vehicle with strong potential for dissemination of your results. Include supporting documentation, such as preliminary interest or acceptance, with your application, if available. (Please note that special consideration will be given to proposals that have a defined opportunity for external dissemination, such as an academic journal or professional conference.)

ILI will arrange channels for disseminating results within RIT.

The videos will be available online for anyone to make use of them. To inform the public about their existence as well as what we learn about their effectiveness and potential to serve as a model for similar products, we will use the following outlets.

Campus Presentation by Students: NTID Brown Bag Series


Potential Journal Publication: Journal of Postsecondary Education and Disability, Deaf Studies Digital Journal, PRIMUS (Problems, Resources, and Issues in Mathematics Undergraduate Studies)
ADDITIONAL CONSIDERATIONS

Please address these questions, if needed.

Will your project require assistance for extensive or unusual media, multimedia, simulation, and/or software development? If so, please explain?

No, the software (Camtasia or similar) and video techniques we intend to use are readily available and easy to understand.

All courses offered by RIT must be accessible to students with disabilities, according to Section 504 of the Rehabilitation Act of 1973 and Title II of the Americans with Disabilities Act of 1990 (rit.edu/studentaffairs/disabilityservices/info). Is your proposed teaching approach accessible to all students, with reasonable accommodation? If not, please explain.

The videos can be easily captioned or voice interpreted. Our intent is to make videos that target students who primarily use ASL. Therefore, we are starting with this group.

RIT abides by the Family Educational Rights and Privacy Act of 1974 (FERPA), which prohibits instructors from making students' identities, course work, and educational records public without their consent (rit.edu/xVzNE). Will any data gathering or sharing for your project raise any FERPA issues? If so, please explain.

No. While we will ask students for feedback upon watching the videos, we will only report these results with consent, and we will consult with IRB about this process.
DISSEMINATION AGREEMENT

By completing this grant application, I agree to provide the materials described here, in support of disseminating what is learned from this project to other faculty at RIT.

I also agree to return all/a portion of the funds that I receive for this project to RIT if I fail to complete or provide the materials described here.

- Full project plan (including roles and responsibilities, milestone dates, and pertinent project details)
- Overview of preliminary findings (may include experiment/study design, lessons learned, initial data collection, and/or literature review summary)
- Final project summary (including data collection, lessons learned, implications for further study, and which may be in the form of an article abstract, conference presentation outline, or short report)
- Teaching and Learning Commons posting (a summary of findings and examples of teaching designs or materials)
- Participation in a faculty dissemination event
- Final budget accounting (reconciliation of budget provided with your application and the actual project expenses)

By submitting this application, I accept this agreement. **BJ** *(Applicants initials)*
DEPARTMENT HEAD CERTIFICATION

I support this PLIG application and budget, and verify that the principal applicant ______________________ is a full-time, tenured or tenure-track faculty member in good standing in my department.

Department Head Name (PRINT): ___________________________ Email: __________________

Department Head Signature: __________________________________ Date: ________________