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](http://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](http://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)
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.
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: David Halbstein _____________________________ Email: dlhfaa@rit.edu

Faculty Title: Assistant Professor (Tenure Track) ____________________________ Phone: 475-3982

(Full-time, tenured and tenure track only)

College: CIAS _______________________________ Department: School of Design, 3D Digital Design

Department Head name: Peter Byrne _____________________________ Email: pibfaa@rit.edu

Proposed Project title: Personalized Learning Environment using Augmented Reality to Increase Student Engagement and Success

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

Others involved in the project (if any): _____________________________

____________________________
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.

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<td>Preliminary findings submitted</td>
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<td>Summary of final findings submitted</td>
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<td>Final budget accounting submitted</td>
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<td>On or before</td>
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<td>(a summary of findings, examples of teaching designs or materials, etc.) due</td>
<td>Oct. 24, 2017</td>
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<tr>
<td>Participation in Teaching and Learning Services PLIG dissemination event</td>
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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.

Project Objectives

This application is for funding a Focus Grant to explore and implement principles of the Universal Design for Learning; although there is significant crossover into the areas described in the “Exploration Grant” opportunity as well.

A: Project Objectives

The intent of this project is to design a system that uses existing curriculum material (textbook) along with a system of “Augmented Reality” intended to supplement, enhance, evaluate and gamify the student experience. A longer-term goal of this project is to incorporate performance and preference tracking algorithms into the system designed to personalize the textbook to an individual student, and report statistical information back to the instructor.

While we intend to focus on an art and design curriculum for this opportunity, a primary goal of this project is to be curriculum-independent; adaptable to any curriculum where curated and guided exploration beyond the textbook is warranted. The augmentation is contextualized to the subject matter and made relevant to student performance, the classroom demographics, the personal learning attitudes and aptitudes of individual learners.

A major aspect of this research is in the area of “Incremental Mastery” achieved by the use of a virtual mentor triggered by an interactive use of the textbook or printed materials.

B. Statement of Problem

Research has shown that under three distinct conditions of instruction (Conventional, “Mastery Learning”, and Tutoring), there is significant incremental improvement when implementing Mastery Learning (ML) and Tutoring methodologies. However, the ability to implement these techniques in average-sized classes (~30 students) proves costly and impractical. The ML strategy yields a “1-Sigma” effect (wherein the average student is above 84% of the students who follow conventional instruction methods) when used alone; when used in conjunction with additional changes to variables such as quality of teaching, cognitive and affective entry characteristics of students, formative testing, rate of learning, and home environment, the results among tested students tend to be additive. (Bloom, p 4, 5).

Various checkpoints in the Universal Design for Learning indicate that student performance is improved with the implementation of several delivery methodologies. A single-stream approach (i.e., textbook) is not appropriate for all learners, but despite yearly claims of the demise of the traditional textbook, this staple of classroom instruction continues to proliferate. With the expanded resources technology offers teachers, the problem is no longer how to deal with the limitations of the textbook, but rather how to curate the nearly infinite amount of information available in so many different areas. A major part of this curation effort is to manage the variety of media, to organize its sequence and relevance to the course material, and test the impact of this additional information to student learning. Technology and methodologies proliferate, with a rate of change that is often faster than can be accommodated by a single course syllabus (a problem particularly apparent in a digital design curriculum). Efforts to curate this additional information must be supplemented with encouragement for an individual student to
freely explore advanced topics within the context of a structured class, and to have the opportunity to dynamically affect the curriculum as a result of this exploration.

Students, too, present individual challenges that must be addressed in order to improve outcomes. These challenges include, but are not limited to, demographic and language barriers, prior mastery of prerequisite topics, reading comprehension level, attention span, incentive, and relevance.

C. Significance to Student Outcomes

We anticipate that the implementation of our augmented system to accomplish a number of improvements to student outcomes, as shown by Bloom’s (and subsequent) research in “The 2 Sigma Problem”; specifically in the area of mentored guidance in pursuit of incremental mastery.

The virtual mentor presents the student with interactive formative assessment challenges, and can respond with remedial guidance (in the case of low assessment scores) either to review sections of the text or to ancillary, augmented material to present the lesson in alternate media: spoken word, full color illustrations, animations or motion graphics, video, etc. The formative assessment also acts as a gateway to further information and exploration which can only be unlocked once mastery has been achieved.

The mentor can also present additional challenges to a more advanced student (in the case of initial or subsequent mastery), which we believe will incentivize and gamify learning. Because the augmented content is triggered by a text, it is by definition relevant to the structure of the class; because it is accessed via a mobile device using customized software, it can track results back to the instructor and bridge the gap between the impractical need to individually tutor everyone in the class and the conventional need to maintain a certain pace in the class.
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.)

This project is unique in that it utilizes existing curriculum; it does not seek to replace or provide commentary on existing methods. Rather, we are attempting to leverage existing technology (Augmented Reality, mobile devices) with traditional and experimental pedagogical methodologies (Mastery Learning, Feedback-Corrective Guidance, and individual mentorship). By using mobile devices and interactive processes, we are able to curate and incorporate a wide range of custom, public domain and subscription-based resources for which the textbook acts as a springboard; these resources can be then dovetailed into existing curriculum to provide formative assessment, remedial guidance, advanced exploration, and information that is more current than a textbook can provide. In further research (not part of this project), we anticipate implementing “track-back” methodologies in order to gauge student interest and engagement, to learn about student preferences and to implement a more streamlined and personalized approach to individual engagement with the material. This personalized approach can be as simple as learning style (one student may prefer video tutorials to printed material) or more complex, such as reading comprehension or attention span issues, language barriers or gaps in prior knowledge.

Current projects at RIT are touching on elements of this project. In their research, RIT professors Garrick, Villasmil, et al, published findings regarding the engagement and learning of students in a technology rich learning environment. While their research was primarily classroom-oriented, this project applies many of the principles they studied (i.e., use of technology to personalize individual pace requirements, various information-delivery methods and media, overcoming social barriers by retaining anonymity through technology) to a more individualized study approach, i.e., homework. While Garrick, et al, address the idea of the “Flipped Classroom” from a classroom engagement perspective – seeking to leverage technology in the classroom itself to create a more engaging, interactive experience, we seek to address the other side of the “Flipped Classroom”. We want to leverage technology outside of the classroom to create an equally engaging interactive experience that provides mentoring, immediate feedback and corrective guidance, and incentive to mastery in preparation for the interactive classroom experience.

Augmented Reality is being explored in various disciplines on the RIT campus as well. In “The MAG Project”, along with Susan Lakin and the curatorial staff of the Memorial Art Gallery, we used an early Augmented Reality application to increase and incentivize visitor engagement with paintings at the MAG. R. Lagiewski, S. Jacobs, S. Foster and J. Petrich implemented an Augmented Reality educational feature to the "FLIP Through History" project, funded through the NY State Tourism Council.

(Please see "Works Cited")
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.

The project will begin with several consultations with the professors of one or more classes within the School of Design. For practical purposes, our original exploration will deal with courses in either 3D Digital Design or in Visual Communication Design.

To the extent that this system is intended to be curriculum-independent, these professors will have a considerable amount of input as to what text is being used, how it is being used, and to what extent this will be a resource for the students. Due to the nature of the curriculum in both disciplines, professors rely heavily on outside media to supplement the reading assignments given, which are either posted on MyCourses as embedded content or presented as links to outside resources. Assignments are often given that require outside subscriptions, such as via “Digital Tutors” or “Lynda.com”. The nature of this curriculum lends itself nicely to the focus of this research.

We believe it is important that we understand the approach that the individual professor is taking, and that we focus our efforts on the curation of that professor’s content and the delivery of that content using our augmented reality methodology.

We will begin by analyzing the course material presented in the printed text and identifying the salient points that the student needs to master. At specific points in the reading, the student will be prompted to take a quiz to gauge understanding. The quiz will be interactive, taking place on a mobile device; it will be triggered by visual cues in the text (augmented reality) or manually triggered by the student as a precursor to beginning an advanced topic. It will not be graded, but rather used as a gateway that leads to additional information as described in previous sections. Based on the outcome of this formative assessment, the student will be guided to additional content, either remedial or advanced/exploratory.

In anticipation of further research beyond the scope of this initial project, the student will be offered choices as to how the additional information will be presented. The specifics of these choices are part of the research, but will include various concepts outlined in the Universal Design for Learning; i.e., multimedia, spoken word, second language, and guided goal-setting.

The scope of this project, within the context of this proposal, is a smaller chunk of a larger project for which we are seeking outside funding. It is our intent to define a course, or part of a course, for which this interactive learning method can be implemented. The extent of the development of a custom Augmented Reality application and/or back-end software is going to be somewhat limited given the parameters of this opportunity. We are defining the scope, therefore, to use readily accessible AR software and focus our efforts on using it interactively.

Our research will be limited to curating the augmented content, creating the triggers within existing curriculum, and creating an interactive navigation system based on student performance.

The data collection will be entirely within the scope of the class; it will involve both quantitative and qualitative analysis. To the extent that the course syllabus requires the mastery of specific technical information, mastery of this information can be tested and evaluated. Ideally, we would like to offer this methodology to half the class using the other half of the class as a control, but it is also possible to compare student performance to prior years.

The qualitative analysis will be less specific as there are many more variables to consider; however, the overall aesthetics of the work produced can be related to both the mastery of the technical and the availability of guided research into full-color, moving examples of the ideas and concepts being presented.

We believe that this kind of testing will have to be done with the cooperation of the professor involved and the specific information being taught, and the exact nature has yet to be determined.

Another important assessment tool will be student feedback. Much of this feedback can be lifted from the RIT Student Evaluation Of Teaching Effectiveness process, but we plan to supplement this with our own surveys to gauge student response and self-evaluation.
Bibliography, Citations

Bloom, Benjamin, “The 2 Sigma Problem: The Search for Methods of Group Instruction as Effective as One-to-One Tutoring”, Educational Researcher, Vol 13, No. 6 (Jun – Jul 1984, pp. 4-16)


Foster, Shaun, Kuetemeyer, Seo, “Augmented Reality in Formal and Informal Education” SIGGRAPH 2014 Birds of a Feather talk

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.

SIGGRAPH 2017, Los Angeles, California; July 2017
Details of this conference have not yet been made public, but the conference sponsors several symposia on technology and higher education and on innovations in mobile technology and “mixed-reality” applications. In 2013, along with Susan Lakin, I spoke about the use of Augmented Reality in the MAG Project, described above; we spoke in Los Angeles, California and at SIGGRAPH Asia in Hong Kong.

Conference on Higher Education Pedagogy (CIDER)
Details on this conference have not yet been released; the conference is held at Virginia Tech in February, 2017. From the 2016 Conference web page:

“*The 8th Annual Conference on Higher Education Pedagogy is focused on higher education teaching excellence and the scholarship of teaching and learning. The conference showcases the best pedagogical practice and research in higher education today. Sessions address disciplinary and interdisciplinary instructional strategies, outcomes, and research. Ultimately, the conference is an opportunity to demonstrate effective instructional practice and disseminate the latest research aimed at improving the quality of higher education.*"

Along with Shaun Foster, I spoke at this conference in 2013 on the topic of “*Leveraging Pedagogical Expertise and Quality of Technology-Based Design Education Using Online Video in Course Content*, in relation to designing alternate-media curriculum for use in a Flipped Classroom setting.

Results of this research will be used to seek additional funding from the NSF and DOE; the curriculum-independent augmented textbook concept will be applied to STEM education in grades 6 - 16, to address the growing STEM gap in industry.
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?

The larger project will require assistance in the development of a custom Augmented Reality platform, but for the purposes of this grant the answer is probably not; our intent is to test the ideas with the free versions of commercially available software in order to determine our precise needs for further development.

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.

Part of the purpose of this project is specifically about accessibility; it addresses cultural, language and some disability barriers. Various augmented content is offered so as to provide alternatives for students who may have reading or language issues; captioning for all video and other spoken-word content will be provided.

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
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. DH (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): Peter Byrne
Department Head Signature: ________________

Email: pbtyne@rit.edu
Date: 02/08/16
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Travel Total $ 1,000

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Other Expenses Total $ 400

Total Award Request $ 5,000