

Personalization of Complete and Hybrid Online Courses in Geology

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ABSTRACT

Physical Geology Online (GEOL 1200) is a general curriculum science course taught 100% online. It is a survey course that introduces students to the processes and properties of the geological sciences. This is a reading intensive course with multiple levels of assessment, and it has been very successful based on student outcomes and end-of-term assessments. Nonetheless, the course is in need of revisions in style and instructor presence. It is a large enrollment course, so many traditional best practices methods for student engagement are difficult to implement. The proposed project will intercalate into the existing course a set of custom modules and pages based on the instructor's extensive encounters with geology in the field. These modules will be blended images made by the instructor and custom narratives. Language in the narratives will be made conversational so that students will hopefully perceive of the instructor as an individual instead of a presence. The ultimate goal is to personalize the students' course experience.

Budget Request for SOTL Grant Year _____

Joint Proposal? _____ s _____ ^{Ye} X No

Title of Project Personalization of Complete and Hybrid Online Courses in Geology

Duration of Project 2 years (15 January 2017 – 15 June 2018)

Primary Investigator(s) Andy R. Bobyarchick

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UNC Charlotte SOTL Grants Previously Received (please names of project, Pls, and dates) NA

Allocate operating budget to Department of Geography and Earth Sciences

Account #	Award	Year One January to June
Faculty Stipend	Transferred directly from Academic Affairs to Grantee on May 15	\$0
911250	Graduate Student Salaries	
911300	Special Pay (Faculty on UNCC payroll other than Grantee)	
915000	Student Temporary Wages	
915900	Non-student Temporary Wages	
920000	Honorarium (Individual(s) not with UNCC)	
921150	Participant Stipends	
925000	Travel - Domestic	800.00
926000	Travel - Foreign	
928000	Communication and/or Printing	
930000	Supplies	1500.00
942000	Computing Equipment	2700.00
944000	Educational Equipment	
951000	Other Current Services	
GRAND TOTAL		\$5000.00

Account #	Award	Year Two July to June
Faculty Stipend	Transferred directly from Academic Affairs to Grantee on May 15	\$ 0
911250	Graduate Student Salaries	
911300	Special Pay (Faculty on UNCC payroll other than Grantee)	
915000	Student Temporary Wages	
915900	Non-student Temporary Wages	
920000	Honorarium (Individual(s) not with UNCC)	
921150	Participant Stipends	
925000	Travel - Domestic	2500.00
926000	Travel - Foreign	
928000	Communication and/or Printing	
930000	Supplies	
942000	Computing Equipment	
944000	Educational Equipment	
951000	Other Current Services	
GRAND TOTAL		\$2500.00

Attachments:

1. Attach/provide a narrative that explains how the funds requested will be used.
2. Has funding for the project been requested from other sources? ___ Yes No.
If yes, list sources.

BUDGET NARRATIVE

It is understood that funding may be in flux based on state budgets and other controls. This budget is a best case scenario.

This is a two-year budget because all of the anticipated field work involved to collect new data can't be completed by 15 June 2017. Funds for travel are in both years.

In year one (2017), field work to pivotal or demonstrative sites in the Appalachians to collect new imagery or to supplement existing insufficient imagery is to be completed. A primary focus of this phase of the field work will be to collect high resolution GigaPan (multiple exposure high resolution image sets) of those sites. Example sites include but are not limited to: New River Gorge (VA, WV) (river erosion and migration), Linville Falls (NC) (nick points, fractures, ancient faults), Pilot Mountain (NC) (differential erosion, mountain building, metamorphism), Croatan National Forest (NC) (Carolina bays, coastal erosion, pocosin formation, sea level rise, cultural activities in the coastal environment), 40-Acre Rock (SC) (plutons and plutonic rocks, exfoliation, unique ecological niches), Uwharrie National Forest (NC) (historic gold mining activities and effects on the environment, ancient volcanic activity, orogeny), and others time permitting.

Year one also includes funds to purchase an EPIC Pro V GigaPan automated camera mount (http://www.omegabrandess.com/products/Gigapan/GigaPan-EPIC-Pro_2), which enables capturing very high resolution, zoomable panoramic images. The instructor will furnish his own cameras, lenses, and other peripherals except for a dedicated tripod for the GigaPan. The budget request also includes an Apple MacBook Pro or equivalent. This computer will have multiple applications. First, it will be used for on-site image storage and tethered camera control. Second, it will be used for on-site and mobile online course development. Third it will

be used to transport a large image database between campus and home, where a lot of course development also occurs. Fourth, this laptop will be used for in-class presentation and instruction for hybrid courses utilizing elements of the new materials developed. The instructor's present laptop is a 2010 model, which was purchased *quid pro quo* through course development or institute teaching, as was a previous model purchased around 2004.

The year two budget is all travel. This will support one or two excursions to collect geological imagery that is not present in the eastern US, and to attempt to collect a wide range of features present in a relatively small region. For example, central and southern California has features ranging from mountain glaciers to recent coastal sea level change to deep impacts on ground subsidence through agricultural practices. Other possibilities include active volcanism and glaciation in Oregon and Washington or Iceland.

No faculty stipend is requested because the instructor expects to be teaching in both summer sessions. This includes the course – GEOL 1200 Physical Geology Online – in first summer session in 2017 and 2018.

LETTER OF SUPPORT



Office of the Dean

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Banita W. Brown
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October 27, 2016

SOTL Grants Committee
Center for Teaching and Learning
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Dear Committee Members:

On behalf of Dean Nancy Gutierrez in the College of Liberal Arts & Sciences, I am writing this letter in support of the SOTL proposal submitted by Dr. Andy R. Bobyarchick from the Department of Geography & Earth Sciences entitled, "Personalization of Complete and Hybrid Online Courses in Geology". The course, Physical Geology, GEOL 1200, is currently a general education science course with large enrollments. The course section which is described in this proposal is taught 100% online by the instructor, Dr. Bobyarchick. The request is to enhance the curricular content of the course through personalization of the content. New geological images from the instructor's actual field work experiences will be integrated with existing course materials in order to provide students with a personalized learning experience in the online course format.

As the enrollment growth of UNC Charlotte continues and our space needs increase, online instruction may become a viable option for managing large course enrollments. The ability for this institution to maintain strong faculty-student engagement opportunities in order to promote student success will become challenging. This project seeks to develop an online environment where students gain a personal knowledge of the instructor through the course content.

I recommend this proposal for your consideration. Please let me know if you require additional information.

Sincerely,

Banita W. Brown
Associate Dean for Academic and Student Success
College of Liberal Arts and Sciences
Associate Professor of Chemistry



PROJECT NARRATIVE

This proposal describes a project to enhance curricular content in 100% online, general curriculum science courses by incorporating experiential visual and narrative materials drawn from the instructor's personal research. Based on recent communications, the University is evaluating instructor presence, instructor connection, and student engagement and learning in online courses. The proposed research directly supports enhanced forms of instructor presence and personal connections in an online course.

Specific Aims

These initial comments apply to a 100% online course (GEOL 1200 Physical Geology Online) that the instructor has offered in the UNC Charlotte general education curriculum for many years. This course satisfies a physical science requirement, and was originally designed to scale to large enrollments per section (typically 110+ per section in the standard academic year). Within the last five years, over 1,000 undergraduate students completed sections of Physical Geology Online offered in the standard and summer academic sessions. Summer sections have also attracted students in active undergraduate programs at many other institutions in the country, as this is a standard general education course offered in higher education.

The **overall purpose** and goal of this project is to personalize the online course curriculum by developing and injecting custom materials that reflect the instructor's 30+ years of research and encountering geology in the field. These materials thus will provide a mirror of the instructor's persona (as reflected in images and narratives), and they will better speak to the individual student as a person than most of the existing course materials.

For large enrollment 100% online courses, students sometimes think of the instructor as a disembodied, omnipotent, and ghostly presence. If the instructor does not have cadres of teaching assistants, it is difficult to personalize the course experience. Some online courses provide talking heads video recordings of in-class lectures. This instructor thinks such resources are less exciting than watching paint dry, even though they are quick ways of building an online course from a standing physical course. The present course does have audio recordings of interviews of the instructor by local radio shows and short video interviews by television stations.

Specific objectives to be achieved are: (1) perform an analysis of current themes in GEOL 1200 that will be enhanced with new content; (2) create new content for the identified target themes by evaluating the existing personal imagery and field notes database; (3) identify gaps in this database to be reduced with newly collected field and lab images and reference materials; (4) prepare new curricular materials and integrate those with previously developed materials; (5) integrate the personalized materials with existing materials in a Canvas LMS; and (6) create formative and summative assessment tools for student response and for self-evaluation.

Some of the resulting new project resources can also be used in other courses taught by the instructor at the advanced undergraduate and graduate levels. For example, new course materials addressing the elements of rock deformation, earthquakes, and mountain building can also be presented in the online components of GEOL 3130 Structural Geology. ESCI 6000 Geology for Educators is taught in summer sessions exclusively for MAT students in the College of Education. Because of different levels of topical preparation in students in this course, the

course serves as both an introduction and overview of geology, and as a conduit to more advanced applications in the field such as conducting indoor radon surveys and analyzing the results of x-ray analyses of crystalline natural materials.

For those personalized curricular elements suitable in use for these advanced classes, the content will have thin and thick content. All content will have thin material, which assumes little or no prior knowledge for the student in geology. Thick material, available to but not necessarily assessed for GEOL 1200 students, will be more extensive and in-depth than thin material.

Literature Review

“Personalized learning” has multiple definitions and implications (Educause 2016). Typically, the focus is on personalizing a course for the student’s benefit, that is, conveying a greater sense of personal recognition to the student. Personalization may be an outgrowth of instructor-learner interaction (Dennen, Aubteen Darabi et al. 2007), but other forms of interaction involve learner-learner, and learner-content interaction. Dennen et al. (2007) further noted that “instructor presence” may be derived from an online instructor’s actions and from the contents of those actions. Here, personalization is viewed more as a consequence of the nature of interactions between instructor and student and less as to how the course content speaks to the student.

Ginns and Fraser (2010) found that online instruction using a conversational style in place of a more formal style of writing enhanced success among students learning scientific terminology. Considering that presentation style may have a positive effect on learning, one may go farther and suggest that the online learning environment benefits from a constructivist

philosophy in content design (Rovai 2004). Key to this argument is that the student is an active, engaged participant in the learning environment. Rovai (2004) cites Jonassen's (1994) constructivist strategy and design for online learning to focus on "knowledge construction" instead of recitation. In comparing traditional versus constructivist learning environments, Rovai (2004) compares the instructor as "expert, source of understanding, lecturer" in the former to "collaborator, tutor...encourager..." in the latter. Rovai (2004) goes on to prescribe several constructivist strategies for online course design. Unfortunately, many of those best practices strategies work best if not only in small enrollment classes and/or classes for majors. For large classes, in particular those without dedicated assistants, class management could subsume all of the instructor's teaching commitments. This does not work well for instructors teaching two or three other classes at the same time.

Nonetheless, it *is* worthwhile to build in some of those constructivist concepts to the proposed new personalization course content. There are several avenues possible. One is to base threaded discussions on some of the modules and to require students or sub-sets of the whole class to make brief responses to a prompt created by the instructor. Another similar idea would be to have students write a brief opinion regarding the module content or even respond to a request for additional questions.

Methods

The present GEOL 1200 course is reading intensive. Students must have access to the required textbook because there are about 15 chapter reading quizzes. There are also 12 custom modules written by the instructor that, in varying numbers for given semesters, have associated quizzes. Five exams re-test these reading assignments and also introduce new

problem- and analytical-style questions. Each class also has an action oriented assignment that are sometimes done as team projects and other times as individual projects. These include Flat Andy (photograph a drawing of the instructor in front of a geological feature), GeoTree (a branching set of increasingly difficult challenge questions), Home Radon Testing (mainly for advanced classes), GeoLocality (conduct and report the geologic setting of a specific site, similar to a Phase 1 environmental analysis), and The Puzzle of Salt (a reading and discovery activity on the geology and societal significance of salt).

Of the custom written topical modules, one student wrote on the current semester mid-term response form that he or she did not think these modules added a lot to the course experience. In part, this may be because the instructor elected not to offer dedicated quizzes to most of the reading modules from the fear of over testing and thus the student may have felt the modules to be superficial. So, the instructor will pay close attention to making existing and new custom course content more directly (if not abundantly) linked to some form of assessment, even if it is just reading completion.

Because there are no face-to-face encounters in 100% online courses, bi-directional personalization features in course delivery are an important consideration. Small enrollment courses may make use of conference tools, but these can be impractical for large courses. Course discussion blocks can be useful asynchronous tools, but many students still prefer to use e-mail, phone, or office visits. The present GEOL 1200 course has an About Me assignment where students write a short profile and post pictures of themselves (except for students in the witness protection program, who can post a picture of their dog or car). Modern students are very expressive in these writings. There is little flavor, however, of who the instructor is.

As a field science with significant laboratory support, geology is highly experiential. Many students choose geology as their science course because they like the natural world and want to learn more about it. Practicing geologists have the opportunity to see that world first hand, and to relate the experience to others. Introductory geology textbooks are full of pictures of rocks and scenery. For most, those pictures are culled from stock collections, government resources, and rarely from the books' authors (unless the author happens to be a photographer). These images provide nice visuals, but the authors and instructors who use the text can't necessarily say that they have "been there and done that." This personal experience where available, however, lends a sense of authenticity if not authority to the examples.

It occurred to the instructor, who has done photography since 1965 and who has had numerous opportunities to see geology in the field since 1970 and make images of that geology, that this image database and the experiences it conveys could be a useful tool to communicate to students the visceral experience of seeing geology first-hand. It is a career narrative.

Translating that narrative to students in GEOL 1200 in digestible form will occur through the development of multiple chunks of information presented as modules (or pages) in Canvas, the LMS being implemented at UNC Charlotte. Each chunk of information will contain one to three images within a cohesive, relatively short narrative. Only images collected personally by the instructor will be employed. These modules will be extensions to and not replacements of other presentations of similar information in the textbook or online references. Although it may not be perfect net etiquette, it's possible the narrative will be written in first person. It seems more personal to write, "It was 106°F. I walked through dry washes in the high Mojave Desert east of

Victorville to avoid the blazing sun and to reach these climbing ripples on the windward face of a sand dune” than to write, “The writer walked to a sand dune and found these sandworms.”

One can think of these information chunks or modules as cards on which imagery, text, and pointers to other resources are imprinted. The card “front” will contain introductory level information; the card “reverse” will contain advanced information. Stylistically, the module may in fact be a virtual card with two faces connected by hyperlinks.

The images will vary in scale and detail, depending on what feature or concept is being illustrated. Geologists often examine “outcrop scale” features. That generally means the observer can see most of the details of the feature with the unaided eye. If the feature is small fractures in a rock mass, the outcrop may be only a few meters across. Landscapes, such as a linear fault scarp running along the foothills of a mountain range, of course are portrayed so that the observer can see most of the *relevant* details (a mountain, a scarp, a pediment, an alluvial fan) in the image but not the fine details. GigaPan imaging, where many high resolution images are patched together, provides zoomable scale images so that both large- and small-scale features may be investigated by the observer as desired.

Between 65% and 75% of the images and supporting notes and references are expected to already be on hand in the instructor’s collection. There are, however, some gaps both in the topical coverage and quality of coverage desired. The existing collection reflects the instructor’s research interests and opportunities to dovetail data collection on organized field trips, conferences, and personal travel. The instructor has seen geology in 49 US states (missing Hawaii), Puerto Rico, British Columbia, Alberta, St. Eustatius (Lesser Antilles), Ireland, Scotland, England, Switzerland, Italy, and Turkey. Images were collected in most of these locations, but

often anecdotally to other missions. Travel funding is requested to collect new data to fill in certain gaps or supplement existing images. Some of the gap areas include active volcanoes, mass wasting (landslides), glaciers, coastal uplift, groundwater depletion, and energy production.

Evaluation

Both formative and summative student assessments will help evaluate the efficacy of the results of this project. Because each module will be relatively compact, formative assessments will involve only one or a few questions related to the intrinsic topic of the module. These questions, or variants, will be included in the summative exams conducted four times during the term as well as the cumulative final exam. Formative surveys will also determine if each module is meeting its desired objective. An end-of-term formative survey will also be issued so that the instructor can modify, replace, or reject some of this content.

The instructor is a current participant in the UNC Charlotte Quality Matters (QM) initiative, and GEOL 1200 is in preparation for QM recognition by 1 April 2017. The proposed content will not be fully developed by then, but the course “wrapper” will meet QM rubric standards. If there is significant course revision, the course may have to be re-reviewed to meet those standards.

Knowledge Dissemination

The instructor actively participates in annual national and regional meetings of the Geological Society of America, an international society. The national meeting normally has many presentation sessions (oral and poster) on the pedagogy of geological and earth sciences. I will plan to present a summary of this research at the 2017 or 2018 (October) annual national

meeting of GSA in one of these sessions. The primary outlet for pedagogical research in geology is the Journal of Geoscience Education. The instructor has previously published and presented papers in both venues. Another possible outlet for presentation is the Fall meeting of the American Geophysical Union, that meets in December. Pedagogical sessions of both organizations are typically well attended, and the participants are largely in higher education or high school teachers. The course materials will reside in Canvas, which does have a Commons area for sharing modules, pages, and web design components for teaching online. Although the personalization elements of the proposed research may not be suitable for posting to Commons, it is anticipated that some form of HTML, CSS, navigation, and design elements involved in the proposed products may be sharable there.

Human Subjects

A reading of the University's Policy 306 suggests that the proposed research does not warrant IRB review. There are no risks to students, assessment results beyond those necessary for assigning grades are aggregated anonymously, and the subject of the research is to develop pedagogical materials for use in instruction.

Extramural Funding

It is not anticipated that extramural funding will be sought for extending this project. It could become part of a larger university initiation to personalize online courses in various ways, but that does not necessarily invoke external grant efforts at the individual level.

Timeline

This is presented as a two-year proposal mainly because of the integrated component of new field work that can't be accomplished before 15 June 2017. The grant period begins 15

January 2017 and ends 15 June 2018. From January-May 2017, the principal project activity will be to catalog and extract existing imagery and notes to serve as the skeletons of new topical modules. May-June of 2017 will include field work to collect new data and to take place in the central and southern Appalachian Mountains.

The instructor will teach GEOL 1200 in the 2017 first summer session in Canvas for the first time. The course will be migrated from Moodle prior to that time, and in setting up the translation, blocks of pages and modules will be staged to include some of the new material. It is possible that the course will also be taught in the Fall 2017 term, allowing for more updating with information collected over the summer. One or two field excursions will take place in the second year to non-Appalachian sites. The fully revised and updated course will be offered in the 2018 first summer session starting in May.

REFERENCES CITED

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