

FOUNDATIONS

Newsletter of the Geo2YC division of the National Association of Geoscience Teachers
Volume III, Issue 4: December 2014

When the Bells & Whistles Fall Silent: *Lessons for geoscience educators, behind bars*

by Sadredin “Dean” Moosavi
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Strolling down the aisles of the exhibit hall at GSA, AGU or NSTA reveals numerous booths from publishing houses, federal research agencies and specialized businesses promoting products and curricula designed to help us improve the accessibility, interest and learning outcomes for the vast majority of students who do not end up specializing in the geosciences. The research literature in geoscience education is replete with NSF-funded research on the efficacy of the use of clickers, course management systems, eye tracking systems, on-line modules, geowalls, podcasts, social media, science on a sphere, etc....all in a desperate attempt to escape the perceived inadequacy of the old fashioned lecture, textbook, chalk and blackboard classrooms of 50 years ago. All of these modern approaches have evidence to recommend them, but also come at great cost in classroom time and institutional resources at a time when full time faculty are being replaced by adjuncts and laboratory activities and field camps are seen as increasingly cost prohibitive. Is it possible, however, that we have become so caught in the “flair” of education that we have lost sight of the point...which is to produce engaged minds-on learning by students?

I ask this question in the context of an introductory geoscience course I had the opportunity to teach as

an adjunct a few years ago in a medium security prison. For those who have never had the opportunity to teach in such an environment, let me describe a typical day. My course was set to run twice a week for two hours over a 15-week term. All lectures/materials that would need to be presented via PowerPoint for the entire course had to be developed prior to the start of the semester and delivered on a flash drive for installation on a single classroom computer attached to a portable projector that remained in the classroom. The only other materials available would be paper copies brought in by the instructor or items that could be written on a white board with dry erase markers. The instructor would have to choose a textbook from those available to the prison system. The text I chose had just released its 13th edition when I had to make my choice....which was a slightly out of date 5th edition!

The students were similarly limited in the resources, which they would be able to access. As prisoners, they were each assigned a textbook and given paper and writing implements, but they were not allowed access to the internet or computers for word processing. The notes and diagrams on the power point were only available during class, so students had to take and rely on their own notes the rest of the time. While the students could use the prison library, topics in geoscience were hardly its strong suit, the closest thing to a journal was a copy of the local newspaper. Another difference with typical students was the only contact they could have with their instructor came during class time; no e-mail, no office hours, not even the option of staying after class to ask a question. Despite these limitations, the students had two tremendous assets, which I will speak to in a moment.

Our typical class day began with my calling the prison about two hours before start time to confirm that class was able to proceed for the evening. (One

night class had to be cancelled because the entire prison system was put on lock down due to a gang killing.) Once I got the green light I would pack my papers into a transparent plastic bag and make the hour trip to the prison. I would sign in at Master Control, go through a metal detector and then wait until an escort was available to bring me to my classroom in a building several hundred yards into the facility. My escort would give me the opportunity to use the rest room, attach a personal alarm device to me and then drop me off in the classroom with the computer giving me about 15 minutes before the prisoner movement period would begin. During this time I could set out papers on the students assigned seats and get everything as ready as possible. Then I'd have to wait. Most of my 24 students would arrive in groups of two or three over a five-minute period. Once in the classroom I had a truly captive audience as no one was allowed to leave until the next movement period about two hours later. I say about because events elsewhere in the facility sometimes impacted our schedule forcing us to start later or end earlier. No exceptions allowed...when movement starts, the students had to leave no matter where we were in the lesson. I would then have to wait in the classroom until I could be escorted back out of the prison in a reverse of the original process. Given the assumptions behind the push for the bells and whistles of educational reform, one would assume that my students would be doomed to failure using ancient texts and with an instructor seriously limited in presentation mechanisms. Yet they actually did very well, demonstrating greater learning success on both class projects and standardized assessments I use in my regular classes. Why?

Were my students somehow different? Not really...other than being all male and in a prison for a variety of felonies ranging from arson, production and sale of crystal meth, and attempted murder, they reflected the state's mix of urban and rural communities including a fairly equal sample of people from all major racial groups. Some of my students clearly came from struggling urban schools while others came from middle class rural and affluent suburban schools. The students ranged in age from early 20's to mid 40's. They closely matched the male general education population of a community college or state university.

My students did have two advantages, however, which I was able to direct my teaching toward that made them successful: Time and Motivation. Unlike the average college student, my prisoners had significantly more free time built into their day than those on the outside who juggle classes with



Dean Moosavi in his classroom, a place for contemplating the essentials of teaching.

work and social activities. In the prison, time is very structured, with more openings for study amidst fewer options for distraction. Most people in prison do work to help defray the costs of their incarceration whether in a commercial laundry, wood shop, etc. and the prisoners do receive pay. Only prisoners on good behavior and working toward pre-requisites for a technical degree or college transfer program were allowed to sign up

for classes...and they had to pay tuition. While my salary was paid by external grants, the students were still required to pay tuition of \$10 for the class... a considerable sum when one is paid between 12 and 25 cents an hour. My students wanted to be there to prepare themselves for life on the outside and to show that they could contribute to society. So, what to do with time and motivation?


My teaching approach in and out of prison has long emphasized a place-based writing project as a way to get students focused on applying the geology they are learning to their own lives. Initially I had concerns that this approach might not work well in the prison environment given the students' very limited ability to look for outside information and the potentially hostile response one might get from discussing beautiful far away places with an incarcerated population possessing no freedom of movement. Fortunately my fears were misguided. The students' incarceration had the opposite effect, giving them focus on places that were meaningful to them that they could NOT visit now...but which they hoped to return to. The old saying that you can't appreciate something until you lose it applied in full. Further, with the students' lack of outside resources and greater free time, they were able to focus on THINKING about what they were learning and applying it to the places they were describing from their memory. Rather than rehashing partially understood terms from an on-line source...they had to really think and express themselves. Even those whose writing skills were not the best expressed themselves with passion, accuracy and clear evidence of learning...evidence backed up by the standardized multiple-choice pre and post-test results on generic geoscience principles. An outside reader of these students' essays compared to those of my typical classes would only be able to distinguish the populations by who used a computer for word processing, cutting and pasting imagery versus those who had written everything by hand, drawing images and maps from memory to express themselves.

The constraints of teaching in this manner required some extra effort on my part as instructor. Besides the obvious burden of reading hand-written essays in the computer age, I also had to spend a lot more time giving written feedback to the students that one could normally share by e-mail or in a quick office visit. A beneficial side effect of this effort, however,

was development of a strong personal relationship between the student and instructor regarding their work. The importance of the instructor in student success is made very clear in a situation like the prison where so few other sources of information exist. The students recognized and appreciated this effort and thus gave more of themselves in response to that investment... returning with even more questions for me to answer. The good working relationship between instructor and students was particularly demonstrated on the occasion when I risked bending the rules and smuggled a dozen small hand samples into the class so they could actually handle some major rock types. The students knew the risk I had taken to bring those 1-inch rocks in... and they treated them like nuggets of silver and gold in return. It was clear after those occasions when class had to be cancelled because of prison conditions or my being ill that our class time was sorely missed... perhaps the greatest complement a teacher can experience.

Not all my students made it through the class. A few dropped out relatively early on for a variety of reasons unrelated to the class. Another got released earlier than expected. Another nearly lost his place after making the mistake of getting a tattoo, an extremely painful, risky and forbidden process, which landed him in solitary confinement. Despite his predicament, he expressed the desire to complete the class and was given the opportunity to finish the last few weeks purely using the textbook and his notes in isolation with assignments being exchanged asynchronously via the guards. He too passed. For the remaining students, on the final day when they turned in their projects and exams, you couldn't help but see the pride on their faces for the hard work they had done and all they had accomplished in our time together. Their gratitude at being given the chance was expressed in the hand shake that each student gave me on their way out the door.

As teachers who love the geosciences we naturally are drawn to find ways to best meet the needs of our students. My experience in prison suggested to me that in our rush to find better ways of teaching, we should not confuse new strategies and fancy technological devices that attempt to compete with distractions with the benefits of developing a personal relationship with our students that focuses on the basic ways in which people have learned for

hundreds, if not thousands, of years. Do we *REALLY* increase student learning when we focus more and more resources into technology if it comes at the expense of having to place students in larger and larger classes to pay for it? Do the bells and whistles *ACTUALLY* improve learning or merely distract us from the harm that reducing the traditional role of the teacher causes in the classroom. Perhaps that's the study NSF should fund. 

Initial Results from “Flipping” a Traditional Physical Geology Lecture

by **Bill D. Richards**
North Idaho College

What possessed me? What possessed me to “pull the trigger” and switch to a 100% completely flipped in-class experience from a traditional, although excellently delivered, lecture model? As with many of my geoscience education colleagues, I was looking for methods to increase student success without compromising content or assessment rigor. The motivation to take that final step, or leap, came at the close of the spring 2014 semester when I experienced an undeniable increase in exam averages over previous semesters, with a single three-week trial of the Learning Catalytics platform from Pearson Publishing.

For both of the freshmen geoscience courses I taught last spring, Physical Geology and Physical Geography, I decided to give the “flipping” experiment a try for the last three and a half weeks of the semester (one major exam’s worth of material – a fourth of the semester). There was an outstanding 13.5% increase in exam averages over previous semesters’ fourth exams! Further, students’ written comments on end-of-semester evaluations noted the desire to have those experiences the entire semester and not just part-time.

The decision was, therefore, to “take the leap” and convert the entire PowerPoint-based lecture model

to a “flipped” model utilizing the Learning Catalytics platform. The craziness and pitfalls of such a decision can be presented another time, but for now, I would like to present the results of the success I had, controlling for as many variables as possible.

The Spring 2014 and the current Fall 2014 semesters are compared because both semesters required students in the compared sections to complete the same Mastering Geology homework assignments, both semesters utilized the same assessment criteria on each of the exams (exam copies were not returned to students, but retained in my office files), and both semesters utilized the same edition of the *Earth* textbook by Tarbuck and Lutgens. Only the first three exams of the semester are compared because the fourth exam in both semesters included the use of the flipped model. The most telling metric, I feel, is the distribution of scores for the average of the three exams. As shown in Table 1, the percent of the class scoring 80% or better increased noticeably between the semester without Learning Catalytics (LC) and the current semester with LC, increasing from 21% to 32% of the students. As important, the percent of the class scoring less than 70% decreased from 50% to 36%. This result indicates the flipped model may serve to push some “B” students into the “A” range, push some “C” students into the “B” range, and decrease the overall number of “D” and “F” students.

Another comparison (Table 2) shows the three-exam average score for each quartile of students enjoyed a consistent increase of about 3% for the flipped class over the non-flipped class.

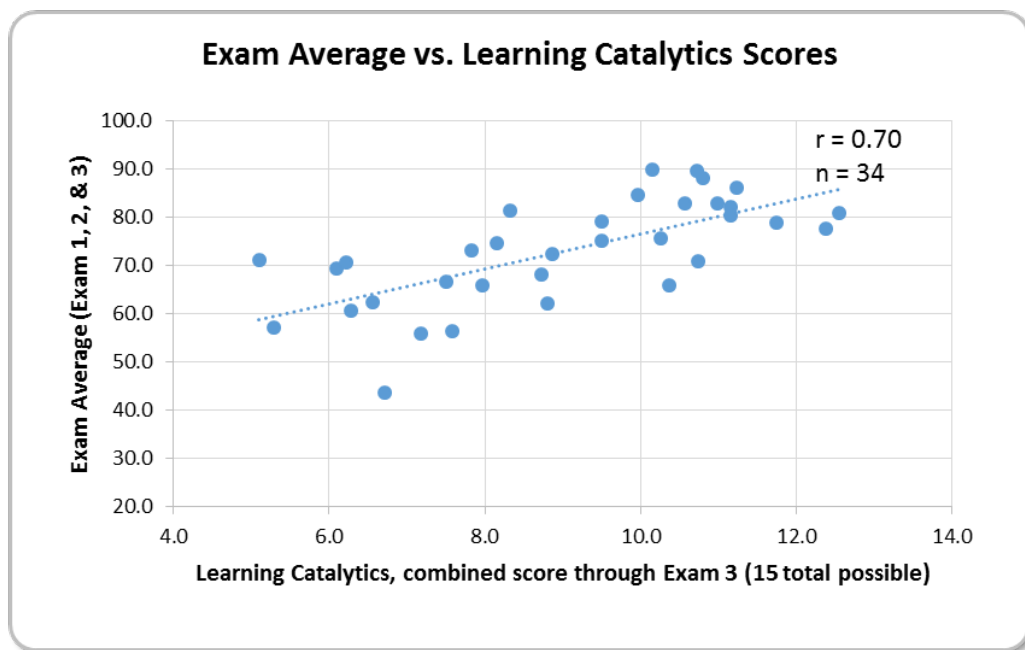
Table 1: Score Distributions (% of class in each grade group)		
Overall Exam Grade Average	Spring 2014 without LC	Fall 2014 with LC
≥ 80%	21.0%	32.0%
70.0 - 79.5	32.0%	32.0%
60.0 - 69.5	32.0%	24.0%
≤ 59.5	18.0%	12.0%


Although not itself a direct indicator of improved success for one semester over another, the correlation between scores from in-class engagement activities and the three-exam average is easily observed in the graph (Figure 1). It is clear from the graph that being prepared with the out-of-class content/assignments, resulting in students performing better during in-class engagement with the LC platform, correlates well with higher exam averages. Students in the current semester are not shown this correlation result;

however, this result will be explicitly shared with students at the start of the next semester (Spring 2015) and future semesters, the hope being that less “self-regulated” students will make behavior modifications to improve success.

A final metric to examine involves how often, and with what timing, students re-visit the in-class session online for review prior to exams. Since the Learning Catalytics platform is cloud-based, each in-class session can be made available to students for re-working, review, or practice after class time. Unfortunately, this metric is not tracked by Pearson and I must rely on students self-reporting this data at the end-of-semester survey that will be administered. This may provide another dimension to understand how this particular flipped model helps improve student success.

In conclusion, even though changing to the flipped



model of instruction was a significant investment in time and a significant shift in classroom operational modality, an improved rate of student success does seem to exist. The modifications and adjustments that may be made for future semesters, as well as an examination of the content delivery and in-class engagement components actually used can be the subject of a more in-depth presentation in the near future. 

President's Column

by Ben Wolfe

Metropolitan Community College – Kansas City

No matter how much I try to plan, this time of year is always busy. The semester is rapidly coming to a close, winter break and a busy Holiday season approaches, the need to plan for a new semester and prep for new classes is just around the corner, plans for traveling and seeing family and friends are in the works, the list goes on and on. Yet as I prepare this column, fat and lazy after a week full of turkey and leftovers, I find myself taking a moment to reflect on success of this past year for Geo2YC. Our division continues to be a leader in NAGT, raising awareness of the importance of two-year colleges in the geosciences. We continue to have a strong presence at national conferences from the Ocean Sciences Conference in Hawaii, GSA in Vancouver, to AGU in San Francisco. Two-year college geoscience faculty were included (and were listened

**Table 2: Overall Exam Averages
(Exams 1, 2, & 3)**

	Spring 2014 without LC	Fall 2014 with LC
upper quartile	82.5%	85.9%
2nd quartile	75.1%	78.3%
3rd quartile	67.2%	69.9%
bottom quartile	55.6%	58.9%

to!) at the Summit on the Future of Undergraduate Geoscience Education last January in Austin, Texas. Our members are leading national workshops and webinars on two-year college student transfer in the geosciences. Geo2YCers are leading the way in establishing partnerships with our four-year counterparts. Members have even taken on leadership roles in GSA and AGU bringing the voice of the two-year college to those tables. However, I am most thankful for the hard work, passion, and dedication for teaching geosciences that you my fellow colleagues have. As open



access institutions, two-year colleges serve a unique mission in higher education by providing access and social mobility to all. It is a noble calling and one I hope you are just as proud as I am to be a part of. If one word could best describe our annual business meeting at GSA in October that word would be “transition.” This is my first President’s column, tasked with the job of filling some very big shoes left by our previous President, Merry Wilson. Please join me in thanking Merry for her wonderful job at the helm and for her hard work in continuing to grow our division! Thankfully, I can still rely on her leadership as she transitions to the Past President position. Let me also take this opportunity to thank the other outgoing division officers:

- Allison Beauregard – outgoing Secretary/Treasurer
- Callan Bentley – outgoing newsletter editor
- Kaatje Kraft – outgoing webmaster
- Lynsey Lemay – outgoing Past President
- Suzanne Metlay – outgoing Archivist

These individuals have been serving in their roles since the establishment of our division and all have done an outstanding job in building a fledgling division into a strong, vibrant, and engaged community! Thank you again! While this has resulted in significant turnover in leadership of our division officers, it has also provided an exciting opportunity for new leaders in our Geo2YC community to come forward. Please welcome our new Division officers:

- Frank Granshaw, Portland Community College – Webmaster
- Amber Kumpf, Muskegon Community College – Archivist
- Thomas Whittaker, University of New Mexico at Valencia – Newsletter Editor
- Christine Witkowski, Middlesex Community College – Secretary/Treasurer

Also, although not new to the Geo2YC community but assuming a new position is Kaatje Kraft, now at Whatcom Community College, who is the incoming Vice-President. I am excited to be part of a great leadership team!

In the coming year we hope to continue building the membership of our division and helping to serve as a community for our colleagues. Be looking for several white papers on supporting field studies as well as the importance of geoscience education in the two-year colleges. A great way to start getting involved is by attending an annual meeting of our partner societies (GSA, AGU, and ASLO to name a few). Better yet, consider proposing and leading a short course or technical session! The deadline for 2015 GSA technical and short course proposals is the first two days of February and more information can be found at: <http://geosociety.org/meetings/2015>. As always if you have any needs, ideas, or just want to get involved, please don’t hesitate to contact me or any of the other division officers. Happy Holidays and I hope the New Year brings new and exciting opportunities to engage your students in the geosciences! 🏔️

Scenes from the 2014 annual Geo2YC Division
business meeting at GSA:



Michelle Selvans, 2014 annual OAFA winner

Congratulations to Dr. Michelle Selvans, 2014 Annual Outstanding Adjunct Faculty Winner

by Allison Beauregard, Brett Dooley, Kaatje Kraft, and Karen Layou


Northwest Florida State College, Patrick Henry Community College, Whatcom Community College, and Reynolds Community College

The Geo2YC OAFA Committee is pleased to announce Dr. Michelle Selvans as our 2014 Annual Outstanding Adjunct Faculty Winner! Michelle was selected from an outstanding group of past Quarterly OAFA Honorees by votes cast by NAGT members. Michelle was recognized in [the May 2014 issue of *Foundations*](#) for her efforts to engage geoscience students at Northern Virginia Community College. In addition to a complimentary 2015 membership to NAGT and the Geo2YC Division, Pearson Education has generously agreed to provide Michelle with a \$750 honorarium to support professional development,



such as attending a regional or national conference, participating in a professional development workshop, or the development of a classroom activity. Thank you to Pearson for allowing us to support our adjunct colleagues. Congratulations, Michelle, and thank you for your hard work as part of the Geo2YC community.

If you are currently working with fantastic adjunct colleagues who are doing great things with their students, or if you are an adjunct making noteworthy contributions to your program, please complete an Outstanding Adjunct Faculty Award nomination form, located here:

https://www.nagt.org/nagt/divisions/2yc/oafa_nomination.html. Your nominees may be recognized in future issues of *Foundations!* 

Outstanding Adjunct Faculty Award Quarterly Honoree is Michael Whittier of Modesto Junior College

by **Karen M. Layou and Brett Dooley**
Reynolds Community College and Patrick Henry Community College

The OAFAC Committee is pleased to announce Michael Whittier of Modesto Junior College as the December 2014 Quarterly Honoree. Michael was nominated by Garry Hayes, Professor of Geology at Modesto Junior College.


Garry writes, “Mike is a well-regarded member of our division who has taught courses on a part-time basis for more than a decade. He is popular with his students, and a large number of them decide to pursue a geology/earth science major. Even though it isn’t required of adjunct faculty, he has participated in division meetings, and has volunteered in our field studies programs. Mike has also supported earth science education in our region by serving as the president of the Mother Lode Mineral Society, leading rock hounding trips and organizing the yearly mineral show in Turlock, considered one of the best in California.”



Michael Whittier, on the beach in Vik, Iceland, August 2014.

Congratulations to Michael from the Geo2YC executive council! We are pleased to award Michael with an honorary membership to the Geo2YC Division of NAGT for 2015 and he will be in the pool for consideration for the annual award announced at GSA 2015.

If you work with an adjunct colleague who deserves recognition, or are an adjunct who is actively engaging geoscience students, please complete the nomination form at:

http://nagt.org/nagt/divisions/2yc/oafa_nomination.html. 

UNVACO seeks community feedback on geodesy in undergraduate field education courses

[UNAVCO](#) is working to get input from the community on how best to support the integration of geodetic methods into undergraduate field education courses. Technologies such as terrestrial lidar scanning (TLS) and real-time kinematic GPS (RTK GPS) have been successfully incorporated into field camps and campus-based field courses (see [talks from recent workshop](#)). UNAVCO is seeking input on how to further these efforts.

Please take 5 minutes to complete this survey so that UNAVCO can better plan for the future and show NSF the community interest in geodesy for field education:

<http://www.surveymonkey.com/s/fieldgeodesy>

New or Updated Resource Guides for Astronomy Educators

by **Andrew Fraknoi**
Foothill College

A new guide to educational resources about eclipses in general and the “Great American Eclipse of the Sun” in 2017 are available at:
<http://www.astrosociety.org/eclipse2017>

New resource guides in the *Unheard Voices* series, “The Astronomy of Many Cultures” and “Women in Astronomy” can be found at:
<http://multiverse.ssl.berkeley.edu/Learning-Resources/Educator-Resource-Guides>

An updated guide to science fiction stories with reasonable astronomy and physics (organized by science topic) is now available at:
<http://www.astrosociety.org/scifi>


Astronomy Talks on YouTube

New talks by noted astronomers in the Silicon Valley Astronomy Lecture Series can be found on their YouTube channel at:
<http://www.youtube.com/SVAstronomyLectures/>

Recent lectures include: Caleb Scharf (Columbia) on “The Copernicus Complex;” Michael Bicay (NASA) on “A Decade of Spitzer Space Telescope Results;” Chung-Pei Ma (U of California, Berkeley) on “Monster Black Holes;” Roger Romani (Stanford) on “Black Widow Pulsars;” and Alex Filippenko (Berkeley) on “Exploding Stars, New Planets, and the Crisis at the Lick Observatory.”

Audio-only Podcasts that can be played on many different devices are also available at:
<https://www.astrosociety.org/education/past-silicon-valley-astronomy-lectures/>

ASP Invites Nominations for the Emmons Award for College Astronomy Teaching

The Astronomical Society of the Pacific is now accepting nominations for the 2015 Emmons Award for outstanding contributions to the teaching of college-level introductory astronomy. Please see: <http://www.astrosociety.org/about-us/the-richard-h-emmons-award-for-excellence-in-college-astronomy-teaching/> for more information. Nomination materials are due by Feb. 15, 2015. 

**Nominate your Outstanding
Teaching Assistants**
<http://naqt.org/naqt/students/ta.html>
Deadline is June 15th!

FOUNDATIONS is edited by Tom Whittaker, University of New Mexico-Valencia (advised for this issue by the former editor, Callan Bentley, Northern Virginia Community College). Please get in touch with your feedback: twhittak@unm.edu and cbentley@nvcc.edu

Adios, amigos!

by **Callan Bentley**
Northern Virginia Community College

Dear Colleagues,
It’s been an honor and a delight to be the inaugural editor of *Geo2YC Foundations*. I’m grateful to have had a chance to show off the great work of some of my colleagues and peers, as well as being able to reach out to new folks in our community and solicit contributions from them. It’s inspiring to see what everyone is up to! Now that my three-year term is over and Tom Whittaker has taken the helm, I’d strongly encourage each of you to make regular contributions to the newsletter and keep it vibrant. Solicit articles from your peers, and send any good leads Tom’s way. Let’s keep this quarterly newsletter full of inspiration and great opportunities!
Thanks! 