NAGT Teacher Education Division

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TED President's Column

The Ultimate Problem for Problem-Based Learning: The Role of Teacher Education

By Eric Pyle, President, NAGT Teacher Education Division

A recent story on NPR reported on a troubling paradox – a majority of parents want their children's teachers to teach the science of climate change, yet far fewer teachers of science actually teach the science of climate change. There are many reasons for this mismatch on the teacher side, that have been persistent over time, such as feeling a lack of preparation to teach climate science, a lack of confidence with climate science, and fears of push-back from parents or local, vocal forces that reject the idea of climate change in general, let alone human-driven climate change. Regardless, the majority of science teachers share a belief that the climate is changing. How can we, as science teacher educators, reconcile these differences and connect teachers, whether preservice or inservice, to the preparation, professional development, and materials needed to not only be able to teach the science of climate change? How can we also make it an imperative in their everyday practice? With much emphasis placed on problem-based learning in science classrooms, I contend that climate science is the ultimate, existential problem that should be addressed in classrooms. (https://www.npr.org/2019/04/22/714262267/most-teachers-dont-teach-climate-change-4-in-5-parents-wish-they-did)

In September 2018, the National Science Teachers Association (NSTA) released a position statement on the teaching of climate science. I had the honor of chairing the committee of scientists, science teachers, and science teacher educators that drafted this statement. In the document, we not only provided a series of suggestions to teachers in the classroom, but also defined the necessary structures from administrators, school boards, parents, and the media that are necessary to support the successful teaching of climate science. In fact, there was so many strong ideas among the committee members that we also produced a supplemental document, "An Exploration of Ideas Related to the Understanding and Teaching of Climate Science and Climate Change." This document placed the teaching of climate science within the context of the nature of science, as well as contrasting personal and scientific beliefs, as well as some of the psychology of deep-seated beliefs in the face of contrary evidence. These documents have a role not only in framing the professional development of current teachers but should also be woven into the fabric of teacher preparation (https://www.nsta.org/about/positions/climatescience.aspx).

A central element of teacher preparation is how to plan instruction. Teachers need to master not only content knowledge, but pedagogical content knowledge as well if they are to effectively plan and organize instruction within each grade band. With such a broad range of topics related to climate change, guides such as PRI's "The Teacher-Friendly Guide to Climate Change" provide guidance for the organization of those topics in a manner useful to content courses as science pedagogy courses alike. By providing the opportunity to develop metacognitive skills as teachers *and* learners, new teachers are set

on a constructive trajectory that can defines their future professional development goals and aspirations. They also gain a level intellectual resilience to face challenges within and surrounding their classrooms related to teaching climate change. (https://teachclimatescience.wordpress.com/)

It would be relatively easy to sink into a mire of panic and despair related to the effects of climate change, one that would cloud judgement and interfere with effective science teaching. This same energy could be harnessed towards constructive ends, directing teacher advocacy, particularly new teachers, towards student understanding of climate resilience, or how we as a society react to and deal with the changes to the world that a changing climate will drive. NOAA's Climate Program Office has provided the US Climate Resilience Toolkit (https://toolkit.climate.gov), which not only serves as a clearinghouse of case studies and teaching tools, it also offers five "steps to resilience" around which instruction can be organized within local contexts that have relevance to the global issues. Such concepts embedded within teacher preparation coursework again set new teachers on a future-oriented trajectory but can also direct a level of activism among the students which they teach.

Years ago, a curriculum theory textbook from one of my licensure classes defined several models of curricular design. One of these was "practical inquiry," which was based on the pressing problems that face society. Climate change is not just the problem of the day, it is the most important problem for us to deal with, not just for today but for the future. TED members have a central role in developing and delivering courses and experiences for both developing as well as experienced teachers that deal with these problems. Considering the mandate offered by NSTA's position statement, the tools offered by PRI's guide, and NOAA's Steps to Resilience, we have what is needed to support teachers across their career span in closing the gap between parent expectations and classroom practice. It is up to us to rise to this challenge.

NAGT Advocacy Committee Update

By Suzanne T. Metlay, Past-President, NAGT Teacher Education Division

Catherine Riihimaki (https://serc.carleton.edu/person/19432.html) will be the new chair of NAGT's Advocacy Committee. Thanks to Don Duggan-Haas for his leadership thus far. The Advocacy Committee meets every two months to consider issues regarding geosciences education in K-16 schools as well as science education policy matters. The next meeting is 28 June: https://nagt.org/nagt/policy/index.html

GSA GeoTeachers Program Update

By Dean Moosavi, Department of Science, Rochester Community & Technical College

Professional development for teachers of earth science remains an under-resourced mechanism for improving the geoscience literacy of society. The renewed GeoTeachers program created by the Geological Society of America in 2017 was an attempt to build on successful models for such professional development. GSA sought to create self-sustaining workshop series at the state level around the country. The first workshops offered in 2018 in Flagstaff, Arizona, Colorado Springs, Colorado and Indianapolis, Indiana made significant progress to this end.

Sadly, surveys the GSA membership conducted in the spring of 2018 as part of crafting GSA's new strategic plan indicate that the members have other priorities for the society's limited resources. Programs for K-12 teachers were identified as the one area for reduced programming in the new strategic plan GSA would implement in 2019.

GSA suspended GeoTeachers at the end of 2018, a loss for the geoscience community.

NAGT TED Elections – Please Renew Your Membership and Vote!

- By Suzanne T. Metlay, Past-President, NAGT Teacher Education Division

Thank you for your membership, your vote, and your active engagement with TED. We are here for you and with you. **To vote in the June elections, you must be a current member of NAGT TED.**

- To renew your membership, please go to https://nagt.org/members/

NAGT's nomination committee reviews all nominations for officers and makes a recommendation to the membership. You also have the option of writing in a candidate for any office.

TED Officer Elections - 2019-2020 Candidates:

President:	Laura Hollister
Vice President:	George Bartuska
Past President:	Eric Pyle
Secretary-Treasurer:	Peggy McNeal
Media Director:	Suzanne Metlay

George Bartuska teaches at Lawton Chiles Middle Academy, an IB Magnet School in Lakeland, Florida. Within the Space Foundation's Teacher Liaison program, George engages in peer-to-peer instruction. Previously, he served as Academic Advisor to USAF Civil Air Patrol and taught adult Coast Guard Auxiliary members in mandated Coastal Marine Weather and Hurricane Preparedness courses. A veteran of the U.S. Navy, he served aboard the U.S.S. John F. Kennedy. Since then, George has emphasized meteorology, oceanography, and space sciences education. In his current position, George facilitated a Sea Perch Challenge Grant through Embry Riddle Aeronautical University for 7th & 8th grade students to build and operate Remotely Operated Vehicles (ROV) underwater. He also obtained two years grant funding for High Altitude Balloon Launch from Motorola Corp. and the Polk Education Foundation, as well as a SPLASH Grant from the Southwest Water Management District to purchase an Aquifer Groundwater Model and other teaching instrumentation.

2019 Conference Abstract Deadlines are Approaching!

Earth Educators' Rendezvous 2019

July 15-19, 2019 | Nashville, TN (co-hosted by Tennessee State and Vanderbilt Universities)

Take Part in the 2019 Rendezvous!

The fifth annual Earth Educators' Rendezvous is now open for registration and we are continuing to accept submissions for poster abstracts or Share-a-thon presentations!

The *submission deadline for late abstracts* is **May 15, 2019.**

https://serc.carleton.edu/earth_rendezvous/2019/program/contributed_program.html

Submitting an Abstract

Submission deadline: 25 June (Tuesday), 11:59 p.m. Pacific Time

Abstract submission fee: US$50 for professionals / US$25 for students

View more detailed guidelines on preparing for an online abstract submission.

Two-Abstract Rule

You may submit two volunteered abstracts, as long as one of the abstracts is for a poster presentation.

Each submitted abstract must be different in content.

If you are invited to submit an abstract in a Pardee Keynote Symposium or a topical session, the invited abstracts do not count against the two-abstract rule.

https://community.geosociety.org/gsa2019/home

AGU 100 FALL MEETING

Mid-June 2019: Session, town hall, and workshop proposals are accepted, and abstracts open for submission. Session conveners are able to contact invited authors.

Wednesday, 31 July 2019: Abstract submissions close.

https://www2.agu.org/fall-meeting

2019 Teacher Professional Development in Minnesota's Iron Range

By Dean Moosavi, Department of Science, Rochester Community & Technical College

The non-profit Minnesota Center for Mineral Resource Education (MCMRE) will be offering its 22nd **Minnesota Mineral Education Workshop from June 18-20, 2019** on Minnesota's Iron Range. The 3-day workshop is being hosted by Itasca Community College in Grand Rapids, Minnesota, financially underwritten by numerous industrial partners and staffed with volunteer leaders and instructors from academia, industry, K-12 education and government agencies, most especially the Minnesota Department of Natural Resources and Minnesota Geological Survey. This strong support makes MMEW inexpensive for teachers to attend.

2018 MMEW St. Cloud, Sample Collecting, Knife River Gravel Pit

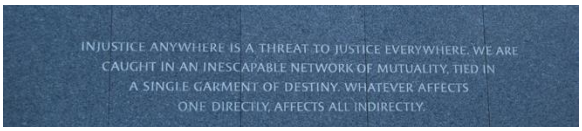
Early registration costs $45 and covers the workshop, field trips and meals. Discounted overnight housing is available at additional cost. Two graduate credits for $100/credit are available through the University of Northern Colorado for teachers seeking credentials beyond standard CEU's. Travel to the workshop is not included in registration with most attendees typically arriving by car from within the state but including teachers from as far away as Detroit. Many attendees combine MMEW with a family vacation as the Iron Range is in the heart of northern Minnesota's evergreen forests, clear fish-filled lakes and classic Precambrian outcrops in lands that would easily qualify to be added to Voyageurs National Park or the famous Boundary Waters Canoe Area.

As with other MMEW's, the first day of this year's workshop is dedicated to 75-minute short courses with attendees able to select 4 from a total of 16 options. Topics of the short courses range from hands-on activities such as rock and mineral id, constructing the rock cycle, continental drift, and the connections between groundwater, lakes and caves to mining geology, extraction of peat resources and protection of groundwater in aggregate basins. A keynote presentation and evening tour of a mine reclamation site converted to a public park round out the official program on day 1. In addition to the short courses materials and field trip guides, all of the 50-100 attendees of MMEW receive a wide selection of rock and mineral samples, maps and various educational resources they can select from for use in their classrooms.

2018 MMEW St. Cloud Esker Merden Gravel Pit

Days 2 and 3 are field trip days. MMEW field trips allow teachers access to field sites, mines, quarries and processing facilities that are generally inaccessible to the general public. Teachers have the opportunity to hear both from expert field geologists and industrial expert representing the diverse jobs that the future geoscientists we teach can consider. Attendees and experts travel together in coach buses, complete with air conditioning and on-board lavatory to diverse sites that characterize the geology and mining activities of the host region.

For Grand Rapids this includes visits to Archean quartzites and granites of the Superior Province granite greenstone terrains, Proterozoic iron formations, and exploration of bog geomorphology in Holocene peatlands. Attendees will visit sites of historic iron mines of the previous century contrasted to the open pit taconite operations used in mining today as well as the commercial extraction of peat. Teachers will be given sample collection and photography opportunities in most locations. You can get a sense of what MMEW field trips are like by looking at pictures from the 2018 workshop in St. Cloud. The 2018 workshop had the privilege of visiting the Cold Spring Quarry, which provided the granite for the Martin Luther King Jr. Memorial on the National Mall, demonstrating the how local geologic resources and workers contribute to the life of our diverse nation.



Cold Spring Quarry Stone, Martin Luther King Jr. Memorial, National Mall, Washington DC

If you are looking for professional development for yourself or seeking insight on how to build an effective professional development program for K-12 teachers, MMEW is a trip well worth taking. Hope to see you there!

To learn more about the 2019 MMEW in Grand Rapids please visit:
http://www.mmew.org/index.php/8-frontpage/12-2019-grand-rapids

Information about past MMEW Workshops can be found at:
http://www.mmew.org/

2018 MMEW in St. Cloud, Teacher Workshop

2018 MMEW in St. Cloud, Martin Marietta Granite Quarry

2018 MMEW St. Cloud, Martin Marietta Aggregate Plant

2018 MMEW in St. Cloud, Diabase Dikes in Granite, Quarry Park

Geoscience Teacher Leader Standards Update

- By Suzanne T. Metlay, Past-President, NAGT Teacher Education Division

Kathy Ellins, Program Director for Geoscience Education Research at the University of Texas at Austin, has included proposed Geoscience Teacher Leader Standards as part of *Teachers Leading to Ensure a Viable and Resilient Earth*. If approved, TLEVRE would be a teacher leadership professional development program through UT-Austin. These standards are still in development with approval pending from NAGT-TED and NAGT EXCOMM. Please submit comments regarding the leadership criteria proposed in Table 1 (below) to kellins@jsg.utexas.edu .

Table 1. Leadership Criteria for Earth Literate Teacher Leaders With Example of Supporting Activities

TLEVRE Criteria That Support Sustainable Development and a Resilient, Habitable Earth.	
1	Fostering the development of other educators with specific examples of peer mentorship. Example: *Support and mentor a novice teacher in the same school or district.*
2	Cultivating collaboration within a school, school district, or state to enhance K-12 education that teaches about Earth as a system and promotes sustainable development. Example: *Organize a school-wide celebration related to Earth literacy in every grade or across disciplines in same grade (AGI Earth Sciences Week; Earth Day).*
3	Promoting, participating in, or providing education professional learning that is relevant to a holistic understanding of Earth. Examples: (*a) Deepen content knowledge by attending UT's ESI Hot Science, Cool Talks (outreach lectures); (b) serve as a facilitator for the UT OnRamps dual enrollment course, Earth, Wind and Fire, and receive related professional development to deepen content knowledge.*
4	Accessing and using scientific data and the results of education research, to improve practice and student learning Examples: (*a) Incorporate EarthLabs curriculum into subjects where appropriate; (b) Use SERC Teaching With Data (resources for educators to teach students how to use, analyze, and understand data as they explore scientific questions about Earth).*
5	Facilitating improvements in instruction and student learning Examples: (*a) Participate in a free webinar offered by the NGSS-ESS Working Group; (b) use or develop learning activities that support the TEKS and the NGSS*
6	Incorporating opportunities to teach Earth literacy in informal settings such as science museums, planetaria, and aquaria and/or in outdoor field settings. *Examples: (a) Bring informal geoscience educators to your school or district with mobile science lab, pop-up exhibits, inflatable planetariums, etc.; (b) participate in summer fieldwork or semester at sea, and apply this enrichment with more meaningful lessons/activities and field opportunities for students.*
7	Promoting diversity and inclusion in the classroom, informal settings (e.g., museums) or related activities. Examples: (*a) Serve as an Education Coach with GeoFORCE, a UT field geology summer program for underserved secondary students; (b) participate in a multicultural partnership to advance Earth literacy (e.g., NSF INCLUDES Earth Connections project)*
8	Improving outreach and collaboration with families and community to improve knowledge of our planet and increase awareness about careers. Example: *Host a career information event for families or a Science Café.*
9	Advocating for student learning and Earth literacy. Examples: (*a) Deliver presentations at the state, national and international level (e.g., Texas CAST, GSA, AAPG, AGU, NSTA, EGU, NESTA, Ocean Sciences); (b) serve on the committees of professional organizations*
10	Serving as a change agent by leading education initiatives and visibly advocating for Earth literacy education at the regional, national and/or international level Examples: (*a) Apply for an NSF Einstein Fellowship or a Fulbright Teaching Fellowship;*

	(b) Serving in the leadership ranks of professional societies such as NESTA, NAGT, NSTA, etc.

Source: Criteria adapted from those developed by the National Association of Geoscience Teachers (NAGT) Teacher Education Division (TED) for Earth Science Teacher Leadership (Metlay and Ellins, 2018) (in development; NAGT-TED and NAGT EXCOMM approval pending).

NAGT Teacher Education Division Elected Officers 2018-2019

President: Eric Pyle, James Madison University
Vice-President: Laura Hollister, Turlock (CA) School District
Secretary-Treasurer: Peggy McNeal, Towson University
Past-President & Interim Media Director: Suzanne Metlay, Western Governors University

Ex Officio Members of the TED Executive Committee

NAGT Executive Committee Liaison: Kathy Ellins, University of Texas at Austin
NAGT Eastern Section Liaison: Christopher Roemmele, West Chester University
NSTA Liaison: Paul Adams, Fort Hays State University
NSTA Region XVI Liaison: Rick Jones, University of Hawaii

Suzanne Metlay is solely responsible for content in this newsletter. No advocacy is intended during reporting of relevant news stories. Any bias is unintentional.

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