October 2015 Newsletter Volume 1 Number 2

TED President's Column
By Heather Petcovic

Fall is my favorite time of year – new preservice teachers fill my classes, my graduate students are back from their summer adventures, and my own children are off to an exciting new school year. Time got away from us and so we apologize for not getting out the Spring newsletter. But this newsletter is extra packed with information and announcements to make up for it!

We are happy to report that TED officers and volunteers kept busy over the past year with efforts focused on Next Generation Science Standards (NGSS) implementation and the role of Earth science teaching in the NGSS. TED also had a strong presence at the first Earth Educators Rendezvous held this past July in Boulder, CO. If you were not able to join us, please consider attending next year's event in Madison, WI (http://serc.carleton.edu/earth_rendezvous/2016/index.html). There promises to be a rich assortment of sessions, workshops, and networking events focused on teacher education. And of course we invite you to join us for our business meeting, social events, and sponsored sessions at the Baltimore GSA meeting coming up in just a few weeks. See the newsletter for details.

Before I step down as TED's first President, I want to extend a warm thank-you to Kyle Gray, the outgoing Past President. Kyle was instrumental in getting the Division up and running, and in persuading many of us to take a hand in managing the group. I am delighted (but also a little sad) to hand over the reins of TED to Jeff Thomas, our soon-to-be President. And I also welcome Mark Turski to the board as our newly elected Vice President. Our full management board for the 2015-16 year is:

Elected Officers
President: Jeff Thomas, Central Connecticut State University
Vice-President: Mark Turski, Plymouth State University
Past President: Heather Petcovic, Western Michigan University
Secretary/Treasurer: Mark Abolins, Middle Tennessee State University
Media Director: Steve Mattox, Grand Valley State University

Ex Officio Officers
Liaison to NESTA/NSTA: Eric Pyle, James Madison University
Liaison to NAGT: Wendi Williams, NorthWest Arkansas Community College

Once again I thank you, our members, for your support and your continuing effort in teacher education.

In this issue:

1. A+ for Opportunity: Reflections on the NAGT AGI NGSS Summit

On April 29th fifty-six NAGT AGI NGSS Summit attendees convened at the NOAA offices in Silver Spring, Maryland for a two and a half day summit focusing on the Implementation of the NGSS at the State Level. Following the opening sessions of the summit it was clear that there was an overwhelmingly optimistic network of stakeholders assembled around a shared focus of achieving the vision of the NRC Framework for the implementation the Earth and space science Next Generation Science Standards.

The participants included a broad cross section of the geoscience education community including: teacher preparation program representatives, informal education providers, professional society representatives, state level science supervisors, science supervisors from large school districts, non-governmental agencies, scientists, university faculty, and others. Goals for the meeting included:

- ➢ Goal 1: Identify the needs of teachers, curriculum supervisors, local and state agencies, and others.
- ➢ Goal 2: Establish an action network to provide communication and support, linking network resources to identified needs.
- ➢ Goal 3: Assemble a virtual representation of NGSS-congruent Earth and space science educational resources and guidance for use.

A needs assessment conducted prior to the summit revealed six broad categories of needs: framework, support (advocacy), curriculum and instruction, teacher readiness and resources, teacher professional development, and assessment. Recordings of two pre-summit webinars are available on the summit website (http://nagt.org/nagt/profdev/workshops/ngss_summit/2015/index.html). These focus on the initial findings of the needs assessment and on a forward-looking vision for the ESS in NGSS.

At the close of the summit conveners laid out a plan for action in the short term that provides significant opportunities for stakeholders from across the community to get involved in substantive ways. A short list of upcoming efforts includes:

- A webinar on June 9th with an initial summit report, overview and discussion of actions that are underway since the summit, and planning for Town Hall meetings at GSA and AGU
- Preparing an EOS communication article
- Preparation of a formal summit report
- Building a repository of resource profiles for the broader Earth and space science community focusing on the implementation of Earth and space science NGSS
- Workshops and topical sessions at the Earth Educator Rendezvous, GSA, AGU, NSTA
- Encouraging ongoing and frequent communications among and between stakeholder groups through virtual meetings, online discussion boards, and other formats

A+ for opportunities! The needs assessment identified teacher readiness and resources, professional development, curriculum and instruction, and assessment as four of the top six areas of need. Could you ask for better alignment to the mission of the Teacher Education Division of NAGT?

- Make a map of your own network. Add a new area you can reach out to provide expertise, support or resources around the Framework and NGSS.
- Reach out and really get to know a K-12 (science) teacher in your local community (administrators too). Learn about their successes and challenges with ESS NGSS implementation.
- Communicate the importance of the ESS in NGSS to state and local school boards.
- Get to know the *Framework for K-12 Science Education* and NGSS deeply. One of the themes presented by NGSS Earth and space science lead writer Michael Wysession during his plenary at the summit suggested that instructors "bundle" performance expectations into integrated "storylines."
- Conduct and publish research into learning progressions in Earth and space science.
- Infuse your work with pre-service and in-service teachers with the "spirit" of ESS NGSS! Promote the idea that the format of NGSS aligns strongly with geoscience methods focusing on systems, models, data, and evidence to explain and solve problems around phenomena.
- Communicate ESS NGSS needs to textbook publishers. Get involved in the development of textbooks and other text type materials.
- Get involved with follow-on efforts within the summit community.
- Engage in workshops, topical sessions, publishing, etc. at the Earth Educators Rendezvous, GSA, AGU, NSTA, etc.
- Develop and collaborate on the development of NGSS aligned K-12 materials.

- ➢ Get involved in an action network to ensure that high school ESS courses are accepted as college preparation science lab courses.
- ➢ Work across stakeholder groups to help develop rigorous NGSS aligned assessments across all levels of K-12.
- ➢ Submit a profile page to describe resources your organization has that address one of the NGSS implementation needs categories. (http://nagt.org/nagt/profdev/workshops/ngss_summit/share_info.html)

Are you ready to get started? The summit conveners would love to hear from you! The final summit activity was the development of personal action plans. Please join us! https://goo.gl/1YhQfw

2. Upcoming events: ESS NGSS Working Group

October 22, 1 PT/2 MT/3p CT/4p ET

Webinar

"Helping Educators Use Your Resources for NGSS" ESS organizations have existing repositories of learning resources and are now beginning to present those resources for use in NGSS implementation. This webinar will include descriptions of different strategies currently being used by organizations to align and display resources for NGSS ESS standards. Come to discuss the projects that are underway, learn how to present your own resources, or find resources aligned for ESS NGSS implementation.

Please register at.
http://nagt.org/nagt/profdev/workshops/ngss_summit/tagging/registration.html

November 1 and November 4, 2015

Geological Society of America Annual Meeting

Town Hall Meeting, Geological Society of America Annual "Next Steps for the NGSS in ESS" Join a community discussion of what has happened in NGSS ESS implementation and help to shape a slate of activities going forward.

November 4th from 12:15-1:15p Room 321, Baltimore Convention Center

Talks in Technical Session T66. Beginning a New Era in Earth Science Education: The Role of Geoscience in Implementing the Next Generation Science Standards
November 1, 2015 1:30-5:30p, Room 321

December 14-16

American Geophysical Union Fall Meeting

December 14, 12:30-1:30p Moscone West 2007

Please join us for "Next Steps for the Next Generation Science Standards in Earth and Space Science: A Town Hall Discussion " Join a community discussion of what has happened in NGSS ESS implementation and help to shape a slate of activities going forward.

December 14-15 American Geophysical Union meeting

"Teaching Mineral Resources with an Emphasis on NGSS Practices and Cross Cutting Concepts" Presentation as part of the AGU Geophysical Information for Teachers (GIFT) workshop.

See http://education.agu.org/education-activities-at-agu-meetings/gift/gift-2015/ for more information.

Talks within Implementing K-12 Geoscience with the Next-Generation Science Standards II December 16, 4:00-6:00p, Moscone South 104

We hope to see you soon!

Other webinars and meetings are in the planning stages. To remain aware of ongoing ESS NGSS events, please sign up on the email list http://nagt.org/nagt/profdev/workshops/ngss_summit/index.html

For more information, please contact Susan Sullivan at susan.sullivan@colorado.edu , Aida Awad at aawad@maine207.org (National Association of Geoscience Teachers) or

Ed Robeck ecrobeck@agiweb.org (American Geosciences Institute)

3. Attend a TED Event in Baltimore

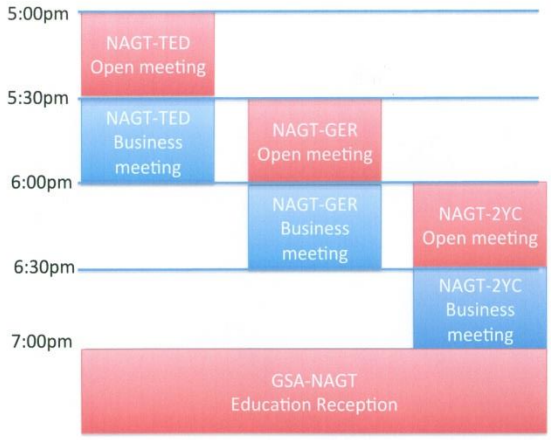
The Teacher Education Division welcomes your input and energy. See us at GSA Baltimore. Our Committee meeting is

Sunday, November 1, 5 p.m. to 7 p.m., Hilton Latrobe Room (Hilton Baltimore)

For other meetings of interest and NAGT sessions please visit:

http://nagt.org/nagt/profdev/GSA/2015GSA/index.html

The three Division presidents agreed over the summer to stagger the meetings to that folks could attend multiple meetings. See the schedule below.



Sessions that may be of interest to TED members include:

T66. Beginning a New Era in Earth Science Education: The Role of Geoscience in Implementing the Next Generation Science Standards

Michael J. Passow, Michael E. Wysession, Jacqueline E. Huntoon, Emily E. Gochis, Alexandria Guth, Ashley E. Miller
National Earth Science Teachers Association; GSA Geoscience Education Division; National Association of Geoscience Teachers; GSA Geology and Society Division

Representatives from school districts, professional societies, teacher training programs, and informal science institutions share examples of incorporating the geosciences to integrate disciplinary core ideas, cross-cutting concepts, engineering practices, and holistic thinking into emerging NGSS-aligned programs.

Sunday, 1 November 2015: 1:30 PM-5:30 PM Room 321

T85. Preparing Pathways in K–12 Classrooms for Tomorrow's Diverse Geoscience Workforce: Teachers, Students, and Communities

Marilyn J. Suiter, Keith A. Sverdrup
GSA Geoscience Education Division; GSA Diversity in the Geosciences Committee; National Earth Science Teachers Association; GSA Geology and Society Division; National Association of Geoscience Teachers

This session will provide examples of teacher preparation programs that support the development of STEM teacher- and administrator-leaders who establish classroom learning environments that reflect diversity and multiculturalism in K–12 STEM education.

Sunday, 1 November 2015: 8:00 AM-12:00 PM Room 322/323

T86. Research on Teaching and Student Learning in the K–12 Earth Science Classroom

Laura A. Guertin, Tanya Furman
GSA Geoscience Education Division; National Earth Science Teachers Association; National Association of Geoscience Teachers

Addressing global challenges and science literacy begins with K–12 earth-science teaching. This session will share research, tested instructional resources, models, and tools to enhance the content knowledge and skills of K–12 earth-science teachers and students.

Tuesday, 3 November 2015: 1:30 PM-5:30 PM Room 324

4. Teacher Prep at NSTA by Eric Pyle

Greetings!

Several events are happening with preservice teachers with NSTA, or happening soon. First of all, the NSTA membership department has initiated a concerted effort to reach out to student chapters that had been started a few years ago, but may have well fallen by the wayside. If your institution has had an NSTA student chapter in the past and their faculty advisor has not been contacted about current officers and contact information, they need to contact Teshia Birts at NSTA headquarters, emailing her at tbirts@nsta.org. And if you would like to start a chapter, she can help you, as well. It is certainly a worthwhile effort, as many prospective science teachers (and especially Earth science teachers), may lack a sense of identity without a group that has common cause. The JMU student chapter that I co-advise adopted the icon of a fire-breathing unicorn, because they are so unique within a larger body of secondary science teacher candidates, but also that they intend to make their presence known.

In support of these teachers-to-be, the NSTA Preservice Teacher Preparation committee is developing a "new science teacher registry," in which students approaching graduation can post their wish-lists of materials in the same way as a bridal or baby registry. While this benefits science teachers in general, NSTA does have some gaps in its offerings for Earth science teachers, one that can be addressed by the membership of TED by offering proposals for publications through the NSTA Bookstore. So we are seeking both your input into the registry development process, but more importantly, your ideas for publications and materials that can

be shared with a larger audience. And remember, it is not just about high school – elementary and middle school teachers are also teachers of Earth science.

One of the largest efforts going on with preservice teacher preparation deals with the accreditation and recognition process for programs. In a framework familiar to many, extensive portfolios have been required to document the performance of programs relative to a set of broad standards set by the Council for the Accreditation of Educator Programs (CAEP), which was formed as the result of a merger between NCATE and TEAC. NSTA's role has been to provide recognition of programs as a Specialist Professional Organization (SPA) based on a detailed set of standards. The process is rigorous and not completed without considerable work on the part of portfolio preparers and reviewers. Sadly, this work often goes under-recognized by administration. By the same token, the impact is somewhat limited to secondary grades Earth science teaching. NSTA is proceeding with several actions, which should emerge over the next year or two.

First of all, NSTA will recognize the developers of SPA-approved portfolios, both through letters directed to program administrators but also in the NSTA Annual Meeting program. Reviewers of these programs will also be recognized in a similar manner. Second, NSTA's current SPA standards predate the release of NGSS, and these standards will undergo a review for their relationship with respect to NGSS. But as NSTA has also produced standards in elementary and middle grades, this standards review will be extended beyond the high school standards and include the lower grades, maintaining the stranded approach offered by NGSS. The report on the NGSS summit offered elsewhere in this newsletter provides a useful perspective. Input by members of TED would be extraordinarily useful, as Earth science is often the last group called to the table in such discussions, so consider yourselves invited now! Finally, a long-term vision for this standards review is for the recognition process to be more facilitative and peer-recognized than has it has been in the past, more than just a series of hoops through with to jump.

Finally, as your students graduate and become teachers, remember how important the induction years are to retaining them in the profession. These first 2-3 years are so critical that NSTA maintains the New Science Teachers Academy (NSTA^2) and the Maitland P. Simmons Award, both of which exist for new teachers. Having reviewed for both programs over the last two cycles, it should come as little surprise that relatively few Earth science teachers are represented. So plant this seed in your students as they graduate and move on to their first jobs – don't let the time slip away!

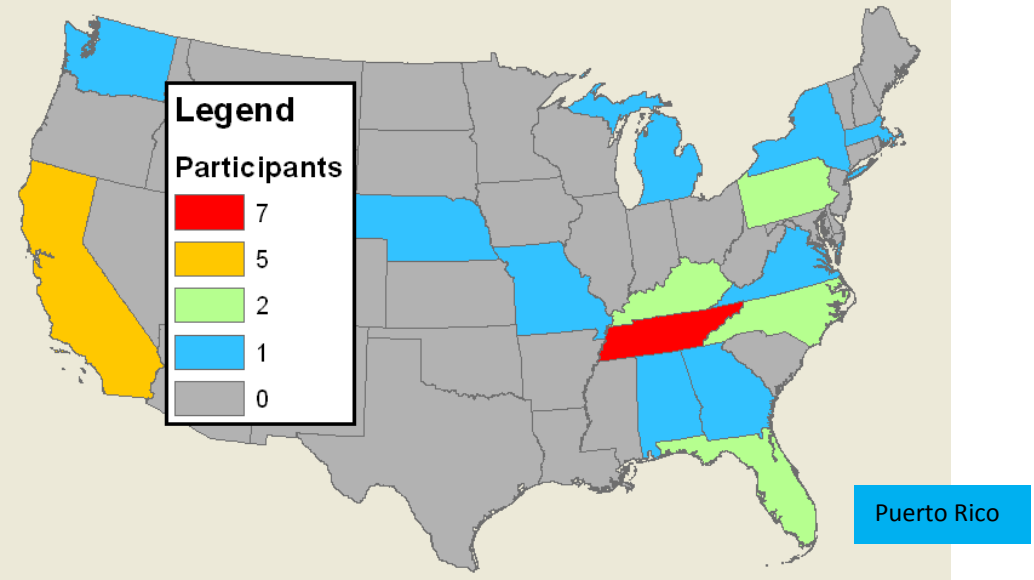
5. The *Geoenvironmental Challenges* Summer Research Experience for Pre-service STEM Teachers

Mark Abolins (Mark.Abolins@mtsu.edu), Department of Geosciences, Middle Tennessee State University, Murfreesboro, Tennessee

A First in Pre-service Teacher Education

The third and final cohort of ten pre-service STEM teachers completed the National Science Foundation (NSF) *Geoenvironmental Challenges* summer research experience during June and July, 2015 at Middle Tennessee State University (MTSU) in Murfreesboro, Tennessee. This Research Experience for Undergraduates (REU) was the Geosciences Directorate's first REU specifically designed for pre-service teachers. Each year, the project recruited five pre-service Earth science, three per-service chemistry, and two pre-service biology middle school and high school teachers. *Geoenvironmental Challenges* participants were 67% female, 33% underrepresented minority, and 10% Asian. Participants were enrolled in universities all over the nation (including Puerto Rico), but most came from Tennessee and California (see Figure 1). Slightly more than half of participants were enrolled at universities where pre-service teacher research opportunities might be regarded as limited because the universities do not have replicates of the U-Teach pre-service teacher education program and the universities are not research university/very high activity or research university/high activity in the Carnegie classification scheme. The application process was fairly competitive in 2014 and 2015 with 90 and 95 applicants, respectively.

Table 1. *Geoenvironmental Challenges* pre-service teacher-participants by state.



What the Pre-service Teachers Did

As with most Geosciences Directorate REU's, the heart of *Geoenvironmental Challenges* was the involvement of pairs of pre-service teachers in nearly eight weeks of research mentored by a MTSU faculty member. Options included structural geology, water quality, pavement systems, air quality, and plant ecology research investigations. During the rest of the nine-week experience, participants were involved in a five-day field trip to Mammoth Cave and Great

Smoky Mountains National Parks, a single-day field trip to Nashville's Adventure Science Center, and other pre-service teacher professional development activities. In addition, participants were encouraged to present at the Geological Society of America (GSA) Annual Meeting during the year that followed their research experience. For example, some Summer 2014 participants will present at the 2015 GSA meeting in Baltimore, Maryland, and many Summer 2015 participants will present at the 2016 GSA meeting.

How the Pre-service Teachers Benefited

Because *Geoenvironmental Challenges* was the first of its kind, there was much to discover. Perhaps most significantly, a tension emerged every year between involvement in mentored research and all other project activities, and, every year, a majority of participants wanted to spend more time on their mentored research investigations. Consequently, participants spent less time outside of their mentored research investigations during each successive year.

Participants completed the Survey of Undergraduate Research Experiences (SURE III) every year and met with project evaluator Tom Cheatham at the mid-point of each summer experience. In addition, psychologist Herschell Parker facilitated pre- and post- experience focus groups during Summer 2015. Evaluation results suggest that the first year was problematic for various reasons related to project start-up, and that the first year was an outlier. SUREIII results show that the 2014 and 2015 cohorts thought their gains were especially large for the 5 items listed in Table 1. Mr. Parker's focus group report suggests that 2015 participants believed that the project benefited them because "they view field trips, scientific fieldwork, scientific research, and networking as experiences that will make them better science teachers." Other benefits included "developing new peer relationships and mentor relationships, learning new science content, and learning about citizen science." REU participants also thought they learned "new methodologies to teach science." Also, "all but one REU participant reported experiencing connections between classroom teaching, geoscience, environmental policy, and history."

Preliminary analysis of 2015 end-of-experience papers (n=9) show that 7 of the participants plan to involve pre-college students in citizen science, and 5 of the participants plan to involve pre-college students in field-based learning including field-based citizen science. Of the two participants who did not emphasize citizen science, field-based learning, or both, one plans to mentor science fair projects and involve students in research within a classroom setting, and the other plans to implement project-based learning. Participants who plan to involve students in citizen science, field-based learning, or both also mentioned incorporating research results into teaching, including a range of topics in their teaching to capture the attention of students who have varied interests, using hands-on activities, implementing student-centered group work, using the learning cycle, early research experiences, parental involvement in research and citizen science, research within a classroom setting, involvement in summer camps, mentoring science fair projects, and mentoring in general.

Table 1. Largest self-assessed participant gains (SURE III survey). 1=no gain or very small gain and 5=very large gain.

ITEM	2014 (n=11)	2015 (n=7)	ALL SUREIII RESPONDENTS (n=2,762)
Ability to integrate theory and practice	4.18	3.86	3.61
Understanding that scientific assertions require supporting evidence	4.09	3.86	3.59
Understanding how scientists work on real problems	4	4.43	3.82
Understanding the research process	3.91	3.86	3.89
Confidence in my potential as a teacher	3.82	3.86	3.19
MEAN	4.00	3.97	3.62

6. POSITION ANNOUNCEMENT: Geoscience Education at Western Washington University

Geoscience Education. Western Washington University invites applications for a tenure-track Assistant Professor starting September 2016, with a joint appointment between the Geology Department and the Science, Math, and Technology Education Program (SMATE). Western Washington University is a nationally recognized, public, masters-granting institution located in the Pacific Northwest at the base of the North Cascade Mountains. The Geology Department and SMATE Program are committed to WWU's goal of recruiting and retaining diverse faculty, and welcome applications from diverse candidates. The ideal candidate will enhance our existing strengths in geoscience teaching and science teacher preparation. An active research program in geoscience and/or geoscience education is expected. A Ph.D. by hire date is required. Please see the full position announcement for required and preferred qualifications: https://jobs.wwu.edu/JobPosting.aspx?JPID=6652. To apply, submit a curriculum vita, undergraduate and graduate transcripts, statements of teaching philosophy and research plans to WWU's Electronic Application System for Employment (linked to electronic job posting). In addition, arrange for three letters of recommendation to be mailed to chris.sutton@wwu.edu or Chris Sutton, Geology Department, Western Washington University, 516 High Street MS 9080, Bellingham WA 98226. Questions regarding this position should be directed to the search committee chair, Susan DeBari (susan.debari@wwu.edu). Review of applications begins December 21, 2015; position is open until filled. WWU is an EO/AA employer and encourages applications from women, minorities, persons with disabilities, and veterans.