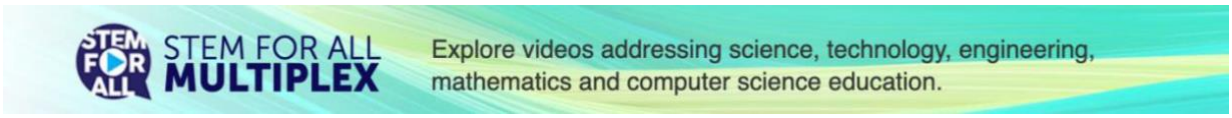

Partnering Culturally Responsive Teaching and Place-Based Science Education
STEM for all Multiplex and STEMTLnet Theme of the Month
Synthesis: September 2021

> *Education cannot be improved...by bigger [teacher] salaries alone. There must also be love of learning and of the cultural tradition, and of excellence — and this love cannot exist, because it makes no sense, apart from the love of a place and a community. Without this love, education is only the importation into a local community of centrally prescribed "career preparation," designed to facilitate the export of young careerists.* Wendell Berry, "The work of local culture."

Introduction

The September Theme of the Month, (co-hosted by STEMTLnet.org and Multiplex.Videohall.com), helped us explore the deep connection and synergy between two ideas being explored widely across the American educational landscape: "place-based education" and "culturally responsive science teaching." As Roberta Howard Hunter wrote in her blog post, "As educators and researchers, we know that making education meaningful to our students and connecting it to their lives makes the learning space more vibrant and supports their learning."

Place-based education connects students with the landscape of their lives, and there are rich, fascinating, and little-known landscapes in urban locales, where the majority of our school children learn, as well as in rural areas, and the "leafy suburbs." "Place" also means the people of the place, and their life-ways, their cultures — these are after all the ways in which we make ourselves at home in a place. As Hunter wrote, "place is more than a physical location – it is the meaning we make of that location, including social and cultural aspects in the past, present, and looking towards the future." For this reason, "outdoor science education can occur anywhere, including places such as school grounds and the nearby communities, and it doesn't require pristine natural settings. In fact, learning outdoors can be more meaningful when it is connected to the places students spend their time and live their lives."

Thus, the cultural layers of our landscapes are gateways and bridges into an engagement with the nature (and the science) of those places. As John Dewey wrote to parents and teachers in the famous Laboratory School, "when a natural object is clothed with human significance and human association, a road lies open from the child's mind to the object through the connection of the latter to life itself." (quoted in Armitage 2009, pg. 57). Moreover, if we want "lasting learning" (as one of our panelists termed it), knowledge must be, in Dewey's phrase, "saturated with meaning" (Dewey 1925), and this means understanding that learning and acting take place in a local, many-layered, and value-filled context. In a time of climatic and social disruptions, science learning that is land- and culture-based can provide our children with intellectual, social, and affective tools and content.

The Expert Panel

The expert panel that came together for the Theme's webinar was moderated by Roberta Howard Hunter, a postdoctoral research associate at Michigan State University, and included Gail Richmond, Professor of Science & Urban Education at Michigan State University; Mike Szydlowski, K-

12 Science Coordinator at Columbia (MO) Public Schools; Anna Lees (Waganakasing Odawa, descendant), Associate Professor of Early Childhood Education at Western Washington University; and Beatriz Cañas, Director of Equity, Diversity, Inclusion and Accessibility initiatives at the Chicago Botanic Garden.

After Roberta Howard Hunter framed the conversation, the panelists brought forward different perspectives on this rich and complex topic. Beatriz Cañas discussed how the lens of environmental justice inherently connects place-based learning and culturally responsive education. She described how the programs she's a part of at the Chicago Botanic Garden connected with grass-roots groups in Chicago to find ways that students could seek in their communities for problems they could both connect to personally, and help to be a part of solutions. This kind of alliance requires time and attention to the needs of the community participants, so that the relationship is mutually beneficial. On the one hand, it's important that any such arrangement be financially equitable, recognizing that community action groups often have limited funds. On the other, as Cañas said, the groups as well as the students are enriched by the opportunity to involve the community's children in their work.

Students are alive to the issues in their community. Cañas spoke of how fundamental questions of Critical Pedagogy of Place are accessible to them — "What has happened here? What is happening here? What do you want to happen here in the future, what should happen here?" These questions, which get close to everyone's lives-in-place, help students understand and get involved with opportunities to take constructive action, which helps students (and other humans!) deal with the emotional challenge that comes with working on big problems (American Psychological Association 2009).

Mike Szydlowski spoke from the perspective of the classroom. The new science standards (NGSS) call for more attention to the process of science, instead of the vocabulary of science. This opens up new possibilities for ways to teach the standards in innovative ways — such as place-based learning, with which culturally-responsive teaching is an excellent fit. He noted that teachers may be uncertain how to begin. Szydlowski advised on the basis of his and others' experience to begin slowly taking small steps. It's an exciting way to do science education, but school systems are not always flexible enough to make room for wholesale changes in schedules, curriculum, and community engagement. Brief, low-key projects are a great way to begin. One example offered was "Why do we put salt on roads in winter, and what effects does this practice have ecologically, and on community life?" Others were: "How can we deal with the problem of wasted food from our cafeterias?" or "Can we use some of the land we're mowing as lawn to restore patches of prairie?" Such projects can introduce students to the process of researching multi-dimensional questions. They enable students to address the required standards for the year, while connecting the standards, which can seem pretty abstract, to their community's culture and commerce.

He described the strategies he and some colleagues are using to scale up the use of place-based, culturally responsive learning in their large district in Missouri. They have used 4 basic steps:

1. "Don't over-complicate." Naturally, teachers and administrators are hesitant to take on an innovation that may add one more item to their already full agenda. This is why it's important to make clear that what is being advocated is a different approach to teaching the same standards.
2. Moving from one to many. He began by seeking a few classes within a school that seemed likely to be successful. Teachers worked to develop a few place-based lessons. These were

popular with the students — really motivating them — and also with the teachers. Success in a curriculum has to be more than happiness — but happiness while learning substantive material is a win-win.

3. Make others jealous. They made sure that their experiment was well documented, and widely shared — Facebook and Twitter were important vehicles for sharing many photos of students and teachers engaged and enjoying themselves. It was important that the dissemination was wide within the district and its community, so that other teachers, administrators, parents, and kids saw what was happening, and wanted the same kind of learning for themselves or their children.
4. Then repeat this in more and more classes and expand to additional schools throughout the district.

This "scaling it up" approach fits very well with the "start small" advice to individual teachers. The main thing to bear in mind is that place-based, culturally responsive learning is a way to reconceive how to achieve the NGSS vision, in a way that is integrated with students' lives and communities.

One open question is assessment, and what effect this approach has on student achievement. Though more research remains to be done, at the present time it seems as though test scores are either holding steady or improving in innovating schools in Szydlowski's district. This general trend is reported for small-scale experiments elsewhere as well (e.g. Sobel 2017). The topic came up again in one of the break-out discussions following the expert panel presentation, as participants reflected on whether assessments currently in use were suited to measure learning gains derived from place-based/culturally responsive learning, which tend to be project-based and experiential. This is a matter deserving of further research.

Szydlowski acknowledged that topics touching on matters such as environmental justice and climate change, which may lead students to examine their own biases and prejudices, may be sensitive. Yet, he feels that we do a disservice to children when we don't acknowledge what's happening in their communities. He agreed with Beatriz Cañas that when learning is action-oriented with an emphasis on student agency, then the students leave feeling inspired and want to learn more about the subject.

Anna Lees spoke of "land education," and of helping teachers work with engaging place, land education, and related topics to help reduce teachers' fears about taking on complicated topics like this - after all, as she said, our young people are living in complicated situations. She emphasized the importance of learning from those who have a long association with the land. Indigenous peoples have knowledge that integrates cultural and scientific understandings. Furthermore, they have traditions of education, methods of passing on the methods and content of their knowledge to the next generation, which can be of great value to educators in public schools or informal education institutions. Working across cultural and pedagogical contexts can help students see their communities as valued sources of authority and agency.

As part of this, educators can come to inquire (and hear community insight about) how students and communities are affected by public schooling. As suggested in the quote from Wendell Berry above, mainstream schooling has often had the effect of distancing children from families and communities. Land education, engaging with community partners as co-educators, can counteract that distancing. It enables the integration of indigenous knowledge and rhythms into the "mainstream" or dominant-

culture curriculum, and enables teachers and students to incorporate basic questions about what matters, and *where* matters, and then going out to places and the people to pursue their learning. Gail Richmond emphasized that a blending of place-based and culturally responsive education is always connected with issues of equity and sustainability. It's not just inviting in voices of concern, but helping students *navigate* so their own views of the world are enlarged. An important part of her work is in providing opportunities for developing a community of teachers, who can work to understand and engage with how the community sees and thinks about their environment, and then make that part of their work in the classroom. Bearing in mind that many students and teachers are and must do their "place based" education in cities, it is important to address "deficit views" about urban schools and environments. (Indeed, it is worth noting the dramatic rise in the field of urban ecology in the past 30 years or so, and the development of the "biocomplexity" approach for such research, which reframes ecology and conservation science to acknowledge and take seriously the processes of urban ecosystems with their people as an integral part of the system.)

Richmond pointed out that many of our educational, social, and ecological problems, locally and nationally, are so knotty that no one person or discipline can't hold the answers — we need diverse expertise and insights, and this must necessarily include the contributions of people who are experts about their places. It is important to help teachers identify and make use of resources in the community (spaces/places) and the challenges that are relevant there; this is the focus of her work with the schools in Lansing (MI). The work starts by situating authentic problems in these known spaces. Part of this work necessitates bridging gaps between teachers and community people, building shared understanding. Teachers can visit each other's school yards, as well as community and informal education sites, gaining a richer knowledge of what their colleagues are doing, and learning about resources and methods from each other.

Gail Richmond closed by reminding us that learning has both cognitive aspects and affective aspects. Place-based and culturally responsive learning can give learners (and teachers) voice about what they want to learn about. It allows opportunities for kids to enlarge their knowledge of the world, and the implications of their actions, and ways of addressing/healing issues — to learn while helping to mend their world.

Recommendations for Teacher-Leaders

For many teachers, the new standards are requiring — and encouraging — significant change in their practice. The adoption of a place-based and culturally responsive approach may seem to add additional learning challenges. Yet these frameworks have the potential to increase interest, student engagement, and the authenticity of material being taught. Teacher leaders can support the emergence of place-based learning by creating partnerships and alliances with community leaders and informal learning centers.

Teacher leaders are well-positioned to create opportunities for their colleagues to discuss, analyze, and reconstruct their practice as they begin to explore place-based learning. Professional learning communities are an increasingly well-understood strategy for this kind of teacher research. Given Mike Szydlowski's advice to start slow, and to value small innovations, some elements of lesson-study may be of use in scaffolding teachers' work together as they explore the challenges and opportunities of authentic community collaborations.

Recommendations for Researchers

Anna Lees said, "If there is a boundary between researchers and practitioners, it needs to become permeable." There is a great need for researchers to work with educators and communities to understand the design and implementations of these new approaches, and to study their outcomes and implications.

Research has shown that place-based education can help foster the growth of people's "place identity" and it has been shown in some cases that education set in the local environment (human and natural) increases attentiveness to and engagement care and preservation of it. (Clayton and Opotow 2003, Twigger-Ross and Uzzell 1996, Lococz et al. 2011). Yet much remains to be understood about place-based and culturally responsive education and its relation to motivating constructive action or further learning.

Some research suggests that place-based learning can address "ecophobia" and similar negative consequences of emotionally "heavy" issues (Strife 2012, McKnight 2010, Sobel 1995). Yet there is also some evidence that such issues-based learning can result in avoidance, discouragement, or apathy (Moser and Berzonsky 2014). What further insight can be gained from place-based and culturally responsive methods about the interaction of cognitive/affective dynamics of these approaches?

What kinds of teacher professional development can support this approach to STEM education? The many experiments around the country provide possible data for comparative studies about teacher learning and supports, and elements of school culture that may support or inhibit place-based learning "beyond the walls."

Recommendations for Administrators and Policymakers

Authentic community engagement of the sort advocated by our expert panel can be a real source of community support and involvement in the school, as well as in student achievement and attitudes towards learning. As with other reforms, making room for flexibility to enable experimentation is always a challenge for administrators, so working with teacher leadership to monitor and support teacher experimentation will be important for effective innovation.

It is essential that teachers feel supported to experiment with place-based, culturally relevant lessons and be given the opportunity to learn from each other. Teachers should share their original aims and assumptions, the nature of the innovation, the resources required, and both successes and roadblocks.

The learning process may be considerably strengthened by partnerships with educational researchers. As Anna Lees said, if there is a boundary between researchers and practitioners, it needs to become permeable. Administrators can help facilitate collaborations with researchers to learn from their school's experience in this area. This learning may be "summative," in terms of the outcomes and benefits of the new approach. Research may also be "formative," perhaps taking a design-based approach to the research, so as to support continuous improvement over time. Administrators may also help to ensure that community partners and stakeholders are part of any research that is undertaken.

The question of adequate or appropriate assessment, that is aligned with the NGSS and designed to evaluate place-based/culturally responsive learning outcomes, remains open. Policymakers should seek research that bears on the adequacy of current tests in this regard.

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