

What are Important Research Questions in Open Access Science Education?

August 25, 2021



#OpenSciEdResearch

Agenda

- Opening message from James Ryan, Executive Director of OpenSciEd
- Brief overview of working group activities and research themes
- Panelist remarks and interactive discussion
 - **Angela DeBarger**, William and Flora Hewlett Foundation
 - **Michael Ford**, National Science Foundation
 - **Tiffany Neill**, Oklahoma State Department of Education
 - **Eileen Carlton Parsons**, University of North Carolina at Chapel Hill
 - **Tricia Shelton**, National Science Teachers Association



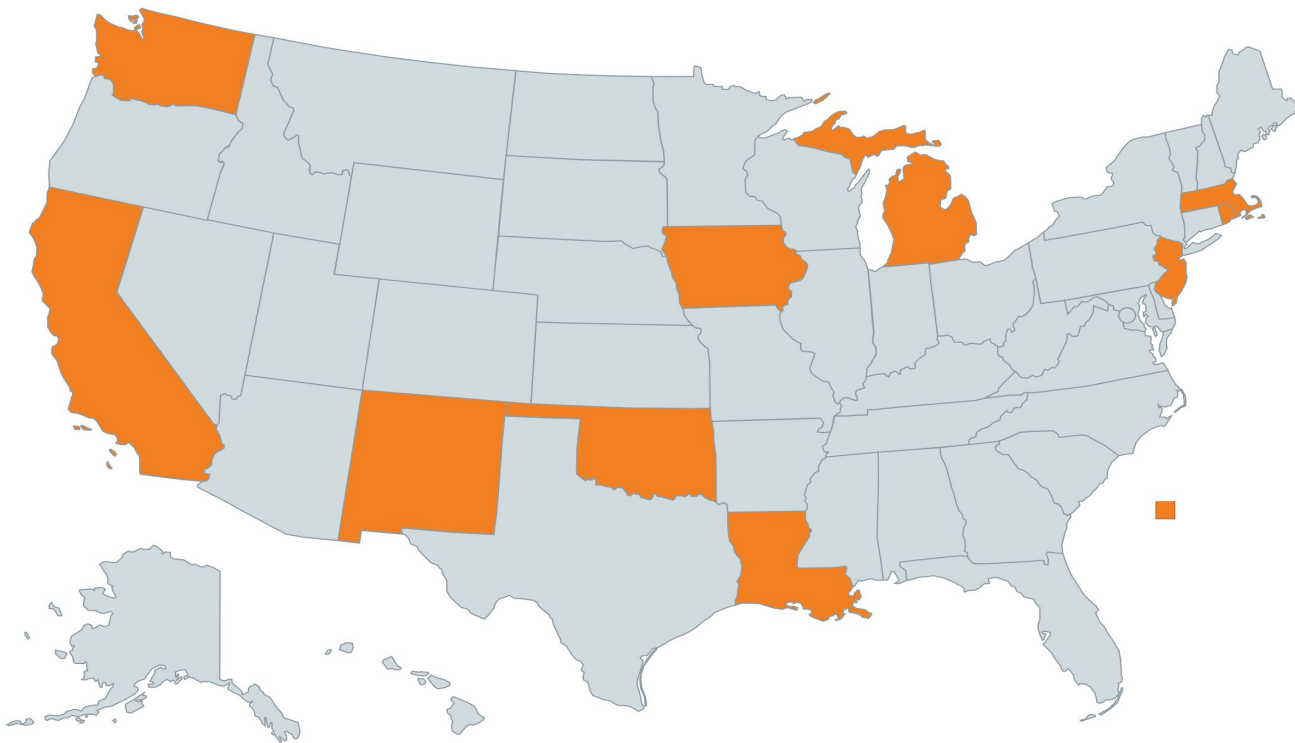
Transforming Science Education with OpenSciEd

Jim Ryan, Executive Director
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August 25, 2021



Why OpenSciEd?



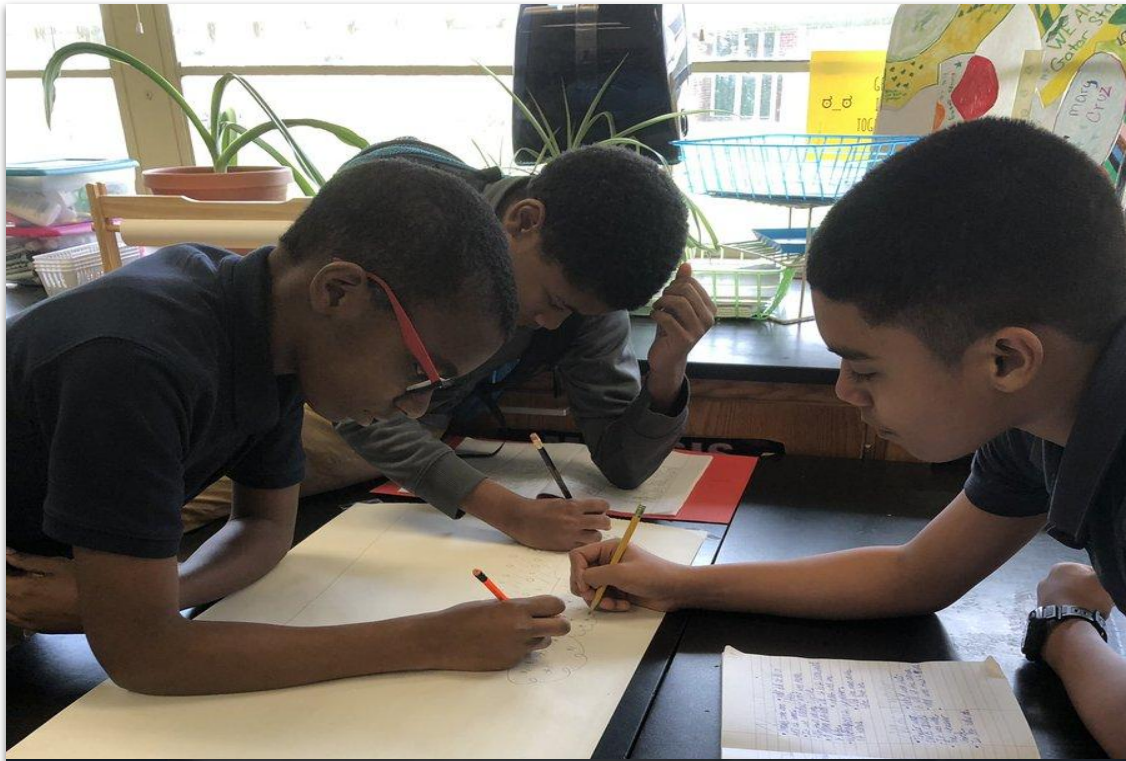
10 Partner States



New Jersey Field Test Teachers

228

Field Test Teachers



Tyne Bankester @BankesterSci · Feb 25

Students
engaged
in the
field test
units

5800

Login

Username or E-mail *

Password *

Keep me signed in

Login

Register

[Forgot your password?](#)

25K

Registered Educators



#OpenSciEdResearch



How can we
use chemical
reactions to
design a solution
to a problem?



 OpenSciEd
MIDDLE SCHOOL SCIENCE



Educational
Assets
Downloaded
by
Registered
Users

300K

3000K

10

25K

228

5800

Initial Logic Model to Guide OpenSciEd Research

Distinctive Principles

- Coherent to students
- Phenomena-driven
- Development/revision of ideas
- Collaborative knowledge building
- Embody the vision of the Framework

Unique/Key Affordances

- Adaptable
- Freely available
- Extensive and detailed
- Approved

OpenSciEd and Educational Ecosystem

System: Aligns OpenSciEd to system change models to support teacher growth and incentivize the instructional approach. Helps make OpenSciEd *adoptable and sustainable*.

Teacher supports: Enable teachers to implement the OpenSciEd vision and promote teacher growth. Helps make OpenSciEd *learnable and feasible*.

Classroom: Promotes interactions among teachers, students, and materials to achieve desired outcomes. Helps make OpenSciEd *implementable and engaging*.

Desired Outcomes

- System
- Teacher capacity
- Students
- Resources and innovations

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What are the worthwhile questions being asked of the OpenSciEd experiment?

What role can a product play in redefining what counts as science education?

Can the combination of high quality and OER delivery of curricula serve to reculture existing policies, practices, and procedures?



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What role can a product play in redefining what counts as science education?

- Curricular materials are a necessary and inadequate component of redefining science education.
- And, curricula that asks schools and teachers to reconsider current practice have existed for years.
- Where OpenSciEd finds success at institutional levels (schools and districts), what are the other meaningful contexts that partner with curricula to help reculture the classroom in ways that bring three dimensional science learning to every student?
- What happens in those institutions where those meaningful contexts do not exist?



Can the combination of high quality and OER delivery of curricula serve to reculture existing policies, practices, and procedures?

- Freely available materials exist
- Editable materials exist
- Quality standards aligned materials exist
- Curriculum based professional learning exist

- What is it about these materials that have captured the initial interest of educators?
- How does the combination of what OpenSciEd brings to the table help reculture institutions to create change in adoption processes, teacher support, materials adaptation, teacher collaboration, ...?



OpenSciEd Research Agenda



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Toward an OpenSciEd Research Agenda

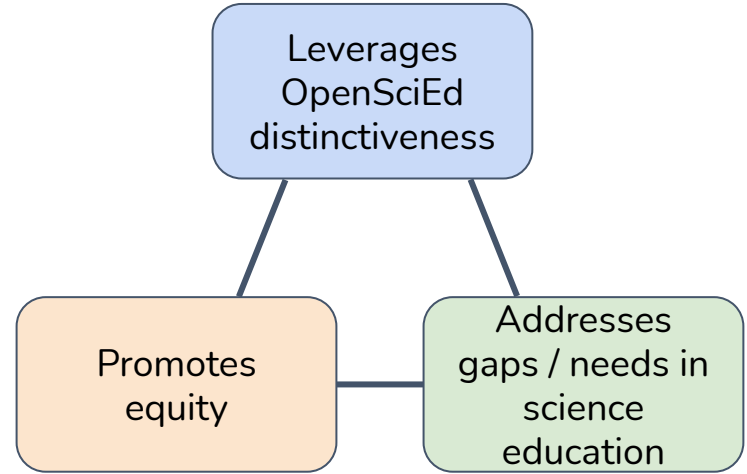
Kevin McElhaney

Senior Research Scientist, Digital Promise



Catalyzing an OpenSciEd Research Community

- Identify priorities for research enabled by OpenSciEd and contributing to its improvement and evaluation
- Help connect like-minded partners
- Support the ongoing refinement of ideas into submittable research proposals



Working Group Participants and Topics

Digital Promise convened a program committee and working groups representing 79 diverse stakeholders:

- researchers
- designers
- district and school practitioners
- state education officials
- professional learning providers
- program officers
- and others

grouped by interest into five topics

- Assessment (16)
- Pedagogy (15)
- Professional Learning (16)
- Curriculum design (18)
- Technology (14)



Working Group Structure

Over the course of several parallel sessions on each topic, participants:

- generated ideas and themes of interest for potential OpenSciEd-related research
- refined, organized, and prioritized the ideas
- outlined and/or gave feedback on a preliminary, hypothetical research proposal



Emergent Themes

These overlapping, cross-cutting themes appeared across working groups:

- Student agency and participation
- Promoting the vision of the *Framework*
- Adoption, implementation, and sustainability
- Materials customization and adaptation

What matters for OpenSciEd?
To whom does it matter?

How does OpenSciEd happen?
Where does it happen?
Who makes it happen?



Theme: Materials Customization and Adaptation

- How can customizations of PD materials and student materials promote deep district adoption and equitably meet specific needs of teachers and students?
- How does customization of materials occur, and who does it?
- What kinds of customizations are made, and for whom?
- Do customized materials maintain the integrity of the original materials? How can high-quality customizations be enabled?

Theme: Materials customization and adaptation

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Unique/Key Affordances

- Adaptable
- Freely available

OpenSciEd and Educational Ecosystem

System:

- Approaches / resources for school systems to enable high-integrity customizations to OpenSciEd
- Stakeholders who customize materials and make them widely available

Teacher supports:

- Customized PL materials that promote OpenSciEd's distinctive principles
- Support for teachers to make high-integrity adaptations

Classroom:

- Customized materials and tools that teachers can adapt with high-integrity to meet classroom needs

Desired Outcomes

- Equitable student outcomes
- Improved teacher capacity to adapt and implement
- Deep district adoption
- New adoption and implementation models
- Widely available customized materials and tools

Theme: Materials customization and adaptation

Example: Adapting OpenSciEd to engage students with local science phenomenon having particular relevance to their community

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Theme: Student agency and participation

Example questions

- How can curriculum materials promote equity by increasing student agency, self-expression, and pursuit of their goals through student-driven investigations?
- How can teaching tools support teachers in classroom orchestration and make instructional decisions to better enable student agency?
- How can resources and tools enable customizations and adaptations that respond to their students' ideas, identities, experiences, needs, interests, communities, and local contexts?



Theme: Promoting the vision of the Framework

Example questions

- How can curriculum materials, tools, and assessments promote students' engagement and learning in practice-based science equitably, within and across classrooms?
- What supports and structures are needed for teachers to develop capacity for ambitious instructional models?
- How can OpenSciEd materials support teachers in promoting views of professional science that are inclusive of all students?
- How can classroom tools help all students participate in the collective processes of generating questions, consensus-building, and refining of scientific ideas?



Theme: Sustainable adoption and implementation

Example questions

- Who is adopting OpenSciEd (e.g., individual teachers, schools, districts)? What are the different models of use?
- What factors promote deep, sustainable, and equitable adoption? What supports are needed?
- What is the role of customization in these models? What are the roles of diverse stakeholders?
- How can learning communities across districts and locales help teachers share ideas and promote equitable participation?

Other Questions

- How do research priorities for different grade bands differ?
- What is the role of teachers' comfort with the *Framework* content (DCIs, SEPs, CCCs) in successful OpenSciEd implementation?
- What are unique considerations for education of preservice teachers? How can preservice teaching programs leverage OpenSciEd?
- What are equity issues faced by teachers, and how can OpenSciEd help address them?



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Applying for research funding at the National Science Foundation

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Merit review criteria for reviewing proposals (How other people are asked how to evaluate proposals)

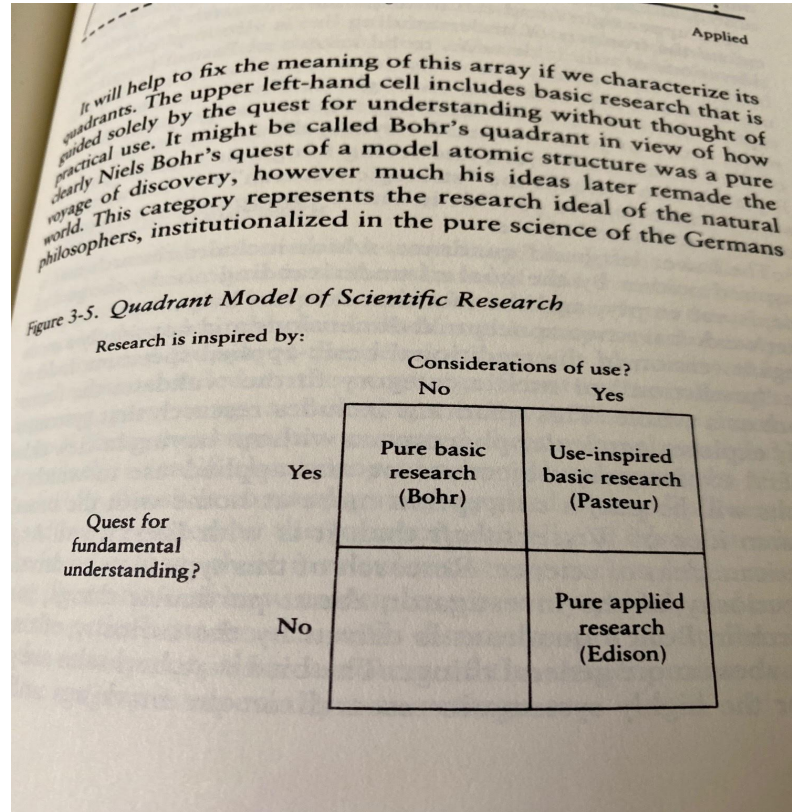
- Intellectual Merit

The potential for a study to produce new scientific knowledge.

- Broader Impacts

Every other way the proposed effort will make the world a better place.

Stokes (1997). Pasteur's Quadrant

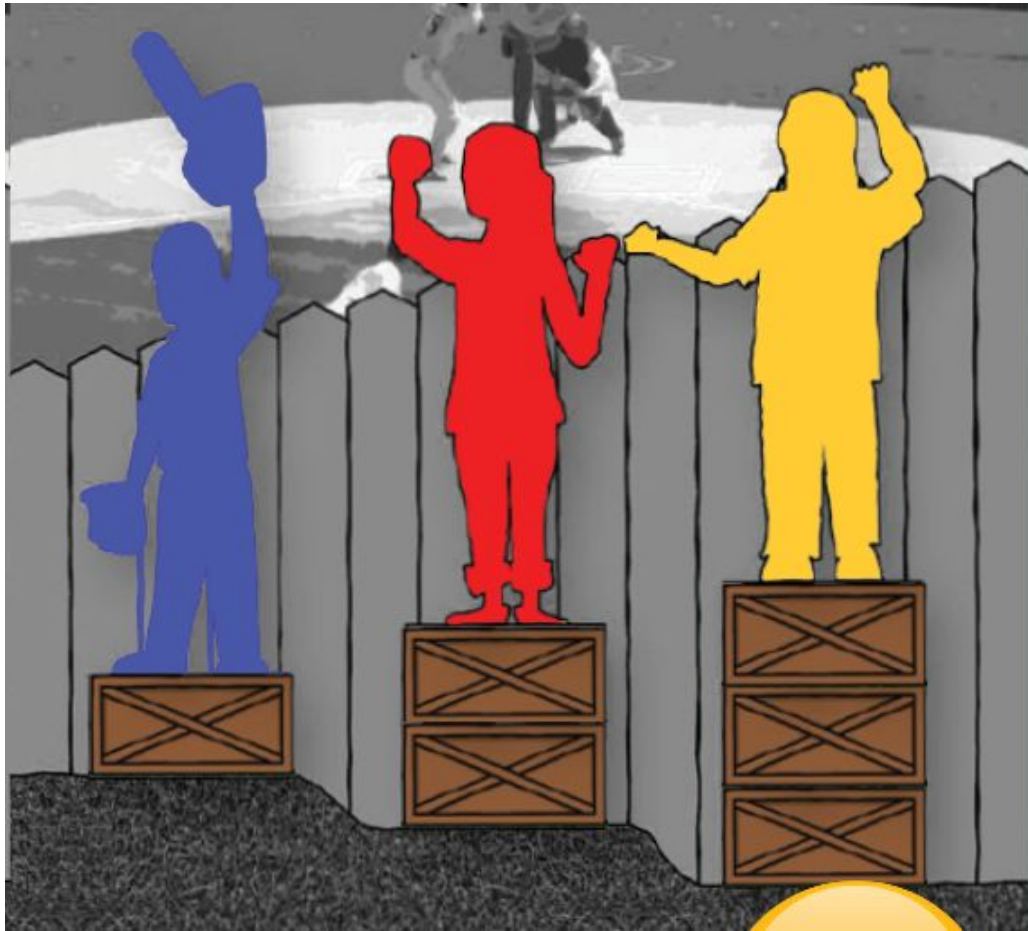


Fundable research questions

- Literature review: What does the field already know about a question?
- What is an important question?
- What are the gaps in terms of what is not known?
- How will the question be addressed, given the contextual opportunity available?
- Hone the question.
- King, K. D. (2020). Posing fundable questions in mathematics and science education. *International Journal of Science and Mathematics Education*, 18, 25-26.

Reflections on Equity and Science Education Research

Eileen Carlton Parsons
UNC School of Education



Next Steps

- Elaborate and refine research agenda document based on community feedback; share it on our webpage
- Support development of new research proposals
 - Seed grants and proposal support
 - Share proposal resources
 - Facilitate partnerships

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- Jim Short, Carnegie Corporation of New York

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