The Science plus Education Collaboratory (S+EC): A Communication Mechanism to Amplify Impact

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Overview

William Wulf, National Science Foundation (NSF) Assistant Director (1988-1990), advocated for leveraging expertise beyond institutional and disciplinary boundaries and accomplishing a broader impact. This concept came to be known as a Collaboratory. Established in response to an American Geophysical Union (AGU) Scientist-Teacher Partnership Session and recent developments suggesting a revision of scientist-teacher partnerships and perspectives, the Science plus Education Collaboratory (S+EC), was officially established in 2018.

Introduction and Background

In the 1990s there was an increased call for science instruction reform. Many aspects of this reform was supported and amplified through Science for All Americans[1] and the National Research Council's (NRC) National Science Education Standards[2]. This change in science instruction mandated a shift from textbook, lecture-based instruction, to "inquiry-based" classrooms where K-12 students learned by exercising scientific practices[1,2].

To encourage this new pedagogical strategy, NRC emphasized more partnerships between scientists and the K-12 educational community[2]. As a result, a sentiment emerged that scientists were best qualified to improve K-12 science education by contributing their knowledge and skills as to how science is done[3,4]. However, developments in the last sixteen years (Table 1), suggest that there could be new ways to approach scientist-teacher partnerships.

Recent Developments in the Last Sixteen Years, Table 1	Year
A scholarship of engagement framework emerges. Reciprocity practices begin to replace linear model of knowledge production and dissemination.	2002
Federal law requires all public school teachers to be highly qualified to teach their assigned content area.	2005
A significant body of education research dedicated to foster K-12 student proficiency in specific practices of scientific enterprise, such as argumentation and modeling, is available.	2009
White House publishes five-year strategic plan to reduce duplication of federal STEM education investments, resulting in consolidation of many long -established programs.	2013
How the work of scientists is accomplished is a significant component of the NGGS. A K-12 continuum of these practices is clearly articulated, informed by recent education research.	
Federal agencies begin to investigate and support opportunities for teacher leadership.	2014
More explicit expectations for federally-funded STEM education performance evaluations and broader impacts (BI) are published.	2015-2018

Science plus Education Collaboratory (S+EC)

Extended Vision: S+EC envisions "viable and sustainable ecosystems comprised of teachers (both formal and informal), researchers, and university-based BI professionals who effectively and reciprocally exchange their expertise to identify and address overlapping national initiatives and issues"**.**

Perspectives and Values:

To ensure the success of this vision, the S+EC adheres to some key perspectives and values for the S+EC Advisory Committee, S+EC committees, members and partners.

i. Transparency and equitable recognition are paramount[5]. S+EC perceive relationships as reciprocal and aligning with concepts underpinning BI and the scholarship of engagement[6,7,8,9]. Communication of scientists' research, application of education research, and opportunities for K-12 authentic science are high priority. Benefitting society in many ways through multiple domains, especially in term of teacher empowerment, is critical for success.

ii. S+EC Advisory Committee members characterize K-12 activities that integrate authentic science research as activities where students can collect, explore, analyze, publish research-grade data, or activities that connect K-12 science standards to current scientific research[10,11,12].

Networked Resources:

In order to begin to make a sustainable and viable scientist-teacher ecosystem, S+EC is in the initial process of designing a website (sciencepluseducation.com), organizing a collection of resources (pictured right) and framework based on best practices, creating a robust advisory committee, connecting with national groups and networks, and contacting teachers and other individuals who are interested in becoming S+EC partners and members.

Early-Stage Initiatives

S+EC is in the very early stages of development. These early-stage initiatives will serve as a catalysts to help S+EC amplify a collective impact, create reciprocal communication pathways, and enhance multi-domain societal benefits by creating the impetus for scientist-teacher partnership ecosystems (Table 2).

Initiatives (I) to Amplify Impact and Communication, Table 2	
I-1	Identify and solicit K-12 teachers who can help disseminate and communicate partnership opportunities through their networks
I-2	Organize interactive events in which representatives from the scientist-teacher ecosystem can exchange insight and goals (e.g. American Chemical Society, Geological Society of America, and American Geophysical Union teacher-scientist partnership sessions)
I-3	Continue to populate website with resources from multiple domains (K-12 education, education research, and science BI)
I-4	Investigate and report status of federal agency and foundation activities dedicated to K-12 BI
I-5	Gather, synthesize, and disseminate tenets of the scholarship of engagement via multiple platforms so they are accessible to representatives of all professional domains
I-6	Investigate and provide instruments associated with scientist-teacher partnership scholarship

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