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Paul A. Trunfio is a Senior Research Scientist and Director of the Science Education Group at the Center for Polymer Studies in the Department of Physics and Fellow at the Hariri Institute for Computing and Computational Science & Engineering at Boston University. I have been a member of the Center for Polymer Studies since an undergraduate student in the mid 1980s, creating computational visualizations of complex systems in nature and medicine. I made my professional focus the integration of interdisciplinary science research with K-16 STEM (Science Technology Engineering and Mathematics) education, leading efforts to bridge the two by developing computer-based tools, curricula, training programs and mentor partnerships.

In my 26-year career at Boston University, I have co-authored and co-led 20 peer-reviewed grants and equipment awards with $24.4M in funding. I began my work with many colleagues – including one of the pioneers in interdisciplinary science, H. Eugene Stanley – by leading some of the early efforts to develop technology-enriched science education. At that time, the early 1990s, computational tools were practically unheard of in schools. Our solution to "move the needle" was to bring high-end computers, donated by major equipment manufacturers, directly into schools. Such technology allowed students to compute and visually render real-time models such as the dynamics of molecular networks in fully immersive three-dimensional environments.

During this era, we developed computer-based tools and curricula on fractal models of nature, molecular dynamics models in physics, biology chemistry, and medicine, and computational neuroscience. We created an exhibit on fractals and complex systems at the *Boston Museum of Science* and at other museums worldwide, where my personal project, *Music of the Heart*, translated a visitor's electrocardiogram into music in real time. We led summer workshops to train and support hundreds of teachers nationally and internationally in the use of our computational modeling tools in STEM education. Workshops provide an environment for teachers to adapt what they are learning into "action research projects" tailored to their own classroom and school priorities. We have hosted high school teacher, undergraduate, and high school internship programs, combining curriculum development with research experiences.

In our effort to bridge science research and science education, from the very beginning we included graduate students in STEM and education into everything we did, from the development of curricula to mentoring in K-12 schools. Our early successes helped form the NSF GK-12 Program, integrating graduate students and K-12 teaching. Our own learning research demonstrated the efficacy of the approach of bringing forefront science research, graduate students, and educational technologies into schools. Our research documented gains in conceptual development as well as motivation among disadvantaged students as well as those who were otherwise turned off to science.

Since 2009, through funded NSF projects and collaborations with other institutions, I have been building bridges between "cyberlearning" and research in data, network and systems science. I led the creation of *NetSci High* which connects high school students who are underrepresented in STEM, and their teachers, with regional university research labs. Each year, our program begins with an intensive residential summer workshop using the new lens of network thinking to understand and find solutions to complex social, health and environmental problems. Students and teachers are introduced to network science foundations including graph theory, statistical inferencing, data mining, systems theory, and information visualization. On a practical level, students learn computational skills for visualizing and analyzing data using Gephi, Python, Javascript D3, Processing and R.

We motivate and inspire through team-building activities, mini-projects, integrating STEM with art and design, non-technical interactive talks by leading researchers, public speaking opportunities, and more. We tear down the walls between student, teacher and researcher. Students thrive in this environment and by the end of our workshop, student teams are armed with tools – and confidence – to embark on a year-long journey of independent discovery. During the academic year, graduate student mentors from partner research labs together with high school teacher mentors guide the student teams in developing their research project. Students engage in data collection, data mining, data processing, and computational network modeling and analysis to discover answers to their specific research questions.

I am currently focused on *synthesizing, sustaining and scaling* my work in order to strengthen the STEM "pipeline", increase capacity for *broader impacts*, and *broaden participation*. I appreciate that truly impactful STEM education enhancements must include stakeholders at all levels. Launching the initiative *Data & Network Science in K-20 Education*, I am exploring the best ideas and strategies to bridge university research, undergraduate education, K-12 students and teachers, school and district administration, parents, local, state and federal governments, industry, community organizations, and others.

My education background includes undergraduate studies in biomedical engineering, graduate coursework in computer science and graduate research in statistical physics, co-authoring peer-reviewed research in such journals as *Nature*, *Physical Review* and *Physical Review Letters*. I am a fellow in the *Massachusetts Academy of Sciences*, and member of the *National Association of Research in Science Teaching*, *American Educational Research Association*, and *National Science Teachers Association*.

Community service is an integral part of my life. I am an active volunteer in community programs and societal issues, that are all about providing opportunities and removing barriers to growth through education and mentoring. I am engaged in bringing awareness to the long-lasting effects of child abuse, as well as seeking pathways for emotional healing regardless of the cause. My message is that healing is not found by focusing only on the injustice of abuse – as a victim – but on perseverance through love, freedom, and empowerment – as a survivor. I am involved in youth creativity programs, art and music programs, and parent-teacher-student partnerships.

I am a "hobbiest" photojournalist and musician.