Workshop on Effecting Systemic Change in QIS Education

National Q-12 Education Partnership

This workshop, organized by Q2Work, is by invitation. It will be held on Feb. 24 at 12:30-4:00 pm Eastern Time/11:30-3:30 pm Central Time. This workshop is primarily aimed at people working on designing, implementing, and/or scaling quantum education programs. Please RSVP by filling out the form below and be sure to let us know about your role in quantum education (e.g., educator, content developer, education researcher, QIS researcher, program manager). This will help us prepare for the workshop breakout discussions. In addition, please feel free to suggest invitees!

Name

Name

Email

Email

Position Title

Position Title

Company or Organization

Company or Organization

What is your role in QIS education?

If you have a program in QIS education, provide details.

Do you have questions that could be addressed in the workshop?

Suggestions for other invitees (name, affil., and contact email)

Meeting Agenda
National Q-12 Education Partnership

Wednesday, February 24, 2021

12:30 pm - 12:40 pm EST (11:30 am - 11:40 am CST)	*Welcome* Diana Franklin, Associate Professor in Computer Science, U. Chicago *Opening remarks* Charles Tahan, Assistant Director for Quantum Information Science, Director, National Quantum Coordination Office, White House Office of Science and Technology Policy Tomasz Durakiewicz, Program Director, Condensed Matter Physics Program, Division of Materials Research, National Science Foundation
12:45 pm - 1:30 pm EST (11:45 am - 12:30 pm CST)	*Effecting Change in K-12 Computer Science Instruction.* Panelists will summarize examples/methods of how computer science has been introduced into the classroom in the context of curriculum, incentives/policies, institutional support, and community. Moderator: Diana Franklin Panelists:

Pat Yongpratik pat@code.org, Code.org

Pat Yongpradit is the Chief Academic Officer for Code.org, a non-profit dedicated to promoting computer science education. As a national voice on K-12 computer science education, his passion is to bring computer science opportunities to every school and student. During his career as a high school computer science teacher, he

inspired students to create mobile games and apps for social causes and implemented initiatives to broaden participation in computer science among underrepresented groups. He has been featured in the book, "American Teacher: Heroes in the Classroom", has been recognized as a Microsoft Worldwide Innovative Educator, and is certified in biology, physics, math, health, and technology education. Although Pat currently spends more time focused on computer science from a national perspective, he still finds ways to sneak into the classroom.

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Debra Richardson djr@ics.uci.edu, UC Irvine

Prof. Debra Richardson was the founding Dean of the UCI Bren School of Information & Computer Sciences at UC Irvine. Her main research area is software engineering. The use of information and communication technology (ICT) has produced profound advances — yet it has also contributed to the exploitation of our planet's natural resources. Her goal is to change how systems are created, encouraging developers to think about ways in which they might make users' behavior more sustainable. She was also the founding leader of ACCESS, an organization to bring computer science to all California schools.

Helen Hu, hhu@westminstercollege.edu, Westminster College

Prof. Helen Hu is a professor at Westminster College in Utah. Her research agenda explores increasing diversity in computer science by improving educational techniques. In particular, she is a leader in creating and studying the POGIL pedagogical approach modified for computer science instruction. Dr. Hu led the Utah Exploring Computer Science Initiative, which quadrupled the number of CS teachers in the state in four years. She is currently supporting local high school teachers by sending college CS students into their classrooms and helping elementary school teachers integrate CS in their science curriculum. She serves on the Utah Board of Education Computer Science Advisory Committee and the College Board AP Computer Science A Development Committee.

Chinma Uche, chinmauche@gmail.com, CREC Academy of Aerospace and Engineering

Dr. Chinma Uche holds a PhD in Biomathematics from Imperial College, London. She teaches Mathematics and Computer Science (CS) at CREC Academy of Aerospace and Engineering. Chinma served as the president of the Connecticut chapter of CSTA, the 9-12 rep at the CSTA Board, co-PI of the Mobile CSP project, and as a member of AP CSP Development Committee. She was named the 2015 CREC Teacher of the Year (https://goo.gl/kXbsEl), a Woman of Innovation by the Connecticut Technology Council and a semi-finalist for the 2016 Connecticut Teacher of the Year award, and the 2018 O'Toole Teacher Leadership Award Winner. Chinma continues to serve as an ECEP co-state Lead, Code.org CS Fundamentals facilitator, and a member of the Connecticut State Department of Education Computer Science Advisory Committee. Chinma also serves in many CS Advisory roles in her effort to advocate for CS for all K-12 students, based on her conviction that making CS a core requirement across all grades will help address the achievement, and economic, gap that currently exists in some subgroups.

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Patrick O'Steen, Patrick.OSteen@microsoft.com, Microsoft TEALS program

Patrick graduated from Whitman College with a B.A. in Mathematics-Physics and received a Master's in Secondary Science Education from George Washington University before going to work with D.C. Public Schools as a high school physics and engineering teacher for 7 years (Woodrow Wilson High School). During his time there he also coached cross-country, track & field, and FIRST robotics. Patrick moved to Seattle and joined the Microsoft Philanthropies TEALS Program in 2015, working to ensure all high school students have equitable access to inclusive computer science education. He is currently the TEALS regional lead for the West region, focusing on supporting high schools and TEALS volunteers across the Western U.S. and BC, Canada.

1:30 pm - 2:15 pm EST (12:30 pm - 1:15 pm CST)

QIS Education at the K-12 level. Panelists will share the status of their current programs that introduce QIS to K-12 students and teachers.

Moderator: Chandralekha Singh, Professor of Physics, U. Pittsburgh

Panelists:

Karen Jo Matsler
kjmatsler@gmail.com, University of Texas Arlington

Karen Jo Matsler is an Assistant Professor at the University of Texas Arlington and currently supervises the UTeach STEM Clinical Teachers. She has been in education for over 35 years, mostly as a high school physics teacher, but has also taught middle school science and served as a K-12 science coordinator. Matsler is the founder of *STEM Experts* and currently Principal Investigator for the NSF funded project, *Quantum for All* https://quantumforall.org/. She has received numerous awards for her service and educational expertise in STEM curriculum

development, program evaluation, and K-12 professional development/certification

James Whitfield,

James.D.Whitfield@dartmouth.edu, QBraid / Dartmouth College,

James Daniel Whitfield is an Assistant Professor of Physics and Astronomy and Adjunct Professor of Chemistry at Dartmouth College. He is a pioneer in the application of quantum computing to quantum chemistry problems. In 2011, he received a Ph.D. in Chemical Physics from Harvard University and has held visiting appointments at top institutions around the world. He currently serves on the advisory boards of Zapata Computing, of the IBM-HBCU Quantum Center, and of the Qubit x Qubit Coding School. Dr. Whitfield is a co-founder and chief scientific advisor at qBraid.com.

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Abe Asfaw, abraham.asfaw@ibm.com, IBM

Dr. Abe Asfaw leads a global education and open science advocacy mission for IBM Quantum, where he has contributed to industry-leading science communication efforts to help democratize the field of quantum computing such as the Qiskit Global Summer School, the Coding with Qiskit YouTube series, the Qiskit Open Source Textbook, and the IBM Quantum Challenge. His work focuses on building curriculum, software, educational materials, and interactive content that allow students and developers to leverage quantum computers over the cloud. Abe's goal is to build diverse quantum communities all over the world, including his home country of Ethiopia, through open access to IBM's real quantum systems. Beyond IBM Quantum, Abe has contributed to the development of quantum education at the US national level by participating in several National Quantum Initiative efforts, such as the National Science Foundation's Key Concepts for Future Quantum Information Science Learners and the Q2Work Education Initiative. Abe obtained his Ph.D. at Princeton University focusing on experimental quantum computation, focusing on using electron spins as qubits in silicon and on the surface of superfluid helium.

Sophia Economou, economou@vt.edu, Virginia Tech

Sophia Economou is a Professor of Physics and the Hassinger Senior Fellow of Physics at Virginia Tech. She focuses on theoretical research in quantum information science, including quantum computing, quantum communications, and quantum simulation algorithms. She has co-developed an early education and outreach program in quantum information

science, which enables students to do hands-on calculations of quantum circuits without the need for advanced math such as linear algebra.

Harris Amiri, haris.amiri@ubc.ca, University of British Columbia

With a background in Physics from the University of British Columbia, Haris Amiri is a project manager, educator, and avid fan of technology! A self-described "third culture kid", he has had the distinct pleasure of living in eight different countries and experienced a variety of education systems (Canadian, American, British, Indonesian, etc.). He currently manages a K-12 Quantum Computing Outreach Initiative at the University of British Columbia, Canada, and has been working in non-profit education for a little over four years. Haris believes that STEM Outreach and more broadly, education outreach, has a huge impact on youth, and is lucky enough to see it in his work every day.

2:15 pm - 2:30 pm EST (1:15 pm - 1:30 pm CST)	Break
2:30 pm - 2:50 pm EST (1:30 pm - 1:50 pm CST)	*Overview on education programs for breakout groups* Diana Franklin
2:50 pm - 3:30 pm EST (1:50 pm - 2:30 pm CST)	40-minute breakout groups for discussing attendee existing programs and brainstorming ideas for new programs/processes/team-building Group 1: Moderator Diana Franklin Formal education programs (mid-late stage programs interested in scaling-up and/or developing new aspects of existing programs) Group 2: Moderator Chandralekha Singh Formal education programs (initiatives in early-stage development/ideation stage; pre-funding) Group 3: Moderator Emily Edwards Informal education programs (informal programs at any stage interested in discussing implementation, scaling, team-building, or other topics)
3:30 pm - 3:50 pm EST (2:30 pm - 2:50 pm CST)	Readout, group discussion, and Q&A

Workshop Organizers

Emily Edwards is the Managing Director of the Illinois Quantum Information Science and Technology Center at the University of Illinois Urbana-Champaign. She has a PhD in physics from the University of

Diana Franklin is an Associate Professor in Computer Science. She leads five projects involving computer science education involving students ranging from 3rd grade through university. She is the lead PI for

Chandralekha Singh is a professor in the Department of Physics and Astronomy and the Founding Director of the Discipline-based Science Education Research Center (dB-SERC) at the University of Pittsburgh. She is

Maryland and research experience in atomic physics and quantum information. Previously, Edwards was the Director of Communications and Outreach at the Joint Quantum Institute and has 9 years experience in science communications and public engagement. In addition to co-leading the development of the QIS Key Concepts in 2020, she is co-leading the NSF-funded Q2Work program, which is a member of the National Q-12 Education Partnership. She also co-leads an NSF AISL project to develop an online multimedia glossary of quantum physics terms called, "The Quantum Atlas."

quantum computing education for EPIQC, an NSF expedition in computing. Her research agenda explores ways to create curriculum and computing environments in ways that reach a broad audience. She is a recipient of the NSF CAREER award, NCWIT Faculty Undergraduate Mentoring Award, four teaching awards, and three best paper awards. She currently co-leads the Q12 Partnership and the Q2Work initiative to magnify and organize K-12 QIS Education efforts.

currently the Past President of the American Association of Physics Teachers. She obtained her BS and MS degrees from the Indian Institute of Technology Kharagpur and her Ph.D. in theoretical condensed matter physics from the University of California Santa Barbara. She was a postdoctoral fellow at the University of Illinois Urbana Champaign, before joining the University of Pittsburgh. She has been conducting research in physics education for more than two decades. She co-led the US team to the International Conference on Women in Physics in Birmingham UK in 2017. She is a Fellow of the American Physical Society, American Association for the Advancement of Science and American Association of Physics Teacher.