SUMMARY OF THE NATIONAL Q-12 EDUCATION PARTNERSHIP KICK-OFF EVENT

Product of

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About the National Q-12 Education Partnership

The National Q-12 Education Partnership builds upon efforts spearheaded by the White House Office of Science and Technology Policy (OSTP) and the National Science Foundation (NSF) to develop nine key QIS concepts[1] that can be introduced to and adapted for computer science, mathematics, physics, and chemistry courses throughout middle and high schools. The concepts can also be expanded and adapted for use in informal learning opportunities, such as museums. NSF has awarded nearly $1 million to support these efforts through the Q2Work program, and two conferences for teachers[2,3].

The partnership commits over the next decade to work with America's educators to ensure a strong quantum learning environment, from providing classroom tools for hands-on experiences to developing educational materials, to supporting pathways to quantum careers. By expanding access to materials and quantum technologies through this partnership, educators in classrooms and other settings will be able to develop programs, courses, and activities to introduce students to the field and open up opportunities for quantum careers. Together, we can prepare America's next generation workforce with the tools to succeed in the industries of the future.

The National Q-12 Education Partnership Kick-off Event

On October 7, 2020, the OSTP and NSF hosted the inaugural meeting of the National Q-12 Education Partnership[4], a public-private initiative working to inspire the next generation of leaders in quantum information science (QIS).

The meeting, co-organized with the NSF-funded Q2Work program[5], brought together over 170 stakeholders from across academia, early education, industry, the federal government, and non-profit organizations to discuss opportunities to increase public engagement and facilitate an expansion of QIS education at the K-12 level. The partnership prioritizes development of high-quality, age-appropriate QIS educational materials and increased learning and training opportunities for students and educators of all backgrounds.

The Q-12 Kick-off event consisted of an opening session followed by small group breakout discussions. The opening session began with remarks from Chief Technology Officer of the United States, Michael Kratsios and NSF Director, Dr. Sethuraman Panchanathan. The Director of the National Quantum Coordination Office (NQCO), Dr. Charles Tahan, provided an overview of the Q-12 Partnership and the Nation's broader workforce goals.

[1] https://www.nsf.gov/news/special_reports/announcements/051820.jsp?et_rid=390004454&&et_cid=3349247
[2] https://www.nsf.gov/awardsearch/showAward?AWD_ID=2009351&HistoricalAwards=false
[3] https://www.nsf.gov/awardsearch/showAward?AWD_ID=2015205&HistoricalAwards=false
[4] https://q12education.org/
[5] https://www.nsf.gov/awardsearch/showAward?AWD_ID=2039745&HistoricalAwards=false

"We believe that early engagement with emerging technologies is essential to inspire and grow the next generation of the American workforce,"
- Chief Technology Officer of the United States Michael Kratsios

The goal of the event, Dr. Tahan noted, was to "increase awareness, while identifying the challenges and opportunities for the partnership and broader community to come together to expand participation and opportunities in quantum."

Next, NQCO Industrial Liaison Dr. Corey Stambaugh moderated a panel consisting of industry and academic representatives with a portfolio in STEM education. Panelists articulated challenges and recommendations for growing the Q-12 Partnership, and supporting QIS-related education and outreach efforts in a manner that connects with students across the Nation. The opening session was concluded with closing remarks provided by NSF/MPS Program Director Dr. Tomasz Durakiewicz.

The opening session included the public release of the NQCO *Quantum Frontiers Report*[6] which was developed with input from industry, academic, and government leaders to identify priority areas that need continued research to enable the full potential of QIS. The NQCO also officially unveiled *Quantum.gov*[7], a dedicated website for connecting to the wide-range of QIS activities being undertaken across the federal government. *Quantum.gov* serves as the primary tool for community news, events, and publications on federally funded QIS activities to the American people.

"Quantum offers great potential for economic prosperity and national security. We must inspire talent and spark curiosity in every corner of our Nation, from coast-to-coast, from remote rural areas, to the largest urban centers; we have talent everywhere across this great Nation,"
- Director of the National Science Foundation Dr. Sethuraman Panchanathan.

During the breakout sessions, participants joined one of four discussions focused on **QIS Education Materials, QIS Careers, QIS Outreach**, and **QIS Teacher Professional Development.** Within each theme, the breakout participants discussed the common challenges, current activities, community collaboration opportunities, diversity and inclusion considerations, and measures for success.

[6] https://www.quantum.gov/wp-content/uploads/2020/10/QuantumFrontiers.pdf
[7] https://www.quantum.gov

Key Takeaways

Key takeaways from breakout discussions included:

- **Increasing Access to High-Quality QIS Educational Materials:** The conversation on QIS educational materials centered around increasing access to quality learning tools that can be used independently or explored in informal settings. This included development of courses and modules that infuse key QIS concepts into the classroom. Participants largely agreed on the need to collaboratively support the creation of new learning tools and materials.

- **Raising Awareness of QIS-Related Career Paths to Pre-College Students:** Participants discussed how to inspire the next generation QIS workforce, including how to leverage internships, mentorship, and networking. Here participants saw the need to ensure information on pathways towards the many different careers in QIS was available and that efforts were made to make connections between students, student mentors, educators and future employers.

- **Making QIS-Concepts More Accessible to a Broad, Non-Scientific Audience:** The conversation for QIS outreach centered on connecting to communities of interest, including public audiences, decision makers, and student groups. Overall, attendees felt that public engagement activities should seek to both inspire future QIS learners and promote QIS awareness, appreciation, intuition, and literacy among non-expert audiences.

- **Engaging with Teachers and Educators in Developing Educational Materials and Curricula:** Discussions at the meeting also focused on educating, informing and supporting educators. Participants highlighted a need to increase communication with educators and professional societies to ensure that programs align with the needs of learners and classrooms.

Next Steps and Conclusion

The National Q-12 partnership will work from the information gathered at the kick-off event to prioritize the challenges and develop actionable steps to address them. The partnership is aware that connecting to a broader community requires time and effort. By promoting career opportunities, teachers can be encouraged to highlight this emerging area. However, QIS-focused educational materials need to be evaluated for the efficacy, and new materials need developed to support educators. Interested parties are encouraged to connect with the growing community and the partnership at https://q12education.org.

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