LEARNING LAB | LOGIC MODEL SAMPLE

PROJECT GOALS:

1. EXPAND ACCESS TO HANDS-ON AND EXPERIENTIAL LEARNING WITH QUANTUM-RELEVANT TECHNOLOGIES AND LAB EQUIPMENT
2. BUILD NEW ENTRY POINTS TO QUANTUM INFORMATION SCIENCE AND TECHNOLOGY (QIST) PATHWAYS AND TO THE QUANTUM WORKFORCE, AND IMPROVE STUDENT UNDERSTANDING OF HOW CLASSROOM KNOWLEDGE AND SKILLS APPLY TO QUANTUM INDUSTRY ROLES
3. INCREASE STUDENT ENGAGEMENT WITH QUANTUM INFORMATION SCIENCE AND TECHNOLOGY

INPUTS → **OUTPUTS** → **OUTCOMES**

Resources	Activities	Deliverables	Project Outcomes	Long-Term Outcomes
• Department/institutional commitment to project • Institutional Research Office support (including IRB approval and institutional data collection) • Faculty time and expertise • Quantum FAST funding to support project team time and equipment procurement • Industry matching support (both monetary and in-kind) • Existing relationships and collaboration with industry partners	*Pre-implementation* • Outreach to quantum industry for consultation on in-demand KSAs • Consult colleagues at other institutions about their experience developing quantum-relevant lab activities for undergraduate students • Procure lab equipment specified in the full proposal • Acquire IRB approval • Develop learning assessments, student and faculty surveys, and student learning and quantum career pathways self-reflection exercises *Implementation* • Regular meetings: project team meetings for planning module development, course coordination, implementation, and assessment • Quantum industry consultations: ongoing project team meetings with quantum industry to identify key KSAs	• New lab and curricula modules, available as OER • Written guidance for faculty on implementing curricula and lab modules • Development of new Introduction to Quantum Information Science course at CSU Imaginary Bay • Analysis of student surveys, learning assessments, and self-reflection exercises summarized in final report • Establishment of quantum student club at CSU Imaginary Bay • Establishment of regional undergraduate quantum hackathon	• Quantum lab and curricula modules implemented in 10 course sections across the 3 partner institutions. Modules will also be deployed and tested in up to 10 additional course sections at up to 4-to-5 additional regional institutions. The modules and updated curricula will reach approximately 450 students over the course of the project. • Learning assessments will show improved student understanding of key quantum concepts and greater mastery of in-demand skills and abilities, including in the use of quantum-relevant equipment • Student survey data and self-reflection exercises will show improved confidence in using quantum-relevant technologies and equipment, and increased understanding of how equipment is used in quantum industry settings	• Lab and curricula modules will enable other institutions to strengthen industry-aligned QIST instruction and provide learners with in-demand KSAs • Greater access to hands-on learning and quantum-relevant technologies will improve student readiness for roles in the quantum industry • Expanded community-building efforts will increase student engagement with quantum information and science, improve student retention in quantum career pathways, and increase the number of students interested in pursuing roles in quantum industry • Relationship building with quantum industry partners

	• Develop and revise: create modules, course materials, and guidance documentation, and revise based on learning assessments, faculty/student feedback, and student self-reflection exercises • Training: 10 faculty from additional institutions will attend a training workforce in Summer 2028 to prepare them for deploying curricular and lab modules in their courses • Pilot: implement curricular and lab modules across 10 course sections at the 3 partner institutions over the course of the project, and in up to 10 additional sections at 4-to-5 additional regional institutions *Post-implementation* • Distribute final student and faculty surveys, and analyze final self-reflection exercises • Collect and analyze final learning assessments • Share findings and project resources at conferences and convenings		• Student survey data and self-reflection exercises will show improved student understanding of how classroom concepts and lab activities connect to quantum applications and potential roles in the quantum industry, as well as greater awareness of potential quantum career pathways and greater interest in pursuing quantum-related careers • Establishment of framework to enable students at Imaginary Community College to access lab equipment at CSU Imaginary Bay	with help faculty maintain curricular alignment with industry needs and foster continued partnership around strengthening the quantum talent pipeline

PROJECT RATIONALE:

Strengthening and expanding the quantum talent pipeline requires increasing access to experiential learning and hands-on experiences with quantum technology (employers identify experimental skills and hands-on experience as key criteria for hiring), as well as building greater awareness among students about roles in the quantum industry and about different pathways to those roles. Our project aims to address both of these challenges. The project team has deep experience in teaching quantum concepts across several academic disciplines, expertise in developing and teaching high-quality lab exercises (including activities involving quantum-relevant technologies and laboratory skills), and strong connections to the quantum industry. By creating lab activities that enable students to develop in-demand experimental and technical skills, establishing new cross-campus partnerships that expand student access to quantum-relevant instruments, building curricular modules that help students understand how classroom concepts relate to industry applications, and fostering supportive environments for learners to engage with quantum science and technology, this project will provide students with the knowledge, skills, and abilities they need for roles in the quantum industry, and build student awareness of opportunities in the quantum industry and help establish clearer pathways to those opportunities.

For additional guidance, see Aligning Data and Measures to Outputs and Outcomes of the Logic Model from the Institution of Education Sciences