Project Description

Project Description: The project description is a narrative describing your proposed program and how it is expected to unfold over the grant period. See the Notice of Grant Opportunity, Section 2.2, Project Requirements, Project Description for specific criteria to be included here. (7,500 character maximum, including spaces.)

[Note from Jennie: The document below was virtually 7500 characters according to the DOE system, even though google says we had a little more wiggle room!]

The Rowan University Computer Science Hub (RUCSH) will use a multifaceted approach to address the needs of K-12 educators and their students and families throughout Southern New Jersey (SNJ). In designing this program, we incorporated input from numerous educators across our region including K-12 teachers, curriculum specialists, school principals, and district administrators who have been working hard to improve the quality of Computer Science (CS) education for their students. Each district has unique strengths and needs, and we designed a program that will support not only our partner districts, but also many other districts throughout SNJ.

****GOAL 1: INCREASE THE NUMBER OF WELL-PREPARED, HIGH-QUALITY EDUCATORS TO TEACH COMPUTER SCIENCE

--- PREPARING IN-SERVICE TEACHERS TO DELIVER PROVEN CS CONTENT

In Summer 2021, we will prepare three cohorts of in-service teachers to teach students across the K-12 spectrum using nationally vetted curricula developed by Code.org. TCNJ serves as Code.org's NJ partner, and will facilitate the Code.org Professional Development (PD). To encourage teacher participation, we will offer stipends to teachers who participate in PD in the summer, and funds to schools for substitute teachers for PD sessions during the school day.

In Summer 2021, three cohorts of educators will begin Code.org training:
* 25 Grade K-5 teachers will take part in a single day of CS Fundamentals (CSF) training.
* 15 Grade 6-10 teachers will participate in 5 full days of CS Discoveries (CSD) training.
* 15 Grade 9-12 teachers will participate in 5 full days of CS Principles (CSP) training, suitable for use in AP or non-AP classes.

In Fall 2021 and Spring 2022:
* Code.org's CSD and CSP programs include four additional PD days spread across the academic year.
* CSF teachers will have continuing support from a Rowan "CS faculty mentor" (RUCSFM) who took part in the summer program with them. The RUCSFM will be available to the CSF teachers for followup support and will also reach out monthly to encourage further interaction.
The CSD curriculum uses special purpose hardware: Adafruit's "Circuit Playground Boards" (CPBs). While CPBs are often used by pairs of students, RUCSH will support social distancing by provide each CSD teacher with 30 CPBs, ensure that teachers in high poverty districts have enough for a full class.

--- INFUSING CS CONTENT INTO PRESERVICE TEACHER PREPARATION

All Rowan preservice teachers are required to take SMED 33220, which focuses on the use of educational technology in support of student learning and integration of technology into the P-12 curriculum. In Summer 2021, a team of faculty from Rowan's STEAM Education and Computer Science departments will develop an Introduction to Scratch Programming module suitable for integration into SMED 33220 that will be piloted in 3 sections of the course taught in Fall 2021. We expect 75 preservice teachers will be impacted by the introduction of programming into their curriculum. We anticipate that the results of this pilot program will be presented in both CS and Education conferences such as the ACM SIGCSE, ITICSE, AECT/AERA and published in journals such as Computer Science Education and Computers & Education

**** GOAL 2: EXPAND EQUITABLE ACCESS TO HIGH-QUALITY COMPUTER SCIENCE EDUCATION FOR ALL K-12 STUDENTS

Twenty years ago, Resnick et al (1998) coined the phrase "Digital Manipulative" (DM) to refer to computationally enhanced versions of traditional classroom manipulatives. Modern DMs, from programmable robots to single board computers like the Raspberry Pi and Arduino, can supplement CS classroom instruction and also make for exciting additions to after-school clubs and weekend and summer enrichment programs.

RUCSH will invite SNJ educators to borrow digital manipulatives from the Rowan University Computational Lending Library (RUCLL) for use in and beyond their classrooms. Our library is modeled on the highly successful P-12 Lending Library at The University of Nebraska Omaha (UNO) and will be implemented in collaboration with the Rowan University Libraries Digital Scholarship Center.

In Spring 2021, the RUCSH team will evaluate a minimum of 15 different DMs for their relevance to K-12 education. We will rank them based on factors such as cost, availability of existing curricula, and alignment with CSTA & NJ standards. We will select 5-10 DMs from across the K-12 spectrum to offer as part of RUCLL and create "Classroom Kits" that can support one DM-per-student for safe social distancing based on targeted grade levels' class sizes. We will create at least one "classroom kit" per selected DM, and we will purchase larger quantities of less expensive DMs.

We will use existing Rowan Library resources to implement an online reservation system. Rowan's Wellness Center and Department of Environmental Health and Safety will work with RUCLL to establish (and regularly reevaluate) protocols regarding appropriate holding periods and cleaning procedures between loans.

To maximize teacher use of these DMs, we will hold 10 half-day PD workshops in Summer 2020. We have budgeted stipends for 15 teachers per workshop; we will also welcome 5-10 additional teachers and administrators to participate in each workshop free of charge. Educators who participate in our DM PD will have early access to our reservation system. We anticipate that the RUCLL will begin lending equipment in August 2020. Our budget also includes support for undergraduate student workers who will help maintain equipment, oversee check-in and check-out, and provide teachers with online DM support.

*** GOAL 3: PROVIDE RESOURCES TO SCHOOLS, SCHOOL DISTRICTS, AND FAMILIES TO ASSIST IN EXPOSING K-12 STUDENTS TO ONLINE AND "UNPLUGGED" COMPUTER SCIENCE CONCEPTS BOTH IN AND OUT OF SCHOOL

RUCSH wants to facilitate all modes of CS instruction, including the use of more traditional "unplugged" manipulatives to teach CS. We will modify UNO's innovative "Computational Thinking Bins" (CTBs) to enable the majority of them to be used in a socially distanced classroom (and remote classroom when possible). Each

of the 11 CTBs contains inexpensive materials for a stand-alone activity that can be used to teach CS concepts (mapped to CSTA K-12 Standards) to groups of students. We will map the CTBs to the 2020 NJ Student Learning Standards for CS and publish instructions on the web so schools can build their own Modified CTBs. In summer 2020 we will offer a PD workshop to 15 curriculum supervisors and other administrators within school districts who themselves offer internal PD to their teachers. At the conclusion of the workshop, each will be given a set of Modified CTBs to bring back for use in their districts.

*** GOAL 4: WORK WITH NJDOE AND OTHER NJ ORGANIZATIONS TO STRENGTHEN COMPUTER SCIENCE EDUCATION THROUGHOUT NEW JERSEY

RUCSH will work with partner LEAs to recommend teachers to participate in NJDOE-Led CS Working Groups, and provide stipends for those teachers.

Rowan University is an educational partner of the South Jersey STEM & Innovation Partnership (SJSIP, southjerseysip.org, part of the NJ STEM Pathways Network) and will leverage this STEM ecosystem to offer an outreach event for at least 50 students and their families to be held in Spring 2022. It is our hope that the Central and Northern CS Hubs will also be interested in collaborating with us and extending this event throughout NJ.