

Coding as Another Language: The Development and Implementation of a Computational Thinking

Curriculum and Sustainable Professional Development Model in K-2 (Early Phase)

The proposed project is a collaboration of the DevTech research group at Tufts University and Norfolk Public Schools in Virginia. It addresses Absolute Priority 1 and 3. The project will 1) develop a comprehensive, high-quality integrated Computer Science curriculum for students K-2, teaching materials and implementation support; 2) implement the curriculum, leading to a significant improvement in student learning outcomes as well as teacher knowledge, and 3) ensure the long-term success of the program beyond the funding period through capacity-building in leaders.

The project will involve all 32 elementary schools in the district (7,505 students in total, K-2, and 450 educators). Norfolk is one of the lowest performing districts in Virginia, with many high-minority schools, more than 70% of students coming from economically disadvantaged backgrounds and low graduation rates. Thus, the project will serve high-need students, defined as students at risk of educational failure and in need of support.

Building on pilot tested materials developed by DevTech, the curriculum will integrate computational thinking and learning to code with ScratchJr with math and literacy skills, through a collaborative process that involves classroom observations, consultation with experts, focus groups and interviews. Special features of the project are its use of ScratchJr (freely available), the first programming language explicitly designed for children 5-7, both screen and unplugged activities, and integration with other content areas. During the implementation phase, teachers will be trained (on-site and online), while leaders will be coached in sustaining and scaling the work after the project ends. The curriculum will be evaluated for impact. The impact study will use a randomized control trial design with delayed treatment. Impact will be assessed through differences in learning outcomes in computational thinking and coding skills, math, and language development. A transfer and sustainability study will compare fidelity of implementation across groups and measure perceived sustainability through interviews with teachers and leaders and the development of a strategic plan.