Date: January 3rd, 2023

Source of Report: 130th Maine Legislature, First Special Session: Chapter 102 – Resolve, To Establish a Pilot Program to Provide Grants for Professional Development in Computer Science Instruction

Topic: Implementation and Results from Year One of Pilot Grant Program

Context

The Maine Department of Education defines computer science education as the purposeful integration of logical reasoning, computational and algorithmic thinking, and problem-solving skills into everyday learning; it is also the teaching and use of technology-specific skills such as programming, coding, robotics, and 3D printing. Computer science education teaches students how to find their way through complex problems and prepares them to interact with and understand a wide variety of technology and technological concepts.

The Department has been supporting and enhancing the development of computer science education in Maine through the creation and implementation of the computer science education state plan, collaboration with educators, educational leaders, partner organizations and stakeholders, as well as deliberate and actionable research that directly informs this important work.

In 2019, the Department convened a group of 30 computer science educators to create the state computer science education plan. This plan outlines seven targeted recommendations for computer science education development and support throughout the state. Each recommendation includes actions that the Department is working to implement with CS (Computer Science) educators. One of the components of the state computer science education plan's second recommendation is to "establish a grant program that provides funds/materials to get high need schools to the minimum required to offer computer science."

In 2021, Senator Matthew Pouliot introduced LD 127 to the Maine legislature. This bill established a pilot grant program to fund educator professional development opportunities for Maine educators. The bill requires the professional learning to be high-quality, research or evidence based, teacher led and/or created, and aligned to best practices. It was designed with an equitable approach to implementation, prioritizing applicants that do not offer computer science, serve socioeconomically disadvantaged and underrepresented populations, and commit to professional learning that emphasizes an integrated approach for all students.
As the Department continues to move toward universal access to computer science for all there are several other ongoing initiatives that complement this grant program.

The #MaineTeachesCS initiative centers around the provision and use of mobile computer science labs alongside ongoing professional learning opportunities for each school. Each lab focuses on one of three computer science topic areas: Robotics and Programing, Coding and Circuitry, and Augmented and Virtual Reality. Each mobile lab has equipment and supplies which teachers can use to integrate the topic area into their classrooms. The mobile lab will be paired with training and ongoing professional learning for educators. The professional learning will be tailored for each computer science topic area and offer tools, strategies, and frameworks for integrating the chosen topic into any content area.

In addition to the mobile labs and ongoing professional learning, the Department is assembling cohorts of educators who will engage in comprehensive Computer Science Integration (CSI) professional learning. Each school will select educators to serve as their Computer Science Integrationist (CSI). These CSIs will explore hands on opportunities to dig into best practice for computer science integration and will serve as the computer science integration "champions" for their schools, proving professional learning for their colleagues and helping other educators to integrate computer science into their classrooms.

This initiative centers around the principles of Maine's 7 Keys to Computer Science Education Success. These mobile labs, paired with targeted professional learning, and an ongoing CSI cohort, will help our schools to continue the important work of integrating computer science into their classrooms, to ensure that all Maine students have access to high quality computer science learning opportunities.

Actions

To administer this grant pilot, the Department's Computer Science Specialist worked to create a streamlined application for SAUs to complete and provided supported if they needed assistance with any number of things, from completing the application to finding a provider for the PD itself. To ensure that the word got out as far and wide as possible, the Department created promotional materials that were shared via the Department's communications, applicable listservs, and at various association meetings, including Maine Educational Technology Directors Association (METDA), the Association of Computer and Technology Educators of Maine (ACTEM), and Computer Science Teachers Association of Maine (CSTAMaine).

The Department hosted 3 information sessions on Monday October 18th, 2021, Monday October 25th, 2021, and Monday November 1st, 2021. These sessions were to ensure that the field would have a chance to ask questions and get additional context. An FAQ document was updated and posted after each session. The grant application and supporting resources were posted ont eh Department webpage. The Computer Science specialist also offered and provided direct support for SAUs who needed assistance with any part of the application process. From developing a plan to navigating the application process, the Computer Science Specialist was available to SAUs every step of the way.

Applications were reviewed by a small committee of Department staff who have backgrounds in computer science. The group used a review template created by the Department's Computer Science Specialist to evaluate each application in comparison with Ch. 102's requirements and priorities. Awards were made based on the degree to which Ch. 102's priorities were met within the application. Applications were reviewed in batches and the group helped to determine the deliverables for each awardee.

Outcomes

In the first year of this pilot, nine Maine school SAUs were awarded computer science professional development grants spread across six different counties in the state. Both rural and urban schools were awarded grants. Awards were made in Androscoggin, Cumberland, Hancock, Lincoln, Penobscot, and Piscataquis counties. In year two, we are working to expand to counties with districts who have not received an award by doing direct outreach, reaching out to county representatives through CSTAMaine, as well as posting to listservs specifically recommending districts from counties who have not been represented through this grant.

The nine Maine schools awarded in year one were: Bangor Public Schools, RSU 22, RSU 25, RSU 68, RSU 16, RSU 52, MSAD 46, RSU 12, and Portland Public Schools. Grants awards ranged from $1,945 to $15,000 and professional development plans ranged from simple and short term to comprehensive and long term. All allocated funding for the first year of the pilot ($50,000) was expended.

In Fall 2021, Bangor Public Schools received a $2,660 award to provide a full-day professional development for teachers, including hands-on training with VEX Robotics kits, Google Suite to learn basic programming, Tinkercad, ArcGIS, HTML, and multimedia coding. They used a Professional Learning Group (PLG) structure to support teachers with the implementation of CS lessons.

In Fall 2021, Portland Public Schools received a $1,775 award to expand their data analytics component of their computer science programming. They worked with local businesses to develop a curriculum to understand how they use data and how that applies to the curriculum utilized at Lyman Moore Middle School. Two educators from Lyman Moore Middle School attended and engaged at the MIT Sloan Sports Analytics conference to explore data analytics and to inform their professional development planning. Based on this, these educators provided at least two PD days that focused on the use of data related to 6th-8th grade teachers.

In Fall 2021, RSU 22 received a $3,160 award to send an educator to engage in and complete a 10-week course, resulting in a programming certificate in the area of X-Reality development (including Augmented Reality/Virtual Reality). This educator then provided one SAU-wide PD and one school-wide PD for each school (3) in the SAU in the areas of XR/VR/AR, open to all teachers and staff.

In Fall 2021, RSU 25 received a $4,865 award to expand current curriculum and add Python coding, beginning immediately in grades 5, 6, 7 & 8. Part of this included having an educator complete the 20-hour online course from Pathfinders Infosys titled, “Python class with a Finch Robot” and then offered at least four Professional Development sessions for Middle School teachers and the Miles Lane Grade 4 computer science instructor.

In Spring 2022, Bangor Public Schools received a $1,945 award to provide professional learning opportunities to teachers at the James F. Doughty school and the William S Cohen school. Through this grant, they provided a middle school PD workshop focusing on teaching educators to incorporate computer science concepts into their middle school curriculum. Participants engaged in a professional learning group that meets monthly to develop and review lessons. Lessons were then shared with other teachers.

In Spring 2022, MSAD 46 received a $3,000 award to provide a minimum of 6 hours of 3D printing and computer science professional learning throughout the school year. They offered computer science professional learning to PK-12 teachers in all content areas.

In Spring 2022, RSU 12 received a $11,160 award to offer professional development that focused on how to integrate coding with other content areas and how to emphasize the higher order thinking strategies involved. They relied on their current SAU model for instruction which seeks to explicitly teach and then embed higher order thinking strategies into content, instruction, and practice. RSU 12 provided 5, 1-hour professional learning sessions, available to all K-8 teachers and are ensuring that Learning Commons staff reach out to teachers to support the integration of Kodable and coding projects into content areas.

In Spring 2022, RSU 16 received a $3,900 award to provide professional learning for up to two teachers per building in each of the three elementary buildings using “Train the Trainer” type model around computer science and robotics. Trainers created training videos for computer science and robotics that can be accessed asynchronously by teachers. Trainers delivered professional development to all staff in their building at faculty meetings and grade level team meetings.

In Spring 2022, RSU 52 received a $15,000 award to look at CS PD at the SAU level. RSU 52 created a CS Planning Team to review and implement their computer science curriculum. They applied to the grant program, looking for additional professional development to take this work to the next level. They applied to engage in a PK-12 approach to computer science implementation, with team members representative of all grade levels, varied content levels from each of the SAU’s six schools.

In Spring 2022, RSU 68 received a $2,600 award to host a professional learning session that included hands-on training and instruction around computer science and classroom integration. They also created a library of video lessons for attendees and other staff to access and provided a sign-out system (through the library) for their DASH robots.

Recommendations

After administering this grant during school year 2021/2022, the Department makes the following recommendations for the computer science grant program:

1. **Continue the CS PD grant program beyond the pilot period.** This grant program has provided school SAUs with an opportunity to focus on computer science professional learning without needing to find a way to add it into their budget. This has allowed SAUs to see the value and importance of CS in their schools in a low stakes way and is causing SAUs to look for ways to continue CS PD in their SAU beyond their award period.

2. **Continue to prioritize and emphasize computer science integration.** One of the most effective ways to increase capacity for Maine students to fill open job positions in computer science related fields is to ensure that all students have access to computer science experiences in school. When integrated meaningfully into a variety of contexts and contents, across all grades, computer science learning provides all students with important skills and understandings essential to their future success.

3. **Expand the allocated funding to allow for more awards per year.** As our schools are increasing their computer science programming, their need for high quality computer science professional learning will also increase. As it stands, this grant program is a great opportunity for schools to take advantage of, however, at the current allocation, we're averaging 8-10 school SAUs per year.

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