

# Motivating and Increasing the Relevance of Elementary Computer Science in Rural Communities

Exploring Elementary Teacher Perspectives in Idaho

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## ABSTRACT

The Idaho Elementary Computer Science (CS) Collaborative (IECC) is a researcher-practitioner partnership dedicated to understanding how to better support the predominately rural districts in Idaho to implement elementary CS education. As part of the IECC's work, we conducted a survey of elementary teachers across the state. This poster will present our initial findings. Two of the research questions we addressed via the survey are: (1) What factors would motivate Idaho elementary teachers to pursue professional development (PD) related to CS? (2) What are elementary teachers' perceptions of the value of connecting CS education to rural community economies and industries? Descriptive analyses of 309 survey responses suggest that about three-quarters of elementary teachers reported that the following factors would be at least somewhat influential in their decisions to pursue CS PD: a K-5 computational thinking requirement, a district-wide CS planning staff, a pathway for elementary teachers to earn a certification in CS teaching, and a way to request CS PD funding. Few (9%) Idaho elementary teachers found that the perception of a disconnect between CS education and rural community interests was a significant barrier to elementary CS education. Even so, over 70% of them were moderately to strongly interested in mechanisms for connecting their CS education efforts to rural community industries through guest speakers and industry partnerships. The poster will discuss the implications of these and other emerging findings from the teacher survey, as well as IECC's related surveys of Idaho district superintendents and elementary school principals.

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## 1 BACKGROUND

The Idaho Elementary CS Collaborative (IECC) is a researcher-practitioner partnership among the Idaho STEM Action Center (Idaho STEM AC), BootUp Professional Development (BootUp), and the American Institutes for Research (AIR) dedicated to investigating problems of practice and effective supports for developing elementary CS education pathways in Idaho. More than 100 of Idaho's 116 school districts are in rural areas. Ergo, much of the IECC's work focuses on addressing challenges and leveraging strengths of rural communities when developing elementary CS education efforts. A key activity in the first year of the IECC was to conduct a survey of elementary teachers in Idaho to gather information about existing elementary CS instruction and perceptions of barriers and needed supports. We present preliminary analyses of the survey data in this poster.

## 2 RATIONALE FOR RESEARCH QUESTIONS

Rural communities (as defined by the National Center of Education Statistics locale definitions and in [4]), including many Idaho communities, often have specific needs related to CS education. For example, adequate staffing for CS and other STEM education efforts is a challenge for rural communities. There is a shortage of STEM teachers nationwide, and the need is particularly acute in rural areas [1]. This situation often leads to teachers with limited background in STEM and STEM education teaching STEM, which can place additional stress on teachers and lead to greater teacher turnover [4]. This also illustrates the importance of providing CS PD to teachers in rural communities. Ergo, we ask the research question, what factors would motivate Idaho elementary teachers to pursue PD related to CS?

Students in rural communities may also have relatively low exposure to CS careers and how those careers can benefit their communities. STEM education is not often perceived as connected to rural towns, geographic areas, or industries. Rather, interest in and success with STEM education is associated with students leaving their communities after high school [3, 4]. This perception may extend to CS. Even when CS courses are available to students in rural communities, enrollment in the courses is not as predictive of student interest in CS as it is for students in urban areas [2]. As such, we ask the second research question, what are

elementary teachers' perceptions of the value of connecting CS education to rural community economies and industries?

### 3 SAMPLE AND METHOD

The IECC distributed the survey via Idaho STEM AC's monthly newsletters and e-mails as well as at in-person educator PD events such as i-STEM, Idaho Education Technology Association Conference, and Idaho Association of School Administrators Conference. Respondents were 309 teachers (92% certified teachers, 8% classified staff). The majority were white (89%). Teachers on average had 11.28 teaching years (range = 0-35, median = 10), and 4.43 years teaching CS (range = 0-29, median = 1). Teachers taught in districts across the state of Idaho, with representation across all six of Idaho's regions.

To explore what would motivate teachers to seek out CS PD, teachers were asked "to what extent would each of the following influence your interest in seeking PD related to CS?" and were presented the six factors in Table 1 to which they responded with a 4-point Likert scale (1 = not at all, 4 = very much).

To understand teachers' perceptions about connecting CS education to rural community economies and industries, teachers were asked the following three questions: 1) how much is the perception that CS education is connected to students leaving rural communities a barrier to developing and/or implementing plans for CS instruction in your classroom? 2) How much would you be interested in opportunities to host guest speakers from local industries to talk to students about how they use CS? and 3) how much would you be interested in opportunities to learn more about how to connect CS education to your local community? Teachers used 4-point Likert scales (i.e., 1 = not a barrier, 4 = a significant barrier; 1 = not at all interested, 4 = very interested) to answer the questions. Descriptive analyses focusing on the spread and distribution of teachers' responses were conducted.

### 4 RESULTS

Table 1 shows that teachers rated "a way to request funding specifically for CS PD" as the most influential factor on their motivation to pursue CS PD, with 45% rating it as very motivating and 33% as somewhat motivating.

Table 1: factors that would motivate teachers to seek CS PD

Item description	Mean	SD
A CS requirement for high school graduation	2.25	1.03
A state assessment of CS	2.31	1.05
A K-5 computational thinking and digital literacy requirement	3.08	.86
A staff member with time dedicated to planning and supporting district-wide CS instruction	3.12	.83
A pathway for elementary teachers to earn a certification in CS teaching	3.09	.95

A way to request funding specifically for CS PD 3.17 .91

Other influential factors in Table 1 include a CS-related K-5 requirement, a staff member to support CS, and a pathway for elementary teachers to earn a certification in CS teaching, with nearly three quarters of the teachers rating these factors as very (36-43%) or somewhat (31-40%) motivating. Fewer teachers rated a high school CS requirement (12%) and a state assessment of CS (15%) as very motivating with about a third of them saying they're not at all motivating (30-32%). This may be in part because they are less relevant to elementary school teachers. The results suggest that K-12 CS pathways are not likely to reach K-5 spaces if only a top-down approach is taken to motivate elementary teachers.

For the connection between CS education and rural communities, Figure 1 shows most teachers (72%) did not view "perceptions that CS education is connected to students leaving rural communities" as a barrier or significant barrier to elementary CS education—contrary to our expectations based on other rural STEM education research [3, 4].

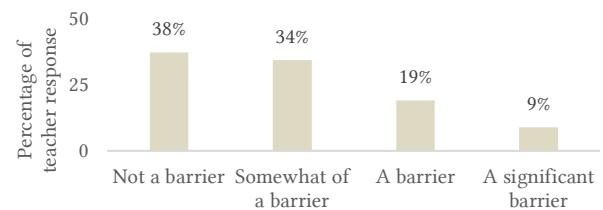


Figure 1: Teacher responses to the extent to which "perception that CS education is connected to students leaving rural communities" is a barrier to elementary CS education.

Teachers did not perceive CS education connected to students leaving their rural communities, but rather expressed interest in making connections between CS and the local community. Most teachers were moderately (32-34%) or very (39-40%) interested in "opportunities to host guest speakers from local industries to talk to students about how they use CS" and "opportunities to learn more about how to connect CS education to my local community." This result suggests the importance of place-based CS education in K-5 for rural communities in Idaho.

### ACKNOWLEDGMENTS

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