Computer Science in Arizona's Rural Schools

Summary Results of AZHACS Landscape Report

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AZ HUBS ADVANCING COMPUTER SCIENCE
AZ HACS

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OBJECTIVE

To assess the levels of preparedness and implementation of Arizona's Computer Science Standards among Arizona's K-8 rural schools, Arizona Hubs Advancing Computer Science (AZ HACS) solicited educators to complete a survey in March 2021. The solicitation to complete the survey was sent directly to administrators at school, district, and county levels; these individuals were asked to complete the survey and to forward the invitation to other educators. Additionally, requests to complete the survey were sent to teachers in rural schools with publicly available email addresses.

The objectives of the survey were the following:
- Assess educators' beliefs regarding the value they place on integrating computer science into K-8 classrooms
- Determine readiness by evaluating the degree to which educators believe their school or district possesses essential ingredients needed to successfully implement and/or advance computer science (e.g., hardware, supportive leadership)
- Gauge self-reported implementation by assessing the extent to which educators believe their institution is currently implementing Arizona's Computer Science Standards

By triangulating these three variables (beliefs, readiness, and implementation) and situating findings in the context of locale and grade level, the survey results support AZ HACS' aim to establish goal-oriented research-practitioner partnerships (RPPs) focused on advancing computer science in Arizona's rural K-8 schools.

Over 200 educators, representing 13 of Arizona's 15 counties, completed most to all of the survey items. Data were disaggregated based on whether respondents were either (a) regular classroom teachers (n = 77) or (b) were administrators or other system-wide personnel (n = 126), such as a school board member or a STEM teacher who worked across multiple classrooms and schools. Teachers completing the survey represented all grades, kindergarten to eighth. Approximately 12% of teacher respondents taught in grades K-2, 27% taught grades 3-5, and 61% taught grades 6-8.

BELIEFS

To assess intrinsic beliefs about the value of teaching computer science and related computational thinking skills in K-8, respondents indicated their level of agreement with a series of statements about the importance of K-8 students learning computer science and components of computational thinking (e.g., ability to evaluate a solution to a problem for correctness).

In general, both teachers and administrators indicated that they hold strong beliefs about the value of students developing computational thinking skills and learning about computer science. The overall strong beliefs are very positive signs as they indicate rural educators are receptive to and in favor of their students developing these 21st century skills.

Figure 1. Beliefs about the Value of Teaching Computer Science and Computational Thinking Skills in K-8 (strongly disagree = 1 to strongly agree = 4)
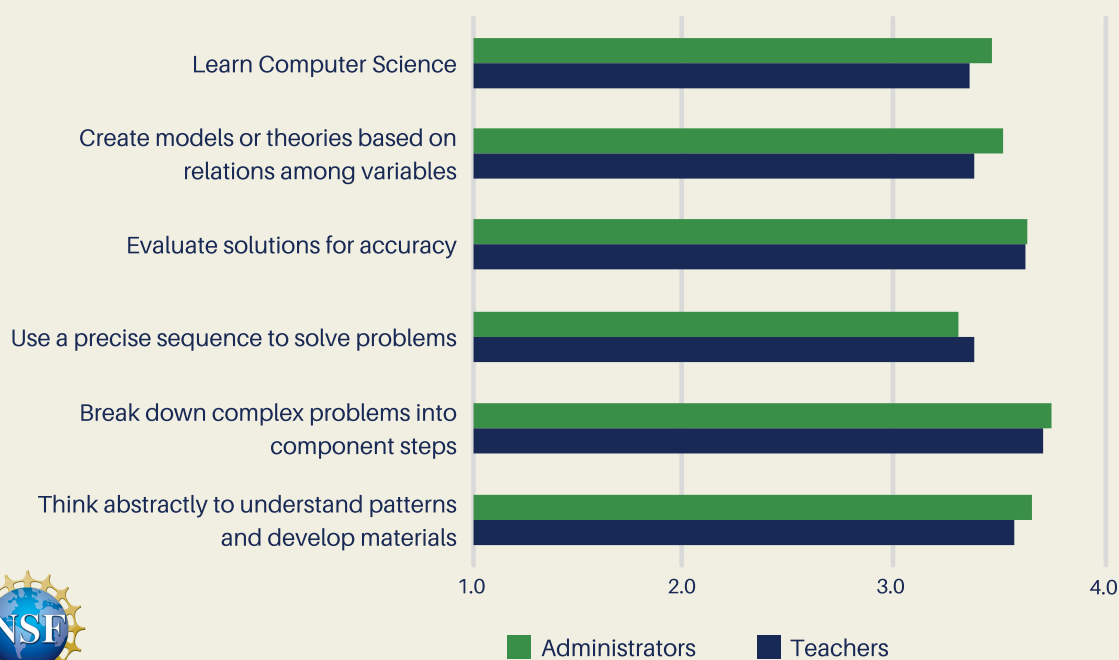
READINESS

Table 1 summarizes responses regarding how ready respondents feel their school or district are to successfully integrate computer science and computational thinking. Respondents indicated the degree to which they believe their institution possesses factors related to personnel, community support, student capacity, and physical properties such as software and networking capability.

Table 1. Respondents indicated from strongly disagree (1.0) to strongly agree (4.0) the extent to which their school(s) possesses attributes needed to successfully implement computer science

	Teachers		Administrators	
Attribute	**Mean**	**SD**	**Mean**	**SD**
Access to appropriate professional development	2.7	0.9	2.6	1.1
Knowledge of where to find curriculum	2.7	1	2.8	0.9
Adequate hardware and software	2.6	1.1	2.9	1
Necessary networking capabilities	2.8	1	3	0.9
Aligned supportive leadership	2.9	0.9	3.1	0.9
Sufficient technical support	2.8	0.8	2.9	1
Teachers interested in integrating such a curriculum	3	0.8	2.9	0.8
Teachers able to integrate such a curriculum	2.9	0.8	2.7	0.9
Capable students	3.2	0.7	3.4	0.7
Supportive parents	3	0.8	3.1	0.7

READINESS

Overall, across all factors assessed, no factors rose to a level beyond agree and no factors approached a level of strongly agree. Among teachers and administrators, the greatest readiness concerns were access to appropriate professional development, knowledge of where to find curriculum, as well as hardware and software needs. These points are highlighted below with more detailed data.

- 33% of teachers and 44% of administrators either disagreed or strongly disagreed that they had access to professional development that could support integrating computational thinking and computer science.
- 38% of teachers and 36% of administrators either disagreed or strongly disagreed that they possessed knowledge of where to find appropriate curriculum.
- 43% of teachers and 33% of administrators either disagreed or strongly disagreed that their institution possessed adequate hardware and software needed to fulfill the goals of successfully implementing computer science.

As evidenced in the following points, respondents were more affirmative about the support and capacity of their community, their students and their own personnel.

- 80% of teachers and 80% of administrators either agreed or somewhat agreed that their school or district's parents were supportive of integrating computer science into the K-8 curriculum.
- 87% of teachers and 92% of administrators either agreed or somewhat agreed that the students attending their schools/districts were quite capable of taking on the challenge of learning computational skills and computer science.
- 75% of teachers and 74% of administrators either agreed or somewhat agreed that teachers in their school or district were interested in implementing computer science into the curriculum. Related, 68% of teachers and 53% of administrators either agreed or somewhat agreed that their teachers were currently able to integrate such a curriculum.

MOST PRESSING NEEDS

Survey respondents were prompted to indicate on an open-response item what they considered their most pressing need in terms of integrating computer science at their school or district. A total of 57 teachers and 94 administrators completed the written response item. Written answers were coded and categorized following standard emergent coding processes. Results of the qualitative data parallel findings from the Likert-scale items regarding readiness previously discussed (see Table 1). Table 2 summarizes the concerns that were reported most often across teacher and administrator responses.

Table 2: Most Pressing Needs

	% of Respondents Mentioning	
	Teachers	**Administrators**
Professional development	68.4	62.8
Instructional models and research-based findings	35.1	28.7
Hardware	26.3	19.1
Infrastructure including internet capacity	17.5	7.4
Designated trained teachers	10.5	10.6
Administrative support	7.0	14.9

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LEVEL OF IMPLEMENTATION

Finally, respondents were asked to review Arizona's Computer Science Standards and to then indicate the degree to which their school or district has implemented these standards. Respondents were given the following choices: not at all, planning, early implementation, moderate implementation, and strong implementation.

Across teacher responses, 41% indicated their school either had not implemented the computer science standards or were at the planning stage; 29% indicated their school was at a level of moderate to strong implementation. However, it should be taken into consideration that the teacher sample is overrepresented by teachers in grades 6-8.

Figure 2 indicates the level of implementation denoted by administrators for the grade bands of K-2, 3-5, and 6-8.

Level of Implementation: Arizona CS Standards

Bar chart legend: grades K-2, grades 3-5, grades 6-8