Evaluation Report

Callie Dean
The Evaluation Group

June 3, 2024

MO State

The Evaluation Group
Dynamic Program Evaluation

Key Findings

Students' math and science scores improved.

In Year 2 (2022-23), the CODERS student cohort experienced **large gains in science and math proficiency rates**. The percentage of students scoring proficient or above in MAP grade-level assessments grew by 42% in science and 10% in math.

The student survey response rate increased.

In Year 3 (2023-24), CODERS teachers successfully administered the student survey within their classrooms and ensured that students used the same unique ID number from fall to spring. The result of their hard work was an **increase** in both the total number of student survey **responses received** and the number of **responses that could be matched** from pre to post, ensuring **greater reliability and representation** of the total student population.

Students' attitudes toward coding and STEM remained largely the same.

From the beginning to the end of Year 3 (2023-24), CODERS students experienced a small but significant **increase in math efficacy**, and a small but significant **decrease in coding interest.** Other attitudinal changes were not statistically significant. More research is needed to better understand and contextualize these results.

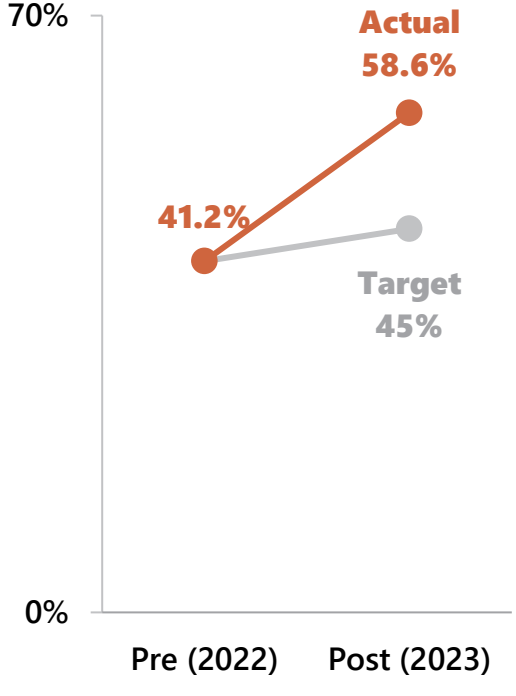
The Coding Olympiad gave students a meaningful chance to apply their coding skills.

Students **enjoyed participating** in the Coding Olympiad event in February 2024. They reported that the coding challenges were **difficult but fun,** and they felt a **strong sense of accomplishment** when they were able to overcome their frustration and complete the challenges.

Academic Achievement

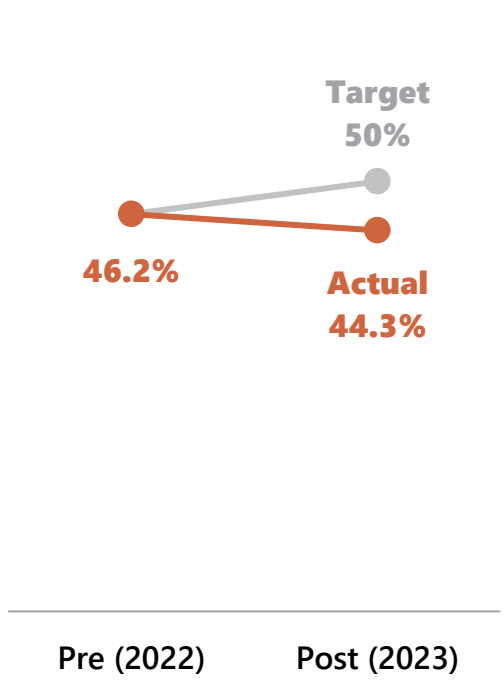
Annual standardized test data in science, math, and English/language arts aims to demonstrate the short and medium-term effects of the CODERS program on students' academic achievement. For Year 2 of the program, baseline test data collected from 852 students in the spring of 2022, before students received any instruction in CODERS, was compared with spring 2023 test data from 911 students who had completed a full year of CODERS instruction. CODERS students saw the greatest increases in their science proficiency rates (a 42% increase), followed by math proficiency rates (a 10% increase); however, ELA proficiency rates fell by 4%. Full academic data from Year 3 (2023-24) will be available in the fall of 2024.

The Year 2 CODERS cohort exceeded the program target for science proficiency...



...met the target for math proficiency...

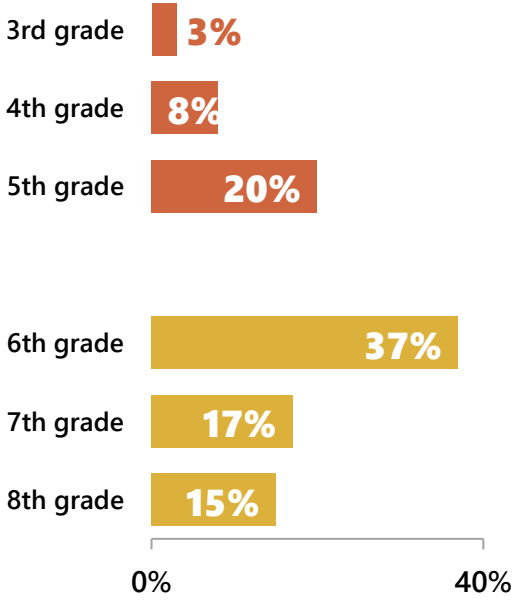
...but fell short of the target for English/language arts proficiency.



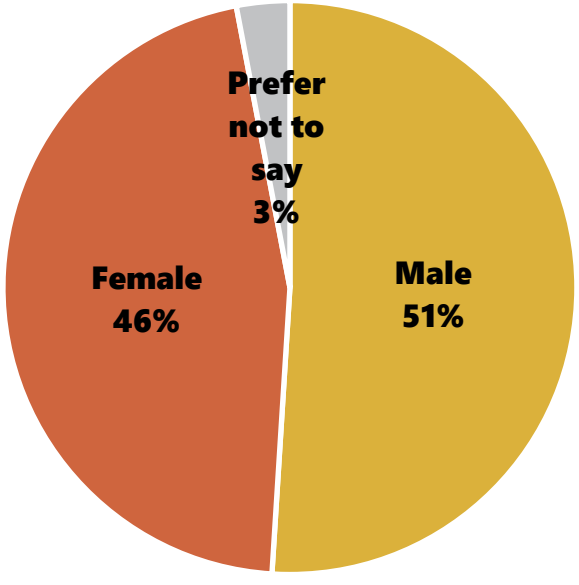
CODERS Student Survey

In Year 3 of the program (2023-24), teachers administered the student pre- and post-survey to their students at the beginning and end of their relevant CODERS course. A total of 1,222 students from 16 schools completed the pre-survey, and 1,121 students completed the post-survey; 978 sets of student pre and post responses were able to be matched (representing 78% of the total students served in Year 3). This year's match rate (83%) represents a 43% increase from last year's rate (58%). The results of the matched student surveys are reported in the slides that follow.

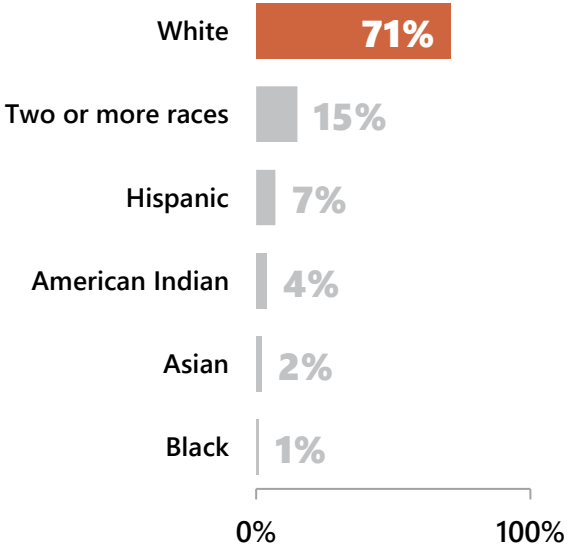
Among all students who took the survey, two-thirds were in middle school (69%), and one-third were in elementary school (31%).



Just over half of students identified as male.

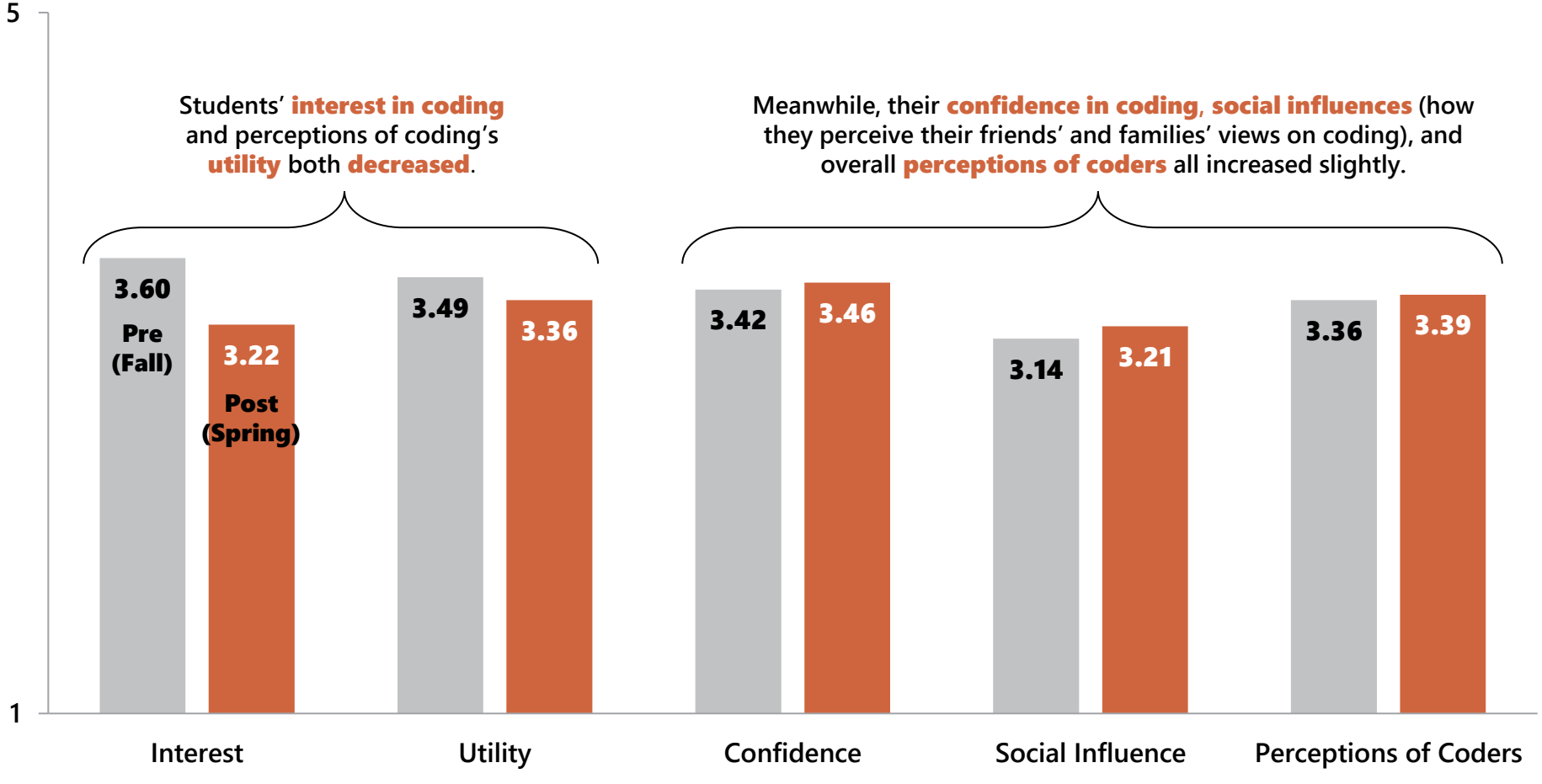


Almost three in four students identified as white.
This figure was less than the overall state demographics (82.5% white).



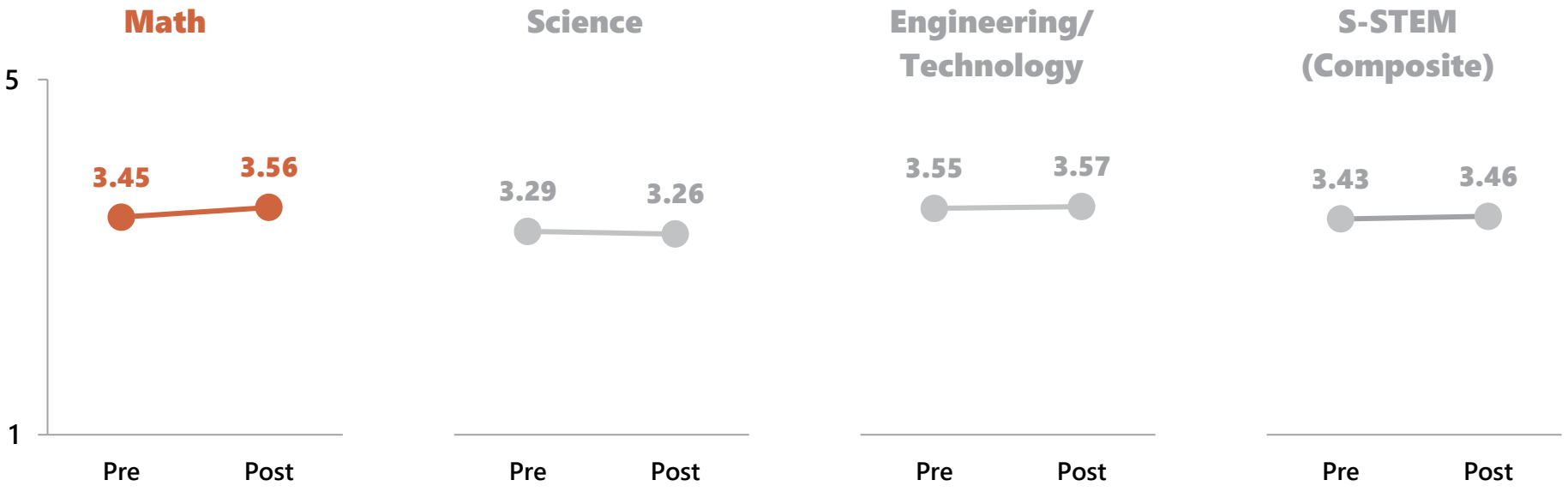
Students' attitudes toward coding remained largely the same from the beginning to the end of the school year.

The graph shows individual subscale scores from the ESCAS (Mason & Rich, 2020). Each subscale ranged from 1 (lowest) to 5 (highest). There was a small but significant decrease in students' interest in coding; no other changes were statistically significant.



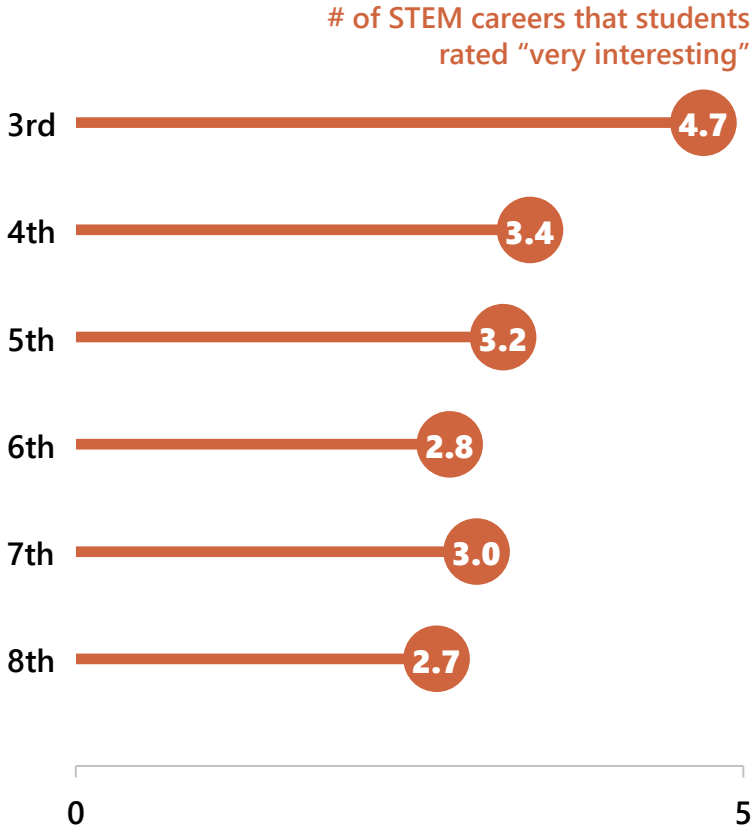
Students experienced a small but significant increase in math confidence and self-efficacy. However, their level of confidence in other STEM disciplines did not change.

The graphs show individual subscale scores and the total composite scores of the S-STEM (Friday Center for Educational Innovation, 2012). Each scale ranged from 1 (lowest) to 5 (highest).



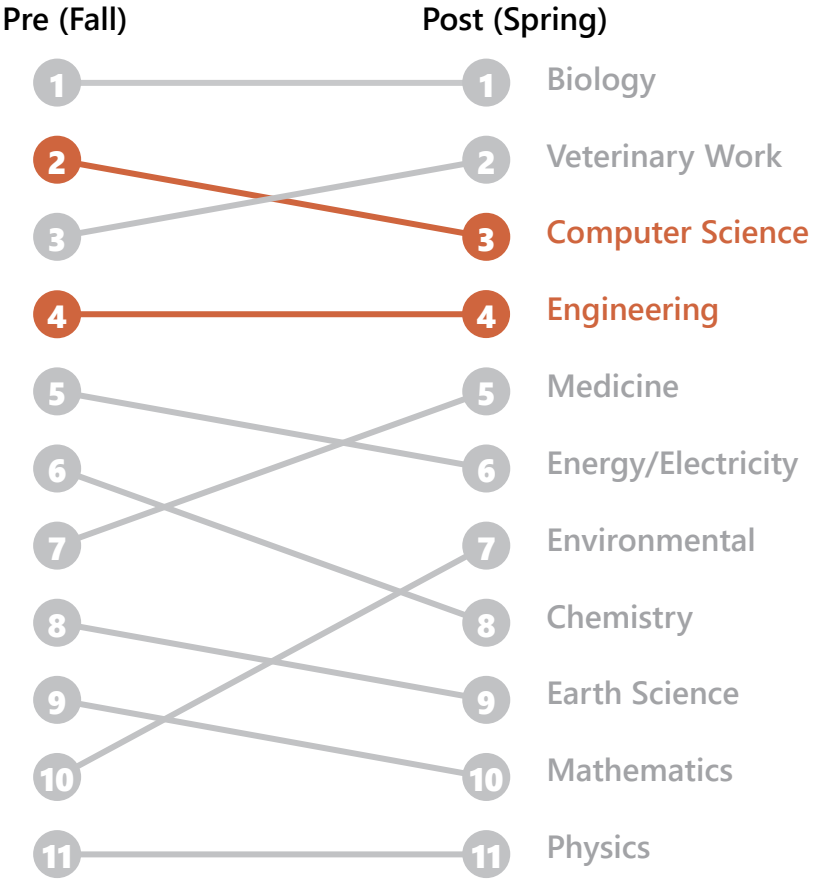
Younger CODERS students had broader career interests than older students.

When asked to consider 11 different STEM careers, 3rd graders said they were "very interested" in an average of 4.7 careers each, compared with 2.7 for 8th graders. This likely demonstrates the natural narrowing of interests that occurs in early adolescence.



Computer science and engineering ranked in the top four STEM career choices for all CODERS students.

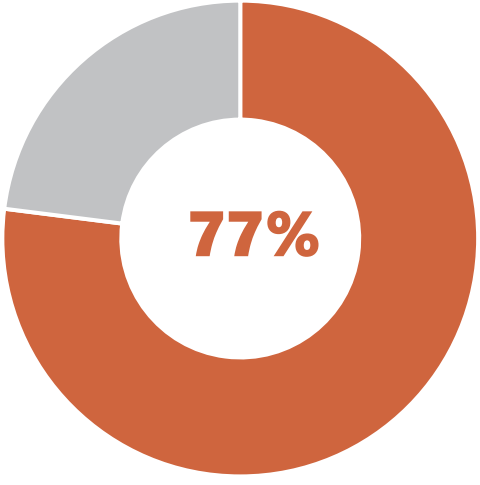
However, computer science fell in rank from 2nd to 3rd from the beginning to the end of the year.



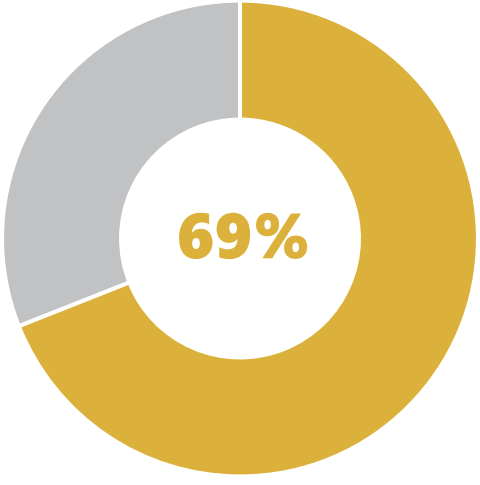
2024 Coding Olympiad

The Coding Olympiad took place on MSU's campus on February 27, 2024, bringing together select CODERS students to complete up to four coding challenges. Students completed a survey at the end of the event, the results of which are reported below. More than half of respondents were male (56%), and two-thirds (67%) were in middle school, roughly mirroring the demographics of the larger CODERS student cohort.

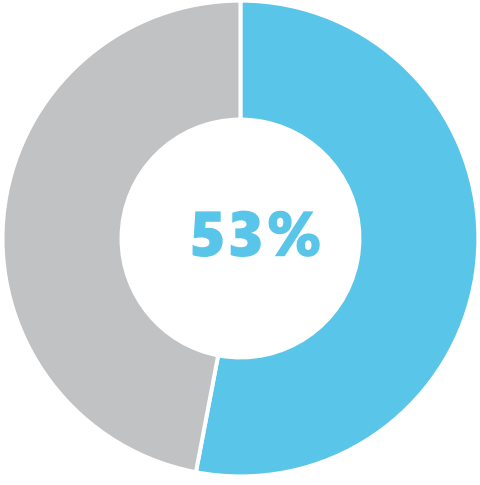
Students enjoyed the Coding Olympiad, giving it an overall rating of 8.4 on a scale of 1 to 10.



said they **learned something new** about coding at the event.



said at least **one teacher had encouraged them** to pursue a STEM career.

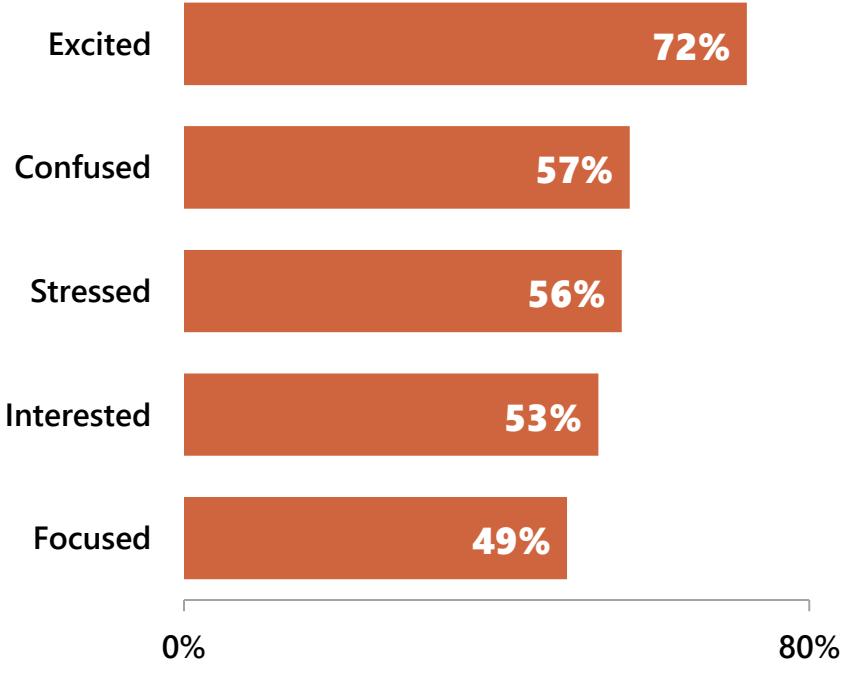


said the event **changed how they think** about STEM.

Participants found the Coding Olympiad challenges to be challenging but fun.

The problem-solving process elicited a range of emotions: while students most frequently reported feeling **excited** (**72%**) during the challenges, more than half also reported "negative" emotions like **confusion** (**57%**) and **stress** (**56%**). More than half **(53%)** of participating students said they felt **prepared to complete the challenges,** and all but one team described an overall feeling of accomplishment after **overcoming their initial frustrations**.

During the challenges, students felt...



Students said they learned coding strategies primarily from their **CODERS teachers and classes**. Some students also credited teacher-led **after-school programs** that helped prepare them for the event, and a few also referenced other **life experiences** (e.g., team sports) that equipped them with the soft skills needed to succeed.

"It was **harder than I expected** because of the complications and teamwork required, but most of all, **it was fun**."

"[My CODERS teacher] is a **very special teacher**. She helps us with a lot of things. In science she's always trying to help us. She is the best coder. I can't thank her enough."

"My friends were helping and though **we made mistakes**, it helped us. It was a good thing to **problem solve**!"

"[My CODERS teacher] is the person who has **taught me everything that I know about STEM**. I am very grateful to have her as my teacher."

"[For the] first time ever I felt **somewhat smart**."

Questions?

Callie Dean, Evaluator
The Evaluation Group
www.evaluationgroup.com
callie@evaluationgroup.com
318-518-8491

The Evaluation Group
Dynamic Program Evaluation