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Impact of the Pandemic on Computer Science Education

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Impact of the Pandemic on Computer Science Education

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Abstract

This poster examines the impacts of the Covid-19 pandemic on computer science education in Nebraska. Data collected by Code.org on student and teacher engagement in CS education in Nebraska public and private schools helps paint a picture of the changing landscape. We reveal a significant decrease in rural student participation since the 2019-20 school year, a minimal increase in the number of teachers teaching with Code.org, and a significant drop in participation of girls at the secondary level. By uncovering these trends in engagement, we hope to inform and inspire educators and administrators to take action.

Code.org®
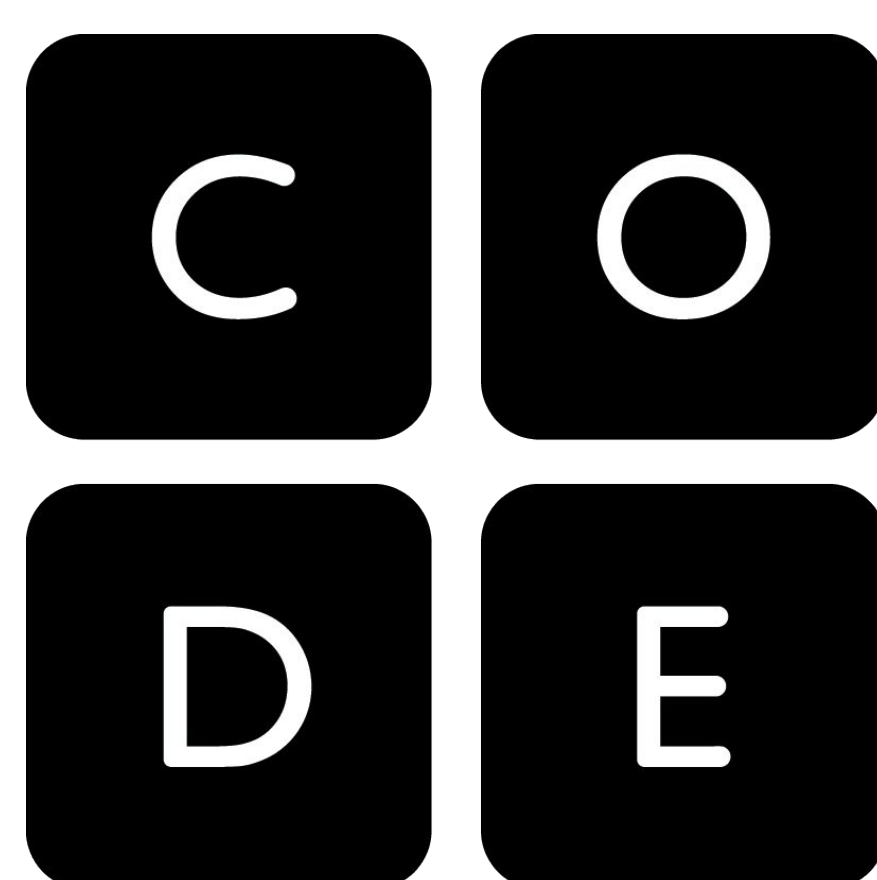
"Code.org is an education innovation nonprofit dedicated to the vision that every student in every school has the opportunity to learn computer science as part of their core K-12 education. We expand access to computer science in schools, with a focus on increasing participation by young women and students from other underrepresented groups." (https://code.org/about)

Here's some of what Code.org does:

- Provide K-12 computer science (CS) **curriculum at no cost**
- Offer **professional learning opportunities** for teachers, counselors, and administrators
- Organize the annual **Hour of Code campaign** to promote student engagement in CS
- Promote **expansion of and equity in CS education** through regional partners

The University of Nebraska-Lincoln is the Code.org regional partner for the state of Nebraska. Our facilitators deliver professional learning workshops for K-12 educators. Code.org supports teachers with three courses:

- Computer Science Fundamentals (CSF): K-5
- Computer Science Discoveries (CSD): Grades 6-8
- Computer Science Principles (CSP): Grades 9-12
- AP Computer Science (CSA): Grades 9- 12

Methodology

Data

Code.org collects and maintains large datasets in Tableau for its regional partners to plan expansion of CS education in their region and inform stakeholders on pressing issues in the field. The program also allows regional partners to visualize trends and work with data in a way that best fits their own needs. The data used in these analyses are from 2016 to 2022 and include teacher and student enrollment and engagement in Code.org curricula, student diversity (enrollment of students who belong to underrepresented, minority groups), and school diversity (type of setting, free/reduced lunch rates).

Analysis

The data was analyzed and visualized using Stata and the Google Sheets. Trends in gendered participation and issues in secondary CS education were uncovered through initial visualizations and follow up statistical analyses.
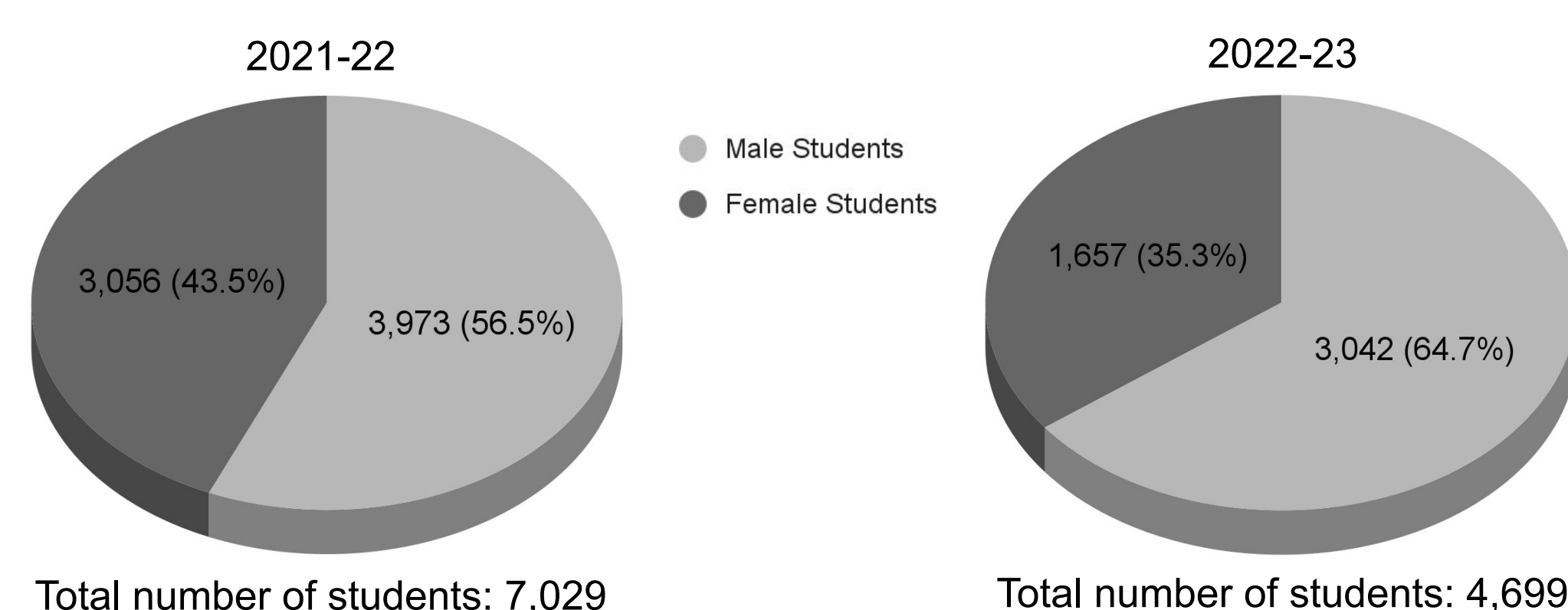
Results

Student and teacher engagement at all levels seem to be affected by the Covid-19 pandemic. Secondary courses appear to be the most impacted.

- High school courses saw a significant decrease (14.8%) in rural student participation following the 2019-20 school year, while non-rural participation remained the same until falling by 20% in 2021.

School Year / Number of Students in CSP (Bar chart: Rural vs Non-Rural, 2016–2021)
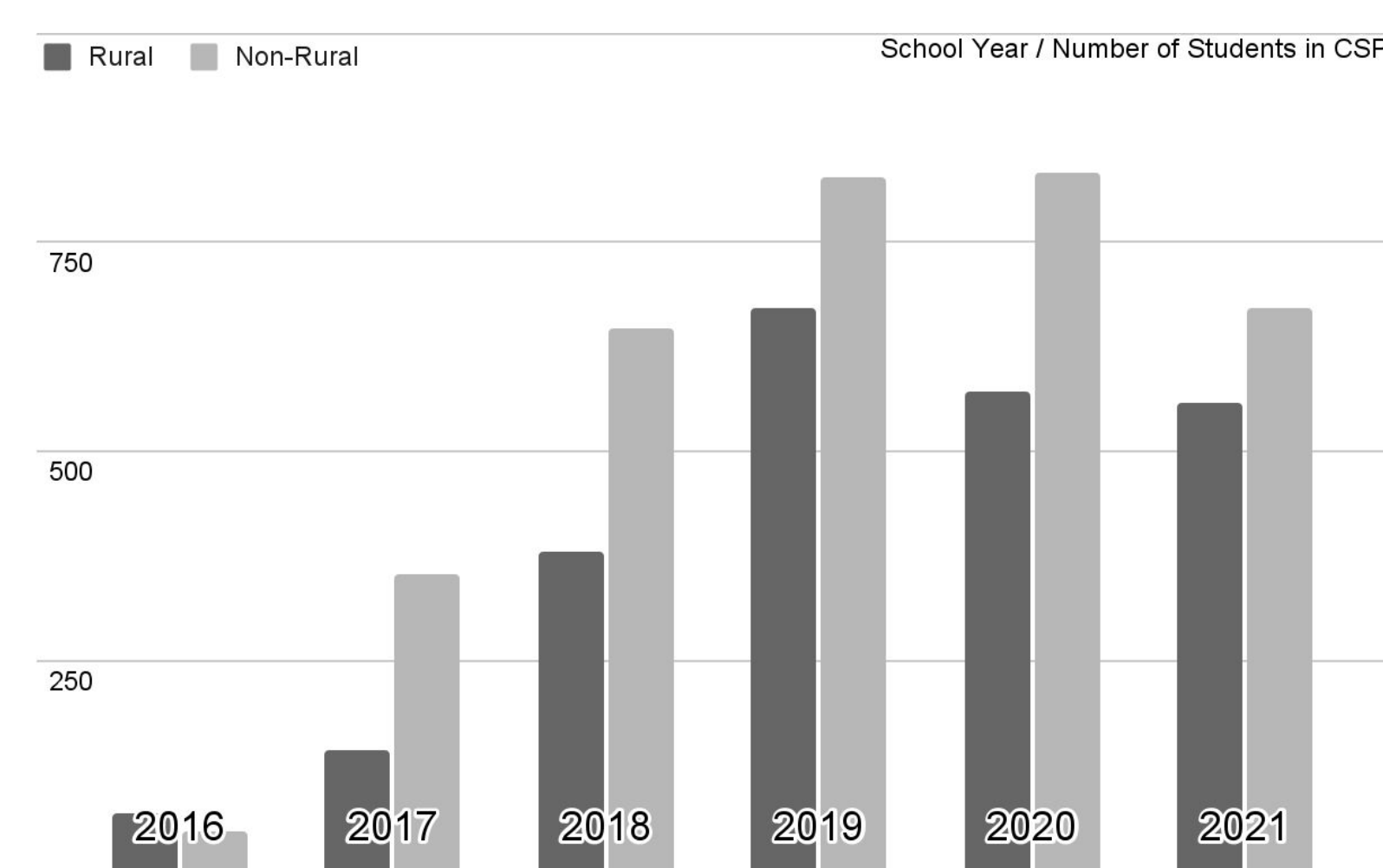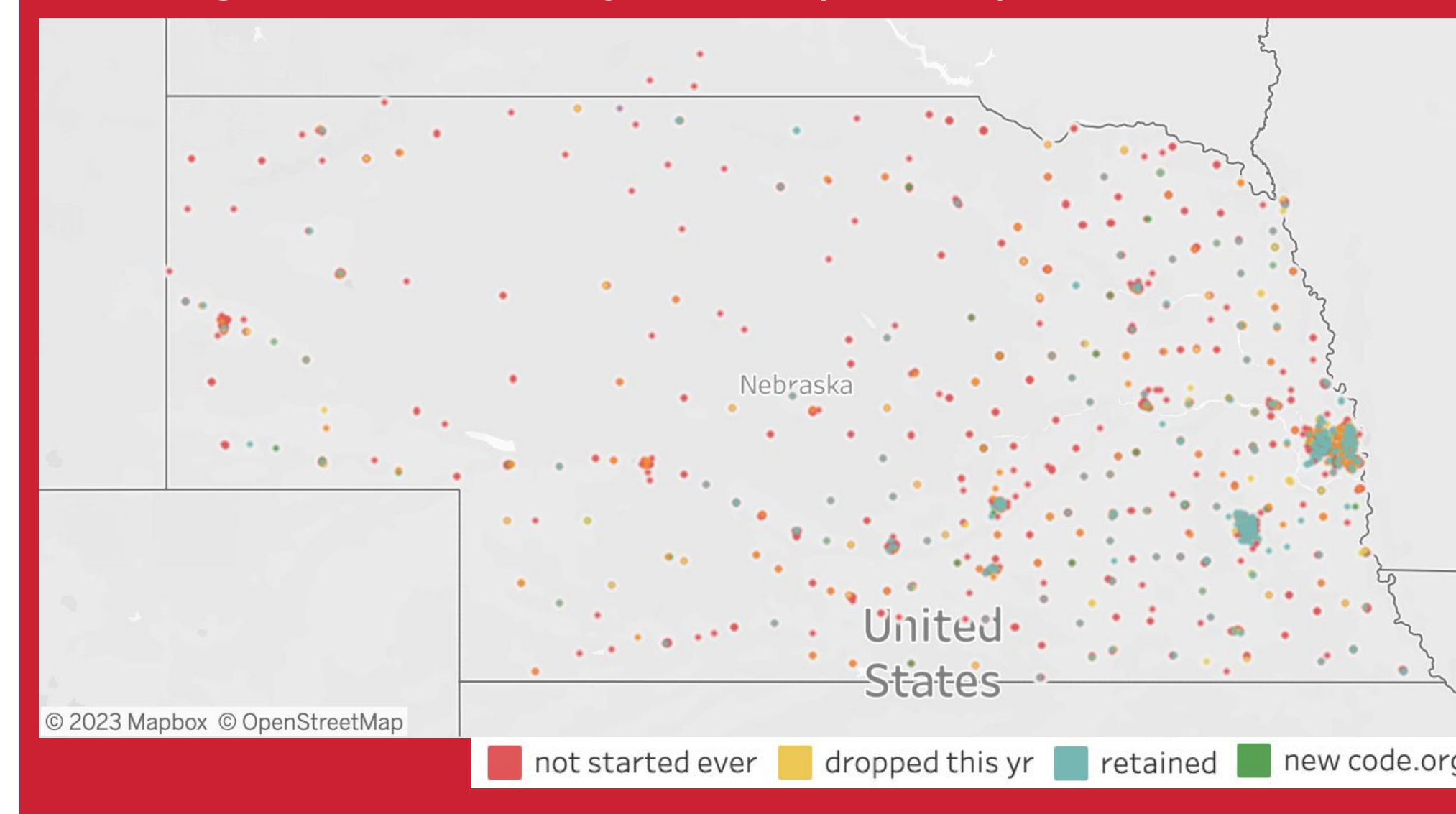
- From 2021 to 2022, enrollment among girls in CSD and CSP dramatically decreased. The overall number of girls dropped by over 45%, while the number of boys dropped by only about 23%.

2021-22 — Male Students / Female Students
3,056 (43.5%) Female, 3,973 (56.5%) Male
Total number of students: 7,029

2022-23
1,657 (35.3%) Female, 3,042 (64.7%) Male
Total number of students: 4,699

Enrollment in CS education is significantly correlated to gender at the secondary level, X^2 (2, 365,672) = 332.56, $p = .000$

Code.org Started Status by District (2022-23)

Legend: not started ever / dropped this yr / retained / new code.org
© 2023 Mapbox © OpenStreetMap

Significant Changes by Course from 2019-20 to 2022-23

CSD (Grades 6-8)

12% increase in number of students

19% decrease in number of teachers

Over 22% increase in number of male students and over 2% *decrease* in number of female students

CSP (Grades 9-12)

45% increase in number of students

4% increase in number of teachers teaching

Over 77% increase in number of male students and under 4% increase in number of female students

Implemented in only one more school since 2019-20

This analysis revealed a significant decrease in participation of both rural and female secondary students across the state in the years following the outbreak of Covid-19. While overall enrollment is up from before the pandemic, we saw a sharp drop since the previous school year. From 2021 to 2022, the number of girls participating dropped by 48% while the number boys fell only 40%. Middle school female enrollment is still in decline while that of high school is growing, but we face growing inequities at both levels.

The overall increase of students has not been matched by an increase of teachers. At the middle school level, we saw a *decrease* in the number of teachers and *increase* in the number of students. This suggests that CS class sizes are growing as opportunities are limited. Higher student:teacher ratios will mean that supports may become less individualized and therefore impede student outcomes.

There is an immediate need for both highly-skilled teachers and effective, readily-available curricula.

Looking Ahead

Promoting Leadership Among Girls and Underrepresented Students

Encourage your students to expand their learning. In addition to using Code.org, there are great opportunities for free activities and learning outside of the classroom. Check out organizations like Girls Who Code and Emerging Ladies Academy in Omaha who help underrepresented groups form and follow passions for CS.

Policy

Nebraska is already expanding computer science education through policy. **LB 1112** requires that CS and technology education be offered throughout elementary and middle schools beginning with school year 2024-25. It also requires high school students to complete a computer science and technology course in order to graduate, beginning with school year 2026-27.

Updated policy is a great step in promoting recruitment and funding for CS teacher positions. However, it means that far more educators are going to need training in order to keep up with growing demand and provide excellent instruction.

Because of this, UNL and Code.org are training more facilitators to lead professional learning workshops. Teachers will have more opportunities to learn and receive increased support in providing improved CS education!

Learning Opportunities for Educators

Code.org and UNL would like to assist school teachers, administrators, and counselors across Nebraska. Our professional learning programs help educators in implementing our curricula and promoting student engagement.

We are recruiting teachers for our 2023-24 professional learning cohort. Funding to participate is available, but positions fill fast.

Apply Today!
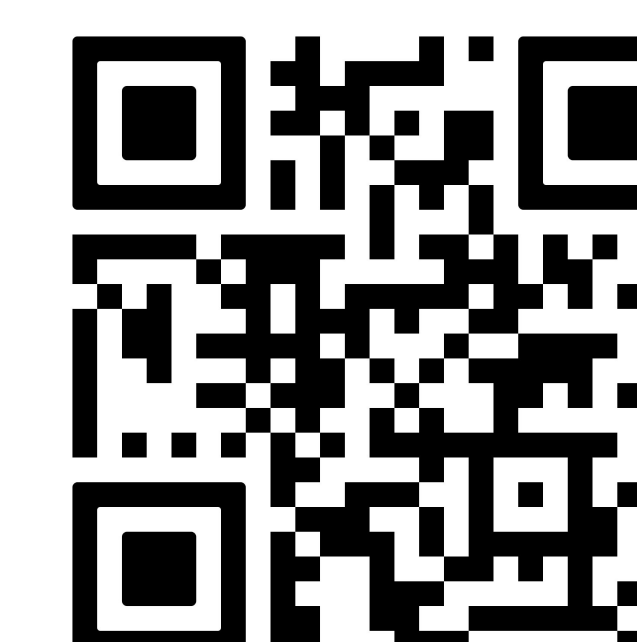
Our 5-day summer workshops for are scheduled for Monday, June 26, 2023, through Friday, June 30. CSD and CSP are in-person, at UNL, and CSA will be held online.

QUESTIONS?

If you have questions, we're here to help!

Please email *dwightwm@huskers.unl.edu* for more information.