Building Capacity for Indiana Preservice Computer Science Education

Fall Collaboration Summit

INDIANA UNIVERSITY BLOOMINGTON SCHOOL OF EDUCATION

With appreciation to the Indiana Department of Education for project funding.

Who is here today?

Welcome

Icebreaker

Data Sorting

Data & Information		
Kindergarten - Grade 2	**Grades 3 - 5**	**Grades 6 - 8**
Learning Outcome: Students collect, store, visualize, and transform data to make inferences and predictions about the world.	**Learning Outcome:** Students select aspects and portions of data to be transformed, clustered, and categorized to provide views and insights about the data.	**Learning Outcome:** Students identify and implement multiple means of representing complex algorithms to communicate how applications store data as a representation understandable by people.
K-2.DI.1: Identify and collect data using digital tools (e.g., take pictures of all blue items, create a document with things that start with "a").	**3-5.DI.1:** Decompose problems and subproblems into parts as a means to solving complex problems. (E)	**6-8.DI.1:** Decompose (i.e., break down) problems into smaller, more manageable subsets by applying the algorithmic problem solving steps to make the possible solutions easier to follow, test, and debug. (E)
K-2.DI.2: Define stored information as data and when appropriate, copy, search, retrieve, modify, and delete it.	**3-5.DI.2:** Organize and present collected data visually to highlight relationships and support a claim.	**6-8.DI.2:** Collect data using computational tools (e.g., sensors, inputs like microphones) and transform the data to make it more useful and reliable.
K-2.DI.3: Model that data can be stored and manipulated using numbers or symbols to represent information.	**3-5.DI.3:** Demonstrate how variables can represent data and are used to store and modify information.	**6-8.DI.3:** Describe that data can be represented in multiple encoding schemes such as binary, RGB values (e.g., red, green, and blue intensity), and hexadecimal codes.
K-2.DI.4: Organize and present data in different visual formats such as charts, graphs, and symbols, and identify and describe patterns to make predictions. (E)	**3-5.DI.4:** Describe that data can be represented in different forms understandable by people, including words, symbols, and digital displays of color.	**6-8.DI.4:** Create visuals such as flowcharts, diagrams, and pseudocode to represent complex problems as algorithms. (E)
	3-5.DI.5: Use data to highlight or propose cause-and-effect relationships, predict outcomes, or communicate an idea. (E)	

Why are we here today?

Purpose

Project Goals

- Increase computer science pedagogical knowledge of in-service and pre-service teachers;
- Increase preservice teacher understanding of and ability to implement authentic problem-solving using computing to address or improve systems and circumstances in local communities; and
- Provide professional pathways for preservice teachers to access and be successful in acquiring transferable credentialing and licensing opportunities.

CS in Indiana

IDOE Updates

Where are we now?

Needs Analysis

Preliminary Needs Analysis

Purpose of Needs Analysis:

To examine the needs of elementary teacher education programs in Indiana with regards to integrating Computer Science (CS) standards/content into their curricula

Method:

- *Link to 5-item questionnaire sent via email to 97 teacher educators representing 53 elementary teacher education programs in Indiana*
- *Contacts were asked to complete questionnaire and/or forward link to questionnaire to any other Indiana teacher educators who had knowledge of how CS was integrated into their programs*

Preliminary Needs Analysis

Method (Continued):

- *Teacher educators given approximately one month to complete questionnaire (several reminders sent)*
- *24 teacher educators completed questionnaire (25% response rate)*
- *Results were aggregated by questionnaire item to determine the state of CS education in Indiana teacher education programs*
- *Questionnaire is still open! Please complete and/or share with colleagues:*
    - https://iu.co1.qualtrics.com/jfe/form/SV_bEIIZJcPUBVMkt0

Preliminary Needs Analysis

Results:

Q1 - Do you currently cover any of the Indiana K-8 CS standards in your Elementary Teacher Education Program?

- *78% of respondents indicated that they currently covered CS standards in their Elementary teacher education programs*
- *16% indicated that they were considering strategies to include CS standards in their elementary teacher education programs*
    - *Either stand-alone class or integrated into methods*

Preliminary Needs Analysis

Results:

Q2 - Are the Indiana K-8 CS standards covered in courses/experiences required for your students to complete as part of their teacher education program?

- *82% of respondents indicated that CS standards were included in teacher educations courses and/or other experiences embedded in their programs*

Preliminary Needs Analysis

Results:

Q3 - How are the Indiana CS K-8 standards covered in the Elementary Teacher Education Program?

- *Methods Courses (54% of respondents)*
  - *Science and/or Math Methods (71%)*
- *Educational Technology Courses (35% of respondents)*

Preliminary Needs Analysis

Results:

Q4 - Please identify the curriculum resources you use to include the Indiana K-8 CS standards into your Elementary Teacher Education Program

- *Specific resources:*
  - *Code.org (16%); Scratch (14%); Hour of Code (10%)*
- *Strategies/experiences:*
  - *Plugged activities (14%); Unplugged activities (12%); Integrating into field experiences/practica (12%)*

Preliminary Needs Analysis

Results:

Q5 - What are some barriers you have encountered while trying to include the Indiana K- 8 CS standards in your Elementary Teacher Education Program?

- *Teacher Educator barriers:*
  - *Lack of time (20%); Lack of faculty with CS knowledge (14%); Lack of faculty interest (11%); Lack of professional development opportunities (9%)*
- *Pre-service teacher barriers:*
  - *Lack of awareness of importance of CS (11%); Lack of opportunities to integrate CS during student teaching (11%)*

Preliminary Needs Analysis

Next Steps:

- *Follow-up interviews:*
  - *10 respondents indicated they were willing to participate in follow-up interviews, so we will be contact them!*
- *Collection/analysis of artifacts:*
  - *In the process of collecting syllabi and other resources for analysis. If you are willing to share resources, please let us know!*
- *Updated findings will be presented at our next summit!*
- *Remember to complete and/or share the questionnaire link:*
  - https://iu.co1.qualtrics.com/jfe/form/SV_bEllZJcPUBVMkt0

Table Discussions

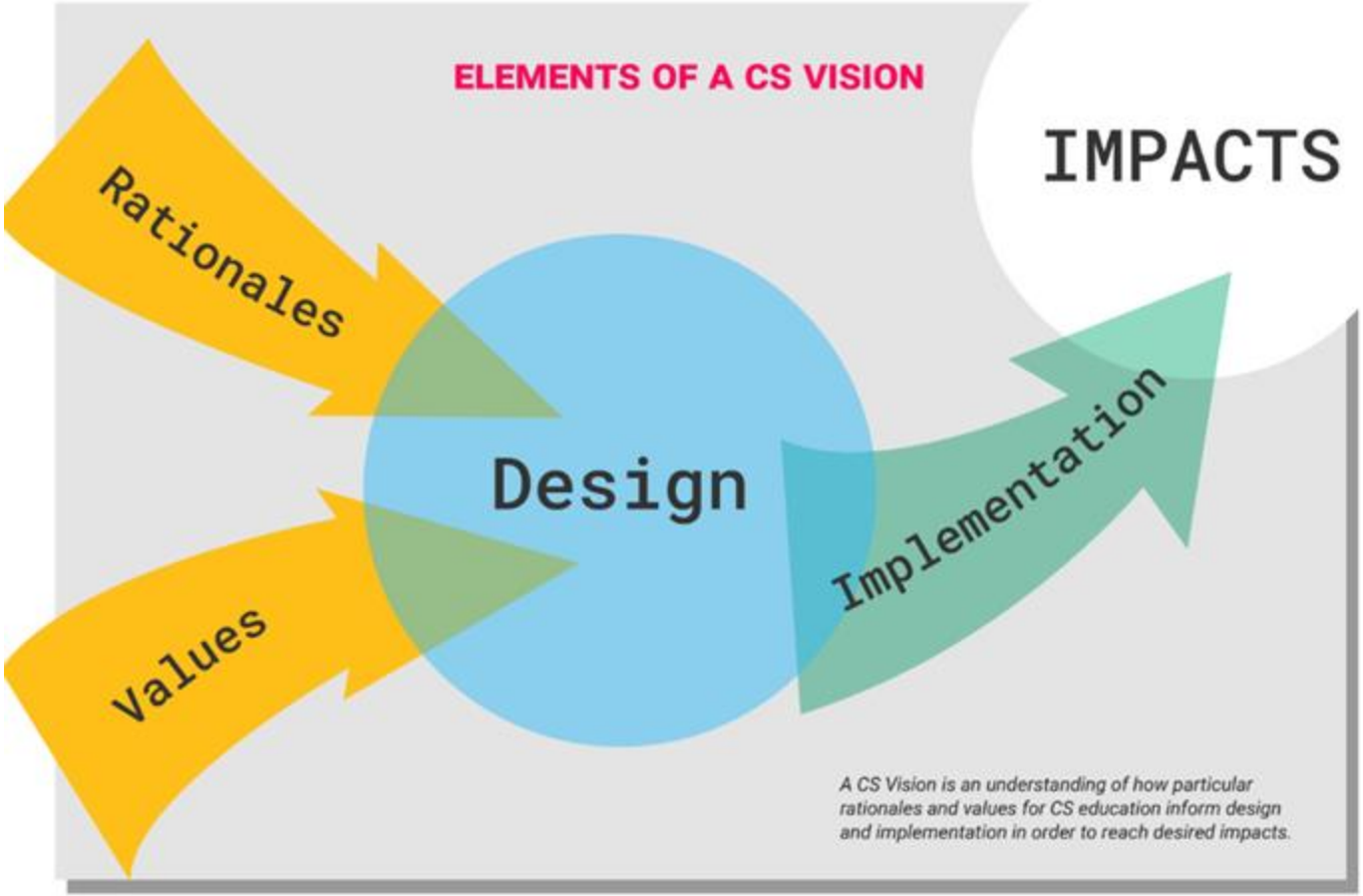
1. What are the most prominent barriers you encounter?
2. What are some of the ways to address these barriers? Who has been successful?

Where do we want to be?

CS Visioning

The CS Visions Framework

Values should drive what CS ed looks like.


ELEMENTS OF A CS VISION
Rationales
Values
Design
Implementation
IMPACTS
A CS Vision is an understanding of how particular rationales and values for CS education inform design and implementation in order to reach desired impacts.

CsforALL


CS VISIONS – VALUES & IMPACT AREAS
Equity & Social Justice
Competencies & Literacies
Citizenship & Civic Engagement
Technological, Social & Scientific Innovation
Economic & Workforce Development
School Reform & Improvement
Personal Agency, Joy & Fulfillment

We should teach CS because...

We need more software engineers.

We should teach CS because...

We need to promote a more diverse tech workforce

We should teach CS because...

Our tech is designed by privileged groups. Their biases get embedded. CSed can help.


CS VISIONS – VALUES & IMPACT AREAS
Equity & Social Justice
Competencies & Literacies
Citizenship & Civic Engagement
Technological, Social & Scientific Innovation
Economic & Workforce Development
School Reform & Improvement
Personal Agency, Joy & Fulfillment

Setting your Rationale for Computer Science Education

Review the rationales and mark your top 3.

Setting your Rationale for Computer Science Education

Notice the impact areas each rationale relates to.

CsforALL

Discussing your Impact Areas for CS Education

As a table, have a discussion around the top 3 rationales and impact areas that were identified by your table.

CsforALL

Reflection

- Why did you select the statements you did?
- What did you notice about which impact areas or rationales were more or less popular at your table?
- Were any reasons that you think CSed is important that were missing? If so, what are they?
- Who did you think had an interesting perspective at your table? What other important stakeholders would you include in this conversation?

CsforALL

How do we begin to link our values to our instruction?

Table Discussions

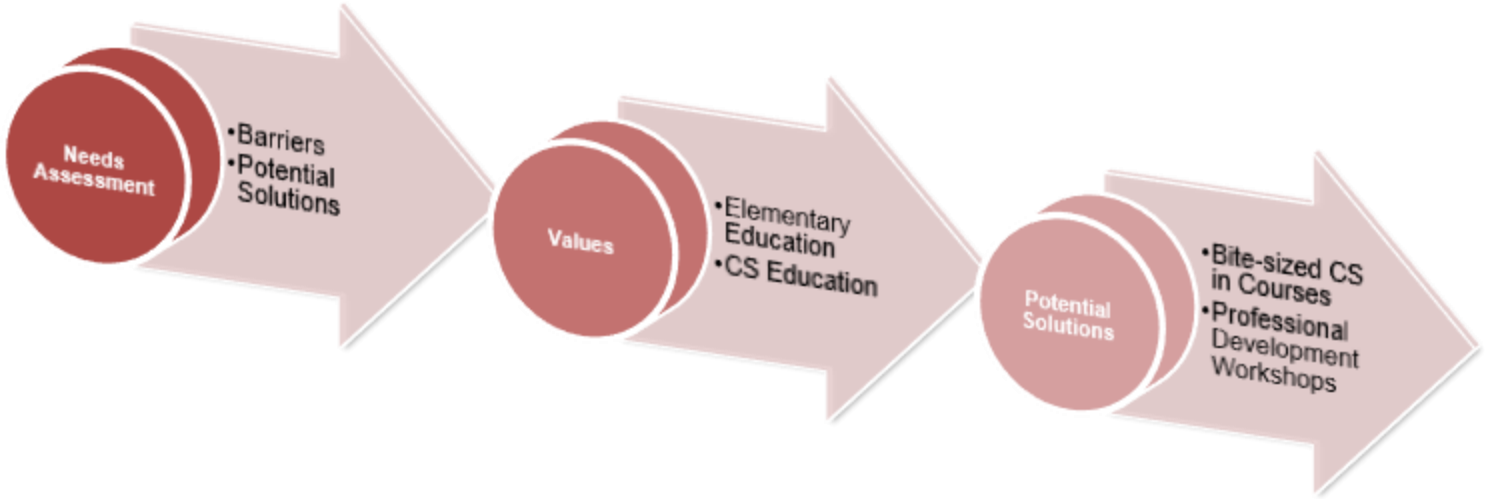
- How can we link our values about CS education to our instruction?

Lunch Break!

How do we get there?

Next Steps

Steps from Today



Professional Learning for Preservice Educators

Overview

- IUB and Nextech will now offer Indiana educator preparation programs (EPPs) the opportunity for CS workshops at their location for preservice teachers and local educators.
- Because of our generous partners at the IDOE, workshops will be offered at no cost, and will potentially include stipends for workshop organizers and attendees.

BCPCS Professional Learning Catalog

Professional Learning for Preservice Educators

Workshop Options

Option 1: In-Class Visit(s) to your Program

Option 2: Professional Learning Workshops

BCPCS Professional Learning Catalog

Professional Learning for Preservice Educators

Option 1: In-Class Program Visit(s)

- In-person or Virtual
- One or more visits
- Content to be mutually determined, based on catalog offerings

BCPCS Professional Learning Catalog

Professional Learning for Preservice Educators

Option 2: Professional Learning Workshops

- Half-day or full-day
- In-person or virtual
- Breakfast & lunch provided if full-day
- Content to be mutually determined, based on catalog offerings

BCPCS Professional Learning Catalog

CSforSocialGood

L1: What is CS?

L2: Introduction to key terms

L3: Design problem: sprite

L4: Design problem: maze

L5: Introduction to Variables

L6: Design Problem: score

L7: Design Problem: questions

L8: Design Problem: game/points

L9: Wrap-up: reflection

CSforSocialGood: Introduction to Block Programming

Primary AI

Unit 1: Introduction to Ecosystems, Population Studies, and AI

Unit 2: Computer Vision

Unit 3: Machine Learning

Unit 4: AI Planning and Yellow-Eyed Penguins

Primary AI Units Overview

AI Goes Rural

L1: AI & Natural Language Processing

L2: Machine Learning I

L3: Machine Learning II

L4: Computer Vision

L5: Project Design

AI Goes Rural Lessons Overview

Rethinking Circle Time (ReCT)

L1: Simple Conditional Logic

L2: Simple Conditional Logic + Literacy: If You Give a Mouse a Cookie

L3: Reverse Sequencing: Robot Mouse

L4: Reverse Sequencing + Literacy: Joey and Jet

L5: Sequencing with Multiple Logic Paths: Robot Mouse Obstacles

L6: Sequencing with Multiple Logic Paths + Literacy: The Snowy Day

L7: Sequencing with Programmed Multiple Logic Paths + ScratchJr: Frogs Hopping

L8: Sequencing with Programmed Multiple Paths + Literacy + ScratchJr: Three Little Pigs

ReCT Lessons Overview

Introduction to Computer Science (Unit)

- L1: Intro to Computer Science
- L2: CS for Creativity & Problem-solving
- L3: Intro to Artificial Intelligence
- L4: Impacts of Computer Science

Introduction to Computer Science for Preservice Teachers Unit Overview.docx

Small Group Guided Discussion

Small Group Discussions

How can you incorporate CS education into your elementary teacher education program?

Which professional learning options would fit best in your context?

Before leaving today…

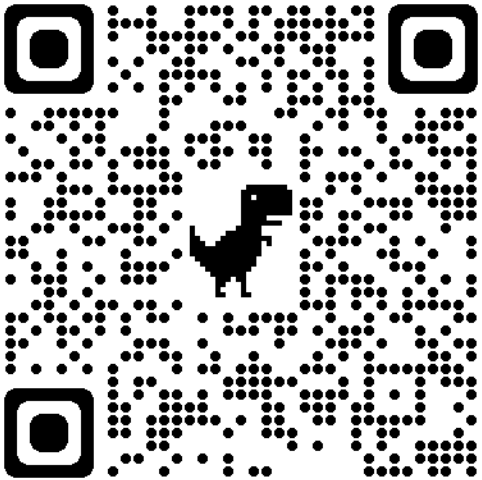
1. Identify struggles you face in including CS into your elementary teacher education program.
2. Craft a clear statement for why CS is important for your elementary preservice teachers.
3. Select one or more of the professional learning options to bring CS into your elementary teacher education program.
4. Connect with Dr. Susan Drumm to talk scheduling.

Help us reflect and evaluate!

Please let us take a photo of your worksheet so that we can collect and reflect on today's discussion.

You can share your feedback of today's Summit via the link below or this QR code.

https://bit.ly/BCPCSFeedback



Sign up for our PD options now!

You can sign up for our PD options now through the link below or the QR code!

https://bit.ly/BCPCSsignup