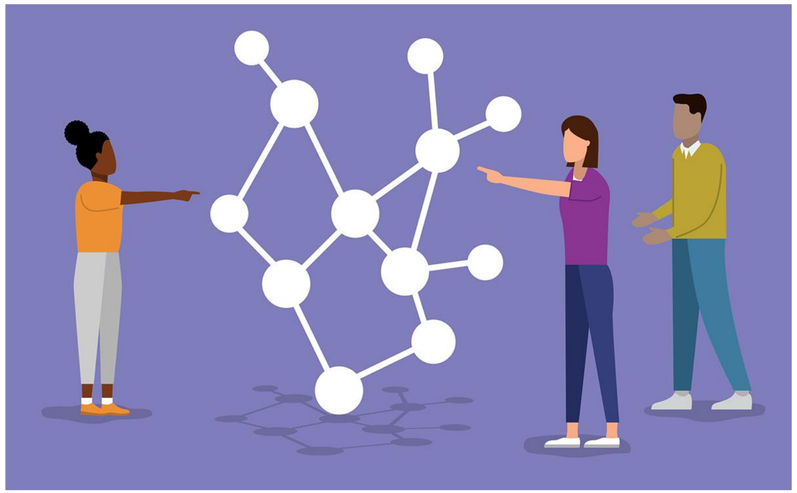
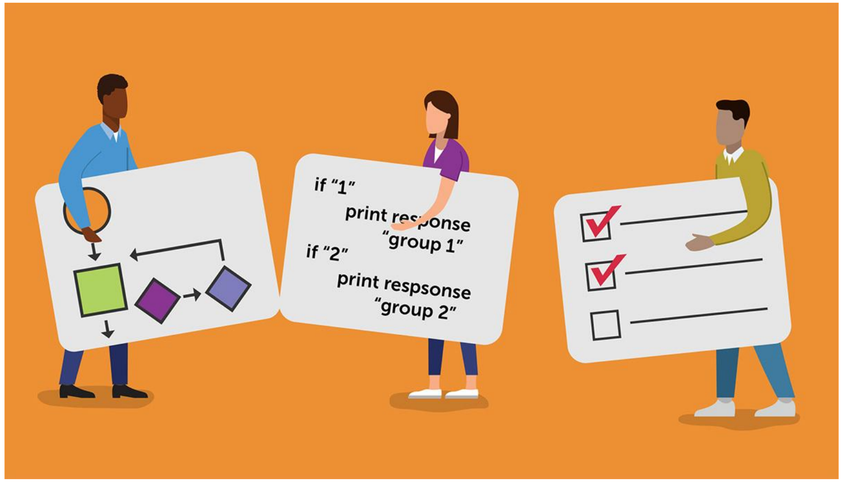
Finding kinship in a far away land: The relevance of Japanese cultural perspectives to education research in Eastern Kentucky

アメリカ･ケンタッキー州東部の教育研究:日本文化との共通性





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Session overview

- **Introductions**
  - Digital Promise
  - Emi
  - Today's theme
- **What is computational thinking (CT)? A CT pathway?**
- **CT in Eastern Kentucky?**
- **The "Tough as Nails" project setting & activities**
- **Research findings, regarding "cultural fit" of CT in Eastern Kentucky**
- **Q&A**

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Introductions

Digital Promise®
Accelerating Innovation in Education

About Digital Promise

- A global non-profit that shapes the future of learning and advances equitable education systems by bringing together solutions across research, practice, and technology.
- Offices in San Francisco Bay Area & Washington DC
- Conducts research, curriculum design, research communications, professional development, etc.

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Learning Sciences Research at Digital Promise

We conduct research that informs more practical, equitable, and scalable improvements in education

How We Work

- We use learning sciences theories and methods
- We work in partnership
- We strive for improvement
- We leverage technology
- We are data intensive
- We prioritize communication

岩谷絵美｜Emi Iwatani

- **Education**
  - Ph.D. in Education Research Methodology (University of Pittsburgh)
  - M.A. in History and Philosophy of Science (University of Pittsburgh)
  - M.A. in Philosophy (Boston University)
  - M.A. in Secondary Science Education (Wake Forest University)
  - B.S. in Biology (Brown University)
  - Grew up in Japan (8 yrs), Indonesia (2.5), Germany (3), China (2) and U.S. (2.5)
- **Professional experience**
  - Education researcher at Digital Promise (since 2018)
  - Education researcher at SRI International (3 years)
  - Education director at Voices Against Violence Pittsburgh (3 years)
  - High school biology and physics teacher at Boston Arts Academy (3 years)

岩谷絵美｜Emi Iwatani

- **Research interests**
  - Designing powerful K-12 learning experiences **with** educators (STEM, world history)
  - **Culturally responsive** research methodologies
- **Current projects (selected)**
  - Deeper Discussions in World History (Institute of Education Sciences)
  - Drawing on Kinship (National Science Foundation)
  - Measurement & Research Methodologies - Black Lives Working Group (AERA-D)
- **Past projects (selected)**
  - “Fairness and Assessment: Engaging Psychometric and Racial Justice Perspectives” (with Drew Gitomer)
  - Evaluation of the Apple & ConnectED Project (Apple)
  - Evaluation of CoolThink@JC (Hong Kong Jockey Club)

Today’s theme: Finding Kinship in a faraway land

- **Kinship**
  - the state or fact of being of kin (relative; having common ancestry or constituting a people, tribe or family); family relationship.
  - relationship by nature, qualities, etc.; affinity.
  - 親族関係、縁者関係、縁故関係（相互の繋がり、よしみ）

Today's theme: Finding Kinship in a faraway land

- **faraway land = Eastern Kentucky** (photos are from visiteasternkentucky.org/)

What is computational thinking?

What is a computational thinking pathway?

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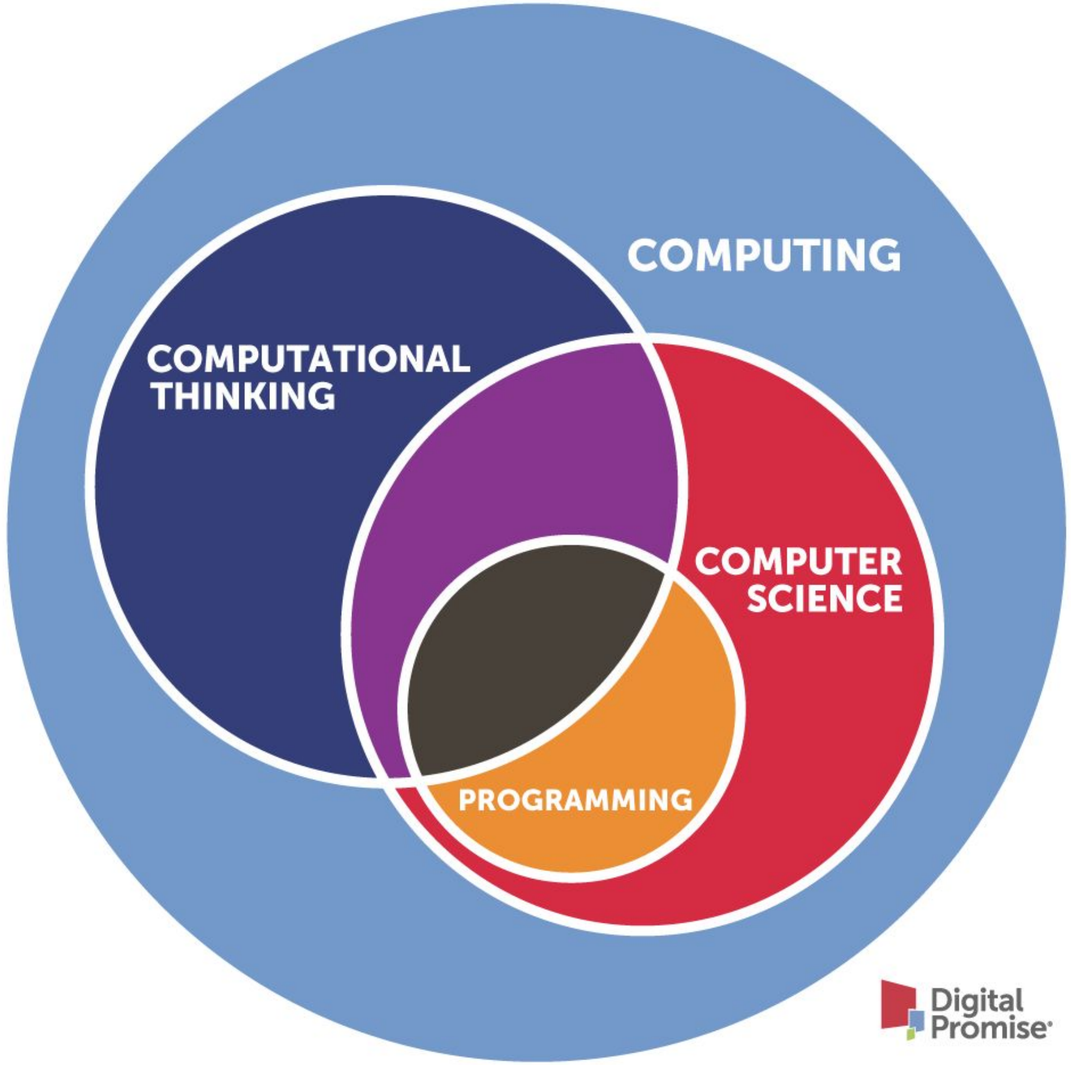
What is computational thinking?

Computational thinking (CT) is a **problem-solving process that is central to Computer Science (CS)**, and also applies to learning in many disciplines

https://bit.ly/AboutCT



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Computational thinking practices & skills

Distinctive **CT practices** include

- Automation
- Data practices
- Computational modeling

CT skills include algorithmic thinking, debugging, decomposition, selecting tools, pattern recognition, and abstraction

https://bit.ly/AboutCT

WHY should K-12 students learn CT/CS?

Personal Agency, Joy & Fulfillment

Economic & Workforce Development

Competencies & Literacies

School Reform & Improvement

Equity & Social Justice

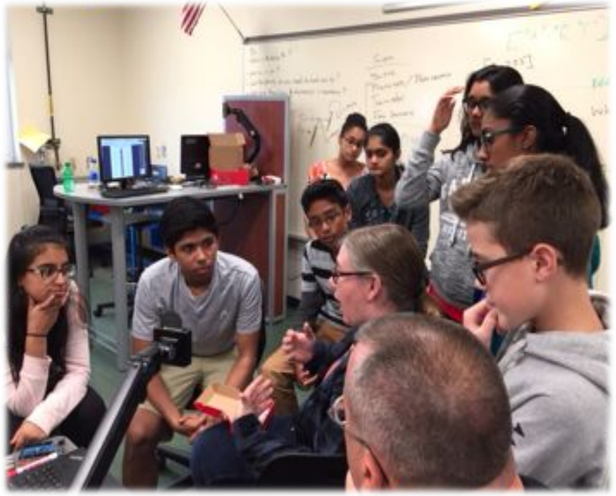
Technological, Social & Scientific Innovation

Citizenship & Civic Engagement

CS Visions Values & Impact Areas (Santo, Vogel & Ching) https://www.csforall.org/visions

CsforALL

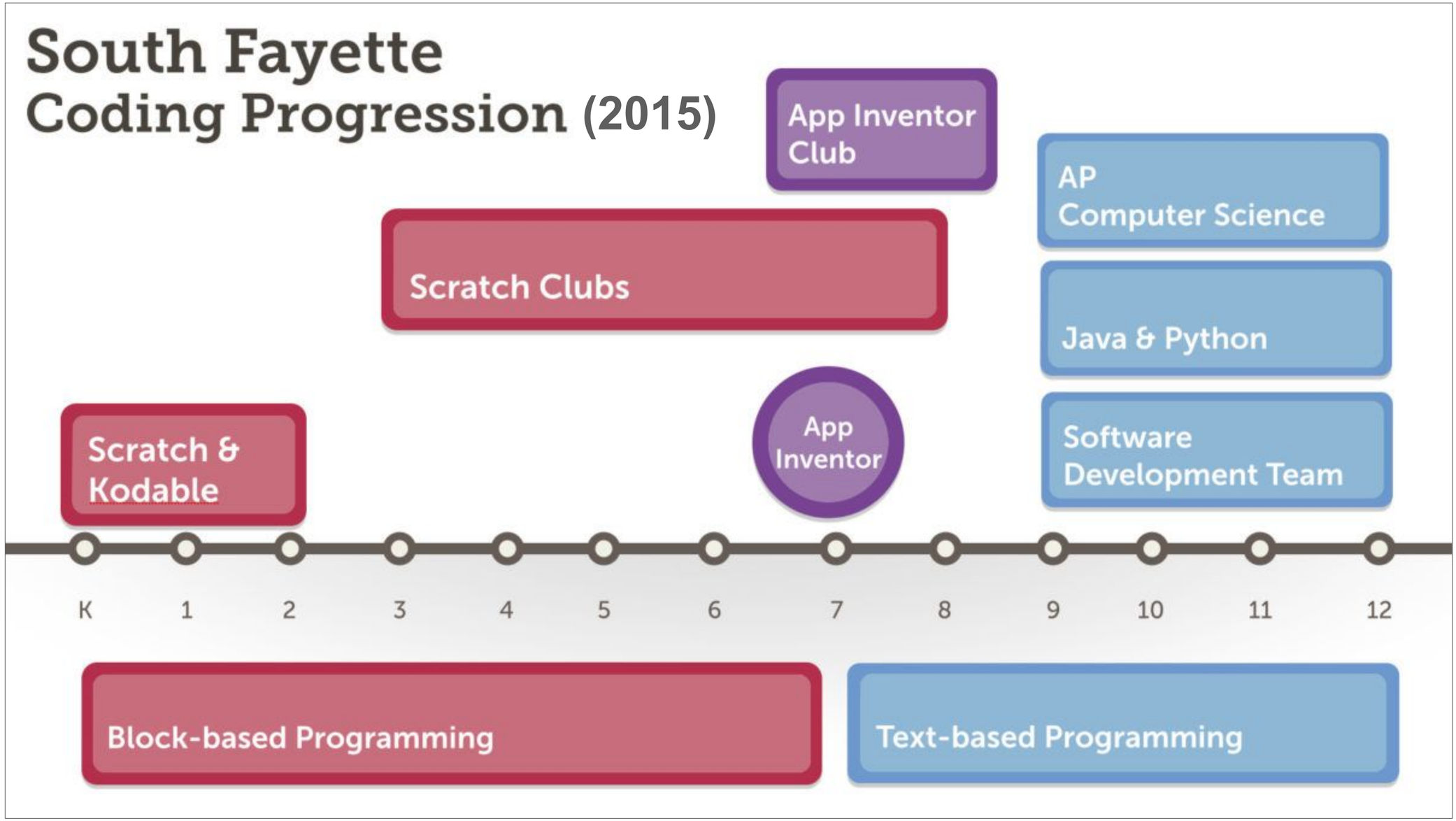
HOW should K-12 students learn computational thinking? (Photos from South Fayette School District)



Digital Promise's response to "HOW?": Computational thinking pathways

Computational Thinking Pathways (CT Pathways) are **system-wide, K-12 learning progressions** supporting equitable participation in computational thinking that is **consistent** across classrooms, **cumulative** from year to year, and **competency-based**.

Example of CT pathway (First in the US?)



Computational thinking pathways in Eastern Kentucky?

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October 2019…

Quinn Burke & Emi Iwatani

Education Researchers
Digital Promise,
Redwood City, CA

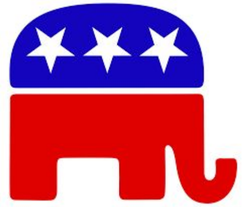
Eastern KY ???

I have some **friends in Eastern Kentucky (KT)** who want a CT Pathway. Let's partner!

Aileen Owens

Chief Innovation Officer
South Fayette School District, Pittsburgh, PA

Computational thinking in Eastern Kentucky? (I knew nothing about the region)



???

← 昔炭鉱業 (coal mining) が盛んだった。

1/21/19 First phone call - CA, KY, PA

Many ideas were exchanged…

CS for All proposal from NSF… deadline Feb 12 … 3 strands… High school or K-8? …etc

South Fayette has a CT pathway we've been developing for 10 years … Have been sharing methods … Developed a friendship with KY, looking at the future of work…etc

Bit Source - startup software development company employing former coal miners learned Python from CMU… some educational initiatives .. designed an app to prevent bullying & opioid app… teaching App Inventor at an entrepreneur fair … Entrepreneurism, SOAR, CEDAR … PISD K-8 initiatives to date…etc

We learned that…

Rusty Justice & Payton May (& Lynn Parish)

元炭鉱作業員を雇い、地域の復興に貢献するソフトウェア開発の会社「Bit Source」を企業。地域のCT教育にも貢献したい。

Traci Tackett

Bit Source の Director of Digital Learning。元PikevilleとFloyd学校区の先生（幼稚園と中学ギフテッド教育）。Aileenの学区が行っているCT教育を東ケンタッキーでも導入したい。

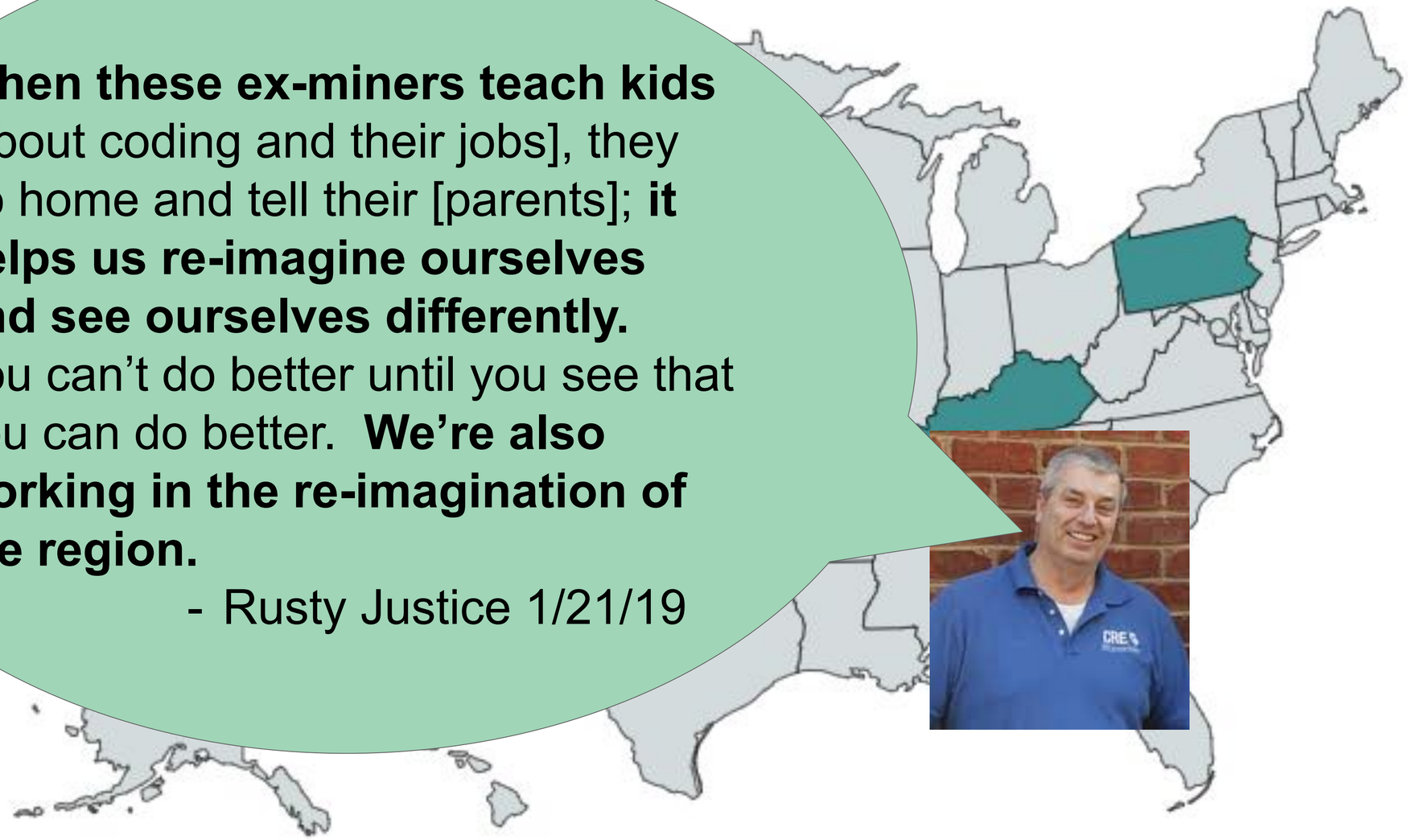
Neil Arnett

Pikeville Independent School District の District Technology Coordinator。特に幼稚園と小中学校にAileenの学区の様なCT教育を導入したい。

A memorable comment

When these ex-miners teach kids [about coding and their jobs], they go home and tell their [parents]; **it helps us re-imagine ourselves and see ourselves differently.** You can't do better until you see that you can do better. **We're also working in the re-imagination of the region.**

- Rusty Justice 1/21/19



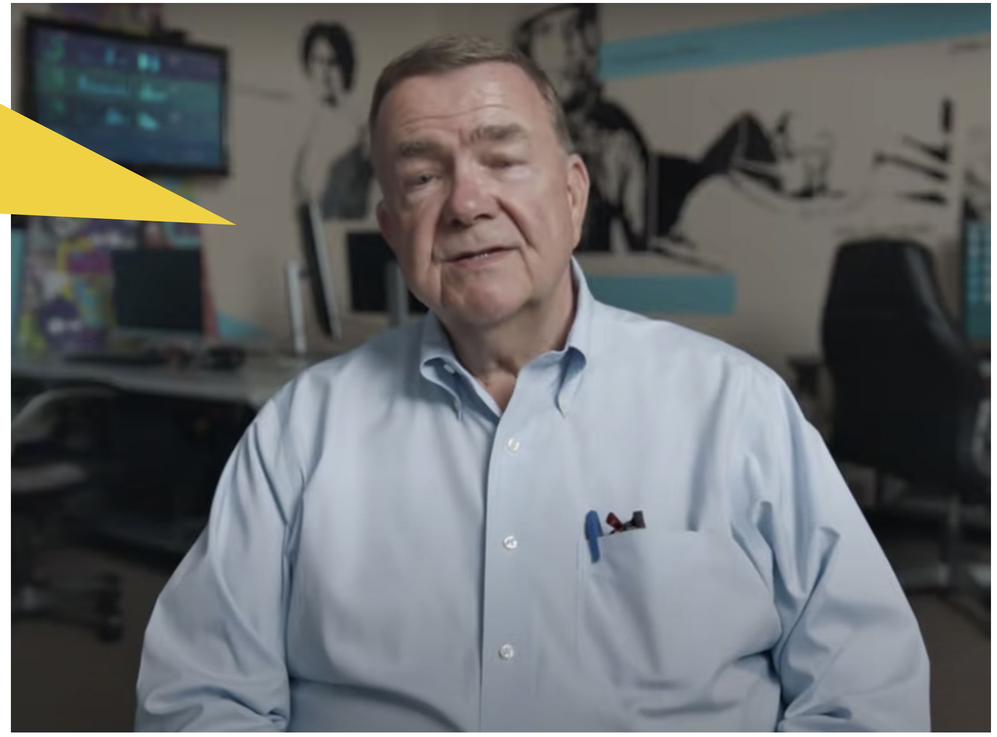
Further Inspiration

Bit Source: Appalachian i...

youtu.be

Lynn Parish - Co-Founder of Bit Source (software development company in Eastern Kentucky)

All the naysayers kept saying, “you can’t train coal miners to be able to code.” But hey, these guys have been working around tech their whole lives. And they’re **tough as nails**. We can do this.



炭鉱作業員は***釘のようにタフ***だ。

2/17/19 Quinn & team proposed “Tough As Nails” research idea to the National Science Foundation

Proposal title: *Tough as Nails, Nimble Fingers (釘のようにタフ, 指は軽快): Developing a K-8 coding pathway for Kentucky Appalachia*

Design: Create a K-8 “Computational Thinking Pathway” in Floyd County & Pikeville Independent Schools by applying South Fayette School District’s model and training 75+ teachers over 3 years

Research: Study what it takes to make this happen and sustain it, what the pathways looks like, what impact it might have

We requested $1,000,000 for a 3-year project.

Relevance of my Japanese heritage & intercultural experiences, upon proposal conception

- **Curiosity** about cultural heritage within the US
  - Who are the people in Eastern KY?　文化的に面白そう。
  - How does “computational thinking” fit into their culture?
  - Can this help me better understand Westernization in my country, and the impacts it’s had on my (and my people’s) lives and worldviews?

- **Desire to be culturally responsive** in a research partnership
  - シリコンバレーの文化や都会人の価値観の押し付けはしたくない！ そして、抽出的な研究はやりたくない！

Proposed to examine cultural fit of CS/CT

"...the Tough as Nails proposal **investigates the wider cultural fit of CS/CT within largely "blue collar,"** illuminating the ways that rural RPPs can **identify and address cultural disjoints that may exist around CS/CT within such communities**."

NSF accepted our research-practice partnership proposal on 8/16/19!

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Award Abstract # 1923314

Tough as Nails, Nimble Fingers: Developing a K-8 Coding Pathway for Kentucky Appalachia

NSF Org:	CNS Division Of Computer and Network Systems
Awardee:	DIGITAL PROMISE GLOBAL
Initial Amendment Date:	August 16, 2019

Our project setting & activities (2019-2022)

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Our setting

SOUTH FAYETTE ELEMENTARY
SOUTH FAYETTE ELEMENTARY SCHOOL
TRADITION
PRIDE
EXCELLENCE

PIKEVILLE
Elementary School
CONGRATULATIONS
PES ACADEMIC TEAM
WORD OF THE MONTH
PERSEVERANCE
PIKEVILLE ELEMENTARY
animus corpus spiritus
INDEPENDENT PIKEVILLE SCHOOLS
KENTUCKY

bitsource

Providing Amazing Opportunities
Floyd County Schools
Inspire - Innovate - Instill
For All Students

WANTED

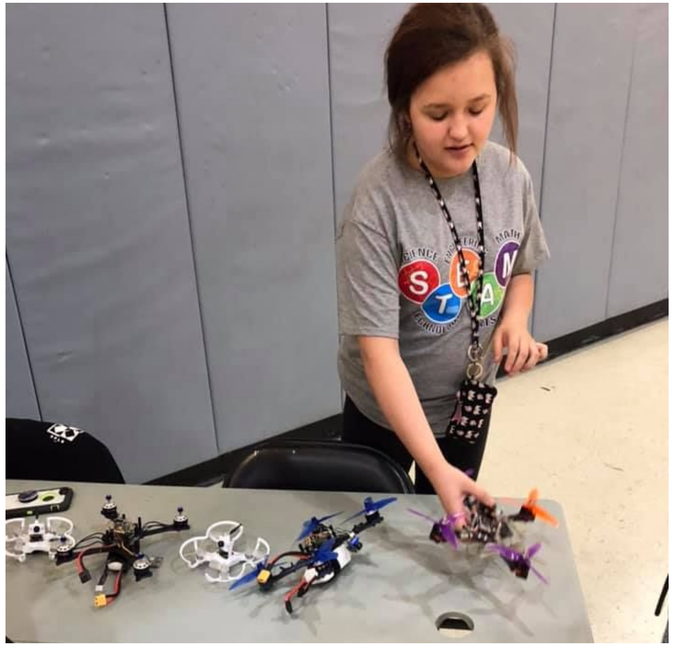
Junior Engineers

PES Library
THURSDAYS
3:15 pm - 4:15 pm

PROJECT STEAM

SCIENCE TECHNOLOGY ENGINEERING ARTS MATHEMATICS

Providing Amazing Opportunities
Floyd County Schools
Inspire - Innovate - Instill
For All Students



Pikeville Independent Schools

Summary

School Count: 2

Students: 1,175

Grades Preschool-12th

Pikeville Elementary PreK-6

Pikeville High School 7-12

Floyd County Schools

Summary

School Count 13

Students: 5,468

Grades Preschool-12th

Allen Elementary PreK-8
Duff Allen Central Elementary PreK-8
Betsy Layne Elementary PreK-8
John M. Stumbo PreK-8
May Valley Elementary PreK-5
Prestonsburg Elementary PreK-5
South Floyd Elementary PreK-8
Adams Middle School 6-8
3 High Schools

Pikeville Independent Schools

Floyd County Schools

Pikeville Independent	Floyd County
Organization Details	
Star Rating ⓘ View Accountability Data >	Star Rating ⓘ View Accountability Data >
ELEMENTARY SCHOOL	ELEMENTARY SCHOOL
4 of 5 stars	2 of 5 stars
MIDDLE SCHOOL	MIDDLE SCHOOL
4 of 5 stars	2 of 5 stars
HIGH SCHOOL	HIGH SCHOOL
5 of 5 stars	2 of 5 stars

Pikeville Independent Schools

ECONOMICALLY DISADVANTAGED

- Economically Disadvantaged **37%**
- Not Economically Disadvantaged **63%**

Floyd County Schools

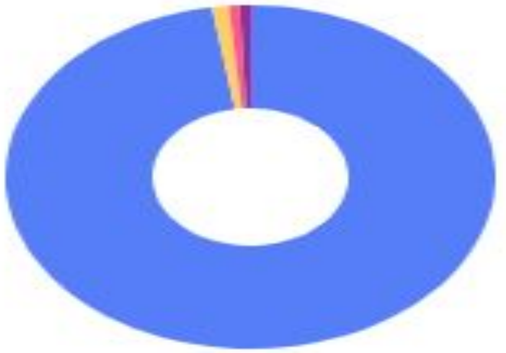
ECONOMICALLY DISADVANTAGED

- Economically Disadvantaged **74.2%**
- Not Economically Disadvantaged **25.8%**

Pikeville Independent Schools

- **91.1%** White (non-Hispanic)
  1070 students
- **2.7%** Asian
  32 students
- **2.1%** Two or More Races
  25 students
- **4.1%** Other
  48 students

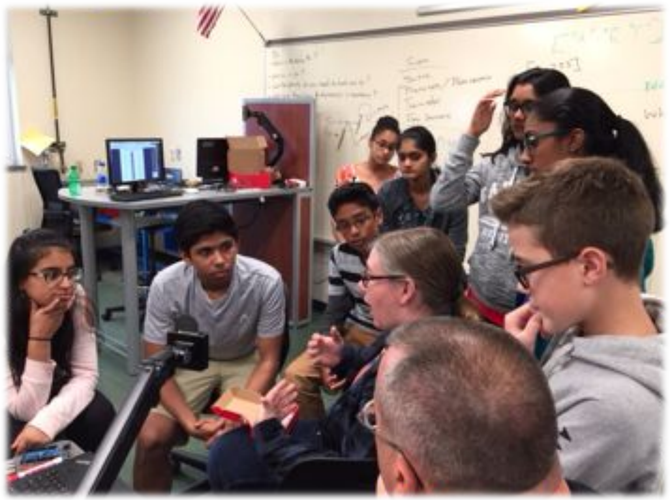
Floyd County Schools



- **97.5%** White (non-Hispanic)
  5330 students
- **1.1%** Hispanic or Latino
  61 students
- **0.7%** Two or More Races
  39 students
- **0.7%** Other
  38 students

Project Activity #1 - Create a CT pathway vision

100 educators visited SFSD's pathway



Districts self-assessed, and created vision & goals for CT

Strategic CSforALL Resource & Implementation Planning Tool

	Novice	Emerging	Developing	Highly Developed
Local Workforce Efforts	Local workforce efforts are not engaged or connected to the CSforAll efforts of the district.	Individual teachers may connect to local workforce efforts, but there is little to no alignment between community workforce development and CS education programs. There may be connections to local industry for one-time events or gifts, but little connection between these interactions and the larger goals or plans of the district.	Local workforce efforts are connected or consulted by the district in the development of CSforAll plans. Curricular selection and enrichment activities are designed to not only prepare students for college but also for potential career readiness opportunities locally. Local industry is engaged in opportunities to support district efforts through employee volunteer programs, support for events or initiatives, and engagement in district plans.	Local workforce efforts engage with individual schools to provide materials for student pathways, and clarity for guidance counselors in recommending student experiences. The school community (teachers, students, parents, guidance, and administrators) understand the regional workforce efforts and leverage appropriate resources to supplement district resources.

Project Activity #2 - Train teachers on how to integrate CT

Eastern KY STEAM Summer Institute

Presented by South Fayette Township School District

Hummingbird & micro:bit

Victoria Lojek & Samantha Edkins, 3-5 STEA

In this session, participants will learn how to use
prepare students for programming with Hummir
identify parts and program hummingbird compo
skill building to become comfortable in planning

Scratch: Foundations of C

Shad Wachter, 3-5 Technology Literacy T

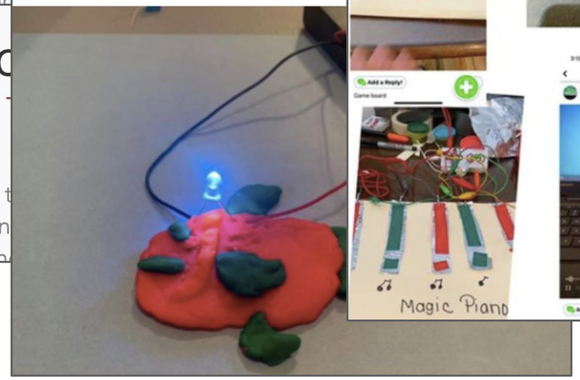
At South Fayette we believe computational t
computer science/STEAM pathway extendin
foundation. Scratch is so powerful in teachin

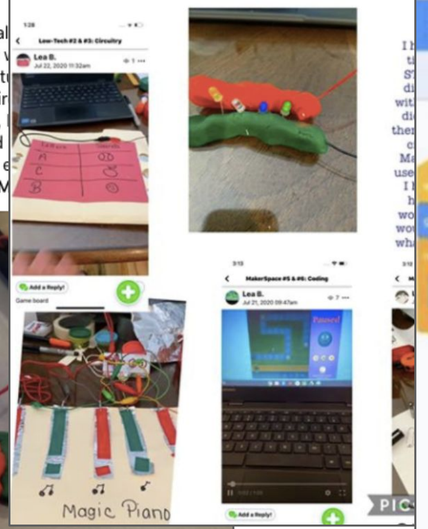
Lea Bentley
July 30 at 8:40 PM ·

Last week I participated in our districts STEM training!
with teachers from South Fayette in Pittsburg through
Science Foundation grant. I was able to join in on two
Maker Movement and Low-Tech High Impact, and I ca
these new found skills in my classroom!!

Markayla Stevens
July 30 at 5:08 PM ·

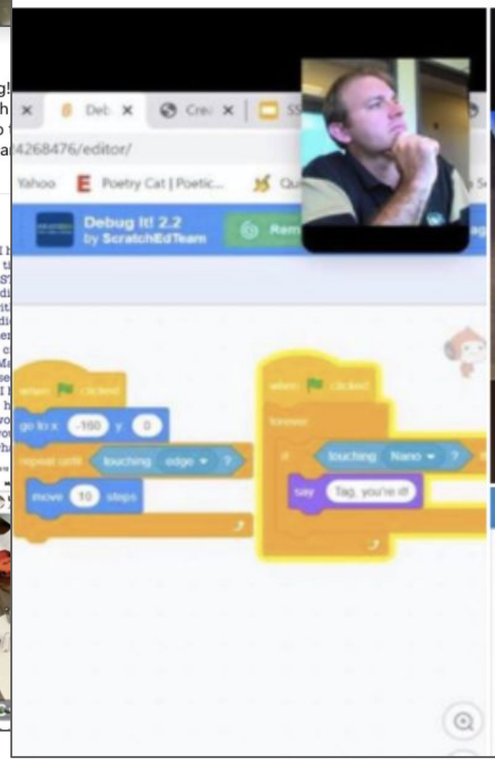
Last week I participated in a 3 day virtual
STEAM Institute. Monday and Tuesday I
training. This training gave me an opport
share my creations of making squishy cir
Makey Makey activities. On Wednesday,
Tech/High Impact training. I participated
incorporate into my own classroom. For e
able to interact with Kodable for ... See M

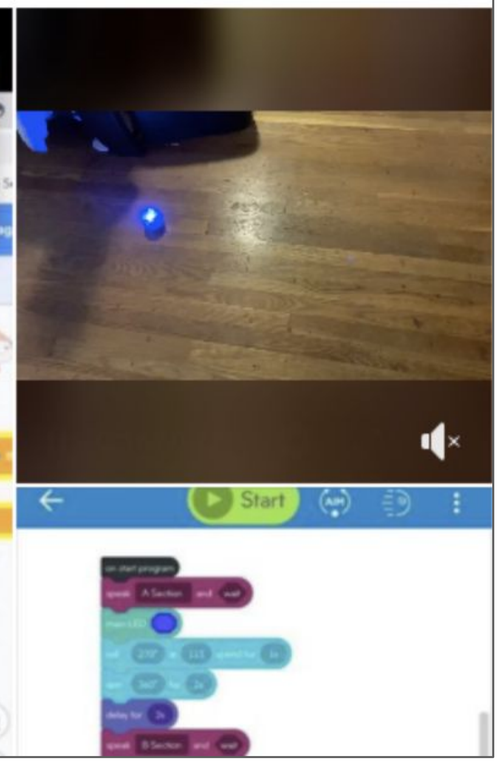




Greta Gilbert
July 30 at 4:01 PM ·

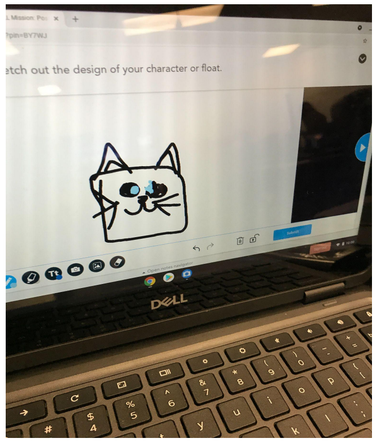
I had a great experience with the South Fayette STEAM Institute last week! I got to learn Scratch and Spheros! Lots of neat ideas for integrating coding with music 🎶. I programmed my Sphero bolt to move and change color based on musical form of "Twinkle Twinkle Little Star"





Project Activity #3 - Design and implement CT lessons

B	C	D	E	F	G	H
District	Grade	Subject	Tentative title of My Little Bet	Integrated vs Stand-a	Brief description of My Little Bet	Estimated run time
Floyd Co	K	All core s	Coding Dash	I plan to **integrate** the	I will be using blockly to code Dash. We will create codes to have him move in certain shapes and letters. Students will be learning how to code.	All school year
Floyd Co	K	All Core S	Coding with Dash	I plan to **integrate** the	We will be using Bockly to learn to code Dash. For math w shapes. For ELA, we will have Dash, and accessories for r teaching with eve	
Floyd Co	7	language	Characterization	I plan to **integrate** the	Creation of chara narration or dram	
					Over the course weeks, campers effects of severe patterns, while a of Pikeville's own from our Mayor.	



Project Activity #4 - Create district curriculum maps

Computational Thinker: Performance Indicator Progression Chart

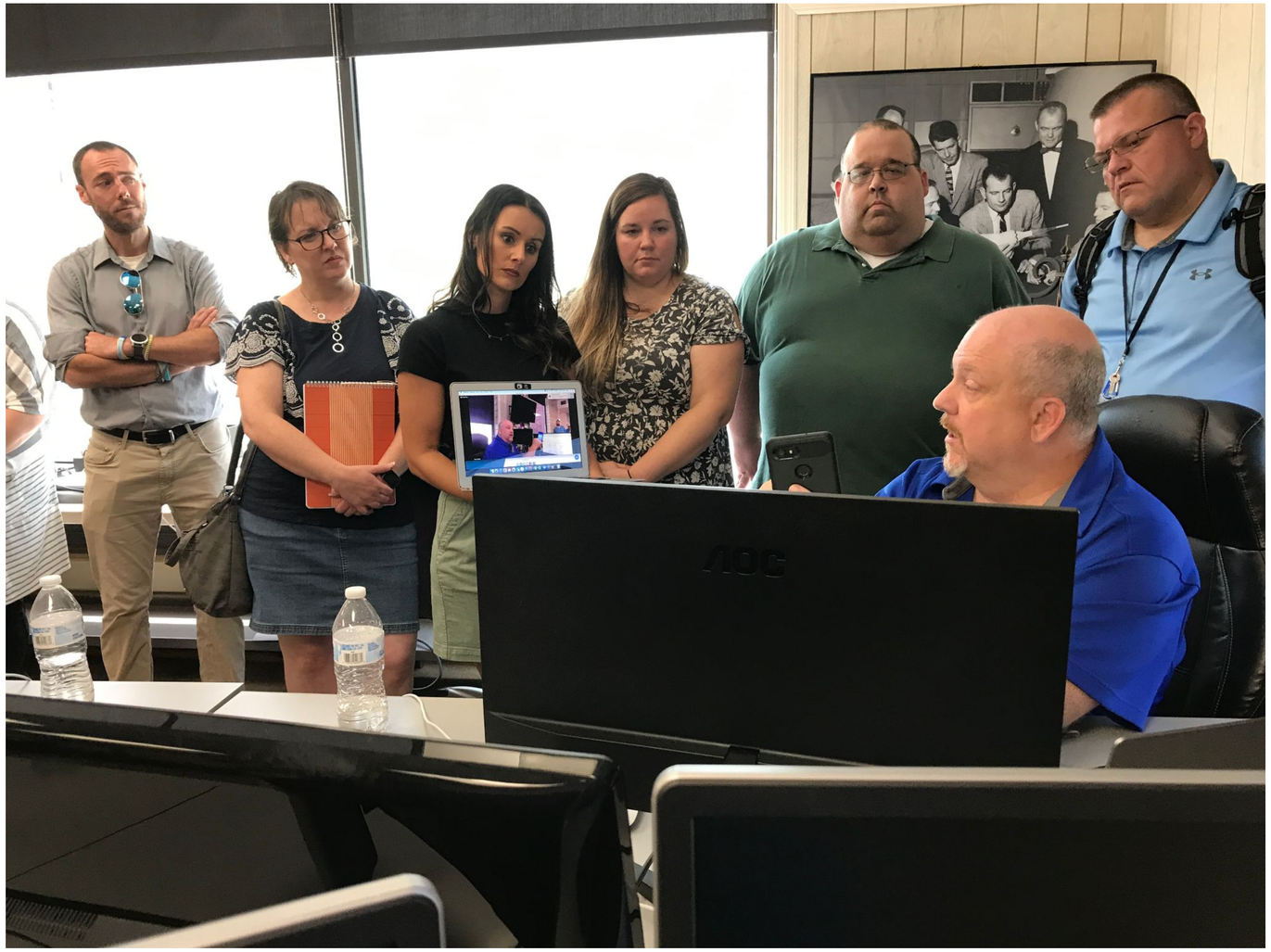
Third Grade Grade Band Skill / Concept Development

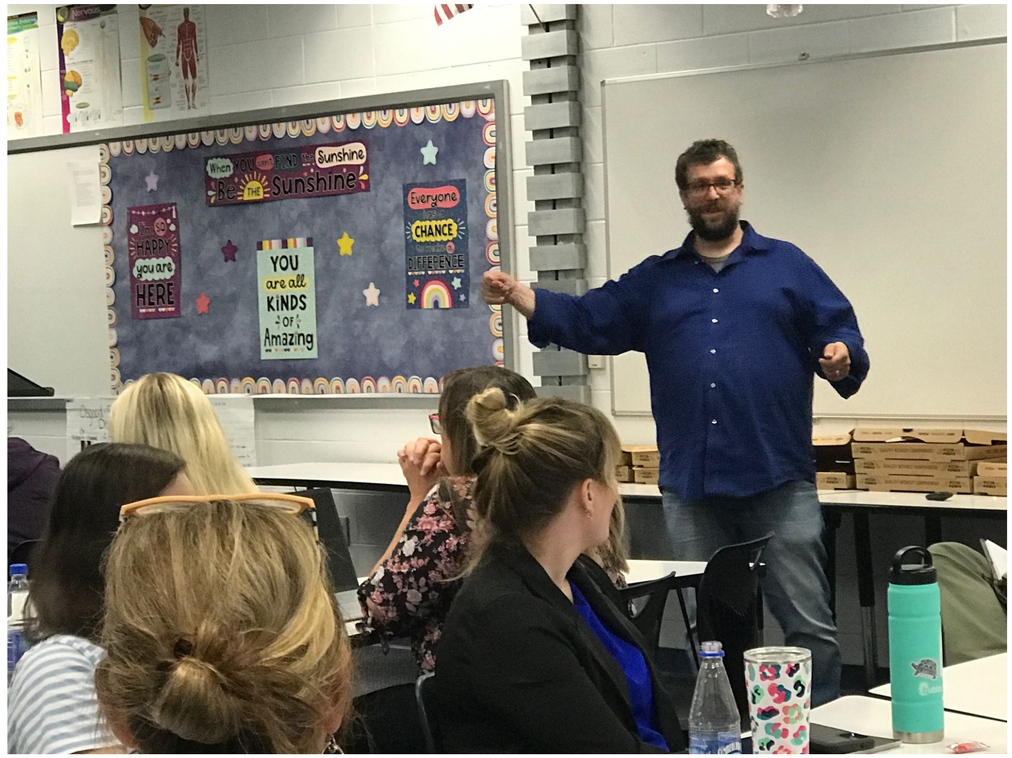
Key Standard: Develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test soluti

Learning Priority	Standard Identifier	Grade 3 By the end of the grade, students will be able to...	Thematic Integration (i.e., CT activities approporiate for grade level)	Sample District Tea (links to teacher less
A. Formulate problem definitions suited for technology- assisted methods such as data analysis, abstract models and algorithmic thinking in exploring and finding solutions.	CT1.A.1	Select appropriate tools to plan a design process in which solutions to a problem are explored and digital tools are used to analyze data, create models, and represent collected data (ex.: spreadsheets, graphs, charts, tables, presentations, infographics) in a way that can be shared with others, with guidance.	**Students will design algorithyms using scratch, or another block based coding program. See second and fourth grade for addition guidance on knowledge students should have. This could be incorporated through ELA with writing, application of a reading comprehension skill or with application of a social studies standard.** **Skill Intergration: ELA, Social Studies, Science**	This might be easy a https://drive.google wUQQiM/view https://scratch.mit.e
	CT1.B.1	Select age-appropriate digital tool to represent data (ex.: spreadsheets, digital graphs/charts), with guidance and support from adults	**If you need an idea maybe have students track their plastic consumption for a week using Google sheets, compile all data and then have a data talk to analyze their discoveries. Then introduce students to the Great Pacific Garbage Patch and have**	

K(P) KY CT | 1st Grade KY CT | 2nd Grade KY CT | 3rd Grade KY CT | 4th (

Project Activity #5 - Invite teachers to see the bigger picture





Project Activity #6 - Constant reflection of “What’s worthwhile for Eastern KY and why? How are we doing? How can we improve?”

Resisting edtech colonialism through Inclusive Innovation in Kentucky Appalachia

Presentation for *CREA VI*, Sept 30, 2021

Emi Iwatani, Pati Ruiz, Quinn Burke, Aileen Owens & Traci Tackett

This material is based upon work supported by the National Science Foundation under Grant No.1923314. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

Leveraging Community Cultural Wealth to Support K-8 CT Education in Kentucky Appalachia

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***Abstract*—Since the departure of the coal industry, Kentucky Appalachia has been striving to cultivate new ways of living in the region that is consonant with their culture and values. Developing a workforce that is competitive in the digital economy is a central part of the region’s plan for revitalization, with local educators and organizations beginning to invest, with intention, in CS/ CT education for K-12 students. The panel consists of local leaders (administrators, teachers, parents, and community leaders) of K-8 CS/CT initiatives in the region. They will discuss how building a K-8 computational thinking pathway both leverages and helps** computational thinking (CT) education for K-16 students, partly through a National Science Foundation (NSF) funded research-practice partnership (“Tough As Nails”) to create K-8 computational thinking pathways in Pikeville Independent School District and Floyd County Schools [4]. Cultural responsiveness has been an express goal of this project, with the team

Our research findings, regarding “cultural fit” of CT in Eastern Kentucky (2019-2022)

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Research discovery (2020): In Eastern KY, supporting workforce development is a motivator for teaching CT/CS

Top 3 reasons why teaching CT is important
(2020 teacher survey, N=56)

Personal Agency, Joy & Fulfillment

100%

Economic & Workforce Development

73%

Competencies & Literacies

70%

Research discovery (2021): Appalachian culture has *aspirational*, *resistance* and *familial capital* which connect to problem-solving and CT (concepts from Yosso 2005)

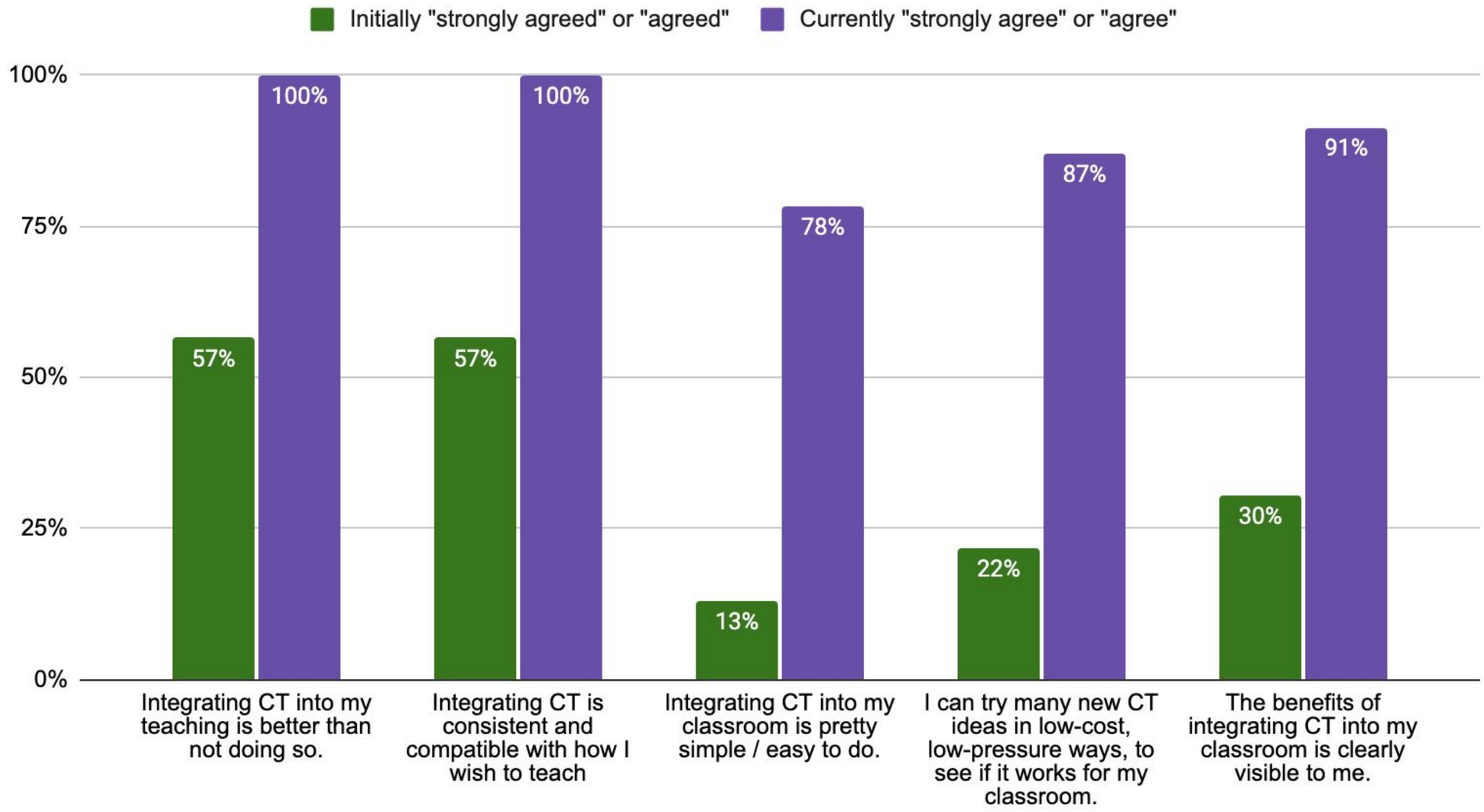
"[Something] indicative of that Appalachian culture is that, while there may be certain stereotypes and stigmas associated with Appalachia, there's a **push against that** and that we're going to **do whatever it takes** in order to **help our neighbors**, and in order to kind of rise to the next level." (Neil, 5/27/21)

" I really like **aspirational capital**. One in relation to Rusty and Lynn and founding Bit Source and their **ability to maintain hopes**, even at the economic collapse of the coal industry, and into this startup period …of not knowing where we're heading and trying to build this sort of tech sector out." (Payton, 5/27/21)

Research discovery (2021): Appalachia's problem-solving heritage may be getting lost or forgotten

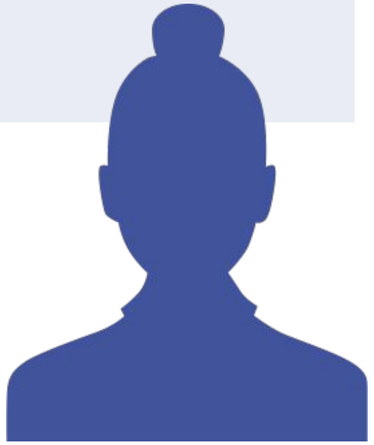
"[O]ne of the things with the collapse of the coal industry is we don't have as quick access to as many of those individuals who kind of created that coal industry out of nothing, in a harsh landscape. We've talked about some examples of people who just create out of sheer necessity. … So I think **part of our work [in CT education] to is trying to capture that and perpetuate that grit and that ability to solve problems that are before you.**" (Neil, 5/27/21)

Research discovery (2022): There are many barriers for teachers to integrate CT, but training can help (N=23)



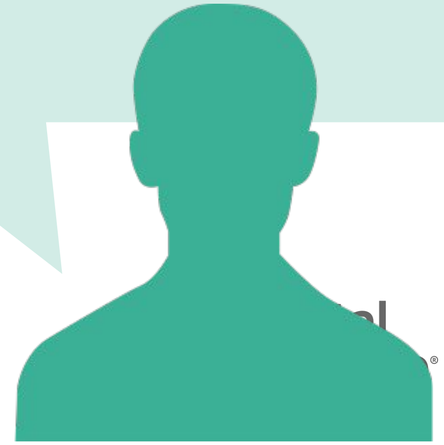
Research discovery (2022): Helpful to introduce CT as a problem solving approach that (often) involves using digital technology

"Computational thinking is not a new theory—this is just a new name of a ***problem solving approach that involves using innovative technology to assist*** *in the process."*



"Computational thinking is ***being able to analyze, build and create steps in a process in order to generate new understandings****. This can entail collecting data, problem solving while building our understanding of various competencies."*

"Computational thinking is ***problem solving steps that teach students perseverance through exploring and analyzing algorithms*** *to find solutions"*



Research discovery (2022): It's powerful to connect CT education to real community opportunities

I want to use Appalachian people as examples of the scientists we discuss in my classroom to inspire my students that their birthplace does not hinder them and they can stay and follow their passions in Appalachia.

The talks from Sam and Rusty are the ones that give you goosebumps and tears as we think about what opportunities are in our region and what possibilities are on the horizon with the intersection of how educators can put their efforts to move this progression forward.

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- **Desire to be culturally responsive** in a research partnership
- Experience-based **appreciation of cultures** that have
  - Unique histories and traditions
  - Undergone severe cultural disruption
  - Values effort, hard work, kinship, aspiration, resistance
  - Knows how to navigate 内と外、本音と建前

Prof. Stafford Hood on conducting research outside of one's own culture

There are some differences across cultures, languages, sometimes family dynamics, and on "what kind of information constitutes evidence." But there are also a lot of similarities—e.g., how traditionally oppressed groups have responded to societal pressures in order to survive. There often is a "common rhythm" or "connectedness" across cultures, surrounding this. One advice is to make sure that you have a cultural liaison. Know what to pay attention to and how you are supposed to engage/enter into a particular setting. We have to always actively strive to be a scholar/teacher and student at the same time.

— Stafford Hood, 10/31/14

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Message from Neil and Traci to you:

One of my favorite parts of every time we meet virtually is we take time to “catch-up”, important events happening in our organizations, life events, how are we feeling. We connect on more than just the bullet points of our agenda.

Personal connections are vital. It isn’t just about getting a job completed, but finding common ground with your colleagues, clients or students, so that relationships can be formed. When that happens, progress can happen. You can empathize with each other for a common good.

Thank you!

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Please reach out!
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