

Civic imagination's role in K-8 computing education in Kentucky Appalachia



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Civic imagination's role in education [Invited speaker session].

Civic Imagination and Worldbuilding Conference, Bowling Green, KY, United States. <https://bit.ly/TANrefs> <https://bit.ly/CTKinship>



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This presentation is about a six-year education research and design project in Eastern Kentucky (KY), funded by the National Science Foundation, where we are currently in year four. The first three years of the project was called “Tough as Nails, Nimble Fingers: Developing a K-8 Coding Pathway for Kentucky Appalachia” and the next three years is called “Drawing on Kinship: Rurally Sustaining Computational Thinking Pathways.” A key goal of both projects is to understand how important principles in computing can be taught in elementary and middle schools in Eastern KY, in ways that are responsive to local culture and values.

The project is an ever-expanding partnership. The project organizers are shown below, and come from Floyd County Schools, Pikeville Independent School District, software development start-up Bit Source, all located in Eastern KY, as well as Throughlines Edu in Pittsburgh, PA, and Digital Promise which has a national and global reach.

NSF “Drawing on Kinship” Project Organizers



Emi Iwatani
Senior Researcher,
Digital Promise



Traci Tackett
Director of Digital
Literacy, Bit Source



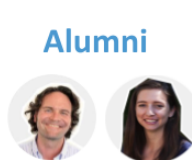
Aileen Owens
Director,
ThroughlinesEdu



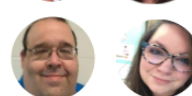
**Merijke
Coenraad**
Project Director,
Digital Promise



Kyle Dunbar
CT Researcher,
Digital Promise



Alumni



Neil Arnett
District Technology
Lead, PISD



Mike Bell
Digital Learning
Coach, FCS



Amy Newsome
Digital Learning
Coach, FCS



Sarah Blackburn
Digital Learning
Coach, PISD



Brian Hobbs
Digital Learning
Coach, PISD



Denise Isaac
HS Instructional
Lead, FCS

Just a few photos of our beautiful setting in Eastern KY, in case you might not have had the pleasure of visiting. Our partner Floyd County Schools has about 5,500 students district wide, and we are working with their 8 schools at the K-8 level. Pikeville Independent School District has approximately 1,200 students in their elementary and high school. The second set are photos of computing-related initiatives at Pikeville Independent depicting some of their computing related education initiatives from around 2020, and similarly (the third set) are scenes from Floyd County Schools from around the same time.

Our Setting: Eastern KY



As background, computing education is a statewide focus for KY. Every student is expected to meet the technology standards, where technology is no longer about keyboarding and knowing how to use spreadsheets, but includes competencies such as “computational thinker.” There are also standards for computer science, for students who elect to take these classes.

Technology & Computer Science Education Standards in KY



7 Big Ideas of Technology

- Global Collaborator
- Computational Thinker
- Creative Communicator
- Empowered Learner
- Digital Citizen
- Knowledge Constructor
- Innovative Designer



Kentucky Academic Standards for Technology

5 Key Concepts of CS

- Networks & the Internet
- Using Algorithms & Programming
- Data Analysis
- Computing Systems
- Impacts of Computing



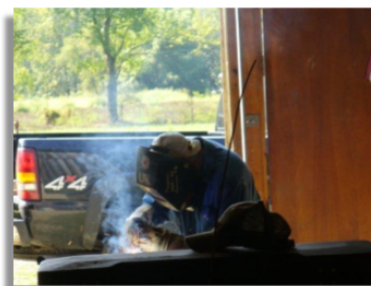
Kentucky Academic Standards for Computer Science

However, our “why” focuses on not just on teaching essential skills that undergird computing (which we call “computational thinking”), but whether/how we can relate that to the maker, tinkerer, innovator, problem-solver heritage that exists in Eastern KY. We hypothesize that highlighting the connections will support students more holistically, and more powerfully, and might even have some positive ripple effects to parents and the broader community.

Our current “Why” - Connecting computing education with Appalachian Ingenuity

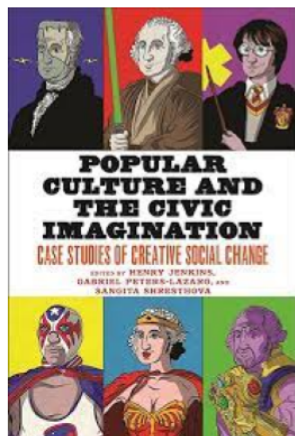
“Who are the community makers? Who are the creators? Even the historians? ... [T]he conversation about imparting that Appalachian ingenuity and how we capture and perpetuate that, for me is the biggest driver that has come out of what we’ve done in the past 3 years. It takes [computer science] from novelty to actual change, and it ties it directly to the people on the ground.”

Neil Arnett (Pikeville Independent School District) reflecting on possible research questions for Drawing on Kinship



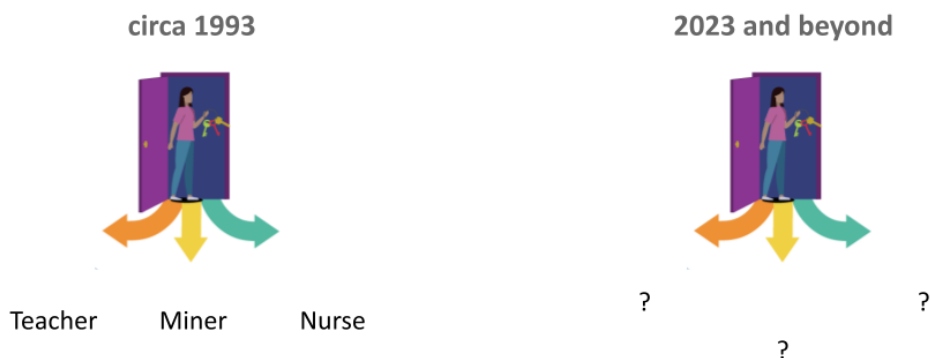
So this project is not “just” a computing education project. More fundamentally it’s a project that works towards a future of Eastern KY and aligned with guiding principles of civic imagination.

We are working towards a future for E KY, aligned with guiding principles of civic imagination



Sam Ford summarizes the core insight of civic imagination in 3 sentences. (Note: I’ve stolen and adapted those for this presentation, changing “people” to “educators,” so that is what the asterisk in the slide indicates). The first is “Educators can’t work towards a future if they can’t see it first.” 20 years ago, the three futures teachers tended to imagine for their students were “teacher, minor, nurse.” This first key idea of civic imagination says that educators must have a concrete view of the future, in order for them to work towards it. What might be their vision today?

(1) Educators can’t work toward a future if they can’t see it first.*



*Headers (1) - (3) are adapted Sam Ford’s summary of Jenkins & Shresthova’s rationale for the importance of civic imagination.

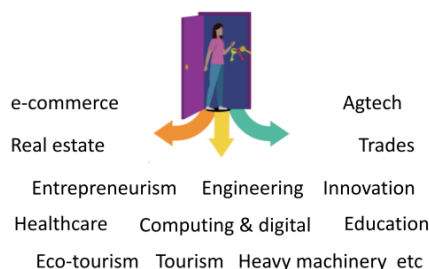
Fortunately, there was already work happening to envision futures, especially among local business leaders. Bit Source and Shaping Our Appalachian Region, among others, were spearheading economic revitalization efforts. As seen in the slide below, there were some business leaders imagining a future for the region.

(1) Educators can't work toward a future if they can't see it first.



**Shaping Our
Appalachian Region**
54 counties, one plan for
prosperity in Eastern Kentucky

2023 and beyond



Of course, the business and education communities tend to be siloed. So as seen in this slide (below), to help K-8 teachers envision a shared future alongside the business community, we've so far conducted 4 types of activities:

- Talks & field trips to familiarize teachers with local innovators.
- A Civic Imagination Workshop this February – where Sam Ford, Dr. Sangita Shresthova, Mary Slone and others helped teachers tap into the ingenuity of their family members and imagine how those might translate into their students' futures.
- Finally, teachers can also get a powerful image of the future when they witness students like 8th grader Coleman over here, who impressively connected and engaged with a Bit Source software developer during our teacher training this summer.

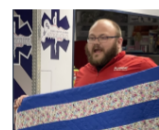
(1) Educators can't work toward a future if they can't see it first.



Inspire talks from local innovators
(Summer 2021, 2022, 2023)



Field trips to innovative companies
(Summer 2022, 2023)



Civic Imagination workshop (Feb 2023)



Seeing students engage with innovators
and innovation (Summer 2023)

Civic imagination tells us that it's not enough to just imagine a future, that educators have to see themselves as part of that future. Our project has supported this in mainly two ways. The first way is through providing hands-on, project-based trainings on computational thinking, led by other K-8 teachers who work in similar contexts. For the first three years, we were extremely blessed to have a STEAM teachers from Pittsburgh, with about 10 years of this type of teaching experience, train our teachers in Eastern KY. The second way is having folks from local industries explain how computing-related skills are important in their sector, and how K-8 teachers play a role. These interactions have led teachers to see their role more clearly in shaping Eastern KY's future.

(2) Educators don't want to design a future that they aren't in.



Great [CT] resources and lessons to use with my students.

The **Appalachian Wireless** presenters were an awesome connection when they conveyed that **the skills they use/need are the exact skills I see in my students**. Big "A-ha" moment for me.

The third important idea of civic imagination is that “educators need to feel a sense of agency or permission to help shape that future.” We are happy to report that there is a lot of agency to go around with regards to computational thinking education and shaping the future. These quotes are examples that show how educators appear to have agency to shape the future of their students.

(3) Educators need to feel a sense of agency or permission to help shape that future.

The week has been eye opening, helping me to look at the larger picture. I want to encourage my students to be innovative and proud of their region.

(Teacher, Summer 2022 survey)

Our cultural wealth is rich in:

- Familial Capital (kinship)
- Social Capital

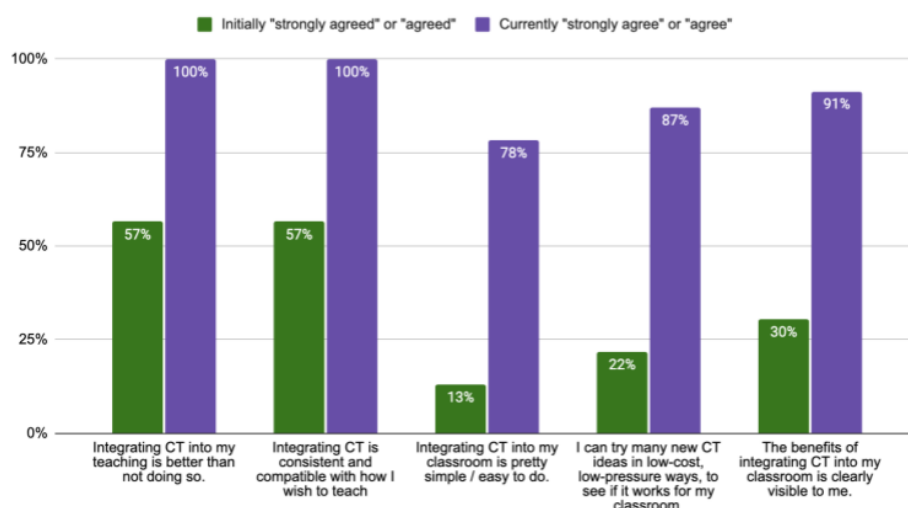
We aim to improve our student's

- Aspirational Capital
- Linguistic Capital
- Navigational Capital
- Resistant Capital

(District leaders, KySTE 2023 presentation)

This set of bar graphs is another example. They show teacher survey responses from 2022 that suggest that they no longer perceive barriers to integrating computational thinking into their classrooms (whereas this was not the case when they entered into the project).

(3) Educators need to feel a sense of agency or permission to help shape that future.



Source:
Summer 2023
teacher
survey (N=23)

Here (below) are examples of how our project tried to foster a sense of agency or permission. I think we did this by repeatedly creating multiple, low-risk high-reward opportunities where educators' perspectives matter, and emphasizing that we're doing this together. We say to the teachers and to each other: "we're working towards this shared future vision with all of us in it, we don't know what the answer is, can you try things out to help us, no big deal if it doesn't work out, but it could be really amazing if it does." So we started with micro-lesson implementations, then some teachers were comfortable enough to present their work, and now there are about twenty who are working on designing much more complex lessons. Currently nearly twenty teachers are designing and implementing project-based lessons that aim to incorporate computational thinking, heritage, and storytelling. And we're proud to say that this summer, we had two E KY teachers shift from learner to trainer, and teach 15 new teachers in Eastern KY what they learned from the Pittsburgh teachers.

(3) Educators need to feel a sense of agency or permission to help shape that future.



"Little Bets" micro-lesson design & implementation (2021, 2022)



Teacher conference presentations (2022, 2023)



Project-based learning lesson design & implementation (starting 2023)



Leading Summer Institute sessions (2023)

Civic imagination will continue to guide computing education in Eastern KY. It importantly reminds us that a shared future for everyone in Eastern KY is the driver of our efforts, and computational thinking provides a supplementary role. We have some next steps, and a lot of work ahead of us, but are excited to be moving forward together. Thank you for listening.

Civic imagination will continue to guide computing education in Eastern KY!

Next steps

- Middle school project-based learning
 - Address community needs
 - Apply computational thinking
 - Tell compelling stories
- Student Innovation Summit
- Parent Inspire Night
- Research on expectancies and values



Thank you! For more bit.ly/TANrefs and bit.ly/CTKinship



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