

A photograph showing several people, mostly women, sitting at a table and working on laptops. They appear to be at a conference or exhibition booth, as there is a large screen in the background displaying text and graphics. One person in the foreground is wearing a white lab coat. The overall atmosphere is professional and focused on technology and education.

The Tensions and Opportunities Surrounding Emerging Educational Technologies

Joshua M. Rosenberg, Ph.D.

Associate Professor, STEM Education, University of Tennessee, Knoxville, USA

<https://joshuamrosenberg.com>

Follow along (or check out after!): <https://joshuamrosenberg.com/>

Home

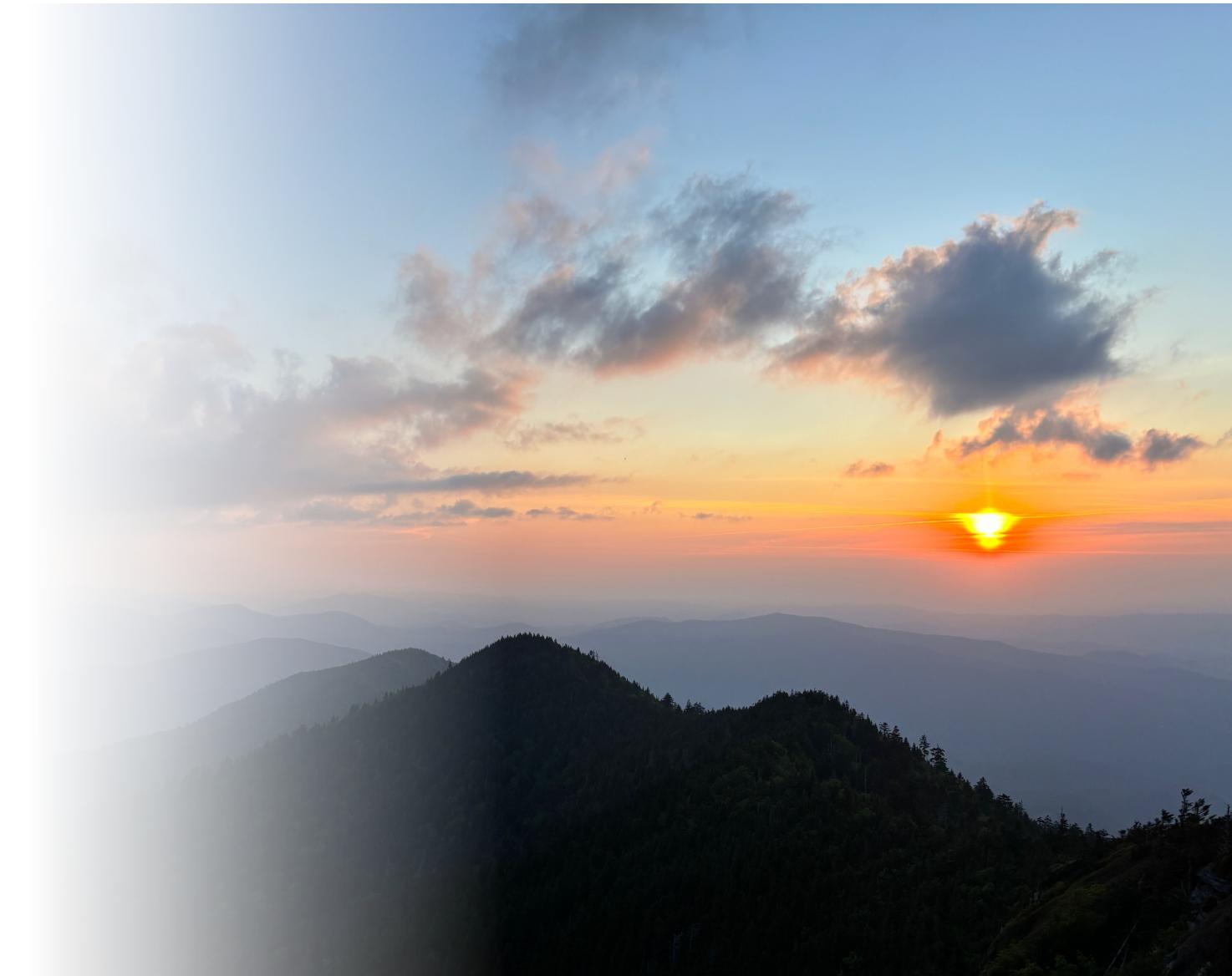
Welcome! I am an Associate Professor of STEM Education at the University of Tennessee, Knoxville.



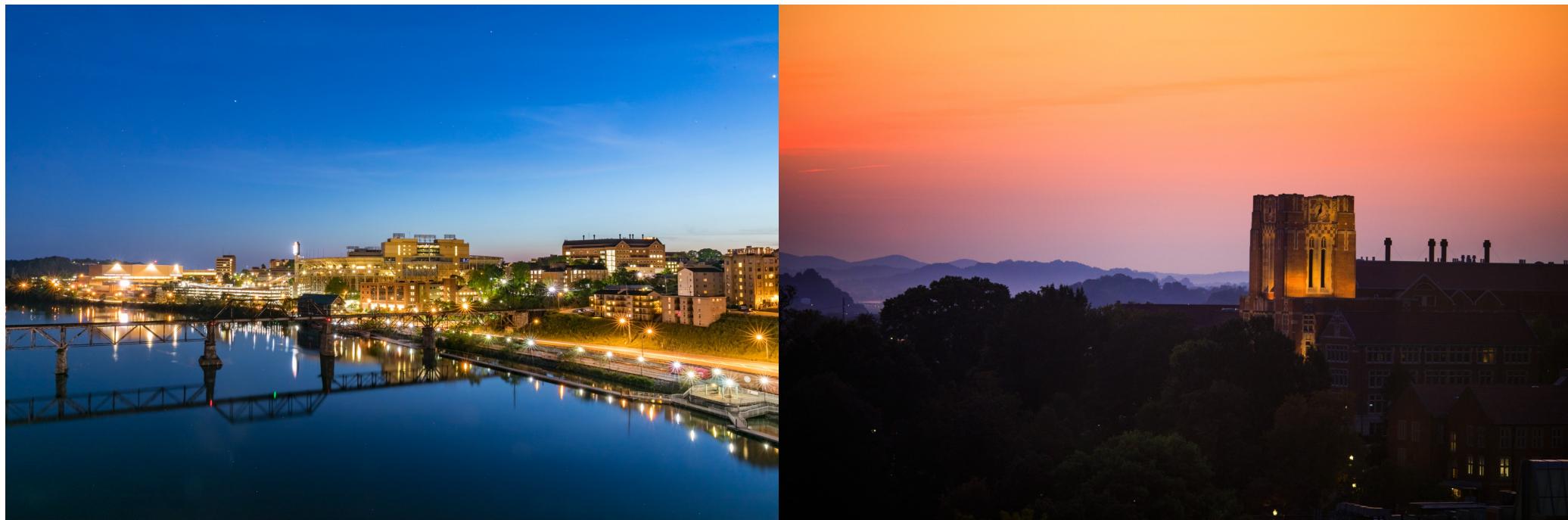
Links/Resources/Affiliations

- [Slides from ICITS 2024 presentation](#)
- [Project CREDIBLE](#) - NSF CAREER-funded project

About



I'm a faculty member at the University of Tennessee, Knoxville



Photos from the University of Tennessee, Knoxville

I'm also a Husband and Dad (and Football Coach)



Right photo from Sam Weisbrod

What is the future of emerging technologies in education?

The future of emerging technologies in education is likely to be shaped by several key innovations that can transform how we teach, learn, and engage with knowledge. These include the directions in which emerging technologies could evolve:

1. Artificial Intelligence (AI) and Adaptive Learning

AI will play an increasingly central role in personalizing education. Adaptive learning systems, powered by AI, can tailor content and learning paths to individual students based on their strengths, weaknesses, and learning styles. This creates a more efficient and effective learning environment, helping students learn at their own pace.

2. Augmented Reality (AR) and Virtual Reality (VR)

AR and VR are poised to make learning more immersive. Students can explore historical sites, conduct virtual science experiments, or engage in 3D simulations, offering hands-on experiences without physical constraints. These tools are particularly promising for subjects like science and geography, making abstract concepts more concrete.

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The Tensions and Opportunities for Researchers Studying Emerging Educational Technologies

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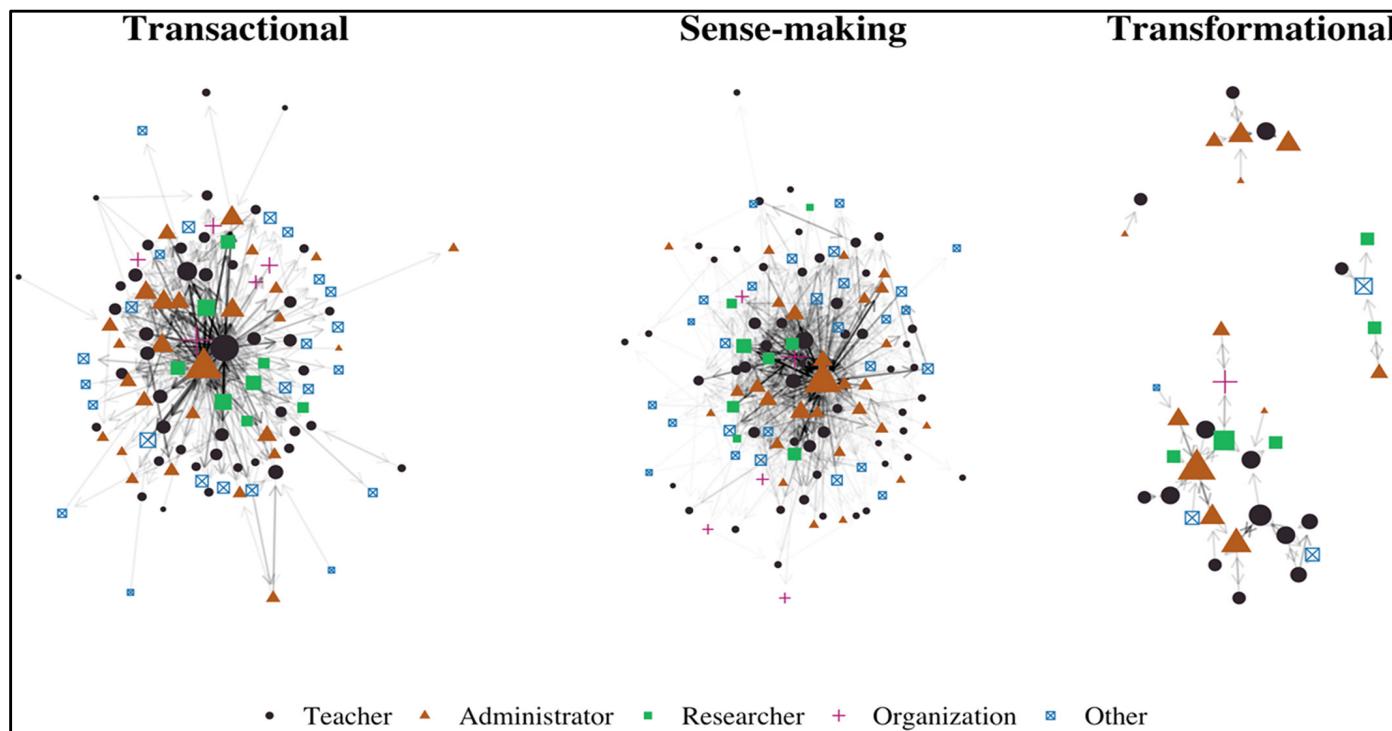
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My Approach



Teachers and others have substantive online conversations



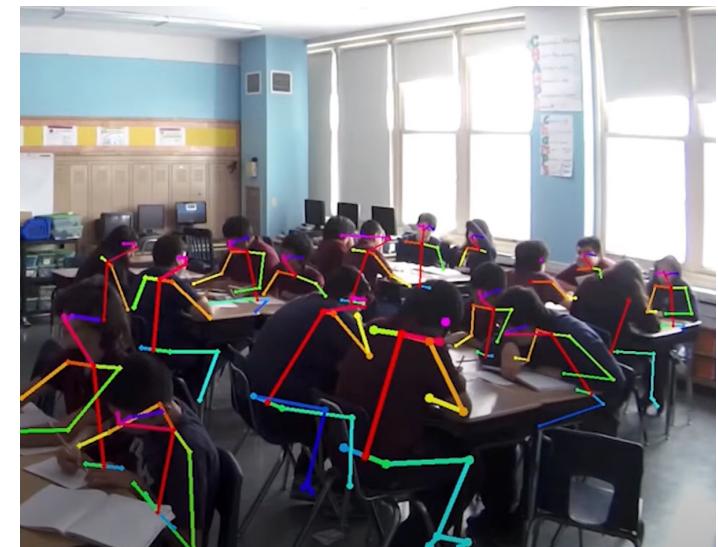
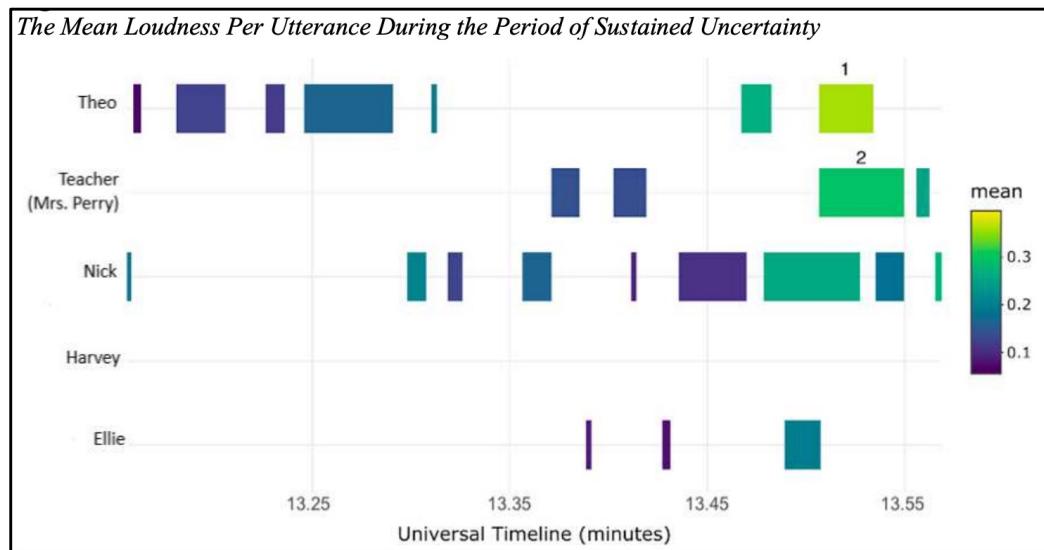
[Rosenberg et al., 2020](#); [Rosenberg et al., 2021](#)

Schools have publicly shared a lot of student information



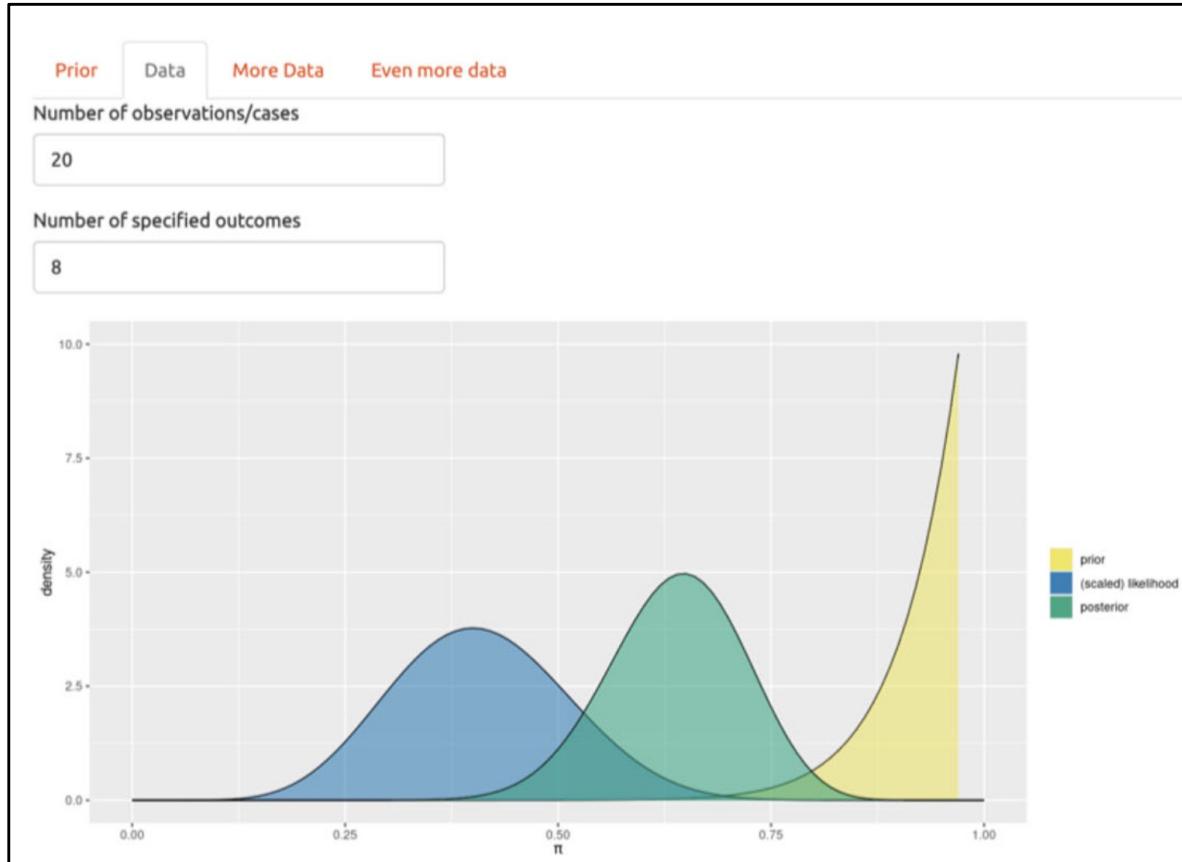
[Burchfield et al., 2024; Pritchard et al., 2024;](#)
[Rosenberg et al., 2023a; Rosenberg et al. 2023b](#)

I've worked to develop new methodological approaches



Rosenberg & Krist, 2020; Krist et al., 2023; Kubsch et al., 2023

I'm interested in making data analysis more accessible and powerful



Rosenberg et al., 2020; [Staudt Willet & Rosenberg, 2023](#); Dogucu et al., 2024

I'm interested in advancing open science

Data Science in Education Using R

Second Edition

Ryan A. Estrellado, Emily A. Freer, Joshua M. Rosenberg, and Isabella C. Velásquez

Welcome

Notice!

This is the website for the second edition of Data Science in Education Using R. For the first edition, visit datascienceineducation-1ed.netlify.app/

Welcome to Data Science in Education Using R! Inspired by {bookdown}, this book is open source. Its contents are reproducible and publicly accessible for people worldwide. The online version of the book is hosted at datascienceineducation.com.



<https://datascienceineducation.com>

Estrellado et al., 2020); Rosenberg et al., 2023;
Rosenberg et al., 2024, under review



Data Science in Education Using R

Ryan A. Estrellado, Emily A. Freer, Jesse Mostipak,
Joshua M. Rosenberg and Isabella C. Velásquez



Opportunities (and Tensions)



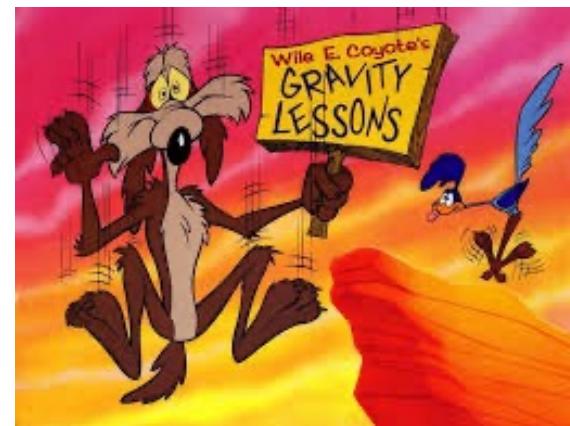
Are we chasing AI?



Are we not anticipating what emerges next?



Are we forgetting the past?



These are process-focused and (I hope) foundational



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JR

Account



Content



Design



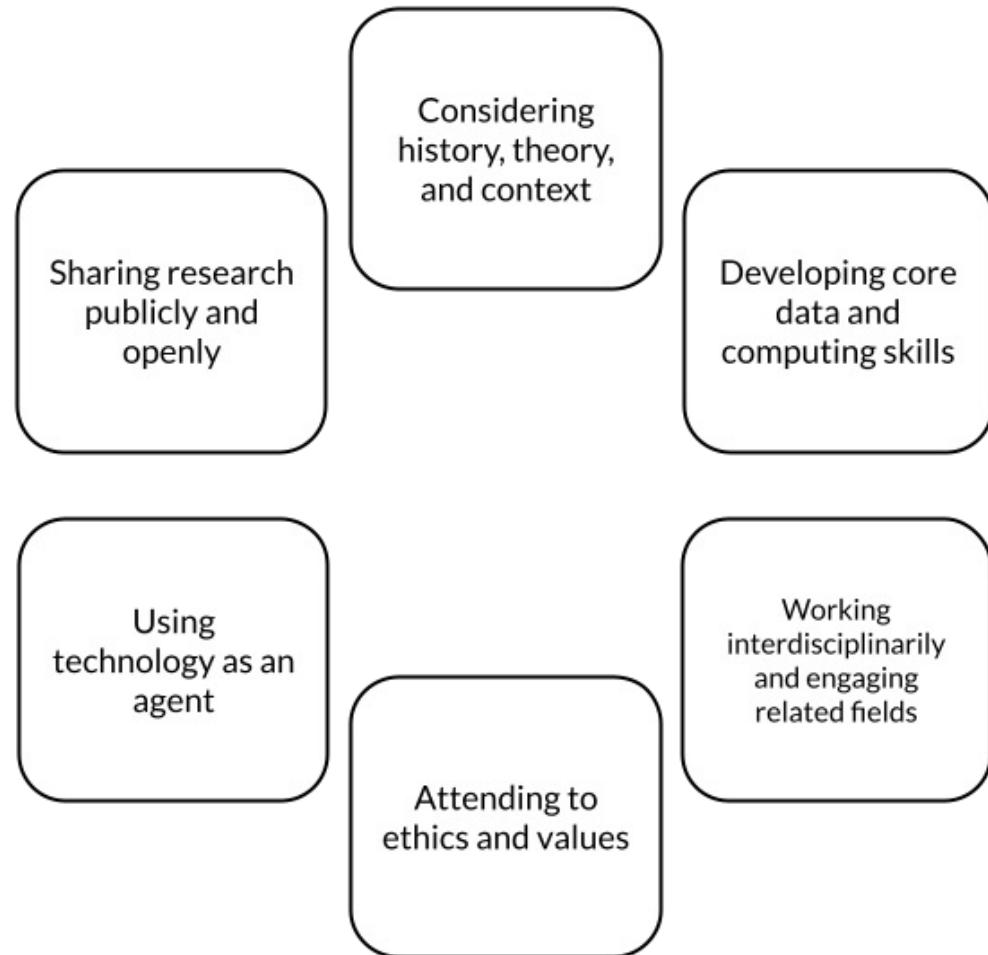
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Help &
Feedback

What is a substantial challenge or tension for the field?





1. Considering History, Theory, and Context



University of Wisconsin-Madison Archives (ID S05822)

1. Considering History, Theory, and Context



Holbert et al. (2022), *Playful Testing*

1. Considering History, Theory, and Context

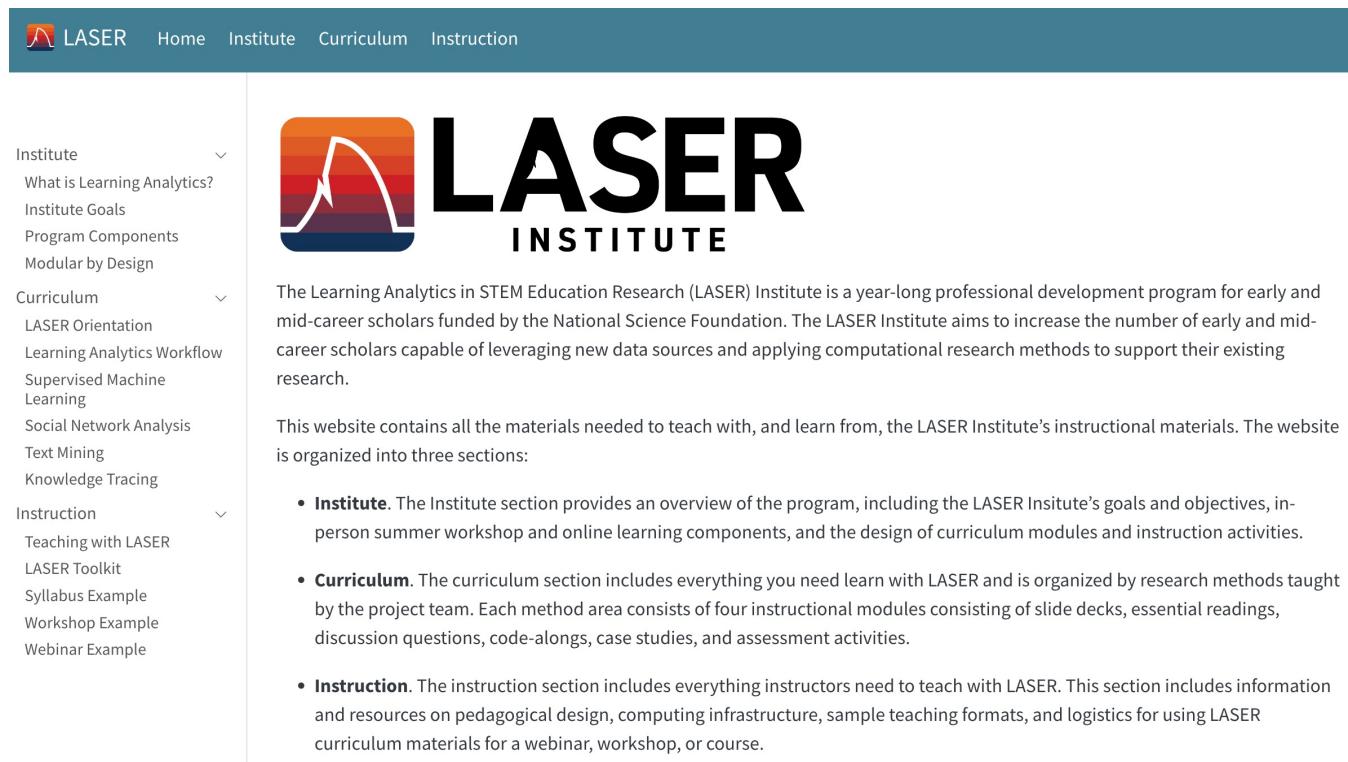


From the University of Wisconsin-Madison Archives

2. Developing Data and Computing Skills



2. Developing Data and Computing Skills



The screenshot shows the LASER Institute website. At the top is a dark blue header bar with the LASER logo (an orange square with a white 'A' shape) and the word "LASER". Below the logo are five navigation links: "Home", "Institute", "Curriculum", and "Instruction". On the left side, there is a vertical sidebar with three main sections: "Institute", "Curriculum", and "Instruction", each with a list of sub-links. The main content area features the LASER Institute logo (a stylized orange and red graphic next to the text "LASER INSTITUTE"). Below the logo is a paragraph of text about the program, followed by another paragraph explaining the website's organization into three sections. A bulleted list then details the three sections: "Institute", "Curriculum", and "Instruction".

Institute

- What is Learning Analytics?
- Institute Goals
- Program Components
- Modular by Design

Curriculum

- LASER Orientation
- Learning Analytics Workflow
- Supervised Machine Learning
- Social Network Analysis
- Text Mining
- Knowledge Tracing

Instruction

- Teaching with LASER
- LASER Toolkit
- Syllabus Example
- Workshop Example
- Webinar Example

LASER INSTITUTE

The Learning Analytics in STEM Education Research (LASER) Institute is a year-long professional development program for early and mid-career scholars funded by the National Science Foundation. The LASER Institute aims to increase the number of early and mid-career scholars capable of leveraging new data sources and applying computational research methods to support their existing research.

This website contains all the materials needed to teach with, and learn from, the LASER Institute's instructional materials. The website is organized into three sections:

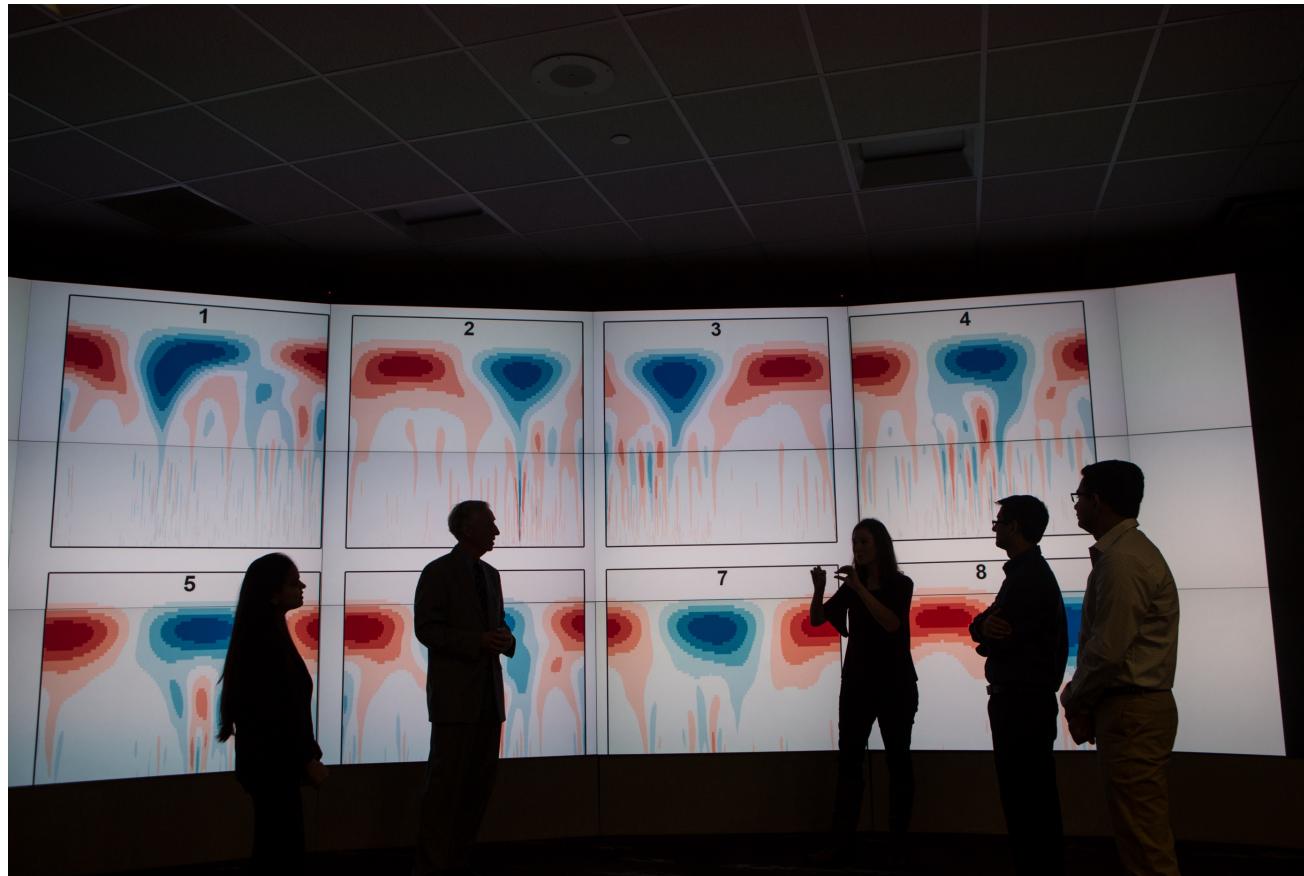
- Institute.** The Institute section provides an overview of the program, including the LASER Institute's goals and objectives, in-person summer workshop and online learning components, and the design of curriculum modules and instruction activities.
- Curriculum.** The curriculum section includes everything you need to learn with LASER and is organized by research methods taught by the project team. Each method area consists of four instructional modules consisting of slide decks, essential readings, discussion questions, code-alongs, case studies, and assessment activities.
- Instruction.** The instruction section includes everything instructors need to teach with LASER. This section includes information and resources on pedagogical design, computing infrastructure, sample teaching formats, and logistics for using LASER curriculum materials for a webinar, workshop, or course.

<https://laser-institute.github.io/laser-website/>

2. Developing Data and Computing Skills



3. Working Interdisciplinarily and Engaging Related Fields



From the University of Tennessee, Knoxville

3. Working Interdisciplinarily and Engaging Related Fields



3. Working Interdisciplinarily and Engaging Related Fields



From the University of Tennessee, Knoxville

4. Attending to Ethics and Values



4. Attending to Ethics and Values



Personal Agency, Joy & Fulfillment



Economic & Workforce Development



Competencies & Literacies



School Reform & Improvement



Equity & Social Justice



Technological, Social & Scientific Innovation



Citizenship & Civic Engagement

We should teach CS because...

...it can promote systems thinking - the ability to understand and intervene in complex systems that are ubiquitous in our world.

We should teach CS because...

...computing provides youth with the ability to express themselves creatively and have voice.

We should teach CS because...

...it has students engage in design thinking—identifying problems and then prototyping, testing and iterating on solutions.

We should teach CS because...

...collaboration on CS projects can lead to meaningful relationships between students as well as adults.

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...collaboration on CS projects can lead to meaningful relationships between students as well as adults.

We should teach CS because...

...being able to understand and make technologies gives kids power and agency.

<https://www.csforall.org/visions/>

4. Attending to Ethics and Values

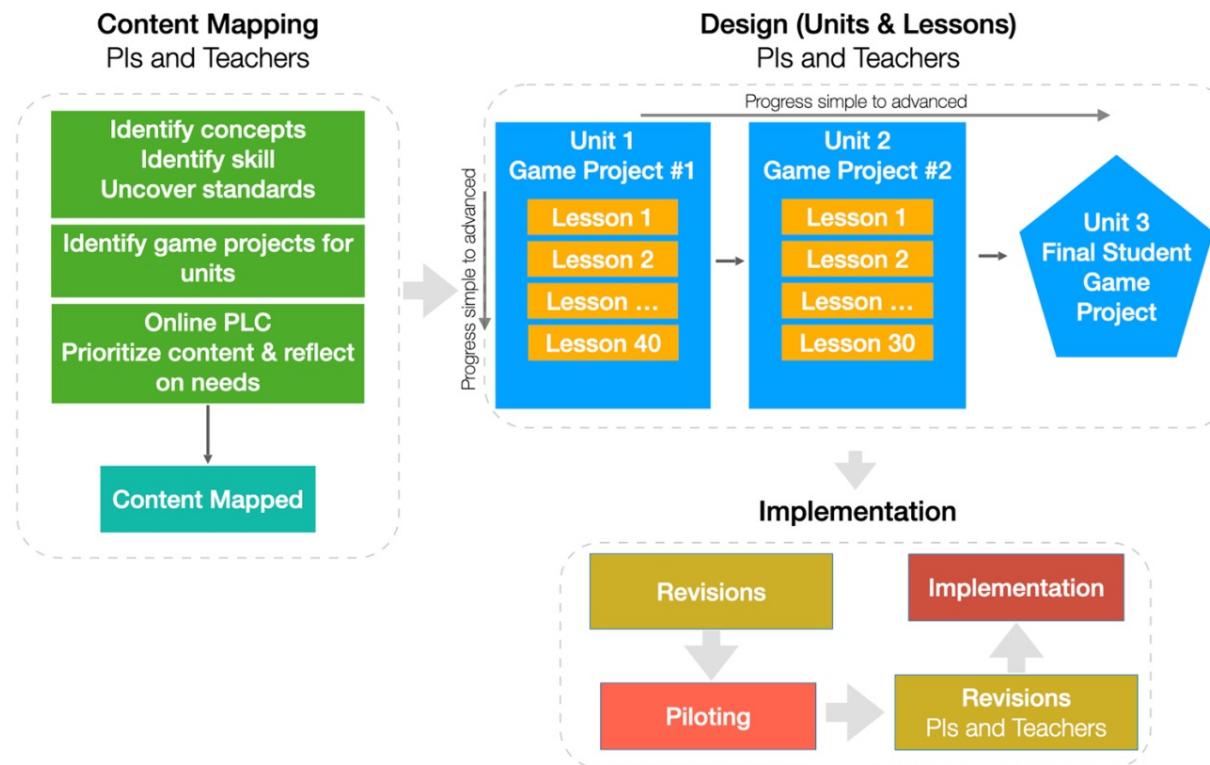


5. Using Technology as an Agent



[From Akcaoglu et al. \(2022\)](#)

5. Using Technology as an Agent



<https://gogoboard.org/>

5. Using Technology as an Agent

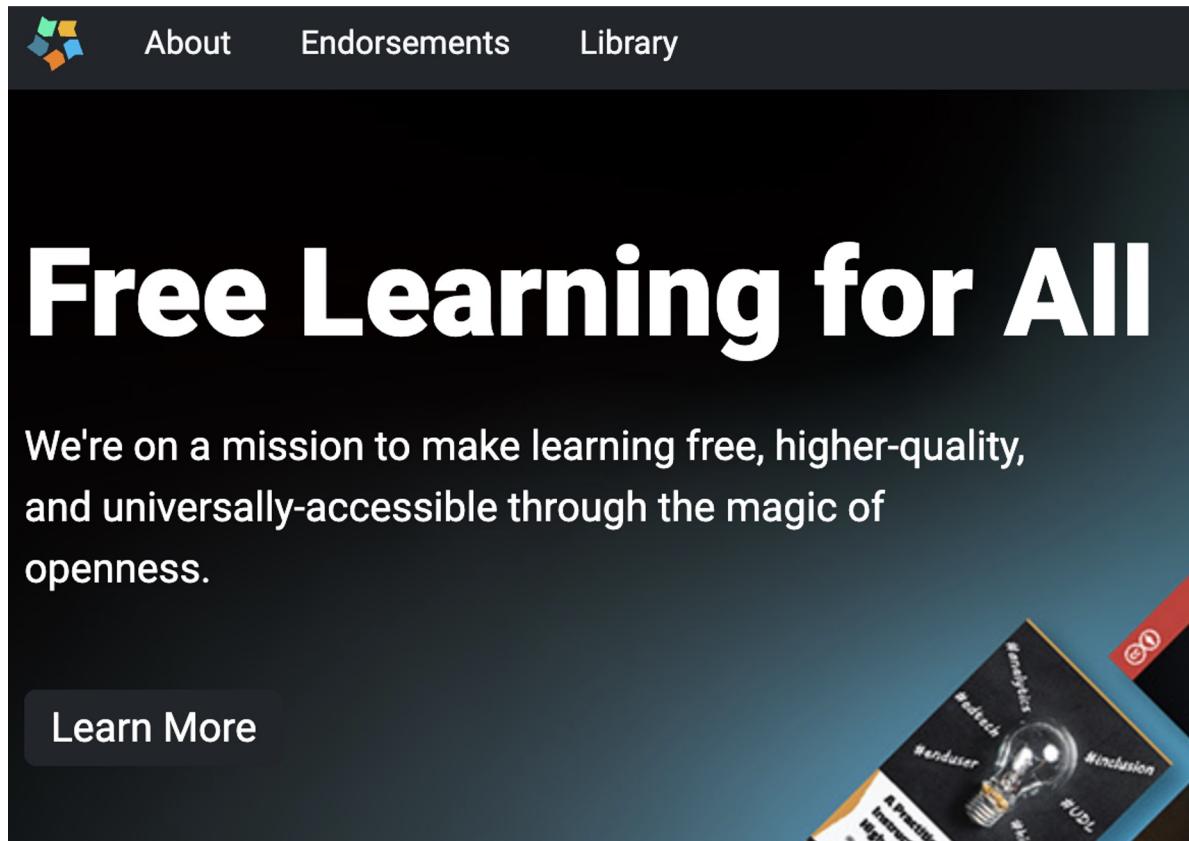


6. Sharing Research Publicly and Openly



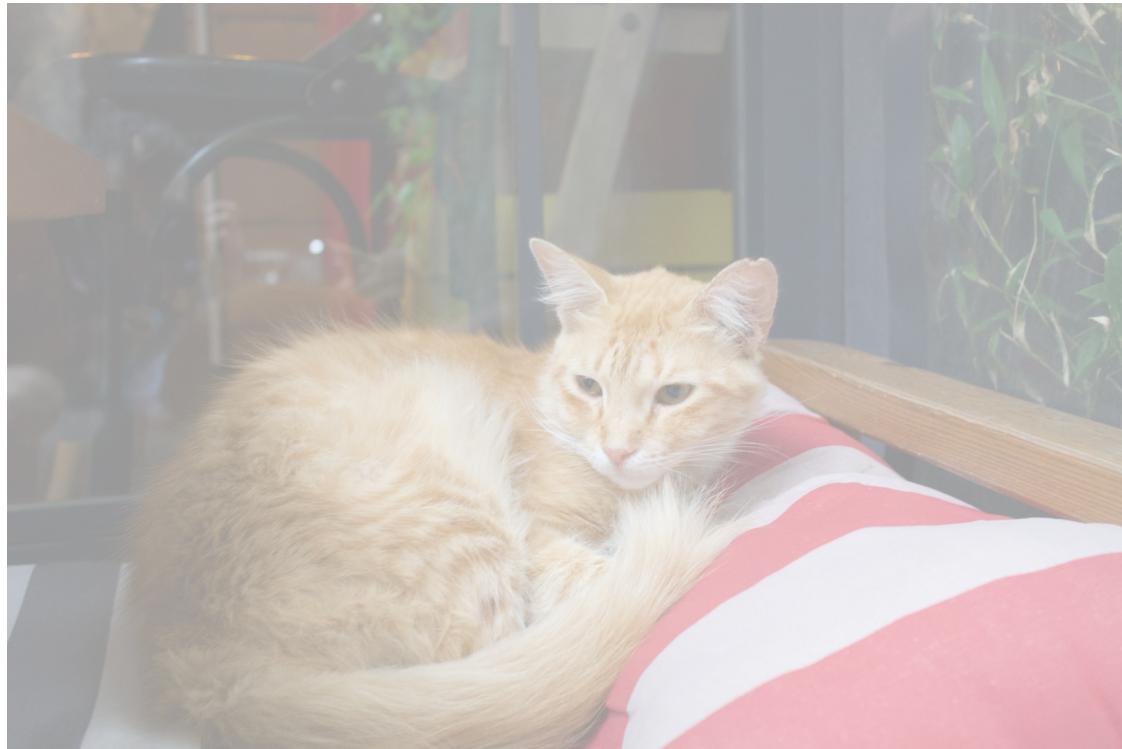
From the University of Tennessee, Knoxville

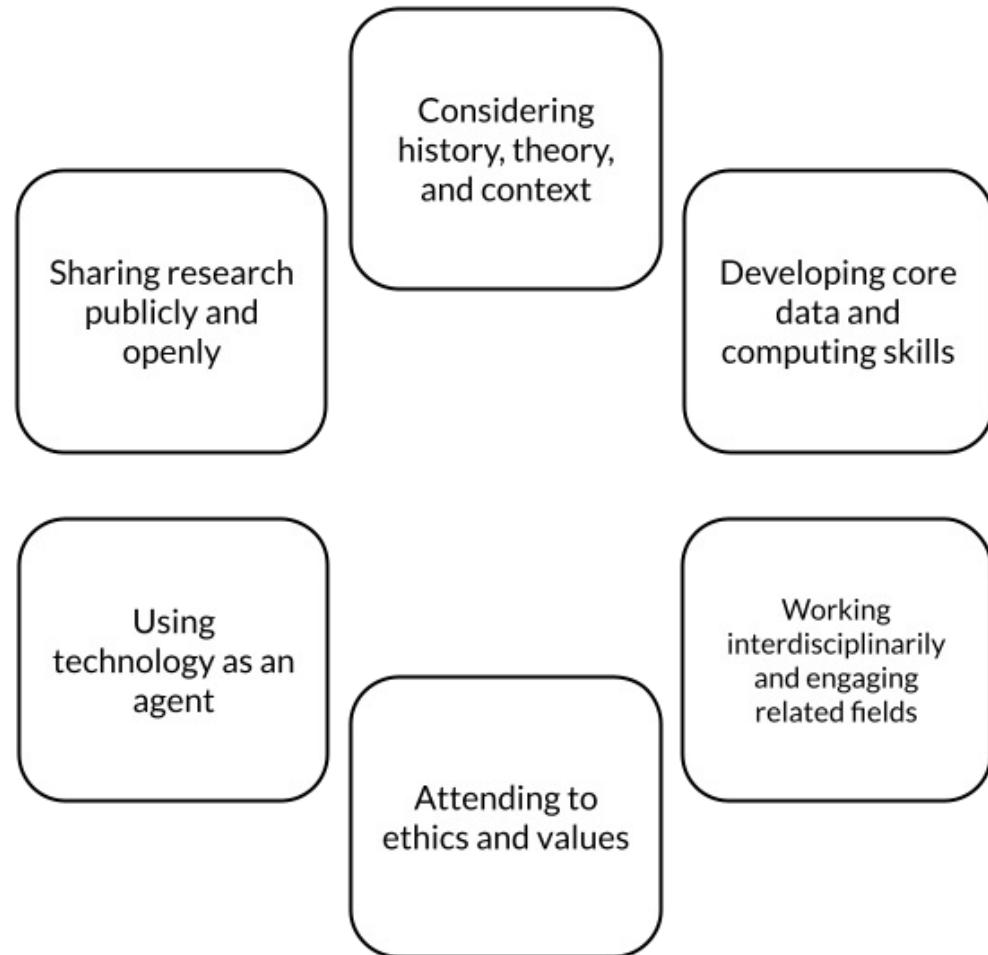
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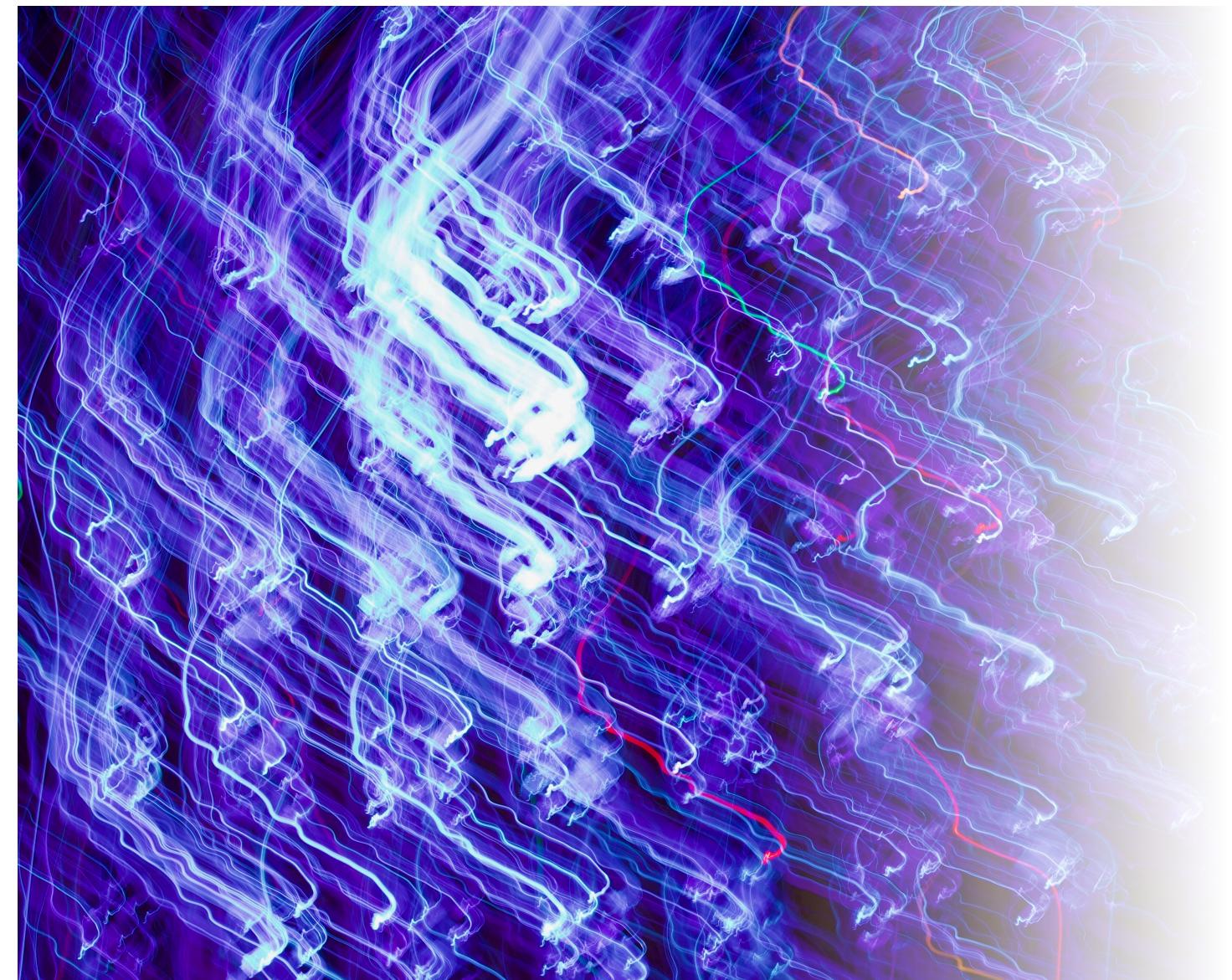


From <https://edtechbooks.org/>

6. Sharing Research Publicly and Openly







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What can leveraging these opportunities do?

Shaping **current** technologies – e.g., games and digital stories

Anticipating **emerging** technologies – e.g., AI, VR, and others

What can leveraging these opportunities do?

Shaping **current** technologies – e.g., games and digital stories

Anticipating **emerging** technologies – e.g., AI, VR, and others

Allowing us to look both back and ahead with wisdom and courage



* Notebook guide

Help me create

FAQ Study Guide

Table of Contents Timeline

Briefing Doc

Audio Overview

Loading conversation...
This may take a few moments...

Summary
This dissertation investigates the motivations behind Facebook users sharing information related to school closures during the COVID-19 pandemic. The study uses both quantitative and qualitative data analysis, exploring how factors such as emotional appeal, source credibility, and the perceived usefulness of content impact users' choices to share posts. The research also uses Uses and Gratifications Theory to frame its analysis of user motivations, ultimately providing recommendations for improving information dissemination practices in education during crises.



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What should we make sure to discuss this week?



In summary

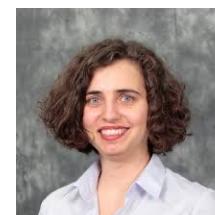
- I shared about how this talk was on tensions and opportunities facing **researchers studying emerging technologies**
- I shared a bit about my **educational data science approach**
- We discussed and I proposed six **key tensions and opportunities**
- These were **process-oriented** – purporting to avoid both hype and despair
- I propose that these can help us to **shape** and **anticipate technologies**

*Left photo from the University of Tennessee, Knoxville;
right photo from Recreation Links*

Thank you!

Thank you kindly to our hosts at Kastamonu University and the organizers of the 17th International Computer and Instructional Technologies Symposium

Thank you to my collaborators (pictured here among others):



This material is based upon work supported by the National Science Foundation under Grant No. 1937700 and 2239152

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.

What questions do you have?

I'd love to answer any questions!

My contact information:

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Email: jrosenb8@utk.edu

Website: <https://joshuamrosenberg.com> (includes these slides)