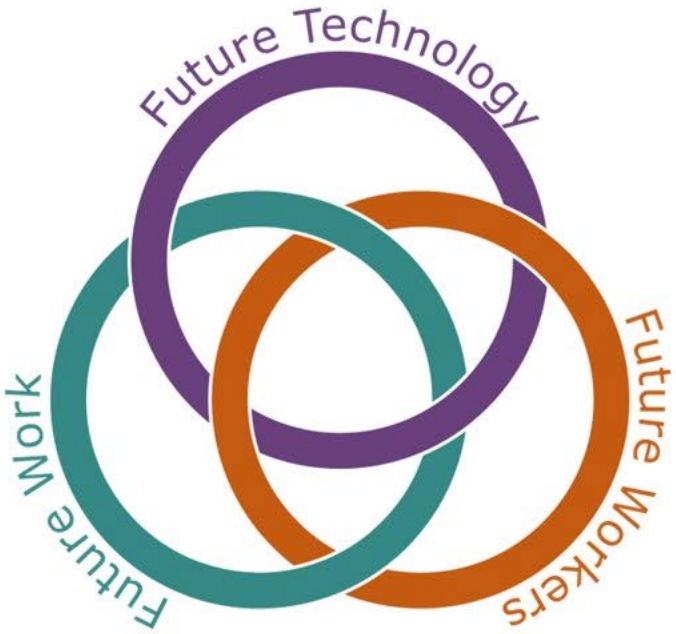
Panel 4:
Knowledge; learning; learning systems; creative service workers, designers and educators

- Augmented Cognition for Teaching: Transforming Teacher Work with Intelligent Cognitive Assistants
- Augmenting Social Media Content Moderation
- Enabling Marginalized Rural and Urban Digital Workers to Collaborate with AI to Learn Skills, Increase Wages, and Access Creative Work
- Intelligent Social Network Interventions to Augment Human Cognition for Interdisciplinary Interactions in Project Teams
- Neurodiversity in Tech: Using Interactive Decision Theory and Augmented Reality to Enable Employment for Adults with Autism Spectrum Disorder
- The future of classroom work: Automated Teaching Assistants



Augmented Cognition for Teaching: Transforming Teacher Work with Intelligent Cognitive Assistants

Krista Glazewski, Cindy E. Hmelo-Silver, Tom Brush
Indiana University

Bradford Mott, James Lester
North Carolina State University

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The project has two central thrusts:

1. Design and develop I-ACT cognitive assistants to support K-12 STEM teachers for PBL implementation and orchestration public school classrooms.
2. Investigate how I-ACT cognitive assistants support teacher practices, performance, and teacher quality of work-life.

Current progress with technology:

- Develop classroom instrumentation pathways.
- Refine the hardware and software tools for gathering classroom-based multichannel data streams.
- Gather multichannel data for multimodal learning analytics.

Current progress with supporting the workforce using the Orchestration Assistant:

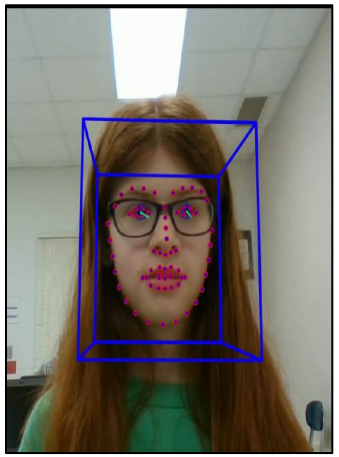
- Provides real-time, actionable data to teachers
- Automates some scaffolds, freeing up the teacher to offer more targeted and sophisticated feedback to learners.

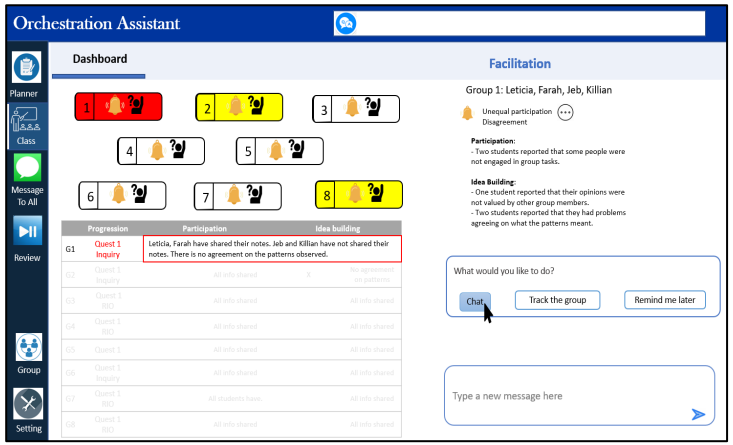
Current progress with improving teacher skills:

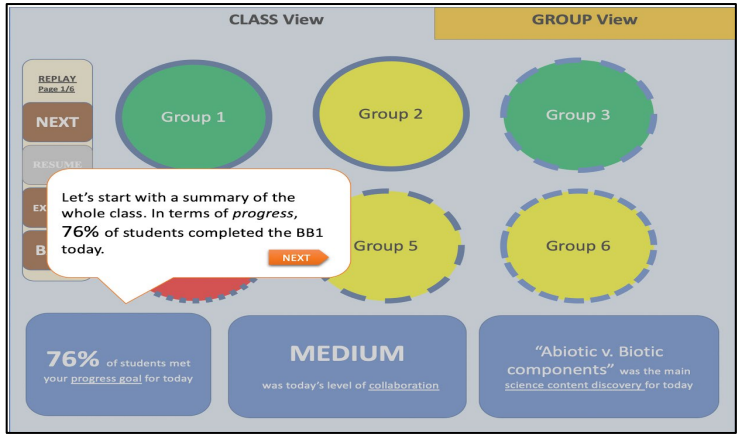
- Conduct co-design focus groups and interviews with teachers.
- I-ACT fellows teacher PD

Teachers as professionals are empowered to:

- Engage with the "unknowns" of problem-based and inquiry learning
- Make decisions based on student actions
- Engage in sophisticated orchestrations scaffolding that may have previously been invisible or overwhelming.







FW-HTF-RM: Collaborative Research: Augmenting Social Media Content Moderation (1928627, 1928286, 1928434)

PI(s): Donghee Yvette Wohn, NJIT, wohn@njit.edu
Sarah T. Roberts, UCLA, sarah.roberts@ucla.edu
Libby Hemphill UMich, libbyh@umich.edu

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1. Improve quality of worklife for content moderators
2. Understand moderator workflow => Augment content moderators' capabilities

Progress

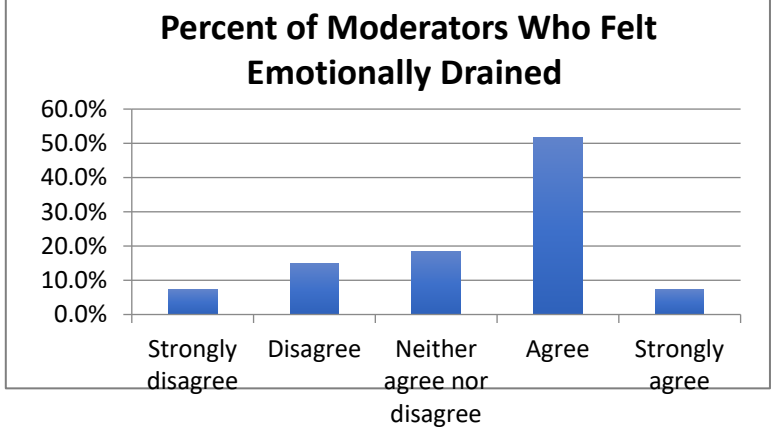
- Training of 7 graduate, 4 undergraduate students (Literature review, qualitative and quantitative research methods, visualization)
- Comprehensive review of state-of-the-art in human-AI moderation tools
- 30 hours of interviews with moderation industry specialists
- Surveying moderators about reasons for quitting

Progress (continued)

- 20 interviews with volunteer moderators on their decision-making processes / remote observations of their work
- Experimenting interventions to alleviate moderator fatigue/stress with freelance moderators
- Developing a model of live information visualization
- Historical analysis of moderation from perspective of assistive technology

Outreach

- Formulating best practices for commercial content moderation teams
- Direct engagement with content moderation industry partners



#1928528: FW-HTF-RL: Collaborative Research: Enabling Marginalized Rural and Urban Digital Workers to Collaborate with AI to Learn Skills, Increase Wages, and Access Creative Work

PI(s): Jeffrey Bigham, Aniket Kittur (CMU), Saiph Savage (WVU), Benjamin Hanrahan (Penn State), Julia Ticona, Chris Callison-Burch (U Penn)

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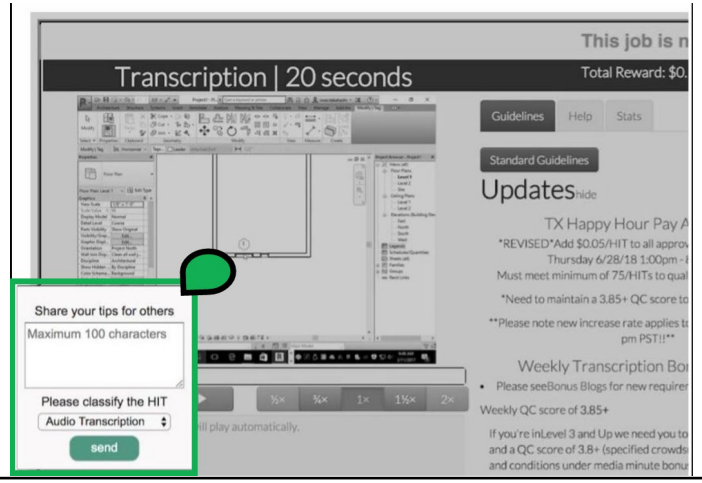
This project focuses on researching A.I. tools to best support marginalized workers to: (i) transition to online work; (ii) augment workers instead of displacing them; (iii) develop their skills and creativity.

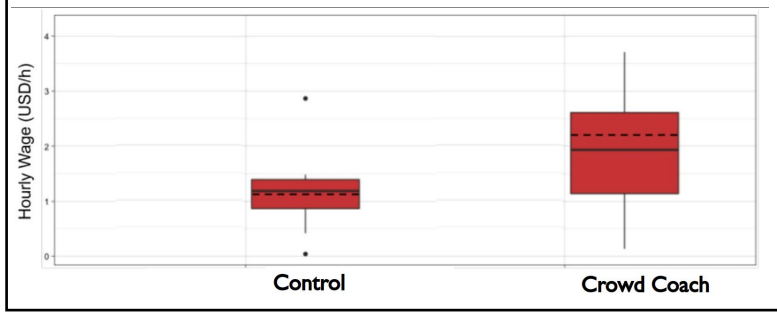
We have developed A.I. tools that live within digital labor platforms and guide:

- Novice online workers on how to earn higher wages.
- Employers on how to evaluate gig workers fairly.



Our research has helped:

- Power digital labor platforms with workers who earn higher wages.
- Drive employers to be fairer with gig workers.
- Start to map the needs of local industry and large technology companies with respect to online rural workers.



Our research has helped:

- Better understand the challenges faced by U.S. online workers in urban and rural settings
- Create tools for empowering novice workers to earn higher wages
- Develop courses for rural adults to develop their digital skills
  - Rural adults have completed several tutorials in rural libraries

#192878 Intelligent Social Network Interventions to Augment Human Cognition for Bolstered Interdisciplinary Interactions in Project Teams

PI(s): Dr. Sinem Mollaoglu: Construction Management, sinemm@msu.edu, 517-353-3252
Dr. Kenneth Frank: Education, kenfrank@msu.edu, 517-355-9567
Dr. Jiliang Tang: Computer Science and Engineering, tangjili@msu.edu
Dr. Richard DeShon: Psychology, deshon@msu.edu, 517-353-4624
Dr Hanzhe Zhang: Economics, hanzhe@msu.edu, 517-355-467

MICHIGAN STATE UNIVERSITY

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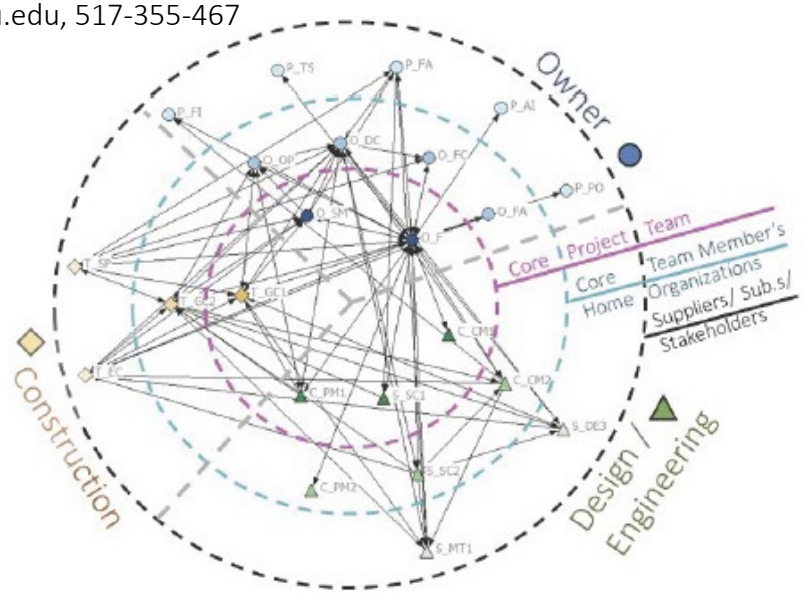
Goal: To augment human cognition and functioning of multiteam systems via machine learning enabled social network interventions to help individuals develop skills for future of work.

Survey, archival, emails, and meeting data:

- 17 student teams across domains (4-14 weeks)
- 2 infrastructure projects teams (1-3 years)



Captured transitions from in-person to virtual team during the pandemic.

Progress addressing Future Technology

Goal: Automated extraction of project team communications in meetings.

- 2.4K training data labels from a mix of student and industry teams
- Individuals' give info/ ask info/ other
- 87 % accuracy established
- Robust to ASR errors and bias of data annotators

Progress addressing Future Work

Goal: Via the social network interventions, help teams improve performance.

- Developed new metrics to predict information bottlenecks in projects.
- Operationalized longitudinal surveys for team & project performance

Progress addressing Future Workers

Goal: Via the social network interventions, help individuals develop skills for complex project teams.

- Developed and operationalized (pre/post surveys):
  - Teamwork skills
  - Network knowledge
  - Individual utility

1928604 FW-HTF-RL: Neurodiversity in tech: using interactive decision theory and augmented reality to enable employment for adults with ASD

Leanne Chukoskie and Pamela Cosman, UC San Diego
lchukoskie@eng.ucsd.edu pcosman@eng.ucsd.edu

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- Build AR/VR interpersonal communication, writing, and soft skills coaching tools
- Build a supportive technology internship model for neurodiverse young adults.
- Study economic and ethical questions that arise from these technologies.

95% of the Neurodiverse Interns were satisfied or very satisfied with their 2020 internship experience.
Neurodiverseinternship.com

1840051 FW-HTF: The future of classroom work: Automated Teaching Assistants

Kurt.VanLehn@asu.edu, Arizona State University

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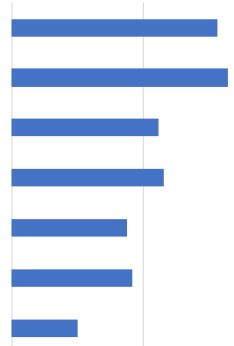
Goal: ***Let teachers teach*** by using AI to interpret speech, position and log data and detect routine non-optimal classroom behavior (see middle panel below) and handle it by messaging students or escalating to teacher only when necessary.

ML & DL-based collaboration detectors successful in lab; now moving to middle-school classrooms. They distinguish work together vs. work separately vs. only 1 working.

Speech + …	Task	Kappa
Log data	Move	0.78
manual segments	Move	0.82
auto segmentation	Move	0.56
auto segmentation	Write	0.58
content removal	Write	0.44
Trained on Move	Write	0.46
Trained on Write	Move	0.25

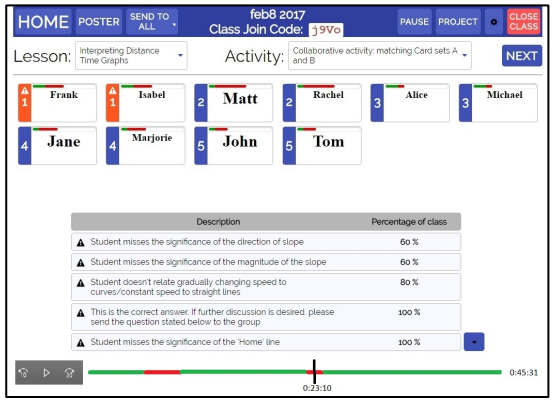


Move = collaborative card moving activity
Write = collaborative writing activity

Automated teaching assistant tasks:

- Remind a group to collaborate: Everyone works together.
- Remind students to explain their reasoning to each other.
- If students can't get started on a task, help them understand the instructions.
- If students work fast and sloppily, ask them to work more carefully.
- If students finish early, ask them to check their work.
- If their work is error-free, assign them new work.

Teacher will review a class session:



& view analyses of student work: