iSAT Snapshot

NSF AI INSTITUTE FOR STUDENT-AI TEAMING

Fall 2024

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In Brief . . .

A quick look at our activities this quarter!

1. EdHeads host AJ Gutierrez conducted one-on-one interviews with iSAT's Acting Director Tamara Sumner and Director Sidney D'Mello on AI in Education with illustrative examples and lessons learned from iSAT and other Institute of Cognitive Science research efforts. Both episodes will be aired in late 2024 and can be listened to at edheadspod.com.
2. A delegation of Strand 3 team members attended a workshop at Stanford University entitled AI For Collaborative Learning.
3. iSAT team member and Professor at University of California, Berkeley (UCB) Thomas M. Philip was appointed to a UC system-wide faculty workgroup on AI.
4. iSAT has launched its new weekly blog series featuring a range of topics relating to AI in education and the technology behind it. The blog posts cater to the interests and needs of different stakeholders in AIEd including students, parents, educators, researchers, and developers.
5. iSAT PI Sidney D'Mello has been traveling internationally sharing iSAT's work across the globe.

Sidney DMello [iSAT PI], Anna Puzio [University of Cambridge], Kerry McInerney [University of Cambridge], and Rafael Calvo [Imperial College London].

Strand 3 members Bill Penuel, Thomas Philip, Michael Chang, alongside External Advisory Board Member Karlyn Adams-Wiggins, join researchers at Stanford University for a workshop on AI for Collaborative Learning.

From the PI

One of iSAT's goals in Y5 is to amplify our impacts through external knowledge transfer. So I've been taking iSAT on the road with an emphasis on information exchange and partnership building with international researchers and stakeholders. I recently shared iSAT research in a series of invited talks at the University of British Columbia (Canada), Imperial College London (UK), and the University of Tübingen (Germany). I also discussed our focus on responsible innovation with researchers from the Leverhulme Centre for the Future of Intelligence at the University of Cambridge.

I like to pepper the talks with videos showing students engaging with our curriculum units, interacting with the AI partners, and showcasing our multimodal analysis capabilities. I may throw in a live demo of our classroom discourse processing pipeline if I'm feeling especially brave! My overall impression – from the comments and questions – is that iSAT is onto something unique. Audiences are inspired by our vision of AI partners that promote collaborative learning and hands-on student-centered investigations through natural social interaction. The excitement is palpable when people are introduced to an alternate approach to integrating AI in classrooms beyond personalized learning chatbots. Our AI partner CoBi (Community Builder) is a big hit, as is the innovative way we're leveraging generative AI in our Jigsaw Interactive Agent (JIA). And they are impressed that we are tackling the deep technical challenges of analyzing sound and sight in real-world classrooms.

The questions I receive fall into two general categories. First, how can iSAT's approach of using AI to facilitate collaborative learning scale and complement more mainstream uses of AI (i.e., individual learning with an intelligent tutoring). Second, how do we navigate issues of privacy, trust, and agency in our AI partner deployments. These questions snowball into lively discussions where the international context has broadened my understanding of the issues. I'm excited to explore these ideas with the iSAT team in the coming months.

Feature: AI Partners in Year 5

Putting All of the Pieces Together!

Now in its fifth year, the Institute for Student-AI Teaming (iSAT) has been on a mission to develop the theories and know-how for next-generation collaborative learning environments powered by AI technologies. Through our work, we help grow a workforce of future AI researchers and practitioners, and our institute serves as a national nexus point for empowering different stakeholders—researchers, K-12 educators, community members, and industry affiliates—to envision and work towards a future where AI technologies are viewed as social, collaborative partners that help students and teachers make learning more effective and engaging. For year 5, it's all about putting the pieces together!

We've Scaled Up!

Over the summer, our team has been hard at work seeking out more school districts to partner with. The outcome of this effort was that between years 4 and 5, we have more than doubled the number of district partners. A growing number of students are using CoBi in the classroom, learning about programmable sensors, and—new this year—self-driving cars, and online moderation. We are grateful to our cohort of teachers who are navigating novel collaborative learning curricula and an AI partner designed to help students become even better collaborators.

Our work this year is supported by a new study protocol that has been approved by our University's Institutional Review Board and the research evaluation boards of each participating school district. Through their participation, students help us better understand their perceptions of collaboration in general, and AI partner support in particular. We are guided by research that look at (1) how and in what ways are teachers and students using curricular tasks in conjunction with CoBi to support the goals of promoting more effective collaboration and STEM learning?; (2) how does the use of the CoBi AI partner in the classroom shape students' collaborative problem-solving skills?; (3) does the repeated use of CoBi and its associated instructional routines—*Establishing Community Agreements* and *Revisiting Community Agreements*—in the classroom affect students' perceptions of their own collaborations?; and (4) we also want to know if the use of CoBi affects students' learning outcomes?

Implementing the Community Builder AI Partner (CoBi) v2 with Three Curriculum Units

In Year 5, we are excited that we're not only getting the change to study CoBi in the Sensor Immersion (SI) curriculum in which students learn about and then use programmable sensors to investigate local scientific phenomena—we are also testing CoBi in two novel curriculum units: Self-Driving Cars, which grew out of and is an extension of the SI curriculum unit, and the Moderation Unit, which covers how and when AI can be used to help people establish and maintain welcoming online communities.

Testing the Jigsaw Interactive Agent (JIA) in Middle School Classrooms

Version 1 of the Jigsaw Interactive Agent (JIA) is the new kid on the block in year 5. Researchers in Strands 2 (see page 6 for our Strand 2 update) and 3 (see page 7 for our Strand 3 update) as well as members from our Institute-wide team have been hard at work getting a real-time pilot of JIA ready for deployment in middle school classrooms. Recall that jigsaws are a type of collaborative learning activity where students first develop expertise in individual areas and then gather to pool their knowledge to solve more complex problems. JIA is a student-facing AI partner that aims to boost more effective knowledge-sharing that can scaffold engagement and lead to increased social cohesion.

Our initial implementation of JIA in the lab has yielded crucial insights into how to predict small group collaborative states and a set of theoretically grounded rules that determine (a) whether an intervention is necessary and (b) what type of prompt JIA should create; that said, our initial testing relied on a human-in-the-loop (HITL)—out of view from participating student groups—who oversaw JIA's prompts and was able to either accept, reject, or modify each prompt before it was sent along to the participating student groups. This time around—during the month of December to be precise—our team is looking forward to taking off JIA's training wheels and letting the interactive agent support students without any outside input. The implementation will take place in one of our Moderation Unit classrooms; our classroom support team has been well trained on JIA to ensure a smooth initial deployment, and the JIA team has worked closely with Strand 3 to integrate both AI partners in a single unit.

Studying the integration of CoBi into iSAT's curriculum units (seen here is Sensor Immersion) helps improve protocols and procedures and has led to CoBi v2.

Feature: Fall Conference Recap

One of the ways iSAT team members share and disseminate their knowledge gained through research is by attending various conferences and workshops throughout the year. iSAT is represented at many prestigious events where we share and showcase our own progress as an Institute as well as learn from others in the industry. Below is a brief overview of three of the many conferences and workshops attended recently.

Special Interest Group on Dialogue & Discourse Conference (SIGDIAL 2024)

Strand 1 team members, Margaret Perkoff and Angela Ramirez, attended the Special Interest Group on Dialogue & Discourse conference held at Kyoto University, Japan. This conference provides a regular forum for the presentation of cutting edge research in discourse and dialogue to both academic and industry researchers and was attended by over 160 participants. Their poster titled "'Keep up the good work!': Using Constraints in Zero Shot Prompting to Generate Supportive Teacher Responses" was a collaborative effort with iSAT members Sean von Bayern, Jim Martin, and Marilyn Walker; it examined how to include constraints in prompts to a Large Language Model (LLM) to create helpful teacher-like responses. Conference attendees were particularly interested in learning more about how these findings are applied in iSAT's lab study setting with student participants.

Speech and Audio in the Northeast Workshop (SANE 2024)

iSAT was represented at this one-day workshop for researchers and students in the speech and audio area by Jiani Wang from Strand 1. With over 200 participants attending, Jiani presented a poster that showed her team's work on speaker diarization in the classroom. The poster was seen by many highly respected people in the field and she was able to get valuable feedback. "A fortunate highlight," Jiani said, "was meeting Quan Wang, the leader of Google's speaker diarization team, and he proposed useful suggestions after seeing our poster." She met many people from MIT, CMU, Apple, Meta and more and came away feeling that this workshop was an incredibly valuable experience.

The Summit for AI Institutes Leadership (SAIL 2024)

Members of iSAT's leadership team, Sidney D'Mello, Peter Foltz, and Thomas Breideband, attended this year's NSF Summit for AI Institutes Leadership (SAIL) meeting in Pittsburgh, Pennsylvania. The meeting included panel discussions and an AI Institutes Expo. Sidney D'Mello presented on the topic of "Human-AI Partnerships: From Efficiency and Enhancement to Transformative Agency"—a work inspired by findings from the Learning Futures Workshops—and he participated in a panel that explored how AI Institutes are approaching the human-AI interface. The panel covered the latest research in building AI systems that can collaborate effectively with humans while preserving human agency and oversight in AI-assisted decision-making in the process. Peter Foltz participated in a panel about targeted educational opportunities that can help cultivate strong interest in AI research and meaningful engagement. The panel explored how the AI Institutes approach educational opportunities from K-12 to college and beyond, through strong mentorship and cutting-edge content anchored to real-world applications. Thomas Breideband represented iSAT at the Expo at Carnegie Mellon, showcasing the iSAT researcher display and our AI partner, CoBi.

iSAT PI Sidney D'Mello presents at The Summit for AI Institutes Leadership (SAIL) in Pittsburgh, PA.

Listen, Understand, and Connect

Strand 1

Strand 1 is guided by the foundational question: What advances in Artificial Intelligence are needed to facilitate collaborative learning conversations? The three research themes identified to help Strand 1 answer this question are: *Speech Processing & Diarization, Content Analysis & Dialog Management,* and *Situated Grounding.*

Speech Processing & Diarization

This team is working to improve our Automatic Speech Recognition (ASR) models for classrooms to make it easier for our AI partners to better tell apart who is speaking in a group and when a group conversation switches from one speaker to another.

Members of our Worcester Polytechnic Institute (WPI) have been working on building a Large Language Model (LLM) Agent to perform multi-stage multimodal speech recognition. In their approach, student group speech transcripts obtained from Whisper are run through the LLM Agent to augment the transcript with contextual cues about what was discussed in order to identify and improve the transcription of named entities. For instance, imagine that the name "Albert Einstein" is uttered during a physics lecture; by combining information on the subject matter, the audio signal, and the curriculum, the utterance "Albert Einstein" could be recognized more accurately. The WPI team is applying their system to speech content from the MIT OpenCourseWare dataset for which both audio and rich image content are available.

The WPI team also submitted a paper to the International Conference on Acoustics, Speech, and Signal Processing (ICASSP 2025) on using discrete Transformer-decoders for multimodal speech recognition. The paper is the first to explore a combination of speech, lips, and image content as inputs to a multimodal speech recognition model. Moreover, it investigates under what conditions speech recognition accuracy can be improved by harnessing different modalities and how this benefit relates to the amount of input noise in the audio signal.

Content Analysis & Dialog Management

This theme is dedicated to helping the AI partners make sense of what they're hearing and seeing, and then determining optimal interactions between students and teachers. This work is intended to enable the partners to understand key content words and concepts uttered by students.

Team members working on Dependency Dialog Acts (DDA) completed an annotation phase for one of our deep sample datasets. Out of 27 sessions (4,529 discourse units), seven sessions remain to be adjudicated. Additionally, they have annotated one dialog session from the Teams corpus (351 discourse units) and two sessions from the STAC corpus, totaling approximately 600 discourse units. The immediate goals are to complete the adjudication of the deep sample dataset and to collect more DDA annotations across different genres of multi-party dialogue. They are in the process of gathering sufficient data before sharing their progress with the Natural Language Processing (NLP) community for feedback.

Building on their recent efforts annotating multi-party classroom dialogues with DDA, team members have also developed an initial DDA Parser. The parser uses chain-of-thought prompting to produce both a structured DDA parse and an utterance-level analysis of an ongoing conversation. This unstructured analysis helps interpret and debug the structured parse and can also be used directly in dialogue-understanding tasks, like predicting collaborative states for the Jigsaw Interactive Agent (JIA). We are continuing to annotate a wider range of multi-party dialogues, allowing them to better evaluate the parser and diversify in-context examples. The team is also exploring ways to distill insights and conventions from adjudication discussions into the parsing prompt, such as distinguishing between 'Motivate' and 'Justify' relations. Finally, we are exploring semi-supervised parsing by combining the annotated data with unlabeled dialogues from the same domain(s).

Another notable achievement this past quarter is the completion of an evaluation of Conceptual Abstract Meaning Representation (CAMRA) using the improved co-reference model and observing significant performance improvements in clustering on the multi-sentence Abstract Meaning Representation (AMR) test set. The team completed the annotation of 15,814 AMRs for iSAT, developing strategies, guidelines, and annotation tool features to support the planned next step of annotating multi-sentence coreference on the Sensor Immersion (SI) curriculum AMRs, and retraining the AMR parser based on the JIA lab study data and conducting evaluations with the LLM-based parser.

Lastly, the team is currently designing a series of experiments to improve the robustness of the response generation model for content support interactions. The proposed experiments will leverage curriculum documents from the SI unit. We will align individual 'facts' from the supporting documents with interactions between students and the JIA interface in human-in-the-loop lab studies. The experiments will involve different methods of encoding and retrieving these facts—using LLM representations as well as AMR representations to store the information and match it to a new student utterance. Additionally, we are in the process of comparing different prompt engineering techniques that are intended to prevent the JIA system from giving away answers to students in order to prevent the blocking of learning opportunities.

Situated Grounding

This theme is identifying common ground—established when students interact with one another through both behavior and verbal cues—through discourse and gesture. The team is currently preparing to start conducting SI lab experiments with various table / laptop configurations and student sizes. We are also examining data from iSAT's lab for interesting non-verbal behaviors that our team has not yet encountered in other studies, preparing specifications for annotation to create training data.

Orchestrating Effective Interactions

Strand 2

Strand 2 is guided by the foundational question: What advances in theories, interaction-paradigms, and frameworks are needed to orchestrate effective student and teacher interactions with AI partners? The three research themes identified to help Strand 2 answer this question are: *Dynamic Framework & Measures of Collaboration, Collaborative Learning (non-verbal* and *verbal communication; peer scaffolding),* and *UX Design & Multimodal Modeling.*

Dynamic Framework & Measures of Collaboration

For this theme, we work on identifying and measuring the basis of collaborative problem-solving skills in social, affective, and cognitive processes, and how to promote trusted interactions in team problem-solving.

Currently, iSAT team members out of Arizona State University have been busy developing an experimen-tal design to test four research questions: (1) Does the valenced nature of AI partner communication influence a group's shared emotional states (via objective measures physiological indicators such as heart rate and respira-tion as opposed to self-reports) during a collaborative problem-solving task? (2a) Does the valenced nature of AI partner communication impact role-specific commu-nicative influence, and (2b) is this relationship mediated by changes in the extent and/or dynamical structure of shared emotional states? (3a) Can measures of team-lev-el physiological synchrony as well as the distribution of role-specific communicative influence predict team task performance, and (3b) are these relationships moderated by the valenced nature of AI feedback? (4a) Do individual measures of perceived rapport, satisfaction with collabo-ration, performance, and self-reported emotional states reflect team-level task performance, and (4b) is the rela-tionship between team performance and these measures of subjective appraisal mediated by the distribution of role-specific communicative influence and shared emo-tional states?

In addition, our team has been creating scripts for a Wizard of Oz (WoZ) AI teammate that are slated for test-ing these research questions along with validating the emotional content of these scripts using latent semantic analysis tools. We have also generated and refined the experimental protocol involving physiological data col-lection (EDA/GSR and ECG) and questionnaires to assess subjective experiences of collaborating students. Lastly, the team conducted the first two full pilot sessions and integrated feedback into the development of this new study.

Collaborative Learning

By identifying verbal and non-verbal modes of collaborative engagement and identifying peer scaffold-ing moves, we hope to better understand how student peers support each other during collaborative learning activities.

Our team out of the University of Wisconsin - Madi-son has been training six researchers from CU Boulder on how to use the Nonverbal Interactions in Collab-orative-Learning Environments (NICE) framework to annotate classroom and lab videos. Expanding iSAT's team members who can perform this sort of work will be significantly enhance our work on multimodal modeling. During the training, trainees annotate small segments of the video, discussing any discrepancies before moving on to new segments. In addition to the training, the team spent the fall examining how non-verbal behaviors can improve understanding of collaborative learning. By using different types of visualizations of the NICE analysis (bar graphs, time sequences, and parallel coordinates), they are examining ways in which multiple modalities together can tell more about how learners are collaborating.

UX Design & Multimodal Modeling

The iSAT lab is collecting data centered on collaboration to understand how data can be used to model collabo-rative behaviors and correspondingly implement these models as part of the AI partners.

High-fidelity prototypes are being created for a new content feature of the Jigsaw Interactive Agent (JIA) web app, which will provide students with content-re-lated resources in the Sensor Immersion curriculum. The team continues to do multimodal analysis on past JIA lab data, including being trained by the UW-Madison team members as mentioned above. The JIA multimodal team, consisting of team members from both Strands 1 and 2, is working on a preliminary analysis of JIA videos. They are moving forward with the nonverbal annotation, which will contribute to the implementation of JIA's multimod-al piece. They are also iterating on a JIA benchmarking application to benchmark different versions of JIA. They have received feedback from the JIA team on what fea-tures are needed, which includes: a large language model "autograder" that can evaluate JIA responses to provide automated ratings and a new version of JIA that can incorporate conversation history, which will be tested using the benchmarking tool.

Engaging Youth

Strand 3

Strand 3 is guided by the foundational question: In what ways can co-design processes help stakeholders envision, co-create, critique and apply Artificial Intelligent learning technologies for their schools and communities? The research themes identified to help Strand 3 answer this question are: *Learning Futures Workshop, Moderation Unit,* and *Sensor Immersion/Self-Driving Cars Units.*

Learning Futures Workshop

These are annual workshops consisting of a group of high school students and result in crucial feedback from the participants including what youth want and need the AI partners to be able to do in the classroom, and—just as important—what they don't want them to do. These work shops are also used to understand parents' hopes and concerns around the use of AI in schools. After hosting a new workshop last spring, which consisted of a series of so-called pláticas—focus groups that center relationship and trust-building through reciprocal sharing between facilitators and participants—with Spanish-speaking parents to explore their concerns and hopes about how AI is used within schools, the team spent the summer analyzing the data.

Currently the team is working on broadening the voices that are included in the design and implementation, and will do this by expanding the Learning Futures Workshops (LFWs) to include school district technology leads. In addition, after analyzing LFW data from 2023 and 2024, the team has contributed to seven new manuscripts, which are currently under review at the International Conference on Learning Sciences (ICLS).

Moderation Unit

In this unit, students learn about how and when AI can be used to help people create welcoming online communities, and the role that moderation plays in online communities.

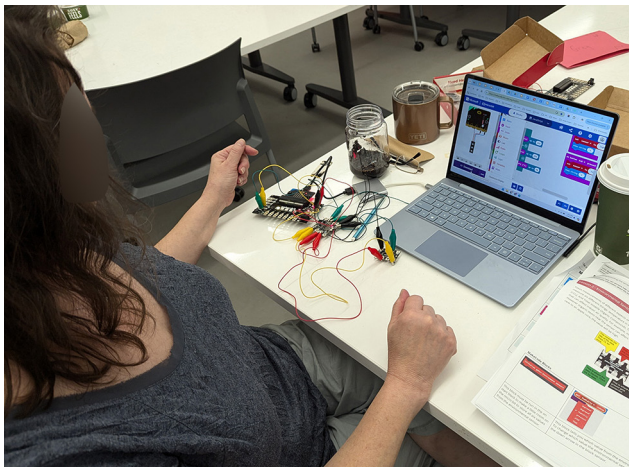
Our new Moderation Unit was part of a high school class this October. One more enactment will begin in December in a middle school English Language Arts classroom. They will be analyzing the implementation in Spring 2025. Two of the team's graduate researchers have been busy supporting an analysis of the professional learning workshops and student data that was collected last Spring.

Sensor Immersion & Self-Driving Cars Units

The Sensor Immersion (SI) curriculum teaches students how to program a sound, a soil-moisture, and an environmental sensor using a micro:bit controller. Students gain a deeper understanding of how sensor systems work and how they can be used to collect, analyze, environmental sensor using a micro:bit controller. and how they can be used to collect, analyze, and display scientific data to support scientific investigations. This fall, the SI curriculum was completed by more than 300 students in classrooms of iSAT's partner school districts.

The Self-Driving Cars (SDC) curriculum has students engage with the decisions that a self-driving car needs to make to keep people safe and get them where they need to go. The students learn about self-driving cars and then program their own cars to navigate the track. The curriculum continues to move towards public release with fine tuning of support materials for teachers and students. Several of iSAT's partner teachers are testing these revisions and are working towards integrating feedback from testing to create publicly available curriculum supports for the unit.

Team members have held several professional learning sessions over the last few months, engaging partner teachers in both the SI and SDC curriculums. These sessions have covered AI partner implementation, reflection on the curriculum routines, co-design of student-facing assessment tools, planning time for curriculum implementation, and time for teachers to develop expertise on the programming and AI topics of the units. They will continue this work in the spring semester.



iSAT's Professional Learnings are held regularly to engage partner teachers in our curriculum units. Here, a teacher is learning the Sensor Immersion curriculum to develop the expertise needed to implement it in her classroom.

Data Collection, Architecture & Implementation

Institute-wide

The Institute-wide team collaborates with all research strands by providing expertise, resources, and dedicated staff to promote and support research convergence. Our main themes include *AI Partner Design, Implementation, and Testing; Technical Architecture;* and *Collaborative Problem-Solving Framework*.

AI Partner Design, Implementation & Testing

This theme focuses on the main activities supporting the design, implementation, and testing of the AI partners. This requires managing a cross-Institute roadmap ranging from conceptualization to implementation and validation for different versions of AI partners.

Our team has continued to produce datasets based on all three of iSAT's curriculum units to make CoBi more usable and accessible across different learning contexts, and we are also studying AI partner integration in middle school classrooms in the US.

The classroom data collection team works on their set up to collect high-quality audio and visual data, which guides improvements to CoBi.

Technical Architecture

This theme focuses on developing the core infrastructure and components for the AI partners, supporting the integration of AI models and services into the AI partners, and supporting secure data storage access to data collections from both classroom and lab studies.

The technical architecture team always has a lot going on and this fall proved to be no exception with several additions made to both CoBi and JIA! The improvements for CoBi consisted of the following: (1) deploying the new CoBi version 2, which refined the feedback provided to teachers and students in the sentence cloud, tree, and radar visualizations; (2) enhancing the Communication Levels (CoLe) interfaces for students and teachers that included adding tabbed interfaces and incorporating new visualizations used as a control group alternative to the CoBi interfaces; (3) implementing auto-save for the community agreements editor, helping to prevent the loss of entries made by students and teachers; (4) implementing an icon that indicates when CoBi data is being received, helping teachers and students understand when CoBi is active during a recording session; and (5) starting implementation of a new teacher hub user interface, which will enable teachers to create and easily manage all their classes and sessions independently.

JIA improvements were aimed at getting it ready for classroom use. The team has been successful in implementing an infrastructure optimized for the classroom, including a faster speech processing pipeline and a dedicated container infrastructure for classroom agents. This provides improved analysis response times for the cloud-based iSAT Recorder, enabling more real-time JIA agent responsiveness during student worksheet activities performed on Chromebooks in the classroom. JIA web application additions include added functionality for the worksheet configurations and user interface such as automatic direct agent messaging mode, no inputs for question mode (ability to show a question that prompts for discussion without input), and no messages for question mode (ability to disable JIA messages while students are working on a given question and when they are finished with the worksheet).

Collaborative Problem-Solving (CPS) Framework

This theme focuses on the need to successfully identify the basis of collaborative problem-solving skills including social, affective, and cognitive processes, identify features of successful collaboration, and identify how to promote trusted interactions in team problem-solving.

By focusing on extending iSAT's Collaborative Problem-Solving (CPS) framework to novel questions of collaborative learning and team cognition, this team has been able to develop a new communicative influence metric. The metric integrates team cognition theory with the assessment methods built on the CPS framework to measure the team dynamics of influence during collaboration. Because it is a measurement of team dynamics, it has implications for both real-time and summary feedback for teams and teachers monitoring collaborative learning in their classrooms. During interviews, middle school teachers mused that being able to see this metric for groups in their classrooms would help them to both attend to more groups than they usually can in a busy classroom and reflect on their own perceptions of their students' interactions. The great work by this team has been recently published in the *Journal of Educational Psychology*.

Member Spotlight

Learn more about our members!

Meet Thomas M. Philip, Professor, University of California - Berkeley. As one of our research leads in Strand 3, he primarily focuses on conceptualizing, designing, implementing, and analyzing the Learning Futures Workshops (LFWs).

Q: What does your research focus on?

A: All learning is inherently ethical and political. With this premise, I study how ideology shapes learning and how learning is a site of ideological contestation and becoming. In relation to iSAT, I'm particularly interested in the assumptions about technology, students, teachers, and the purposes and processes of learning that go into the design of AI tools. In turn, I am intrigued by how these AI tools create or close off particular human relationships, shape how students learn and interact, and who they then become as learners and human beings.

Q: What is the coolest thing about your research?

A: In my research, I spend a lot of time in conversation with teachers and students about society and their place within it, which always entails profound questions. I get to have in-depth conversations in interviews and witness lively discussions in classrooms. They talk about their hopes for the world, how they perceive their purpose within it, and the challenges and opportunities to realizing their hopes. I get to see how they make sense together and work through differing perspectives. In our society, it's become increasingly difficult to find such places of authentic communication about significant matters. My research lets me witness (and sometimes participate in) these rich exchanges, which affirms the power and possibility of deliberate dialogue.

Q: What has been a turning point or defining moment in your career?

A: In graduate school, I became involved in the anti-war movement during the Iraq War of 2003. I became intrigued by the complex and highly context-dependent ways in which people made sense of the war, whether they supported or opposed the U.S. invasion of Iraq. The larger political context that defined my graduate school years got me interested in ideology and how the learning sciences might illuminate the interactions through which ideological stances are reproduced, contested, and transformed at the micro-level.

Q: What do you like to do outside of work?

A: A long walk through redwood forests or sitting by a body of water are always rejuvenating, as is a bike ride in the Berkeley Hills. Every year, I look forward to a summer camping road trip with my family.

Meet Brooklyn Clines - a Professional Research Assistant for the Institute-wide team who focuses on classroom data collection and data organization.

Q: What are you currently working on?

A: Currently, I am in classrooms for primarily our Moderation curriculum unit and creating resource materials for our upcoming Teacher Hub that helps our collaborators with anything they need regarding the AI partners we're implementing this year!

Q: How does your research contribute to iSAT?

A: I'd hope it contributes to iSAT's ability to reach more classrooms as we build ourselves up as a Nexus Hub for other institutions looking to get into AI studies. My goal is to provide teachers with readily available and short-form content that supports them in implementing our curricula and AI artners in the classroom.

Q: What do you like most about your work at iSAT?

A: I love creating materials that are accessible to teachers. It is a big pull to not only implement a new curriculum but also to learn new things about AI and then socialize it with students. I have a passion for assisting different strands as an honest and communicative liaison from the teacher and classroom environments to iSAT.

Q: What is a fun fact about you?

A: I love Dungeons and Dragons, especially running games for new players. I am fluent in French and know some basic sign language! I love making crafts from painting, woodburning, pottery, sculpting, graphic design, sewing, etc.

New Quarter, New Faces!

Growing our team and our impact.

We're excited to welcome new members to our team! Some of our new faces include:

Michael Buchanan is a first year PhD student in Computer Science at CU Boulder who is interested in AI development, human-AI teaming, and planning. Before coming to Boulder, Michael conducted research with Dr. Nancy Cooke in the Center for Human, AI, and Robot Teaming at Arizona State University, and he holds a B.S. in mathematics.

Lucrezia Lucchi is a Psychology PhD student in the Dynamics of Perception, Cognition, & Action Lab directed by Dr. Nia Amazeen. Their research interests involve uncovering the dynamical structures which underlie the emergence of flow & insight experiences—especially in the contexts of collaborative problem-solving, learning (inside and out of the classroom), and motor skill development. Lucrezia also has a background in Exercise Physiology and Human Movement Sciences.

Ray Hao is a PhD student and Fulton Fellow in Human Systems Engineering at Arizona State University, studying under Dr. Jamie Gorman. Ray's research focuses on using modeling techniques to understand and enhance complex systems within human factors engineering. She is particularly interested in team error management dynamics and optimizing human-designed environments for human-machine teams.

Yifan Zhu is a PhD student in computational linguistics at Brandeis University. Her research focuses on multimodal meaning representations, such as language and gestures, and how they contribute to forming common ground in classrooms and other educational settings. She received a B.A. from Xiamen University in Chinese language and literature, an M.A. from University College London in linguistics, and an M.S. from Georgetown University in computational linguistics. Her research interests include meaning representations, logic, and computational semantics.

Welcome Michael, Lucrezia, Ray, and Yifan!

Michael Buchanan
Strand 2
PhD Student

Lucrezia Lucchi
Strand 2
PhD Student

Ray Hao
Strand 2
PhD Student

Yifan Zhu
Strand 1
PhD Student

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info.ai-institute@colorado.edu

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iSAT Publications and Outreach

Published / Accepted

Dey, I., Doherty, E., Zhang, R., Hoang, N., Bush, J. B., Hirshfield, L., Puntamekar, S. (2024). MOSAIC-AI: Moment of Support Analysis with AI Partners. Accepted to American Education Research Association (AERA 2025).

Reitman, J. G., Harrison, J. L., Gorman, J. C., Lieber, R., & D'Mello, S. K. (2024). Communicative influence: A novel measure of team dynamics that integrates team cognition theory with collaborative problem solving assessment. Journal of Educational Psychology. Advance online publication. https://dx.doi.org/10.1037/edu0000904

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Submitted / Under Review

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