NITASHA MATHAYAS

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EDUCATION

Ph.D. Mathematics, Science, & Engineering Education **2014 - 2020**
University of Illinois, Urbana-Champaign
Thesis: Exploring middle school students' sensemaking of a gesture-augmented computer simulation depicting thermal conduction.

Master of Science with Honors in Physics, **2009 - 2011**
University of Delhi, India

Bachelor of Science with Honors in Physics, **2006 - 2009**
University of Delhi, India

PROFESSIONAL APPOINTMENTS

Researcher, Science and Computer Science Education **Jan – May 2025**
American Institutes for Research

Postdoctoral research fellow **Jan - Dec 2024**
University of Illinois, Urbana-Champaign, IL
NSF Grant: Teacher-Driven Development, Implementation, and Assessment of Integrated Computational Thinking in Grades 3-5 (ID: 1923483)

Postdoctoral research fellow **2020 –2023**
Indiana University, Bloomington IN
NSF Grant: Generalized Embodied Modelling to support Science through Technology Enhanced Play (GEM: STEP) (ID: 1908632 & 1908791)

Science teaching videos content developer **2012 - 2013**
IDiscoveri Education Private Ltd.

TEACHING APPOINTMENTS

Instructor, Methods of Science Teaching **Spring 2024, Fall 2024**

Fall 2019, Fall 2014

College of Education, University of Illinois at Urbana Champaign

Recognized on List of Teachers Ranked Excellent by Their Students, 2019

Visiting /Adjunct Instructor, Methods of Science Teaching **Spring 2023**
Ivy Tech Community College, Bloomington, IN

Teaching Assistant, Methods of Educational Inquiry **Fall 2019**
College of Education, University of Illinois at Urbana Champaign

Fourth grade teacher, Nigam Pratibha Vidyalaya, Aruna Nagar **2013 – 2014**
Teach for India, New Delhi

Science Curriculum Expert, New Delhi chapter **2013 - 2014**
Teach for India, New Delhi

PROFESSIONAL SERVICE

Program Chair, Advanced Technologies for Learning SIG **2025-2026**
American Educational Research Association (AERA)

Chair, Advanced Technologies for Learning SIG **2024-2025**
American Educational Research Association (AERA)

Editorial Board Member **2024–2026**
Journal of Research and Science Teaching (JRST)

Editorial Board Member **2021–2025**
Instructional Science

Guest Lecturer, Independent Writing Seminar **Fall 2024**
Instructional Technology and Learning Sciences, Utah State University

Guest Lecturer, Curriculum & Instruction Doctoral Proseminar **Fall 2024**
College of Education, University of Illinois at Urbana Champaign

Guest speaker, Embodied Learning **Fall 2022**
College of Education, University of Iowa

Journal Manuscript Reviewer
Science Education 2020-2023
IEEE Transactions on Learning Technologies 2021

Conference proposal reviewer
National Association for Research in Science Teaching (NARST) 2016-2022
American Educational Research Association (AERA) 2016-2026

ACM CHI Conference on Human Factors in Computing systems 2021
International Society for the Learning Sciences (ISLS) 2016-2024
Learning Sciences Graduate Student Conference 2017-2019

Research Committee student representative **2019**
College of Education, University of Illinois at Urbana-Champaign

Science consultant, Visual Metaphors: Illinois Learning Sciences Design Initiative **2015**
College of Education, University of Illinois at Urbana-Champaign

HONORS AND AWARDS

SITE 2025 TPACK SIG Judi Harris Research into Practice Award for Best Paper **2025**
SITE 2025 Conference, Orlando, FL

ISLS Early Career Workshop Participant **2021**
International Society of Learning Sciences, Bochum, Germany

Outstanding Student Medal Nominee **2020**
College of Education, University of Illinois at Urbana-Champaign

William Chandler Bagley Doctoral Scholarship ($2000) **2020**
College of Education, University of Illinois at Urbana-Champaign

William Chandler Bagley Doctoral Scholarship ($1000) **2017**
College of Education, University of Illinois at Urbana-Champaign

EI Desafio Educational Game Development Award (₹ 1000) **2012**
Educational Initiatives Pvt. Ltd., India

PUBLICATIONS

Manuscripts under review:

Mathayas, N. (book chapter, accepted). Facilitating mechanistic reasoning with gesture-augmented simulations: A study of two students' sensemaking of air pressure.

Mathayas, N., & Krist, C. (under review). Examining a science teacher's strategic and progressive indexing of epistemic responsibility when cultivating a community characterized by epistemic agency.

Mouza, C., Karlin, M., Leftwich, A., & Mathayas, N. (accepted). Implications of the TPACK framework for developing computationally literate preservice teachers.

Peer-reviewed publications: (Papers marked with * are student-led papers)

*Tu, X., Danish, J., Humburg, M., Zhou, M., Mathayas, N., Enyedy, N., & Jen, T. (2023). Understanding young children's science learning through embodied communication within

an MR environment. Invited Special Issue for *International Journal of Computer Supported Collaborative Learning.*

Danish, J., Anton, G., Mathayas, N., Jen, T., Vickery, M., Lee, S., Tu, X., Cosic, L., Zhou, M., Dim, E., Steinberg, S., Enyedy, N., & Ryan Z. (2023). Designing for Shifting Learning Activities. *The Journal of Applied Instructional Design, 11(4).* https://dx.doi.org/10.51869/114/jdabc

Krist, C., Machaka, N., Voss, D., Kelly, S., Mathayas, N., & Shim, S. Y. (2023) Teacher noticing for supporting students' epistemic agency in science sensemaking discussions. *Journal of Science Teacher Education.* https://doi.org/10.1080/1046560X.2022.2155355

Mathayas, N., Brown, D. E., & Lindgren, R. (2021). "I got to see, and I got to be a part of it": How cued gesturing facilitates middle school students' explanatory modeling of thermal conduction. *Journal of Research in Science Teaching, 58(10),* 1557-1589. https://doi.org/10.1002/tea.21718

Mathayas, N., Brown, D. E., Wallon, R. C., & Lindgren, R. (2019). Representational gesturing as an epistemic tool for the development of mechanistic explanatory models. *Science Education, 103(4)*, 1047-1079. https://doi.org/10.1002/sce.21516

Peer-reviewed conference proceedings and white papers:

*Garg, S., Mathayas, N., & Lindgren, R. (2025, June 10-13). *Emergent patterns of dyadic interaction around an embodied simulation* [Paper presentation]. In Rajala, A., Cortez, A., Hofmann, R., Jornet, A., Lotz-Sisitka, H., & Markauskaite, L. (Eds.) (2025). *Proceeding of the 19th International Conference of the Learning Sciences – ICLS 2025* (pp. 1106-1114). Helsinki, Finland: International Society of the Learning Sciences.

*Zhou, M., Mathayas, N., & Danish, J. (2024, June 10-14). *Elementary students' emergent and divergent goals in collective embodied modeling activities* [Paper presentation]. In Lindgren, R., Asino, T. I., Kyza, E. A., Looi, C. K., Keifert, D. T., & Suárez, E. (Eds.). (2024). *Proceedings of the 18th International Conference of the Learning Sciences - ICLS 2024* (pp. 1339 – 1342). Buffalo, USA: International Society of the Learning Sciences.

*Vickery, M., Mathayas, N., & Danish, J. (2024, June 10-14). *Being body-conscious: A trauma-informed inquiry into elementary students' collective embodied learning experiences* [Paper presentation]. In Lindgren, R., Asino, T. I., Kyza, E. A., Looi, C. K., Keifert, D. T., & Suárez, E. (Eds.). (2024). *Proceedings of the 18th International Conference of the Learning Sciences - ICLS 2024* (pp. 1846-1859). Buffalo, USA: International Society of the Learning Sciences.

*Tancredi, S., Vickery, M., Krause, C., Benally, J., Champion, D., Solomon, F., Hussain, F. N., Gholson, M., Ma, J. Y., Marin, A., Lindberg, L., Lopez, B. Y., Davé, S., Mathayas, N., Steinberg, S., Humburg, M., & Vossoughi, S. (2024, June 10-14). *Learning for every body: Intersectional dimensions of embodied learning* [Symposium Session]. In Lindgren, R., Asino, T. I., Kyza, E. A., Looi, C. K., Keifert, D. T., & Suárez, E. (Eds.). (2024). *Proceedings of the 18th International*

Conference of the Learning Sciences - ICLS 2024 (pp. 2037-2046). Buffalo, USA: International Society of the Learning Sciences.

Danish, J., Mathayas, N., Zhou, M., Steinberg, S., & Vickery, M. (2024, June 10-14). *Character based models and computational and embodied action tweaking for sensemaking* [Poster session]. In Clarke-Midura, J., Kollar, I., Gu, X., & D'Angelo, C. (Eds.). (2024). Proceedings of the 17th International Conference on Computer-Supported Collaborative Learning – CSCL 2024. (pp. 391-392). Buffalo, USA: International Society of the Learning Sciences.

Anton, G., Ayalon, E., Mathayas, N., Zhou, M., Danish, J., & Enyedy, N. (2023, June*). Computational tinkering with movement in embodied models* [Poster presentation]. International Conference of the Learning Sciences – ICLS 2023, Montréal, Canada. https://repository.isls.org//handle/1/10148

*Steinberg, S., Zhou, M., Vickery, M., Mathayas, N., & Danish, J. (2023, June). *Making sense of modes in collective embodied science activities* [Paper presentation]. International Conference of the Learning Sciences – ICLS 2023, Montréal, Canada. https://repository.isls.org//handle/1/9883

Mathayas, N., Tu, X., Danish, J., Vogelstein, L., & Cosic, L. (2022). *Moving towards meaningful participation using embodied Mixed Reality technologies* [Symposium presentation]. International Conference of the Learning Sciences – ICLS 2022, Hiorshima, Japan. https://repository.isls.org//handle/1/8579

*Tu, X., Humburg, M., Mathayas, N., Zhou, M., & Danish, J. (2022). *How embodiment helps students explain their ideas within an MR environment and content interviews* [Paper presentation]. International Conference of the Learning Sciences – ICLS 2022, Hiorshima, Japan. https://repository.isls.org//handle/1/8451

Mathayas, N., Danish, J., Tu, X., Zhou, M., & Vickery, M. (2021). *Social positioning in collective embodied models in an elementary STEM classroom* [Symposium presentation]. International Conference of the Learning Sciences – ICLS 2021, Bochum, Germany. https://repository.isls.org//handle/1/7592

Mathayas, N. (2021). *Gesture-based representational challenges for learning science with Mixed Reality technologies* [Paper presentation]. International Conference of the Learning Sciences – ICLS 2021, Bochum, Germany. https://repository.isls.org//handle/1/7384

Mathayas, N. (2021). *Developing embodied and agentive ways of learning science through Mixed Reality technologies* [Poster presentation]. International Conference of the Learning Sciences – ICLS 2021, Bochum, Germany.

Kelly, S. B., Mathayas, N., Machaka, N., Chis, J., & Krist, C. (2020). *Variations in teachers' practical conceptions of epistemic agency* (Best Student Paper Nominee). International

Conference of the Learning Sciences – ICLS 2020, Nashville, Tennessee. https://repository.isls.org//handle/1/6489

Mathayas, N., & Brown, D. E. (2018). *Exploring multimodal scaffolds supporting middle school students' construction of causal-mechanistic scientific explanations* [Paper presentation]. International Conference of the Learning Sciences – ICLS 2018, London, United Kingdom. https://repository.isls.org//handle/1/893

Mathayas, N., Brown, D. E., & Lindgren, R. (2016). *Exploring middle school students' sense making of a computer simulation about thermal conduction* [Poster presentation]. International Conference of the Learning Sciences – ICLS 2016, Singapore.

Alameh, S., Morphew, J. W., Mathayas, N., & Lindgren, R. (2016). *Exploring the relationship between gesture and student reasoning regarding linear and exponential growth* [Paper presentation]. International Conference of the Learning Sciences – ICLS 2016, Singapore. https://repository.isls.org//handle/1/365

Lindgren, R., Wallon, R. C., Brown, D. E., Mathayas, N., & Kimball, N. (2016). *"Show me" what you mean: Learning and design implications of eliciting gesture in student explanations* [Paper presentation]. International Conference of the Learning Sciences – ICLS 2016, Singapore. https://repository.isls.org//handle/1/367

Peterson, M., Wise, K., Lindgren, R., Cox, D., & Mathayas, N. (2015, November 20). *Understanding and implementing visual metaphor* [White paper]. Illinois Learning Science Design Initiative at the University of Illinois, Urbana-Champaign.

Peer-reviewed presentations:

Mathayas, N., Nolte, A., Mead, H., Mouza, C., Pollock, L., Rolón-Dow, R., Alkhateeb, B., Ospina-Tabares, S. (2025,). *Lessons in adaptation: A five-year design analysis of culturally responsive computer science PD for elementary teachers*. Paper presented at the Society of Information Technology and Teacher Education Annual Conference 2025, Orlando, FL. [Best paper awardee]

*Ospina-Tabares, S., Mathayas, N., Mead, H., Mouza, C., & Pollock, L. *Exploring elementary educators' perceptions of ai in the context of professional development.* Paper presented at the Society of Information Technology and Teacher Education Annual Conference 2025, Orlando, FL.

Mathayas, N., Mead, H., Mouza, C., & Ospina-Tabares, S. (2025, April 23 - 27). *Examining elementary students' attitudes and interests toward computational thinking in the context of teacher professional development*. Paper presented at the American Educational Research Association (AERA) Annual Meeting.

*Ospina-Tabares, S., Mead, H., **Mathayas, N.,** Mouza, C., & Pollock, L. (2025, April 23 - 27). *Factors shaping k-5 educators' selection of computer science tools for classroom integration.* Poster presented at the American Educational Research Association (AERA) Annual Meeting.

*Zhou, M., Anton, G., **Mathayas, N.,** Ayalon, E., Jen, T., Lee, S. J., Lane, A., Enyedy, N., & Danish, J. (2025, April 23 - 27). *Exploring the role of observers in shaping embodied modeling activities*. Poster presented at the American Educational Research Association (AERA) Annual Meeting.

*Steinberg, S., **Mathayas, N.,** Zhou, M., & Danish, J. (2025, April 23 - 27). *The role of embodiment in scientific modeling and learning about wetlands ecosystems.* Poster presented at the American Educational Research Association (AERA) Annual Meeting.

Mathayas, N., Zhou, M., Danish, J., Vickery, M., Steinberg, S., Ryan, Z., Tu, X., & Devine, I. (2024, April 11 - 14). *The impact of embodied modeling on fifth grade students' perspective on ecosystems thinking and metamodeling.* Paper presented at the American Educational Research Association (AERA) Annual Meeting. https://aera24-aera.ipostersessions.com/default.aspx?s=F1-91-4E-02-56-07-7A-73-FE-E5-EE-AD-42-16-8B-6D&guestview=true

Zhou, M., **Mathayas, N.**, Danish, J. (2024, April 11 - 14). *Exploring students' divergent interpretations while studying ecosystems in an embodied mixed reality environment.* Poster presented at the American Educational Research Association (AERA) Annual Meeting. **(Best student paper nominee)** https://aera24-aera.ipostersessions.com/default.aspx?s=17-1C-6A-5D-8C-10-2E-B0-93-E1-30-14-DE-50-5F-13

Krist, C., & **Mathayas, N.** (2023, April, 18 -21). *Do we have the same definition? Variations in published transcripts showcasing students' epistemic agency.* Symposium paper presented at the National Association for Research in Science Teaching (NARST): Annual International Conference.
Mathayas, N., Kelly, S. B., Machaka, N., & Krist, C. (2022, April 21 – 26). *Factors affecting science teachers' decision-making to support students' epistemic agency.* Paper presented at the American Educational Research Association (AERA) Annual Meeting.

Krist, C., **Mathayas, N.**, Shim, S-Y., Kelly, S. B., Machaka, N., & Voss, D. (2022, March 27 – 30). *Teacher noticing for epistemic agency: What cues teachers to open up space for student sensemaking?*Paper presented at the National Association for Research in Science Teaching (NARST): Annual International Conference.

Mathayas, N. (2021, April 7 – 10). *Framing in gesture-augmented simulation: How differing student frames impacts their sensemaking.* Paper presented at the National Association for Research in Science Teaching (NARST): Annual International Conference held virtually.

Mathayas, N., Machaka, N, & Krist, C. (2021, April 7 – 10). *How teachers navigate tensions between enacting coherent curriculum materials and supporting students' epistemic agency.* Symposium paper presented at the National Association for Research in Science Teaching (NARST): Annual International Conference held virtually.

Tu, X., Humburg, M., Davis, B., Danish, J., Ryan, Z., Vickery, M., Zhou, M., & Mathayas, N. (2021, April 8 - 12). *Assessing young children's embodied learning of states of matter in a Mixed-Reality environment.* Paper presented at the 2021 Virtual American Educational Research Association (AERA) Annual Meeting.

Mathayas, N., Kelly, S. B., & Krist, C. (2020, Apr 17 – 21). *How science teachers conceptualize students' epistemic agency in their teaching: Two teachers' narratives* [Paper Session]. American Educational Research Association (AERA) Annual Meeting San Francisco, CA http://tinyurl.com/vzlanfw (Conference Cancelled)

Mathayas, N., & Lindgren, R. (2020, Apr 17 – 21). Exploring how learners make sense of multimodal representations within a gesture-augmented simulation teaching thermal conduction [Roundtable Session]. American Educational Research Association (AERA) Annual Meeting San Francisco, CA http://tinyurl.com/v6b7qt8 (Conference Cancelled)

Mathayas, N., Brown, D. E., & Lindgren, R. (2018, March). *Tracing students' evolving embodied conceptions of heat transfer: Implications for designing dynamic computer simulations.* Paper presented at the National Association for Research in Science Teaching (NARST): Annual International Conference, Atlanta, GA.

Brown, D. E., Mathayas, N., Lindgren, R., & Wallon, R. C. (2018, March). *Design-based research on a gesture-controlled dynamic simulation to better help students refocus causal intuitions.* Paper presented at National Association for Research in Science Teaching (NARST): Annual International Conference, Atlanta, GA.

Mathayas, N., Morphew, J. W., Lindgren, R., & Alameh, S. (2017, April). *When two equals ten times one: Facilitating reasoning about exponential growth with an embodied simulation.* Paper presented at the Annual Meeting of the American Educational Research Association (AERA), San Antonio, TX.

Morphew, J. W., Mathayas, N., Alameh, S., & Lindgren, R. (2017, April). *Student understanding about exponential growth and the Richter scale following an embodied digital simulation.* Paper presented at the National Association for Research in Science Teaching (NARST): Annual International Conference, San Antonio, TX.

Brown, D. E., Mathayas, N., & Lindgren, R. (2017, April). *Exploring the conceptual affordances of embodied explanatory control of a gas pressure simulation.* Paper presented at the National Association for Research in Science Teaching (NARST): Annual International Conference, San Antonio, TX.

Mathayas, N., Brown, D. E., & Lindgren, R. (2016, April). *Exploring middle school students' embodied conceptions of thermal conduction and its implications for instruction.* Paper presented at the National Association for Research in Science Teaching (NARST): Annual International Conference, Baltimore, MD.

Alameh, S., Linares, N., Mathayas, N., & Lindgren, R. (2016, April). *The effect of students' gestures on their reasoning skills regarding linear and exponential growth.* Interactive poster session at the National Association for Research in Science Teaching (NARST): Annual International Conference, Baltimore, MD.

Lindgren, R., Wallon, R., Kimball, N., Mathayas, N., & Brown, D. E. (2016, April). *Making gesture explicit in student explanations: Exploring learning effects and design implications.* Paper presented at the Annual Meeting of the American Educational Research Association (AERA), Washington, DC.

RESEARCH ASSISTANTSHIPS

Sustainable world: Developing a global perspective storyline for elementary preservice teachers **2020**
Department of Curriculum and Instruction, University of Illinois at Urbana-Champaign, UIUC Internal grant, PI: Dr. Barbara Hug

Learning to open up space for epistemic agency: Towards a model of teacher learning **2018-2019**
Department of Curriculum and Instruction, University of Illinois at Urbana-Champaign, UIUC Internal grant, PI: Dr. Christina Krist

Gesture Augmented Simulations for scientific explanations (GRASP), **2014-2018**
Department of Curriculum and Instruction, University of Illinois at Urbana-Champaign and Concord Consortium, NSF Award ID: 1432424, PI: Dr. Robb Lindgren

Embodied learning augmented through simulation theatres for interacting with cross-cutting concepts in science (ELASTIC³S), **2015-2016**
Department of Curriculum and Instruction and the NCSA, University of Illinois at Urbana-Champaign, NSF Award ID: 1441563, PI: Dr. Robb Lindgren

GRANT WRITING

2024 NSF Grant – IUSE (submitted).
Collaborative Research: Developing K-8 Pre-Service Teachers' Computational Thinking (CT) by Preparing Teacher Educators to Integrate CT into STEM Methods Courses with Dr. Chrystalla Mouza, University of Illinois at Urbana-Champaign, and Dr. Hui Yang and Dr. Satabdi Basu at SRI International.

2022 NSF Grant – AISL (unfunded).

Embodied modeling to construct new pathways for learning about local ecosystems in libraries and nature centers with Dr. Joshua A. Danish, Indiana University, Dr. Noel Enyedy and Dr. Heidi Carlone, Vanderbilt University, and Dr. Ben Loh and Dr. Mathew Brown, Inquirium LLC.

2019 NSF Grant – DRK-12 (unfunded).
Enacting causal explanations through gesture control of dynamic simulations in middle school science classrooms with Dr. David E. Brown and Dr. Robb Lindgren, University of Illinois at Urbana-Champaign and Nathan Kimball, Concord Consortium

2018 College of Education O'Leary Learning Center Award for project expenses ($1000).
Project Data Analysis Workstation and Network (DAWN) with Robert Wallon and Sherry Yi, University of Illinois at Urbana-Champaign

PROFESSIONAL MEMBERSHIPS

National Association for Research in Science Teaching (NARST)
American Educational Research Association (AERA)
International Society for the Learning Science (ISLS)
Society for Information Technology and Teacher Education (SITE)