

Kelsey E. Schenck, Ph. D.

Southern Methodist University | Assistant Professor | Department of Teaching & Learning

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Education

Ph.D. in Educational Psychology- Learning Sciences, 2023– University of Wisconsin-Madison.
Dissertation: *An Exploration of the Role of Spatial Ability and Spatial Anxiety in Gesture Production and Mathematical Thinking*

Chair: Dr. Mitchell Nathan

Minor: *Distributed- Education Reform*

M.S. in Educational Psychology- Learning Sciences, 2019 – University of Wisconsin-Madison.
Major Area Paper: *Exploring the Relationships Between Spatial Ability, Spatial Anxiety, and Math Performance*

Chair: Dr. Mitchell Nathan

M.Ed. in Mathematics Curriculum and Instruction, 2016 – University of Texas-Arlington
Thesis: *Exploring the Effects of Curriculum: Mathematics Achievement in Low-Socioeconomic Populations*

B.S. in Interdisciplinary Studies - Middle Grades Mathematics and Science Education, 2013 –
Texas A&M University- College Station; Mathematics Minor; Cum Laude

Scholarly Appointments

Assistant Professor, Southern Methodist University, Simmons School of Education and Human Development, Department of Teaching and Learning, Technology-Enhanced Immersive Learning Cluster, August 2023 to date.

Adjunct Instructor, University of Wisconsin-Madison, Learning Analytics Masters Program, Fall Semesters, August 2022 to date.

Graduate Project Assistant: University of Wisconsin-Madison, “Exploring Collaborative Embodiment for Learning (EXCEL): Understanding Geometry Through Multiple Modalities” (IES: R305A200401), September 2020 to June 2023.

Graduate Student Instructor of Record: University of Wisconsin-Madison, Department of Educational Psychology, September 2019 to May 2023.

Graduate Project Assistant: University of Wisconsin-Madison, “How Dynamic Gestures and Directed Actions Contribute to Mathematical Proof Practices” (IES:R305A160020), August 2017 to September 2020..

Middle School Teacher, Frisco Independent School District, Frisco, Texas, August 2015 to August 2017.

Middle School Teacher, Carrollton-Farmers Branch Independent School District, Farmers Branch, Texas, August 2013 to August 2015.

Funded Research Support

1. Principal Investigator, “Collaborative Research: Enhancing Collaboration and Embodied Learning in Online Virtual Reality STEM Laboratories through High-fidelity Interactive Avatars,” National Science Foundation Research on Innovative Technologies for Enhanced Learning (NSF- RITEL, DRL-2506912). November 2025 - August 2028. Award: \$300,000.
2. Principal Investigator, “Understanding and Building the Link between Spatial and Math Abilities,” Prioritizing Productivity Micro-grants, SMU Simmons School of Education & Human Development. July 2025 - August 2026. Award: \$18,600.
3. Principal Investigator, “Assessing Spatial Skills with Educational Technologies (Project ASSET),” University Research Council Grants, Southern Methodist University Office of Research and Innovation. February 2025 - February 2026. Award: \$13,000.

Peer-Reviewed Journal Publications

(N. B. * Student co-authors; + Postdoctoral fellow co-authors)

1. *Xia, F., Nathan, M.J., **Schenck, K. E.**, & Swart, M. I. (2025). Eliciting predictive behaviors to support embodied geometric reasoning. *Cognitive Science*, 49, e70055. doi.org/10.1111/cogs.70055
2. **Schenck, K. E.**, & Nathan, M. J. (2024). Navigating spatial ability for mathematics education: a review and roadmap. *Educational Psychology Review*, 39(90). doi.org/10.1007/s10648-024-09935-5.
3. Walkington, C., Nathan, M.J., *Washington, J., *Hunnicutt, J., Darwin, T., +Daugherty, L., & **Schenck, K. E.** (2024). Comparing Learning Geometry using a Tablet to Head-Mounted Display Augmented Reality: How and When Dimensionality Matters. *Education and Information Technologies*, 30, 5397–5426. doi.org/10.1007/s10639-024-13008-z.
4. **Schenck, K.E.**, & Duschl, R. A. (2024). Context, language, and technology in data literacy [version 1; peer review: 3 approved with reservations]. *Routledge Open Research*, 3(19), doi.org/10.12688/routledgeopenres.18160.1

5. Walkington, C., Nathan, M. J., Wang, M. & **Schenck, K.E.** (2022). The effect of relevant directed arm motions on gesture usage and proving of geometry conjectures. *Cognitive Science*, 46(9), e13180. doi.org/10.1111/cogs.13180
6. Nathan, M. J., **Schenck, K. E.**, Vinsonhaler, R., Michaelis, J. E., Swart, M. I., & Walkington, C. (2021). Embodied geometric reasoning: Dynamic gestures during intuition, insight, and proof. *Journal of Educational Psychology*, 113(5), 929 – 948. doi.org/10.1037/edu0000638

Peer-Reviewed Conference Papers

1. **Schenck, K. E.**, & Pande, P. (2026, April). *Spatial Ability and Epistemic Actions in Digital Tangram Puzzles*[Paper Presentation]. American Educational Research Association Conference, Los Angeles, CA, United States.
2. **Schenck, K. E.** (2025, October). Priming spatial and geometric reasoning with a Tangram task. In X. Yao, A. McCloskey, R. M. Zbiek, & R. Martinez (Eds.), *Proceedings of the forty-seventh annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (pp.).State College, PA, United States.
3. **Schenck, K. E.**, & Pande, P. (2025, October). Exploring the potential of a VR Tangram game for enhancing students’ mathematics. In X. Yao, A. McCloskey, R. M. Zbiek, & R. Martinez (Eds.), *Proceedings of the forty-seventh annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (pp.).State College, PA, United States.
4. *Xia, F., *Kim, C., *Beier, J., Swart, M. I., **Schenck, K.E.**, & Nathan, M. J. (2025, June). Embodied Transfer of Mathematical Ideas Through Gestural Replay. In Rajala, A., Cortez, A., Hofmann, R., Jornet, A., Lotz-Sisitka, H., & Markauskaite, L. (Eds.), *Proceedings of the 19th International Conference of the Learning Sciences - ICLS 2025* (pp. 917-925). Helsinki, Finland. International Society of the Learning Sciences.
5. *Kim, C., *Xia, F., *Beier, J., Swart, M. I., **Schenck, K.E.**, & Nathan, M. J. (2025, June). How students ground mathematics through distributed gestures: Designing computer-supported collaborative embodied learning. In Oshima, J., Chen, B., Vogel, F., & Järvelä, J. (Eds.), *Proceedings of the 18th International Conference on Computer-Supported Collaborative Learning - CSCL 2025* (pp. 355-359). Helsinki, Finland. International Society of the Learning Sciences.
6. **Schenck, K. E.** (2025, April). *Exploring Technologies for Supporting High Schoolers’ Embodied Geometric Reasoning and Spatial Skills* [Paper Presentation]. In Symposium on Learning and the Growing Body: Embodied Learning Research Across Different Age Groups. American Educational Research Association Conference, Denver, CO, United States.
7. *Kim, D., **Schenck, K. E.**, *Xia, F., Swart, M. I., Walkington, C.A., & Nathan, M. J. (2025, April). *The Effect of DGS Access on Embodied Geometric Reasoning: An Experiment* [Paper Presentation]. American Educational Research Association Conference, Denver, CO, United States.

8. Nathan, M. J., +Bock, C., Harrison Closser, A., **Schenck, K.E.**, Kokushkin, V., & Zhang, Y. (2024, November). VR/AR: Envisioning the future of mathematics education in uncertain times: Embodied Mathematical Imagination and Cognition (EMIC) research colloquium. In K. Kosko, J. Caniglia, S. Courtney, & M. Zolfaghari (Eds.), *Proceedings of the forty-sixth annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (pp. 2153 - 2156). Cleveland, Ohio, United States.
9. **Schenck, K.E.** (2024, June). Promoting embodied geometric reasoning using a spatial puzzle task. In *Proceedings of the 18th International Conference of the Learning Sciences-ICLS2024* (pp. 210-217). Buffalo, New York, United States. International Society of the Learning Sciences.
10. **Schenck, K.E.**, *Kim, D., *Xia, F., Swart, M.I., Walkington, C., & Nathan, M. J. (2024, June). Exploring an interactive technology for supporting embodied geometric reasoning. In *Proceedings of the 18th International Conference of the Learning Sciences-ICLS2024* (pp. 131-138). Buffalo, New York, United States. International Society of the Learning Sciences.
11. *Xia, F., **Schenck, K. E.**, Swart, M. I., *Kim, D., *Grondin, M., Kwon, O.H., Walkington, C., & Nathan, M. J. (2024, June). How pedagogical hints impact embodied geometric reasoning. In *Proceedings of the 18th International Conference of the Learning Sciences-ICLS2024* (pp. 121-130). Buffalo, New York, United States. International Society of the Learning Sciences.
12. Xia, F., Swart, M.I., **Schenck, K. E.**, & Nathan, M. J. (2023, June). Gestural replays support mathematical reasoning by simulating geometric transformations. In *Proceedings of the 17th International Conference of the Learning Sciences-ICLS2023* (pp. 305-312). Montréal, Canada: International Society of the Learning Sciences.
13. Fogel, A., Swart, M. I., Grondin, M., Xia, F., **Schenck, K. E.**, & Nathan, M. J. (2023, June). Scaffolding the conceptual salience of directed actions. In *Proceedings of the 17th International Conference of the Learning Sciences-ICLS2023* (pp. 910-913). Montréal, Canada: International Society of the Learning Sciences.
14. Swart, M. I., **Schenck, K. E.**, Xia, F., Kim, D., Grondin, M., Nathan, M. J., & Walkington, C. (2023, May). *Embodying students' geometric thinking in an interactive narrative game*. [Paper Presentation]. American Educational Research Association Conference, Chicago, IL, United States.
15. **Schenck, K. E.**, & Nathan, M. J. (2022, November). Spatial anxiety moderates the effect of spatial ability in geometric reasoning. In A. E. Lischka, E. B. Dyer, R.S. Jones, J. N. Lovett, J. Strayer, & S. Drown (Eds.), *Proceedings of the forty-fourth annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (pp. 598). Nashville, TN, United States.
16. **Schenck, K. E.**, Hubbard, E. M, Nathan, M., & Swart, M. (2022, July). Expanding Understandings of Embodied Mathematical Cognition in Students' Fraction Knowledge. In J. Culbertson, A. Perfors, H. Rabagliati & V. Ramenzoni (Eds.), *Proceedings of the Annual Meeting of the Cognitive Science Society*, 44. Toronto, Canada.

17. Xia, F., **Schenck, K.E.**, Swart, M.I., & Nathan, M.J. (2022, June). Directed actions scaffold gestural insights in geometric reasoning. In *Proceedings of the 2022 International Conference of the Learning Sciences-ICLS2022* (pp. 1982-1983). Hiroshima, Japan: International Society of the Learning Sciences.
18. Xia, F., **Schenck, K. E.**, Swart, M. I., & Nathan, M. J. (2022, June). The role of action-prediction in mathematical reasoning. In *Proceedings of the 16th International Conference of the Learning Sciences-ICLS2022* (pp. 1469-1472). Hiroshima, Japan: International Society of the Learning Sciences.
19. **Schenck, K.E.**, Kim, D., Swart, M.I., & Nathan, M.J. (2022, April). *With no universal consensus, spatial system perspective affects model fitting and interpretation for mathematics*. [Paper presentation]. American Educational Research Association Conference, San Diego, CA, United States.
20. Xia, F., **Schenck, K.E.**, Swart, M.I., & Nathan, M.J. (2022, April). *When conceptualization gets moving: Exploring how directed actions complement gestural insights for generating geometric reasoning*. [Paper presentation]. American Educational Research Association Conference, San Diego, CA, United States.
21. Swart, M., Kirankumar, V., Sung, H., Xia, F., Kim, D., Kwon, O., Walkington, C., **Schenck, K.E.**, & Nathan, M. J. (2021, October). Embodied transmission of ideas: Mathematical thinking through collaborative construction of geometry video game content. In Olanoff, D., Johnson, K., & Spitzer, S. M. (2021). In D. Olanoff, K. Johnson, & S. M. Spitzer (Eds.), *Proceedings of the forty-third annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (pp. 1341 – 1345). Philadelphia, PA, United States.
22. **Schenck, K.E.** & Nathan, M.J. (2021, June). Exploring expanded notions of mathematical reasoning: Spatial systems, anxiety, and embodiment. In A. Wichmann, H. U., Hoppe, & N. Rummel (Eds.), *General Proceedings of the 2021 Annual Meeting of the International Conference of the Learning Sciences 2021* (pp. 113 -114). Bochum, Germany: International Society of the Learning Sciences.
23. Kim, D., Swart, M.I., **Schenck, K.E.** & Nathan, M.J. (2021, June). Grounded and embodied proof production: Are gestures and speech enough to produce deductive proof? In E. de Vries, Y. Hod, & J. Ahn (Eds.), *Proceedings of the 15th International Conference of the Learning Sciences - ICLS 2021* (pp. 1109-1110). Bochum, Germany: International Society of the Learning Sciences.
24. Swart, M.I., **Schenck, K.E.**, Xia, F., Kim, D., Kwon, O.H., Nathan, M.J. & Walkington, C. (2020, October). Embodiment as a rosetta stone: Collective conjecturing in multilingual classroom using a motion capture geometry game. In A. I. Sacristán & J. C. Cortés (Eds.) (pp. 2206-2214), *Proceedings of the 42nd annual conference of the North-American chapter of the International Group for the Psychology of Mathematics Education (PME-NA 42)*. Mazatlán, Sinaloa, Mexico.

25. Swart, M. I., **Schenck, K.E.**, Xia, F., Kwon, O. H., Nathan, M. J., Vinsonhaler, R., & Walkington, C. (2020). Grounded and embodied mathematical cognition for intuition and proof playing a motion-capture video game. In M. Gresalfi and I. S. Horn (Eds.), *The Interdisciplinarity of the Learning Sciences, 14th International Conference of the Learning Sciences (ICLS) 2020, Volume 1* (pp. 175-182). Nashville, Tennessee: International Society of the Learning Sciences.
26. **Schenck, K.E.**, Michaelis, J.E., Swart, M. I., Xia, F., Nathan, M. J., & Walkington, C. (2020, April). *Mathematical knowledge is embodied: Synergistic contributions of gesture and speech during geometry proof production*. [Paper presentation]. American Educational Research Association Conference, San Francisco, CA, United States.
27. **Schenck, K.E.** & Nathan, M.J. (2020, April). *Connecting mathematics, spatial ability and spatial anxiety*. [Paper presentation]. American Educational Research Association Conference, San Francisco, CA, United States.
28. Xia, F., Nathan, M. J., Swart, M. I., **Schenck, K.E.**, & Kwon, O. (2020, April). *Does click matter? The role of text and diagram on geometric reasoning and gesture production*. [Paper presentation]. American Educational Research Association Conference, San Francisco, CA, United States.

Book Chapters

1. **Schenck, K.E.**, Walkington, C., & Nathan, M. J. (2022). Groups that move together, prove together: Collaborative gestures and gesture attitudes among teachers performing embodied geometry. In Sheila Macrine and Jennifer Fugate (Eds.), *Movement Matters: How Embodied Cognition Informs Teaching and Learning*. (pp. 131-145). MIT Press.

Invited Presentations

1. **Schenck, K. E.** (2024, Apr. 1). “Embodied Mathematics: Metaphor, Gesture, and Technology.” Presentation to EDUC 464: Methods and Materials in Teaching Mathematics at Colorado State University. (Organizers: Hortensia Soto, Liz Arnold, and Janet Oien).
2. *Xia, F., & **Schenck, K. E.** (2024, Apr. 1). “Grounded and Embodied Mathematical Cognition.” Presentation to Math 674: Theoretical Perspectives in Mathematics Education at Colorado State University. (Organizers: Hortensia Soto, Liz Arnold, and Janet Oien).
3. **Schenck, K.E.**, Swart, M.I., Binzak, J.V., McGinty, J., Michaelis, J.E., Kwon, O., Visonhaler, R., Nathan, M.J., & Walkington, C. (2019, May). *Connecting to geometric proof concepts using gestures*. [Poster presentation]. Embodied Design for Mathematical Imagination and Cognition NSF Workshop, Madison, WI, United States.

4. Xia, F., Nathan, M.J., **Schenck, K.E.**, Swart, M.I., Kwon, O., Michaelis, J.E., Binzak, J.V., McGinty, J., Visonhale, R., & Walkington, C. (2019, May). *Examining the effects of geometric scaffolds on gesture Production*. [Poster presentation]. Embodied Design for Mathematical Imagination and Cognition NSF Workshop, Madison, WI, United States.

Under Review and In Preparation

- i. **Schenck, K. E.**, & Nathan, M. J. (under review). Investigating spatial anxiety in embodied geometric reasoning
- ii. **Schenck, K.E.**, & Nathan, M. J. (under review). Investigating spatial thinking-based puzzle tasks for improving geometric reasoning. (pre-registered: <https://doi.org/10.17605/OSF.IO/WTAZ8>)
- iii. *Kim, D., **Schenck, K. E.**, Xia, F., Swart, M. I., Nathan, M. J., & Walkington, C. (in preparation). Mathematical Reasoning with Dynamic Geometry. (pre-registered: <https://doi.org/10.17605/OSF.IO/R9CUV>)
- iv. **Schenck, K. E.**, Xia, F., Swart, M. I., *Kim, D., Kwon, O. H., Nathan, M. J., & Walkington, C. (in preparation). Embodying geometric thinking: Investigating directed actions, pedagogical hints, gesture, and speech.
- v. Xia, F., Nathan, M. J., & **Schenck, K. E.** (in preparation). Integrating actions and multimodal self-explanations enhances embodied geometric reasoning.

Teaching

Southern Methodist University

EDU 6620: Research Methodologies and the Learning Sciences (M.S. in the Learning Sciences Program). 6 course credits. Online.

EDU 6318: Theories and Trends in the Learning Sciences (M.S. in the Learning Sciences Program). 3 course credits. Online.

EDU 7302: Quantitative Research Methods I (Simmons Ph.D program). 3 course credits.

University of Wisconsin

ED PSYCH 560: Foundations of Quantitative and Qualitative Research Methods (M.S. in Educational Psychology - Learning Analytics Program). 6 course credits. Online.

ED PSYCH 301: How People Learn (Undergraduate course). 3 course credits.

Awards and Honors

1. *Capstone PhD Teaching Award*, University of Wisconsin-Madison, 2023. A competitive campus-wide award that recognizes TAs who have performed as outstanding teachers throughout their UW–Madison tenure.

2. *Arvil S. Barr Award*, School of Education, University of Wisconsin-Madison. 2021. A competitive award for advanced graduate students in the School of Education who demonstrate a program of study and research on teacher education of high quality.

Contributions to the Scientific Community

Professional Activities

Positions Held

Secretary/Treasurer, Learning Sciences SIG, AERA, 2025-2026.

Secretary/Treasurer-Elect, Learning Sciences SIG, AERA, 2024-2025.

Society Memberships

International Society of the Learning Sciences

American Educational Research Association (Division C, LS-SIG, RME-SIG)

North American Chapter of the International Group for the Psychology of Math Education

Cognitive Science Society

American Psychological Association (Division 15 - Educational Psychology)

Ad Hoc Peer Review Activities for Journals

Journal of the Learning Sciences

Educational Technology Research and Development (Consulting Editor)

International Journal of Early Years Education

Journal for Research in Mathematics Education

Cognitive Science

Other Ad Hoc Peer Review

American Educational Research Association -Learning Sciences SIG, Division C

International Society of the Learning Sciences Conference

North American Chapter of the International Group for the Psychology of Math Education

3rd International Workshop on Embodied Learning @ICCE

International Conference on Technology 4 Education

Advising and Mentoring

Doctoral Students- Dissertation Committee Member

Julianna Washington

Doctoral Students- Major Area Paper Committee Member

Julianna Washington

Doctoral Students- Qualifying Exam Reader

Kathleen Roberts

Research Assistants

Ruth Assefa- SMU Undergraduate Computer Science/Data Science Major
Iyanna Christie- SMU Undergraduate Creative Computing Major
Auria Polefka- SMU Undergraduate Psychology Major
Jasmine No- SMU Undergraduate Psychology Major
Gillian Beebe- SMU Master of Education Major
Carrie (Kairui) Gu- UW-Madison Undergraduate Psychology Major

Other

Faculty Mentor, Preparing Future Faculty Program at the University of Nebraska - Lincoln,
Mentee: Kimia Akhavein (Psychology Ph.D. program, graduated spring 2024, postdoctoral scholar at SMU)

Service at Southern Methodist University

Department-Level

Member, Chair-Elect (2024), Chair (2025), Policy and Advisory Committee, 2024-2027.
Member, Masters of the Learning Sciences Committee, 2023-.
Member, Recruitment ad hoc Task Force, 2024-2025.
Member, STEM Education Committee, 2023-2025.

School-Level

Member, Faculty Advisory Committee, 2025-
Executive Committee Member, Simmons PhD Committee, 2024-2027.
Member, Recruitment Sub-Committee, 2024-2026.
Member, Curriculum Revision ad hoc Sub-Committee, 2023-2025.

University-Level

Member, Faculty Search Committee for Professor and Frensley Endowed Chair, Department of Statistics & Data Science, 2024-2025.