NOBORU MATSUDA

Director, Innovative Educational Computing Laboratory
Associate Professor

Department of Computer Science
North Carolina State University   **Email**: Noboru.Matsuda@ncsu.edu
890 Oval Dr., Raleigh NC 27606   **Web**: go.ncsu.edu/matsuda

EDUCATION

PhD, Intelligent Systems (Advisor: Kurt VanLehn, currently at Arizona State University)
     University of Pittsburgh, Pittsburgh, PA, November 2004

MS, Mathematics Education
     Tokyo Gakugei University, Tokyo, Japan

BS, Mathematics Education
     Tokyo Gakugei University, Tokyo, Japan

RESEARCH INTERESTS

Advanced Technology Innovation and Integration for Educational Studies and Practice
     Artificial Intelligence; Machine Learning; Educational Data Mining; Intelligent tutoring systems; Pedagogical agents

Human-Computer Interaction in Education
     Human-Centered Educational Technology Design; Tangible Educational Manipulatives

Sciences of Learning
     Cognitive theories of learning and teaching; Computational model of learning; Cognitive modeling for teaching, learning, and problem solving; Math education

Adaptive Instruction for Online Learning Environment
     Learning Engineering; Integration of Intelligent Tutoring and Online Course Technologies; Big Learning Data Analytics

PROFESSIONAL EXPERIENCE

8/2018 – Current   **North Carolina State University**   Raleigh, NC

Associate Professor

Department of Computer Science, College of Engineering

7/2015 – 8/2018   **Texas A&M University**   College Station, TX

Associate Professor of Cyber STEM Education

Department of Teaching, Learning, & Culture, College of Education & Human Development

6/2009 – 7/2015   **Carnegie Mellon University**   Pittsburgh, PA

Systems Scientist

Human-Computer Interaction Institute, School of Computer Science

11/2004 – 5/2009   **Carnegie Mellon University**   Pittsburgh, PA

Postdoctoral Research Fellow

Human-Computer Interaction Institute, School of Computer Science

SimStudent Project at the Pittsburgh Science of Learning Center (PSLC)

1/1999 – 10/2004   **University of Pittsburgh**   Pittsburgh, PA

Graduate Student Researcher

Learning Research and Development Center

Advanced Geometry Intelligent Tutoring System Project at the Center for Interdisciplinary Research on Constructive Learning Environments (CIRCLE)

3/1998 – 12/1998   **University of Pittsburgh**   Pittsburgh, PA

Visiting Scholar

Learning Research and Development Center

4/1993 – 12/1998   **University of Electro Communications**   Tokyo, Japan

Assistant Professor

Graduate School of Information Systems

4/1988 – 3/1993   **Kanazawa Institute of Technology**   Kanazawa, Japan

Assistant Professor

Center for Computer Assisted Instruction

PUBLICATIONS

[Note: Authors with an asterisk are graduate student advisees and mentees]

Journal Papers

J32.   Matsuda, N., Lv, D.*, & Zheng, G. (2023). Teaching How to Teach Promotes Learning by Teaching. *International Journal of Artificial Intelligence in Education, 33*, 720–751. doi: 10.1007/s40593-022-00306-1

J31.   Matsuda, N. (2023). Teachable Agent as an Interactive Tool for Cognitive Task Analysis: A Case Study for Authoring an Expert Model. *International Journal of Artificial Intelligence in Education, 32*, 48-75. doi: 10.1007/s40593-021-00265-z

J30.   Matsuda, N., Wood, J.*, Shrivastava, R.*, Shimmei, M.*, & Bier, N. (2022). Latent Skill Mining and Labeling from Courseware Content. *Journal of Educational Data Mining*, *14*(2), 1-31.

J29.   Matsuda, N. (2022). Teachable Agent as an Interactive Tool for Cognitive Task Analysis: A Case Study for Authoring an Expert Model. *International Journal of Artificial Intelligence in Education*, 32, 48-75 [Impact factor: 4.33]

J28.   Zhang, Z.*, Duan, X., & Matsuda, N. (2021). Building Place-based Research in a Study Abroad Program: Interdisciplinary Pedagogical Approaches to Learning about Cultural Sites. *Perspectives on Undergraduate Research and Mentoring, 9*(1), 1-16.

J27.   Zimmer, W. K.*, McTigue, E. M., & Matsuda, N. (2021). Development and validation of the teachers' digital learning identity survey. *International Journal of Educational Research, 105*, 101717. doi: https://doi.org/10.1016/j.ijer.2020.101717 [Impact Factor: 1.794]

J26.   Matsuda, N., Weng, W.*, & Wall, N.* (2020). The effect of metacognitive scaffolding for learning by teaching a teachable agent. *International Journal of Artificial Intelligence in Education*, 30(1), 1-37.

J25.   Matsuda, N. (2018). The State-of-the-Art Pedagogical Agent Technology in the Field of Learning Science. *Journal of Japan Society for Information and Systems in Education*, 35(1), 13-20.

J24.   Namatame, M., & Matsuda, N. (2016) Development of a peer review system for art education and its evaluation. *Transactions of Japan Society of Kansei Engineering*, 15(4),425-430.

J23.   Toyose, K., Asaba, N., Yamaguchi, H., & Nishino, K., Matsuda, N. (2015). Application of Waka-Kansei Database for Learning Japanese Waka in Middle School. *Japan Journal of Educational Technology*, 38(4), 329-340.

J22.   Matsuda, N., Cohen, W. W., & Koedinger, K. R. (2015). Teaching the Teacher: Tutoring SimStudent leads to more Effective Cognitive Tutor Authoring. *International Journal of Artificial Intelligence in Education, 25*, 1-34.

J21.   Li, N.*, Matsuda, N., Cohen, W. W., & Koedinger, K. R. (2015). Integrating representation learning and skill learning in a human-like intelligent agent. *Artificial Intelligence, 219*, 67-91. doi: http://dx.doi.org/10.1016/j.artint.2014.11.002 [Impact factor: 2.709]

J20.   Matsuda, N., Yarzebinski, E., Keiser, V., Raizada, R., Stylianides, G. J., & Koedinger, K. R. (2013). Studying the Effect of a Competitive Game Show in a Learning by Teaching Environment. *International Journal of Artificial Intelligence in Education*, 23(1-4), 1-21. [Invited paper for the special issue on the Best of ITS2012]

J19.   Matsuda, N., Yarzebinski, E., Keiser, V., Raizada, R., William, W. C., Stylianides, G. J., & Koedinge, K. R. (2013). Cognitive anatomy of tutor learning: Lessons learned with SimStudent. *Journal of Educational Psychology, 105*(4), 1152-1163. doi: 10.1037/a0031955 [Impact factor: 2.909]

J18.   Rodrigo, M. M. T., Geli, R. I. A. M., Ong, A., Vitug, G. J. G., Bringula, R., Basa, R. S., . . . Matsuda, N. (2013). Exploring the Implications of Tutor Negativity Towards a Synthetic Agent in a Learning-by-Teaching Environment. *Philippine Computing Journal, 8*(1), 15-20.

J17.   Toyose, H., Nishino, N., Asaba, N., & Matsuda, N. (2012). An empirical study on the effect of Kansei-database for middle school students to learn Waka-reading comprehension. *Japan Journal of Educational Technology*, 36(2), 125-134.

J16.   Matsuda, N. & VanLehn, K. (2004). GRAMY: A geometry theorem prover capable of construction. *Journal of Automated Reasoning*, 32(1), 3-33.

J15.   Ochi, T.*, Matsuda, N., & Okamoto, T. (1998). An object oriented distributed working environment to integrate cooperative work and personal work. *Transactions of Information Processing Society of Japan*, *39*(1), 123-130.

J14.   Yoshida, T.*, Matsuda, N., & Okamoto, T. (1997). The system for supporting to learn/diagnose Z notation. *Transaction of Japan Society for Information and Systems in Education*, *14*(1), 3-12.

J13.   Okamoto, T., Matsuda, N., & Sasaki, H.* (1996). Intelligent CAI for geometric theorem proving with dynamic manipulative interface. *Transactions of Information Processing Society of Japan*, *37*(9), 1679-1687.

J12.   Okamoto, T., Matsuda, N., & Furiya, T.* (1995). A Study of the relationship between programming abilities and academic achievement in junior high school mathematics. *Japan Journal of Educational Technology*, *19*(2), 85-100.

J11.   Okamoto, T., Morihiro, K.*, Matsuda, N., & Takuma, S. (1994). Application of analogical reasoning and extraction of tutoring rules for concept-formation learning. *Electronics and Communications in Japan Part Iii-Fundamental Electronic Science*, *77*(3), 75-86.

J10.   Okamoto, T., Matsuda, N., & Yasuda, K.* (1994). Study of CAI with algorithm diagnosis system for novice C programmers. *Journal of Japan Society for CAI*, *11*(2), 63-74.

J09.   Matsuda, N. & Okamoto, T. (1993). Student modeling for procedural problem solving. *The IEICT* (*Institution of Electronics, Information, and Communication Engineering*) *Trans. of Informatics & Systems*, *E77-D*(1), 49-56.

J08.   Matsuda, N., Nagashima, S., Okamoto, T., & Takuma, S. (1993). On the system of learning and diagnosis for fostering space concept. *Journal of Japan Society for CAI*, *10*(3), 114-121.

J07.   Matsuda, N. & Okamoto, T. (1992). Student model and its recognition by hypothesis-based reasoning in ITS. *Journal of Electronics and Communications in Japan*, *Part III*, *75*(8), 85-95.

J06.   Okamoto, T. & Matsuda, N. (1992). Overview on the studies of intelligent CAIs/ITSs in Japan. *Educational Technology Research*, *15*(1-2), 1-8.

J05.   Matsuda, N. & Okamoto, T. (1992). Mental model of the process of composing geometric proofs using an intelligent tutoring system. *Japan Journal of Educational Technology*, *15*(4), 167-182.

J04.   Okamoto, T., Matsuda, N., & Takuma, S. (1991). A knowledge based CAD to support students' learning elementary geometric concepts and diagnosing their misconceptions. *Japan Journal of Educational Technology*, *14*(4), 147-157.

J03.   Matsuda, N. & Okamoto, T. (1990). An automatic generation of knowledge-base for an intelligent CAI on geometry theorem proving and a GUI to draw geometric figures. *Transactions of the Institution of Electronics, Information, and Communication Engineering*, *J73-D-II*(1), 88-99.

J02.   Okamoto, T. & Matsuda, N. (1989). Learning to recognize students' plan in geometry proof using intelligent CAI. *Transactions of Information Processing Society of Japan*, *30*(8), 1046-1057.

J01.   Okamoto, T. & Matsuda, N. (1988). An intelligent CAI for geometry proof. *Transactions of Information Processing Society of Japan*, *29*(3), 311-324.

Peer-reviewed Conference Papers

C42.   Shimmei, M., Uto, M., Matsubayashi, Y., Inui, K., Mallavarapu, A., & Matsuda, N. (2025; to appear). Tell me who your students are: GPT can generate valid multiple-choice questions when students' (mis)understanding is hinted. In A. I. Cristea, E. Walker, L. Yu, O. C. Santos & S. Isotani (Eds.), *Proceedings of the International Conference on Artificial Intelligence in Education* (pp. 1-8; Late Breaking Results): Springer. [0.36 acceptance rate out of 200 submissions]

C41.   Shahriar, T.*, & Matsuda, N. (2024). "I am confused! How to differentiate between…?" Adaptive Followup Questions Facilitate Tutor Learning with Effective Time-on-task. In Andrew, Irene & Zitao (Eds.), *Proceedings of the International Conference on Artificial Intelligence in Education* (pp. 1-14): Springer. [0.15 acceptance rate out of 334 submissions]

C40.   Shahriar, T.*, & Matsuda, N. (2023). What and how you explain matters: Inquisitive Teachable Agent Scaffolds Knowledge-building for Tutor Learning. In N. Wang, G. Rebolledo-Mendez, O. C. Santos, V. Dimitrova & N. Matsuda (Eds.), *Proceedings of the International Conference on Artificial Intelligence in Education* (pp. 126-138): Springer. [0.21 acceptance rate out of 251 submissions]

C39.   Shimmei, M.*, & Matsuda, N. (2023). Machine-Generated Questions Attract Instructors when Acquainted with Learning Objectives. In N. Wang, G. Rebolledo-Mendez, O. C. Santos, V. Dimitrova & N. Matsuda (Eds.), *Proceedings of the International Conference on Artificial Intelligence in Education* (pp. 3-15): Springer. [0.21 acceptance rate out of 251 submissions]

C38.   Shimmei, M.*, & Matsuda, N. (2023). Can't Inflate Data? Let the Models Unite and Vote: Data-agnostic Method to Avoid Overfit with Small Data. In R. Agrawal, Y. Narahari, M. Pechenizkiy, M. Feng, T. Käser & P. Talukdar (Eds.), *Proceedings of the International Conference on Educational Data Mining* (pp. 1-10): Educational Data Mining Society. *Recipient of the Honorable Mention Award*

C37.   Shimmei, M.*, & <u>Matsuda, N.</u> (2022). Finding Key Concepts to Automatically Generate Pedagogically Valuable Questions for Learning Objectives *Paper presented at the Annual Meeting of the American Educational Research Association* (pp. 1-7). *Nominee for the Best Paper award and for the Best Student Paper award*

C36.   Shimmei, M.*, & <u>Matsuda, N.</u> (2021). Learning Association between Learning Objectives and Key Concepts to Generate Pedagogically Valuable Questions. In I. Roll & D. McNamara (Eds.), *Proceedings of the International Conference on Artificial Intelligence in Education* (pp. 320-324, short paper).

C35.   Shahriar, T.*, & <u>Matsuda, N.</u> (2021). Can you clarify what you said?—Studying the impact of tutee agent's follow-up questions on tutor's learning. In I. Roll & D. McNamara (Eds.), *International Conference on Artificial Intelligence in Education* (pp. 1-10). [0.24 acceptance rate out of 168 submissions]

C34.   Shimmei, M.*, & <u>Matsuda, N.</u> (2020). Learning a Policy Primes Quality Control: Towards Evidence-Based Automation of Learning Engineering. In A. Rafferty & J. Whitehill (Eds.), *Proceedings of the International Conference on Educational Data Mining* (pp. 1-9): EDM. [0.30 acceptance rate out of 96 submissions]

C33.   Shimmei, M.*, & <u>Matsuda, N.</u> (2019). Evidence-Based Recommendation for Content Improvement UsingReinforcementLearning. In S. Isotani, A. Ogan, B. McLaren, E. Millán, P. Hastings & R. Luckin (Eds.), *Proceedings of the International Conference on Artificial Intelligence in Education* (pp. 369-373). Cham, Switzerland: Springer. *Doctoral consortium scholarship winner*

C32.   Inventado, P. S., Inventado, S. G. F., <u>Matsuda, N.</u>, Li, Y., Scupelli, P., Ostrow, K., . . . McGuire, P. (2019). Using Design Patterns for Math Preservice Teacher Education. In T. Isaku (Ed.), *Proceedings of the 23rd European Conference on Pattern Languages of Programs* (pp. 1-8). Irsee, Germany: ACM.

C31.   <u>Matsuda, N.</u>, Sekar, V. P. C., & Wall, N. (2018). Metacognitive scaffolding amplifies the effect of learning by teaching a teachable agent. In B. McLaren & B. du Boulay (Eds.), *Proceedings of the International Conference on Artificial Intelligence in Education* (pp. 311-323). [0.25 acceptance rate out of 186 submissions]

C30.   Dumdumaya, C., Banawan, M., Rodrigo, M. M., Ogan, A., Yarzebinski, E., & <u>Matsuda, N.</u> (2017). Investigating the Effects of Cognitive and Metacognitive Scaffolding on Learners using a Learning by Teaching Environment. In W. e. a. Chen (Ed.), *Proceedings of the International Conference on Computers in Education* (pp. 1-10). [0.23 acceptance rate out of 213 submissions].

C29.   Yarzebinski, E., Dumdumaya, C., Rodrigo, M. M. T., <u>Matsuda, N.</u>, & Ogan, A. (2017). Regional Cultural Differences in How Students Customize Their Avatars in Technology-Enhanced Learning *Proceedings of the International Conference on Artificial Intelligence in Education* (pp. 598-601).

C28.   <u>Matsuda, N.</u>, Barbalios, N., Zhao, J., Ramamurthy, A., Stylianides, G., & Koedinger, K. R. (2016). Tell me how to teach, I'll learn how to solve problems. In A. Micarelli, J. Stamper & K. Panourgia (Eds.), *Proceedings of the International Conference on Intelligent Tutoring Systems* (pp. 111-121). Switzerland: Springer. [0.15 acceptance rate out of 134 submissions]

C27.   <u>Matsuda, N.</u>, Van Velsen, M., Barbalios, N., Lin, L., Vasa, H., Hosseini, R., . . . Bier, N. (2016). Cognitive Tutors Produce Adaptive Online Course: Inaugural Field Trial. In A.

Micarelli, J. Stamper & K. Panourgia (Eds.), *Proceedings of the International Conference on Intelligent Tutoring Systems* (pp. 327-333). Switzerland: Springer. [0.27 acceptance rate out of 119 submissions]

C26. Matsuda, N., Chandrasekaran, S., & Stamper, J. (2016). How quickly can wheel spinning be detected? In T. Barnes, M. Chi & M. Feng (Eds.), *Proceedings of the International Conference on Educational Data Mining* (pp. 607-608).

C25. Matsuda, N., Furukawa, T., Bier, N., & Faloutsos, C. (2015). Machine beats experts: Automatic discovery of skill models for data-driven online course refinement. In J. G. Boticario, O. C. Santos, C. Romero, M. Pechenizkiy, A. Merceron, P. Mitros, J. M. Luna, C. Michaescu, P. Moreno, A. Hershkovitz, S. Ventura & M. C. Desmarais (Eds.), *Proceedings of the International Conference on Educational Data Mining* (pp. 101-108). Madrid, Spain.

C24. Yarzebinski, E., Ogan, A., Rodrigo, M. M. T., & Matsuda, N. (2015) Understanding Students' Use of Code-switching in a Learning by Teaching Technology. In C. Conati & N. Heffernan (Eds.), *Proceedings of the international conference on artificial intelligence in education* (pp. 504-516). [0.29 acceptance rate out of 170 submissions]

C23. Matsuda, N., Griger, C. L., Barbalios, N., Stylianides, G., Cohen, W. W., & Koedinger, K. R. (2014). Investigating the Effect of Meta-Cognitive Scaffolding for Learning by Teaching. In S. Trausen-Matu & K. Boyer (Eds.), *Proceedings of the International Conference on Intelligent Tutoring Systems* (pp.104-113). Switzerland: Springer [0.17 acceptance rate out of 177 submissions]

C22. MacLellan, C., Koedinger, R. K., & Matsuda, N. (2014). Authoring Tutors with SimStudent: An Evaluation of Efficiency and Model Quality. In S. Trausen-Matu & K. Boyer (Eds.), *Proceedings of the International Conference on Intelligent Tutoring Systems* (pp. 551-560). Switzerland: Springer. [0.17 acceptance rate out of 177 submissions]

C21. Matsuda, N., Yarzebinski, E., Keiser, V., Raizada, R., William, W. C., Stylianides, G., et al. (2012). Shallow learning as a pathway for successful learning both for tutors and tutees *Proceedings of the Annual Conference of the Cognitive Science Society* (pp. 731-736). Austin, TX: Cognitive Science Society.

C20. Matsuda, N., Yarzebinski, E., Keiser, V., Raizada, R., Stylianides, G., Cohen, W. W., et al. (2012). Motivational factors for learning by teaching: The effect of a competitive game show in a virtual peer-learning environment. In S. Cerri & W. Clancey (Eds.), *Proceedings of International Conference on Intelligent Tutoring Systems* (pp. 101-111). Heidelberg, Berlin: Springer-Verlag. [acceptance rate: 0.15] *Nominee for the best paper award*

C19. Carlson, R., Matsuda, N., Koedinger, K. R., & Rose, C. (2012). Building a Conversational SimStudent. In S. Cerri & W. Clancey (Eds.), *Proceedings of International Conference on Intelligent Tutoring Systems* (pp. 563-569). Heidelberg, Berlin: Springer-Verlag.

C18. Matsuda, N., Keiser, V., Raizada, R., Yarzebinski, E., Watson, S., Stylianides, G. J., et al. (2012, accepted). Studying the Effect of Tutor Learning using a Teachable Agent that asks the Student Tutor for Explanations. In M. Sugimoto, V. Aleven, Y. S. Chee & B. F. Manjon (Eds.), *Proceedings of the International Conference on Digital Game and Intelligent Toy Enhanced Learning (DIGITEL 2012)* (pp. 25-32). Los Alamitos, CA: IEEE Computer Society [acceptance rate: 0.13] *Nominee for the best paper award*

C17. Ogan, A., Finkelstein, S., Mayfield, E., D'Adamo, C., Matsuda, N., & Cassell, J. (2012). "Oh, dear Stacy!" Social interaction, elaboration, and learning with teachable agents. In *Proceedings of CHI2012*. [acceptance rate: 0.23]

C16. Matsuda, N., Yarzebinski, E., Keiser, V., Raizada, R., Stylianides, G., Cohen, W. W., et al. (2011). Learning by Teaching SimStudent – An Initial Classroom Baseline Study comparing with Cognitive Tutor. In G. Biswas & S. Bull (Eds.), *International Conference on Artificial Intelligence for Education* (pp. 213-221): Springer.

C15. Li, N., Matsuda, N., Cohen, W. W., & Koedinge, K. R. (2011). A Machine Learning Approach for Automatic Student Model Discovery. In C. Conati & S. Ventura (Eds.), *Proceedings of the International Conference on Educational Data Mining*.

C14. Matsuda, N., Cohen, W. W., Koedinger, K. R., & Stylianides, G. (2010). Learning to solve algebraic equations by teaching a computer agent. In M. F. Pinto & T. F. Kawasaki (Eds.), *Proceedings of the Conference of the International Group for the Psychology of Mathematics Education* (Vol. 2, pp. 69).

C13. Matsuda, N., Keiser, V., Raizada, R., Tu, A., Stylianides, G., Cohen, W. W., et al. (2010). Learning by Teaching SimStudent: Technical Accomplishments and an Initial Use with Students. In V. Aleven, J. Kay & J. Mostow (Eds.), *Proceedings of the International Conference on Intelligent Tutoring Systems* (pp. 317-326). Heidelberg, Berlin: Springer. [acceptance rate: 0.38]

C12. Matsuda, N., Lee, A., Cohen, W. W., & Koedinger, K. R. (2009). A Computational Model of How Learner Errors Arise from Weak Prior Knowledge. In N. Taatgen & H. van Rijn (Eds.), *Proceedings of the Annual Conference of the Cognitive Science Society* (pp. 1288-1293). Austin, TX: Cognitive Science Society. [acceptance rate: 0.32]

C11. Matsuda, N., Cohen, W. W., Sewall, J., Lacerda, G., & Koedinger, K. R. (2008). Why Tutored Problem Solving may be better than Example Study: Theoretical Implications from a Simulated-Student Study. In B. P. Woolf, E. Aimeur, R. Nkambou & S. Lajoie (Eds.), *Proceedings of the International Conference on Intelligent Tutoring Systems* (pp. 111-121). Heidelberg, Berlin: Springer. [acceptance rate: 0.33]

C10. Matsuda, N., Cohen, W. W., & Koedinger, K. R. (2007). Evaluating a simulated student using real students data for training and testing. In C. Conati, K. McCoy & G. Paliouras (Eds.), *Proceedings of the international conference on User Modeling* (LNAI 4511) (pp. 107-116). Berlin, Heidelberg: Springer. [acceptance rate: 0.20]

C09. Matsuda, N., Cohen, W. W., & Koedinger, K. R. (2007). Predicting students performance with SimStudent that learns cognitive skills from observation. In R. Luckin, K. R. Koedinger & J. Greer (Eds.), *Proceedings of the International Conference on Artificial Intelligence in Education* (pp. 467-476). Amsterdam, Netherlands: IOS Press. [acceptance rate: 0.30]

C08. Matsuda, N., Cohen, W. W., & Koedinger, K. R. (2005). Building Cognitive Tutors with Programming by Demonstration. In S. Kramer & B. Pfahringer (Eds.), *Proceedings of the International Conference on Inductive Logic Programming* (Technical report: TUM-I0510) (pp. 41-46): Institut fur Informatik, Technische Universitat Munchen

C07. Matsuda, N., & VanLehn, K. (2005). Advanced Geometry Tutor: An intelligent tutor that teaches proof-writing with construction. In C.-K. Looi, G. McCalla, B. Bredeweg & J. Breuker (Eds.), *Proceedings of The 12th International Conference on Artificial Intelligence in Education* (pp. 443-450). Amsterdam: IOS Press. [acceptance rate: 0.31]

C06.   Matsuda, N. & VanLehn, K. (2003). Modeling Hinting Strategies for Geometry Theorem Proving. In P. Brusilovsky, A. Corbett & F. de Rosis (Eds.), *Proceedings of the 9th International Conference on User Modeling* (pp.373-377), Berlin, Heidelberg: Springer.

C05.   Matsuda, N. & VanLehn, K. (2000). A Reification of a Strategy for Geometry Theorem Proving. In G. Gauthier, C. Frasson & K. VanLehn (Eds.), *Proceedings of the International Conference on Intelligent Tutoring Systems* (Lecture Notes in Computer Science, No.1839, p.660), Berlin, Heidelberg: Springer.

C04.   Matsuda, N. & Okamoto, T. (1998). Diagrammatic Reasoning for Geometry ITS to Teach Auxiliary Line Construction Problem. In B. P. Goettl, H. M. Halff, C. L. Redfield & V. J. Shute (Eds.), *Proceedings of the International Conference on Intelligent Tutoring Systems*, (Lecture Notes in Computer Science No.1452, pp.244-253), Heidelberg, Berlin: Springer.

C03.   Matsuda, N. & Okamoto, T. (1996). Parallel Computing Model for Problem Solver Towards ITSs. In C. Frasson, G. Gauthier & A. Lesgold (Eds.), *Proceedings of the International Conference on Intelligent Tutoring Systems* (Lecture Notes in Computer Science No.1086, pp.234-242), Heidelberg, Berlin: Springer.

C02.   Matsuda, N. & Okamoto, T. (1994). Student Modeling for an ITS to Study Problem Solving. In H Ueno & V. L. Stefanuk (Eds.), *Proceedings of Japan-CIS Symposium on Knowledge Based Software Engineering* (pp.94-99), Saitama, Japan: Isshinsha.

C01.   Matsuda, N. & Okamoto, T. (1992). Student Model Diagnosis for Adaptive Instruction in ITS. In C. Frasson, G. Gauthier & G.I. McCalla (Eds.), *Proceedings of the International Conference on Intelligent Tutoring Systems* (Lecture Notes in Computer Science No.608, pp.467-474), Heidelberg, Berlin: Springer-Varlag.

Workshops, Symposiums, and other Conferences

W14.   Zhang, Z.*, Dong, Z*., Shi, Y.*, Price, T., Matsuda, N., & Xu, D. (2024). Students' Perceptions and Preferences of Generative Artificial Intelligence Feedback for Programming. In M. Neumann & S. Rosenthal (Eds.), *Proceedings on the 14th Symposium on Educational Advances in Artificial Intelligence* (pp.1-9). Vancouver: AAAI.

W13.   Shimmei, M.*, & Matsuda, N. (2022). Automatic Question Generation for Evidence-based Online Courseware Engineering. *The 4th Workshop on Intelligent Textbooks at the 23th International Conference on Artificial Intelligence in Education* (pp. 1-7).

W12.   Shimmei, M.*, & Matsuda, N. (2021). Learning Association between Learning Objectives and Key Concepts to Generate Pedagogically Valuable Questions. In I. Roll & D. McNamara (Eds.), *International Conference on Artificial Intelligence in Education* (pp. 1-4; Short paper).

W11.   Matsuda, N., & Shimmei, M.* (2019). Application of Reinforcement Learning For Automated Contents Validation Towards Self-Improving Online Courseware. In B. Goldberg (Ed.), *Proceedings of the Annual GIFT User Symposium* (pp. 57-65). Orlando, FL: U.S. Army Combat Capabilities Development Command Soldier Center.

W10.   Park, S.*, & Matsuda, N. (2018). A Scalable Method for Rapid and Efficient Skill Discovery for Next-Generation Adaptive Online Courseware *Paper presented at the Annual Meeting of the American Educational Research Association*. New York, NY.

W09. Matsuda, N., Stylianides, G. J., & Koedinger, K. R. (2015). Studying the Effect of Guided Learning by Teaching in Learning Algebra Equations. *Paper presented at the Annual Meeting of the American Educational Research Association* Chicago, IL.

W08. Matsuda, N., Stylianides, G. J., Cohen, W. W., & Koedinger, K. R. (2014). Using a Synthetic Peer to Investigate the Effect of Competitive Learning by Teaching in Mathematics. *Paper presented at the Annual Meeting of the American Educational Research Association*. Philadelphia, PA

W07. MacLellan, C. J., Matsuda, N., & Koedinger, K. R. (2013). Toward a reflective SimStudent: Using experience to avoid generalization errors. In G. McCalla & J. Champaign (Eds.), *Proceedings of the AIED Workshop on Simulated Learners* (pp. 51-60)

W06. Rodrigo, M. M. T., Ong, A., Bringula, R. P., Basa, R. S., Cruz, C. D., & Matsuda, N. (2013). Impact of Prior Knowledge and Teaching Strategies on Learning by Teaching. In G. McCalla & J. Champaign (Eds.), *Proceedings of the AIED Workshop on Simulated Learners* (pp. 71-80)

W05. Matsuda, N., Cohen, W. W., Koedinger, K. R., Stylianides, G., Keiser, V., & Raizada, R. (2010). Turning Cognitive Tutors into a Platform for Learning-by-Teaching with SimStudent Technology. In D. Pérez-Marín, I. Pascual-Nieto & S. Bull (Eds.), *Proceedings of the International Workshop on Adaptation and Personalization in E-B/Learning using Pedagogic Conversational Agents* (APLeC) (pp. 20-25). Hawaii.

W04. Li, N., Matsuda, N., Cohen, W., & Koedinger, K. (2010). Towards a computational model of why some students learn faster than others. *Proceedings of the AAAI 2010 Fall Symposium on the Cognitive and Metacognitive Educational Systems*. Arlington, VA.

W03. Matsuda, N., Cohen, W. W., & Koedinger, K. R. (2005). Applying Programming by Demonstration in an Intelligent Authoring Tool for Cognitive Tutors. In *AAAI Workshop on Human Comprehensible Machine Learning* (Technical Report WS-05-04) (pp. 1-8). Menlo Park, CA: AAAI association.

W02. Matsuda, N. & VanLehn, K. (2000). Decision Theoretic Instructional Planner for Intelligent Tutoring Systems. In B. du Boulay (Ed.), *Workshop Proceedings on Modeling Human Teaching Tactics and Strategies* (ITS2000, pp.72-83).

W01. Matsuda, N. (1998). Cognitive Contribution of Diagrammatic Reasoning Model towards Geometry ITS. In B. P. Goettl, H. M. Halff, C. L. Redfield, V. J. Shute (Eds.), *Workshop Proceedings on Cognitive Principles in Intelligent Tutoring Systems* (ITS98).

Book Chapters

B16. Matsuda, N., Shimmei, M.*, Chaudhuri, P.*, Makam, D.*, Shrivastava, R.*, Wood, J.*, & Taneja, P.* (2023). PASTEL: Evidence-based learning engineering methods to facilitate creation of adaptive online courseware. In F. Ouyang, P. Jiao, B. M. McLaren & A. H. Alavi (Eds.), *Artificial Intelligence in STEM Education: The Paradigmatic Shifts in Research, Education, and Technology* (pp. 93-108). New York, NY: CSC Press.

B15. Shimmei, M.*, & Matsuda, N. (2021). Interactive Online Course Engineering Using Reinforcement Learning with Students' Performance Profile. In H. Jiao & R. Lissitz (Eds.), *Enhancing Effective Instruction and Learning Using Assessment Data* (pp. 47-59). Charlotte, NC: Information Age Publishing.

B14.   Shen, S.*, Shimmei, M.*, Chi, M., & Matsuda, N. (2019). Applications of Reinforcement Learning to Self-Improving Educational Systems. In A. M. Sinatra, A. C. Graesser, X. Hu, K. Brawner & V. Rus (Eds.), *Design Recommendations for Intelligent Tutoring Systems* (Vol. 7: Self-Improving Systems, pp. 77-96). Orlando, FL: US Army Research Lab.

B13.   Matsuda, N. (2017). Natural language processing in educational systems. In Hitoshi Matsubara (Ed.) *Encyclopedia of Artificial Intelligence*. Tokyo: Japan Society of Artificial Intelligence (p. 1101)

B12.   Matsuda, N. (2017). Instructional Strategy. In Hitoshi Matsubara (Ed.) *Encyclopedia of Artificial Intelligence*. Tokyo: Japan Society of Artificial Intelligence (pp.1157-1159)

B11.   Matsuda, N. (2017). Intelligent Pedagogical Agents. In Hitoshi Matsubara (Ed.) *Encyclopedia of Artificial Intelligence*. Tokyo: Japan Society of Artificial Intelligence (pp.1152-1153)

B10.   Blessing, S. B., Aleven, V., Gilbert, S. B., Heffernan, N. T., Matsuda, N., & Mitrovic, A. (2015). Authoring Example-based Tutors for Procedural Tasks. In R. Sottilare, A. Graesser, X. Hu & K. Brawner (Eds.), *Design Recommendations for Adaptive Intelligent Tutoring Systems: Authoring Tools* (Vol. 3, pp. 71-94).

B09.   Matsuda, N. (2006). How to get a Ph.D in America. In Akira Arimoto and Ikuo Kitagaki (Eds.) *University Authority*, (pp.132-137). Tokyo: Minervashobo Publishers Inc.

B08.   Matsuda, N. (2005). Instructional strategies. In Hozumi Tanaka (Ed.) *Encyclopedia of Artificial Intelligence*. Tokyo: Japan Society of Artificial Intelligence.

B07.   Matsuda, N. (2005). Natural language processing in educational systems. In Hozumi Tanaka (Ed.) *Encyclopedia of Artificial Intelligence*. Tokyo: Japan Society of Artificial Intelligence.

B06.   Matsuda, N. (1999). Cognitive model of geometry theorem proving with construction and its application to intelligent tutoring systems. In Yoshishige Sugiyama (Ed.) *Towards new practical theories in mathematics education*. Tokyo: Toyokan Publishers Inc.

B05.   Matsuda, N. (1993). Computer networking. In Okamoto, T. (Ed.) *Introduction to Information Education for Teachers: Cases in High-School Education*, (pp.180-197). Tokyo: Personal Media.

B04.   Matsuda, N. (1992). Foundations of Computers. In Okamoto, T. (Ed.) *Introduction to Information Education for Teachers: Cases in Middle-School Education*, (pp.88-119). Tokyo: Personal Media.

B03.   Matsuda, N. (1990). What is CAI? In Okamoto, T. (Ed.) *Introduction to C Programming*, (pp.201-236). Tokyo: Personal Media.

B02.   Matsuda, N. & Kazuhiko Hatano (1990). Knowledge communication. In Okamoto, T. and Riichiro Mizoguchi (Eds.) *Artificial Intelligence and Tutoring Systems*, (pp.447-456). Tokyo: Ohmu Inc. This is a Japanese translation of Etienne Wenger, Artificial Intelligence and Tutoring Systems, Los Altos, CA: Morgan Kaufmann (1987).

B01.   Matsuda, N. (1988). Drill, Practice, and Machine Learning. In Okamoto, T., Kanji Akahori, and Setsuo Yokoyama (Eds.) *Computer environments for children*, (pp.21-40). Tokyo: Personal Media. This is a Japanese translation of Cynthia Solomon, Computer environments for children, Cambridge, MA: MIT Press (1986).

Dissertation

D1.   Matsuda, N. (2004). The impact of different proof strategies on learning geometry theorem proving. Unpublished Ph.D dissertation. University of Pittsburgh. Supervisor: Kurt VanLehn.

Other Publications

O03.   Matsuda, N. (2018) The State-of-the-art Pedagogical Agent Tecnology in the Field of Learning Science. Column. Transactions of Japan Society for Information and Systems in Education. 35(1), pp.13-20.

O02.   Matsuda, N., William W. Cohen, Jonathan Sewall, and Kenneth R. Koedinger (2006). Applying Machine Learning to Cognitive Modeling for Cognitive Tutors, Technical report CMU-ML-06-105, School of Computer Science, Carnegie Mellon University.

O01.   Matsuda, N., William W. Cohen, Jonathan Sewall, and Kenneth R. Koedinger (2006). What characterizes a better demonstration for cognitive modeling by demonstration? Technical report CMU-ML-06-106, School of Computer Science, Carnegie Mellon University.

Invited Talks

T28.   Development of data-driven AI technologies for building adaptive online courseware (2025). RIKEN Center for Advanced Intelligence Project Workshop. Tokyo, Japan.

T27.   Advancing the Theory of Learning by Teaching with a Teachable-agent Technology (2024). Asia-Pacific Society for Computers in Education (APSCE) Webinar series. Online.

T26.   Learning by Teaching a Teachable Agent that asks constructive questions and engages students in the knowledge building dialogue (2024). Invited speaker at the Global Artificial Intelligence Technology Conference. Online.

T25.   Artificial Intelligence for Evidence-Based Learning Engineering towards Adaptive Online Courseware (2023). Keynote at the International Conference on Artificial Intelligence and Technology-Enhanced Language Learning. Shanghai, China.

T24.   Learning by Teaching a Synthetic Peer: Lessons Learned, Now, and Then (2023). Human-Computer Interaction Institute, Carnegie Mellon University. Pennsylvania, PA.

T23.   Teachable Agent as an Interactive Tool for Cognitive Task Analysis (2022). Harvard Graduate School of Education. Boston, MA.

T22.   Current State of the Art Teachable Agent Technology—Theory and Practice (2021). Central Florida University. Orlando, FL.

T21.   Evidence-based Method for Iterative Online Course Engineering with Students' Performance Profile (2019). The Nineteenth Annual Maryland Assessment Research Center (MARC) Conference: Enhancing Effective Instruction and Learning Using Assessment Data Theory and Practice, Maryland, MD.

T20.   Evidence-based learning engineering method towards self-improving online courseware (2019). The 7th CyberPsychology and Behavioral Seminar. The School of Psychology, Central China Normal University. Wuhan, China.

T19. Evidence-based detection of ineffective content towards a realization of self-improving courseware (2019). The International Conference on Artificial Intelligence + Adaptive Education (AIAED). Beijing, China

T18. Evidence-based Learning Engineering Methods for Adaptive Online Courseware (2018). Department of Computer Science, North Carolina State University. Raleigh, NC.

T17. The current state-of-the-art in the sciences of learning in US (2016). The Second Forum for Young Researchers, Japan Society for Information Systems and Education. Osaka, Japan.

T16. Artificial intelligence is to change the education (2016). The Third Forum for Young Researchers, Japan Society for Information Systems and Education. Osaka, Japan

T15. Learning by Teaching :- Teaching how to teach. What does AI expect for the Sciences of Learning? (2016). SIG Advanced Learning Science and Technology, Japan Society of Artificial Intelligence. Hiroshima City University. Hiroshima, Japan.

T14. Pedagogical Agents as Methodology for Cyberlearning Research (2015). Department of Teaching, Learning, & Culture. Texas A&M University. College Station, TX.

T13. How are pedagogical agents changing education? (2015). Department of Educational Theory and Practice. University at Albany, State University of New York.

T12. Simulated Student as promising methodology to advance theories of learning (2014). Department of Teaching, Learning, & Culture. Texas A&M University. College Station, TX.

T11. SimStudent: An intelligent pedagogical agent that helps students learn and researchers learn how students learn (2014). Department of Computer & Information Science & Engineering, University of Florida. Gainesville, FL.

T10. Simulated student as a methodology to advance theories of learning (2014). Learning Sciences Institute, Arizona State University. Phoenix, AZ.

T09. Simulated Learners: Amplifying research beyond simulation (2013). A keynote at the International AIED Workshop on Simulated Learners. Memphis, TN.

T08. SimStudent: A Teachable Agent that advances theories of learning (2011). Department of Instructional Technology and Learning Sciences, Utah State University. Logan, UT.

T07. SimStudent: A Pedagogical Machine-Learning Agent and its Application for the Sciences of Learning (2010). Department of Instruction Science, Sungkyunkwan University. Seoul, Korea.

T06. SimStudent for STEM Education: A synthetic student to explore theories of learning and build effective interventions (2009). School of Education, Public Policy and Civic Engagement, University of Massachusetts Dartmouth. Fairhaven, MA.

T05. SimStudent: Teaching a smart machine to learn how people learn (2008). Human Computer Interaction Graduate Program, Iowa State University. Ames, IA.

T04. Beyond Building Cognitive Tutors by Demonstration – When SimStudent helps building a bridge between technology and education (2007). School of Education, Stanford University. Palo Alto, CA.

T03. Using Simulated Student to build Cognitive Tutors and beyond – Cognitive Modeling with Programming by Demonstration (2006). Department of Computer Science Colloquium, Northern Illinois University. DeKalb, IN.

T02. Building Cognitive Model for Cognitive Tutors by Demonstration (2006). Seminar series on e-Learning, Kumamoto University. Kumamoto, Japan.

T01. Building Robust Learning Theories for Robust Learning (2006). International Symposium on e-Learning, Osaka Prefecture University. Osaka, Japan.

Press

P03. NC State University News (2023). Pop Quiz: AI Matches Human Performance at Developing Good Test Questions. https://news.ncsu.edu/2023/05/ai-test-questions

P02. College of Education and Human Development, Texas A&M University (2016). Research Highlights Impact Of Learning By Teaching. http://transform.tamu.edu/news/research-highlights-impact-learning-teaching

P01. The Battalion (2016). Teaching computers to learn. http://www.thebatt.com/science-technology/teaching-computers-to-learn/article_c0e1ec7a-a798-11e6-a39e-7f979564df5c.html

PATENT

2016   Nan Li, William W. Cohen, Kenneth R. Koedinger, and Noboru Matsuda. *An Intelligent System with Integrated Representation Learning and Skill Learning*. US Patent 20,160,026,932.

GRANTS

Major Federal Grants

Current -

2024/08   **National Science Foundation, Research on Innovative Technologies for Enhanced Learning (RITEL)**
Le*arning by teaching with constructive tutee inquiry for robust learning in algebra*. Principal Investigator (with Shiyan Jiang). Aug 15, 2024 to Aug. 14, 2027. Award No. 2418586. $916,000

Past -

2018/09   **Department of Education, Institute of Education Sciences, Education Technology**
Developing an online learning environment for learning algebra by teaching a synthetic peer. Principal Investigator. September 1, 2018 to August 31, 2024. Award No. R305A180319. $1,399,947

2020/07   **National Science Foundation, Cyberlearning and Future Learning Technologies**
Collaborative Research: Cyberinfrastructure for Robust Learning of Interconnected Knowledge. Principal Investigator (with Norman Bier and David Yaron). July 1, 2020 to June 30, 2024. Award No. 2016966. $434,884

2016/09   **National Science Foundation, Cyberlearning and Future Learning Technologies**

Exploratory study on the Adaptive Online Course and its implication on synergetic competency. <u>Principal Investigator</u> (with Norman Bier and Larry Johnson). August 1, 2016 to July 31, 2018. Award No. 1623702. $566,000

2014/08   **National Science Foundation, Research on Education and Learning (DIR)**

Data-Driven Methods to Improve Student Learning from Online Courses. <u>Principal Investigator</u> (with Norman Bier, John Stamper, and Ken Koedinger). August 1, 2014 to July 31, 2017. Award No. 1418244. $520,740

2013/10   **National Science Foundation, Research on Education and Learning (REAL)**

Learning by Teaching a Synthetic Peer: Investigating the effect of tutor scaffolding for tutor learning. <u>Principal Investigator</u> (with co-PIs: Kenneth R. Koedinger, William W. Cohen, and Gabriel Stylianides). October 1, 2013 to September 30, 2017. Award No. 1252440. $1,519,349

2012/07   **National Science Foundation, Transforming Undergraduate Education in Science, Technology, Engineering and Mathematics (TUES)**

Improving Students' Professional Communication Skills by Employing an Integrated System of Learning Tools and Methods. <u>Senior Project Personnel</u> (PI: Suguru Ishizaki). July 2012 to June 2014. Award No. DUE-1140134. $199,995

2009/08   **National Science Foundation, Research and Evaluation on Education in Science and Engineering (REESE)**

Learning by Teaching a Synthetic Student: Using SimStudent to Study the Effect of Tutor Learning. <u>Principal Investigator</u> (with co-PIs: Kenneth R. Koedinger, William W. Cohen, and Gabriel J. Stylianides). August 1, 2009 to July 31, 2012. Award No. 0910176. $553,239

2009/06   **Department of Education, Institute of Education Sciences, Education Technology**

Learning by Teaching Synthetic Student: Using SimStudent to Study the Effect of Tutor Learning. <u>Principal Investigator</u> (with co-PIs: Kenneth R. Koedinger, William W. Cohen, and Gabriel J. Stylianides). June 1, 2009 to May 31, 2012. Award No. R305A090519. $1,413,273

2005/09   **National Science Foundation, Advanced Learning Technologies (ALT)**

Building Cognitive Tutors with Programming by Demonstration: When Simulated Students help Cognitive Modeling and Educational Studies. Co-Principal Investigator (PI: William W. Cohen, CMU). September 15, 2005 to August 31, 2009. Award No. REC-0537198. $499,473

Other Grants

Past -

2022/06   **North Carolina State University, Faculty Research and Professional Development Program (FRPD)**

Investigating the effect of interactive map comparison as a facilitator of Multivocal Thinking in history education. Principal Investigator. July 1, 2022 to June 30, 2023. $8,000.

2018/10 **North Carolina State University, Non-laboratory Scholarship/Research Support Program (NSRP)**

Visualizing Cultural Landmarks: An Interactive 3D Map of China's West Lake. Co-Principal Investigator (PI: Xiaolin Duan). November 1, 2018 to October 31, 2019. $11,380.

2016/12 **College of Education and Human Development, Texas A&M University, Catapult Grants**

Learning to Write in a Digital Age: Technology-Enhanced Intervention for Young At-Risk Writers. Co-Principal Investigator (PI: Li-Jen Kuo with Quentin Dixon). December 1, 2016 to November 31, 2017. $30,000

2016/11 **Department of Teaching, Learning and Culture, Texas A&M University, Recap Renew, Rebuild & Reinvest Awards**

Minding the Gap: STEM Opportunity, Choice & Achievement in Texas High Schools. Co-Principal Investigator (with PI: Hersh Waxman). November 1, 2016 to October 31, 2017. $65,000

2015/02 **Carnegie Mellon University, ProSEED/Simon Initiative Seed Grants**

Facilitating online course engineering with adaptive tutors using intelligent pedagogical agent. Principal Investigator (with Norman Bier). February 1, 2015 to January 31, 2017. $20,000

2014/04 **Japan Ministry of Education, Culture, Sports, Science and Technology**

Research and development on an adaptive video-based learning system and the effect of sequential feedback. Co-principal Investigator (PI: Nobutaka Asaba; Kitakyushu City University). April 1, 2014 to March 31, 2018. Approximately $40,000

2008/09 **Pittsburgh Science of Learning Center** (Pittsburgh, PA)

Towards a Theory of Learning Errors: Application of a Synthetic Student to Model How Students Learn Errors. Principal Investigator (with co-PIs: William W. Cohen and Kenneth R. Koedinger; CMU). September 1, 2008 to August 31, 2009. $72,335

2008/12 **Japan Ministry of Education, Culture, Sports, Science and Technology**

Computer Supported Learning System for learning Communication Skills for Students with High-functioning Autism. Co-principal Investigator (PI: Kiyoshi Tajitsu, Hokusei University, Hokkaido, Japan). Award No. 20330197. Approximately $207,000

2006/07 **Japan Ministry of Education, Culture, Sports, Science and Technology**

Developing a Computer Assisted Instruction System for teaching Communication Skills using Pictograms for Students with Autism. Co-principal investigator (PI: Ikuya Murata, Hokkaido University of Education). Approximately $24,400

1995/04 **Japan Ministry of Education, Culture, Sports, Science and Technology**

Intelligent Learning Environment for Exploratory Learning, Principal Investigator, Approximately $10,000

1994/04   **University of Electro-Communications** (Tokyo, Japan)

Advanced Problem Solving Model for Intelligent Tutoring Systems, <u>Principal Investigator</u>, Approximately $9,000

1993/04   **Japan Ministry of Education, Culture, Sports, Science and Technology**

Modeling Students Competence in Procedural Problem Solving, <u>Principal Investigator</u>, Approximately $10,000

1990/04   **Japan Ministry of Education, Culture, Sports, Science and Technology**

Plan Recognition for an Intelligent Tutoring System in Geometry Theorem Proving, <u>Principal Investigator</u>, Approximately $10,000

AWARDS AND CERTIFICATES

Awards

2023   **Honorable Mention Award**

Can't Inflate Data? Let the Models Unite and Vote: Data-agnostic Method to Avoid Overfit with Small Data. *Int. Conf. on Educational Data Mining (EDM2023)*

2022   **Nominee for the Best Paper Award and Best Student Paper Award**

Finding Key Concepts to Automatically Generate Pedagogically Valuable Questions for Learning Objectives. *Annual Meeting of the American Educational Research Association (AERA2022)*

2019   **Most Receptive Graduate Professor Outside of Class**

ACM/AITP Faculty and Staff Awards, Department of Computer Science, North Carolina State University

2012   **Nominee for the Best Paper Award**

Studying the Effect of Tutor Learning using a Teachable Agent that asks the Student Tutor for Explanations. *Int. Conf. on Digital Game and Intelligent Toy Enhanced Learning (DIGITEL2012)*

2012   **Nominee of the Best Paper Award**

Motivational factors for learning by teaching: The effect of a competitive game show in a virtual peer-learning environment. *International Conference on Intelligent Tutoring Systems (ITS2012)*

2010   **Best Demo Award**

Learning by teaching SimStudent. *International Conference on User Modeling and Adaptive Personalization*

1988   **Outstanding Young Researcher Research Award**

GEOMEX II: An Intelligent Tutoring System for Geometry Theorem Proving. *Japan Society of Educational Technology*

Certificate

2013	**The Second Degree Certificate for the Japanese Kanji Aptitude Test**, The Japan Kanji Aptitude Testing Foundation [23.3% acceptance rate out of 83,000 applicants]—for reading and writing ~2200 Japanese Kanji letters.
1985	**Teaching Certificate** in Mathematics for all grade levels (1st through 12th grade), *Japan Ministry of Education, Culture, Sports, Science and Technology*

SERVICE TO THE DEPARTMENT, COLLEGE, AND UNIVERSITY

2022-2025	Faculty Awards committee, Department of Computer Science, North Carolina State University
2020-current	Member of the Graduate Faculty in Liberal Studies, Master of Arts in Liberal Studies (MALS), North Carolina State University
2019	Hiring Process Task Force, Department of Computer Science, North Carolina State University
2019-2020	Coordinator of the Center for Educational Informatics Brown Bag Seminar, Department of Computer Science, North Carolina State University
2017	Coordinator of the Department Brown Bag Seminar, Department of Teaching, Learning and Culture, Texas A&M University
2017	Teacher Education Faculty Search Committee, Department of Teaching, Learning and Culture, Texas A&M University
2017	Online Ed.D Program Steering Committee, Department of Teaching, Learning and Culture, Texas A&M University
2016	Coordinator of the Department Brown Bag Seminar, Department of Teaching, Learning and Culture, Texas A&M University
2016	Math & Science Education Research Group for College of Engineering, Texas A&M University
2016	Tech Management Faculty Search Committee, Department of Educational Administration & Human Resource Development, Texas A&M University
2016	Online Ed.D Program Steering Committee, Department of Teaching, Learning and Culture, Texas A&M University
2015	MHCI Admission Committee, Human-Computer Interaction Institute, CMU.
2014	MHCI Admission Committee, Human-Computer Interaction Institute, CMU.
2013	Internal Operations Committee, Human-Computer Interaction Institute, CMU.

SERVICES TO THE FIELD

Editorial Board

1996 – 1999   Journal of Japanese Society of Information and Systems in Education

Executive Committee

2024 – 2029   International Artificial Intelligence in Education Society

2015 – 2020   International Artificial Intelligence in Education Society

Conference General Chair

International Conference on Artificial Intelligence in Education, 2023 (co-chair with Olga Santos and Vania Dimitrova)

Conference Program Chair

International Conference on Artificial Intelligence in Education, 2022 (co-chair with Didith Rodrigo)

Special Session in Adaptive Educational Technology at the International Conference on Computer Science, Applied Mathematics and Applications, 2017 (co-chair with Nguyen-Thinh Le and Tomoko Kojiri)

Conference Steering Committee

Int. Conf. on Artificial Intelligence in Education, 2024, 2025

Conference Senior Program Committee

AAAI Conference on Artificial Intelligence, 2022

Int. Conf. on Artificial Intelligence in Education, 2021-2023, 2025

Int. Conf. on Educational Data Mining, 2018-2023

Int. Conf. on Intelligent Tutoring Systems, 2022-2023

Int. Conf. on Metaverse and Artificial Companions in Education and Society, 2023-2025

Conference Program Committee

AAAI Conference on Artificial Intelligence, 2021 (Senior PC since 2022)

IEEE Int. Conf. on Advanced Learning Technologies and Technology-enhanced Learning, 2019

IEEE Int. Conf. on Digital Game and Intelligent Toy Enhanced Learning, 2010-2012

IEEE Int. Conf. on Information Processing, 2017

Int. Conf. on Artificial Intelligence in Education, 1997, 2011-2020 (Senior PC since 2021)

Int. Conf. on Computers in Education, 2001, 2006-2022

Int. Conf. on E-learning and Games, 2011

Int. Conf. on Educational Data Mining, 2008-2017 (Senior PC since 2018)

Int. Conf. on Intelligent Tutoring Systems, 2010, 2016-2021 (Senior PC since 2022)

Int. Florida Artificial Intelligence Research Society Conference, 2006, 2008-2012

Int. Workshop on Educational Recommender Systems, 2016

Int. Workshop on Intelligent Textbooks, 2019-2022

Int. Workshop on Personalization Approaches in Learning Environments, 2011-2018

Int. Workshop on Social Computing in Digital Education, 2015

Joint National Conference on Educational Technology in Japan, 1994, 1997

Symposium on Educational Advances in Artificial Intelligence, 2023

Reviewers (ad-hoc) for Peer-reviewed Conferences

Annual Conference of the Cognitive Science Society, 2009-2014

International Conference on Artificial Intelligence in Education, 1995, 2005-2010

International Conference on Intelligent Tutoring Systems, 1998, 2000, 2006-2016

Reviewers for Major Grant Proposals

IES, US Department Education review panel: Science, Technology, Engineering, and Mathematics, 2024; Digital Learning Platform Research, 2023

DRL

NSF review panel: BIGDATA, 2016, 2017, 2018; Connected and Smart Community, 2020, 2021; Cyberlearning, 2012, 2015, 2018; DRL, 2025; Graduate Fellow Research Program, 2024; Human-Centered Computing, 2007; Innovative Technology Experiences for Students and Teachers, 2023; Research on Education and Learning, 2014; Science of Learning and Augmented Intelligence, 2022;

NSF ad-hoc reviewer: Information & Intelligent Systems, 2007; EHR Core Research, 2021

Reviewers for Journals

Applied Artificial Intelligence

Computers & Education

IEEE Transactions on Learning Technologies

IEICE Transactions on Information and Systems (IEICE: Institution of Electronics, Information and Communication Engineering)

International Journal of Artificial Intelligence in Education

International Journal of Human-Computer Studies

International Journal of STEM Education

Japan Journal of Educational Technology

Journal of Ambient Intelligence and Humanized Computing

Journal of Educational Technology

Journal of Experimental Psychology: Applied

Journal of Educational Research

Journal of Information Processing Society of Japan

Journal of Intelligent Systems

Journal of Learning Analytics

Journal of Machine Learning Research

Journal of Technology, Instruction, Cognition, and Learning

Transaction of Japanese Society for Information and Systems in Education

User Modeling and User-Adapted Interaction

Membership in Professional Organization

Association for the Advancement of Artificial Intelligence (AAAI)

Association for Computing Machinery (ACM)

Cognitive Science Society

International Artificial Intelligence in Education Society (AIED)

International Educational Data Mining Society (EDM)

International Group for the Psychology of Mathematics Education (PME)

Japanese Society of Artificial Intelligence

Japanese Society for Information and Systems in Education

Japan Society of Mathematical Education

INVITED VISITING PROFESSORSHIP

5/2025   **Shanghai International Studies University**   Shanghai, China

Taught one week course on machine learning and advanced educational technologies at the School of Education.

6/2016-7/2016   **Osaka Prefecture University**   Osaka, Japan

Taught two 4-weeks courses (one for undergraduate and another one for graduate) at the School of Knowledge and Information Systems.
Supervise graduate and undergraduate students' research.

TEACHING EXPERIENCE

8/2018-current   **North Carolina State University**   Raleigh, NC

CSC116: Introduction to Computing – Java (Spring 2023, Fall 2018-2021)
CSC554/791: Human-Computer Interaction (Spring 2019-2021, Fall 2022-2025)
CSC522: Automated Learning and Data Analysis (Spring 2024-2025)

8/2015-5/2018   **Texas A&M University**   College Station, TX

EDCI446: Curriculum Development (2017 Fall, 2018 Spring)
EDCI689: Special Topic: Educational Data Mining (2017 Spring)
EDIC689: Special Topic: Programming Usable and Reliable Educational Technology—Theory and Practice (2016 Spring, 2016 Fall)
MASC351: Problem Solving in Mathematics (2015 Fall)

8/2010-8/2015   **Carnegie Mellon University**   Pittsburgh, PA

MHCI Intro Programming with Media (2014 Summer, 2015 Summer)
05-430 Programming Usable Interfaces (2011 Fall)
05-571 Undergraduate Project in HCI (2011 Spring, 2012 Spring)
05-832 Cognitive Modeling and Intelligent Tutoring Systems (2010 Fall)

4/2004 – 7/2015   **Pittsburgh Japanese School**   Pittsburgh, PA

Part-time Lecturer (full lecturing responsibility)

Opens every Sundays for K-12 students to learn Japanese language and math in Japanese. Topics: 7th to 12th graders mathematics

11/2001 – 5/2003   **Chatham College**   Pittsburgh, PA

Tutor for learning aid (a part time tutor at the Chatham Learning Center)

Topics: Mathematics, Statistics, Physics, Signal Communication, Java

4/1995 – 3/1998   **Tokyo Zokei University**   Tokyo, Japan

Part-time Lecturer (full lecturing responsibility)

Topics: Introduction to information processing and Internet

4/1993 – 12/1999   **University of Electro-Communications**   Tokyo, Japan

Topics (graduate level): Artificial Intelligence, Programming language (C, Java, LISP, Prolog), Unix operating system and networking

MENTORING EXPERIENCE

Postdoctoral Research Fellow:

2024/08-2025/03   Tasmia Shahriar (Department of Computer Science, NCSU)

2024/03-2024/08   Machi Shimmei (Department of Computer Science, NCSU)

2023/01-2025/01   Yancy Paredes (Department of Computer Science, NCSU)

2021/05-2022/01   Guoguo Zheng (Department of Computer Science, NCSU)

2017/02-2018/04   Yi-Ting Huang (Department of Teaching, Learning, and Culture; Texas A&M University)

2015/11-2016/03   Nick Barmpalios (Department of Teaching, Learning, and Culture; Texas A&M University)

2011/09-2012/08   Amy Ogan (Human-Computer Interaction Institute, Carnegie Mellon University; co-mentored with Justine Cassell)

Graduate Students (Chair):

Current: - - - - - - - - - - - - - -

Mia Ameen (PhD). Dept of Computer Science, NCSU
Meet Vora (MS). Dept of Computer Science, NCSU
Kahaan Patel (MS). Dept of Computer Science, NCSU

Completed: - - - - - - - - - -

Tasmia Shahriar (PhD, 2024). Dept of Computer Science, NCSU
Machi Shimmei (PhD, 2024). Dept of Computer Science, NCSU
Jesse Wood (MS, 2022). Dept of Computer Science, NCSU
Wendi Zimmer (PhD, 2018 co-chair). Dept of Teaching, Learning and Culture, Texas A&M.

Foreign Visiting Scholars:

2024/10-current   Lihua Peng (Shanghai International Studies University, China)
2023/10-2024/04   Hiroaki Funayama & Yuya Asazuma (Tohoku University, Miyagi, Japan)
2019/08-12   Yuanmin Huang, Visiting Undergraduate Intern (Fudan University, China)
2017/09-11   Mizue Kayama, Visiting Professor (Shinshu University, Nagano, Japan)
2017/07-08   Machi Shimmei, Visiting Undergraduate Research Associate (Osaka Prefecture University, Osaka, Japan)
2017/03-04   Tomoki Aburatani, Visiting Graduate Research Associate (Osaka Prefecture University, Osaka, Japan)

Research Staffs:

2018/12-2019/09   Wenxin Zhang (Research Associate)
2017/09-2018/10   Qing Li (Research Associate)

2017/05-2018/07   Natalie Wall (Lab Manager)
2017/05-2018/07   Tao Liu (Research Programmer)
2016/08-2018/07   Vishnu Chandra Sekar (Research Programmer)
2015/09-2016/05   Rong Zhang (Research Associate)
2013/12-2015/10   Nick Barmpalios (Research Programmer)
2011/05-2015/08   Evelyn Yarzenbinski (Research Associate)
2015/01-2015/05   Fei Lu (Research Associate)
2013/11-2014/10   Cassondra Griger (Research Associate)
2009/12-2012/08   Rohan Raizada (Research Programmer)
2009/11-2012/08   Victoria Keiser (Research Programmer)
2010/12-2011/12   Shayna Watson (Research Associate)
2009/11-2010/03   Arthur Tu (Research Associate)
2006/08-2008/08   Gustavo Lacerda (Research Associate)