

Thomas W. Price

Department of Computer Science
North Carolina State University
Raleigh, NC, 27606

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twprice@ncsu.edu

go.ncsu.edu/twprice

(919) 515-1286

Education

Ph.D. in Computer Science	North Carolina State University	2018
Thesis: <i>iSnap: Data-driven Support for Novice Programming Informed by Evaluations of Hint Quality and Investigations of Student Help-seeking Behavior</i>		
Committee: Dr. Tiffany Barnes (advisor), Dr. James Lester, Dr. Sarah Heckman, Dr. Roger Azevedo		
M.S. in Computer Science	North Carolina State University	2015
B.S. in Computer Science	Elon University	2013
Thesis: <i>Engineering on the Go: Designing a Game Maker on the Android Platform</i>		

Professional History

Assistant Professor	North Carolina State University	2018 – Present
Graduate Research Assistant	North Carolina State University	2013 – 2018
Data Science Intern	Khan Academy	2016
Educational Game Developer	Center for Lebanese Studies	2015 – 2016

Research

Research Interests

- Computing Education Research
- Advanced Learning Technologies and Educational Data Mining
- Game-based Learning

Research Experience

Center for Educational Informatics	Research Assistant (Dr. Tiffany Barnes)	2014 – Present
<ul style="list-style-type: none">• Developed an algorithm to generate programming hints and feedback using student data• Designed iSnap (go.ncsu.edu/isnap), a programming environment with data-driven hints• Evaluated programming hints using novel qualitative and quantitative methods• Redesigned the Pyrenees intelligent tutoring system and analyzed student process data		
Liquid Narrative Lab	Research Assistant (Dr. Michael Young)	2013 – 2014

Research Grants:

NSF: Improving Undergraduate STEM Education	\$2.0M	2020 - Present
#2013502: Generalizing Data-Driven Technologies to Improve Individualized STEM Instruction by Intelligent Tutors		Role: Co-PI
NSF: Improving Undergraduate STEM Education	\$175K	2020 - Present
#1917885: Analysis of a Simple, Low-cost Intervention's Impact on Retention of Women in Computer Science		Role: Co-PI

NSF: Cyberlearning & Future Learning Technologies	\$750K	2019 - Present
#1917885: Intelligent Support for Creative, Open-ended Programming Projects		Role: PI

Awards and Honors

2018 Doctoral Scholar of the Year, North Carolina State University College of Engineering

NSF Graduate Research Fellowship, Honorable Mention: Awarded by the National Science Foundation to recognize and support outstanding graduate researchers (2012, 2013 and 2014).

2016 Outstanding Student Leader, recognized by the national STARS Computing Corps.

Lumen Prize: Competitive, \$15K internal student research grant (Elon University, 2011).

John Barney Award: Recognizes the student with the highest outgoing GPA (Elon University, 2013).

Teaching Experience

CSC110: Computer Science Principles	NC State University	2019-Present
<ul style="list-style-type: none"> • Taught Fall 2019, Fall 2020 • Co-designed the course as a new introduction to computational thinking for non-majors • Course features novice-friendly programming, creative projects, and societal applications 		
CSC422: Automated Learning and Data Analysis	NC State University	2018-Present
<ul style="list-style-type: none"> • Taught Spring 2019, Spring 2020 • Undergraduate data mining and machine learning course, featuring a large, collaborative course project designed to apply machine learning to solve a meaningful problem 		
CSC522: Automated learning and Data Analysis	NC State University	2018-Present
<ul style="list-style-type: none"> • Taught Spring 2019, Spring 2020 • Graduate data mining and machine learning course, covering advanced concepts including deep learning, support vector machines and association rule mining 		

Publications

Peer-Reviewed Publications in Conference Proceedings¹

- C23. W. Wang, Y. Rao, R. Zhi, S. Marwan, G. Gao, T.W. Price, "The Step Tutor: Supporting Students through Step-by-Step Example-Based Feedback" (To be published in) ITiCSE'20 – Proceedings of the 2020 ACM Conference on Innovation and Technology in Computer Science Education.
- C22. ★ T.W. Price, J.J. Williams, J. Solyst, S. Marwan, "Engaging Students with Instructor Solutions in Online Programming Homework." (To be published in) Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems. 2020. (24.3% acceptance rate; 760/3126 papers)
- C21. W. Wang, R. Zhi, A. Milliken, N. Lytle, T.W. Price, "Crescendo: Engaging Students to Self-Paced Programming Practices." ACM Special Interest Group on Computer Science Education (SIGCSE). 2020.
- C20. ★ S. Marwan, J. J. Williams, T.W. Price. "An Evaluation of the Impact of Automated Programming Hints on Performance and Learning." International Computing Education Research Conference (ICER). 2019. (20.4% acceptance rate; 28/137 full papers)

¹ Top-tier conference in CS Education, Intelligent Tutoring Systems and Educational Data Mining are selective venues for archival research, often exceeding journals in their selectivity, visibility and impact.

★ Indicates a representative paper

- C19. R. Zhi, M. Chi, T. Barnes, T.W. Price. "Evaluating the Effectiveness of Parsons Problems for Block-based Programming." International Computing Education Research Conference (ICER). 2019. (20.4% acceptance rate; 28/137 full papers)
- C18. Zhi, R., S. Marwan, Y. Dong, N. Lytle, **T.W. Price**, T. Barnes. "Toward Data-Driven Example Feedback for Novice Programming." Proceedings of the International Conference on Educational Data Mining (EDM). 2019, forthcoming. (22.5% acceptance rate for full papers)
- C17. Mao, Y., R. Zhi, F. Khoshnevisan, **T.W. Price**, T. Barnes, M. Chi. "One minute is enough: Early Prediction of Student Success and Event-level Difficulty during a Novice Programming Task." Proceedings of the International Conference on Educational Data Mining (EDM). 2019, forthcoming. (22.5% acceptance rate for full papers)
- C16. Marwan, S., N. Lytle, J. J. Williams and **T. W. Price**. "The Impact of Adding Textual Explanations to Next-step Hints in a Novice Programming Environment." Proceedings of the Annual Conference on Innovation and Technology in Computer Science Education (ITiCSE). 2019, forthcoming. (28% acceptance rate; 67/243 full papers).
- C15. Zhi, R., **T. W. Price**, S. Marwan, A. Milliken, T. Barnes and M. Chi. "Exploring the Impact of Worked Examples in a Novice Programming Environment." ACM Special Interest Group on Computer Science Education (SIGCSE). 2019. (32% acceptance rate; 169/526 full papers)
- C14. Dong, Y., S. Marwan, V. Cateté, T. Barnes and **T. W. Price**. "Defining Tinkering Behavior in Open-ended Block-based Programming Assignments." ACM Special Interest Group on Computer Science Education (SIGCSE). 2019. (32% acceptance rate; 169/526 full papers)
- C13. **Price, T. W.**, R. Zhi, Y. Dong, N. Lytle and T. Barnes. "The Impact of Data Quantity and Source on the Quality of Data-driven Hints for Programming." *International Conference on Artificial Intelligence in Education*. 2018. (25% acceptance rate)
- C12. Zhi, R., N. Lytle, **T. W. Price**. "Exploring Instructional Support in an Educational Game for K-12 Computing Education." ACM Special Interest Group on Computer Science Education (SIGCSE). 2018, forthcoming (37% acceptance rate; 82/221 full CS Education Research papers).
- C11. ★ **Price, T. W.**, Z. Liu, V. Cateté and T. Barnes. "Factors Influencing Students' Help-Seeking Behavior while Programming with Human and Computer Tutors." *International Computing Education Research (ICER) Conference*. 2017. (27% acceptance rate; 29/108 full papers)
- C10. **Price, T. W.**, R. Zhi and T. Barnes. "Hint Generation Under Uncertainty: The Effect of Hint Quality on Help-Seeking Behavior." *International Conference on Artificial Intelligence in Education*. 2017. (30% acceptance rate; 36/121 full papers)
- C9. **Price, T. W.**, R. Zhi and T. Barnes. "Evaluation of a Data-driven Feedback Algorithm for Open-ended Programming." *International Conference on Educational Data Mining*. 2017. (42% acceptance rate; 32 short papers)
- C8. ★ **Price, T. W.**, Y. Dong and D. Lipovac. "iSnap: Towards Intelligent Tutoring in Novice Programming Environments." *ACM Special Interest Group on Computer Science Education (SIGCSE)*. 2017. (**Exemplary CS Research Paper Award**; 30% acceptance rate; 105/350 full papers)
- C7. **Price, T. W.**, N.C.C. Brown, D. Lipovac, T. Barnes and M. Kölling. "Evaluation of a Frame-based Programming Editor." *International Computing Education Research (ICER) Conference*. 2016. (25.5% acceptance rate; 26/102 full papers)
- C6. ★ **Price, T. W.**, Dong, T. and Barnes, T. "Generating Data-driven Hints for Open-ended Programming." *International Conference on Educational Data Mining*. 2016. (**Exemplary Paper Award**; 27.5% acceptance rate; 30/105 full papers)
- C5. Zhou, G., C. F. Lynch, **T. W. Price**, T. Barnes, M. Chi. "The Impact of Granularity on the Effectiveness of Students' Pedagogical Decision." *Annual Meeting of the Cognitive Science Society (CogSci)*. 2016. (34% acceptance rate; 222/656 full papers)

- C4. **Price, T. W.**, V. Cateté, J. Albert, T. Barnes and D. Garcia. "Lessons Learned from "BJC" CS Principles Professional Development." *ACM Special Interest Group on Computer Science Education (SIGCSE)*. 2016. (35.4% acceptance rate; 105/297 full papers)
- C3. **Price, T. W.**, J. Albert, V. Cateté and T. Barnes. "BJC in Action: Comparison of Student Perceptions of a Computer Science Principles Course." *Research in Equity and Sustained Participation in Engineering, Computing, and Technology (RESPECT) Conference*. 2015. (44.4% acceptance rate; 8/18 short papers)
- C2. ★ **Price, T. W.** and T. Barnes. "Comparing Textual and Block Interfaces in a Novice Programming Environment." *International Computing Education Research (ICER) Conference*. 2015. (26% acceptance rate; 25/96 full papers)
- C1. Zhou, G., **T. W. Price**, C. Lynch, T. Barnes and M. Chi. "The Impact of Granularity on Worked Examples and Problem Solving." *Annual Meeting of the Cognitive Science Society (CogSci)*. 2015. (28% acceptance rate; 187/666 full papers)

Peer-Reviewed Publications in Academic Journals

- J3. **Price, T.W.**, Y. Dong, R. Zhi, B. Paaßen, N. Lytle, V. Cateté, T. Barnes. "A Comparison of the Quality of Data-driven Programming Hint Generation Algorithms." *International Journal of Artificial Intelligence in Education*. 2019.
- J2. Paaßen, B., B. Hammer, **T. W. Price**, T. Barnes, S. Gross and N. Pinkwart. "The Continuous Hint Factory - Providing Hints in Continuous and Infinite Spaces." *Journal of Educational Data Mining*. 2018.
- J1. Cardona-Rivera, R.*, **T. W. Price***, D. Winer* and R. M. Young. "Question Answering in the Context of Stories Generated by Computers." *Advances in Cognitive Systems*. 2016.
*The first three authors are considered co-first authors on this publication.

Peer-Reviewed Publications in Workshops

- W7. **Price, T. W.**, D. Hovemeyer, K. Rivers, A. C. Bart, A. Petersen, B. A. Becker and J. Lefever. "ProgSnap2: A Flexible Format for Programming Process Data." *2nd Educational Data Mining in Computer Science Education (CSEDM) Workshop at the International Conference on Learning Analytics and Knowledge (LAK)*. 2019, forthcoming.
- W6. **Price, T. W.**, J. J. Williams, S. Marwan. "A Comparison of Two Designs for Automated Programming Hints." *2nd Educational Data Mining in Computer Science Education (CSEDM) Workshop at the International Conference on Learning Analytics and Knowledge (LAK)*. 2019, forthcoming.
- W5. Zhi, R., **T. W. Price**, N. Lytle, Y. Dong and T. Barnes. "Reducing the State Space of Programming Problems through Data-Driven Feature Detection." *Educational Data Mining in Computer Science Education (CSEDM) Workshop at the International Conference on Educational Data Mining (EDM)*. 2018.
- W4. **Price, T. W.** and T. Barnes. "Position Paper: Block-based Programming Should Offer Intelligent Support for Learners." *Blocks and Beyond Workshop at the IEEE Symposium on Visual Languages and Human-Centric Computing (VL/HCC)*. 2017.
- W3. Lynch, C., **T. W. Price**, M. Chi and T. Barnes. "Using the Hint Factory to Compare Model-based Tutoring Systems." *Workshop on Graph-based Educational Data Mining at the International Conference on Educational Data Mining (EDM)*. 2015.
- W2. **Price, T. W.** and T. Barnes. "An Exploration of Data-Driven Hint Generation in an Open-Ended Programming Problem." *Workshop on Graph-based Educational Data Mining at the International Conference on Educational Data Mining (EDM)*. 2015.

- W1. **Price, T. W.** and R. M. Young. "Towards an Extended Declarative Representation for Camera Planning." *Workshop on Intelligent Cinematography and Editing (WICED) at the 28th AAAI Conference on Artificial Intelligence*. 2014.

Extended Abstracts, Posters, Demos and Discussions in Conference Proceedings

- A8. **Price, T. W.** "iSnap: Automatic Hints and Feedback for Block-based Programming." *ACM Special Interest Group on Computer Science Education (SIGCSE)*. 2018, forthcoming.
- A7. **Price, T. W.** and T. Barnes. "Showpiece: iSnap Demonstration." *IEEE Symposium on Visual Languages and Human-Centric Computing (VL/HCC)*. 2017.
- A6. **Price, T. W.**, N. C. C. Brown, C. Piech and K. Rivers. "Sharing and Using Programming Log Data." *ACM Special Interest Group on Computer Science Education (SIGCSE)*. 2017.
- A5. Duval, S., D. Eagle, R. Narcisse, **T. W. Price**. "Clashroom: A Game to Enhance the Classroom Experience." *ACM Special Interest Group on Computer Science Education (SIGCSE)*. 2016.
- A4. **Price, T. W.**, V. Cateté, J. Albert and T. Barnes. "Determining the Impact of Teacher Professional Development on Perceived Ability to Teach a Computer Science Principles Course." *International Computing Education Research (ICER) Conference*. 2015.
- A3. **Price, T. W.** "Integrating Intelligent Feedback into Block Programming Environments." *Doctoral Consortium at the International Computing Education Research Conference (ICER)*. 2015.
- A2. **Price, T. W.** and T. Barnes. "Creating Data-driven Feedback for Novices in Goal-driven Programming Projects." *Doctoral Consortium at the International Conference on Artificial Intelligence in Education (AIED)*. 2015.
- A1. **Price, T. W.**, Lynch, C., T. Barnes and M. Chi. "An Improved Data-Driven Hint Selection Algorithm for Probability Tutors." *International Conference on Educational Data Mining (EDM)*. 2015.

Professional Service and Memberships

Conference and Workshop Reviewing:

International Conference on Educational Data-Mining (EDM)	PC: 2016-20
ACM Technical Symposium on Computer Science Education (SIGCSE)	PC: 2017-19, APC: 2020
International Conference on AI in Education (AIED)	PC: 2020
International Computing Education Research Conference (ICER)	PC: 2020
ACM CHI Conference on Human Factors in Computing Systems (CHI)	Rev: 2018-20
Conference on Innovation and Technology in Computer Science Education (ITiCSE)	PC: 2017-20
Educational Data Mining in Computer Science Education (CSEDM) Workshop	PC: 2018-20
BLOCKS+ Workshop	PC: 2018

Journal Reviewing:

Journal of Engineering Education (JEE)	2020
ACM Transactions on Computing Education (TOCE)	2017-20
Computer Science Education (CSE)	2019-20
IEEE Transactions on Learning Technologies (TLT)	2017-19
Computers and Education (C&E)	2018
IEEE Transactions on Emerging Topics in Computing (TETC)	2017
International Journal of Artificial Intelligence in Education (IJAIED) [subreviewer]	2015-16

Organization of Conferences and Workshops:

Co-organizer, Educational Data Mining in Computer Science Education (CSEDM) Workshop	2018-20
Co-organizer, SPLICE Workshop: "Computing Science Education Infrastructure:	

From Tools to Data"	2019
Associate Program Chair, ACM SIGCSE Symposium	2020
Publications Chair, Research in Equity and Sustained Participation in Engineering, Computing, and Technology (RESPECT) Conference	2015

Invited Talks:

Keynote Speaker, Fourth Alice Symposium, Duke University	2017
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Memberships:

Association for Computing Machinery (ACM)	since 2017
ACM Special Interest Group on Computer Science Education (SIGCSE)	since 2017
International Educational Data Mining Society	since 2016
International AI in Education Society	since 2019
Society for Learning Analytics Research (SoLAR)	since 2018
Phi Beta Kappa, national honors society for the liberal arts and sciences	since 2014

Outreach

STARS Computing Corps:	2013 – 2018
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Outreach Leader (2013 - 2018): Led monthly middle school CS outreach programs, and designed curricula, for example using Kodu and Minecraft to teach programming and circuitry.

Co-president (2015 – 2017): Managed CS outreach volunteers, organized group meetings, managed a \$10K+ budget and coordinated with school administrators.