

LAUREN E. PROVOST, Ph.D.



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Division of Mathematics, Computing and Statistics
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PROFESSIONAL PROFILE

Lauren Provost is an Assistant Professor in Computer Science at Simmons University. Her research interests are focused around cyber security, specifically the protection of critical infrastructure and private sector approaches to cyber security. She is particularly interested in the intersection of penetration testing, social engineering and ethical hacking. Dr. Provost is in the process of launching the Simmons University's Center for Cybersecurity, as the Director for the fall of 2021 in parallel with additionally participating in the application process to become Center for Academic Excellence in Cybersecurity, a National Security Agency (NSA) designation.

Dr. Provost is also a member of the National Security Agency's [Science of Security \(SoS\)](#) initiative for the promotion of a foundational cybersecurity science that is needed to mature the cybersecurity discipline and to underpin advances in cyberdefense.

Scholarly research contributions are best illustrated by the most recent papers:

- (1) Provost, L. E. Ethical Hacking: A Conceptual Analysis for Practice in Cybersecurity. Submitted April 28, 2020, [International Journal of Cyber-Security and Digital Forensics \(IJCSDF\)](#).
- (2) Provost, L. E. Ethical Hacking: Case Studies. Accepted June 2, 2020, publication date pending. [International Journal of Cyber-Security and Digital Forensics \(IJCSDF\)](#).

- (3) Gamboa, R. and B. Middleton (2002). “Taylor’s Formula with Remainder”. In: [Proceedings of the Third International Workshop on the ACL2 Theorem Prover and its Applications](#), ACL2 2002, Grenoble, France, April 8-9, 2002.

Dr. Provost is also the Director of [The Ethical Hackers Cybersecurity organization](#), a virtual community for policymakers, educators and industry providing comprehensive planning and risk management updates, network and cloud security knowledge and updates on other cybersecurity topics such as general penetration testing, ethical hacking and compliance readiness. Updates are given on Dr. Provost’s Cyberbits Ethical Hacker’s youtube channel [here](#).

Recent talks: (1) Provost, L. E. (October, 16, 2019. Ethical Hacking: A Conceptual Framework for Practice in Cybersecurity SoS Winter 2019 Quarterly Lablet PI Meeting at ICSI: January 10-11, 2019. (2) Provost, L. E. (October 2, 2019). [Metasploit: Penetration Testing and Social Engineering](#). Grace Hopper Convention, Orlando, Florida.

Upcoming talks: (1) Provost, L., Labitt, R., Alexandre, D. & Rodriguez, A.(September 22, 2020). [Multiple Case Study Research on Ethical Hacking with a focus on Penetration Testing in Cybersecurity Ecosystems](#). To be presented at the seventh annual HoTSoS in Lawrence, Kansas. (2) Supporting the Transition from High School to Undergraduate Years for Underrepresented Students in Computer Science: Curriculum Examples. To be presented at the NIST K-12 Cybersecurity Conference, St. Louis, Missouri.. (3) Provost, L.. (May, 2021). Embracing the Complexity of STEM Ecosystems: Effectively Applying Research to Support Pathways in Computer Science. National Alliance for Partnerships in Equity and their STEM Pathways Project, Washington, D.C.

In previous work, her research with the University of Texas at Austin’s Department of Computer Science Formal Methods Research Group culminated in the international publication, “Taylor’s Formula with Remainder” presented in Grenoble, France. This work highlighted a hardware calculation error with the square root algorithm in the IBM Power 4 processor and the development of a new model and its verification of correctness.

In all of her work, Lauren Provost is an advocate for equity and excellence in computer science education at all levels. Dr. Provost successfully expanded the STEM Outreach Office as the Director of STEM Outreach at Dartmouth College, directing collaborations with under-resourced K-12 schools enhancing computer science and mathematics education. She is involved in multiple computer science education initiatives nationally as the policy liaison with the National Alliance for Partnership in Equity’s STEM Equity Pipeline Project. Dr. Provost was a member of the Massachusetts Department of Education’s STEM Advisory Council and a member of the New Hampshire Governor’s STEM Task Force focusing on computer science equity issues surrounding gender.

RESEARCH INTERESTS

Cyber security - Private sector approaches to cyber security with a focus on the intersection of penetration testing and social engineering. Interested in developing models of human behavior (of both users and adversaries) that enable the design, modeling, and analysis of systems with specified security properties, in alignment with NSA's Science of Security Research Group's goals.

EDUCATION

- Ph.D. Mathematics – Qualifying exams in Mathematics, Dissertation in Mathematics Education, University of New Hampshire, 2013.**
Concentrations: Mathematics Education and Quantitative Research Methodology
- Dissertation Committee Members: Dr. Uri Treisman (Director, Charles A. Dana Center, Professor, Departments of Mathematics & Public Policy, University of Texas at Austin), Dr. Karen J. Graham (Director, James L. Leitzel Center, Professor of Mathematics, UNH), Dr. Thomas H. Schram (Director of Teacher Education Professor of Education, UNH), Dr. Suzanne E. Graham, Dr. Sharon Nodie Oja (Education, UNH).
- B.S. Computer Science, with Honors, University of Texas at Austin, 2002.**

EXPERIENCE

Assistant Professor of Computer Science, Simmons University. July 2018 - Current. Teaching areas include networking and information assurance, operating systems, computer architecture and special topics in cybersecurity. Lauren Provost's research area is cybersecurity. She seeks to understand the way the intersection of ethical hacking, penetration testing and social engineering can inform the enhancement of information security within complex cyberecosystems. Dr. Provost is in the process of launching the Simmons University of The Simmons Center for Cybersecurity, as the Director for the fall of 2020 in parallel with applying to be a Center for Academic Excellence in Cybersecurity, a National Security Agency (NSA) designation.

Director, The Ethical Hackers Cybersecurity Organization, Dr. Provost organizes a virtual community for educators and industry providing comprehensive planning and risk management updates, network and cloud security knowledge and information on other cybersecurity topics such as general penetration testing, ethical hacking and compliance readiness.

Director of STEM Outreach, Dartmouth College. December 2015 – 2017. Supported STEM faculty across the institution in writing National Science Foundation (NSF) grants, specifically focusing on broader impacts, educational outreach, research translation or community engagement requirements of funded research and scholarship in keeping with Dartmouth's mission; to advise the senior administration on the broad relevance of Dartmouth research and scholarship; to serve as the institution's principle liaison for Dartmouth's external and internal outreach constituencies, regionally and nationally.

Collaborated and coordinated with computer science faculty in bringing computer science opportunities for K-12 across the state of New Hampshire.

Graduate Research Assistant, University of Texas at Austin, Department of Computer Science. Worked with the ACL2 Formal Methods Group using *A Computational Logic*, in proving the correctness of the computer algorithm Taylor's Formula with Remainder for IBM. Worked with the National Security Agency in enhancing computer algorithms used by the National Security Agency, PI: Dr. J Strother Moore (2000-2001).

STEM NATIONAL AND STATE POLICY INITIATIVES

New Hampshire Governor's Task Force. Developed a statewide strategic plan focused on STEM pathways access and computer science and engineering specifically. Developed a plan for increased industry participation in teacher preparation and school programming. Specifically focused on gender equity issues that plague STEM pathways. (2015 – 2017).

Policy Program Committee, STEM Equity Pipeline National, National Alliance for Partnerships in Equity (NAPE). Enhance federal legislative activity affecting gender equity in computer science education and workforce development. Work with the Director of Public Policy to draft position papers and respond to requests for comments from federal agencies supporting equity in computer science education (2013 – present).

Mathematics and Science Education Advisory Council, Massachusetts Board of Elementary and Secondary Education. Advise the Commissioner and the Board of Elementary and Secondary Education on matters pertinent the creation and modification of the *Mathematics and Technology/Engineering Standards*. Supported the creation of a comprehensive statewide definition of the terms *STEM Industries* and *STEM Education*. (2012-2014).

PROFESSIONAL PRESENTATIONS

Women in Cybersecurity (WiCyS). (March, 2020). *Towards a Conceptual Framework for Penetration Testing: A Review of Research and Next Steps*.

National Security Agency (NSA) Science of Security Research Lablets Quarterly Meeting. (January X, 2020). Social Engineering and Penetration Testing.

Provost, L. E. (October 2, 2019). [Metasploit: Penetration Testing and Social Engineering](#). Grace Hopper Convention, Orlando, Florida.

National Alliance for Partnerships in Equity and their STEM Pathways Project. (April 27, 2017). Tools for Improving Access to Computer Science Pathways.

Special Interest Group on Computer Science Education (SIGCSE). (February, 2018). University-Industry Collaboration in Curriculum Design: A Case Study of Cybersecurity Curriculum Design with an Eye on Diversity and Inclusion. Presentation [abstract](#).

Provost, L. E. (2019). University-Industry Collaboration in Curriculum Design: A Case Study of Curriculum Design for Early Undergraduate Computer Science Coursework with an Eye on Equity. Presented at SIGCSE in Minneapolis, Minnesota. (NOTE: Cancelled due to illness).

Provost, L. E. (2010). What does computer science look like in the elementary school classroom? Presented at Seacoast Professional Development Center, Exeter, NH.

Provost, L. E. (2012). Technology that engages and supports content learning in online undergraduate computer science learning. Presented at Seacoast Professional Development Center, Exeter, NH.

Provost, L. E. Multiple Tools for Online Engagement: Creating Authentic Computer Science Undergraduate Learning Experiences. Presented at the International Society for Technology in Education. (ISTE) in Atlanta, Georgia (June, 2014).

INVITED TALKS

New Hampshire's Women in Technology. (March, 2017). Building Gender Parity: Beyond the Dichotomy and Applying Current Research. (see <http://www.unionleader.com/apps/pbcs.dll/article?AID=/20170409/NEWS02/170409327/0/opinionStewartstown>).

National Alliance for Partnerships in Equity and their STEM Pathways Project. (April, 2017). Embracing the Complexity of STEM Ecosystems: Effectively Applying Research to Support Pathways in Computer Science.

U.S. Department of Education/OCTAE STEM Equity Panel. (October, 2016). An Overview of Central Career and Technical Educational Issues related to Computer Science Fields.

First Women. A panel presented by First Robotics. *The Importance of Computer Science Education and Equity*. (October, 2014).

UNIVERSITY TEACHING

STEM Undergraduate Coursework

Information Technology: Foundations in Network Security, Network Assessment and Defense, *Engineering*: Statistics & Data Sciences, *Computer Science*: Introduction to Programming, Algorithms and Complexity, Discrete Mathematics, Number Theory I, Computer Networks and Cybersecurity, *Mathematics*: Calculus I, II, Abstract Algebra I, Real Analysis I, Introduction to Number Theory, and Finite Mathematics.

Graduate Coursework

Mathematics: Analytical Methods in Engineering Technology, Multilevel Modelling, Introduction to Research Methods, Elementary Mathematics, Supervision of Secondary Teachers of Mathematics, Quantitative Methods I.

NOTE: Courses have been taught in a variety of modes: face-to-face, hybrid and fully online.

UNIVERSITY STUDENT SUPERVISION AND RESEARCH

Ph.D. Defense Committee member

Fall 2019 - present. Anita Lavakumar, Program Director for Computer Science, Boston Public Schools, May, 2021, Regis College.

Undergraduate Student Research

Simmons University SURE Grant. Spring 2020. Jamie Daley. Research Questions: (1) How do socially engineered attacks occur? (2) How can attacks be deterred through employee and organizational training?

Simmons University SURE Grant. Spring 2019. Katelyn Kalliel. Research Questions: (1) How do socially engineered attacks occur? (2) How can attacks be deterred through employee and organizational training?

STEM INDUSTRY EXPERIENCE

Research Lead, IBM & Formal Methods Research Group at the University of Texas at Austin. Worked with both IBM and the UT-Austin Formal Methods Group in proving the correctness of the computer algorithm Taylor's Formula with Remainder for IBM (2001-2002).

National Security Agency & Formal Methods Group at the University of Texas at Austin. Worked with the ACL2 Formal Methods Group at the University of Texas at Austin and the National Security Agency in enhancing the correctness of computer algorithms used by the National Security Agency (2000-2001).

Software Engineer, National Instruments. Designed algorithms that represent secondary science laboratory procedures for the software *Labview*, using C++ and Java programming. Led a program verification team for Labview (1999-2000).

SOFTWARE SKILLS

Programming Languages: Fluency: Java, JavaScript, C/C++, Python, LISP

Operating Systems: Linux, Mac OS, Windows

Statistical Software: SAS, SPSS, MPLUS, JMP, R

Other Tools: Visual Studio, Eclipse, Netbeans, Xamarin, SQL, Matlab, Mathematica, LaTeX

HONORS AND AWARDS

Robert Lee Moore Teaching Award, University of Texas at Austin, Department of Computer Science. Awarded for exemplary inquiry-based computer science and mathematics teaching (2003-2004).

Presidents' Good Steward Award, Campus Compact for New Hampshire. For service and commitment to the communities of New Hampshire as a result of the Design-Make-Code program in collaboration with Granite United Way's Bring It! Program (2015).

GRANT WRITING EXPERIENCE

Provost, L. (PI) & Manolios, P. Innovative Technology Experiences for Students and Teachers (ITEST). To be submitted, August 14, 2020.

Provost, L. NIST Standards Services Curricula Development Cooperative Agreement Program (SSCD CAP). To be submitted, June 12, 2020.

As the Director of Dartmouth's Office of STEM Outreach, I collaborated in writing both full National Science Foundation (NSF) computer science-related proposals and other outreach-related funding opportunities acting as principal investigator, senior personnel or broader impact section author as appropriate and/or as needed depending on the project.

New Hampshire Department of Education. Improving the Quality of Computer Science Education. Title II-A, Subpart 3: State Agency for Higher Education (SAHE) Partnership Grants. \$50,000 for 1 year. Grant awarded December 1, 2016.

PUBLICATIONS

- (1) Provost, L. E. Ethical Hacking: A Conceptual Analysis for Practice in Cybersecurity. Submitted April 28, 2020, [International Journal of Cyber-Security and Digital Forensics \(IJCSDF\)](#).
- (2) Provost, L. E. Ethical Hacking: Case Studies. Accepted June 2, 2020, publication date pending. [International Journal of Cyber-Security and Digital Forensics \(IJCSDF\)](#).
- (3) Gamboa, R. and B. Middleton (2002). "Taylor's Formula with Remainder". In: [Proceedings of the Third International Workshop on the ACL2 Theorem Prover and its Applications](#), ACL2 2002, Grenoble, France, April 8-9, 2002.
- (4) Provost, L. E. (May, 2014). Book Review of Rethinking Mathematics by Eric Gutstein. *Journal of Democracy & Education*. (See <http://democracyeducationjournal.org/cgi/viewcontent.cgi?article=1160&context=home>).
- (5) Provost, L. E. with the New Hampshire Governor's Task Force. (September, 2016). *Governor's Task Force Report on K-12 Science, Technology, Engineering and Math Education*. Concord, NH: Department of Education. (See <https://www.education.nh.gov/instruction/stem/documents/stem-annual-report-2016.pdf>).
- (6) Provost, L. E. with the Massachusetts Department of Elementary and Secondary Education STEM Advisory Council, Massachusetts Department of Elementary and

- Secondary Education. (September, 2013). *Mathematics and Science Education Advisory Council with the STEM Advisory Council's Joint Annual Report, 2012-2013*. Malden, MA: Department of Elementary and Secondary Education. (See <http://www.doe.mass.edu/boe/sac/13annual.pdf>).
- (7) Provost, L. E. (May, 2014). Book Review of Rethinking Mathematics by Eric Gutstein. *Journal of Democracy & Education*.
- (8) Graham, S., & Provost, L. E. (2012). [Mathematics achievement gains of rural, urban, and suburban students between kindergarten and eighth grade](#). (Iss. 52). Durham, NH: Carsey School of Public Policy.
- (9) Provost, L. E. with the Massachusetts Department of Elementary and Secondary Education Mathematics and Science Advisory Council, Massachusetts Department of Elementary and Secondary Education. (September, 2011). *Mathematics and Science Education Advisory Council with the Engineering Education Advisory Council's Joint Annual Report, 2010-2011*. Malden, MA: Department of Elementary and Secondary Education.

UNPUBLISHED WORK

Provost, L. E. (2013). The multifaceted nature of mathematics knowledge for teaching: *Understanding the use of teachers' specialized content knowledge the role of teachers' beliefs from a practice-based perspective*. Dissertation, University of New Hampshire.

PROFESSIONAL PRESENTATIONS

Recent talks: (1) Provost, L. E. (October, 16, 2019. Ethical Hacking: A Conceptual Framework for Practice in Cybersecurity SoS Winter 2019 Quarterly Lablet PI Meeting at ICSI: January 10-11, 2019. (2) Provost, L. E. (October 2, 2019). [Metasploit: Penetration Testing and Social Engineering](#). Grace Hopper Convention, Orlando, Florida.

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Past talks:

Provost, L. E. (2019). University-Industry Collaboration in Curriculum Design: A Case Study of Curriculum Design for Early Undergraduate Computer Science Coursework with an Eye on Equity. Special Interest Group in Computer Science Education (SIGCSE) in Minneapolis, Minnesota. Cancelled due to illness.

Provost, L. E. (June, 2014). Multiple Tools for Online Engagement: Creating Authentic Computer Science Undergraduate Learning Experiences. Presented at the International Society for Technology in Education. (ISTE) in Atlanta, Georgia.

Provost, L. E. (2012). Technology that engages and supports content learning in online undergraduate computer science learning. Presented at Seacoast Professional Development Center, Exeter, NH.

Provost, L. E. (2010). What does computer science look like in the elementary school classroom? Presented at Seacoast Professional Development Center, Exeter, NH.

ACADEMIC COMMITTEES AND SERVICE

NCWIT Grant Reviewer, 2019-present.

Simmons Advances in Learning & Teaching Committee, 2019-present.

University of New Hampshire, Durham, New Hampshire

- University of New Hampshire TEAC/CAEP Program Evaluation Crosswalk Committee, Department of Education, (2010-2014).
- University of New Hampshire Teacher Education Committee, Department of Education, (2009-2014).

EDITORIAL ACTIVITIES

Manuscript Reviewer. International Journal of Cyber-Security International Journal of Cyber-Security and Digital Forensics (IJCSDF), (2019-present).

Manuscript Reviewer. Special Interest Group in Computer Science Education (SIGCSE), (2019-present).

Manuscript Reviewer. Current Issues in Education (CIE) Journal, (2012-2014).

STATISTICAL EXPERIENCE

University of New Hampshire, Durham. Working with Dr. Suzanne Graham on a project entitled *Mathematics achievement trajectories of rural, urban, and suburban students*, including the analysis of a large national data set employing multiple advanced statistical techniques. Specifically, after conducting exploratory descriptive data analysis, we modeled trajectories of change in mathematics achievement using multilevel modeling. The data resulted from the National Center for Education Statistics' Early Childhood Longitudinal Program, September 2010-May 2012.

NECAP Item Review Committee. Reviewed passages and items for alignment to the Grade Learning Expectations, correct depth of knowledge levels, universal design principles such as reliability and validity, and for bias and sensitivity concerns, February 2011.

New Hampshire Alternate Learning Progressions (NH ALPs) Alignment Study Panelist. Reviewed passages and items for alignment to the Grade Learning Expectations, correct depth of knowledge levels, universal design principles such as reliability and validity, and for bias and sensitivity concerns for students with special needs and ELL students. August, 2011.

PROFESSIONAL MEMBERSHIP

Women in Cybersecurity, 2018 - present.

Lesbians Who Tech, 2017 - present.

ACM, 2006 – present.

OTHER SKILLS AND EXPERIENCE

Spanish. High level of reading and comprehension ability, intermediate levels of writing.