Jean Salac, PhD

Postdoctoral Researcher | Computing Education & Human-Centered Computing

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Education

2021 PhD | Computer Science | University of Chicago | National Science Foundation Graduate Research Fellow
Dissertation : *Beyond Child's Play : Understanding and Supporting Program Comprehension in Young Learners*

2020 MS | Computer Science | University of Chicago
Thesis : *Why Access isn't Enough : An Analysis of Elementary-Age Students' Computational Thinking Performance through an Equity Lens*

2017 BS | Computer Science | University of Virginia | High Distinction

Professional Experience

Jan '22-Present Postdoctoral Researcher & Computing Innovations Fellow, University of Washington

Jul '17-Dec '21 Research Assistant, University of Chicago
- Applied human factors, statistical, and machine learning techniques to analyze student data.
- Built a tool for automatic generation of personalized written assessments that incorporates student code, and a tool that scraped features of student code for static analysis.

Jun-Sep 2021 AI/ML Education Research Intern, Apple Inc
- Explored opportunities to introduce data science practices to K-12 students using Swift Playgrounds & Charts
- Incorporated the latest findings in computing education research into Apple's education strategy

Sep '17-Dec '18 Teaching Assistant, University of Chicago
- Designed programming assignments and instructed students in 2D game engine design for *Computers for Learning*

Jan '16- May '17 Research & Teaching Assistant, University of Virginia
- Researched problematic demographic categories used in STEM higher education.
- Investigated the impact of informal computing education on low-income female youth of color.

May-Aug 2016 Computer Science Education Intern, National Science Foundation
- Analyzed prior NSF CS education and broadening participation initiatives.
- Researched social innovation best practices to help shape President Obama's CS for All initiative.

May '13-Jun '17 Museum Educator, Smithsonian National Air and Space Museum
- Conducted demonstrations for audiences of up to 50 visitors to illustrate the science and history behind flight and space
- Developed age-appropriate explanations of air and space concepts for the museum website

Honors, Awards, and Prominent Appointments

2022-24 Computing Innovations Fellow, National Science Foundation & Computing Research Association
2021 William Rainey Harper Dissertation Award, University of Chicago's Highest Honor for Graduate Students
2020-21 Graduate Fellow, Computing Research Association - Education
2020 EECS Rising Star, Rising Stars Academic Career Workshop for Women
2020 Best Reviewed Paper, ACM Conference on International Computing Education Research
2020 Online Organizing Committee Member, IEEE RESPECT Conference for Equity and Sustained Participation
2019 Graduate Research Fellowship, National Science Foundation
2019 Bridge Builder Leadership Award, University of Chicago
2019 Computer Science Department Teaching Award, University of Chicago
2019 Physical Science Division Teaching Award Nomination, University of Chicago
2018 Graduate Student Leadership Award, University of Chicago
2017 Rader Award for Undergraduate Research, University of Virginia
2016 AAPI Young Leader, White House Initiative for Asian-Americans and Pacific Islanders (WHIAAPI)

Publications

2021 **Jean Salac**, Cathy Thomas, Chloe Butler, and Diana Franklin. "Investigating the Role of Cognitive Abilities in Computational Thinking for Young Learners." In *Proceedings of the 2021 ACM Conference on International Computing Education Research*, 2021.
Found that the correlations between computational thinking performance and measures of cognitive abilities increased with the complexity of concepts, suggesting that further scaffolding beyond the TIPP&SEE strategy may be needed for more complex concepts.

2021 **Jean Salac**, Cathy Thomas, Chloe Butler, and Diana Franklin. "Understanding the Link between Computer Science Instruction and Reading & Math Performance." Research Paper in the *27th Annual Conference on Innovation and Technology in Computer Science Education*, 2021.
Found that a more open-ended, less scaffolded form of computing instruction was linked to performance gains in math, but not in reading, suggesting that moderately scaffolded computing instruction supports the development of skills applicable to math.

2021 **Jean Salac**, Cathy Thomas, Chloe Butler, and Diana Franklin. "Supporting Diverse Learners in K-8 Computational Thinking with TIPP&SEE." Research Paper in the *Proceedings of the 52nd ACM Technical Symposium on Computer Science Education*, 2021.
Found that when using the TIPP&SEE strategy, the gaps between students with and without academic challenges narrowed, suggesting its potential to lead to more equitable computing instruction.

2020 Diana Franklin, **Jean Salac**, Zachary Crenshaw, Saranya Turimella, Zipporah Klain, Marco Anaya, Cathy Thomas. "Exploring Student Behavior Using the TIPP&SEE Learning Strategy" In *Proceedings of the 2020 ACM Conference on International Computing Education Research*, 2020. Best Reviewed Paper Award
Found that while students using the TIPP&SEE strategy exhibited behaviors that would lead to success, no individual behaviors directly explain the results, suggesting that the value of TIPP&SEE may lie in metacognition.

2020 **Jean Salac** and Diana Franklin. "If They Build It, Will They Understand It?: Exploring the Relationship between Student Code and Performance." Research Paper in the *25th Annual Conference on Innovation and Technology in Computer Science Education*, 2020.
Found almost no relationship between code constructs in student work and performance on assessments on concepts represented by the code, suggesting that students do not fully understand the code they write.

2020 **Jean Salac**, Cathy Thomas, Bryan Twarek, William Marsland, and Diana Franklin. "Comprehending Code : Understanding the Relationship between Reading and Math Proficiency, and 4th-Grade CS Learning Outcomes." Research Paper in the *Proceedings of the 51st ACM Technical Symposium on Computer Science Education*, 2020.
Found differences in learning outcomes between students whose reading and math proficiencies were below grade-level, and students whose proficiencies were at or above grade-level.

2020 **Jean Salac**, Cathy Thomas, Chloe Butler, Ashley Sanchez, and Diana Franklin. "TIPP&SEE : A Learning Strategy to Guide Students through Use–>Modify Scratch Activities." Research Paper in the *Proceedings of the 51st ACM Technical Symposium on Computer Science Education*, 2020.
Found that students using the TIPP&SEE metacognitive strategy out-performed students who did not on nearly all questions in computational thinking assessments.

2020 **Jean Salac**, Qi Jin, Zipporah Klain, Saranya Turimella, Max White, and Diana Franklin. "Patterns in Elementary-Age Student Responses to Personalized & Generic Code Comprehension Questions." Research Paper in the *Proceedings of the 51st ACM Technical Symposium on Computer Science Education*, 2020.
Found that students demonstrate more of a functional, rather than structural, understanding when asked personalized questions about their own code

2020 Diana Franklin, **Jean Salac**, Cathy Thomas, Zené Sekou and Sue Krause. "Eliciting Student Scratch Script Understandings via Scratch Charades." Experience Report in the *Proceedings of the 51st ACM Technical Symposium on Computer Science Education*, 2020.
Introduces Scratch Charades, a game in which students act out Scratch scripts while others build them, to elicit (mis)understandings of code.

2019 **Jean Salac**, Max White, Ashley Wang, and Diana Franklin. "An Analysis through an Equity Lens of the Implementation of Computer Science in K-8 Classrooms in a Large, Urban School District." Research Paper in the *Proceedings of the 50th ACM Technical Symposium on Computer Science Education*, 2019.
Found that staggering performance differences between high- and low-performing schools persist in a school district's initiative to increase access to computing instruction.

2018 David Weintrop, Afsoon Afzal, **Jean Salac**, Patrick Francis, Boyang Li, David C. Shepherd, and Diana Franklin. "Evaluating CoBlox : A comparative study of robotics programming environments for adult novices." In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*, 2018. **Best Paper Honorable Mention**
Found that participants using a block-based interface successfully implemented robot programs with no loss in accuracy while reporting higher scores for usaibility, learnability, and overall satisfaction.

2018 Daniel S. Katz, Kyle E. Niemeyer, Sandra Gesing, Lorraine Hwang, Wolfgang Bangerth, Simon Hettrick, Ray Idaszak, **Jean Salac**, Neil Chue Hong, Santiago Nunez-Corrales, Alice Allen, R. Stuart Geiger, Jonah Miller, Emily Chen, Anshu Dubey, and Patricia Lago. "Fourth workshop on sustainable software for science : practice and experiences (WSSSPE4)." *Journal of Open Research Software* 6, no. 1 (2018).
Summarizes a workshop that aims to improve scientific software practices.

Grants

2022 Computing Innovations Fellowship, National Science Foundation & Computing Research Association ($250,000)
2019 Graduate Research Fellowship, National Science Foundation ($138,000)
2016 The Jefferson Trust, University of Virginia ($10,320)

Select Service

2021-Present Program Committee Member & Social Media Chair, International Computing Education Research Conference
2021-Present Peer Reviewer for Communications of the ACM, Journal of Computer Science Education, and ACM Transactions of Computing Education
2018-21 Computer Science Liaison, University of Chicago Graduate Recruitment Initiative Team
2019-21 Computer Science Representative, University of Chicago Committee on Equity, Diversity, & Inclusion
2019-20 Co-Organizer, University of Chicago Women in STEM Symposium
2018-19 Co-Chair & Founder, University of Chicago Graduate Women in Computer Science
2018 Co-Organizer, University of Chicago Transcending Boundaries Research Symposium for Scholars of Color

Invited Talks and Workshops

July 2022 *"K-8 Research+Practice Workshop"*, Computer Science Teachers Association Conference, csedresearch.org
April 2021 "What is the Relationship between Computer Science Instruction and Reading & Math Performance ?", American Educational Research Association
April 2021 "Supporting Diverse Learners in Computational Thinking with TIPP&SEE", American Educational Research Association
March 2021 *"Scratch Strategies to Engage Diverse Learners"*, Equity in Action Conference, Computer Science Teachers Association
February 2021 *"Scratch Strategies to Engage Diverse Learners"*, Excellence in Teaching Conference, Notre Dame University
2020-21 *Workshop on the Next 15 Years of Computing Education Research*, National Science Foundation
November 2020 *Accessible Computer Science Education Workshop*, Microsoft Research
August 2020 "Diagramming as a Strategy for Primary/Elementary-Age Program Comprehension", Doctoral Consortium, International Computing Education Research (ICER) Conference
April 2020 "TIPP&SEE : A Previewing & Navigating Strategy for Use/Modify Scratch Activities", American Educational Research Association
August 2019 "Personalized Assessment Worksheets for Scratch (PAWS) : Exploring a Bridge between Interviews, Written Assessments, and Artifact Analysis", Doctoral Consortium, International Computing Education Research (ICER) Conference