

# Benjamin Xie

Postdoctoral Fellow

I design socio-technical systems that enable critical discourse with and about data for equitable computing education, community advocacy, and ethical AI use.

## Education

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| 2016 - 2022 | <b>University of Washington</b> , Seattle, WA<br>Ph.D. in Information Science<br>Advisor: Amy J. Ko<br>Thesis: <i>Stakeholders' Interpretations of Data for Equitable Computing Education</i>                              |
| 2011 - 2016 | <b>Massachusetts Institute of Technology</b> , Cambridge, MA<br>M.Eng., B.S. in Computer Science<br>Advisor: Hal Abelson<br>Thesis: <i>Progression of Computational Thinking Skills Demonstrated by App Inventor Users</i> |

## Academic Appointments

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| 2022-       | <b>Stanford Institute for Human-Centered AI (HAI), McCoy Family Center for Ethics in Society (EiS)</b><br><i>Embedded EthiCS Fellow</i> . Mentors: Mehran Sahami, Rob Reich |
| 2021 - 2022 | <b>UW Code &amp; Cognition Lab</b> , <i>Postdoctoral Scholar</i> . Mentor: Amy J. Ko  |
| 2016 - 2021 | <b>UW Code &amp; Cognition Lab</b> , <i>Graduate Research Assistant</i> . Mentor: Amy J. Ko   |
| 2020 - 2021 | <b>Code.org</b> , <i>Research Intern</i> . Mentor: Baker Franke   |
| 2014 - 2016 | <b>MIT App Inventor</b> , <i>Research Assistant</i> . Mentor: Hal Abelson   |
| 2012 - 2013 | <b>MIT Scheller Teacher Education Program</b> , <i>Research Assistant</i> . Mentors: Judy Perry, Lisa Stump   |

## Awards & Honors

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| 2022 | <b>ACM CSCW Award for Contribution to Diversity and Inclusion</b><br>Awarded to 3.5% of accepted papers to recognize contributions to diversity & inclusion |
| 2022 | <b>UW Distinguished Dissertation Award, Nomination</b><br>Dissertation was nominated by UW Information School for its "significant contribution"            |
| 2021 | <b>University of Washington Husky 100</b><br>Awarded to 100 of UW's 55,000 students who make the most of their time at UW                                   |
| 2021 | <b>UW Marcy Migdal Fund for Educational Equality, Honorable Mention</b>   |
| 2016 | <b>National Science Foundation (NSF) Graduate Research Fellowship</b> (\$138,000 over 3 yrs)  |
| 2015 | <b>MIT EECS - Google Research and Innovation Scholar</b> (\$6,000)  |

## Funding

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| 2020 | <b>Google Cloud Academic Research Grant</b> (\$5,000)                        |
| 2020 | <b>National Science Foundation (NSF) INTERN</b> (\$35,056)                   |
| 2019 | <b>iConference Doctoral Colloquium Travel Award</b> (\$1,300)                |
| 2019 | <b>University of Washington Information School Travel Award</b> (\$300)      |
| 2016 | <b>SOLAR Learning Analytics Summer Institute Student Scholarship</b> (\$580) |

## Peer-Reviewed Publications

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*My publications have been cited over 500 times, and I have an h-index of 10. ([Google Scholar](#), Nov 2022)*

### **A Decade of Demographics in Computing Education Research: A Critical Review of Trends in Collection, Reporting, and Use**

A. Oleson\*, B. Xie\*, J. Salac, J. Everson, F. M. Kivuva, A. J. Ko (2022)

ACM ICER: International Computing Education Research Conference

\* \* \* denotes equal contribution

*Critical content analysis of 510 computing education research papers to identify themes in the collection, reporting, and use of demographic data.*

### **Surfacing Equity Issues in Large Computing Courses with Peer-Ranked, Demographically-Labeled Student Feedback**

**B. Xie, A. Oleson, J. Everson, A. J. Ko** (2022)

PACMHCI: Proceedings of the ACM on Human-Computer Interaction (presented at ACM CSCW)

🏆 **Award for contribution to Diversity & Inclusion** (3.5% of accepted papers)

*Developed & evaluated tool that contextualizes student feedback for teaching teams to identify equity issues in large classes.*

### **Domain Experts' Interpretations of Assessment Bias in a Scaled, Online Computer Science Curriculum**

**B. Xie, M. J. Davidson, B. Franke, E. McLeod, M. Li, and A. J. Ko** (2021)

ACM L@S: Conference on Learning @ Scale

*Explored a new use of Differential Item Functioning (DIF) where domain experts (Code.org curriculum designers) interpreted data on potential test bias by gender and race.*

### **The Effect of Informing Agency in Self-Directed Online Learning Environments**

**B. Xie, G. L. Nelson, H. Akkaraju, W. Kwok, A. J. Ko** (2020)

ACM L@S: Conference on Learning @ Scale

*Designed and evaluated three variations of self-directed online learning tool to explore how informing and affording agency affected engagement and learning outcomes.*

### **Investigating Novices' In Situ Reflections on Their Programming Process**

**D. Loksa, B. Xie, H. Kwik, A. J. Ko** (2020)

ACM SIGCSE: Technical Symposium on Computer Science Education

*Presented evidence that self-regulation use during programming varies, and that teaching self-regulation skills may require targeted instruction based on students' self-regulation and programming practices.*

### **Towards a Validated Formative Assessment for Language-Specific Program Tracing Skills**

**G. L. Nelson, B. Xie, A. Hu, A. J. Ko** (2019)

ACM Koli Calling

*Developed formative assessment with Kane's validity framework and situated framework within computing education.*

### **An Item Response Theory Evaluation of a Language-Independent CS1 Knowledge Assessment**

**B. Xie, M. J. Davidson, M. Li, A. J. Ko** (2019)

ACM SIGCSE: Technical Symposium on Computer Science Education

*Evaluated SCS1 language-agnostic concept inventory, using Item Response Theory to identify items that were problematic*

### **A Theory of Instruction for Introductory Programming Skills**

**B. Xie, D. Loksa, G. L. Nelson, M. J. Davidson, D. Dong, H. Kwik, A. H. Tan, L. Hwa, M. Li, A. J. Ko** (2019)

CSE: Journal of Computer Science Education

*Proposed theory of instruction to teach four programming skills and demonstrated improved learning outcomes.*

### **Experiences of Computer Science Transfer Students**

**H. Kwik, B. Xie, A. J. Ko** (2018)

ACM ICER: International Computing Education Research Conference

*Investigated social and academic experiences of computer science students who transferred to a 4 yr university.*

### **An Explicit Strategy to Scaffold Novice Program Tracing**

**B. Xie, G. L. Nelson, A. J. Ko** (2018)

ACM SIGCSE: Technical Symposium on Computer Science Education

*Described and evaluated a simple but powerful strategy to scaffold tracing of program execution. With <30 min of practice, novices in intro CS course had midterm grades 7% higher than a control group.*

### **Comprehension First: Evaluating a Novel Pedagogy and Tutoring System for Program Tracing in CS1**

**G. L. Nelson, B. Xie, A. J. Ko** (2017)

ACM ICER: International Computing Education Research Conference

*Contributed a new theory of what it means to know a programming language, instruction based on their theory, and a computer-based tutorial for teaching this knowledge. Found that the tutorial resulted in improved learning gains*

### **Skill Progression in MIT App Inventor**

**B. Xie, H. Abelson** (2016)

IEEE VL/HCC: Symposium on Visual Languages & Human-Centric Computing

*Found that long-term users of App Inventor tend to expand breadth of programming knowledge (use new blocks) before depth (use blocks in more complex ways)*

### **Measuring the Usability and Capability of App Inventor to Create Mobile Applications**

**B. Xie**, I. Shabir, H. Abelson (2015)

PROMOTO: Workshop on Programming for Mobile and Touch

*Investigated the usability and realized capability of >5,000 App Inventor projects, finding that the order of App Inventor tutorials heavily influence the usability of App Inventor to implement particular functionalities*

## Magazine Articles

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### **How Data Can Support Equity in Computing Education**

**B. Xie** (2020)

ACM XRDS: ACM Crossroads Magazine

*Article describing techniques I am exploring in my dissertation to use data to support equity in computing education.*

### **It Is Time for More Critical CS Education**

A. J. Ko, A. Oleson, N. Ryan, Y. Register, **B. Xie**, M. Tari, M. J. Davidson, S. Druga, D. Loksa (2020)

ACM CACM: Communications of the ACM

*Position article calling for more critical lens to computer science education.*

### **Learning and Education in HCI: A Reflection on the SIG at CHI 2019**

V. Pammer-Schindler, E. Harpstead, **B. Xie**, B. DiSalvo, A. Kharrufa, P. Slovak, A. Ogan, J. J. Williams, M. J. Lee (2020)

ACM IX: ACM Interactions Magazine

*Follow-up report on our CHI 2019 SIG on learning, education, and HCI*

## Technical Reports

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### **Theories of Programming (Dagstuhl Seminar 22231)**

T. D. LaToza, A. J. Ko, D. C. Shepherd, D. Sjøberg, **B. Xie** (2023)

Dagstuhl Reports

*Summary of research seminar to sketch new theories of programming and consider the role of theories in programming*

## Invited Talks

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### **Ethical Considerations in Working with Communities and the Public**

**B. Xie** (2023)

Stanford University Research, Action, and Impact through Strategic Engagement Doctoral Fellowship (RAISE)

*Presented instructional workshop to graduate fellows conducting research with communities.*

### **Designing for Equitable, Ethical, and Community-Centric Computing Education**

**B. Xie** (2022)

University of Pittsburgh School of Computing and Information Technology for Social Change series

*Presented research in designing sociotechnical systems that foster critical discourse with and about data.*

### **Roles of Student Feedback for Equity in Large Computing Courses**

**B. Xie** (2022)

University of Washington Information School Research Symposium

*Presented research on contextualized student feedback that was published to PACMHCI/CSCW 2022.*

### **Designing Tech for Equity in Education**

**B. Xie** (2022)

University of Washington Impact++ Panel on Education & Tech

*Presented a framework for designing and developing technology for equitable learning.*

### **Domain Experts' Interpretations of Assessment Bias in a Scaled, Online Computer Science Curriculum**

**B. Xie** (2021)

University of Washington DUB Seminar

*Presented my work done in collaboration with Code.org and published to Learning @ Scale 2021 to UW HCI community.*

### **Equitable Learning Analytics - Why should everyone care?**

R. Ferguson, D. Gasevic, L. Lawrence, **B. Xie** (2021)

ACM LAK: International Conference on Learning Analytics & Knowledge

*Panel to bring awareness to gaps in diversity, equity, and inclusion practices for learning analytics community.*

## Doctoral Colloquium/ Consortium

*Opportunities for doctoral students to engage with peers and faculty members to advance their research.*

### Interpretations and Uses of Data for Equity in Computing Education

B. Xie (2021)

ACM ICER: International Computing Education Research Conference

### Supporting Equity in Computing Education with Student-Led Interactions with Data

B. Xie (2020)

UW DUB Doctoral Colloquium

### Human-AI Collaborations within Computing Education

B. Xie (2019)

iConference

## Teaching

Instructor	<b>Identity, Demographic Data, and Computing Education Seminar</b> , UW INFO 499. Wi '22 <b>Introduction to Data Science</b> , UW INFO 370. Fa '17
Teaching Fellow	<b>Programming Methodologies</b> , Stanford CS 106A. Wi '23 <b>Probability for Computer Scientists</b> , Stanford CS 109. Wi '23, Fa '22 <b>Operating Systems Principles</b> , Stanford CS 111. Wi '23 <b>Design &amp; Analysis of Algorithms</b> , Stanford CS 161. Fa '22 <b>Human-Centered Product Management</b> , Stanford CS 177. Fa '22
Teaching Assistant	<b>Advanced Methods in Data Science</b> , UW INFO 371. Wi '21 <b>Technical Foundations of Informatics</b> , UW INFO 201. Fa '19 <b>Cooperative Software Design</b> , UW INFO 461. Sp '17 <b>Introduction to Computer Science</b> , Prospect Hill Academy. Fa '14, Sp '15
Guest Lecturer	<b>Gradient Descent</b> . In Advanced Methods in Data Science, UW INFO 371. Wi '21. <b>Exploratory Data Analysis</b> . In Applied Regression and ANOVA, UW STAT 423. Wi '19.

## Students Mentored

I have mentored 13 students (two Master's, 11 undergrad), including six women, three BIPOC (Black, Pacific Islander), one non-binary, two international, and one transfer student. Seven co-authored five papers with me, with one first-authoring a paper. Three went on to pursue PhDs, one a Master's, and five into industry.

## Service

Associate Chair	<b>ACM CHI</b> : ACM Conference on Human Factors in Computing Systems (2022, 23)
Program Committee	<b>ACM COMPASS</b> : Conference on Computing and Sustainable Societies (2021), <b>EECScon</b> : MIT EECS Undergrad Research Conference (2014, 15)
Reviewer	<b>ACM CHI</b> (2018, 20, 21, 22), <b>ACM UIST</b> (2019), <b>ACM TOCE</b> (2019, 22), <b>ACM SIGCSE</b> (2018, 19), <b>ICIS</b> (2020), <b>Journal of CS Education</b> (2021), <b>Journal of Information and Learning Sciences</b> (2018)
Committee Member	<b>UW Information School HCI Faculty Search Committee</b> (2020-21)
Student Volunteer	<b>ACM ICER</b> : International Computing Education Research Conference (2021)
Student Coordinator	<b>UW HCI Seminar</b> (2020-21), <b>UW DUB Seminar</b> (2019), <b>UW DUB Doctoral Colloquium</b> (2019), <b>UW DUB PhD Retreat</b> (2018), <b>UW Information School PhD Retreat</b> (2018)
Mentor	<b>Technology Access Foundation</b> (TAF) Academy STEM Expo (2016-2019) <b>Google Summer of Code</b> (on behalf of MIT Media Lab, 2016)

## Research Development

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- 2022 Center for Integrative Research in Computing & Learning Sciences (CIRCLS) Emerging Scholar
- 2022 Dagstuhl Seminar on *Theories of Programming*
- 2017 CMU Simon Initiative LearnLab Summer School
- 2016 SOLAR Learning Analytics Summer Institute (LASI)

## Professional Experience

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- 2015 **NovoEd**, Software Engineering Intern
- 2014 **AppNexus**, Software Engineering Intern, API Team
- 2013 **eBay**, Software Engineering Intern, Marketplace Team