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Benjamin Xie

Ph.D. Candidate

Research Interests: I am a human-computer interaction (HCI) researcher who designs interactive tools to support equity in computing education. I engage with the fields of HCI, computing education, artificial intelligence in education, and psychometrics.

Education

2016 - **University of Washington**, Seattle, WA
Ph.D. in Information Science
Advisor: Amy J. Ko

2015-2016 **Massachusetts Institute of Technology**, Cambridge, MA
M.Eng. in Computer Science
Thesis: *Progression of Computational Thinking Skills Demonstrated by App Inventor Users*
Advisor: Hal Abelson

2011-2015 **Massachusetts Institute of Technology**, Cambridge, MA
B.S. in Computer Science
Advisor: Hal Abelson

Professional Experience

2016- **University of Washington**, Research Assistant, Code & Cognition Lab
2014-2016 **Massachusetts Institute of Technology**, Research Assistant, MIT App Inventor
2015 **NovoEd**, Software Engineering Intern
2014 **AppNexus**, Software Engineering Intern, API Team
2013 **eBay**, Software Engineering Intern, Marketplace Team
2012-2013 **Massachusetts Institute of Technology**, Research Assistant, MIT Education Arcade

Awards & Honors

2016-2021 National Science Foundation (NSF) Graduate Research Fellowship
2019 Society for Collegiate Leadership & Achievement Nomination
2017 Golden Key Honour Society Nomination
2014-2015 MIT EECS - Google Research and Innovation Scholar
2013-2016 USTFCCCA All-Academic Honoree in Cross Country, Track

Publications

Dastyni Loksa, **Benjamin Xie**, Harrison Kwik, and Amy J. Ko. "Investigating Novices' In Situ Reflections on Their Programming Process." In Proceedings of the ACM Technical Symposium on Computer Science Education (SIGCSE), Research Track. ACM, 2020.

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.

Greg L. Nelson, **Benjamin Xie**, Andrew Hu, and Amy J. Ko. "Towards a Validated Formative Assessment for Language-Specific Program Tracing Skills." In Koli Calling, 2019.

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

Benjamin Xie, Erik Harpstead, Betsy DiSalvo, Petr Slovak, Ahmed Kharrufa, Michael J. Lee, Viktoria Pammer-Schindler, Amy Ogan, and Joseph Jay Williams. "Learning, Education,

and HCI." In Extended Abstracts of the 2019 CHI Conference on Human Factors in Computing Systems. CHI EA '19. ACM, 2019.

Proposed special interest group to foster the intersection of HCI and learning sciences.

Benjamin Xie, Matthew J. Davidson, Min Li, and Amy J. Ko. "An Item Response Theory Evaluation of a Language-Independent CS1 Knowledge Assessment." In Proceedings of the 50th ACM Technical Symposium on Computer Science Education, 699–705. SIGCSE '19. ACM, 2019.

Evaluated SCS1 language-agnostic concept inventory, using Item Response Theory to identify items that were problematic (e.g. to hard to provide information).

Benjamin Xie, Dastyni Loksa, Greg L. Nelson, Matthew J. Davidson, Dongsheng Dong, Harrison Kwik, Alex Hui Tan, Leanne Hwa, Min Li, and Amy J. Ko. "A Theory of Instruction for Introductory Programming Skills." Computer Science Education, January 25, 2019, 1–49.

Proposed theory of instruction to teach four distinct programming skills incrementally: tracing, writing syntax, comprehending reusable programming abstractions (templates), applying templates. Demonstrated that teaching these skills resulted improved certain learning outcomes.

Harrison Kwik, **Benjamin Xie**, and Amy J. Ko. "Experiences of Computer Science Transfer Students." In Proceedings of the 2018 ACM Conference on International Computing Education Research, 115–23. ICER '18. ACM Press, 2018.

Investigated experiences of computer science students who transferred to a university, finding that univeristy interventions helped support social transition but did not eliminate gaps in academic performance.

Benjamin Xie, Greg L. Nelson, and Amy J. Ko. "An Explicit Strategy to Scaffold Novice Program Tracing." In 2018 ACM SIGCSE Technical Symposium on Computer Science Education. SIGCSE '18. New York, NY, USA: ACM, 2018.

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.

Greg L. Nelson, **Benjamin Xie**, and Amy J. Ko. "Comprehension First: Evaluating a Novel Pedagogy and Tutoring System for Program Tracing in CS1." In Proceedings of the 2017 ACM Conference on International Computing Education Research, 2–11. ICER '17. New York, NY, USA: ACM, 2017.

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.

Benjamin Xie, and Hal Abelson. "Skill Progression in MIT App Inventor." In 2016 IEEE Symposium on Visual Languages and Human-Centric Computing (VL/HCC), 213–17, 2016.

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).

Benjamin Xie, Isra Shabir, and Hal Abelson. "Measuring the Usability and Capability of App Inventor to Create Mobile Applications." In Proceedings of the 3rd International Workshop on Programming for Mobile and Touch, 1–8. PROMOTO 2015. New York, NY, USA: ACM, 2015.

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.

Teaching

Instructor	UW INFO 370: Introduction to Data Science (Fa '17)
Teaching assistant	UW INFO 201: Technical Foundations of Informatics (Fa '19) UW INFO 461: Cooperative Software Design (Sp '17) Prospect Hill Academy Intro to Computer Science (Fa '14, Sp '15)

Service

Reviewer	CHI (2018, 2020), UIST (2019), TOCE (2019), SIGCSE (2018-2019), Journal of Information an Learning Sciences (2018)
Program committee	EECScon: MIT EECS Undergrad Research Conference (2014, 2015)
Student Coordinator	UW DUB Seminars (2019), UW DUB Doctoral Consortium (2019), UW DUB PhD Student Retreat (2018), UW Information School PhD Retreat (2018)
Mentor	Technology Access Foundation (TAF) Academy STEM Expo (2016-2019) Google Summer of Code (on behalf of MIT Media Lab, 2016)
Educational Counselor	Massachusetts Institute of Technology (2016-2019)