

## Education

Ph.D.	<b>Human Computer Interaction</b>	Carnegie Mellon University	2011-Present
M.S.	<b>Human Computer Interaction</b>	Carnegie Mellon University	2015
B.S.	<b>Mathematics and Computer Science</b>	Carnegie Mellon University	2011

## Research Interests

**Keywords:** data-driven tutoring, automatic feedback, solution spaces, computer science education, intelligent tutoring systems, learning analytics, educational data mining, human computer interaction

**Summary:** I work on the development of data-driven tutoring techniques, mostly in the domain of programming. This work is aimed at providing students and instructors with in-depth information about the solution space of a given domain, where a student is within it, and what might be done to instigate and assist learning. I also study the effects that these tutoring techniques have on student learning.

## Journal Papers

1. Rivers, K. & Koedinger, K.R. (2015). Data-Driven Hint Generation in Vast Solution Spaces: A Self-Improving Python Programming Tutor. *International Journal of Artificial Intelligence in Education*, 1-28.

## Conference Publications

1. Rivers, K., Harpstead, E., and Koedinger, K. (2016) Learning Curve Analysis for Programming: Which Concepts do Students Struggle With? In *Proceedings of the 2016 ACM Conference on International Computing Education Research*. pp 143-151.
2. Ihanola, P., Vihavainen, A., Ahadi, A., Butler, M., Börstler, J., Edwards, S., Isohanni, E., Korhonen, A., Petersen, A., Rivers, K., Rubio, M., Sheard, J., Skupas, B., Spacco, J., Szabo, C., Toll, D. (2015). Educational Data Mining and Learning Analytics in Programming: Literature Review and Case Studies. In *Proceedings of the 2015 ITiCSE on Working Group Reports*. pp. 41-63.
3. Rivers, K. & Koedinger, K.R. (2014). Automating Hint Generation with Solution Space Path Construction. In *Proceedings of the 12<sup>th</sup> International Conference on Intelligent Tutoring Systems*. pp. 329-339.
4. Rivers, K. & Koedinger, K.R. (2013). Automatic Generation of Programming Feedback: A Data-Driven Approach. In *Proceedings of the Workshops at the 16th International Conference on Artificial Intelligence in Education AIED 2013*. pp. 50-59.

5. Spacco, J., Fossati, D., Stamper, J. & Rivers, K. (2013). Towards improving programming habits to create better computer science course outcomes. In *Proceedings of the 18<sup>th</sup> ACM conference on Innovation and technology in computer science education*. pp. 243-248.
6. Sudol, L.A., Rivers, K. & Harris, T. (2012). Probabilistic Distance to Solution in a Complex Problem Solving Domain. In *Proceedings of the 5<sup>th</sup> International Conference on Educational Data Mining*. pp. 144-147.

### Other Publications

1. Rivers, K. (2015). Designing a Data-Driven Tutor Authoring Tool for CS Educators. In *Proceedings of the eleventh annual International Conference on International Computing Education Research*. pp. 277-278.
2. Rivers, K. and Koedinger, K. (2014). Open-Ended Tutoring for Programming: Building Next-Step Hints into an Online Development Environment. At *the Second Workshop on AI-supported Education for Computer Science (AIEDCS)*.
3. Rivers, K. (2014). Automating Hint Generation with Solution Space Path Construction. At *the Seventh Annual inter-Science of Learning Center Student and Post-doc Conference*.
4. Hovemeyer, D., Hertz, M., Denny, P., Spacco, J., Papancea, A., Stamper, J., & Rivers, K. (2013). CloudCoder: building a community for creating, assigning, evaluating and sharing programming exercises. In *Proceeding of the 44th ACM technical symposium on Computer science education*. pp. 742.
7. Rivers, K. & Koedinger, K.R. (2012). A Canonicalizing Model for Building Programming Tutors. In *Proceedings of the 11<sup>th</sup> International Conference on Intelligent Tutoring Systems*. pp. 591-593.

## Teaching Experience

- Co-Instructor for [Principles of Computing](#) Fall 2016  
*Taught lectures to ~300 students, performed course management, designed lecture materials and some assignments, held office hours.*
- Teaching Assistant for [User-Centered Research & Evaluation](#) Fall 2014  
*Taught recitation of 20 students, created some quizzes and assignment write-ups, graded assignments and final projects.*
- Instructor for [User Interface Lab \(Section B - GUI\)](#) Fall 2013  
*Managed class of 17 students, updated the lecture and assignment materials from previous iterations of the course, held office hours, and graded assignments.*
- Instructor for [Fundamentals of Programming and Computer Science](#) Spring 2013  
*Led the second lecture (of ~50 students), using the same curriculum and assessments as the lead instructor. Taught two 1.5 hour lectures a week, held office hours, assisted in grading and assessment of course progress, and performed other miscellaneous duties.*
- Head Course Assistant for [Introduction to Programming](#) 2008-2011  
*Managed 28 to 36 course assistants, QA'd recitations and grading, organized grading sessions and other events, created official autograders and rubrics for assignments, managed course's submission website, led recitation and held office hours.*
- Head Teaching Assistant for [Andrew's Leap](#) Summer 2011
- Teaching Assistant for Media & Programming Summer 2011
- TA's Assistant for [Physics for Science Students 1](#) Spring 2008
- Teacher's Assistant for Remedial Algebra Spring 2007

## Other Research and Industry Experience

- Google Software Engineering Intern Summer 2014
- [Autolab](#) Frontend Developer 2010-2012
- [Pittsburgh Science of Learning Center](#) Intern Summer 2010
- Undergraduate Research Assistant Fall 2009

## Honors and Awards

- [Program for Interdisciplinary Education Research](#) 2011-2016
- [Science and Humanities Scholar](#) 2007-2011
- Carnegie Mellon Senior Leadership Recognition 2011

## Service

### Committees

- HCI PhD Admissions Committee 2015
- Head of Carnegie Mellon SCS Teaching Awards Committee 2014
- Carnegie Mellon CSD TA Committee 2013-2016

### Reviewer (Conferences)

- SIGCSE 2013-2017
- EDM 2015
- AIED 2013

### Reviewer (Fellowships)

- [NCWIT](#) 2011-2015

### Student Volunteer (Conferences)

- SIGCSE 2012, 2015-2016

## Skills

### *Languages*

**Python, Java**, Actionscript, Android, Assembly, Bash Scripting, C, Jess, LaTeX, Prolog, Ruby, Standard ML

### *Web Design*

HTML, Javascript, Java Servlets, MySQL, PHP, Ruby on Rails, Flex

### *Software*

**Cognitive Tutor Authoring Tools (CTAT), Eclipse**, Dreamweaver, InDesign