

Austin Cory Bart

Associate Professor of Computer Science at University of Delaware

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SUMMARY

Continuing-Track Associate Professor studying Computer Science Education. Passionate about teaching and developing technology to support education by leveraging the latest learning theory and computational techniques. Equally comfortable as both Software Engineer and Educational Researcher. Developing sophisticated software, including [BlockPy](#), [Pedal](#), and [CORGIS](#). Committed to supporting education and diversity in every discipline, especially Computer Science.

HIGHLIGHTED CURRICULAR WORK

- **The Python Bakery** - CS1 course with autograding and full teaching content [v2]. Also the flagship curriculum of VSCode Edu (<https://vscodeedu.com/courses/intro-to-python>).
- **The Tome** - Mid-degree Software Engineering course with a new focus on modern web development, including an [open-source interactive](#) textbook.
- **AlgoTutorBot** - Novel upper-division Algorithmic Theory course with an [embedded narrative](#).

WORK HISTORY

| | |
|--|--------------|
| Associate Professor in Computer Science <i>University of Delaware, Newark, DE</i> Courtesy Appointment in School of Education | 2023-present |
| Assistant Professor in Computer Science <i>University of Delaware, Newark, DE</i> Courtesy Appointment in School of Education | 2018-2023 |
| Visiting Assistant Professor in Computer Science <i>Virginia Tech Computer Science Department, Blacksburg, VA</i> | 2017-2018 |

EDUCATION

| | |
|---|-----------|
| PhD. Computer Science <i>Virginia Tech</i> Dissertation: <i>Motivating Introductory Students with Pedagogical Datasets</i> Coursework GPA: 4.00 | 2012-2017 |
| Certification in Learning Sciences <i>Virginia Tech</i> Four courses on learning sciences, academic motivation, educational technology, and instructional design. Coursework GPA: 4.00 | 2013-2015 |
| Honors Bachelor with Distinction in Computer Science <i>University of Delaware</i> Thesis: <i>Exploring the XO Laptop as a Platform for Encouraging Creative Writing by Children</i> Coursework GPA: 3.85 | 2008-2012 |

COURSES TAUGHT

Virginia Tech - Blacksburg, VA

Fall 2017

| | | |
|--|-----------------|------------|
| CS1014 - Intro to Computational Thinking | 51 students in | 1 sections |
| CS1064 - Intro to Python | 300 students in | 1 sections |

Spring 2018

| | | |
|--|-----------------|------------|
| CS1014 - Intro to Computational Thinking | 70 students in | 1 sections |
| CS1064 - Intro to Python | 242 students in | 1 sections |

University of Delaware - Newark, DE

Fall 2018

| | | |
|-------------------------------------|-----------------|------------|
| CISC108 - Intro to Computer Science | 151 students in | 3 sections |
| CISC320 - Intro to Algorithms | 43 students in | 1 sections |

Spring 2019

| | | |
|---------------------------------------|----------------|------------|
| CISC108 - Intro to Computer Science | 55 students in | 1 sections |
| CISC320 - Intro to Algorithms | 43 students in | 1 sections |
| CISC357 - Engaging Youth in Computing | 6 students in | 1 sections |

Fall 2019

| | | |
|---------------------------------------|-----------------|------------|
| CISC108 - Intro to Computer Science | 175 students in | 4 sections |
| CISC357 - Engaging Youth in Computing | 17 students in | 1 sections |

Spring 2020

| | | |
|-------------------------------------|----------------|------------|
| CISC108 - Intro to Computer Science | 55 students in | 1 sections |
| CISC320 - Intro to Algorithms | 58 students in | 1 sections |
| CISC374 - Educational Game Design | 44 students in | 1 sections |

Fall 2020

| | | |
|-------------------------------------|-----------------|------------|
| CISC108 - Intro to Computer Science | 169 students in | 4 sections |
| CISC890 - Colloquium: CS Education | 4 students in | 1 sections |

Spring 2021

| | | |
|-------------------------------------|----------------|------------|
| CISC108 - Intro to Computer Science | 60 students in | 1 sections |
| CISC320 - Intro to Algorithms | 39 students in | 1 sections |
| CISC367 - Intro to Data Science | 21 students in | 1 sections |
| CISC890 - Colloquium: CS Education | 5 students in | 1 sections |

Fall 2021

| | | |
|---|-----------------|------------|
| CISC108 - Intro to Computer Science | 102 students in | 2 sections |
| CISC275 - Intro to Software Engineering | 68 students in | 2 sections |
| CISC890 - Colloquium: CS Education | 3 students in | 1 sections |

Spring 2022

| | | |
|---|----------------|------------|
| CISC108 - Intro to Computer Science | 56 students in | 1 sections |
| CISC275 - Intro to Software Engineering | 91 students in | 1 sections |
| CISC890 - Colloquium: CS Education | 7 students in | 1 sections |

Fall 2022

| | | |
|-------------------------------------|-----------------|------------|
| CISC108 - Intro to Computer Science | 180 students in | 4 sections |
|-------------------------------------|-----------------|------------|

Spring 2023

| | | |
|-------------------------------------|----------------|------------|
| CISC108 - Intro to Computer Science | 55 students in | 1 sections |
| CISC320 - Intro to Algorithms | 87 students in | 1 sections |

Fall 2023

| | | |
|-------------------------------------|-----------------|------------|
| CISC108 - Intro to Computer Science | 185 students in | 1 sections |
|-------------------------------------|-----------------|------------|

HONORS AND AWARDS

Nomination for Excellence in Teaching

University of Delaware

Nominated for the prestigious, University-wide [Excellence in Teaching Award](#) by former students.

2020

Third Best Curriculum Issues Paper

SIGCSE 2019

2019

Awarded to the paper considered third best in the Curriculum Issues track by the program committee.

Items below are from before the promotion period

Best CS Education Research Paper

2017

SIGCSE 2017

Awarded to the paper considered to have the Best CS Education Research by the program committee.

Outstanding Graduate TA Award

2017

Virginia Tech Computer Science Department

Awarded to the graduate student who has shown the most exemplary teaching that year.

NSF Graduate Research Program Fellowship

2014-2017

National Science Foundation

A \$96,000 stipend given over three years to pursue the student's own graduate-level research agenda. Given to less than 2,000 of the 13,000 submitted applications from PhDs in varying fields across the entire US, and considered one of the most prestigious scholarships offered through the NSF.

XCaliber Award for Excellence in Technology Assisted Teaching and Learning

2016

Virginia Tech TLOS Organization

Received as part of a team with Dr. Dennis Kafura for the creation of a Computational Thinking course for non-majors. The XCaliber award recognizes the application of novel pedagogy and innovative technology in course design across the Virginia Tech community. Includes a \$1000 stipend to further develop resources.

Davenport Leadership Award

2015

Virginia Tech Computer Science Department

Virginia Tech Computer Science Department award that annually acknowledges strong academic performance and recognition as a Davenport Leadership Scholar. Also includes a \$2000 stipend.

Third Place in the Graduate Level Student Research Competition

2015

SIGCSE 2015

Competed at the 2015 SIGCSE (Special Interest Group for Computer Science Education) Student Research Competition, winning third place at the graduate level.

NSF Graduate Research Program Honorable Mention

2013

National Science Foundation

Given to less than 2,000 of the 13,000 submitted applications from PhDs across the entire US, this award recognizes a promising application for this prestigious fellowship.

PUBLICATIONS AND PRESENTATIONS

Bolding indicates student authors

^U indicates undergraduate student author

^G indicates graduate student author

Underline indicates my position in authorship list

Conference and Journal Publications

- L. Hye Rin, T. Rutherford, A. C. Bart. Logs and Surveys of Reviewing Behaviors in an Introductory Computer Science Course: Their Motivatioanl Antecedents and Relation to Performance. CSEDM'23.
- **K. Holsapple**^U, A. C. Bart. Designing Designer: The Evidence-Oriented Design Process of a Pedagogical Interactive Graphics Python Library. SIGCSE'22, Boston, MA. March, 2022.
- **J. Harden**^G, L. Gusukuma, A. C. Bart, D. Kafura. A Specification Language for Matching Mistake Patterns with Feedback. SIGCSE'21, Digital. March, 2021.

- [A. C. Bart](#), T. Rutherford, [J. Skripchuk](#)^U. Evaluating an Instrumented Python CS1 Course. Educational Data Mining in Computer Science Education (CSEDM) Workshop @ EDM'20, Digital. July, 2020.
- L. Gusukuma, [A. C. Bart](#), and D. Kafura. Pedal: An Infrastructure for Automated Feedback Systems. SIGCSE'20, Portland, Oregon. March, 2020.
- T. Price, D. Hovemeyer, K. Rivers, [A. C. Bart](#), G. Gao, A. M. Kazerouni, B. Becker, A. Petersen, L. Gusukuma, S. H. Edwards and D. Babcock. "ProgSnap2: A Flexible Format for Programming Process Data." ITiCSE'20, Trondheim, Norway, 17-19 June 2020. 2020.
- T. Price, D. Hovemeyer, K. Rivers, [A. C. Bart](#), A. Petersen, B. Becker and J. Lefever, ProgSnap2: A Flexible Format for Programming Process Data, CSEDM'19, Tempe, Arizona. March, 2019.
- [A. C. Bart](#), [A. Sarver](#)^U, [M. Friend](#)^U, L. Cox, PythonSneks: An Open-Source, Instructionally-Designed Introductory Curriculum with Action-Design Research, SIGCSE'19, Minneapolis, Minnesota. February, 2019.
 - Won 3rd Best Paper in Curriculum track
- [A. C. Bart](#), C. A. Shaffer, What Have We Talked About?, SIGCSE'19, Minneapolis, Minnesota. February, 2019.
- [L. Gusukuma](#)^G, [A. C. Bart](#), D. Kafura, Misconception-Driven Feedback: Results from an Experimental Study, ICER '18, Finland. August, 2018.
- [A. C. Bart](#), E. Tilevich, C. A. Shaffer, D. Kafura, Reconciling the Promise and Pragmatics of Enhancing Computing Pedagogy with Data Science, SIGCSE '18, Baltimore, MD. February, 2018.
- L. Gusukuma, [A. C. Bart](#), D. Kafura, Instructional Design + Knowledge Components: A Systematic Method for Refining Instruction, SIGCSE '18, Baltimore, MD. February, 2018.
- B. Chowdhury, [A. C. Bart](#), D. Kafura, Analysis of Collaborative Learning in a Computational Thinking Class, SIGCSE '18, Baltimore, MD. February, 2018.
- L. Gusukuma, [A. C. Bart](#), D. Kafura, Authoring Feedback for Novice Programmers in a Block-based Language (Position Paper), Blocks & Beyond 2017, Raleigh, North Carolina. October 2018. (Workshop-level)
- [A. C. Bart](#), J. Tibau, D. Kafura, E. Tilevich, C. A. Shaffer, Design and Evaluation of a Block-based Environment with a Data Science Context, IEEE Transactions on Emerging Topics in Computing. May, 2017. (Journal)
- [A. C. Bart](#), J. Tibau, E. Tilevich, C. A. Shaffer, D. Kafura, BlockPy: An Open Access Data-Science Environment for Introductory Programmers, IEEE Computer '17. May, 2017.
 - Invited submission
- [A. C. Bart](#), [R. Whitcomb](#)^U, D. Kafura, A. A. Shaffer, E. Tilevich. Computing with CORGIS: Diverse, Real-world Datasets for Introductory Computing. ACM Inroads 8, 2 (March 2017), 66-72. (Reprint)
- [A. C. Bart](#), [R. Whitcomb](#)^U, E. Tilevich, C. A. Shaffer, D. Kafura, Computing with CORGIS: Diverse, Real-world Datasets for Introductory Computing, SIGCSE '17, Seattle, Washington. March, 2017. (30% acceptance)
 - Won 1st Best Paper Award on CS Education Research Track
- [A. C. Bart](#), L. Gusukuma, D. Kafura. Pushing My Buttons: Talking about Affordances in Block Interfaces. Blocks & Beyond 2017. Raleigh, NC. October 2017.
- [A. C. Bart](#), J. Tibau, E. Tilevich, C. A. Shaffer, D. Kafura, Implementing an Open-access, Data Science Programming Environment for Learners, COMPSAC '16, Atlanta, Georgia. June 10-15, 2016. (18% acceptance)

- [A. C. Bart](#), E. Tilevich, C. A. Shaffer, D. Kafura, Position Paper: From Interest to Usefulness with BlockPy, a Block-based, Educational Environment, Blocks & Beyond '15, Atlanta, Georgia. October 21-23, 2015.
- D. Kafura, [A. C. Bart](#), B. Chowdhury, Design and Preliminary Results From a Computational Thinking Course. ITiCSE'15, Vilnius, Lithuania. July 6-8, 2015. (44% acceptance)
- [A. C. Bart](#), E. Tilevich, T. Allevato, S. Hall, C. A. Shaffer, Transforming Introductory Computer Science Projects via Real-Time Web Data, SIGCSE '14, Atlanta, Georgia. March 5-8, 2014. (39% acceptance)

Workshops, Birds of a Feather, and Demos

- BB Morrison, A Decker, L Margulieux, [A. C. Bart](#). Subgoals for CS1 in Python. Toronto, Canada. March, 2023.
- T. Rutherford, [A. C. Bart](#). Applying Learning Theories within an Introductory Computer Science Course. CTAL Summer Institute on Teaching. Newark, DE. Summer 2023.
- [A. C. Bart](#). Let's Learn Algorithms with AlgoTutorBot! An Entire Course as an Educational Escape Room. SIGCSE'22. Boston, MA. March, 2022.
- A. Decker, B. Morrison, and [A. C. Bart](#). Using Subgoal Labeling in Teaching CS1. SIGCSE'22. Boston, MA. March, 2022.
- [A. C. Bart](#), L. Gusukuma, D. Kafura. Authoring Semi-automated Feedback for Python Code with Pedal, SIGCSE'21, Digital. March, 2021.
- [A. C. Bart](#), P. Conrad, M. Hilton, B. Edmison. The Problem of Packaging Curricular Materials. SIGCSE 2019. Minneapolis, MN. February 2019.
- [A. C. Bart](#) and D. Kafura. BlockPy Interactive Demo: Dual Text/Block Python Programming Environment for Guided Practice and Data Science. SIGCSE'17. Seattle, Washington. March 2017.
- E. Tilevich, C. A. Shaffer, [A. C. Bart](#). Creating Stimulating, Relevant, and Manageable Introductory Computer Science Projects that Utilize Real-Time, Large, Web-Based Datasets , SIGCSE'15, Kansas City, MO. 2014.
- E. Tilevich, C. A. Shaffer, [A. C. Bart](#). Creating Stimulating, Relevant, and Manageable Introductory Computer Science Projects that Utilize Real-Time, Web-Based Datasets , SIGCSE'14, Atlanta, GA. 2013.

Panels and Talks

- [A. C. Bart](#). Is My Course Effective? Data Science Institute 2019. Newark, DE. November 2019.
- [A. C. Bart](#). Curricular Material Packaging Working Group Report. CSSPLICE'19. Minneapolis, MN. February 27, 2019.

Talks below are from before the promotion period.

- [A. C. Bart](#), K. Subramanian, R. E. Anderson, N. A. Hamid, Preparing, Visualizing, and Using Real-world Data in Introductory Courses, SIGCSE'18, Baltimore, Maryland. February, 2018.
- [A. C. Bart](#), C. A. Shaffer. Instructional Design is to Teaching as Software Engineering is to Programming. SIGCSE '16. Kansas City, MO. March 2-5, 2016.
- [A. C. Bart](#), [J. Riddle](#)^U, [O. Saleem](#)^U, B. Chowdhury, E. Tilevich, C. A. Shaffer, D. Kafura, Motivating Students with Big Data: CORGIS and MUSIC, Splash-E '14, Portland, Oregon. October 21-23, 2014.
- [A. C. Bart](#), E. Tilevich, C. A. Shaffer, T. Allevato, S. Hall, Using Real-Time Web Data to Enrich Introductory Computer Science Projects, Splash-E '13, Indianapolis, Indiana. October 26-31, 2013.

Posters

- **M. Englert, A. C. Bart.** Building Curricular Supports Through Undergraduate Teaching Assistants to Scale Individualized Instruction in CS1. SIGCSE'23. Toronto, Canada. March 2023.
- L. Gusukuma, **A. C. Bart**, D. Kafura, Authoring Feedback for Novice Programmers in a Block-based Language. Blocks & Beyond 2017. Raleigh, NC. October 2017.
- **A. C. Bart.** Applying Formal Models of Instructional Design to Measurably Improve Learning in Introductory Computing. SIGCSE '16. Kansas City, MO. March 2-5, 2016.
- **A. C. Bart**, E. M. Bart, Teaching Animal Science with Minecraft: AnimalScienceCraft. GSA Research Symposium at Virginia Tech, Blacksburg, VA, March 2015.
- **A. C. Bart**, Situating Computational Thinking with Big Data: Pedagogy and Technology, SIGCSE 45th ACM technical symposium on Computer Science Education Graduate Research Poster Competition, Kansas City, MO, March 2015.
- **A. C. Bart**, E. Tilevich, C. A. Shaffer, T. Allevato, S. Hall, Teaching Computational Thinking with Real-Time Data, Conference on Higher Education Pedagogy, Virginia Tech, Blacksburg, VA, February 2014.
- **A. C. Bart**, E. Tilevich, C. A. Shaffer, T. Allevato, S. Hall, Transforming Introductory Computer Science Projects via Real-Time Web Data, Graduate Student Poster Symposium, Virginia Tech, Blacksburg, VA, May 2013.
- **A. C. Bart**, L. Pollock, Wacky Writing: Enhancing the XO Laptop Platform to Motivate Creative Writing by Children, SIGCSE 44th ACM technical symposium on Computer Science Education, Denver, CO, March 2013.
- **A. C. Bart**, R. Deaton, E. McGinnis, Lowering Development Barriers in Educational Game Design, Conference on Higher Education Pedagogy, Virginia Tech, Blacksburg, VA, February 2013.
- **A. C. Bart**, G. Sridhara, L. Pollock, V. Shanker, Reverse Engineering from Java Identifier Names: Conventions and a Grammar, Summer Scholars Poster Presentation, University of Delaware, Newark, DE, August 2011.

GRANTS

- Senior Personnel on NSF IUSE: A \$400k external grant titled “Collaborative Research: Expanding Subgoal Labels for Imperative Programming to Further Improve Student Learning Outcomes.” Helped develop the Python-version of their materials as a domain expert. 2021-2023

PROFESSIONAL SERVICE ACTIVITIES

Departmental Committees

- Undergraduate Program Coordinator for CIS Department (University of Delaware, Summer 2023 - Present)
- CS1 Coordinator for CIS Department (University of Delaware, Summer 2022 - Present)
- CIS Department Chair Search Committee (University of Delaware, 2021- Spring 2022)
- CIS CERAD Committee for Diversity and Inclusivity (University of Delaware, Fall 2020-2022)
- CIS Undergraduate Program Committee (University of Delaware, Fall 2019-Spring 2021)
- CIS Broadening Participation Planning Committee (University of Delaware, Fall 2019-2022)
- CIS Education-enhancing Infrastructure Committee (University of Delaware, Fall 2019-Spring 2020)
- CIS Faculty Learning Community on Teaching (University of Delaware, Fall 2019-Present)
- CIS Undergraduate Recruiting (University of Delaware, Fall 2018- Spring 2020)

- CIS CT Faculty Recruiting (University of Delaware, Fall 2018- Spring 2019)
- CS Undergraduate Program Committee (Virginia Tech, fall 2017 - Spring 2018)

University/College Committees

- Serving in College of Engineering Undergraduate Diversity Working Group (University of Delaware, Fall 2019-2022).
- Serving on Honors Faculty Advisory Board (University of Delaware, Fall 2019-Present).

External Service

- Conference/Journal/NSF Reviewing: CHI 2022, ITiCSE 2021, CHI 2020, CSED 2020, CSEDM 2020, LAS 2020, TOCE 2020, LAK 2019, ICER 2019, NSF STEM+C Panelist
- Served in the “[Future of Computing Education Research](#)” working group
- Web Chair for ICER’21
- Volunteer Instructor at Partner4CS 2019 Summer Workshop for CS K-12 PD of In-service teachers and CS Summit 2019 for Partner4CS (Summer 2019).
- Leading one CSSPLICE Working Group (Curricular Materials Packaging) and serving as member on two others (Programming Snapshot Data and Programming Exercise Representation). (Fall 2017-Present).
- `r/CSEducation` Subreddit Moderator - a major digital CS Education communities (2018-2021).
- Publicity and Web Chair in Organizing Committee (SPLASH-E 2015) - reviewed submissions, organized website, and coordinated emails.

NOTABLE SOFTWARE PROJECTS

Pedal Project

2018-Present

<https://pedal-edu.github.io/pedal>

- Framework to analyze student’s code and provide feedback.
- Collection of powerful program analysis tools for type inferencing, sandboxed execution, and AST queries.
- Instructors can incorporate guided feedback to analyze students’ code and provide immediate feedback
- Organize, label, and test code for providing students feedback.

BlockPy Project

2015-Present

<https://blockpy.com>

- A web-based, open-access Python programming environment
- Features a dual block/text editor with mutual language translation – users can switch between the two interfaces at will (separately available at <https://github.com/blockpy-edu/BlockMirror/>)
- Instructors can incorporate guided feedback to analyze students’ code and provide immediate feedback via Pedal.
- Data science tools for creating graphs and accessing real-world datasets using simple blocks.

CORGIS Dataset Project

2014-Present

<https://think.cs.vt.edu/corgis>

- A curated collection of Big Data sets for introductory programming
- Provides a contextualized experience to motivate students and increase comprehension
- Specially developed, innovative technology makes creating and working with real-time and massive datasets trivial even for beginner students

Waltz Project

2018-Present

<https://github.com/acbart/waltz>

- Synchronizes curricular materials between a Learning Management Systems (LMS) and your local filesystem.
- Extensible platform works a variety of technologies, including orks with Canvas, GradeScope, and BlockPy
- Lightweight, friendly Markdown-based format for local resources

Designer

2020-Present

<https://github.com/designer-edu/designer>

- User-friendly game development library for Python
- Participatory design with the goal of being truly easy for novices
- Built on Pygame with support for an extensive number of sophisticated features like animations, image manipulation, and more.

Drafter

2023-Present

<https://github.com/drafter-edu/drafter>

- User-friendly web development library for Python
- Goal to be truly easy for novices
- Built on Bottle with a simple, testable API

ADVISING

Graduate

- Luke Gusukuma, Ph.D. Computer Science at Virginia Tech (2017-2020) - Co-advisor with Dennis Kafura. Successfully defended in June 2020.
 - Topic: Misconception Driven Student Analysis Model: Applications of a Cognitive Model in Teaching Computing

Undergraduate

- Megan Englert, B.S. Computer Science at University of Delaware (2021-present) - In progress Senior Thesis
 - Topic: Building curricular supports for undergraduate TAs to scale individualized instruction in CS1
- Kristina Holsapple, B.S. Computer Science at University of Delaware (2020-present)
 - Topic: Designing a truly novice-friendly game development library for Python via Participatory Design
- James Skripchuk, Honors B.S. Computer Science at University of Delaware (2019-2020)
 - Topic: Using fine-grained programming snapshot data to evaluate introductory programming experiences
- Darren Butler, B.S. Computer Science at Philander Smith College (2018-2019)
 - Topic: Exploring how instructors use automatic feedback in grading programming many small programming assignments
- Allie Sarvar, B.S. Computer Science at Virginia Tech (2016-2017)
 - Topic: Investigating the impact of in-class cohorts for building community in a large lecture context
- Michael Friend, B.S. Computer Science at Virginia Tech (2016-2017)
 - Topic: Investigating the impact of worked examples on student learning in introductory programming courses
- Edward McEnrue, B.S. Computer Science at Virginia Tech (2015-2016)

- Topic: Building and deploying datasets in introductory computing courses to motivate non-computing majors
- Ryan Whitcomb, B.S. Computational Modeling at Virginia Tech (2014-2016)
 - Topic: Building and deploying datasets in introductory computing courses to motivate non-computing majors
- Ishita Ganotra, B.S. Computer Science at Virginia Tech (2014-2015)
 - Topic: Building and deploying datasets in introductory computing courses to motivate non-computing majors
- Omar Saleem, B.S. Computer Science at Virginia Tech (2013-2014)
 - Topic: Building and deploying datasets in introductory computing courses to motivate non-computing majors
- Jason Riddle, B.S. Computer Science at Virginia Tech (2013-2014)
 - Topic: Building and deploying datasets in introductory computing courses to motivate non-computing majors

CURRENT RESEARCH INTERESTS

Digital Education, Computer Science Education, Data Science, Academic Motivation, Instructional Design, Situated Learning Theory, Introductory Computing Experiences, Web-based Programming Environments, Guided Feedback, Program Analysis, Educational Data Mining, Learning Analytics, Educational Games, Educational Software Design, Educational Escape Rooms

REFERENCES

References available on request.