

CONTACT INFO

Brian A. Danielak
Postdoctoral Research Associate
Michigan State University
640 May St Apt 6
Lansing, MI 48906
brian@briandk.com | 845-901-4422

EDUCATION

- Ph.D.** Curriculum & Instruction
University of Maryland, College Park (2014)
- B.A.** Chemistry & English
University at Buffalo (2007)
Summa Cum Laude, Phi Beta Kappa

Software Development Experience

OPEN-SOURCE PROJECTS

1. **Transdown**: *A Lightweight Syntax for Qualitative Transcript Data* (2015). **Transdown** is **Markdown** for transcripts. Inspired by both **Markdown** and **Fountain**, Transdown lets qualitative researchers transcribe data in a simple, human-readable plaintext markup format that can be rendered and styled as HTML. <http://transdown.org>
2. **Analyzing Data with ADAGE**: *A Guided Tour of Mining Data from a Game for Learning* (2014). <http://capbri.gitbooks.io/makescape-adage-gitbook/>
3. **CodeTimeline**: *A Visual Browser for Code File History* (2012). CodeTimeline works like an interactive VCR for playing back the history of a git-versioned source code file. Run from the command line, it presents a browser-based, zoomable, scrollable, visual interface to a file's history. <https://github.com/briandk/gitvisualizations>
4. **RepoStatistics**: *Small Multiple Visualizations of Git Repository History* (2012). RepoStatistics gives programming instructors a visual dashboard representation of students' progress on code. <https://github.com/briandk/gitvisualizations>
5. **granovaGG**: *Graphical Analysis of Variance Using ggplot2* (2012). GranovaGG creates plots that enable visual inference and statistical exploration of Omnibus *F*-tests, Dependent Sample *t*-tests, and contrasts. <http://cran.r-project.org/web/packages/granovaGG/index.html>

PROGRAMMING LANGUAGES

| Language | Associated Projects |
|------------|---|
| R | granovaGG, RepoStatistics |
| JavaScript | Transdown, CodeTimeline |
| Python | CodeTimeline, RepoStatistics, Analyzing Data with ADAGE |

Research Experience

POST-DOCTORAL RESEARCH ASSOCIATE

Department of Computational Mathematics, Science, and Engineering (CMSE)

2015–Present, Michigan State University, Brian O'Shea Ph.D. (PI)

I work with Brian O'Shea to develop CMSE's flagship Introduction to Computational Modeling course. This course serves as a programming-based introduction to how STEM practitioners create, evaluate, and refine models through computation. My responsibilities include **designing course curricula, teaching the course, and conducting rigorous learning science research** on the course.

Data Explorer and Assessment Resources for Physics Faculty (DEAR-Faculty)

2014–2015, American Association of Physics Teachers, Sarah McKagan (PI)

This project is built around a web portal where physics instructors can learn about research-validated assessments and find out how to use them in their courses. For this project, **I'm developing a software system to automatically create assessment-specific implementation guides. I also conduct user interviews with faculty** to understand how we can tune the database and its front-end to meet their needs.

Learning Ethnographies of New Engineers (LENE), 2014, Northwestern University

Reed Stevens Ph.D. (PI) and Kevin O'Connor, Ph.D. (Co-PI)

LENE tries to understand what new engineers know and learn. We develop case studies to explore how what new engineers must learn to do on the job aligns (or doesn't align) with what they learned to do when they were students. My role was lead ethnographer: **I identified and followed recent engineering graduates, observing them at work and conducting interviews with them** to develop detailed cases of their development.

MakeScape, 2013 – 2014, University of Wisconsin–Madison

Matthew Berland Ph.D. (PI) and Leilah Lyons, Ph.D. (Co-PI)

I co-designed an interactive game-based museum environment to support students' design thinking. Specifically, I worked with game designers and artists to develop the conceptual architecture and intended learning outcomes of the game. And, I worked with software engineers to design and implement specifications to collect in-game telemetry data. I also led weekly meetings of the Complex Play Lab.

Learning Games PlayData Consortium, 2014, University of Wisconsin–Madison

Matthew Berland Ph.D. (PI) and Kurt Squire, Ph.D. (Co-PI) & Richard Halverson Ph.D. (Co-PI)

I co-designed the frameworks for collecting, analyzing, and presenting in-game telemetry data. Working with software engineers, game designers, and learning science researchers I helped refine telemetry data specifications and develop visualization and statistical analysis tools. I also planned and coordinated meetings and workshops for key stakeholders on the project.

NSF DISCIPLINARY EXPERT IN SCIENCE EDUCATION FELLOW

Exploring Students' Understanding of Modularized Code, 2011–2013

Using my fellowship, I proposed an independent project that became the basis of my dissertation. I **ethnographically observed an Introductory Programming for Engineers course**. I arranged, conducted, transcribed, and analyzed ethnographic interviews with electrical engineering students. I **co-developed a system to automatically capture snapshot histories of students' codebases**. I also developed open-source tools for visualizing code evolution over time: *CodeTimeline* and *RepoStatistics*

Publications

PEER-REVIEWED PUBLICATIONS

1. **Danielak, B. A.** & Doane, W. E. J. (under review). Reconstructing design thinking and learning through code snapshots and clinical interviews. *Proceedings of the 2016 International Conference on Computing Education (ICER)*.
2. **Danielak, B. A.** & Doane, W. E. J. (under review). Expanding Models of Cognition within Computing Education Research. *Proceedings of the 2016 International Conference on Computing Education (ICER)*.
3. **Danielak, B. A.**, Gupta, A., & Elby, A. (2014). Marginalized identities of sense-makers: Reframing engineering student retention. *Journal of Engineering Education*, 103(1), 8–44. <http://dx.doi.org/10.1002/jee.20035> (Impact Factor: 1.925)
4. **Danielak, B. A.**, Mechtley, A., Berland, M., & Lyons, L. (2014). MakeScape lite: A prototype learning environment for making and design. In *Proceedings of the 2014 Conference on Interaction Design and Children* (pp. 229–232). DOI: <http://doi.org/10.1145/2593968.2610459> (Acceptance Rate: 30%)
5. **Danielak, B. A.**, & Doane, W. E. J. (2014). Studying students' early-stage software design practices. In *Proceedings of the 11th International Conference of the Learning Sciences*. Boulder, Colorado, USA: International Society of the Learning Sciences. (Acceptance Rate: 30%)

Talks and Invited Presentations

1. **Danielak, B. A.**, O'Shea, B. W., & Colbry, D. (2016). Using Principles from the Learning Sciences to Develop a Data-Driven Introduction to Computational Modeling. To be presented at the 2016 International Conference on Computational Science Workshop on Teaching Computational Science
2. **Danielak, B. A.** (2015) Using Code Snapshots and Interviews to Understand How Students Design Computer Programs. Presented at Michigan State University. *Invited Talk*
3. Elby, A., **Danielak, B. A.**, & Gupta, A. (2012). *Entangled Identity and Epistemology Meet Electromagnetism: The Case of Michael*. Contributed Presentation presented at the Summer Meeting of the American Association of Physics Teachers (AAPT), Philadelphia, PA (USA).

4. **Danielak, B. A.** (2012). Using Fine-Grained Code and Fine-Grained Interviews to Understand How Students Learn to Program. University of New Mexico – Department of Computer Science Colloquium. *Invited Talk*
5. Pruzek, R. M., **Danielak, B. A.**, Bryer, J., & Doane, W. E. J. (2011). *Some New Developments in Graphics for Comparing Groups*. Presented at the Society for Multivariate Experimental Psychology, Norman, Oklahoma, USA.
6. **Danielak, B. A.** (2011). *Do We Value Sense-Makers in Science Education?* Presented at Bennington College, Bennington, VT. *Invited Talk*
7. **Danielak, B. A.** (2010). Using R to Assess Mathematical Sense-Making in Introductory Physics Courses. Presented at the 2010 UseR! Statistics Conference, Gaithersburg, MD
8. **Danielak, B. A.** (2010). *Identity, Culture, and Sense-Making*. Presented at the 2010 American Association of Physics Teachers Winter Meeting, Washington, D.C.

FUTURE PUBLICATIONS

1. **Danielak, B. A.** (in preparation). Combining clinical interviews and code snapshot history to study students' software design. Target Venue: *Journal of the Learning Sciences*
2. **Danielak, B. A.**, Gupta, A., & Elby, A. (in preparation). Understanding students' cognitive resources for designing computer programs. Target Venue: *Cognition and Instruction*

Grant Experience

1. Robust Descriptions of Faculty Teaching Practice at Scale (\$1,386,566; NSF ECR; not funded). Grant co-author.
2. *Transdown*: A Lightweight, Markdown-Inspired Syntax for Qualitative Data Transcripts (\$750). 2014. Innovation Grant from the Physics Education Research Topical Group of the American Association of Physics Teachers. Principal Investigator. <http://transdown.org>
3. An application-based learning approach to introductory C programming language courses (\$199,354.00; *funded*). NSF DUE 1245745. Grant co-author.

Awards and Fellowships

| Year | Award Description |
|-----------|--|
| 2008–2013 | National Science Foundation Fellow Disciplinary Experts in Science Education Program, (NSF DRL 0733613) |
| 2011 | Doctoral Consortium Participant 2011 International Computing Education Research Workshop (ICER) |
| 2008 | NSF Graduate Research Fellowship in the History of Science <i>Honorable Mention</i> |
| 2007–2008 | Owen Fellow in the History of Science, Johns Hopkins University |
| 2007 | Outstanding Senior Award - Chemistry <i>University at Buffalo</i> |
| 2007 | Outstanding Senior Award - English <i>University at Buffalo</i> |
| 2003–2007 | University at Buffalo Distinguished Honors Scholar |
| 2007 | University at Buffalo Renaissance Scholar Award |
| 2007 | Samuel P. Capen Award for Interdisciplinary Excellence |
| 2007 | Tufariello Award for Outstanding Excellence in Chemistry |
| 2006 | Elected to Phi Lambda Upsilon Chemistry Honor Society |
| 2006 | Elected to Phi Beta Kappa |
| 2006 | The George and Sheila Nancollas Physical Chemistry Scholarship |
| 2005 | The American Chemical Society Award for Excellence in Analytical Chemistry |
| 2005 | The Grace Capen Award for Academic Excellence |
| 2004 | The CRC Handbook Award for Excellence in General Chemistry |