

Adding Research Accounts to the ASSISTments Platform: Helping Researchers Do Randomized Controlled Studies with Thousands of Students

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Overview

Real-world learning and teaching is rarely guided by data or theory from research in psychology, education and computer science. The rigorous experiments and randomized controlled trials conducted in research are overwhelmingly limited to laboratory environments.

This project begins the development of Cyberinfrastructure that any researcher can use to apply theory and do rigorous studies in the context of students learning from online mathematics homework.

Building on the existing www.Assistments.org platform, we build the capacity for external researchers to propose practical *and* scientifically valuable randomized experimental comparisons, and receive data without needing direct connections to classrooms, or having to solve data privacy concerns on their own.

Current Outcomes

On July 28th, 2014, hosted a webinar on running experiments that 100 scientists attended. Received applications as of February 2014 for twelve researchers from the universities listed below to run experiments in ASSISTments.

- Boston College
- Indiana University
- Northwestern University
- Southern Methodist University
- Stanford University
- Harvard University
- Temple University
- University of Colorado
- University of Illinois Chicago
- University of Maine
- University of Wisconsin
- Vanderbilt University
- Successfully supported eight external researchers in implementing their studies.
- Infrastructure for automatic weekly delivery of most recent anonymized data.
- Published paper comparing Cyberinfrastructure for experiments on ASSISTments to Khan Academy and EdX to identify improvements:
Williams, J. J., Ostrow, K., Xiong, X., Glassman, E., Kim, J., Maldonado, S. G., Reich, J., & Heffernan, N. (2015). Using and Designing Platforms for In Vivo Educational Experiments. *Proceedings of the Second ACM Conference on Learning@Scale*.
- Submitted paper on methods for linking practitioners who use software with researchers in a scalable way:
Williams, J. J., Maldonado, S., Williams, B. A., Rutherford-Quach, S., & Heffernan, N. (2015). How can digital online educational resources be used to bridge experimental research and practical applications? Embedding In Vivo Experiments in “MOOClets”. *Paper to be presented at the Spring 2015 Conference of the Society for Research on Educational Effectiveness*, Washington, D. C.
- Paper on novel scientific contribution of this platform, and how researchers can use it:
Ostrow, K., Heffernan, N., & Williams, J. J. (*in prep*). The Future of Adaptive Learning: Infusing Educational Technology with Sound Science. *Teachers College Record*.

Next Steps & Objectives

- Workshop on how researchers can run these studies at largest education conference in the world – American Education Research Association.
- Additional researchers involved – especially more diverse set, multiple disciplines.
- Scientific Publications from this work.
- Practical improvements in students learning outcomes.

Future Directions: Beyond Current Grant

- **Crowdsourcing**
- **Infrastructure to apply Machine Learning Algorithms for Automatic Experimentation**
- **APIs for Artificial Intelligence & Machine Learning researchers to contribute to development**
- **Automatic Adaptation & Personalization**

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