

Miggy Andres-Bray, Ph.D.  
*Curriculum Vitae*

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Email: *miggy.andres-bray@mheducation.com* • Mobile: +1 (704) 443-1258

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**RESEARCH INTERESTS**

Learning Analytics, Machine Learning, MOOCs, Replication, Affective Computing

**EDUCATION**

- 12/2021      **Ph.D.**, Teaching, Learning, and Teacher Education  
*University of Pennsylvania*  
Advisor: Ryan S. Baker, Ph.D.  
Dissertation: Replication in Massive Open Online Course Research: Using the MOOC Replication Framework [Distinction]
- 10/2014      **M.S.**, Computer Science  
*Ateneo de Manila University*  
Advisor: Ma. Mercedes T. Rodrigo, Ph.D.  
Thesis: A Study of the Relationships Between Learning and Affect Trajectories Within Newton's Playground
- 03/2011      **B.S.**, Computer Science  
Specialization in Enterprise Systems  
*Ateneo de Manila University*  
Advisor: Ma. Mercedes T. Rodrigo, Ph.D.  
Thesis: Emotiv EPOC in the Implementation of an Assistive Smart Room

**PROFESSIONAL EXPERIENCE**

2021-Present    **Senior Data Scientist**, McGraw Hill Education

**PUBLICATIONS**

*Journal Papers*

Richey, J.E., **Andres-Bray, J.M.L.**, Mogessie, M., Scruggs, R., Andres, J.M.A.L., Star, J.R., Baker, R.S., & McLaren, B.M. (2019). More confusion and frustration, better learning: The impact of erroneous examples. *Computers & Education*, 139, 173-190.

Gardner, J., Brooks, C., **Andres, J. M.**, & Baker, R. S. (2018). MORF: A framework for predictive modeling and replication at scale with privacy-restricted MOOC data. In *2018 IEEE International Conference on Big Data (Big Data)* (pp. 3235-3244). IEEE.

**Andres, J.M.L.**, Baker, R.S., Siemens, G., Gašević, D., & Spann, C.A. (2017). Replicating 21 Findings on Student Success in Online Learning. *Technology, Instruction, Cognition, & Learning*.

Richey, J. E., Zhang, J., Das, R., **Andres-Bray, J.M.**, Scruggs, R., Mogessie, M., Baker, R.S., & McLaren, B.M. (2021). Gaming and Confrustion Explain Learning Advantages for a Math Digital Learning Game. In *International Conference on Artificial Intelligence in Education* (pp. 342-355). Springer, Cham.

Zhou, Y., **Andres-Bray, J.M.**, Hutt, S., Ostrow, K., & Baker, R. S. (2021). A Comparison of Hints vs. Scaffolding in a MOOC with Adult Learners. In *International Conference on Artificial Intelligence in Education* (pp. 427-432). Springer, Cham.

Mogessie, M., Richey, J. E., McLaren, B. M., **Andres-Bray, J.M.L.**, & Baker, R. S. (2020). Confrustion and gaming while learning with erroneous examples in a decimals game. In *International Conference on Artificial Intelligence in Education* (pp. 208-213). Springer, Cham.

Richey, J. E., **Andres-Bray, J.M.L.**, Mogessie, M., Scruggs, R., Andres, J. M., Star, J.R., Baker, R.S., & McLaren, B. M. (2019). More confusion and frustration, better learning: The impact of erroneous examples. *Computers & Education*, 139, 173-190.

Joksimovic, S., Baker, R.S., Ocumpaugh, J., **Andres, J.M.L.**, Tot, I., Wang, E.Y., & Dawson, S. (2019). Automated identification of verbally abusive behaviors in online discussions. In *Proceedings of the Third Workshop on Abusive Language Online* (pp. 36-45).

Richey, J. E., McLaren, B. M., **Andres-Bray, J.M.**, Mogessie, M., Scruggs, R., Baker, R., & Star, J. (2019). Confrustion in Learning from Erroneous Examples: Does Type of Prompted Self-explanation Make a Difference?. In *International Conference on Artificial Intelligence in Education* (pp. 445-457). Springer, Cham.

**Andres-Bray, J.M.L.**, Ocumpaugh, J. L., & Baker, R. S. (2019). Hello? Who is posting, who is answering, and who is succeeding in Massive Open Online Courses. In *EDM*.

Aleven, V., Sewall, J., **Andres, J.M.**, Popescu, O., Sottolare, R., Long, R., & Baker, R. (2019). Towards deeper integration of intelligent tutoring systems: one-way student model sharing between GIFT and CTAT. In *Proceedings of the 7th Annual Generalized Intelligent Framework for Tutoring (GIFT) Users Symposium*.

Gardner, J., Brooks, C., **Andres, J.M.**, & Baker, R. (2018). Replicating MOOC predictive models at scale. In *Proceedings of the Fifth Annual ACM Conference on Learning at Scale* (pp. 1-10).

Aleven, V., Sewall, J., **Andres, J.M.**, Sottolare, R., Long, R., & Baker, R. (2018). Towards adapting to learners at scale: integrating MOOC and intelligent tutoring frameworks. In *Proceedings of the Fifth Annual ACM Conference on Learning at Scale* (pp. 1-4).

**Andres, J.M.L.**, Baker, R. S., Gašević, D., Siemens, G., Crossley, S. A., & Joksimović, S. (2018). Studying MOOC completion at scale using the MOOC replication framework. In *Proceedings of the 8th International Conference on Learning Analytics and Knowledge* (pp. 71-78).

Banawan, M. P., **Andres, J.M.L.**, & Rodrigo, M. M. T. (2017). Predicting Student Carefulness in an Educational Game for Physics Using Semi-supervised Learning. In *Proc. of the 15th National Conference on Information Technology Education* (pp. 19-21).

Ocuppaugh, J., **Andres, J.M.**, Baker, R., DeFalco, J., Paquette, L., Rowe, J., Mott, B. Lester, J., Georgoulas, V., Brawner, K., & Sottolare, R. (2017). Affect dynamics in military trainees using vMedic: From engaged concentration to boredom to confusion. In *International conference on artificial intelligence in education* (pp. 238-249). Springer, Cham.

Kai, S., **Andres, J.M.L.**, Paquette, L., Baker, R. S., Molnar, K., Watkins, H., & Moore, M. (2017). Predicting Student Retention from Behavior in an Online Orientation Course. *International Educational Data Mining Society*.

Aleven, V., Baker, R., Blomberg, N., **Andres, J.M.**, Sewall, J., Wang, Y., & Popescu, O. (2017). Integrating moocs and intelligent tutoring systems: edx, gift, and ctat. In *Proceedings of the 5th Annual Generalized Intelligent Framework for Tutoring Users Symposium, Orlando, FL, USA* (p. 11).

Banawan, M. P., Rodrigo, M. M. T., & **Andres, J.M.L.** (2017). Predicting Student Carefulness within an Educational Game for Physics using Support Vector Machines. In *Proc. of the 25th International Conference on Computers in Education* (pp. 62-67).

Palaoag, T.D., Rodrigo, M.M.T., **Andres, J.M.L.**, Andres, J.M.A.L., & Beck, J.B. (2016). Wheel-spinning in a Game-Based Learning Environment for Physics. 13<sup>th</sup> International Conference on Intelligent Tutoring Systems, Zagreb, Croatia, June 6-10, 2016.

Andres, J.M.A.L., **Andres, J.M.L.**, Rodrigo, M.M.T., Beck, J.B., & Baker, R.S. (2015). An Investigation of Eureka and the Affective States Surrounding Eureka Moments. 23<sup>rd</sup> International Conference on Computers in Education, Hangzhou, China, November 30-December 4, 2015.

Banawan, M.P., Rodrigo, M.M.T., & **Andres, J.M.L.** (2015). An Investigation of Frustration Among Students Using Physics Playground. 23<sup>rd</sup> International Conference on Computers in Education, Hangzhou, China, November 30-December 4, 2015.

Palaoag, T.D., Rodrigo, M.M.T., & **Andres, J.M.L.** (2015). An Exploratory Study of Persistence Markers Within a Game-Based Learning Environment. 23<sup>rd</sup> International Conference on Computers in Education, Hangzhou, China, November 30-December 4, 2015.

**Andres, J.M.L.**, & Rodrigo, M.M.T. (2014). The Incidence and Persistence of Affective States While Playing Newton's Playground. 7<sup>th</sup> IEEE International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management, Palawan, Philippines, November 13-14, 2014.

**Andres, J.M.L.**, Rodrigo, M.M.T., Sugay, J.O., Baker, R.S., Paquette, L., Shute, V.J., Ventura, M., & Small, M. (2014). An Exploratory Analysis of Confusion Among Students Using Newton's Playground. 22<sup>nd</sup> International Conference on Computers in Education, Nara, Japan, November 30-December 4, 2014.

Rodrigo, M.M.T., Grosch, M., & **Andres, J.M.L.** (2013). Media Usage by Filipino Students – An Empirical Study. 21<sup>st</sup> International Conference on Computers in Education, Bali, Indonesia, November 18-22, 2013.

## Workshop Papers

Alevan, V., Baker, R.S., Long, R.A., Sewell, J., **Andres, J.M.L.**, Wang, Y., Popescu, O., & Blomberg, N. (2017). Integrating MOOCs and Intelligent Tutoring Systems: edX, GIFT, and CTAT. 5th Annual GIFT Users Symposium. Orlando, Florida, United States. May 10-11, 2017.

Brooks, C., Baker, R., & **Andres, J.M.L.** (2017). Infrastructure for Replication in Learning Analytics. In *MLA/BLAC@LAK*.

**Andres, J.M.L.**, Rodrigo, M.M.T., Baker, R.S., Pacquette, L., Shute, V.J., & Ventura, M. (2015). Analyzing Student Action Sequences and Affect While Playing Physics Playground. 1<sup>st</sup> International Workshop on Affect, Meta-Affect, Data, and Learning, Madrid, Spain, June 26, 2015.

**Andres, J.M.L.**, Rodrigo, M.M.T., Sugay, J.O., Banawan, M.P., Paredes, Y.V.M., Dela Cruz, J.S., & Palaoag, T.V. (2015). More Fun in the Philippines? Factors Affecting Transfer of Western Field Methods to One Developing World Context. 6<sup>th</sup> International Workshop on Culturally-Aware Tutoring Systems, Madrid, Spain, June 22, 2015.

**Andres, J.M.L.**, & Rodrigo, M.M.T. (2014). Learning and Affect Trajectories Within Newton's Playground. 3<sup>rd</sup> International Workshop on ICT Trends in Emerging Economies, Nara, Japan, December 1, 2014.

## TEACHING AND RESEARCH APPOINTMENTS

2016-2021      **Research Fellow**, University of Pennsylvania

- Developed and supported the use of the MOOC Replication Framework (MORF), an analytics PaaS that facilitates the execution of large-scale studies on Massive Open Online Courses (MOOCs), led to the publication of 8 replication studies
- Designed and conducted the first large-scale quantitative research studies in Learning Analytics, provided insight into the replicability of previously published MOOC findings
- Streamlined the data analysis process of a 4-year project by designing a pipeline for the preprocessing, cleaning, coding, and analysis of various learning platform data, led to the publication of one journal publication and three conference publications
- Gathered, manipulated, and analyzed large data sets across different learning platforms, leading to four conference publications
- Designed and currently conducting a study on the cross-cultural generalizability of completion prediction models in MOOCs on over 1.9 million learners
- Presented findings at multiple major conferences in the field of Learning Analytics
- Developed data infrastructure for the Penn Online Learning Initiative and supported data analyses and reporting
- Co-managed a team of 4 developers in implementing upgrades to MORF, aided in developing list of fixes, new features, and tasks necessary to achieve each milestone, presided over weekly meetings, and ensured clear communication between team members, led to the relaunch of MORF, where 3 new studies are currently being supported
- Managed two Master's students in their research internships with the Penn Center for Learning Analytics, aided in the design of their research plan and supported all data gathering, analysis, and publication, led to the acceptance of one intern's study into the 2021 International Conference on Artificial Intelligence in Education

2017-2021      **Teaching Assistant**, University of Pennsylvania  
Big Data and Education MOOC on edX

- Integrated adaptive modules from the Army Research Lab's Generalized Intelligent Framework for Tutoring (GIFT) tool into edX in order to implement adaptive capabilities within the course
- Developed Python assignment content for the course and integrated them into edX using the Cognitive Tutor Authoring Tools (CTAT) software
- Developed the back-end structure of the course
- Responded to learners' questions and comments in the discussion forum
- Conducted and published on data analyses on the impact of multi-platform integration on learner outcomes

Spring 2019      **Teaching Assistant**, University of Pennsylvania  
EDUC 691: Core Methods in Educational Data Mining

- Managed Tutor Shop content for the course, including:
  - Managing student accounts and access to assignments
  - Providing technical support to students
  - Creating content for and developing Intelligent Tutoring System-based weekly assignments using the Cognitive Tutoring Authoring Tools (CTAT) software

2015-2016      **Doctoral Research Fellow**, Teachers College, Columbia University

- Developed Version 1 of the MOOC Replication Framework
- Conducted and published on production rule analyses that looked at the relationship of various student behaviors to course completion within a single course, and across all Massive Open Online Courses (MOOCs) offered by the University of Edinburgh on the edX platform
- Collaborated on learning analytics-driven research with other institution members of the Digital Learning Research Network (dLRN)
- Conducted and published on data analyses that looked at the efficacy of an online introductory course to student retention in following semesters, in collaboration with the University of Arkansas System

Spring 2015      **Research Assistant**, Ateneo de Manila University

**Grant:** Development and Deployment of Adaptive, Interactive, SMS-Based Modules for English

- Connected with experts in Elementary English in order to develop content for these modules
- Aided in the development of the SMS infrastructure that enabled the implementation of this service

2014-2015      **Information Systems Researcher**, Ateneo de Manila University

**Grant:** Stealth Assessment of Student Conscientiousness, Cognitive-Affective States, and Learning Using an Educational Game for Physics

- Planned and executed a 3-city data gathering effort that sought to gather student data from Luzon (Baguio City National High School and University of the Cordilleras), Visayas (Sacred Heart School – Ateneo de Cebu), and Mindanao (Ateneo de Davao).
- Conducted and published on multiple data analyses that investigated the 1) the efficacy of an open-ended education game on Physics understanding, 2) the relationship between affect

trajectories and in- and out-game performance, and 3) the differences between field methods in the Philippines and in the US.

- Provided consultancy to research teams that published on data analyses that investigated 1) wheel-spinning, or unproductive persistence, 2) the experience of eureka and how it relates to performance, and 3) frustration within the educational gaming environment.

Spring 2015    **Lecturer**, Ateneo de Manila University

### COURSES TAUGHT

Spring 2015    **Mathematics for Computer Science II**, Ateneo de Manila University  
The course covers number representation, graph theory, linear algebra, statistics, and optionally, numerical analysis. The course also teaches and uses the Python programming language.

Spring 2015    **Theory of Algorithms**, Ateneo de Manila University  
The course focuses on the fundamental techniques used to design and analyze efficient algorithms. These techniques include greedy algorithms, divide-and-conquer algorithms, dynamic programming, and graph algorithms.

### COURSES TAKEN

Fall 2017        **University of Pennsylvania**  
EDUC 880: Complex, Multilevel, and Longitudinal Research Models  
EDUC 545: Social and Statistical Network Analysis

Spring 2017    EDUC 726: Foundations of Teaching and Learning  
EDUC 545: Mixed Methods Research  
EDUC 777: Structural Equations Modeling

Fall 2016        EDUC 727: Education, Culture, and Society  
EDUC 682: Qualitative Modes of Inquiry


Spring 2016    **Teachers College, Columbia University**  
HUDK 4080: Educational Psychology  
HUDK 4051: Learning Analytics: Process and Theory  
HUDM 5122: Applied Regression Analysis

Fall 2015        HUDK 4029: Human Cognition and Learning  
HUDK 4050: Core Methods in Educational Data Mining  
HUDM 4122: Probability and Statistical Inference

### AWARDS

2013-2015      **Research Scholarship**, Department of Science and Technology – Engineering Research and Development for Technology (DOST-ERDT)

## AFFILIATIONS

- 2016-Present **Penn Center for Learning Analytics**
- 2015-2018 **Digital Learning Research Network**
- 2015-2017  **Interlab**
- 2015-Present **Baker Educational Data Mining Laboratory**
- 2010-Present **Ateneo Laboratory for the Learning Sciences**

## SERVICE

- 2018-2020 **Program Committee**, 7<sup>th</sup>-10<sup>th</sup> IEEE International Conference on Engineering, Technology, and Education
- 2018 **Program Committee**, 1<sup>st</sup> Information and Computing Education Conference
- 2018 **Organizer**, *replicate.education: A Workshop on Large-Scale Education Replication*, in conjunction with the 11th International Conference on Educational Data Mining
- 2016 **Sub-Reviewer**, 18<sup>th</sup> International Conference on Artificial Intelligence in Education
- 2016 **Program Committee**, 1st International Conference on Advanced Technologies Enhancing Education
- 2016 **Program Committee**, 1<sup>st</sup> International Conference on Wearable Technologies, Knowledge Development, and Learning
- 2015 **Program Committee**, 6<sup>th</sup> International Workshop on Culturally-Aware Tutoring Systems

## PRESS AND MEDIA COVERAGE

### *Interviews*

Rosati, J.B. (June 2018). Mining for Data Gold: Ph.D. Student Digs Into Research on MOOCs. Penn GSE Magazine: Spring 2018. Retrieved from [https://issuu.com/pennngse/docs/the\\_penn\\_gse\\_magazine\\_-\\_spring\\_2018](https://issuu.com/pennngse/docs/the_penn_gse_magazine_-_spring_2018)

## TECHNICAL SKILLS

Languages	Python, R, Java, SQL, SAS, C++, Racket
Machine Learning	Scikit-learn, pandas, numpy, xgboost, pyspark, nltk
Frameworks/Tools	AWS, Docker, Tableau, SPSS, Spark, Git