# $\begin{array}{c} \text{JooYoung} \\ \text{Seo} \\ \\ \text{Learning, Design, and Technology, 301 Keller Building, University Park, PA 16802, USA} \\ \\ Ph.D. Candidate \\ (ABD) \\ \\ \end{array}$

I am a learning scientist, software engineer, and accessibility professional.

## Research Areas

- o Inclusive Makerspaces
- Accessible STEM Learning
- Computational Thinking for Learners with dis/ABILITIES
- o Inclusive CSCL (Computer-Supported Collaborative Learning)
- Accessibility
- o Universal Design
- Assistive Technology

# Primary Research Methods

- Supervised/Unsupervied Machine Learning-Based Text Mining
- Computational Linguistics
- o Data Science-Based Reproducible Research
- Quantitative Ethnography

#### Education

Aug. 2016 - Ph.D. in Learning, Design, and Technology, The Pennsylvania State Present University, University Park, PA.

- Expected graduation: May 2021.
- o Dissertation Title: "Discovering Informal Learning Cultures of Blind Individuals Pursuing STEM Disciplines: A Quantitative Ethnography Using Public Listserv Archives."
- o Committee members: Drs. Gabriela T. Richard (adviser; dissertation chair), Roy B. Clariana, ChanMin Kim, and Mary Beth Rosson.
- Aug. 2014 M.Ed. in Learning, Design, and Technology, The Pennsylvania State May. 2016 University, University Park, PA.
  - o GPA 3.97/4.0.

Mar. 2009 - B.A. in Education, Sungkyunkwan University, Seoul, South Korea.

Feb. 2014 • GPA 4.08/4.50.

Mar. 2009 - **B.A. in English Literature**, *Sungkyunkwan University*, Seoul, South Korea. Feb. 2014 • GPA 4.08/4.50.

# Certificate

- Apr. 2017 Certified Professional in Accessibility Core Competencies, Interna-Present tional Association of Accessibility Professional, Atlanta, GA.
- Feb. 2014 English Teacher Certificate for Secondary Education, Korean Ministry Present of Education, Sejong, South Korea.
- Feb. 2014 General Education Teacher Certificate for Secondary Education, Ko-Present rean Ministry of Education, Sejong, South Korea.

# Research Experience

- Aug. 2016 Graduate Assistant, IT Accessibility Team, Teaching and Learning with Present Technology (TLT), University Park, PA.
  - o Developing "Image ALT Text for HTML" and "Image ALT Text for Word" badges using the Penn State digital badges platform.
  - o Evaluating suitability of digital badges according to web content accessibility guidelines (WCAG) 2.0.
  - o Testing and consulting for accessible HTML5/CSS3 webpages for Penn State University sites and learning management tools (e.g., Angel, Canvas, Voice Thread, Adobe products, etc.)
  - o Engaged in a project for future research on making visualized statistical data accessi-
  - o Developed a package for statistical software R, called tactileR, which converts visual data into touchable graphs in conjunction with a Swell Form Heating Machine (portfolio of samples available upon request).
- Aug. 2016 Graduate Researcher, Playful Learning and Inclusive Design Research Group, Present University Park, PA.
  - o Conducting interaction analysis and microethnographic studies for Dr. Gabriela Richard's inclusive gaming for learning and accessible makerspaces for youth with diverse background.
- May. 2019 Principal Investigator, Online Interactions of the Blind, University Park, PA.

- Present o Conducting quantitative ethnography research on how blind learners pursue STEM disciplines as captured through a large-scale mailing listservs.
  - o Using data science, computational linguistics (i.e., unsupervised machine learning for text mining; natural language processing) approaches coupled with conventional ethnographic methods.
- May. 2018 Project Manager, Accessible RMarkdown Online Writer (AROW) Project, Present Teaching and Learning with Technology (TLT), University Park, PA.
  - o Developed an accessible web application for people with dis/abilities to easily compose a high-quality scientific document based on LAMP, AJAX, R Markdown, and MathML.
- Jun. 2017 Principal Investigator, Exploring Accessibility of Maker Toolkits, University Present Park, PA.
  - Conducting usability and design research on how to make current electronics and maker toolkits more accessible for learners with visual impairments.

- Feb. 2015 Site Manager, Learning2CC, University Park, PA.
- Dec. 2015 Participated in an ongoing learning community project for sharing tips for video caption for deaf learners.
  - o Developed Learning 2CC, the online community site, using the WordPress platform.
- Sep. 2014 Graduate Researcher, Avenue PM Research Group, University Park, PA.
- May. 2016 Participated in Dr. Simon Hooper's grant project sponsored by the U.S. Department of Education Stepping Stones Phase II program.
  - o Improved web accessibility for deaf-blind learners by removing blockers on website platform.
- Feb. 2012 Student Researcher, The Ministry of Knowledge Economy and Seoul National Mar. 2012 University, Seoul, South Korea.
  - o Visited various places in California, such as CSUN conference, museums, universities, and other publiclocations, to observe universal design products and services.
  - o Produced a comparison report on universal design products and services in Korea and the United States.
  - o Presented the report to the Quality of Life Technology team at Seoul National University.

# Teaching Experience

- Mar. 2015 Accessibility Instructor, IT Accessibility Team, Teaching and Learning with Present Technology (TLT), University Park, PA.
  - o Teaching over 30 staff members of the Penn State Accessibility team HTML5/CSS3/JavaScript coding and accessibility evaluation practice.
- Mar. 2013 Assistant English Teacher, Gunpo High School, Gyeonggi, South Korea.
  - May. 2013 Taught English to 10-grade high school students.

# Working Experience

- Jul. 2010 Co-Founder and Project Manager, ICE Soft, Seoul, South Korea.
- Jun. 2011 Co-founded and managed a start-up company to develop Android-based navigation App and assistive technology for blind people.
  - Applied for and received a \$30,000 fund from the city of Seoul.
- May. 2010 Intern, National Human Rights Commission of Korea, Seoul, South Korea.
- Nov. 2010 Investigated illegal cases of discrimination against the disabled with regard to voting.
  - o Interviewed the disabled who had experienced discrimination against their voting rights.
  - o Produced written report for National Human Rights Commission of Korea.

#### Awards and Honors

- Oct. 2019 Cengage Best Doctoral Proposal Fellowship, The First International Conference on Quantitative Ethnography (in partnership with Cengage), Madison, WI.
  - 2019 Andrew V. Kozak Memorial Fellowship, The PDK Educational Foundation, University Park, PA.

- Apr. 2019 **AERA Pre-Conference Travel Award**, The Spencer Foundation, Toronto, ON, Canada.
  - 2017 **Delta Gamma Golden Anchor Award**, The Pennsylvania State University, University Park, PA.
  - 2015 **Delta Gamma Golden Anchor Award**, The Pennsylvania State University, University Park, PA.
  - 2017 ACM Richard Tapia Celebration of Diversity in Computing Conference Scholarship, The National Science Foundation (NSF), Atlanta, GA.
  - 2017 ACM Student Research Competition Travel Award, Microsoft Research, Atlanta, GA.
  - 2017 **Summer Tuition Assistance Funding**, College of Education, University Park, PA.
- Aug. 2016 Graduate Student Travel Grant, College of Education, University Park, Present PA.
- Aug. 2016 Graduate Assistantship, Teaching and Learning with Technology, University Present Park, PA.
- 2014 2019 **Outstanding Academic Award**, *Hyomyoung Scholarship*, Seoul, South Korea.
- 2016 2018 Academic Scholarship for Doctoral Research, ChungInwook Scholarship Foundation, Seoul, South Korea.
  - 2016 All Nations Church Graduate Scholarship, ANC Scholarship Foundation, Lake View Terrace, CA.
- 2014 2016 Future Interdisciplinary Study of Global Korea Scholarship for Master's Research, National Institute for International Education, Korean Government, Seoul, South Korea.
- 2009 2013 **Academic Achievement Scholarship**, Sungkyunkwan University, Seoul, South Korea.

Grants

- Mar. 2016 Providing Touchable Knowledge Structure Graphic Feedback for Aug. 2017 Blind Online Learners: Tablet-Based Haptic Feedback and Paper-Based Tactile Feedback, Center for Online Innovation in Learning, The Pennsylvania State University, University Park, PA.
  - o Co-led (Co-PI) a development project funded by Penn State to provide blind online learners with accessible network graphs that measure students' knowledge structure.
  - Developed a prototype website and mobile app for accessible knowledge structure.
  - o Funding amount: \$33,060
  - Jul. 2010 ICE Soft: I See Everything through Assistive Technology, Seed Funding Jun. 2011 for Start-Up Company for the Youth, City of Seoul, Seoul, South Korea.
    - o Co-Founded and Project-Managed ICE Soft.
    - Worked with a team and developed an gps app for the blind.
    - Funding amount: \$30,000 USD.

## **Publications**

### Selected Publications

- Seo, J. (2019). Is the maker movement inclusive of ANYONE?: Three accessibility considerations to invite blind makers to the making world. *TechTrends*, 63(5), 514–520. https://doi.org/10.1007/s11528-019-00377-3
- Seo, J., & McCurry, S. (2019). LaTeX is not easy: Creating accessible scientific documents with r markdown. *Journal on Technology and Persons with Disabilities*, 7, 157–171.
- Seo, J., & Richard, G. T. (2018). Accessibility, making and tactile robotics: Facilitating collaborative learning and computational thinking for learners with visual impairments. In J. Kay & R. Luckin (Eds.), Rethinking learning in the digital age: Making the learning sciences count, 13th international conference of the learning sciences (icls) 2018 (Vol. 3, pp. 1755–1757). London, UK: International Society of the Learning Sciences (ISLS).
- Seo, J., AlQahtani, M., Ouyang, X., & Borge, M. (2017). Embracing learners with visual impairments in cscl. In B. K. Smith, M. Borge, E. Mercier, & K. Y. Lim (Eds.), Making a difference: Prioritizing equity and access in cscl, 12th international conference on computer supported collaborative learning (cscl) 2017 (Vol. 2). Philadelphia, PA: International Society of the Learning Sciences (ISLS).

## Refereed Journal Papers

- Choi, S., & Seo, J. (2019). Analysis of caregiver burden in palliative care: An integrated review.  $Nursing\ Forum,\ 54(2),\ 280-290.$  https://doi.org/10.1111/nuf.12328
- Choi, S., & Seo, J. (2019). Heart failure research using text mining: A systematic review. NURSING RESEARCH, 68(2), E119–E120.
- Choi, S., & Seo, J. (2019). Trends in self-management among adults with heart failure from 2011 to 2016 using the national health and nutrition examination surveys. *Journal of Cardiac Failure*, 25(8), S4. https://doi.org/10.1016/j.cardfail.2019.07.540
- Seo, J. (2019). Is the maker movement inclusive of ANYONE?: Three accessibility considerations to invite blind makers to the making world.  $TechTrends,\ 63(5),\ 514-520.$  https://doi.org/10.1007/s11528-019-00377-3
- Seo, J., & McCurry, S. (2019). LaTeX is not easy: Creating accessible scientific documents with r markdown. *Journal on Technology and Persons with Disabilities*, 7, 157–171.
- Choi, S., & Seo, J. (2018). Effects of nonpharmacological interventions for fatigue in patients

with heart failure: A systematic review and meta-analysis. *Journal of Cardiac Failure*, 24(8), S73–S74.

## Papers in Refereed Conference Proceedings

- Choi, S., Seo, J., & Kitko, L. (2019). Exploring the lived experience of a family member with advanced heart failure: Using a text mining approach. *The first international conference on quantitative ethnography: Poster session*, S8–S9. Madison, WI.
- Seo, J. (2019). Discovering informal learning cultures of blind individuals pursuing stem disciplines: A quantitative ethnography using listserv archives. *The first international conference on quantitative ethnography: Doctoral consortium*, S66–S67. Madison, WI.
- Seo, J. (2018). Accessibility and inclusivity in making: Engaging learners with all abilities in making activities. In *Proceedings of the 3rd learning sciences graduate student conference* (pp. 141–142). Nashville, TN: LSGSC Planning Team.
- Seo, J., & Richard, G. T. (2018). Accessibility, making and tactile robotics: Facilitating collaborative learning and computational thinking for learners with visual impairments. In J. Kay & R. Luckin (Eds.), Rethinking learning in the digital age: Making the learning sciences count, 13th international conference of the learning sciences (icls) 2018 (Vol. 3, pp. 1755–1757). London, UK: International Society of the Learning Sciences (ISLS).
- Konecki, M., Lovrenčić, S., Seo, J., & LaPierre, C. (2017). The role of ict in aiding visually impaired students and professionals. *Proceedings of the 11th Multidisciplinary Academic Conference*, 148.
- Seo, J., AlQahtani, M., Ouyang, X., & Borge, M. (2017). Embracing learners with visual impairments in cscl. In B. K. Smith, M. Borge, E. Mercier, & K. Y. Lim (Eds.), Making a difference: Prioritizing equity and access in cscl, 12th international conference on computer supported collaborative learning (cscl) 2017 (Vol. 2). Philadelphia, PA: International Society of the Learning Sciences (ISLS).

## Working Papers under Revision or Review

Richard, G. T., & Seo, J. (under review). Able to play, ready to learn: Proposing an intersectional, critical dis/abilities framework for research, design and practice in video games and learning. *Disability Studies Quarterly*.

# Software Developments and Publications

## Peer-Reviewed Data Mining Packages

- 1. Seo, J and S Choi (2019). ezpickr: Easy Data Import Using GUI File Picker and Seamless Communication Between an Excel and R. R package version 1.2.0. https://CRAN.R-project.org/package=ezpickr.
- 2. Seo, J and S Choi (2019). mboxr: Reading, Extracting, and Converting an Mbox File into a Tibble. R package version 0.2.0. https://CRAN.R-project.org/package=mboxr.
- 3. Seo, J and S Choi (2019). youtubecaption: Downloading YouTube Subtitle Transcription in a Tidy Tibble Data Frame. R package version 0.1.2. https://CRAN.R-project.org/package=youtubecaption.

#### Open-Source Project on GitHub

1. Seo, J (2019). ezviewr: View Tidy Data in Preferable Spreadsheet. R package version 0.1.0. https://github.com/jooyoungseo/ezviewr.

- 2. Seo, J (2019). jladown: Writing a Reproducible Article for Journal of Learning Analytics in R Markdown. R package version 0.0.0.9000. https://github.com/jooyoungseo/jladown.
- 3. Seo, J (2019). tactileR: Converting R Graphics into a Braille Ready-to-Print PDF. R package version 0.1.0. https://github.com/jooyoungseo/tactileR.

## Officially Contributing R Packages

- My name has been officially listed as a contributor for the following refereed open-source packages:
  - 2019 bookdown: Authoring Books and Technical Documents with R Markdown, Yihui Xie, https://cran.r-project.org/web/packages/bookdown/.
    - o Developed beamer\_presentation2, html\_fragment2, html\_notebook2, html\_vignette2, ioslides\_presentation2, slidy\_presentation2 and rtf\_document2 functions to enable R markdown users to utilize cross-references for figures and tables in an RTF file format through bookdown package.
  - 2019 wordcountaddin: Word counts and readability statistics in R markdown documents, Ben Marwick, https://github.com/benmarwick/wordcountaddin.
    - Contributed text\_stats() function for R markdown users to Get a word count and some other stats for selected text (excluding code chunks and inline code).
  - 2019 BrailleR: Improved Access for Blind Users, A. Jonathan R. Godfrey, https://cran.r-project.org/web/packages/BrailleR/.
    - o Contributed BRLThis() function to enable blind R users to convert a graph into a pdf ready for embossing in Braille.

## Presentations

#### Peer-Reviewed Conference Posters and Presentations

- Seo, J., & Richard, G. T. (2020, April). Maker inclusivity = maker accessibility: further interrogations for diverse participation. Poster will be presented at the annual meeting of the American Educational Research Association (AERA), San Francisco, CA.
- Seo, J. (2019, October). Discovering informal learning cultures of blind individuals pursuing STEM disciplines: a quantitative ethnography using listserv archives. Poster presented at the Doctoral Consortium of the first International Conference on Quantitative Ethnography (ICQE), Madison, WI. Awarded the best doctoral proposal fellowship.
- Seo, J., & McCurry, S. (2019, March). LaTeX is NOT easy: creating accessible scientific documents with R markdown. Paper presented at the annual meeting of the CSUN Assistive Technology Conference, Northridge, CA.
- Seo, J. (2018, October). Accessibility and inclusivity in making: engaging learners with all abilities in making activities. Paper presented at the annual meeting of the Learning Sciences Graduate Student Conference (LSGSC), Nashville, TN.
- Seo, J., & Richard, G. T. (2018, June). Accessibility, making and tactile robotics: facilitating collaborative learning and computational thinking for learners with visual impairments. Poster presented at the 13th International Conference of the Learning Sciences (ICLS), London, UK.
- Seo, J., & Richard, G. T. (2018, April). Furthering inclusivity in making: a framework for accessible design of makerspaces for learners with disabilities. Poster presented at the annual meeting of the American Educational Research Association (AERA), New York

- City, NY.
- Seo, J. (2017, September). Tactile access to visualized statistical data using R. Poster presented at the annual meeting of the ACM Richard Tapia Celebration of Diversity in Computing, Atlanta, GA.
- Seo, J., AlQahtani, M., Ouyang, X., & Borge, M. (2017, June). Embracing learners with visual impairments in CSCL. Paper presented at the 12th International Conference on Computer Supported Collaborative Learning (CSCL), Philadelphia, PA.
- Liao, J., Patcyk, M., Seo, J., & Hooper, S. (2016, October). Using hierarchical linear modeling to measure growth rate in a gamified CBM environment. Paper presented at the annual meeting of the Northeastern Educational Research Association (NERA), Trumbull, CT.

#### Invited Guest Lectures

- Oct. 2019 Blockers for Users on a Screen Reader, EIT Accessibility Group, The Pennsylvania State University, University Park, PA.
  - Invited guest talk to a webinar to train Penn State instructional designers for key WCAG 2.1 guidelines to make content more accessible including: image alt text, clear link text and heading structure, proper table structure, form and button labels, the need for keyboard functionality and how to convey information regardless of visual formatting.
- Jul. 2019 A Small Step to Take Your Data Analysis to Another Level, Chonnam National University, Gwangju, South Korea.
  - Invited guest talk to CNU to teach nursing faculty and students for basic concept of machine learning, computer-assisted text mining, and topic modelling to improve their qualitative data reliability.
- Jun. 2019 Being a Reasonable Realist: Wise Negotiation between Give and Take, Sungkyunkwan University, Seoul, South Korea.
  - Invited guest talk to SKKU "Student Success Center" as one of the successful role models to inspire undergraduate students for future planning.
- May. 2019 Accessibility of Math, Statistics, and Social Sciences, The MathML Meeting, The Pennsylvania State University, University Park, PA.
  - Invited guest talk to Penn State MathML group to present assistive technology and accessibility for STEM content.
- Jul. 2018 **Key-Note Speech for STEM Extension**, BBVS Summer Academy STEM Extension, University Park, PA.
  - Invited key-note speaker to the STEM (Science, Technology, Engineering, and Mathematics) week of "The Summer Academy for Students who are Blind or Visually Impaired."
  - O Hosted by the Pennsylvania Department of Labor and Industry, Office of Vocational Rehabilitation's Bureau of Blindness and Visual Services, in partnership with the Pennsylvania Department of Education, Bureau Of Special Education's Pennsylvania Training and Technical Assistance Network and Pennsylvania State University's College of Education and College of Health and Human Development.
- Apr. 2018 Adaptive Technology Lesson, LDT 100 "World Technologies and Learning", The Pennsylvania State University, University Park, PA.
  - Two times invited guest talk to Dr. Joshua Kirby's class for the week of "The Cost of 21st Century Education."

- Apr. 2017 Universal Design 101: Three Fundamental Frameworks for an Equitable World, LDT First Friday Speaking Series, The Pennsylvania State University, University Park, PA.
  - Invited guest talk to the Learning, Design, and Technology (LDT) program of Penn State to introduce theoretical and practical background of Universal Design for Learning.
- Nov. 2017 The Rapidly Changing World of Accessible Online Learning, AECT (The Association for Educational Communications and Technology) International Convention, Jacsonville, FL.
  - o Panel Discussion: DDL Accessible Online Learning In Concurrent Presentation.
- Oct. 2017 Inclusive Making, Northwestern University, Evanston, IL.
  - o Invited guest talk to Dr. Marcelo Worsley's "Inclusive Making" class for Learning Sciences Program.
- Jul. 2017 Accessibility Testing Using NVDA, The Accessibility Users Group, The Pennsylvania State University, University Park, PA.
  - Invited guest talk to the Penn State online learning Accessibility User Group to train web accessibility testing with open-source screen reader NVDA.
- Mar. 2017 Non-Visual Access to Canvas with Assistive Technology, Canvas Day 17, University Park, PA.
  - Invited guest to a showcase of Canvas, a learning management tool, to demonstrate
    how to interact with the online system using assistive technology for students with
    disabilities.
- Mar. 2017 **Student Panel Discussion: Student Issues**, Ed-ICT International Network: Disabled students, ICT, post-compulsory education & employment, Seattle, WA.

  o Invited student panel to the first Ed-ICT International Network symposium.
- Jul. 2016 Accessibility: The First Step towards Ability, Korea Employment Promotion Agency for the Disabled, Gyeonggi, South Korea.
  - Invited guest talk to KEAD to train the employees in concept of accessibility and universal design.
- Mar. 2016 Engaging Blind Learners in Statistics Study Using R, The TLT (Teaching and Learning with Technology) Symposium, University Park, PA.
  - o Presented Penn State faculty members, instructional designers, and staff how to teach Statistics in more efficient and accessible way for the students with visual impairments using R programming environment.
- Mar. 2016 Automatic Knowledge Structure Measure in Online Courses, The TLT (Teaching and Learning with Technology) Symposium, University Park, PA.
  - Presented Penn State faculty members, instructional designers, and staff about how to employ automatic network-based measurement system to visualize students' knowledge structure of any given content.
- Nov. 2015 Assistive Technologies for Equal Access in General Education, AECT (The Association for Educational Communications and Technology) International Convention, Indianapolis, IN.
  - Showcased on some combinations of ICT and assistive technologies for students with visual impairments.

- Oct. 2015 More Accessible, More Potential: Simple Tips for Online Accessibility, Technology and Learning Conference, Montgomery County Community College, Blue Bell, PA.
  - Presented conference session attendees about how to design their online learning content in an accessible way.

## Service

- Aug. 2019 College of Education Technology Committee, The Pennsylvania State Present University, University Park, PA.
  - Working as a student committee member to support understanding of educational technology for College of Education.
- Aug. 2019 Libraries' Accessibility Student Advisory Group, The Pennsylvania State Present University, University Park, PA.
  - 2019 **Reviewer**, The 14th International Conference of the Learning Sciences (ICLS), Nashville, TN.
  - 2019 **Reviewer**, The ACM CHI Conference on Human Factors in Computing Systems (CHI 2020), Honolulu, HI.
  - 2019 **Reviewer**, The 1st International Conference on Quantitative Ethnography (ICQE), Madison, WI.
  - 2018 **Reviewer**, The 3rd Learning Sciences Graduate Student Conference (LSGSC), Nashville, TN.
  - 2017 **Reviewer**, The 2nd Learning Sciences Graduate Student Conference (LSGSC), Bloomington, IN.
  - 2016 Funding Reviewer, Center for Online Innovation in Learning (COIL), The Pennsylvania State University, University Park, PA.

## Skills

## Programming Languages

- o Data Mining: R, Python, and SQL (as advanced level as being able to develop and release packages and libraries).
- Web Programming: HTML/CSS/JavaScripts/PHP (as advanced level as being able to develop and maintain accessible web modules and application).
- o Operating System: Unix/Linux (as advanced level as being able to develop and maintain system-level Shell scripts for server and database programs).
- Compile Languages: C/C++ and Java (as basic level as being able to review source codes and develop simple modules).
- o Others: Git, Docker, Travis CI, LaTeX, Markdown, Pandoc, Lua, and Quorum.

## Languages

- o English: professional fluency in reading, writing, listening and speaking.
- o Korean: native fluency in reading, writing, listening and speaking.
- o Japanese: basic fluency in reading, writing, listening and speaking.

#### Software

- o Statistical Software: R and Python (professional level), SPSS/SAS, MiniTab, and Stata.
- o Office Programs: Microsoft Office and Google Suites.
- o Learning Management System: Canvas and Angel.
- o General Web Content Management: WordPress, Drupal, and Hugo.

# Current Memberships

- o Member, International Society of the Learning Sciences (ISLS)
- o Member, Association for Computing Machinery (ACM)
- o Member, American Educational Research Association (AERA)
- Member, Association for Educational Communications and Technology (AECT)
- o Member, International Association of Accessibility Professionals (IAAP)