HEQIAO WANG

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EDUCATION

Michigan State University *August 2019 - anticipated June 2024*
Ph.D. Candidate in Special Education (Specialization: Language and Literacy)
Comprehensive Exam: (1) A 20-Year Perspective of Research Methodology in Special Education; (2) Special Education Legislation and Policy in the United States

The Ohio State University *September 2017 - December 2018*
M.A. in Language Education
Portfolio: Corrective Feedback and Communicative Language Teaching: Appropriate and Skillful Use to Support L2 Accuracy (Advising committee: Drs. Alan Hirvela & Leslie Moore)

Northeast Normal University *September 2013 - June 2017*
B.A. in English Linguistic
Thesis: The Corpus Study of the Relationship Between the Use of Cohesive Devises and the Quality of Writing in English Language Learners (Advisor: Dr. Ying Pan)

RESEARCH

RESEARCH INTERESTS

Disciplines: Language-based learning disabilities · Measurement and assessment · Scientific Literacy · AI technology enhanced learning · Automated essay evaluation · Machine learning and education

Focuses: Experienced engagement with diverse academic levels, including K-12 and postsecondary students, while accommodating varying degrees of language and literacy proficiency.

PUBLICATIONS

Peer-Reviewed Journal Articles

Wang, H., & Troia, G. A. (2023). How students' writing motivation, teachers' personal and professional attributes, and writing instruction impact student writing achievement: a two-level hierarchical linear modeling study. *Frontiers in Psychology, 14.* (IF = 4.23) [↗]

Wang, H., & Troia, G. A. (2023). Writing Quality Predictive Modeling: Integrating Register-Related Factors. *Written Communication, 40*(4), 1070-1112. (IF = 2.70) [↗]

Troia, G. A., **Wang, H.** , & Lawrence, F. R. (2022). Latent profiles of writing-related skills, knowledge, and motivation for elementary students and their relations to writing performance across multiple genres. *Contemporary Educational Psychology, 71,* 102100. (IF = 7.28) [↗]

Shen, M., & **Wang, H.** (2022). Teaching effective revising strategy to improve writing performance for children with learning disabilities in the United States: A review. *Chinese Journal of Contemporary Special Education, 1* (G769), 77-79. [↗]

Peer-Reviewed Conference Proceedings

Wang, H., Li, T., Haudek, K., Royse, E., Manzanares, C., Adams, S., Horne, L., Romulo, C. (2023, November). Is ChatGPT a Threat to Formative Assessment in College-Level Science? An analysis of Linguistic and Content-Level Features to Classify Response Types. In *Artificial Intelligence in Education Technologies: New Development and Innovative Practices: Proceedings of 2023 4th International Conference on Artificial Intelligence in Education Technology* (Vol. 190, p. 171). Springer Nature. [↗]

Journal Manuscripts Under Review

Wang, H., Haudek, K., Manzanares, C., & Romulo, C. (in review). Extending a Pretrained Language Model (BERT) using an Ontological Perspective to Classify Students' Scientific Expertise Level from Written Responses. *International Journal of Artificial Intelligence in Education.*

Royse, E., Manzanares, C., **Wang, H.**, Haudek, K., Azzarello, C., Horne, L., Druckenbrod, D., Shiroda, M., Adams, S., Fairchild, E., Vincent, S., Anderson, S., & Romulo, C. (in review). FEW Questions, Many Answers: Using Machine Learning Analysis to Assess How Students Connect Food-Energy-Water Concepts. *Nature: Humanities and Social Sciences Communication.*

Sarmiento, C. M., Truckenmiller, A., Cho, E., & **Wang, H.** (under revision for resubmission). Academic Language Use in Middle School Informational Writing. *Psychology in the Schools.* [↗]

Agha, A., Sarmiento, C., Valentine, K., **Wang, H.**, Troia, G., & Truckenmiller, A. (under revision for resubmission). Prospects and Challenges of Using MTSS for Children with Written Language Disorders. *Psychology in the Schools.*

Journal Manuscripts in Preparation

Wang, H., Lu, X., Haudek, K. (in preparation). CohBERT: Enhancing Language Representation through Coh-Metrix Linguistic Features for Analysis of Student Written Responses. (Target Journal: Computers & Education)

Sarmiento, C., **Wang, H.**, Truckenmiller, A. (in preparation). Supporting Graphical Literacy in the Science Classroom. (Target Journal: The Reading Teacher)

Cho, E., Sarmiento, C., **Wang, H.**, & Hicks, L. (in preparation). A Synthesis of Research on Expository Science Text Comprehension. (Target Journal: Journal of Special Education)

Royse, E., Manzanares, A., Romulo, C., **Wang, H.**, & Haudek, K. (in preparation). Applying Language Processing to Concept Inventory Development to Characterize Undergraduate Explanations of Food-Energy-Water Concepts and Connections. (Target Journal: TBD)

PRESENTATIONS

International and National Conference

Wang, H., Haudek, K., Azzarello, C., & Anderson, S. (April, 2024). *Investigating Use of Ontologies as Part of Automated Short Answer Scoring in Science Assessments* [Poster presentation]. In X. Zhai & G. Lee (Chair), AI and Formative Assessment: The Train Has Left the Station. 2024 American Educational Research Association Annual Meeting (AERA 2024), Philadelphia, Pennsylvania.

Haudek, K., Romulo, C., Anderson, S., Vincent, S., Horne, L., Manzanares, C., Fairchild, E., Royse, E., Adams, S., **Wang, H.**, & Azzarello, C. (April, 2023). *Development of a Next Generation Concept Inventory with AI-based Evaluation for College Environmental Programs* [Poster presentation]. 2023 American Educational Research Association Annual Meeting (AERA 2023), Chicago, Illinois.

Wang, H., Li, T., Haudek, K., Royse, E., Manzanares, C., Adams, S., Horne, L., Romulo, C. (July, 2023). *Is ChatGPT a Threat to Formative Assessment in College-Level Science? An analysis of Linguistic and*

Content-Level Features to Classify Response Types [Paper presentation]. 4th International Conference on Artificial Intelligence in Education Technology (AIET 2023), virtual.

Troia, G., **Wang, H.,** & Lawrence, F. (June, 2022) *Latent profile of Writing and Their Relations to Writing Performance* [Paper presentation]. SIG writing conference 2022, Umeȧ, Sweden.

Wang, H., Troia, G., & Lawrence, F. (February, 2022) *Latent profile of fourth and fifth Graders* [Poster presentation]. 27th Annual Pacific Coast Research Conference (PCRC 2022), San Diego, CA.

Shen, M., & **Wang, H.** (November, 2021). *Effective Revising Instruction for Struggling Writers* [Paper presentation]. 13th Asian Conference on Education (ACE 2021), virtual. [↗]

State and Regional Conference

Wang, H., & Haudek, K. (May, 2023). *Exploratory Text Analysis of Student Constructed Responses to NGCI Assessment Items* [Poster presentation]. 2023 CREATE for STEM Conference: Towards STEM Education that Contributes to Just & Sustainable Life, East Lansing, Michigan. [↗]

Haudek, K., Romulo, C., Anderson, S., Vincent, S., Horne, L., Manzanares, C., Fairchild, E., Royse, E., Adams, S., **Wang, H.**, & Azzarello, C. (May, 2023). *Development of a Next Generation Concept Inventory with AI-based Evaluation for College Environmental Programs* [Poster presentation]. 2023 CREATE for STEM Conference: Towards STEM Education that Contributes to Just & Sustainable Life, East Lansing, Michigan.

RESEARCH EXPERIENCE

Graduate Research Assistant *May 2022 - present*

CREATE for STEM Institute, Michigan State University & University of Northern Colorado
Principal Investigators: Drs. Kevin Haudek, Chelsie Romulo, Steven Anderson, & Shirley Vincent
Project Description: A NSF-funded grant aiming to develop and fine-tune machine learning algorithms for automated writing assessment in order to create an advanced Next Generation Concept Inventory for use in undergraduate environmental science and sustainability courses. Core responsibilities include:

- Conducted exploratory data analysis exploring linguistic, content, thematic, and semantic aspects of undergraduate writing responses in interdisciplinary environmental and sustainability programs;
- Designed and fine-tuned machine learning algorithms through an iterative rubric development process tailored for assessing undergraduate constructed responses in science.

Graduate Research Assistant *August 2019 - December 2022*

Department of Counseling, Educational Psychology & Special Education, Michigan State University
Principal Investigator: Dr. Gary Troia

Project Description: An IES-funded grant aiming to examine the developmental progress of writing proficiency, motivational aspects, and academic performance in fourth and fifth-grade students. This research also aims to analyze the impact of instructional techniques and assessment methodologies employed by educators, within the framework of Common Core State Standards and corresponding aligned evaluations. Core responsibilities include:

- Facilitated the collection and administration of demographic data and researcher-designed writing and reading assessments among Michigan students in locales such as Lansing, Troy, and Detroit;
- Conducted textual analyses of students' data and performed multivariate statistical techniques to investigate interrelations across students, teachers, class, and the broader school and district context;
- Implemented comprehensive data archiving procedures covering multi-level variables and subsequently submitted the dataset to the ICPSR repository.

Undergraduate Research Assistant *November 2015 - November 2016*

Department of Foreign Language, Northeast Normal University, Changchun, China
Principal Investigator: Dr. Yunlong Qiu

Project Description: A research grant funded by the Chinese Department of Education aiming to explore the enhancement of research capabilities among undergraduate English majors through targeted academic training. Core responsibilities include:

- Distributed, collected, and administered both qualitative data through online surveys and interviews, as well as quantitative data encompassing in-class and out-of-class variables such as frequency of teacher guidance, engagement of journal readings, and participation in academic conferences.

AWARDS & CERTIFICATIONS

Summer Research Fellowship ($6,000), College of Education, Michigan State University, 2022 Summer

Summer Research Fellowship ($6,000), College of Education, Michigan State University, 2021 Summer

Doctoral Student Fellowship and Assistantship ($45,996/yr stipend+tuition+travel), College of Education at Michigan State University, 2019-2024

University Honored Student ($800), Northeast Normal University, 2016, 2015

Presidential Scholarship ($800), Northeast Normal University, 2016, 2015

National Certificate for Secondary School Teaching (China)

LIFELONG LEARNING & METHODS TRAINING

Certificate in AI & Data Engineering *April 2022 - October 2022*
Laioffer Bootcamp, Virtual
Courses Taken: Machine learning model & Python fundamentals (60 hrs), statistics essentials & Python essentials (45 hrs), Data scientist track with in-depth training of cutting-edge technologies such as distributed systems and deep learning (126 hrs).

Longitudinal Structural Equation Modeling *June 2021*
One-week (40 hrs) online workshop (Instructor: Amy Nuttall, Ph.D., MSU Department of HDFS)
Courses Taken: Latent growth curve models, growth mixture modeling, latent class analysis, bivariate dual change models, longitudinal mediation and moderation, etc.

Structural Equation Modeling *May 2021*
One-week (40 hrs) online workshop (Instructor: Amy Nuttall, Ph.D., MSU Department of HDFS)
Courses Taken: Factor analysis, model specification and estimation, measurement invariance, medication and moderation, mixture modeling, etc.

MSU Graduate School RCR Program *2019 - present*
Online training models (CITI program) and in-person, discussion-based workshops

The Data Scientist's Toolbox *2017*
Coursera course provided by Johns Hopkins University

AD HOC REVIEWS

American Educational Research Association
British Journal of Educational Psychology
Journal of Research in Special Educational Needs

SKILLS

Programming
SPSS, R, Python, Mplus, WordStat, QDA Miner, Excel, Keras, Tableau, Spark, Qualtrics, HTML

Workspace
Google Colab, VS Code, Jupyter Notebook, Databricks, Microsoft, Overleaf, Atom

Language
Native Language: Mandarin Chinese; Fluent in English

TEACHING

TEACHING EXPERIENCE

Independent Instructor *Fall 2022, Spring 2023, Fall 2023*
CEP 240: Introduction to Special Education, College of Education, Michigan State University
Class size: 25; Time Commitment: 3 hours per week; Duration: 16 weeks per semester.

Course Description: This course serves as an introductory platform for students to comprehend the realm of special education, encompassing diverse categories such as learning disabilities, autism, cognitive impairments, emotional and behavior disorders, and low incidence disabilities. The curriculum delves into interventions and instructional methodologies pertinent to these categories, exploring identification criteria, prevalence, demographics of exceptional children, legal considerations, advocacy, family dynamics, and cultural sensitivities.

Graduate Teaching Assistant *August 2019 - May 2022*
CEP 240: Diverse Learners in Multicultural Perspective
CEP 301: Literacy Instruction for Students with Mild Disabilities
CEP 803A: Assessment of Students with Mild Disabilities
CEP 844: Applied Behavior Analysis
College of Education, Michigan State University, under the supervision of Drs. Troy Mariage, Adrea Truckenmiller, Karen Hicks

Full-Time Teaching Assistant *April 2019 - July 2019*
The Goddard School, Grandview Heights, Ohio

Part-Time Teaching Aide *December 2017 - December 2018*
The Ohio State University Family Center Community Program, Columbus, Ohio

English Teacher Intern *September 2016 - December 2016*
Shenyang Railway Middle School, Shenyang, China

Student Intern *January 2017 - March 2017*
New Oriental Education & Technology Group, Shenyang, China

VOLUNTEER EXPERIENCE

EFL Teacher *August 2016*
Ban Pa Mai Daeng School, ChiangMai, Thailand

EFL Teacher *October 2015 - December 2015*
Eastern Square Primary School, Changchun, China