Research Statement

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Background

Since the launch of ChatGPT, Large Language Models (LLMs) have evolved rapidly, offering unprecedented potential to scale item generation in education. However, this potential is tempered by risks; without proper contextual grounding and engineering, LLMs frequently generate vague, non-specific, or confidently inaccurate outputs (hallucinations). Because education should focus on acquiring knowledge, not introducing misconceptions, responsible integration of Generative AI is essential. Successful integration requires dual focus: using LLM outputs to support meaningful pedagogical activities, including student engagement through the analysis and debunking of LLM-generated misconceptions, and establishing a collaborative, systematic process for ensuring the quality of generated items. The quality check should score items for their content-based cognitive alignment with specific course materials and detect item-writing flaws, ensuring assessment integrity is maintained.

Beyond pedagogical integration, AI offers substantial opportunities for simulating human behavior through generative agents while addressing key challenges like high recruitment costs, ethical constraints in human subject testing, and variability in response quality. It is of interest to evaluate the potential of these generative agents in the education, social and business domains by incorporating a proficiency-calibration layer and enable agents to not only simulate baseline survey behaviors but also tunable expertise levels (e.g., novice vs. expert respondents).

Research Areas

AI in Education

With known problems of ChatGPT, such as hallucination, it is essential to build in guardrail or implement quality control within the tool and application so that generative AI can still be leveraged for its strength. One of the key focuses is evaluating the quality of generative AI or more specifically, LLMs, generated content for teaching and learning. Another focus is on assessing effective learning with LLMs, as recent studies suggest they may encourage metacognitive laziness. Two projects are on-going: 1) evaluating personalized learning through LLMs (through two awarded MOE-TRF projects); 2) working with Dr Steven Moore from CMU to formulate a series of metrics to evaluate MCQs. Besides that, leveraging *SMU Educational Research Fellowship 2023* project on "DE.AI: Debunking misconceptions for Enhanced Student Learning with the Power of Generative AI", misconceptions have been incorporated into teaching of IS215 and received positive feedback from students.

Outcome:

1. co-PI of an awarded 2024 MOE-TRF project– "PromptTutor - Generative AI-enabled Personalised Tutor for Promoting Reflection and Learning in Programming Courses"
2. co-PI of an awarded 2025 MOE-TRF project– "Enhance Students' Interdisciplinary Learning through Large Language Model-Empowered Learning Analytics"

3. Published one journal paper at *Computers and Education: Artificial Intelligence* – 'Harnessing the Power of AI-Instructor Collaborative Grading Approach: Topic-Based Effective Grading for Semi Open-Ended Multipart Questions'
4. Published two conference papers at 30th annual ACM conference on Innovation and Technology in Computer Science Education:
    a. 'PromptTutor: Effects of an LLM-Based Chatbot on Learning Outcomes and Motivation in Flipped Classrooms'
    b. 'Evaluating ChatGPT-4o to answer Multi-Modal Exercises in Computer Science Education'
5. Submitted a 2026 MOE-TRF project as PI – "Debunkr - Debunk to Deepen: An AI-enhanced Pedagogical Approach for Transforming Misconceptions into Deeper Understanding"
6. Submitted one book chapter to a book on about technology enabled learning in higher learning institutions led by Thomas Menkhoff (LKCSB) and Nachamma Sockalingam (SUTD) – 'De.AI: Debunking misconceptions for Enhanced Student Learning with the Power of Generative AI'

Generative agents for education and social domains

The first phase is exploring generative agents in simulating students with different abilities and assessing the feasibility in implementing a tunable expertise level (e.g., novice vs. expert respondents). Eventually, I am interested in analyzing generative agents in enabling resilient workforce by exploring adaptive upskilling (Education) and facilitating proactive change management (Social). They allow organizations to stress-test processes and predict human reaction to disruption (simulation), ensuring employees are skilled and psychologically prepared for change.

Outcome:

1. PI of an awarded 2026 MOE Tier 1 (Category A) project – "Generative Agents for Pre-Assessment Evaluation: Simulating Student Knowledge-state Deficiencies via LLMs".

Actionable situational intelligence for urban events

This project was funded by ST Engineering Mission Software & Services Pte Ltd (***$865,569*** *for 2 years – May 2021 to Apr 2023)*, to provide sense-making capability on an urban event based on social media content, which can be an incident of an armed assault or a crisis of a sudden riot. The research focuses on in-depth analysis of the event including timeline-based situational and emotional changes and relationship among the key-entities.

Outcome:

1. One published paper at *Information Processing and Management* journal, one published paper at *Information and Management* journal (both A ranked journal) (*details in page 3*).

Publications and Outputs:

Journal papers

1. Phyo Yi Win Myint, Siaw Ling Lo, Yuhao Zhang (2024), 'Unveiling the dynamics of crisis events: Sentiment and emotion analysis via multi-task learning with attention mechanism and subject-based intent prediction', *Information Processing & Management 61 (4)*, Article 103695 https://doi.org/10.1016/j.ipm.2024.103695
2. Yuhao Zhang, Siaw Ling Lo and Phyo Yi Win Myint (2024), 'Empowering Crisis Information Extraction through Actionability Event Schema and Domain-Adaptive Pre-training', *Information & Management 62 (1),* Article 104065 https://doi.org/10.1016/j.im.2024.104065
3. Phyo Yi Win Myint, Siaw Ling Lo, Yuhao Zhang (2024), 'Harnessing the Power of AI-Instructor Collaborative Grading Approach: Topic-Based Effective Grading for Semi Open-Ended Multipart Questions' *Computers & Education: Artificial Intelligence* 7, Article 100339 https://doi.org/10.1016/j.caeai.2024.100339

Conference papers

1. Yuhao Zhang, Eng Lieh Ouh, Adam Ho, Siaw Ling Lo, Kar Way Tan, and Feng Lin (2025), 'PromptTutor: Effects of an LLM-Based Chatbot on Learning Outcomes and Motivation in Flipped Classrooms', In *Proceedings of the 30th ACM Conference on Innovation and Technology in Computer Science Education V. 1 (ITiCSE 2025),* 445–451. https://doi.org/10.1145/3724363.3729095
2. Eng Lieh Ouh, Kar Way Tan, Siaw Ling Lo, and Benjamin Kok Siew Gan (2025), 'Evaluating ChatGPT to Answer Multi-Modal Exercises in Computer Science Education', In *Proceedings of the 30th ACM Conference on Innovation and Technology in Computer Science Education V. 1 (ITiCSE 2025),* 58–64. https://doi.org/10.1145/3724363.3729056

Teaching Cases

1. Yi Meng Lau, Siaw Ling Lo, Thomas Lim, 'Battling Hawkers' and Consumers' Resistance to Change: The Course of Digitalisation Never Did Run Smooth' published in *Harvard Business Review* on 21 January 2025. https://store.hbr.org/product/battling-hawkers-and-consumers-resistance-to-change-the-course-of-digitalisation-never-did-run-smooth-b/164SMU

Paper accepted:

1. 'Detecting Doubt in Reflective Learning: A Learning Analytics Study with Large and Small Language Models' – Eng Lieh Ouh, Kar Way Tan, Siaw Ling Lo, Yuhao Zhang *accepted by 16th Learning Analytics & Knowledge conference 2026 (LAK26)*

Paper submitted:

2. 'De.AI: Debunking misconceptions for Enhanced Student Learning with the Power of Generative AI'- Siaw Ling Lo, Cheryl Sze Pei Goh, Andrew Koh – *book chapter in Technology-enhanced Learning in Higher Education* (To be published in Feb 2026)

Working papers:

a. ‘Pre-assessment Evaluation of Content Alignment and Usability in MCQs: The CAUS Framework’ – Siaw Ling Lo, Sriya NANNAPANENI, Steven Moore, Yuhao Zhang, Eng Lieh Ouh, Kar Way Tan – *target to submit to AIED 2026*
b. ‘Learning Analytics for Assessment Validation: A Psychometric Comparison of Human-Authored and LLM-Generated MCQs’ – Yuhao Zhang, Eng Lieh Ouh, Siaw Ling Lo, Kar Way Tan – *target to submit to Computer and Education: Artificial Intelligence journal*