

Mapping the True Nature of Generative AI: Applications in Educational Research & Practice

Symposium Leaders: Punya Mishra (Arizona State University) & Melissa Warr (New Mexico State University)

Chair & Discussant: Michael Henderson (Monash University)

michael.henderson@monash.edu

Professor of Digital Futures in the Faculty of Education, Monash University

Symposium Session Introduction

The rapid proliferation of generative AI (genAI) technologies, including chatbots, image generators, and creative tools, has received a lot of media and scholarly attention. That said, most discussions of this new technology lack depth and nuance. We argue that there are certain key attributes of generative AI that separate it from all other technologies that have come in the past. It is only by developing a better understanding of these attributes that we can best take advantage of the possibilities for transformational learning that these tools can provide. Specifically, we argue that the generative capacity enables unique outputs from identical inputs, bringing new dimensions of possibility and uncertainty. Meanwhile, the social quality fosters anthropomorphism and relationships between users and agents. Together, these attributes have the potential to disrupt established practices around learning, literacy, creativity, and assessment. In this symposium, a group of educators and scholars explore the implications of these attributes of this technology (its generative, multi-modal and social nature) using both theoretical and empirical approaches across multiple contexts (teacher preparation, doctoral research, theory generation and more). We believe that it is only through this form of collaboration across approaches and contexts that we can map and investigate genAI's emerging implications for students, teachers, researchers, and policymakers.

Structure of the Symposium

Each paper/presentation will be allocated 15 minutes. Papers #1 - #3 will be presented during the first hour, and papers #4 - #6 will be presented during the second hour. 15 minutes in each of the hours will be devoted to a question-and-answer period led by the discussants. The organizers are Dr. Punya Mishra (Arizona State University) and Dr. Melissa Warr (New Mexico State University). The chair and discussion moderator will be Dr. Michael Henderson (Monash University).

Individual Sessions

Paper 1

Grasping the true nature of generative AI: A smart, drunk, occasionally biased intern

Nicole Oster, Graduate Student, Mary Lou Fulton Teachers College, Arizona State University,

nicole.oster@asu.edu

Dr. Punya Mishra, Associate Dean, Office of Scholarship & Innovation, Mary Lou Fulton Teachers College,
Arizona State University, punya.mishra@asu.edu

As generative AI tools rapidly proliferate, a nuanced understanding of its capabilities is critical. These tools demonstrate an emergent capacity for creative abstraction as they can create novel outputs that transcend their training data (Mishra et al., 2023). However, this generative power comes at the cost of accuracy. The models hallucinate (Ji et al., 2023); they extrapolate beyond given information and, consequently, sacrifice accuracy for originality. Thus, generative AI should be seen not as a neutral assistant, but more as a smart yet unreliable intern, at times brilliantly creative and other times biased (Warr et al., 2023) or blatantly inaccurate (Ji et al., 2023). In education, this demands recognizing the models' limitations. Like an intern, generative AI requires close supervision. Yet, leveraging these tools appropriately affords pedagogical opportunities to build critical thinking and augment creativity. This paper will explore the underlying characteristics and ethical use of generative AI in education.

Paper 2

On Having Difficult Conversations: Leveraging the Social Nature of Generative AI

Rezwana Islam, Doctoral Student, Learning, Literacies and Technologies Program, Mary Lou Fulton Teachers College, rislam11@asu.edu

Difficult conversations are crucial in educational settings, including interactions among teachers, students, parents, and administrators for conflict resolution or negotiation. These discussions often cover diverse topics such as pedagogy, misconceptions, and power dynamics, requiring adaptable learning strategies. Traditionally, learning to navigate these conversations has relied on on-the-job experience, risking potentially harmful mistakes (Bartholomew, & Sanders, 2018). Simulation, recommended for practice, faces challenges such as high costs and limited scenarios when using technologies like VR or role-play (Wang, 2021; Rappa & Ledger, 2023). However, Generative AI (GenAI) introduces a novel, cost-effective, and pedagogically sound approach to training, offering a broad spectrum of scenarios for practice. This paper presents examples of GenAI's application in educational contexts, showcasing its ability to enhance conversation skills in a versatile and efficient manner.

Paper 3

Using LLMs to develop Pedagogical Content Knowledge

Dr. Suparna Chatterjee, Assistant Professor, School of Teacher Preparation, Administration and Leadership, New Mexico State University
suparna@nmsu.edu

Dr. Melissa Warr, Assistant Professor, School of Teacher Preparation, Administration and Leadership, New Mexico

State University
warr@nmsu.edu

Large language models (LLMs) such as ChatGPT are particularly effective at taking on personas, supporting powerful, inexpensive, and low-risk simulations for teaching and learning. For example, an LLM can act as a third grade student who has misconceptions about science. The user can interact with this persona, attempting to guide the virtual student toward new conceptual understandings. Such a use may help pre- and in-service teachers develop pedagogical content knowledge (PCK), expertise that typically requires considerable practical experience (Park & Oliver, 2007; Shulman, 1987). In this paper, we will provide two examples of use of LLMs for the development of PCK: one in mathematics and one in science. In addition to sharing effective prompts, we will present an analysis of our own conversations with ChatGPT personas, highlighting how the LLM pushed us to think more deeply about the connection between the content and the learner's thoughts and experiences.

Paper 4

Student Perceptions of Artificial Intelligence

Jennifer Werner, Senior Instructional Designer, Mary Lou Fulton Teachers College, Arizona State University,
Jennifer.Werner.2@asu.edu

Tracy Arner, Assistant Director, Learning Engineering Institute, Arizona State University, tarnar@asu.edu

Janel White Taylor, Clinical Professor, Mary Lou Fulton Teachers College, Arizona State University, drj@asu.edu

As the availability of Generative Artificial Intelligence (Gen AI) grows, its inclusion in education has also grown. This technology has been introduced throughout coursework and project workflows. As this tool becomes more prominent it is important to recognize students' knowledge, understanding, and perceptions (Baidoo-Anu et al., 2023). These metrics are strong predictors of student acceptance (Chan & Hu, 2023). In this study, students at a 4-year university in the Southwestern United States completed an 18-question survey in their Technology Literacy: Problem Solving using Digital Technology Applications course. Questions focus on six areas of student perception: Knowledge, Experience, AI use academically and overall, Ethics and Bias, and Future. This survey was assigned in class before participants explored AI assignments to prevent biased responses. Initial findings indicate that students' familiarity and utilization of Gen AI is not as extensive as anticipated. Further, students report minimal guidance on how these technologies can be used appropriately. By understanding these perceptions elevated conversations between students and faculty can continue about AI use (Lubowitz, 2023). Additionally, these results inform ongoing assignments and create future research pathways in the area of student engagement and learning outcomes (Kumar, 2023).

Paper 5

Generative AI as a tool for doctoral research

Dr. Jim Dunnigan, Instructor, Mary Lou Fulton Teachers College, Arizona State University

james.dunnigan@asu.edu

Generative AI revolutionizes how graduate students conduct research (O’leary, 2023). New innovative AI tools can streamline the process of searching, curating, and synthesizing academic literature, transforming a process that once took hours or days into a matter of minutes. This introduces new challenges for educators when evaluating student work (Schwenke et al., 2023). These new tools analyze scholarly writing and suggest improvements in clarity, tone, voice, and adherence to academic language. These suggestions can help you critique your methodology and even provide you with a guide to defend your dissertation! However, generative AI also introduces critical ethical challenges, including concerns about plagiarism and inherent biases in the tools (Acerbi & Stubbersfield, 2023). Does AI undermine the process of academic research, or does it simply catalyze efficiency? This paper examines the pragmatic and ethical implications of using generative AI in academic research.

Paper 6:

Building Theory Using Generative AI

Dr. Melissa Warr, Assistant Professor, School of Teacher Preparation, Administration and Leadership, New Mexico State University, warr@nmsu.edu

Dr. Kevin Close, Associate Program Officer, The Spencer Foundation, kevin.j.close@gmail.com

Dr. Punya Mishra, Associate Dean, Office of Scholarship & Innovation, Mary Lou Fulton Teachers College, Arizona State University, punya.mishra@asu.edu

Can generative AI be used in theory development? In this reflective study we explore the convergence of generative artificial intelligence (GenAI) and educational scholarship. We used ChatGPT to tackle an inconsistency within our educational design framework, the “5 Spaces for Design in Education” by prompting AI to write multiple position papers to find ways to resolve this inconsistency. The responses surprised us, offering two distinctive solutions from two rounds of prompts. One response suggested integrating Bronfenbrenner's (1986) ecological theory, introducing a fresh perspective to address the issue. The other presented three structural strategies for resolving the inconsistency. These outputs illustrated AI's potential as a thought partner, providing a range of possibilities to fuel our intellectual journey. The value of AI lies not in accuracy but in the range of ideas generated, a form of possibility thinking, essential for creativity. The AI's capacity to provide immediate, relevant examples was evident, though it sometimes referred to outdated or risk-averse ideas. Our experience suggests that GenAI can assist scholars in the theory development process, underscoring the idea that AI can serve as a potent tool for idea generation and exploration.

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