

Generative AI for Learning Analytics (GenAI-LA): Exploring Practical Tools and Methodologies

Lixiang Yan¹, Andy Nguyen², Lele Sha¹, Jionghao Lin³, Mutlu Cukurova⁴, Kshitij Sharma⁵, Roberto Martinez-Maldonado¹, Linxuan Zhao¹, Yuheng Li¹, Yueqiao Jin¹, and Dragan Gašević¹

¹ Monash University, Wellington Rd, Clayton VIC, 3800, Australia

² University of Oulu, Pentti Kaiteran katu 1 Linnanmaa, Finland

³ Carnegie Mellon University, 4804 Forbes Avenue, Pittsburgh, PA 15213, USA

⁴ University College London, 20 Bedford Way, London, WC1H 0AL, United Kingdom

⁵ Norwegian University of Science and Technology, IT-bygget, 147, Gløshaugen, Norway

Abstract

The GenAI-LA workshop aims to highlight the significant impact generative artificial intelligence (GenAI) can have on learning analytics (LA). GenAI offers a wide range of benefits, including the ability to process unstructured data automatically, create adaptive educational materials, and improve the way LA findings are communicated through engaging stories and thorough explanations. This workshop aims to bring together a diverse mix of professionals, including learning scientists, LA practitioners, software developers, and AI experts, to engage in meaningful discussions and collaborations. Our goal is to thoroughly explore and envision how GenAI can play a crucial role in advancing both the research and application of learning analytics. We received a total of 12 paper submissions. Following a thorough peer review process, we accepted seven full papers and two short papers. Each paper presents a unique perspective on the potential of GenAI to transform the field of LA and education, from addressing data sparsity in intelligent tutoring systems to supporting self-regulated learning and beyond.

Keywords

Generative artificial intelligence, learning analytics, educational technologies, large language models

Preface

In this collection of workshop papers, we delve into the innovative intersection of generative artificial intelligence (GenAI) and learning analytics, exploring a wide array of applications and methodologies aimed at enhancing educational experiences and outcomes. Each paper presents a unique perspective on the potential of GenAI to transform the field of education, from addressing data sparsity in intelligent tutoring systems to supporting self-regulated learning and beyond. Here is a brief introduction to each paper:

3DG: A Framework for Using Generative AI for Handling Sparse Learner Performance Data From Intelligent Tutoring Systems by Liang Zhang et al. introduces the 3DG framework, a novel approach that combines tensor factorization with advanced generative models to address the challenge of sparse data in intelligent tutoring systems. This paper showcases how the framework can generate scalable, personalised simulations of learning performance, highlighting the potential of GenAI in creating more effective educational technologies.

An AI Agent Facilitating Student Help-Seeking: Producing Data on Student Support Needs by Joonas Merikko and Anni Silvola examines the use of large language models (LLMs) to facilitate students' help-seeking behaviours. The authors discuss the development of a support bot prototype that leverages GPT-4 and WhatsApp APIs, aiming to lower barriers to help-seeking and gather data on student support needs.

Enhancing Trust in Generative AI: Investigating Explainability of LLMs to Analyse Confusion in MOOC Discussions by Yuanyuan Hu et al. explores the potential of explainable AI (XAI) methods to enhance trust in GenAI tools. Through a pilot study, the paper demonstrates how XAI can identify indicators of confusion in MOOC discussions, advocating for the integration of XAI in GenAI applications to improve learning analytics solutions.

Generative AI for Critical Analysis: Practical Tools, Cognitive Offloading and Human Agency by Simon Buckingham Shum discusses the implications of GenAI for critical analysis tasks. The paper highlights practical examples where GenAI can support intellectual engagement and examines the balance between the benefits and risks of cognitive offloading to AI.

Generative Multimodal Analysis (GMA) for Learning Process Data Analytics by Ridwan Whitehead et al. introduces the GMA method, a systematic framework for applying GenAI to the analysis of multimodal learning process data. This paper presents a case study to demonstrate the method's applicability and effectiveness, contributing to the advancement of learning analytics methods.

GPT-3.5, GPT-4, Bard, and Claude's Performance on the Chinese Reading Comprehension Test by Bor-Chen Kuo et al. assesses the performance of advanced GenAI models in Chinese reading comprehension tasks. The study compares these models' performances with that of fifth-grade students, offering insights into the educational applications of GenAI.

Supporting Self-Regulated Learning with Generative AI: A Case of Two Empirical Studies by Jacqueline Wong and Olga Viberg explores the use of GenAI chatbots to enhance self-regulated learning and learning performance. The paper presents preliminary results from two empirical studies, contributing to the discussion on personalising SRL support using AI.

Supporting Student Decisions on Learning Recommendations: An LLM-Based Chatbot with Knowledge Graph Contextualization for Conversational Explainability and Mentoring by Hasan Abu-Rasheed et al. proposes an LLM-based chatbot that utilises a knowledge graph to support students in understanding learning-path recommendations. The paper discusses the chatbot's development and evaluation, highlighting its potential in conversational explainability.

Tamil Co-Writer: Towards Inclusive Use of Generative AI for Writing Support by Antonette Shibani et al. extends the application of GenAI to the development of a writing aid prototype for the Tamil language. The paper emphasises the importance of inclusive AI tools that support linguistically diverse learners, showcasing the potential of GenAI to enhance writing skills and productivity.

Together, these papers represent a comprehensive exploration of the transformative potential of GenAI in learning analytics and education, offering valuable insights and innovative solutions to the challenges faced by learners, educators, and researchers in the field.