

INTRODUCTION

- This poster presents a literature review on transforming STEM learning in higher education through generative AI
- The proportion of students using AI tools has risen sharply to 92% from 66% within a single year¹
- As generative AI (genAI) continues to transform the learning process, the research specifically focused on learning and teaching for STEM contents remains limited²
- GenAI performs well on basic physics problems but struggles with advanced university-level physics (83.4% on GCSE, 63.8% on A-Level, and 37.4% on university-level questions, with an overall average of 59.9% using the most effective prompting technique)³
- Moreover, ChatGPT-4 can successfully complete most aspects of a UK physics undergraduate degree, except for practical learning or presentation, such as laboratory work and viva assessments⁴

OBJECTIVE(S)

- 1 To synthesise the benefits and drawbacks of using GenAI in STEM education
- 2 To identify the transformation of teaching and learning in STEM education

RESULTS

 The database contains a total of 17,920 journal and conference proceeding articles. After identifying 7,988 duplicates and excluding 8,432 articles, the review remains ongoing. So far, 15 thoroughly reviewed and finalized articles have been included in this poster.

Table 1. Distribution of STEM Articles by Major/Content and Country-Based Research

Content/Major	Nu.of Articles	Country-based research
Science	3	Australia, Mexico, Brazil
Technology	8	Turkey, Canada, USA
Engineering	3	India, UK, Mexico
Mathematics	1	South Korean

DRAWBACKS OF GEN-AI

- Misinformation, when the abstraction level and reasoning become more complex, GenAI produces incorrect answer¹²
- The risk of reduced critical thinking, genuine engagement⁵, and increasing dependency on genAI¹⁰
- GenAI uses biased training data and can lead to biased answers^{19,20}, due to the pre-training data model.
- Ethical dilemmas and attitudes towards academic integrity⁸
- Environment impact because AI data centers need tens of terawatt-hours (TWh) of electricity annually^{21,22}

CONCLUSION

Further Plans

- 1 GenAI offers personalized learning, enhanced problem-solving, and efficiency in coding and data analysis, yet it also raises concerns regarding accuracy, and ethical considerations.
 - 2 GenAI will continue to evolve. The transformation of STEM curricula in higher education is a necessity, from pedagogical catalysts, structured prompts for learners, authentic and continuous assessment
- Finalize the literature review research on the transformation of STEM learning, teaching and assessing in the era of genAI
 - Examine the perceptions of students, staff, and STEM professionals regarding genAI
 - Design best practices for integrating genAI into STEM higher education to ensure effective and ethical implementation

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METHODOLOGY



Search strategy

TITLE-ABS (Generative AI OR generative artificial intelligence OR GenAI) AND (learn OR teach OR assess)

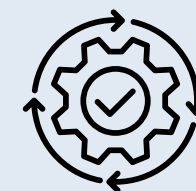


Inclusion criteria

- Published from 2020 - March 2025
- Written in English
- Journal or conference articles
- Evidence-based research or case studies
- Exploring genAI within the context of higher education
- Applying genAI in the classroom for STEM majors/contents

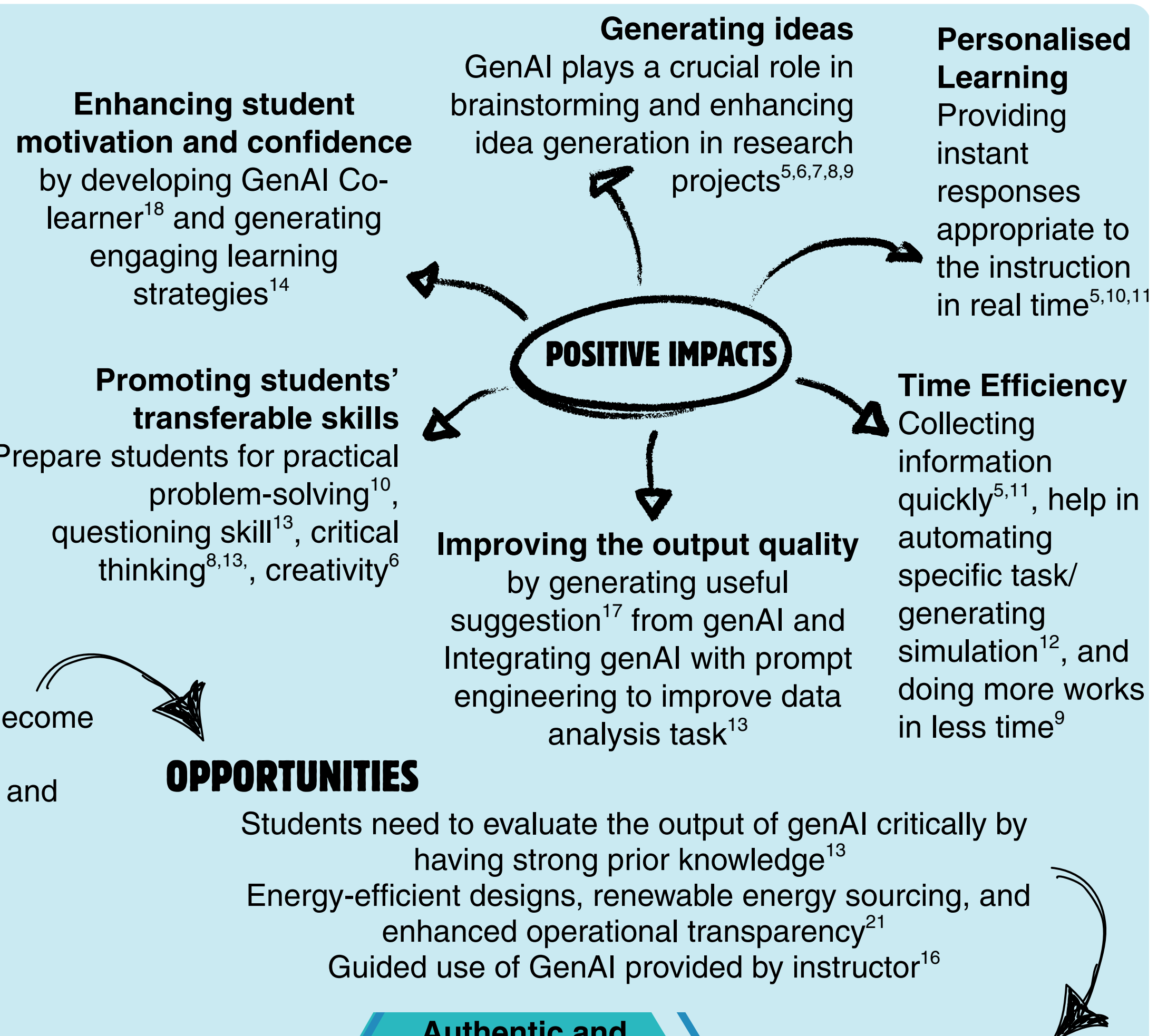


Database

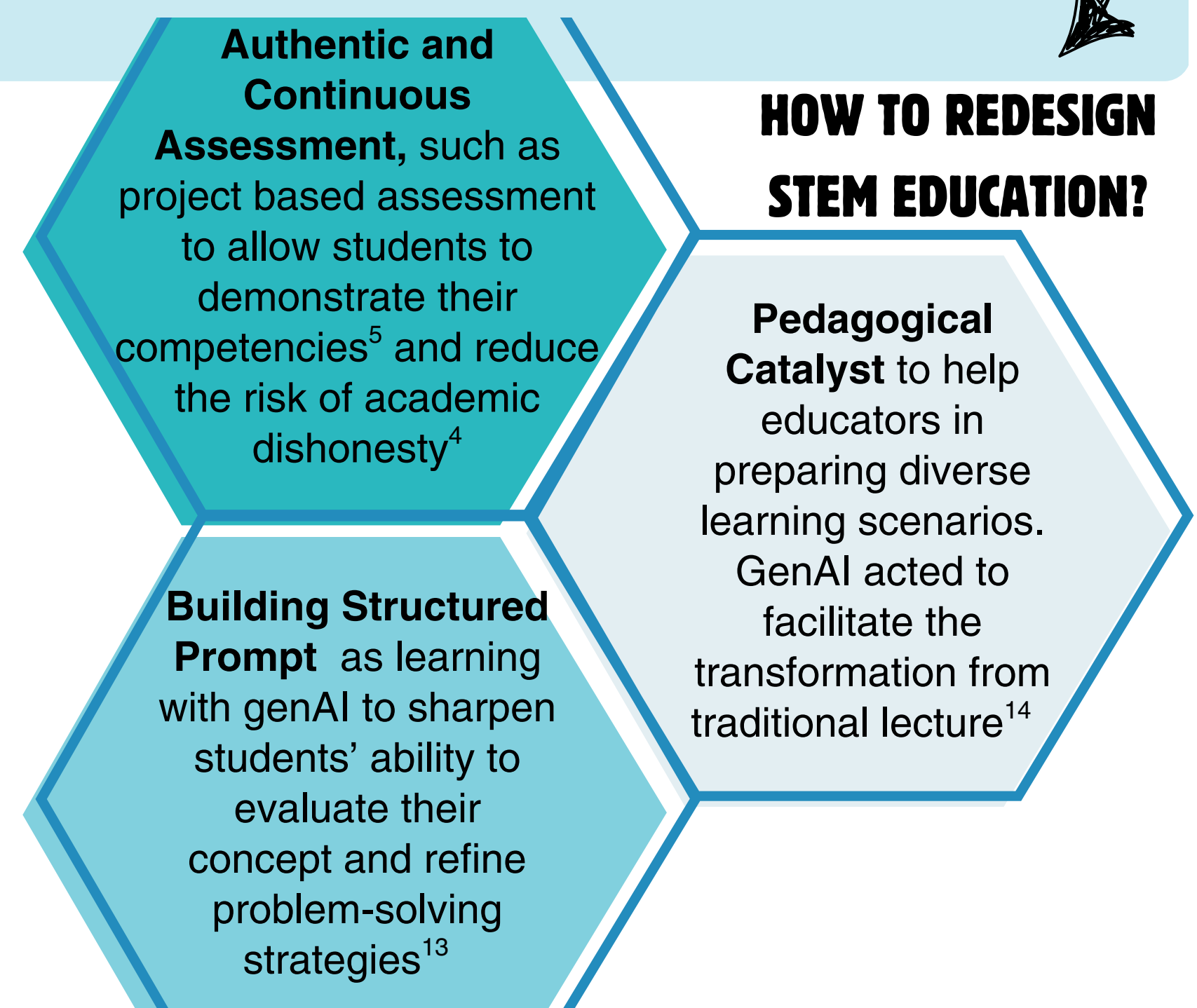


Selecting studies and analysis

- Upload sorted article database to Rayyan.ai to remove and facilitate screening
- Collect information from included article
- Upload sorted article to NVivo to do thematic analysis



HOW TO REDESIGN STEM EDUCATION?



Have any feedback or questions about this project?
Please contact me!



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