Assessment and Feedback in the Generative AI Era: Transformative Opportunities, Novel Assessment Strategies and Policies in Higher Education

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Abstract

Technological advances influence and shape education to ensure learners meet the ever-evolving real-world demand. The advent of generative artificial intelligence (GAI) has profoundly and suddenly disrupted higher education. While concerns have been raised about the ethical use of GAI, particularly to ensure academic integrity, artificial intelligence in education (AIEd) offers transformative opportunities for learners, educators, and institutions. Here we show the transformative potential of AIEd in Assessment and Feedback, address academic integrity concerns while offering assessment strategies that empower learners and educators to employ GAI. Further, we offer a review of latest policies, and an overview of upcoming changes to policies inherent to the use of GAI in higher education. These findings provide novel insight into the fast-changing field of AIEd, inform educators about relevant assessment strategies in the generative AI era, and may contribute to the development and enhancement of policies associated with assessment and feedback.

Keywords

Higher Education, Generative Artificial Intelligence, Assessment, Feedback, Policy

Introduction

Artificial intelligence in education has been established for decades, as revealed by the reviews of Zawacki-Richter et al. (2019), Chen et al. (2022) and Ouyang et al. (2022). Yet, the recent advent and availability of generative artificial intelligence (GAI) has resulted in a paradigm shift (Qadir, 2023), particularly in assessment and feedback (Sullivan et al., 2023). Indeed, GAI includes chatbot technologies with text-based (e.g. ChatGPT), image (e.g. DALL-E) and presentation (e.g. SlideAI) outputs, which raise academic integrity concerns.

However, higher education has proven agile in adapting to disruptive technological advances that challenge established practice, such as the internet (Harasim, 2000), search engines (Gilbert, 2014), and massive open online courses (MOOCs) (Kent and Benner, 2017). While the threats posed by GAI are acknowledged, this paper focuses on harnessing the potential of GAI in assessment and feedback as it can yield numerous benefits that enhance the learning experience, including personalised and timely feedback.

Consequently, this paper endeavours to present a comprehensive review and new insights into assessment and feedback in the GAI era. First, GAI opportunities are tackled at student-facing, educator-facing, and system-facing levels, as categorised by Baker and Smith (2019). Then, assessment strategies to ensure academic integrity and empower learners are addressed. Subsequently, current policies are reviewed, and future developments outlined.

Transformative Opportunities in Higher Education

Student-Facing

Providing timely, personalised feedback is a challenge in traditional higher education owing to limited resources (Paterson et al., 2020). Assessment efficiency may be improved through automated marking, which yields timeliness but lack personalisation (Appiah and Van Tonder, 2018). However, GAI achieves both (Perez et al., 2017, Peng et al., 2019). GAI can further contribute to an adaptative and individualised learning experience, incorporating formative assessments through personalised quizzes designed to individual student's needs (Barber et al., 2021), challenging them at a suitable level (Bommasani et al., 2021), which is critical to foster engagement (Boyd et al., 2023).

GAI-powered learning platforms evaluate individual student's strengths, weaknesses, and learning styles, providing feedback and study material recommendations accordingly. This allows students to progress at their own pace and promote a deeper understanding of the content. Immediate feedback and virtual chatbot companions also constitute improved student support (Gao, 2021; Roscoe et al., 2017), promoting asynchronous communication and enhancing student engagement (Li & Xing, 2021).

Educator-Facing

Workload reduction is an attractive benefit of GAI, particularly in providing feedback while ensuring academic integrity is upheld. As such, Automated Essay Scoring (AES) or Automated Writing Evaluation (AWE) (Rudolph et al., 2023) and automated assessment systems (Xiao et al., 2019, Combéfis, 2022) have been adopted to reduce workload. Whether student work should be entirely assessed by GAI remains under debate. GAI

feedback has been suggested to be more informative and more objective and consistent than that provided by academics (Haleem et al., 2022). Furthermore, by analysing students' work, GAI can suggest or create personalised resources for future improvement. This could lead to a shift from result-oriented to process-oriented assessment to encourage lifelong learning, while reducing workload.

System-Facing

Institutions may benefit from GAI chatbot (Popenici and Kerr, 2017) as students have been shown to largely feel comfortable receiving suggestions on course, module and university selection as well as skill requirements for their studies from GAI-powered chatbots (Rodway and Schepman, 2023). Institutions are now providing chatbots for frequently asked questions. With intelligent mood tracking, chatbots may also help to maintain students' mental health and wellbeing (Rodway and Schepman, 2023). Thanks to the intensive interaction with students, chatbots could also provide information about market trends and students' needs (Haleem et al., 2022), as well as enhance accessibility (Barber et al., 2021). GAI is, therefore, a significant system-facing opportunity at institutional level, which has received comparatively less attention than student or educator-facing applications, and thus represents a valuable area of future work.

Designing Assessments in the Generative AI Era

Academic Integrity

GAI can pose an academic integrity risk (Anders, 2023; Chan and Hu, 2023; Cotton et al., 2023; Rudolph et al., 2023). This has led to the detection and sanctioning of improper use (Huang, 2023), with a high disciplinary-specific impact of chatbots (Jacobson, 2023). Consequently, students must be educated on making ethical and critical use of GAI (Francis and Smith, 2023).

Yet, it is crucial for educators to identify 'red flags', which include tortured phrases, where a word is inappropriately replaced by a synonym (Cabanac et al. 2021); changes in the style, voice or British/American English; high AI detection score; absence of critical self-reflection, which GAI has not yet developed; or poor, irrelevant or artificial references. These may inform assessment design and academic malpractice detection. However, there remain limitations to AI detection tools, and students with weaker academic English may be incorrectly and unfairly suspected (Liang et al., 2023). Contracted cheating or essay mills also leads to a high likelihood of GAI use, which may not directly originate from the student, but still constitutes academic misconduct.

Generative AI in Assessments

GAI has triggered a redesign of assessments to alleviate the concerns previously raised, educate students, and integrate this technology into the learning journey. This is an ongoing process given the fast-paced advances made in GAI, which may lead to some staff resistance (McMurtie. 2023), but provides opportunities for innovative assessments, flipped learning, gamification and student-centred approaches (Sutton and Allen, 2019; Mills, 2023).

First, formulaic assessments, easily performed by GAI, should be avoided in favour of, for instance, presentations or artefacts, focusing on portfolio and CV-building deliverables. Therefore, a shift towards real-world applications and authentic assessments (Archer et al., 2021; Lawrie, 2023), or artefacts, with frameworks such as the Conceive Design Implement Operate (CDIO) initiative (Souppez and Awotwe, 2023; Liu, 2023) would be seen as pertinent, and ensure GAI does not restrict student learning (Steele, 2023).

A case is also made for a flipped classroom approach (Huang et al., 2023), supporting an ethical use of GAI and critical evaluation of its outputs, with live deliverables such as presentations or viva to fully ascertain the students' understanding (Cotton et al., 2023).

Increasingly, AI is employed to perform early idea generation, harnessing its power to fast-track the early stages of coursework. This provides an opportunity to develop students' professional use of GAI while understanding its limitations. Moreover, it frees up additional time for the students to focus on the more advanced and in-depth aspects that remain beyond current GAI capabilities.

Policies in Higher Education

While early policies focused on academic misconduct (Rudolph et al., 2023), institutions quickly adapted to the opportunities associated with GAI. Education and empowerment of the student are now core to these policies, with a requirement for a student statement on the extent of any GAI used for submitted work.

The common principles of GAI in higher education, adopted in the UK, revolve around five key principles: (i) students and educators proficiency in GAI; (ii) employing GAI to enhance student experience; (iii) institutional responsible for the ethical use of GAI; (iv) sharing of good practice; and (v) teaching and assessment should reflect developments in GAI, with ethical use and equitable access.

On the latter point, as GAI becomes more prevalent, considerations for digital inequality have become critical (Qadir et al, 2022) and should be prioritised (Imran, 2023). Indeed, while ChatGPT-3.5 is free, the more advanced ChatGPT-4 is a paid service, which could

lead to unfair outcomes based on the students' socio-economic background (Cotton et al., 2023).

A further area to consider is GAI for marking and feedback. The advantages have been identified, and early work by Chan and Hu (2023) reveals a positive student perception of GAI support and feedback while developing their assessment. However, there remains an unanswered question about student perception of GAI for summative feedback and marking, and the perceived value for money.

Outlook

The prompt reaction of plagiarism-checking platforms led to detection tools, the accuracy of which continues to improve. Significant advances are soon to be provided by virtual learning environment (VLE) platforms (e.g. Blackboard) to harness the power of AI. This includes, among others, the ability to automatically generate quizzes from lecture slides, with personalised feedback based on the students' scores. With artificial intelligence in education (AIEd) forecast to be a six billion US dollar industry in 2024, there are high stakes in providing transformational tools (Miao et al., 2021).

Regulatory authorities overseeing course accreditation are in the process of developing new policies to ensure ethical use of GAI in higher education as well as professional body registration. As such, this will impact institutional approaches to GAI.

Conclusions

Generative artificial intelligence has already transformed the higher education landscape, particularly in the areas of assessment and feedback. This paper tackled the opportunities for students, educators and administrative systems, threats and opportunities to redesigning assessment. Policies have been discussed and recommendations to ensure equitable access and for further research into student perception of artificial intelligence marking have been made. Lastly, forthcoming education tools and policies were introduced. These findings provide novel insight into assessment strategies in the generative artificial era and may contribute to future developments in assessment and feedback policies.

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