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Advancements in artificial intelligence and the reframing of student assessment in geography education

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ABSTRACT

The increasing presence of large language models (LLMs) like ChatGPT in higher education presents both opportunities and challenges for geography assessment. While these tools support learning, they also raise concerns about plagiarism and the authenticity of student work. This study investigates students' use of ChatGPT for academic tasks and their perspectives on authentic assessment methods. Our survey revealed that 80% of students used ChatGPT, primarily for brainstorming (63%). To mitigate potential negative impacts, students favoured project-based assessments (70%) and fieldwork or internships (70%), citing benefits such as fostering creativity (70%) and learning process and skill development (67%). Student interviews revealed themes of academic support, integrity concerns, authentic assessment preference, and responsible AI integration in education. In response, we implemented a project-based learning (PBL) approach in the physical geography teaching, incorporating environmental data collection, analysis, and reporting. This was complemented by oral presentations and peer assessments to enhance assessment. The transition towards authentic assessment, integrating real-world applications, aims to cultivate deeper learning, originality, and self-reflection. Our findings highlight the importance of reassessing traditional evaluation methods in the context of AI advancements, ensuring both academic integrity and meaningful learning experiences in geography education.

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Authentic assessment;
ChatGPT; project-based
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Introduction

The rapid advancement of generative artificial intelligence (AI) – particularly large language models (LLMs) like ChatGPT – is transforming the landscape of education sector. Since its public release in late 2022, ChatGPT has been adopted at an unprecedented scale, offering students and educators a powerful tool capable of producing human-like text (Baidoo-Anu & Ansah, 2023; Kooli & Yusuf, 2025). The emergence of generative AI tools has sparked some optimism about their pedagogical potential. Several scholars argue that LLMs can function as intelligent tutors or writing assistants, providing instant feedback, personalized explanations, and inspiration for student work (Adeshola & Adepoju, 2024; AlGhamdi, 2024). Evidence suggests that ChatGPT can support students in improving various aspects of academic writing, including grammar, clarity, and coherence. These benefits extend beyond non-native English speakers to learners with weaker academic writing skills, including students with dyslexia, thereby contributing to more inclusive learning environments (Ioanid & Andrei, 2025). In a literature review of ChatGPT's educational applications, Sok and Heng (2024) found the tool offers a variety of benefits, including instructional support and content generation, especially in online and remote learning contexts. Such capabilities could be harnessed to foster student creativity and engagement. For example, teachers can use generative AI to create simulated case studies or data sets for classroom exercises, sparking inquiry and problem-solving. However, alongside these positives, researchers caution against uncritical use of generative AI in teaching. ChatGPT's responses, while fluent, often lack depth or contain inaccuracies, and the tool cannot truly replace human guidance in developing higher-order thinking (Gamage et al., 2023; Wang et al., 2025). There is also a risk that over-reliance on generative AI could deskill students or dampen their motivation to learn if answers are too readily provided (Karamuk, 2025). Thus, the literature portrays a nuanced picture: LLMs are valuable allies

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in teaching and learning when used to complement traditional pedagogy, but they require careful integration and AI literacy on the part of both teachers and students (Wilby & Esson, 2024).

Several educational theories have increasingly been applied in research examining the influence of generative AI on teaching and learning, particularly constructivist learning theory, social constructivism, and experiential learning. Constructivist theory conceptualises learning as an active process in which learners construct knowledge through engagement, reflection, and problem solving rather than through passive reception (Fosnot, 2013; Piaget, 1980). Within higher education, constructivist approaches have been closely associated with scaffolded learning, where temporary supports enable students to develop higher-order thinking and independence (Vygotsky, 1978). Social constructivist perspectives extend this view by emphasising that knowledge is co-constructed through social interaction, dialogue, and shared practices (Adams, 2006; Berger & Luckmann, 1966). These ideas have been particularly influential in geography education, where collaborative inquiry, group projects, and peer learning are central pedagogical strategies. Experiential learning theory further complements these perspectives by highlighting the role of direct experience and reflection in transforming knowledge, especially in field-based and project-based learning contexts (Healey & Jenkins, 2000; Kolb, 1984).

Noteworthy, one of the most contentious issues surrounding ChatGPT in higher education is its impact on student assessment. Traditional assessment formats – such as take-home essays – are vulnerable to generative AI-generated content, raising alarms about plagiarism and the authenticity of student work (Cotton et al., 2024; Rudolph et al., 2023). Within seconds, a student can prompt ChatGPT to produce a plausible essay answer or code solution but potentially undermining the meaningfulness of assignments and complicating grading. ChatGPT's ease of use raises significant concerns about academic dishonesty, particularly in traditional assessment formats, prompting scholars to argue that educators must reconsider their assessment strategies in response (Sullivan et al., 2023). Negative implications of LLMs on assessment integrity have been increasingly reported. For instance, Cotton et al. (2024) heightened concerns among faculty that students may submit generative AI-written essays, prompting some universities to revert to in-person exams or oral defence to verify student knowledge. There is also evidence that ChatGPT can generate false or misleading content with an air of authority. Wilby and Esson (2024) described how ChatGPT produced superficially coherent responses to exam questions, earning approximately 50% of the available marks, despite fabricating references and containing factual inaccuracies.

Like other subjects, geography education is not insulated from the challenges posed by LLMs. Many geography courses still rely on essays, literature reviews, and theory exams where ChatGPT could be misused. Preliminary research indicates that ChatGPT is capable of answering certain geography questions with moderate success, especially those grounded in widely available information, but it performs poorly on prompts requiring region-specific knowledge or data interpretation (Ioanid & Andrei, 2025). For instance, Ioanid and Andrei (2025) tested ChatGPT on Romanian geography assignments and found significant factual inaccuracies and omissions in its answers, particularly where local archival knowledge was needed.

Despite burgeoning studies on generative AI in higher education, our understanding about the discipline-specific impacts of LLMs on student assessment is still limited. Most published studies to date discuss broad institutional responses or focus on fields like computer science, writing, or business education (e.g. Banerjee et al., 2025; Bucol & Sangkawong, 2025; Valcea et al., 2024). In the context of geography in higher education, research is only beginning to explore these issues. For example, Redican et al. (2025) assessed the utility of ChatGPT in Geographical Information Systems (GIS) education. More importantly, Wilby and Esson (2024) call for investigations into how geographers can maintain academic rigor and originality in the age of AI, urging the community to develop strategies for responsible use of tools like ChatGPT in research and learning. The present work seeks to bridge these gaps by providing both empirical data and a pedagogical intervention within the context of geography education.

This study investigates the intersection of ChatGPT and student assessment in geography higher education and proposes a reframing of assessment strategies to uphold academic integrity while enriching learning. The specific aims of this research are to: 1) examine how geography undergraduates use ChatGPT for academic tasks and their associated concerns, 2) explore student attitudes toward authentic and alternative assessment methods in the context of generative AI, 3) evaluate

a project-based, AI-resilient assessment strategy in a physical geography module, and 4) offer recommendations for enhancing assessment practices in geography education to promote academic integrity and meaningful learning in the age of AI. The findings offer insights that extend the literature on generative AI in education into the domain of geography, addressing the current paucity of discipline-specific evidence.

Materials and methods

Research design

Guided by constructivist, social constructivist, and experiential learning perspectives, the study design focused on how students actively engage with generative AI tools, how learning is mediated through social and collaborative practices, and how assessment formats support experiential and authentic learning outcomes. This study adopted a mixed-methods approach (Creswell & Clark, 2017), combining quantitative survey data and qualitative interviews to explore how undergraduate geography students engage with ChatGPT, their perceptions of authentic assessment, and views on reframing assessment in the context of generative AI. The mixed-method design enabled both breadth and depth of insight: the survey provided a broad understanding of usage patterns and preferences, while the interviews offered rich, contextualised perspectives (Johnson & Onwuegbuzie, 2004).

Study context and participants

The study was conducted within undergraduate geography programmes at a British university. Participants were recruited from geography modules enrolling students across human geography, physical geography, and human-physical geography. All students registered on these modules were invited to complete an anonymous online questionnaire. Of the 130 survey respondents, 20 students volunteered to participate in follow-up interviews.

Ethical approval was obtained from the School's Ethics Committee. All participants provided informed consent, and anonymity was assured throughout data collection, analysis, and reporting.

Data collection

An anonymous online questionnaire was conducted on Microsoft Forms. The survey consisted of four closed-ended questions covering: (1) frequency of ChatGPT use, (2) purposes for using ChatGPT, (3) preferred assessment formats in response to AI advancements, and (4) perceived benefits of authentic assessment in mitigating AI-related challenges. Prior to completing the questionnaire, students were provided with a short, standardised explanation of authentic assessment to ensure a shared conceptual understanding.

To gain deeper insights into students' attitudes and experiences, 20 semi-structured interviews were conducted in person or using Microsoft Teams. An interview protocol was developed, comprising open-ended questions on ChatGPT use, its impact on learning, perceptions of assessment integrity, and views on authentic assessment strategies. All interviews were audio-recorded, transcribed verbatim, and anonymised.

Data analysis

Survey responses were analysed using descriptive statistics to identify patterns in ChatGPT usage and assessment preferences. Response frequencies and proportions were calculated for each item. Interview transcripts were analysed using thematic analysis following Braun and Clarke's (2006) framework.

Based on the questionnaire and interview findings, the module was revised to incorporate a project-based learning (PBL) framework encompassing air quality data collection, analysis, reporting, oral presentation, and peer assessment.

Results

Questionnaire findings

A total of 130 students completed the questionnaire, comprising a near-equal proportion of male and female respondents, with very few respondents identifying outside the gender binary. When asked about their frequency of ChatGPT use for academic assignments, 80% of students reported some level of engagement with the tool (Figure 1). Specifically, 30% stated they used ChatGPT “rarely,” another 30% “occasionally,” and 20% “regularly.” Notably, no respondents reported using it “frequently” or “very frequently,” and only 20% indicated that they had never used ChatGPT.

In terms of how students used ChatGPT, the most frequently reported applications were for idea generation and language refinement. A significant majority (63.3%) indicated that ChatGPT helped them brainstorm ideas or topics for assignments, while 60.0% reported using it to rephrase or improve the clarity of their own thoughts and writing (Figure 2). Other uses included receiving answers to specific questions (26.7%), generating full paragraphs or sections of assignments (13.3%), and assisting with the identification of sources or citations (13.3%). Notably, only 10.0% used ChatGPT to produce original sentences directly included in their written work, and 10.0% reported using it for programming tasks (e.g. in R or Python).

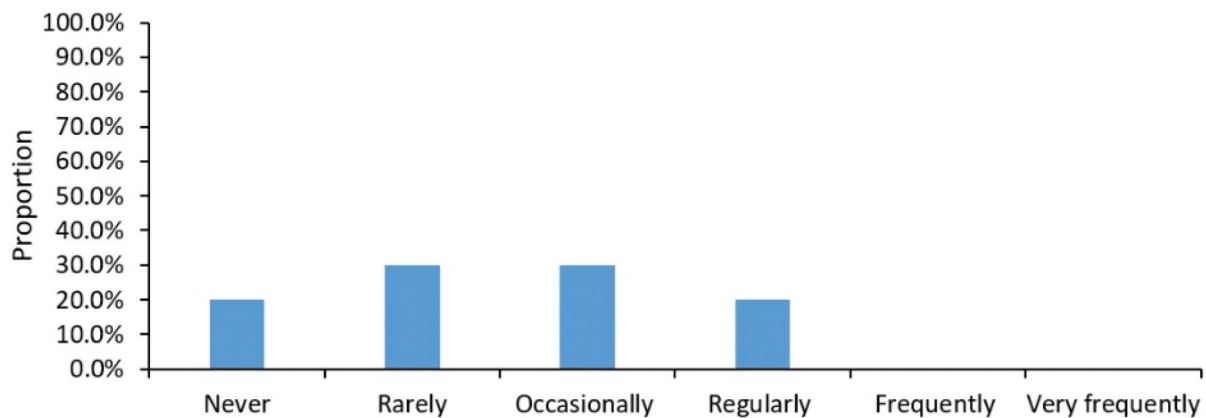


Figure 1. Students' responses to the survey question: "How frequently do you use ChatGPT for your academic assignments?".

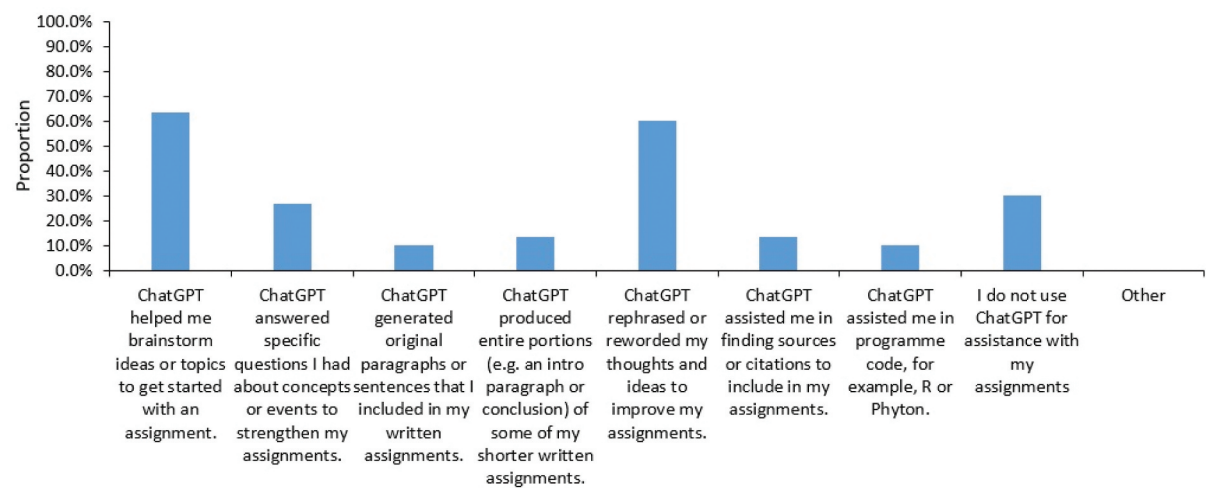


Figure 2. Students' responses to the survey question: "In what ways has ChatGPT been helpful to you in completing your assignments?".

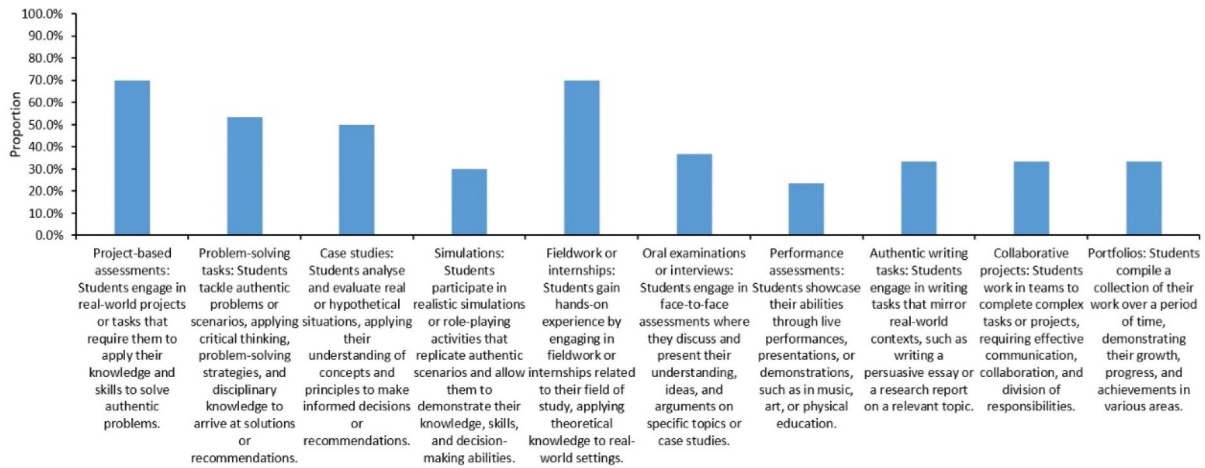


Figure 3. Students’ responses to the survey question: “To minimise the negative impacts of ChatGPT, you prefer which authentic assessment?”.

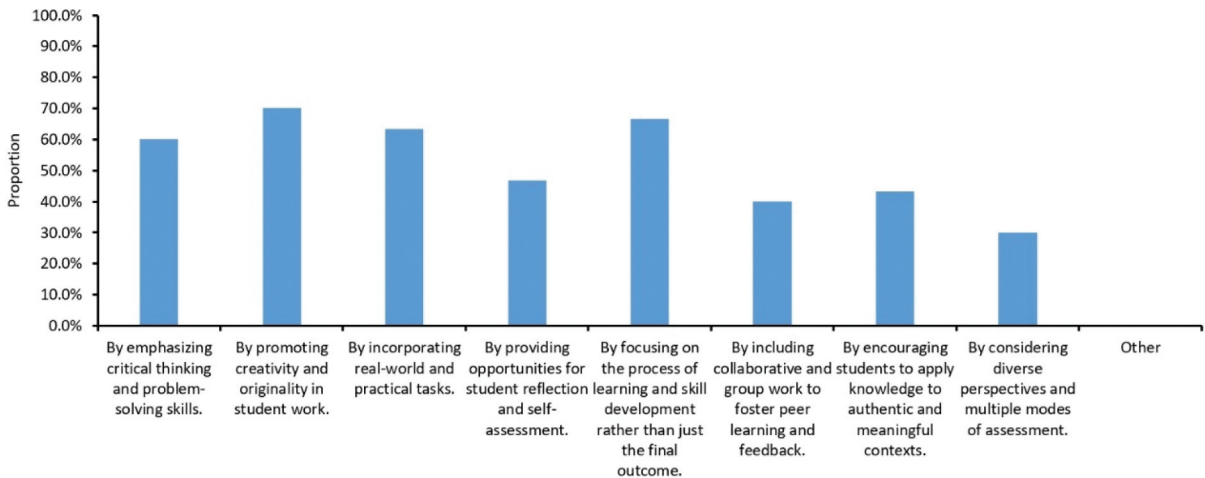


Figure 4. Students’ responses to the survey question: “How do you think authentic assessment methods can minimize the negative impact of ChatGPT on student assessment?”.

To explore how assessment formats might adapt to the presence of generative AI, students were asked to indicate their preferred forms of authentic assessment to mitigate negative impacts from ChatGPT use. The top two preferences were project-based assessments and fieldwork or internships, each selected by 70.0% of respondents (Figure 3). These were followed by problem-solving tasks (53.3%) and case studies (50.0%), suggesting that students value assessments that require the practical application of knowledge and skills. Less commonly preferred formats included oral examinations (36.7%), authentic writing tasks (33.3%), collaborative projects (33.3%), portfolios (33.3%), simulations (30.0%), and performance assessments (23.3%).

When asked how authentic assessment methods might help reduce the negative impact of ChatGPT on assessment, students highlighted several key areas. The most cited benefit was the promotion of creativity and originality (70.0%), closely followed by a focus on the learning process and skill development (66.7%) and the inclusion of real-world and practical tasks (63.3%) (Figure 4). Other frequently mentioned benefits included an emphasis on critical thinking and problem-solving (60.0%) and opportunities for self-assessment and reflection (46.7%). Fewer students cited the value of collaborative work (40.0%), application to meaningful contexts (43.3%), and consideration of diverse perspectives and assessment modes (30.0%).

Interview findings

Thematic analysis of 20 student interviews revealed four core themes that reflect students' experiences with ChatGPT and their perspectives on assessment amid the rise of generative AI: (1) Academic support and productivity, (2) Concerns over academic integrity, (3) Preference for authentic assessment, and (4) Responsible integration of AI tools.

Academic support and productivity

Students widely acknowledged ChatGPT's value as a supportive academic tool. It was commonly described as a resource for planning, brainstorming, clarifying concepts, and structuring academic work. Many used it as a starting point rather than a replacement for learning, especially when encountering difficulties or seeking quick explanations. For example, one participant noted that ChatGPT "*gives extremely relevant and structured answers which are extremely helpful*" (Student 3), while another described it as "*a thinking partner*" that supports idea development without replacing learning (Student 11).

Some participants noted its accessibility benefits, especially for students who are not native English speakers or those who need help expressing their thoughts more clearly. One international student, whose first language is not English, stated, "*It's very useful for breaking down complex topics and getting quick summaries. I still write my work, but it helps me get started*" (Student 7).

Concerns over academic integrity

Despite its perceived benefits, students expressed concern about misuse and overreliance of ChatGPT. The most common issue raised was the temptation to copy and paste AI-generated responses, leading to potential plagiarism and shallow learning. For instance, one participant remarked, "*You need to treat it like a book paragraph – assess it critically, not just copy it*" (Student 2), while another cautioned that "*a lot of students might be copying the content completely and not taking anything from it*" (Student 14).

Several students highlighted the limitations of existing plagiarism detection systems like Turnitin and called for updated tools that can detect AI-generated content more reliably. For example, one student commented that "*AI is getting so good, and Turnitin doesn't always catch it. We need better systems to keep things fair*" (Student 9).

Preference for authentic assessment

There was broad support for a shift toward authentic assessment formats, especially those grounded in real-world tasks and personal engagement. Students believed that project-based assignments, fieldwork, presentations, and oral assessments were more resistant to generative AI misuse and better reflected learning. As one participant explained, "*Authentic assessment tests how you apply skills, not just memorise facts. That's more meaningful*" (Student 5). Another added, "*When we do fieldwork or real projects, you can't just copy from ChatGPT – you have to think for yourself*" (Student 18).

Participants appreciated assessment types that required critical thinking, creativity, and personal reflection – qualities they saw as difficult to replicate with AI assistance. For example, one noted, "*You can't use AI to reflect on your own experience collecting data – it has to come from you*" (Student 16), while another stated, "*When we present our work, we really have to understand it. You can't fake it like you might with AI-written essays*" (Student 12).

Responsible integration of AI tools

Rather than advocating for bans on ChatGPT, students emphasised the need for clearer guidance and formal training on ethical and effective generative AI use. They suggested that institutions should integrate AI literacy into the curriculum to help students use tools like ChatGPT appropriately. For example, one participant stated, "*We need to understand how to use ChatGPT responsibly, not just be told not to use it*" (Student 4), while another argued that "*Formal training should come before integrating AI into learning and assessment*" (Student 16).

Some students also raised concerns about fairness, noting that digital inequality could create an uneven playing field in the absence of institutional support. As one student observed, "*It's not fair if some students use it well and others don't even know how – it needs to be equal*" (Student 10).

Discussion

This study set out to examine how geography students engage with ChatGPT, their perceptions of authentic assessment, and the efficacy of alternative strategies in promoting academic integrity amid the growing use of generative AI tools. The findings contribute to a nascent body of research exploring the implications of generative AI on student assessment in geography education.

Comparison with existing literature: ChatGPT usage, integrity concerns, and assessment preferences

Through a mixed-method, this study investigated ChatGPT usage and authentic assessment preferences among geography undergraduates. Regarding student patterns of ChatGPT usage, our findings reveal that 80% of participants had used ChatGPT for academic purposes, with brainstorming being the predominant application (63.3%, [Figure 2](#)). Our finding that 80% of geography students use ChatGPT represents a notably higher adoption rate than reported in several recent studies across different disciplines. For instance, medical students in the United States showed 48.9% usage rates ([Zhang et al., 2024](#)), while pharmacy students demonstrated only 22% usage for academic purposes ([Dirks-Naylor, 2024](#)). However, our findings align more closely with broader educational surveys, where 86% of students globally reported using generative AI tools for academic work ([Digital Education Council, 2024](#)). This discrepancy may reflect disciplinary differences, with geography students potentially finding generative AI more applicable to their essay-based and conceptual work compared to the more technical, procedural knowledge required in medical and pharmacy education.

The predominance of brainstorming applications (63.3%) in our study ([Figure 2](#)) corresponds with findings from other educational contexts. A study conducted in the United Arab Emirates (UAE) similarly found that students primarily used ChatGPT for idea generation and language refinement ([Sallam et al., 2024](#)). A survey in Germany and Switzerland indicated that students placed greater emphasis on literature searches and conceptual development ([Spirgi et al., 2024](#)). This consistency across different national and institutional contexts suggests that students universally perceive generative AI as most valuable for cognitive scaffolding rather than direct content production.

Concerning academic integrity, our qualitative findings reveal a nuanced student perspective that both acknowledges generative AI's benefits while expressing genuine concerns about misuse. This mirrors the "dual nature" identified in recent literature, where students simultaneously appreciate generative AI's efficiency while recognising risks of over-reliance and academic dishonesty ([Hasin et al., 2025](#); [Mulaudzi & Hamilton, 2025](#)). The finding that 75% of students in Ghana cited academic integrity as a primary concern when using generative AI ([Wiredu et al., 2024](#)) mirrors the concerns expressed by our interview participants, who highlighted the importance of clear guidelines and responsible use protocols.

Our students' strong preference for authentic assessment (70% favouring project-based approaches and fieldwork, [Figure 3](#)) aligns with broader educational trends documented in the literature. Research on project-based learning in higher education consistently demonstrates enhanced student engagement, deeper learning, and improved critical thinking skills ([Mutanga, 2024](#); [Yang, 2021](#)). Particularly relevant to geography education, studies emphasise fieldwork's unique value in developing spatial thinking and connecting theoretical knowledge with real-world applications ([Lambert & Reiss, 2016](#)). The convergence between our findings and the established literature suggests that geography students intuitively recognise authentic assessment's potential to mitigate generative AI-related concerns while enhancing learning outcomes.

Theoretical interpretation of findings: constructivist, social, and experiential perspectives

The patterns observed in this study can be understood through several established educational theories. Constructivist learning theory provides a particularly relevant framework for interpreting both student generative AI usage and assessment preferences ([Pavlik, 2025](#)). According to constructivist principles, learners actively build knowledge through experiences and interactions with their environment rather than passively receiving information ([Fosnot, 2013](#); [Piaget, 1980](#)). Our finding that students primarily use ChatGPT for brainstorming and idea generation aligns with constructivist emphasises on scaffolding, where learners receive temporary support to achieve higher-level thinking before developing independent capabilities.

Social constructivist principles further illuminate the collaborative aspects of our findings (Adams, 2006; Berger & Luckmann, 1966). Students' preference for group projects and peer assessment reflects the social nature of knowledge construction, where learning emerges through interaction and shared meaning-making. The integration of generative AI tools into these collaborative contexts creates new forms of human-AI interaction that extend traditional social constructivist frameworks into hybrid learning environments.

The student preference for project-based assessment and fieldwork can be explained through experiential learning theory, which emphasises learning through direct experience and reflection (Dubay & Richards, 2024; Hovelynck, 2000). Geography students' attraction to hands-on, real-world applications reflects the discipline's inherent connection between theoretical concepts and spatial phenomena. This preference also aligns with authentic assessment theory, which posits that meaningful evaluation should mirror real-world contexts and require students to demonstrate complex competencies rather than isolated knowledge (Darling-Hammond & Snyder, 2000).

Recommendations for enhancing assessment practices in geography education

In light of the challenges and opportunities posed by generative AI tools such as ChatGPT, it is essential for geography educators to adopt forward-thinking and resilient assessment practices. The goal is not only to uphold academic integrity but also to foster deeper, more authentic learning. Drawing from the findings of this study and emerging literature, several key recommendations are proposed.

Embrace authentic, experiential assessment designs

Geography is inherently applied and spatial, making it well-suited to authentic assessment formats such as fieldwork, data collection, mapping exercises, and community-engaged projects. These tasks require students to interact with real-world environments, apply theoretical knowledge in practice, and generate original outputs—characteristics that are not easily replicable by generative AI (Grobelski et al., 2023). Project-based learning (PBL) and field-based tasks enhance student engagement, critical thinking, and transferable skills, aligning with the disciplinary strengths of geography and making them more resistant to AI-enabled academic misconduct.

Incorporate multi-stage and process-oriented assessments

To minimise opportunities for generative AI-assisted plagiarism, assessment tasks should emphasise process over product. Multi-stage assignments that include proposals, drafts, peer feedback, and reflective components can help verify student authorship and encourage metacognitive engagement (Quinlan et al., 2025). Embedding oral presentations or viva-style defences further ensures that students can articulate their understanding, adding a layer of accountability and promoting deeper learning.

Diversify assessment formats and reduce reliance on essays

Given that text-based outputs are most susceptible to LLM misuse, geography educators should diversify assessment formats. This includes visual assessments (e.g. story maps, annotated GIS outputs), collaborative projects, field diaries, podcasts, and portfolios. Such formats not only challenge students to demonstrate multiple competencies but also reduce dependence on long-form essays that are easily generated by AI (Xia et al., 2024).

Promote AI literacy and ethical use

Rather than prohibiting generative AI tools outright, geography education should integrate AI literacy into the curriculum. Students need to be taught how to use generative AI responsibly – e.g. for brainstorming or information retrieval—while critically evaluating its limitations and acknowledging generative AI-assisted contributions appropriately (Kasneji et al., 2023). Embedding discussions around AI ethics, data bias, and information reliability into modules can foster responsible digital citizenship and informed technology use.

Limitations and future research directions

Like most studies, several limitations should be acknowledged in interpreting these findings. First, the study's scope was limited to a single institution and geography programme, potentially limiting generalisability to other disciplines or educational contexts. Second, the study's temporal limitation presents challenges for understanding evolving generative AI technologies and student adaptation patterns. Given the rapid development of generative AI tools, student usage patterns and institutional policies continue to evolve, potentially rendering some findings less applicable to future contexts. Third, the research design did not include longitudinal tracking of student learning outcomes or academic performance, limiting our ability to establish causal relationships between AI usage, assessment format, and educational achievement. A further limitation concerns gender analysis. Although the survey employed inclusive gender response options, the very small number of respondents identifying outside the gender binary precluded disaggregated analysis. Gender was not treated as an analytical variable in this study, and the findings should be interpreted as broadly indicative rather than sensitive to potential gendered differences.

Future research should address these limitations through several promising directions. Large-scale, multi-institutional studies comparing ChatGPT usage and assessment preferences across different disciplines would provide valuable insights into disciplinary variations and inform broader educational policy. Longitudinal research tracking student generative AI usage patterns and learning outcomes over extended periods would illuminate adaptation processes and long-term effects on academic development. Experimental designs comparing learning outcomes between traditional and AI-integrated assessment formats would provide stronger evidence for pedagogical effectiveness.

Conclusion

This research examined how generative AI, particularly ChatGPT, is reshaping assessment in geography higher education and how assessment practices can respond constructively. First, the findings show that most geography students already use ChatGPT, primarily for brainstorming and language refinement, while simultaneously expressing concerns about over-reliance, inaccuracies, and academic integrity. Second, students demonstrated a strong preference for authentic assessment approaches, especially project-based work and fieldwork, which they perceived as more meaningful, skill-oriented, and resistant to AI misuse. Third, evaluation of the implemented project-based, data-driven assessment suggests that integrating experiment, oral presentation, and peer engagement can enhance authenticity, accountability, and student engagement in geography modules. Finally, the study highlights the need to reframe assessment practices in geography by combining authentic, process-oriented assessment with explicit guidance on ethical and responsible AI use. Rather than viewing generative AI solely as a threat, the findings position it as a catalyst for reassessing what constitutes meaningful learning and valid assessment in contemporary education.

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