From Knowledge Retention to Critical Reasoning: Youth Learning in the Age of Generative AI

JACK BURNETT, University of Bristol, UK

This position paper highlights the dual-developmental trajectory created by youth–GenAI interaction: one that can amplify reasoning, reflection, and intellectual agency, and another that risks cognitive offloading, superficial engagement, and dependency. I argue that schools and education systems must design learning environments that treat GenAI use as a means to scaffold reasoning rather than a cognitive substitute, by reshaping assessments and increasing teacher and student involvement in youth-AI education research.

CCS Concepts: • **Human-centered computing** → **Human computer interaction (HCI)**; *Interaction design theory, concepts and paradigms*; • **Applied computing** → **Interactive learning environments**; • **Computing methodologies** → **Artificial intelligence**.

Additional Key Words and Phrases: Generative AI, Youth–AI Interaction, Critical Thinking, AI in Education

With my background as a secondary school governor and as a classroom teacher, I closely observe the rapid integration of Generative Artificial Intelligence (GenAI) into student workflows. I believe that GenAI is fundamentally reshaping learning from a knowledge-retention approach to one grounded in reasoning and synthesis, which enables a deeper ability to critique proposed information. When used intentionally, GenAI tools can strengthen youths' critical analysis skills by providing access to vast information resources and functioning as interactive reasoning partners; however, these same affordances can lead students to outsource their reasoning, weakening both critical thinking and knowledge retention. I believe that the main impacts of GenAI on youth learning affect student cognitive, social, and epistemic development, and result in a need to rethink educational assessment methods.

Cognitive Development. Historically, school learning has emphasised memorisation and procedural recall. GenAI disrupts this paradigm by allowing students almost instant access to reasoning and factual recall; while it could be argued that search engines also enabled this, GenAI generates tailored responses that automate the cognitive tasks of interpreting and synthesising information, rather than simply retrieving results on a known topic. This paradigm shift has the potential to reduce students' cognitive demands, enabling deeper discussions and critical analyses. While students can use GenAI as a form of "rubber duck reasoning" to articulate problems and iterate toward a clearer understanding through dialogue, which can promote testing of ideas through questioning and mimic exposure to multiple perspectives, students can also rely on GenAI to produce answers without reflection, leading to cognitive offloading and an inability to internalise conceptual structures. Differences in students' approaches to GenAI create a gap between those who build critical thinking competencies and those who develop a pattern of cognitive offloading; this gap extends beyond knowledge retention into the ability to generate independent insight.

Social Development. GenAI introduces a form of interaction into youth learning environments that feels conversational but lacks social accountability. This may lead students, particularly those hesitant to ask questions publicly, to use GenAI as a low-risk environment to explore uncertainty, potentially supporting self-directed inquiry and confidence-building; however, an overreliance on GenAI may reduce opportunities for collaborative reasoning with peers and classroom discourse, which are key parts of social learning. If GenAI replaces peer discussion rather than supplementing it, social reasoning skills may stagnate in current student cohorts. Emotionally, GenAI can function either as a confidence

Author's Contact Information: Jack Burnett, jack.burnett@bristol.ac.uk, University of Bristol, Bristol, UK.

amplifier, empowering students by acting as an accessible reasoning partner to enable deeper engagement with learning and ideas, or as a dependency risk, as students who defer judgment to AI outputs may develop reduced confidence in their own reasoning and conversational abilities.

Epistemic Development. GenAI challenges traditional ideas of authority and knowledge ownership; as such, students must learn to evaluate outputs critically rather than assume correctness. This creates a developmental opportunity for students to understand how knowledge is produced, validated, and challenged; however, this requires intentional instruction. Without guidance, students may treat GenAI responses as authoritative because of GenAI's fluency and perceived confidence through its language, leading to uncritical acceptance that weakens moral reasoning around truth and intellectual responsibility. A key educational challenge is therefore to teach students not only to use GenAI, but also to question it.

Teachers witness daily patterns of GenAI use, misuse, experimentation, and resistance; as such, classroom research is necessary to meaningfully study youth–GenAI interaction. By including youth as co-designers of research questions and incorporating teacher observations as longitudinal data sources, we can gain valuable insights into how youth-GenAI interactions evolve over time. These methods would produce richer data and potentially allow for the research itself to become a learning process through fostering metacognition among student participants. This would allow research questions such as "At what point does AI-assisted reasoning shift from supportive scaffolding to harmful substitution?" and "How does repeated AI-supported learning affect long-term memory formation?" to be studied, while also enabling classroom norm development surrounding GenAI.

As an educator rather than a youth-ai researcher, I believe the most immediate structural challenge posed by GenAI in education lies in assessment. Traditional written examinations are designed to measure individual knowledge retention and procedural recall; however, in an environment where students can rapidly access synthesised information through GenAI, such assessments are increasingly measuring access to GenAI rather than depth of understanding. This shift requires reconsidering both how students learn and how their learning is evaluated.

I believe that education systems should progressively transition toward viva and discussion-based forms of assessment, in which students are evaluated through structured oral reasoning and reflective explanation rather than through written responses. Such approaches emphasise process over product, making reasoning visible in ways that written answers alone often do not. Viva-style examinations create an environment in which students must demonstrate conceptual understanding rather than memorised responses, with an ability to explain reasoning steps and show adaptability when challenged. Viva-style examination also showcases student ownership of ideas rather than reproduction of external outputs. The characteristics of these assessments closely align with changes in cognitive demands in a GenAI-mediated learning environment. If students can consult AI tools during preparation, assessment should measure their capacity to interpret, critique, and defend their ideas rather than recall isolated facts. I believe that discussion-based assessments also provide an effective counterbalance to cognitive offloading, as students anticipate being asked to justify their thinking verbally, which may make them more likely to engage deeply with the material rather than rely on surface-level outputs.

To summarise, I believe that GenAI is a catalyst for structural change across cognitive, social, and epistemic dimensions of youth learning. GenAI value depends less on the technology itself and more on how intentionally it is integrated into pedagogy. If education systems prioritise reasoning and critical engagement over recall, GenAI has the potential to strengthen students' intellectual development. The challenge is how to shape learning environments that ensure GenAI remains a scaffold for thinking rather than a substitute for it.