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CAN AI TOOLS ENHANCE THE LEARNING OUTCOMES OF GIFTED KS2 STUDENTS?

KIERAN BIRRELL

Deira International School
kbirrell@disdubai.ae

Introduction

In the ever-evolving landscape of education, the role of Artificial Intelligence (AI) is no longer a futuristic dream; it is a present-day imperative. Schools across the globe are being challenged to rethink traditional pedagogies and adopt innovative technologies that can personalise learning, deepen understanding, and promote independence. At the heart of this transformation lies one fundamental question:

Can AI meaningfully enhance the learning experience, particularly for our most able students?

This action research project, conducted at Deira International School in Dubai, explored that question with a specific focus on gifted Key Stage 2 (KS2) students. Our aim was to investigate how AI tools could enhance their learning outcomes in core academic subjects: Mathematics, English, and Science. With the rapid advancement of tools like Generative Pre-trained Transformer (GPT)-powered chatbots and platforms such as Century Tech, we asked: can AI act as more than just a support tool? Can it become a co-pilot in the learning journey?

As Holmes, Bialik, and Fadel (2019) assert in Artificial Intelligence in Education, "AI has the potential to transform education, not just through automation, but by changing how we teach, how students learn, and how learning is assessed" (p. **23**). This project set out to explore that transformative potential firsthand.

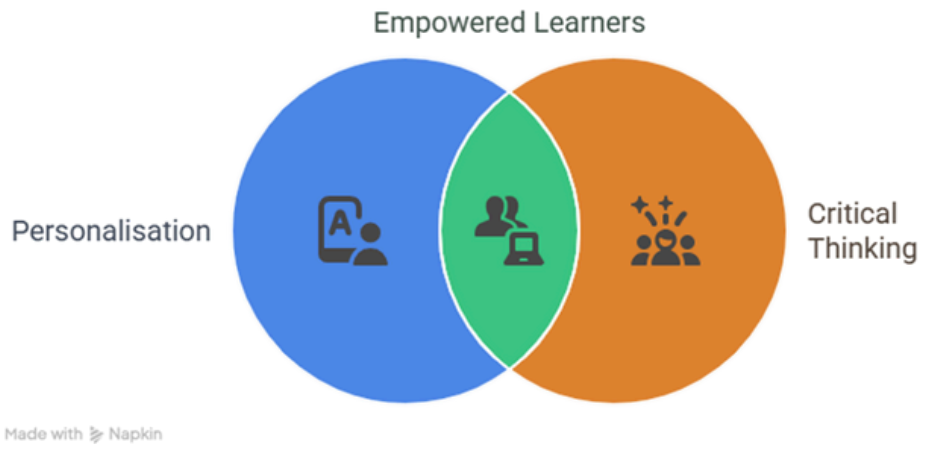
Project Rationale and Aim

Our investigation focused on a carefully selected cohort of gifted Year 5 and Year 6 students, identified using Cognitive Abilities Test (CAT4) data, teacher assessments, and internal grading. The programme was structured around three terms, each highlighting a different core subject: Term 1 (Mathematics), Term 2 (English), and Term 3 (Science).

AI tools were embedded strategically, not as content delivery mechanisms, but as scaffolding systems that encouraged independent thought. Century Tech was used diagnostically; custom AI chatbots guided inquiry; and platforms like BriskTeaching and Magic School enabled students to explore beyond the curriculum.

Fitzpatrick et al. (2023) emphasize that AI's real value in education is its capacity to tailor learning, stimulate critical thinking, and transform students into active, engaged problem-solvers - a philosophy that underpinned our entire approach (see Figure 1).

Figure 1
Unlocking Educational Potential with AI



Methodology

- Setting: Deira International School, Dubai
- Participants: A focused cohort of 10–12 gifted students selected from Year 5 and Year 6, each demonstrating high potential in core subjects through a combination of data and teacher judgment.
- Subjects Covered: A term-based progression designed to mirror academic year cycles... Mathematics (Term 1), English (Term 2), and Science (Term 3).
- Tools Deployed: A diverse suite of AI-driven tools including Century Tech (diagnostic and adaptive learning), Magic School (creativity support), EdCafe (student-led inquiry), BriskTeaching (task scaffolding), Google Notebook LM (knowledge organisation), and bespoke GPT-powered chatbots created specifically to align with curriculum objectives.

Instructional Approach:
Term 1 and 2 used pre- and post-assessments to quantify academic impact and growth.

Term 3 employed a qualitative methodology, emphasising student dialogue, open-ended reflections, and creative science exploration.

Throughout, tasks were crafted to provoke thinking and foster independence, deliberately steering away from rote content delivery.

Identification of students was robust and triangulated, combining CAT4 cognitive ability scores, internal grading, and teacher referrals. This ensured a balanced representation of high-ability learners with diverse learning profiles. AI tools were introduced not as digital tutors, but as interactive partners, guiding student inquiry, prompting critical thought, and personalising content pathways.

"The real power of AI lies in helping teachers shift from information dispensers to architects of learning experiences" (Miller, 2023). This research model embodied that philosophy, placing educators in a facilitative role while empowering students to engage deeply and independently with AI support.

Key Findings

Term 1 – Mathematics
Students began the term with a baseline average of 65% in a diagnostic assessment. By the end of the intervention, this rose to 77% - a 12% improvement. More importantly, student reflections indicated a greater willingness to take on challenging problems and self-correct using AI guidance.

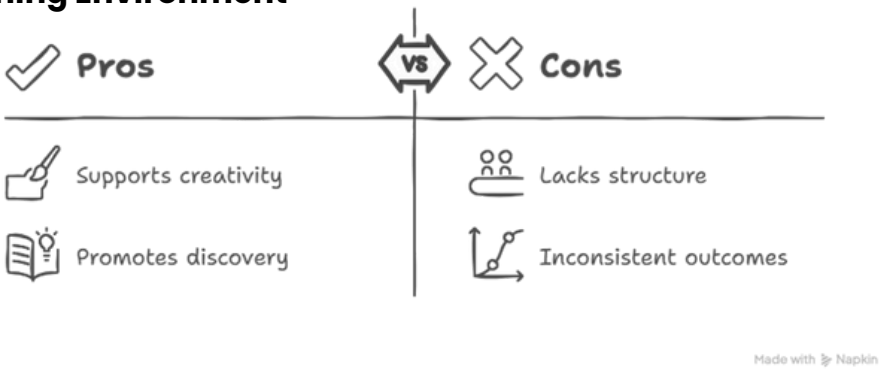
AI's role here was not to answer questions but to provoke them. Chatbots provided hints and scaffolds, encouraging students to rethink strategies and verify solutions independently. In his book, Brave New Words, Khan (2023) "When AI is used to extend a student's zone of proximal development, it doesn't replace struggle; it makes the struggle productive." Our findings validated this claim. (see **Figure 2**)

Figure 2
Where AI-Enhanced Learning Transforms Struggle

Term 2 – English
This term presented unexpected complexity. Students initially scored 73% but concluded the term with a post-assessment average of 68%a 5% dip. This result could be interpreted as regression, but upon deeper reflection, it symbolised cognitive growth. Students were pushed into more abstract, metaphor-rich texts and asked to write using advanced literary devices.

Failure became a tool, not a verdict. "Creativity flourishes when learners are allowed to get messy. Standardisation is the enemy of discovery." (Fredericks, 2023). Students wrestled with language, explored new structures, and built resilience through discomfort (see **Figure 3**).

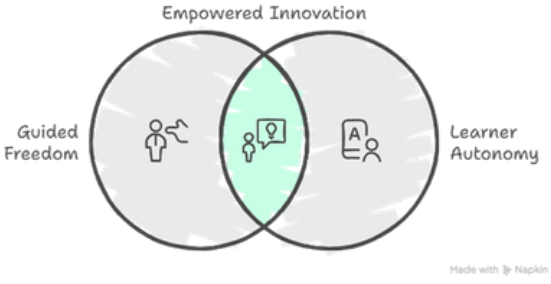
Figure 3
Creative Learning Environment



Term 3 – Science
This term marked a shift in assessment philosophy. Pre/post testing was removed entirely. Students engaged in Key Stage 3-level content, using AI to navigate scientific theories, perform analogical reasoning, and explain concepts in their own words. Engagement soared.

As Sawyer (2012) suggests "Innovation emerges from guided freedom. When learners are trusted with autonomy, they become authors of their own discovery." This was exactly what we observed, students using AI as a cognitive companion, not a content crutch (see **Figure 4**).

Figure 4
The Sweet Spot of Innovation



Student Voice
Authentic feedback from students revealed the emotional and cognitive depth of their experience:

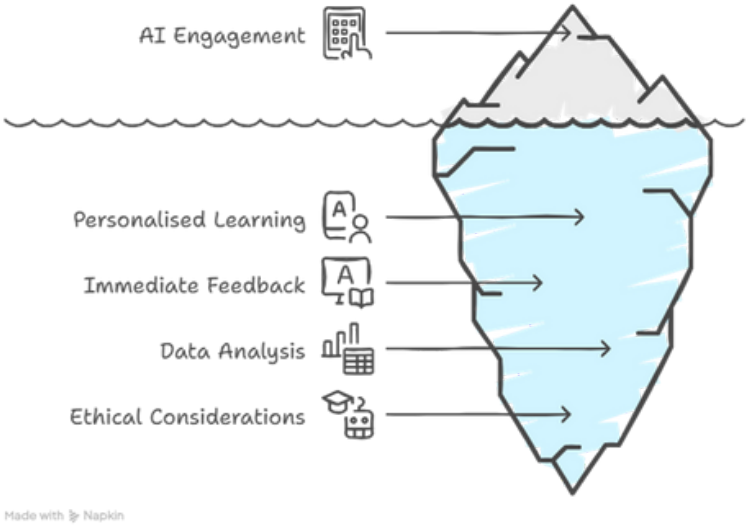
"*Using AI was like having a clever friend who never got bored of my questions.*"

"I still had to write my story myself, but the chatbot gave me ideas I hadn't thought of."

"It felt like solving puzzles—not just doing work."

These reflections echo Miller's (2023) observation: "AI can unlock engagement by making students feel seen, heard, and individually supported." In our project, AI supported curiosity without compromising challenge (see **Figure 5**).

Figure 5
AI Engagement

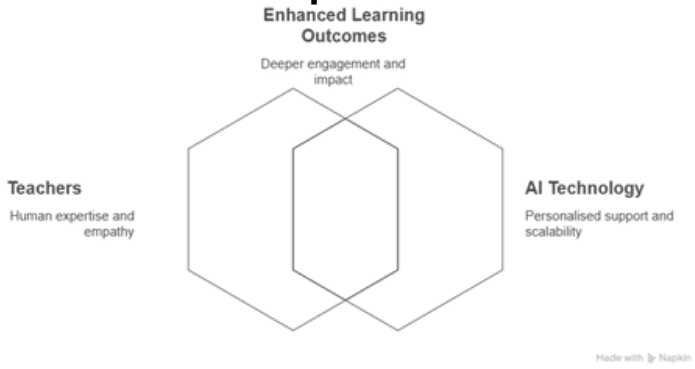


Insights and Lessons Learned

1. **Prompting Over Providing:** AI chatbots that asked better questions, rather than offering answers, empowered students to think critically.
2. **Failure as Feedback**: English outcomes declined numerically but increased cognitively, discomfort signalled deep engagement.
3. **Assessment Liberation**: When testing was removed in science, curiosity flourished, and learning felt authentic and joyful.
4. **Educator Partnership**: AI worked best when integrated purposefully by educators, not simply deployed as a plug-and-play tool.

As Bowen and Watson (2023) assert, "AI isn't a replacement for teachers, it's a partner that extends their reach and deepens their impact."

Figure 6
The Power of Human-AI Partnership in Education



Limitations and Future Direction

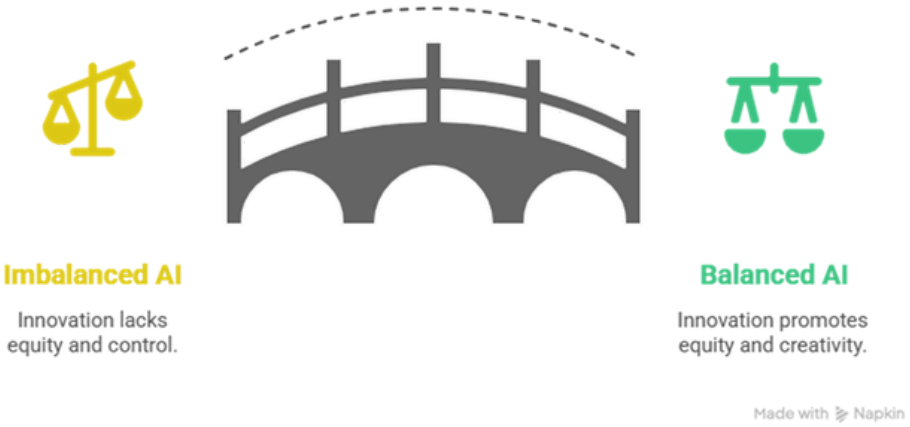
The sample size (n=12) and inconsistent attendance due to scheduling constraints limit the generalisability of our findings. Term 3 lacked formal assessment data, making results more observational than statistical. However, the qualitative gains were unmistakable.

Our next steps include:

- Expanding to KS3 and inclusion students
- Implementing more robust tracking tools
- Embedding AI practices school-wide across subjects

Kaska Porayska-Pomsta et al. (2022) caution "We must adopt AI mindfully, balancing innovation with equity, creativity with control." Our roadmap honours this balance (see **Figure 7**).

Figure 7
Mindful AI Adoption in Education



The Cultural Shift

Ultimately, this was not just a technological endeavour, it was a cultural one. We shifted from content delivery to content co-creation. We empowered students not just to answer questions, but to ask better ones.

Robinson (2006) reminds us, "We are educating people out of their creative capacities." This project aimed to reverse that trend, releasing gifted students from the constraints of standardisation and reigniting their innate curiosity. The outcome? A new vision for gifted education. One where AI scaffolds, teachers guide, and students soar.

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