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Exploring LLMs as Educational Tools in in Cultural Heritage Heritage

Dimitrios Gousopoulos & George Petrakos

Panteion University - Research Institute for Tourism

Understanding Large Language Models

Transformer Mechanism

Introduced in 2017, this breakthrough allows AI to consider entire context when predicting the next word.

Contextual Learning

LLMs utilize knowledge from training on vast language data language data to predict contextually relevant words. words.

Probabilistic Output

Words are selected based on probability, with built-in in randomness for varied responses.

Generative Capabilities

Beyond text, these systems create music, images, code, and code, and more based on prompts.

LLMs in Education: Key Applications

Personalized Learning

Adjusts educational content to student needs, creating tailored tailored learning experiences.

Interactive Learning

Responds to user input dynamically, increasing student engagement and motivation.

Task Assistance

Reduces teacher workload on repetitive tasks, allowing focus on focus on complex teaching.

Skill Development

Explains difficult concepts simply, making complex subjects more accessible.

Areas that LLMs can help educators

1. Planning

- Design learning activities
- Create lesson plans
- Develop course syllabi
- Craft individualized activities

2. Content Creation

- Generate presentations
- Create glossaries and summaries
- Develop guides and mind maps
- Design 3D models and visuals

3. Evaluation

- Create assignments
- Grade student work
- Provide valuable feedback
- Assess learning progress

4. LLMs as Teaching Assistants Assistants

Engagement Enhancement Enhancement

Provide ideas matching students' interests to boost classroom engagement and participation.

Misconception Identification

Present common student misconceptions and suggest educational approaches to address them.

Historical Personas

Create engaging discussions by simulating conversations with historical figures in the classroom.

Challenges of Using LLMs

Hallucinations

LLMs can generate realistic but factually factually incorrect information.

Bias

AI systems reflect human biases present in present in training data.

Academic Integrity

Human-like responses raise concerns about about plagiarism and cheating.

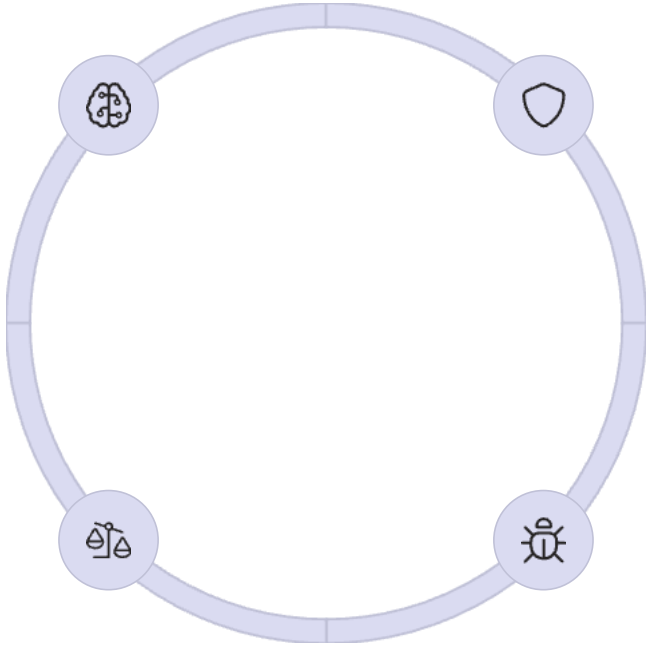
More Challenges to Address

Critical Thinking

Students may over-rely on AI responses responses without questioning them.

Biased Content

AI may perpetuate existing biases in educational materials.



Data Privacy

Concerns about student data protection and protection and responsible AI usage.

Inaccurate Information

LLMs can provide incorrect or misleading misleading content.

AI in Cultural Heritage: Current Applications

Transcription

Digitizing historical documents and manuscripts.

Translation

Interpreting hieroglyphs hieroglyphs and ancient ancient languages.

Reconstruction

Rebuilding pottery and and deciphering carbonized scrolls.

Museum Support

Creating exhibit labels labels and visitor query query systems.

Adapting Heritage Narratives for Diverse Audiences

Age-Appropriate Content

Generate narratives tailored to students' age in real-time.

Cultural Adaptation

Adjust stories for local and international audiences.

Accessibility Enhancement

Create content for blind and visually impaired audiences.

Engagement Boost

Improve interest through personalized storytelling approaches.

Case Study: Prometheus Myth Adaptation

For 10-Year-Olds

Simpler language with chapter divisions. divisions. Added age-appropriate morals: morals: "Even when someone tells you that you that you can't make a difference, remember Prometheus. One spark can can change everything."

For Blind Students

Enhanced sensory details beyond visual visual elements. Suggested sound effects: effects: "One stormy night, while the gods gods were asleep... The wind howled, and and lightning flashed. Can you hear it? - it? -Pause for dramatic thunder sound-" sound-"

For International Students

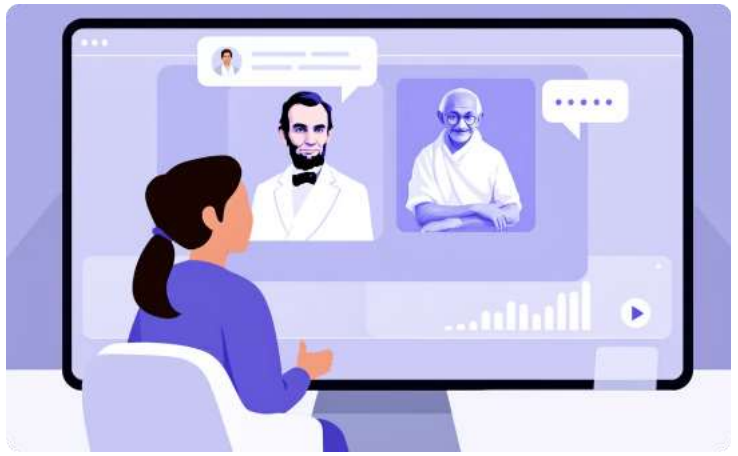
Included familiar cultural references: "A "A brave hero named Heracles — much much like the legendary knight Siegfried Siegfried from the German epic Nibelungenlied — came to free Prometheus."

Developing Historical Scenarios

LLMs can create immersive historical learning experiences through these key approaches:

Interactive Decision-Making

Students make choices that affect historical outcomes, allowing them to experience the weight of historical decisions firsthand.



Historical Figure Dialogues

Students can interact with simulated historical personalities to understand their perspectives, motivations, and the context of their actions.

Context-Rich Environments

Explore detailed historical settings and situations that bring the past to life through sensory-rich, authentic details.

These scenario-based approaches help students understand history through active participation rather than passive learning.

Example of Historical Scenarios

1 **Battle of Gaugamela**

"You've ordered your left flank to retreat. The Persian cavalry begins to advance. How do you you respond?"

2 **Black Death Management**

"Your town has witnessed a 20% mortality rate. How will you balance public health with economic stability?"

3 **"What If" Scenarios**

"Napoleon's forces landed near Portsmouth in 1804. How would you leverage this momentum?"The momentum?"The British army, caught off guard, retreated toward London. How would you leverage you leverage this momentum, knowing that naval reinforcements from France are delayed?). delayed?).

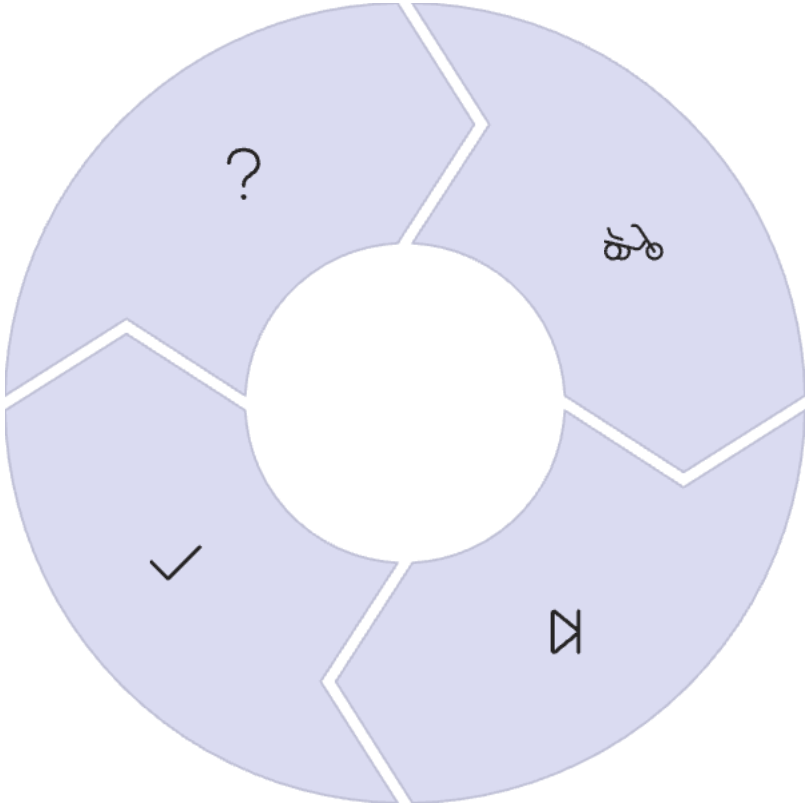
4 **Socratic Dialogue**

You: Socrates, why do you think the pursuit of knowledge is so important? **Socrates:** "Ah, a fine a fine question indeed. Tell me, my friend, do you believe that ignorance leads to wisdom?" **You:** No, I wisdom?" **You:** No, I think ignorance is the opposite of wisdom. **Socrates:** "Then if ignorance is the lack ignorance is the lack of wisdom, how does one transition from ignorance to understanding? Is it not understanding? Is it not through questioning and seeking truth? Knowledge, you see, is the bridge the bridge between the two. Would you agree, or is there another path you perceive?"

Creating Personalized Learning Experiences

Information Gathering

Assess student learning level and and prior knowledge.



Adaptive Tutoring

Adjust teaching style to student responses.

Understanding Verification

Confirm comprehension before before advancing topics.

Step-by-Step Learning

Break topics into manageable parts parts with examples.

AI Tutor Implementation - Prompts' structure

Building an effective AI tutor requires thoughtful prompt engineering to guide the LLM's behavior and responses.

Goal Definition

Clarify the tutor's purpose: helping students explore cultural heritage topics while evaluating understanding through open-ended questions.

Persona Development

Create a practical, encouraging AI tutor persona that believes in students' ability to learn and grow.

Narrative Structure

Begin with initial assessment questions about learning goals, level, and prior knowledge.

Adaptive Progression

Ensure the AI only advances to new topics after verifying student comprehension of current material.

This structured approach creates a responsive learning experience tailored to individual student needs and progress.

Sample AI Tutor: Democracy in Ancient Greece

Initial Assessment

The AI tutor begins by asking about learning level and prior knowledge to tailor the discussion.

Concept Exploration

Explains democracy's etymology: "demos" (people) and "kratos" (power), then explores historical context.

Critical Thinking

Prompts students to evaluate fairness of Athenian democracy compared to modern systems.

Actionable Insights for Educators Educators

Start Small

Begin with one application area like narrative adaptation.

Build Skills

Develop prompt engineering knowledge for better results.

Collaborate

Share experiences with colleagues to improve implementations.

Evaluate Impact

Measure student engagement and learning outcomes.

Future Research Directions

Effectiveness Studies

Measure impact of LLM-enhanced learning on cultural heritage understanding and retention.

Bias Mitigation

Develop methods to identify and reduce cultural biases in AI-generated generated heritage content.

Museum Integration

Explore personalized, interactive AI experiences for museum visitors and visitors and students.

Multimodal Approaches

Combine text, image, and sound generation for immersive heritage heritage experiences.

Conclusion: Bridging Technology and Heritage

Value Cultivation

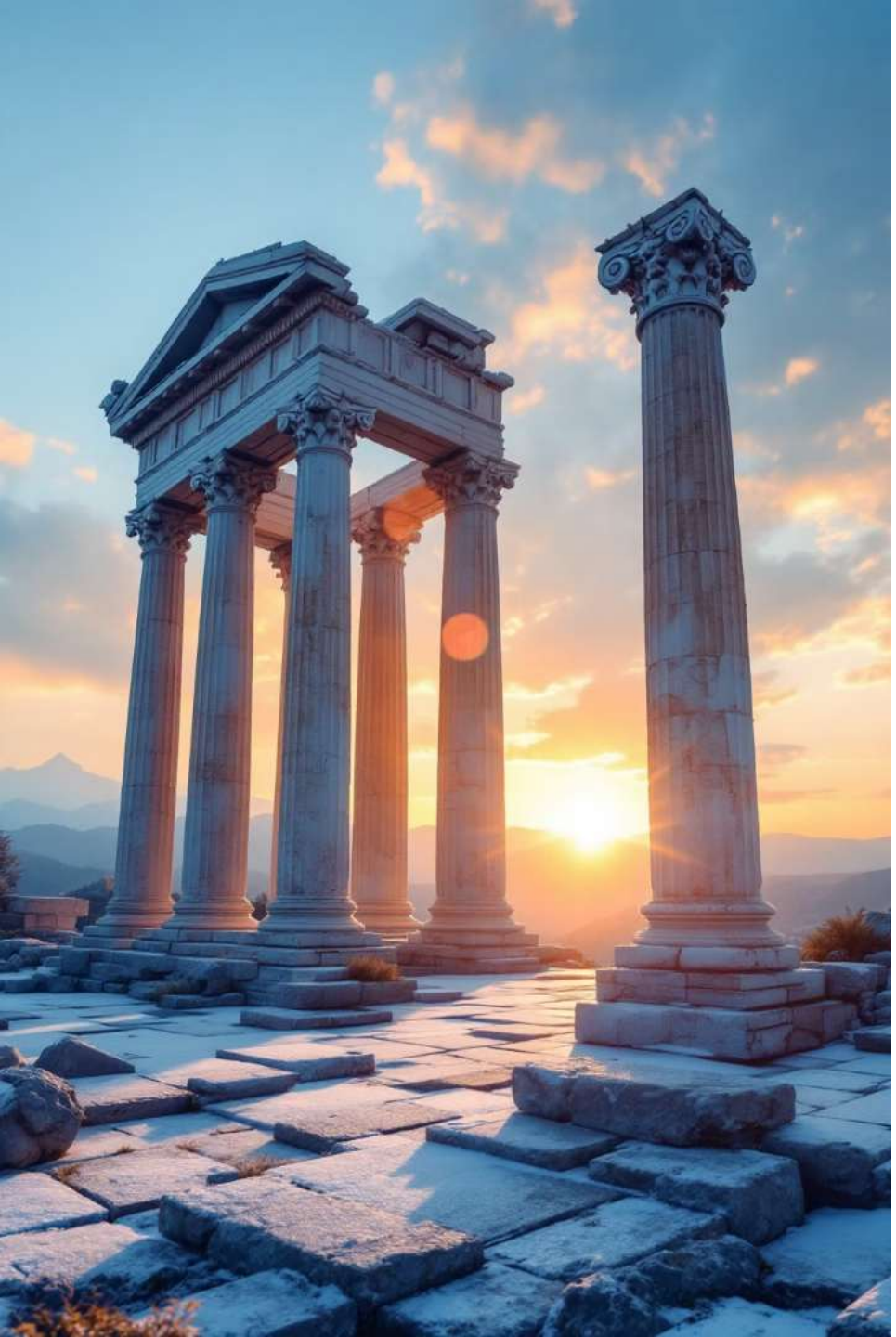
LLMs help students appreciate tangible and and intangible cultural assets inherited from from past generations.

Engagement Enhancement

Interactive, personalized experiences deepen deepen understanding and connection with with cultural heritage.

Human-AI Partnership

Technology enhances rather than replaces replaces human expertise in cultural heritage heritage education.



Thank You for Your Attention

We've explored how LLMs can transform cultural heritage heritage education through personalized learning experiences experiences and adaptive content.

Contact us to discuss implementing these AI approaches in your your educational setting.