Supplementary material (SM)

The chatbots' challenge to education: Disruption or destruction?

Exhibit SM-1:
A test and a quiz in history for 7th graders as suggested by ChatGPT

User: Could you please suggest test items in history about Julius Caesar and the Roman Empire, for 7th graders?

ChatGPT: Sure, here are some possible test items in history for 7th grade students about Julius Caesar and the Roman Empire:

1. Who was Julius Caesar and what was his role in Roman history?
2. Describe the political situation in Rome during Julius Caesar's time.
3. What were some of Julius Caesar's major accomplishments as a leader of Rome?
4. What was the significance of the Roman Republic, and how did it differ from the Roman Empire?
5. What factors contributed to the decline and fall of the Roman Empire?
6. How did Julius Caesar's death impact the future of Rome?
7. Describe the social structure of ancient Rome and the roles played by different groups in society.
8. What was the significance of the Pax Romana, and how did it affect the Roman Empire?
9. What were some of the major cultural achievements of the Roman Empire, and how did they influence Western civilization?
10. What was the impact of the Roman Empire on the development of Christianity?

These questions can be modified and expanded upon to create a more comprehensive test on Julius Caesar and the Roman Empire for 7th grade students.

User: Could you please write a quiz on the same topic for the same grade level?

ChatGPT: Sure, here's a sample quiz on Julius Caesar and the Roman Empire for 7th grade students:

1. Who was Julius Caesar and what was his role in Roman history?
   a. A famous philosopher and writer
   b. A military general and politician who became dictator of Rome
   c. A wealthy merchant who sponsored public works projects
   d. A famous playwright and actor

2. What was the significance of the Roman Republic, and how did it differ from the Roman Empire?
   a. The Roman Republic was a period of expansion and conquest, while the Roman Empire was a period of decline and collapse.
   b. The Roman Republic was a period of democracy and political freedom, while the Roman Empire was a period of dictatorship and oppression.
   c. The Roman Republic was a period of economic growth and prosperity, while the Roman Empire was a period of poverty and stagnation.

d. The Roman Republic was a period of representative government and civic participation, while the Roman Empire was a period of centralized rule and cultural diversity.

3. What were some of Julius Caesar's major accomplishments as a leader of Rome?

a. Conquering Gaul, reforming the Roman calendar, and expanding Roman citizenship
b. Building the Colosseum, creating the Praetorian Guard, and establishing the Julian dynasty
c. Writing the Aeneid, sponsoring public works projects, and promoting civic virtue
d. Developing the Latin language, creating the Roman road system, and founding the Roman Catholic Church.

4. How did Julius Caesar's death impact the future of Rome?

a. It led to a period of stability and prosperity known as the Pax Romana.
b. It sparked a civil war and political instability that eventually led to the fall of the Roman Empire.
c. It resulted in the emergence of a new political system based on democratic ideals and civic participation.
d. It had no significant impact on the future of Rome.

5. What factors contributed to the decline and fall of the Roman Empire?

a. Political corruption, economic stagnation, and military overextension
b. Cultural decline, religious persecution, and natural disasters
c. Technological stagnation, environmental degradation, and social unrest
d. Invasion by barbarian tribes, economic collapse, and political fragmentation

6. Describe the social structure of ancient Rome and the roles played by different groups in society.

a. Ancient Rome was a classless society where everyone had equal opportunities.
b. Ancient Rome was divided into two classes: patricians (wealthy elites) and plebeians (commoners).
c. Ancient Rome was divided into three classes: senators (political leaders), knights (wealthy merchants), and plebeians (commoners).
d. Ancient Rome was divided into four classes: nobles, patricians, plebeians, and slaves.

7. What was the impact of the Roman Empire on the development of Christianity?

a. The Roman Empire actively persecuted Christians and sought to suppress their beliefs.
b. The Roman Empire played a key role in the spread of Christianity throughout Europe and the Mediterranean.
c. The Roman Empire had no impact on the development of Christianity.
d. The Roman Empire tolerated Christians but did not actively promote their beliefs.

Answers:

1. b
2. d
3. a
4. b
5. a
6. b

7. b

Note: This is just a sample quiz and can be modified and expanded upon based on the specific learning objectives and content covered in the classroom.

(Mar.7, 2023)

Exhibit SM-2:
ChatGPT suggested topics for classroom discussions or group projects (regarding Julius Caesar and the Roman Empire, for 7th grade)

User: Hello! Could you please suggest topics for classroom discussion to promote critical thinking (in history for Grade 7 about Julius Caesar and the Roman Empire)?

ChatGPT: Sure, here are some topics for classroom discussion on Julius Caesar and the Roman Empire that could promote critical thinking among Grade 7 students:

1. Was Julius Caesar a hero or a tyrant? Why?
2. Did Julius Caesar really deserve to be assassinated? Why or why not?
3. What were the reasons behind the fall of the Roman Empire? Was it inevitable?
4. How did Julius Caesar impact the Roman Republic, and what changes did he bring about?
5. What were the key achievements of the Roman Empire during Julius Caesar's rule, and what were its limitations?
6. What lessons can we learn from the Roman Empire's successes and failures, and how can they be applied to contemporary society?
7. How did Julius Caesar's military campaigns shape the course of Roman history, and what were the consequences of his conquests?
8. How did Julius Caesar's leadership style compare to other leaders in ancient and modern history, and what were the strengths and weaknesses of his approach?
9. What role did the Roman Empire play in shaping Western civilization, and how has its legacy continued to influence us today?
10. What were the key factors that enabled Julius Caesar to rise to power, and how did he maintain his authority over the Roman Empire?

Encourage your students to critically evaluate different perspectives and sources, analyze primary and secondary sources, and make evidence-based arguments to support their viewpoints. Good luck with your discussions!

User: Thanks! If I were to assign topics 1 and 6 as group projects, could you please suggest rubrics for evaluating the process and the product by the group members; and for peer feedback once it is completed?

ChatGPT: Certainly! Here are some rubrics you could use to evaluate the group projects on topics 1 and 6, as well as peer feedback forms for your students:

Rubric for evaluating the process:

Criteria	4 (Excellent)	3 (Good)	2 (Fair)	1 (Poor)
Contribution	All group members contributed equally and	Most group members contributed equally and	Some group members did not contribute equally or effectively to the project.	One or more group members did not contribute to the project.

Criteria	4 (Excellent)	3 (Good)	2 (Fair)	1 (Poor)
	effectively to the project.	effectively to the project.		
Collaboration	The group worked together cooperatively, communicated effectively, and resolved conflicts constructively.	The group generally worked together cooperatively, communicated effectively, and resolved conflicts constructively.	The group had some difficulty working together cooperatively, communicating effectively, or resolving conflicts constructively.	The group had significant difficulty working together cooperatively, communicating effectively, or resolving conflicts constructively.
Organization	The group was well-organized, met all deadlines, and completed all assigned tasks on time.	The group was mostly organized, met most deadlines, and completed most assigned tasks on time.	The group was somewhat disorganized, missed some deadlines, or did not complete all assigned tasks on time.	The group was very disorganized, missed many deadlines, or did not complete many assigned tasks on time.

Rubric for evaluating the product:

Criteria	4 (Excellent)	3 (Good)	2 (Fair)	1 (Poor)
Content	The project demonstrates a deep understanding of the topic, is well-researched, and presents multiple perspectives.	The project demonstrates a good understanding of the topic, is adequately researched, and presents some perspectives.	The project demonstrates a basic understanding of the topic, is somewhat researched, and presents limited perspectives.	The project demonstrates a poor understanding of the topic, is poorly researched, and presents no perspectives.
Analysis	The project analyzes the topic critically, presents evidence-based	The project analyzes the topic adequately, presents some evidence-based	The project analyzes the topic minimally, presents few evidence-based	The project does not analyze the topic, presents no evidence-

Criteria	4 (Excellent)	3 (Good)	2 (Fair)	1 (Poor)
	arguments, and considers multiple viewpoints.	arguments, and considers some viewpoints.	arguments, and considers few viewpoints.	based arguments, and considers no viewpoints.
Organization	The project is well-organized, presents information clearly and logically, and includes appropriate visuals or other media.	The project is mostly organized, presents information somewhat clearly and logically, and includes some visuals or other media.	The project is somewhat disorganized, presents information unclearly or illogically, or includes few visuals or other media.	The project is very disorganized, presents information unclearly and illogically, and includes no visuals or other media.

Peer feedback form:

Criteria	Excellent	Good	Fair	Poor
Contribution	The group member contributed equally and effectively to the project.	The group member mostly contributed equally and effectively to the project.	The group member did not contribute equally or effectively to the project.	The group member did not contribute to the project.
Collaboration	The group member worked cooperatively, communicated effectively, and resolved conflicts constructively.	The group member generally worked cooperatively, communicated effectively, and resolved conflicts constructively.	The group member had some difficulty working cooperatively, communicating effectively, or resolving conflicts constructively.	The group member had significant difficulty working cooperatively, communicating effectively, or resolving conflicts constructively.

User: Thanks! These are quite generic rubrics for group work. How about more task specific ones to guide the work on each topic and for peer evaluation of the products?

ChatGPT: Great point! Here are more specific rubrics for the two topics that can guide the work on each topic and for peer evaluation of the products:

Rubric for Evaluating the Process and Product for Topic 1: "Was Julius Caesar a hero or a tyrant? Why?"

Criteria	4 (Excellent)	3 (Good)	2 (Fair)	1 (Poor)
Process: Contribution	All group members contribute equally and effectively to the project, and take on tasks that leverage individual strengths to support the group's success.	Most group members contribute equally and effectively to the project, and take on tasks that leverage individual strengths to support the group's success.	Some group members do not contribute equally or effectively to the project, and do not take on tasks that leverage individual strengths to support the group's success.	One or more group members do not contribute to the project, and do not take on tasks that leverage individual strengths to support the group's success.
Process: Collaboration	The group works together cooperatively, communicates effectively, and resolves conflicts constructively. The group consistently seeks and incorporates peer feedback to improve the quality of their work.	The group generally works together cooperatively, communicates effectively, and resolves conflicts constructively. The group seeks and incorporates peer feedback to improve the quality of their work.	The group has some difficulty working together cooperatively, communicating effectively, or resolving conflicts constructively. The group only occasionally seeks and incorporates peer feedback to improve the quality of their work.	The group has significant difficulty working together cooperatively, communicating effectively, or resolving conflicts constructively. The group rarely seeks and incorporates peer feedback to improve the quality of their work.
Process: Research	The group conducts thorough research from multiple sources and perspectives, and critically analyzes the credibility and reliability of the sources they use. The group uses evidence to support their argument and effectively integrates it into the final product.	The group conducts research from multiple sources and perspectives, and analyzes the credibility and reliability of the sources they use. The group uses evidence to support their argument and adequately integrates it into the final product.	The group conducts limited research from one or two sources and perspectives, and struggles to analyze the credibility and reliability of the sources they use. The group struggles to use evidence to support their argument and integrate it into the final product.	The group conducts minimal research from one source and perspective, and does not analyze the credibility and reliability of the sources they use. The group does not use evidence to support their argument or integrate it into the final product.

Criteria	4 (Excellent)	3 (Good)	2 (Fair)	1 (Poor)
Product: Argument	The group presents a compelling argument that is well-supported by evidence from credible and reliable sources. The group acknowledges and addresses counter-arguments to their position, and presents a nuanced and thoughtful perspective.	The group presents a strong argument that is supported by evidence from credible and reliable sources. The group acknowledges and addresses counter-arguments to their position, and presents a thoughtful perspective.	The group presents a basic argument that is supported by limited evidence from credible and reliable sources. The group acknowledges some counter-arguments to their position, and presents a somewhat thoughtful perspective.	The group presents a weak argument that is not supported by evidence from credible and reliable sources. The group does not acknowledge counter-arguments to their position, and presents a simplistic or unclear perspective.

Peer feedback form for Topic 1: "Was Julius Caesar a hero or a tyrant? Why?"

Criteria	Excellent	Good	Fair	Poor
Contribution	The group member contributed equally and effectively to the project, and took on tasks that leveraged individual strengths to support the group's success			

User: Thanks! Do you suggest to use the same rubrics for evaluating the products of the two different topics?

ChatGPT: It's possible to use the same rubrics for evaluating the products of both topics, as they both involve research, critical thinking, and effective communication skills. However, since the topics themselves are different, you may want to modify the rubrics to reflect the specific requirements and expectations of each topic. This can help ensure that you are evaluating the products based on the specific skills and knowledge relevant to each topic. Additionally, it may be helpful to provide students with rubrics that are tailored to each topic to help them understand the specific requirements and expectations for each project.

User: Yes, that is exactly what I was expecting to see.

ChatGPT: Great! Here are more specific rubrics for the second topic that can guide the work on each topic and for peer evaluation of the products:

Rubric for Evaluating the Process and Product for Topic 6: "What was life like in Ancient Rome? How did it differ by social class?"

Criteria	4 (Excellent)	3 (Good)	2 (Fair)	1 (Poor)
Process: Contribution	All group members contribute equally and effectively to the project, and take on tasks that leverage individual strengths to support the group's success.	Most group members contribute equally and effectively to the project, and take on tasks that leverage individual strengths to support the group's success.	Some group members do not contribute equally or effectively to the project, and do not take on tasks that leverage individual strengths to support the group's success.	One or more group members do not contribute to the project, and do not take on tasks that leverage individual strengths to support the group's success.
Process: Collaboration	The group works together cooperatively, communicates effectively, and resolves conflicts constructively. The group consistently seeks and incorporates peer feedback to improve the quality of their work.	The group generally works together cooperatively, communicates effectively, and resolves conflicts constructively. The group seeks and incorporates peer feedback to improve the quality of their work.	The group has some difficulty working together cooperatively, communicating effectively, or resolving conflicts constructively. The group only occasionally seeks and incorporates peer feedback to improve the quality of their work.	The group has significant difficulty working together cooperatively, communicating effectively, or resolving conflicts constructively. The group rarely seeks and incorporates peer feedback to improve the quality of their work.
Process: Research	The group conducts thorough research from multiple sources and perspectives, and critically analyzes the credibility and reliability of the sources they use. The group uses evidence to support their argument and effectively integrates it into the final product.	The group conducts research from multiple sources and perspectives, and analyzes the credibility and reliability of the sources they use. The group uses evidence to support their argument and adequately integrates it into the final product.	The group conducts limited research from one or two sources and perspectives, and struggles to analyze the credibility and reliability of the sources they use. The group struggles to use evidence to support their argument and integrate it into the final product.	The group conducts minimal research from one source and perspective, and does not analyze the credibility and reliability of the sources they use. The group does not use evidence to support their argument or integrate it into the final product.
Product: Understanding of Life in Ancient Rome	The group demonstrates a deep understanding of life in Ancient Rome, including social customs, economic systems, and political structures. The group	The group demonstrates a solid understanding of life in Ancient Rome, including social customs, economic systems, and political	The group demonstrates a basic understanding of life in Ancient Rome, but may struggle to describe social customs, economic systems, and political structures. The group only	The group demonstrates a weak understanding of life in Ancient Rome and may provide inaccurate or incomplete information. The group does not

Criteria	4 (Excellent)	3 (Good)	2 (Fair)	1 (Poor)
	clearly articulates the differences in lifestyle between social classes and effectively uses evidence to support their arguments.	structures. The group describes the differences in lifestyle between social classes and uses evidence to support their arguments.	partially explains the differences in lifestyle between social classes and may struggle to use evidence to support their arguments.	explain the differences in lifestyle between social classes and does not use evidence to support their arguments.
Product: Communication	The group effectively communicates their ideas and arguments using appropriate language, tone, and style. The group organizes their ideas logically and uses appropriate visual aids to enhance their			

User: We are experiencing communication shortcut. We will continue are chat tomorrow. Thank you very much for you help.

ChatGPT: You're welcome! Sorry for the communication shortcut. Feel free to reach out to me again tomorrow if you have any more questions. Have a good day!

(6.3.2023)

Exhibit SM-3:
ChatGPT's responses to the same question posed three months apart (A) and its responses to the same question posed twice in the same day (B)

A. Responses to the same question posed three months apart

Dec. 12.2022

19a) User: what models of school accountability are known?

ChatGPT: There are several models of school accountability that have been developed and implemented in different countries around the world. Some common models include:

1. *Standardized testing*: In this model, schools are held accountable for student achievement through the use of standardized tests. These tests are typically administered to all students in a particular grade level or subject area, and the results are used to evaluate school performance.
2. *School report cards*: In this model, schools are evaluated and rated based on a variety of indicators, such as student test scores, graduation rates, and other measures of student achievement. This information is typically presented in a publicly available report card or scorecard.
3. *School improvement plans*: In this model, schools are required to develop and implement plans to improve student achievement. These plans may include specific goals, strategies, and measures of progress, and they may be developed with input from teachers, parents, and other stakeholders.
4. *Peer review*: In this model, schools are evaluated by a team of educators from other schools, who visit the school and review its practices and processes. This model can help to promote collaboration and shared learning among schools.

Overall, the most effective model of school accountability will depend on the specific context and needs of the school and its community.

March 16th 2023

49a) User: What models of school accountability are known?

ChatGPT: There are several models of school accountability that are known. Here are some of them:

1. *Outcome-based accountability*: This model focuses on measuring the outcomes of students in terms of academic achievement, such as test scores, graduation rates, and college acceptance rates.
2. *Input-based accountability*: This model focuses on the inputs to the education system, such as funding, resources, and teacher qualifications, and holds educators accountable for using these inputs effectively.
3. *Process-based accountability*: This model focuses on the processes used by educators to deliver education, such as teaching methods, curriculum design, and classroom management, and holds them accountable for using effective processes.
4. *Performance-based accountability*: This model sets specific performance targets for schools and holds them accountable for meeting those targets, often using incentives or penalties to motivate them.
5. *Market-based accountability*: This model emphasizes competition between schools and allows families to choose schools based on their performance.
6. *Community-based accountability*: This model involves community members in the school accountability process, with the aim of increasing engagement and support for schools.

These models are not mutually exclusive, and many accountability systems use a combination of several models. The choice of model depends on the goals of the accountability system and the context in which it is implemented.

B. Responses to the same question posed twice in the same day

March 6th 2023 (first case)

User: Hello! How do you recommend to use chatbots (like yourself) in schools to promote deep learning and increase students' curiosity and their joy of learning?

ChatGTP: Hello! There are several ways in which chatbots like myself can be used in schools to promote deep learning, increase students' curiosity, and enhance their joy of learning. Here are some recommendations:

1. *Personalized learning*: Chatbots can provide students with personalized learning experiences based on their interests and needs. By asking students questions and providing customized feedback, chatbots can help students understand their strengths and weaknesses and provide them with tailored learning opportunities.
2. *Gamification*: Chatbots can be integrated into educational games that help students learn in a fun and engaging way. By using game mechanics like rewards and points, chatbots can motivate students to continue learning and make the learning process more enjoyable.
3. *24/7 sup*port: Chatbots can provide students with 24/7 support for their learning needs. This means that students can get help with their homework or ask questions about a lesson at any time, even outside of normal school hours.
4. *Language learning*: Chatbots can be used to help students learn a new language by engaging them in conversations and providing feedback on their grammar and pronunciation.
5. *Revision and exam preparation*: Chatbots can help students revise for

March 6th 2023 (second case)

47a) User: Hello! How do you recommend to use chatbots (like yourself) in schools to promote deep learning and increase students' curiosity and their joy of learning?

ChatGPT: Hello! Chatbots like me can be a powerful tool in promoting deep learning and increasing students' curiosity and joy of learning in schools. Here are some ways that you could consider using chatbots in the classroom:

1. *Personalized Learning*: Chatbots can provide personalized learning experiences for each student based on their individual needs and learning styles. Teachers can program the chatbot to ask questions, provide feedback, and offer additional resources based on the student's responses.
2. *Gamification*: Chatbots can be designed with game-like features that make learning more fun and engaging. For example, you could create a chatbot that rewards students with points or badges for completing quizzes or answering questions correctly.
3. *Collaboration*: Chatbots can facilitate collaboration between students by encouraging them to work together to solve problems or complete tasks. Teachers can program the chatbot to prompt students to collaborate and provide feedback on each other's work.
4. *Real-time Feedback*: Chatbots can provide students with immediate feedback on their work, which can help them to identify areas where they need to improve and stay motivated.
5. *24/7 Availability*: Chatbots can be available 24/7, allowing students to access learning resources and support outside of traditional classroom hours.