



Computer Science



“Hey AI, create a lesson plan, presentation, podcast, and worksheets with mark scheme for my computing class on the topic of emerging technologies.”



AI for Computing Teachers

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Teacher's Introduction

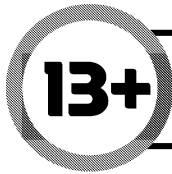
Search the Internet for ways in which AI can help teachers and you will find many suggestions; “differentiate your work”, “create lesson plans”, “create answers”, “mark work” and many more, but not so many specifics.

This guide gives practical direct advice and suggestions with examples and prompts for ChatGPT and Gemini – both currently offer free and pro versions – along with other AI tools relevant for Computing teachers. It also sets out to demonstrate some of the limitations of the current versions of AI so you can look out for those pitfalls when you use it. It may also give you a greater awareness to spot the use of AI in your students' work.

Key:
AI generated content



Warning: Although AI is the general term, one must remember that it is not, literally, Artificial Intelligence but a neural network trained on vast amounts of data, learning patterns, and grammar with some logic programming, which works by predicting the next word in a sentence based on context.



Both ChatGPT and Gemini have a minimum age limit. ChatGPT requires parental consent for those aged 13–18 to use it. Gemini states that you must be 13 or over and only allows 18+ to register.

Personal Data Concern: Some teachers are being told by their schools that they must ensure that no content is given to an AI which includes real student names.

Tell us your AI ideas → be rewarded 😊😊😊

This guide was written towards the end of 2024 and no doubt new applications of AI for teachers and new ideas of how to apply AI to help with your preparation, teaching, marking, testing or administration will become available, and we will want to update this with a new edition.

As you come across new ideas that you use, please email them to **AIsuggestions@zigzageducation.co.uk** including the name of school you teach at which purchased this resource. In return, if we use your suggestion, **we will send you the next edition of this resource for free.**



“Create a modern black-and-white illustration of a teacher looking very happy while receiving an award.”

Written by a human, JL Hagger, December 2024

Acknowledgements: ❶ original cover image created by NightCafe AI (look carefully to identify the two mistakes), ❷ reward image created by ChatGPT, ❸ AI key logo created by Gemini.

Selected Pages Only

This sample shows a limited selection of pages.

Turn your teaching notes into a presentation

Remarkably, ChatGPT will turn your notes into bullet point form, put them into a PowerPoint presentation, and provide it to you as a download.



ChatGPT Prompt	Output
<p>Turn my notes below into a PowerPoint presentation</p> <p>Local Area Networks <i>Cheap microcomputers (thus the increased number of people using computers) and the development of networking have led to the development of LANs (Local Area Networks). A LAN is used over short distances – usually within the same building or on the same site so that direct physical connection is possible. A LAN consists of cabling run around a building connected to various workstations. LANs are usually able to carry data, text, voice and video, although often not all are used. Installation costs for LANs can be high for the initial wiring, although adding new devices is then straightforward and inexpensive.</i></p> <p><i>A range of devices can be connected within the workplace using a LAN. Printers, network attached storage, etc. can be attached and workstations can share resources so that users can have quick and easy access to each other's' data files. Users can often communicate over LANs, normally using email or an instant messaging program. This can be useful for managers and secretaries to send reports and memos, and for users to rapidly communicate with each other without wasting time and money on printouts or handwritten documents. Communication between LANs is also possible, either by linking the LANs directly, or by joining a WAN.</i></p>	<p>1</p> <div data-bbox="944 331 1417 683"><p>Local Area Networks (LANs)</p><p>An Overview of LAN Technology and Its Benefits</p></div> <p>2</p> <div data-bbox="944 698 1417 1052"><p>Introduction to Local Area Networks</p><ul style="list-style-type: none">• The rise of cheap microcomputers and networking has led to the development of LANs.• LANs are used over short distances, typically within the same building or site.• A LAN consists of cabling connecting various workstations.• Can carry data, text, voice, and video, though not all may be used.• Initial installation costs can be high, but</div> <p>3</p> <div data-bbox="944 1068 1417 1422"><p>Devices Connected in a LAN</p><ul style="list-style-type: none">• A variety of devices can be connected:<ul style="list-style-type: none">- Printers- Network attached storage• Workstations can share resources:<ul style="list-style-type: none">- Quick access to data files.• Users can communicate:<ul style="list-style-type: none">- Email and instant messaging.- Efficient communication for reports and memos.</div> <p>4</p> <div data-bbox="944 1438 1417 1792"><p>Communication Over LANs</p><ul style="list-style-type: none">• Communication between users is quick and cost-effective:<ul style="list-style-type: none">- Reduces the need for printouts and handwritten documents.• Linking multiple LANs:<ul style="list-style-type: none">- Direct linking- Joining a WAN</div>

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The presentation I only generated as the result of this done a pretty good job of turning the original information into bullet points. I then created a better version as my follow-up prompts:

- “Generate a presentation, giving a few more examples of LANs.”
- “Make the bullet points much briefer, and add teaching notes for me to read out when displaying the PowerPoint”
- “Add a slide at the end with some recap questions to check my students have been listening.”

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Writing questions based on your content

Although in the previous example we just told ChatGPT the topic and asked it to create the questions, when we are teaching to a specification we may be better off attempting to limit the questions to some content which matches the specification.

For this example we took an extract from a Course Companion, and asked Gemini to create questions and a mark scheme.



Create two 2-mark questions and one 4-mark question for GCSE students based on the following content. Provide a mark scheme too.

The Equality Act in the UK means that you must not be discriminated against due to age, gender reassignment, being married or in a civil partnership, being pregnant or on maternity leave, disability, race (including colour, nationality, ethnic or national origin), religion or belief, sex or sexual orientation. This means that the use of technology should not discriminate, nor should anyone be denied use of technology.

One simple example is that websites should be readable by screen readers so that blind or partially sighted people are not discriminated against.

In 2006, the United Nations (UN) set out to challenge the perception that disabled people are just 'objects' – instead, that they are just like anybody else – 'subjects', who just happen to live with a disability. People with disabilities should have equal rights with non-disabled people; they should be active within society and have the same access to information in order to make decisions. It is also argued that access to information, including the Internet, is a human right.

2-Mark Questions

1. **What is the Equality Act 2010?**
 - A UK law that protects people from discrimination.
 - It covers areas like age, gender, disability, race, religion, and sexual orientation.

[1 mark for each point]

2. **Why is it important for websites to be accessible to people with disabilities?**
 - To ensure equal access to information and services.
 - To prevent discrimination against people with disabilities.
 - To comply with the Equality Act 2010.

[1 mark for each point]

4-Mark Question

Explain how the UN's view of disabled people has changed and how this relates to access to technology.

- **UN's changed view:**
 - Previously, disabled people were seen as passive recipients of care.
 - Now, they are recognized as active members of society with equal rights.
 - They should have the same opportunities as non-disabled people.
- **Relation to technology:**
 - Access to technology, including the internet, is a human right.
 - Technology can empower disabled people and reduce barriers.
 - Websites and other digital resources should be accessible to everyone.

[1 mark for each point]

There are a number of issues with what Gemini has created:

1. Question 1 looks good on the surface, but students will struggle to know how to get the second mark – should they, for example, list all of the characteristics to get the question would be 'List the 9 protected characteristics under the 2010 Equality Act'. The mark scheme that says 1 mark listing at least 7, 2 marks for listing all 9.
2. Question 2 is not a great question in that it is off-topic in that the source text does not discuss accessibility. The mark scheme says '1 mark for each point'.
3. The 4-mark question completely misses the point. The content does not discuss how the UN's view has changed, but that the UN set out to challenge perceptions, and the answer should discuss this. The mark scheme just says "1 mark for each point" where the

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Debugging

When a student is writing code when learning, or when developing code for a project, hours can be wasted when code doesn't work properly. Often AI will pinpoint the problem.



ChatGPT prompt	ChatGPT analysis
<p>Why is this code not working properly?</p> <pre><?php function solveQuadratic(\$a, \$b, \$c) { \$discriminant = \$b * \$b - 4 * \$a * \$c; if (discriminant >= 0) { \$root1 = (-\$b + sqrt(\$discriminant)) / (2 * \$a); \$root2 = (-\$b - sqrt(\$discriminant)) / (2 * \$a); return "Roots are: \$root1 and \$root2"; } else { return "No real roots."; } } ?></pre>	<ol style="list-style-type: none"> Incorrect Discriminant Calculation: <ul style="list-style-type: none"> The discriminant should be calculated using the formula $b^2 - 4ac$ instead of $b^3 - 4ac^3 - 4ac$. Correction: Change <code>\$discriminant = \$b * \$b * \$b - 4 * \$a * \$c;</code> to <code>\$discriminant = \$b * \$b - 4 * \$a * \$c;</code>. Undefined Constant: <ul style="list-style-type: none"> In the condition <code>if (discriminant >= 0)</code>, <code>discriminant</code> should be prefixed with a dollar sign (\$) to reference the variable. Correction: Change <code>if (discriminant >= 0)</code> to <code>if (\$discriminant >= 0)</code>. Potential Division by Zero: <ul style="list-style-type: none"> You should check if <code>\$a</code> is not zero before proceeding, as division by zero will cause an error when calculating the roots. Suggestion: Add a condition to check if <code>\$a</code> is zero. <p>Here's the corrected version of your code:</p> <pre><?php function solveQuadratic(\$a, \$b, \$c) { if (\$a == 0) { return "Coefficient 'a' cannot be zero."; } \$discriminant = \$b * \$b - 4 * \$a * \$c; if (\$discriminant >= 0) { \$root1 = (-\$b + sqrt(\$discriminant)) / (2 * \$a); \$root2 = (-\$b - sqrt(\$discriminant)) / (2 * \$a); return "Roots are: \$root1 and \$root2"; } else { return "No real roots."; } } ?></pre>

In this case ChatGPT does a **brilliant** job of picking up (1) the logic error in the formula, (2) the syntax error, and (3) that the code will crash in a specific case, and giving you an improved solution.

Do we need programmers any more?

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Students may ask, 'Do I need to write a program? The answer is yes, but the large scale of this is only as good as the results combined with professional knowledge has available. It may be that a combination of intelligent structured design and knowledgeable programmers using AI may be able to create good large IT systems.

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Ultimately, good programmers will still be needed, but they may be able to work more efficiently. In the UK and businesses reliant on technology, one can argue this is a good thing.



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Appendix 3: Dangers of AI

Most of this resource suggests helpful uses of generative AI, whilst pointing out some of its limitations. However, many other potential negatives have also been raised in the news:

- Over-reliance on AI: a benign but frustrating example is an AI telephone answering service that will not pass you to a human when it cannot answer your question, or equally does not 'understand' the information it is being given. For example, it might 'decide' that you do not need to see the doctor, when in fact you have a curable but fatal disease.
- Bias: given that generative AI relies on data provided by humans, some of their biases will be baked into the data, others may be in the design of the model.
- Hallucination: sometimes a generative AI perceives patterns (or objects) that are non-existent or not relevant, and as a result creates outputs that are inaccurate or nonsensical. This is known as 'hallucination'.
- Lack of transparency: we know that complexity is dangerous; for example, many Post Office workers were jailed because the Horizon system, which wasn't an AI, was too complicated for them to prove their innocence. The workings of an AI system are even more complex to understand than most programmed computer systems.
- Physical control systems: many people died in two Boeing crashes caused by an automatic flight-control feature made with rule-based software. Similarly, if AI is used, for example, to identify and detect nuclear rockets being fired so it can fire counter attack rockets, mistakes could be made.
- Radically increased unemployment: as increasing number of tasks are performed or controlled by AI.
- Intellectual property theft: digital content, including images, is used to train AI, but is very difficult if not impossible to prove when it has been illegally copied.
- Environmental cost: AI consumes a huge amount of electricity and water

Student task

Draw up a table of the above dangers. Propose solutions to each problem. Where there is no solution give ideas to mitigate the danger.

Some problems may require a change in the law, and some problems might be helped by having another AI to monitor the AI output to look for potential erroneous output, biased output and to look out for risk.

Give your solutions to an AI to see if it can suggest any other good solutions or mitigations for you to add to your table.

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