

Artificial Intelligence for Educators



STEM
PRE-ACADEMY

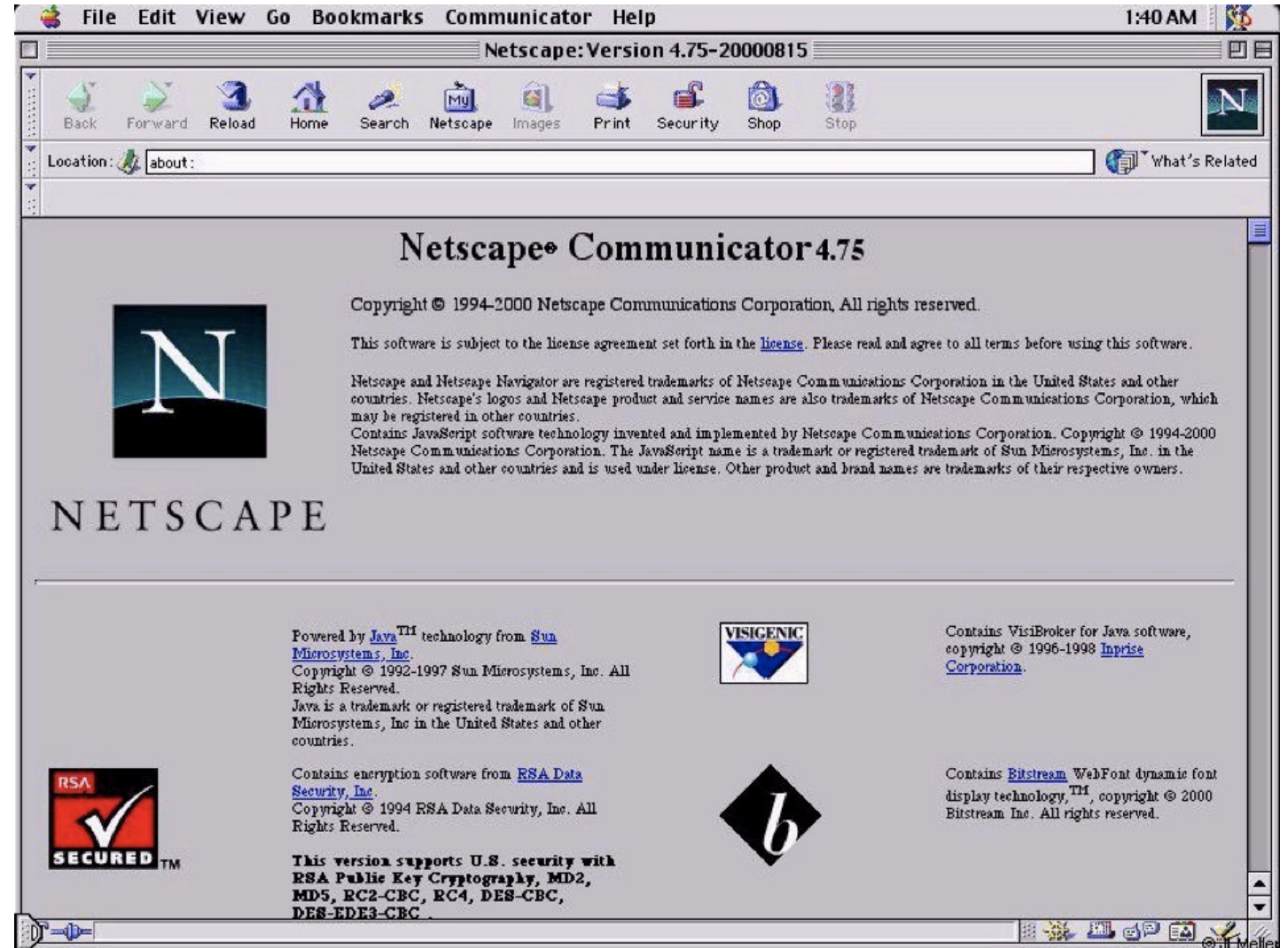


INFORMATION AND COMPUTER SCIENCES
UNIVERSITY OF HAWAII AT MĀNOA

We have seen ~4 big tech booms in the last 30 years

What were they?

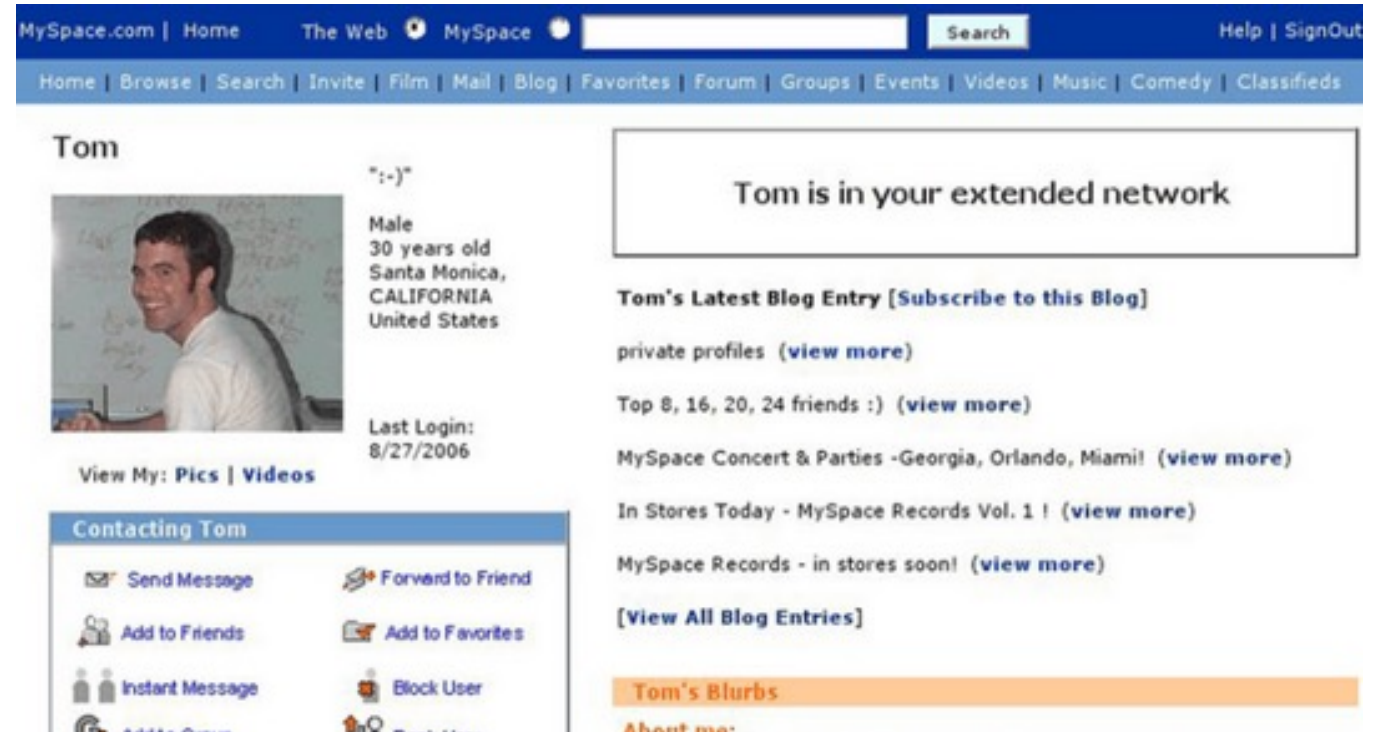
- 90s: World Wide Web
- Early 2000s: Social media
- Late 2000s/2010s: Mobile connectivity
- 2022: Generative AI



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The screenshot shows a MySpace user profile for 'Tom'. The profile includes a navigation bar at the top with links like 'Home', 'Browse', 'Search', 'Invite', 'Film', 'Mail', 'Blog', 'Favorites', 'Forum', 'Groups', 'Events', 'Videos', 'Music', 'Comedy', and 'Classifieds'. The user's name 'Tom' is displayed, along with a profile picture of a man in a white shirt. To the right of the photo, it says 'Male', '30 years old', 'Santa Monica, CALIFORNIA', and 'United States'. Below the photo, it says 'Last Login: 8/27/2006'. A box on the right says 'Tom is in your extended network'. Below that, there are links for 'Tom's Latest Blog Entry', 'private profiles', 'Top 8, 16, 20, 24 friends', 'MySpace Concert & Parties', 'In Stores Today', and 'MySpace Records'. At the bottom, there is a 'Contacting Tom' section with buttons for 'Send Message', 'Forward to Friend', 'Add to Friends', 'Add to Favorites', 'Instant Message', and 'Block User'.

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Mobile connectivity
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- **2022: Generative AI**



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Coffee talk points

- What is AI?
- What are GPT?
- What is the impact on the workforce?
- How does GPT influence education?
- How can we get started?

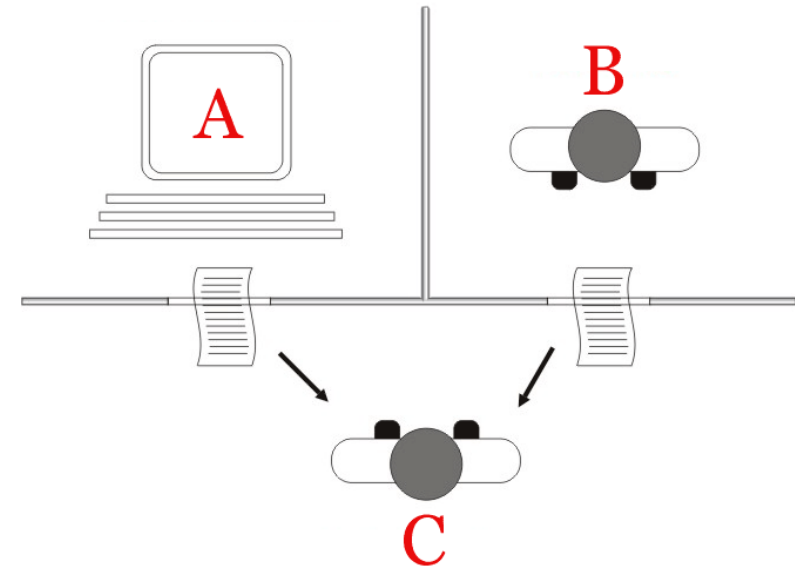
What is artificial
intelligence?

What is artificial intelligence?

It is the science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable.
(McCarthy, 2007)

Alan Turing (Turing test)

If we have a human operator asking questions in a chat, can it tell the difference between responses generated by a machine or human?



(Wikipedia)

What are GPT?

ChatGPT

Chat*GPT*

GPT: Generative Pre-trained Transformer

- **G**enerative: Produce new (textual) content
- **P**re-trained: Trained on a set of data
- **T**ransformer: Neural network that learns context based on relationships between words in a sentence (data); aka a large language model (LLM)
 - Neural Networks: inspired by the human brain, where this approach is modeled after the signals between biological neurons
- Trained to produce “realistic” text and dialog
- Example: Customer service chatbots
- Trained on large amount of text (usually Internet) to determine patterns in language

How GPT works

- Trained on large amount of text (usually Internet) to determine patterns in language (e.g. ChatGPT 3 includes data through 2021)
- User inputs text
- GPT system analyzes the text and uses a text predictor to create the most likely output
- Works with closed- and open-ended questions

General GPT search concerns

- Limited to trained data set
- Machine learning bias based on training data
- May not answer your question directly
 - Does the user know how to verify the answer
 - Can the user adjust the input to match the desired output

GPT Applications

- Chatbots: Chat-based query-response systems ([ChatGPT](#), [Bing Chat](#), etc.)
- Art generators: Generating art through keywords ([Image creator](#) by Bing, [Midjourney](#), etc.)
- Image editing: Generative image editing ([Adobe Photoshop / Firefly](#))
- Productivity content: Creating productivity-oriented content and information ([Microsoft Copilot](#))
- Pair programming: generate programs with a developer ([GitHub Copilot](#))
- And much much more...

In action: Bing Chat (powered by GPT-4)

The screenshot displays the Bing Chat interface in a browser window. The browser's address bar shows the URL: <https://www.bing.com/search?toWww=1&redig=BC80F38EA6F44BA1BFFCA054C7CD34B&q=Bing+AI&showconv=1>. The page features a Microsoft Bing logo and a search bar. Below the search bar, there are several AI-powered tools and suggestions:

- Write a poem with vivid imagery that doesn't rhyme**
- Create a table that helps me plan meals for the next two weeks**
- What's a good budget hotel chain that usually has a pool?**
- Start a knock joke**
- Compare**: Calculate my energy bill if I switched from gas to electric
- Laugh**: Write a joke that a toddler would find hilarious
- Write**: Compose an invite for a baby shower that includes gift ideas

A "Recent activity" sidebar on the right lists several prompts and their completion dates:

- what is the difference bet... 10:15 AM
- create a lesson plan to... Aug 1, 2023
- Write a 500-word essay... Jun 8, 2023
- What year did 'Lassie' d... Jun 7, 2023
- what is his latest projec... Jun 7, 2023
- smallest ocean in the W... Jun 7, 2023

At the bottom, there is a "Choose a conversation style" section with three options: **More Creative**, **More Balanced** (selected), and **More Precise**. A "New topic" button and a text input field "Ask me anything..." are also visible. A "Feedback" button is located at the bottom right.

On the right side, a chat window is open, showing a "Write about" section with the prompt "advertisement for my 2010 Camry" and a character count of "0/2000". Below this, there are sections for "Tone" (Professional, Casual, Enthusiastic, Informational, Funny) and "Format" (Paragraph, Email, Blog post, Ideas). A "Length" section offers "Short", "Medium" (selected), and "Long" options. A "Generate draft" button is present at the bottom of the chat window. A "Preview" section at the very bottom of the chat window contains the text: "Your AI generated content will be shown here".

In action: ChatGPT (powered by GPT-3.5)

Energy Transfer & Conservation x

https://chat.openai.com/c/583544f6-7c02-4099-9e52-c6a3440ba309

Default (GPT-3.5)

- Set up a testing station with heat sources and thermometers.
- Each group will test their device by placing it between the heat source and a thermometer, measuring the temperature change over time.
- Have students record their observations and discuss the effectiveness of their devices in minimizing or maximizing energy transfer.

Step 5: Present and Reflect (15 minutes)

- Each group presents their device, explaining its purpose, design, and results.
- Lead a class discussion on the challenges faced during the design and testing process and the principles that made certain devices more effective.

Assessment:

- Group presentations and discussions
- Students' recorded observations during testing
- Reflection questions: Ask students to write a short reflection on what they learned about energy transfer, conservation, and the design process.

Extensions:

- Students can research real-world applications of energy transfer and conservation such as

Send a message

Regenerate

Free Research Preview. ChatGPT may produce inaccurate information about people, places, or facts. [ChatGPT August 3 Version](#)

In action: Image Create

The screenshot displays the Microsoft Bing Image Creator interface. At the top, the browser address bar shows the URL <https://www.bing.com/create>. The page header includes the Microsoft Bing logo, a search icon, and the text "Image Creator powered by DALL-E" with a "PREVIEW" button. On the right, a user profile for "Michael-Br..." with 8285 points is visible, along with a "Create" button and a "Surprise Me" button. A notification bell icon shows 98 alerts.

The main content area features a section titled "Creating is a process" with the text: "The more you create, the better you get. So, play with your prompts. Include descriptive words. And iterate until you get what you envision." Below this text is a gallery of five generated images, each with a descriptive prompt:

- Image 1: "red sports car at a gas station" (A red sports car at a gas station with a neon sign.)
- Image 2: "neon, futuristic style" (A red sports car in a neon-lit, futuristic setting.)
- Image 3: "pencil drawing" (A pencil drawing of a red sports car at a gas station.)
- Image 4: "dark and ominous" (A red sports car in a dark, ominous setting.)
- Image 5: "driving into the sunset" (A red sports car driving into a sunset.)

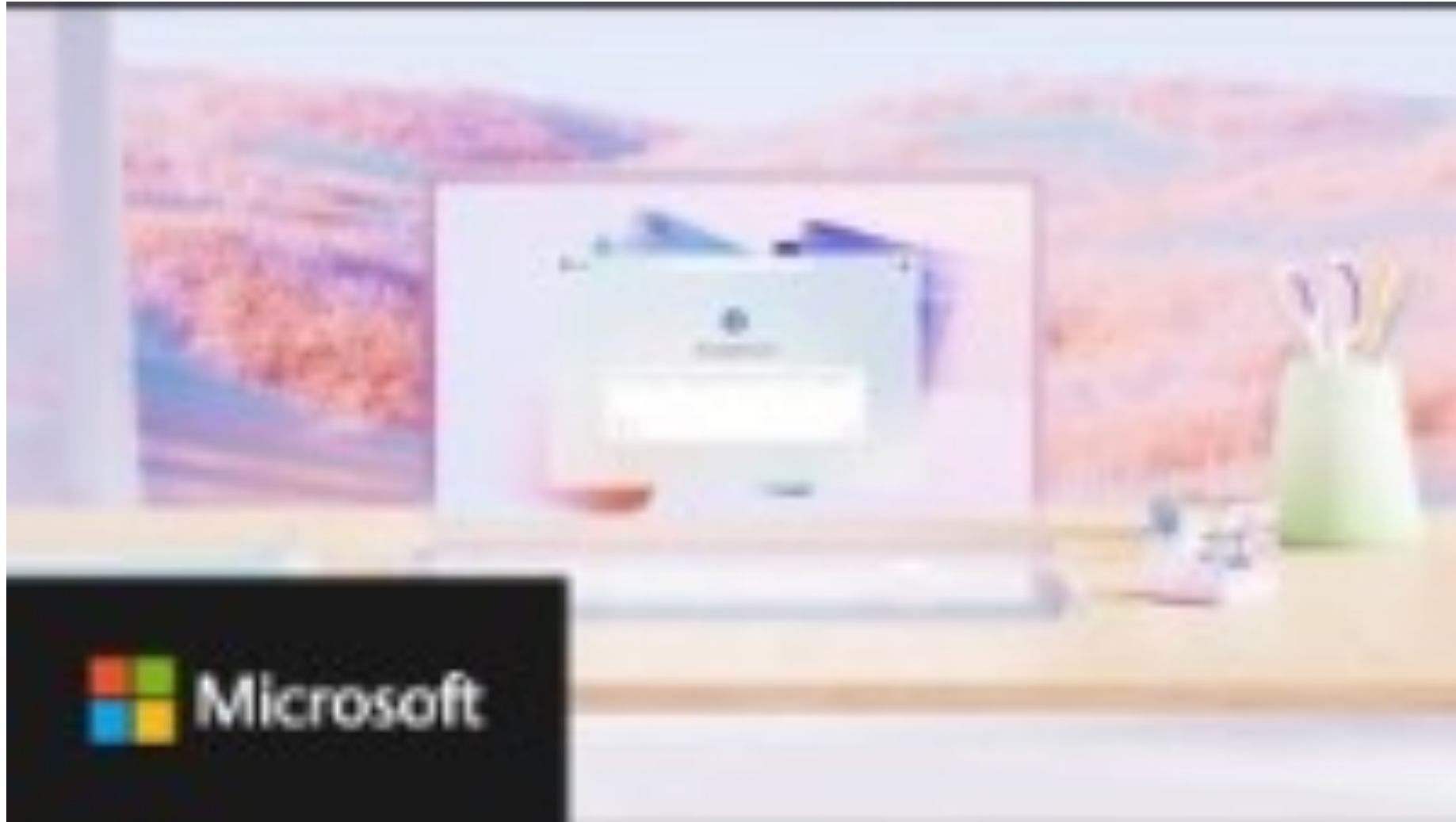
At the bottom of the page, there is a "Explore ideas" section with a "Creations" tab. Below this are six thumbnail images representing different creative ideas: a rainbow, colorful confetti, colorful ribbons, a close-up of a person's eye with colorful makeup, a colorful butterfly, and colorful paint splatters. The footer contains links for "Privacy and Cookies", "Content Policy", "Terms of Use", and "Feedback".

In action: Image editing



<https://youtu.be/IVTyLYupECI>

In action: Microsoft Copilot



<https://youtu.be/S7xTBa93TX8>

In action: GitHub Copilot



Sample use cases

- Generate code (GitHub Copilot) aligning code to coding standards and goals are a challenge)
- Create content for various outputs
 - Social media
 - Journalistic
- Data analytics
- Generative image editing
- Deep fake video/audio

Let's illustrate GPTs



Which one was created by an AI art generator?

A.



B.



Slightly deeper explanation



(Chai, You-Fan, 2023)

What is the impact on the
workforce?

Workforce: a few job examples

- Programmers: ~92% of programmers reported using AI in their work (such as GitHub Copilot)
- Security experts use ChatGPT to draft security company/organization policies
- Attorneys use GPT sources to draft legal briefs
- Professors use GPT to start parts of their work (publications, grants, student feedback, etc.)
- Writing articles for media outlets
- Creating illustrations for media
- Using generative AI in post-production for media

AI Content Specialist

Boostability

Lehi, UT

Full-Time

Job Description

The Role and Mission...

We are looking for AI Content Specialists to join our AI Content team! Our AI Content team works with Jasper AI to generate blog posts on behalf of our clients. The AI Content Specialist is primarily responsible for generating AI content and editing that content for our clients. We want candidates who have strong AI skills as well as strong writing/editing skills, and who are creative enough to research and learn about a lot of different topics in various industries. If you meet these qualifications, apply to become an indispensable part of our team.

There is a permanent work-from-home option for this role.

Why Boostability?

- Option to work from home, in our UT office, or hybrid. Your choice!
- Full-time employees are eligible for:
 - Paid time off, 10 paid holidays, and a paid floating holiday
 - Health, dental, orthodontia, vision, EAP, and 401k benefits
 - Internet allowance
 - HSA company match

from Ziprecruiter

Workplaces: a few job examples

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- Attorneys use GPT sources to draft legal briefs
- Professors use GPT to start parts of their work (publications, grants, student feedback, etc.)
- Writing articles for media outlets
- Creating illustrations for media
- Using generative AI in post-production for media
- Questions:
 - What issues come up with these examples?
 - What do these workplace examples have in common?

Issues

- Programmers: Can have AI take them down path different than the goal (takes much longer to complete the work)
- Attorneys: Lawyer used a chatbot to write a legal brief, which included “fabricated cases”
- AI art wins art contest: A person submitted AI art (indicating it is AI art) to a Colorado State Fair competition. Many folks accused him of “cheating”



Théâtre D'opéra Spatial by Jason Allen via Midjourney

Issues

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- FraudGPT: “...can be used to ‘write malicious code, develop undetectable malware, and identify leaks and vulnerabilities.’”

What do these workplace
examples have in common...
when used well?

Commonality when used well

***People with a strong background augmenting their
intelligence and workflow (not replacing it)...***

People with a strong background augmenting their intelligence and workflow (not replacing it)...

Computers are intelligence augmenters. We need to learn to use technology to augment our abilities.

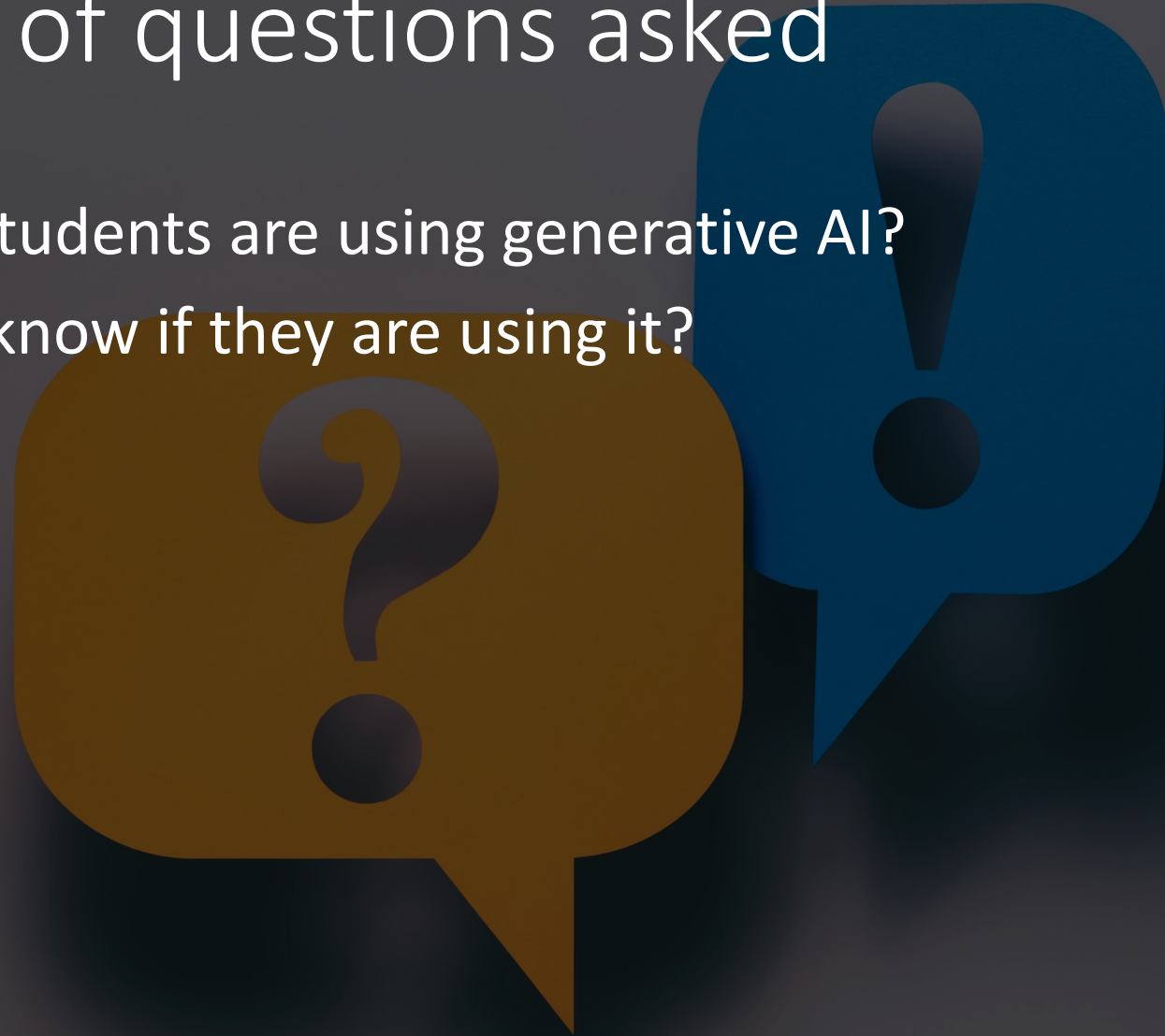
(Streveler, D.)

An example we commonly see is students and teachers using ChatGPT

How does GPT
influence education?

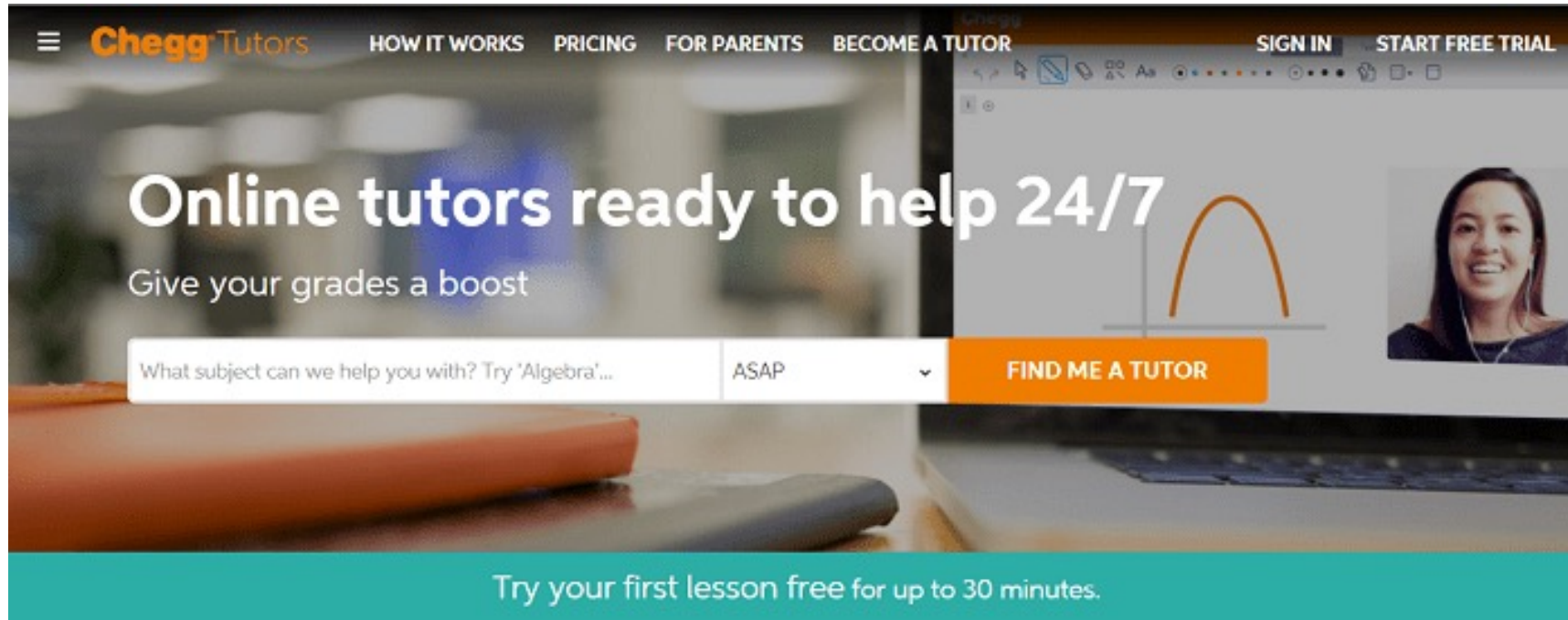
First sets of questions asked

- How many students are using generative AI?
- How do we know if they are using it?



Chegg

- Get 24/7 Homework Help



The image shows a screenshot of the Chegg Tutors website. At the top, there is a navigation bar with the Chegg Tutors logo on the left and links for 'HOW IT WORKS', 'PRICING', 'FOR PARENTS', 'BECOME A TUTOR', 'SIGN IN', and 'START FREE TRIAL' on the right. The main content area features a large heading 'Online tutors ready to help 24/7' and a subheading 'Give your grades a boost'. Below this is a search bar with the placeholder text 'What subject can we help you with? Try 'Algebra'...' and a dropdown menu set to 'ASAP'. To the right of the search bar is an orange button labeled 'FIND ME A TUTOR'. In the background, there is a blurred image of a laptop screen displaying a graph of a parabola and a small video feed of a smiling woman. At the bottom of the page, a teal banner contains the text 'Try your first lesson free for up to 30 minutes.'

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Chegg, Inc. (CHGG) ☆

NYSE - Nasdaq Real Time Price. Currency in USD

10.46 +0.43 (+4.29%) **10.43** -0.03 (-0.29%)

At close: 04:00PM EDT

After hours: -

Premium 
Technical Events 

All 18 Events

Short Term
Neutral 

Mid Term
Bullish 

Long Term
Bearish 

Support - Resistance

9.45

15.99

Stop loss

9.04

Indicators Comparison Events  Date Range 1D 5D 1M 3M 6M YTD 1Y 2Y 5Y Max   



(Yahoo Finance)

How do we know if they are using ChatGPT?

- Researchers have a decent idea of text that is ChatGPT created
- Developed DetectGPT model (based on GPT-2)
- Possibility of GPT text watermarking themselves

Algorithm 1 DetectGPT model-generated text detection

```
1: Input: passage  $x$ , source model  $p_\theta$ , perturbation function  $q$ ,  
   number of perturbations  $k$ , decision threshold  $\epsilon$   
2:  $\tilde{x}_i \sim q(\cdot | x)$ ,  $i \in [1..k]$  // mask spans, sample replacements  
3:  $\bar{\mu} \leftarrow \frac{1}{k} \sum_i \log p_\theta(\tilde{x}_i)$  // approximate expectation in Eq. 1  
4:  $\hat{\mathbf{d}}_x \leftarrow \log p_\theta(x) - \bar{\mu}$  // estimate  $\mathbf{d}(x, p_\theta, q)$   
5:  $\bar{\sigma}_x^2 \leftarrow \frac{1}{k-1} \sum_i (\log p_\theta(\tilde{x}_i) - \bar{\mu})^2$  // variance for normalization  
6: if  $\frac{\hat{\mathbf{d}}_x}{\sqrt{\bar{\sigma}_x^2}} > \epsilon$  then  
7:   return true // probably model sample  
8: else  
9:   return false // probably not model sample
```

$$\frac{-\text{tr}(H)f(x)}{2} \approx f(x) - \mathbb{E}_{\mathbf{z}} f(x + \mathbf{z}).$$

What is happening in education from a bird's eye view in CS?

- Many are debating the core concepts students learn
- Current focus on programming concepts and generation
- Future concern is if the focus should be on computational thinking/program comprehension and testing
- Do learning objectives and goals need to be modified?
- Some in industry are concerned about novice use to generate without knowing what they want

The University of Hawaii's view

- Decentralized decision-making approach
- Prioritization to instructor autonomy to consider benefits, limitations, and ethical considerations for academic disciplines
- No formal policy

The University of Hawaii's view



- Educate: focus on expectations, ethics, and limitations
- Leverage: tutoring, language learning, personalized recommendations, intelligent feedback, chatbots, and virtual assistants
- Assess: Assignments that focus on critical thinking, tailor work to specific scenarios and case studies, focus on open-ended prompts encouraging original thought and thoughtful reflection

University of Hawaii's view: Sample statements

UNIVERSITY
of HAWAII
SYSTEM

Artificial Intelligence (AI) Syllabi Icons and Sample Statements

Overall Course
This is a general guide to the icons and sample statements faculty can use in their syllabi. Right click on the icon to copy and paste into your syllabus. The sample statement can also be copied, pasted, and edited to reflect the course and assignment expectations.

Icon	Description	Sample Statements
	Do not use	In this course, students are not permitted to use generative AI applications such as ChatGPT, Bard, or Bing, in whole or in part, to generate course materials or assignments. Grammar and spell checking tools such as those integrated into MS Word may be used. If you have any questions about whether a particular tool or specific use is permitted, check with the professor.
	Light Assistance with Non-Substantive Tasks	In this course, students must be the primary and majority authors of text, code, analysis, images, graphics, and all course work products and assignments. Students are permitted to use AI to generate ideas, polish text they have drafted, or perform tasks that are not essential to completing the learning outcomes of the course. The application of this principle will vary by course or by assignment. For example, in some courses a student may be permitted to use AI to generate a PowerPoint slide deck, because they are graded on the content of the slides but not on the design. In another course, a student may be graded on the design and layout of a PowerPoint slide deck, in which case they would not be permitted to use AI to generate the slides. Students are encouraged to keep drafts of assignments and logs of interactions with AI applications to demonstrate their

In the classroom: How it impacted me

- Asked Bing Chat to write portions of articles to get me started
- Asked Bing Chat to give feedback to student work
- Asked Bing Chat to write a lesson for class
- Students submitted ChatGPT-based papers in my ethics class (I think)

In the classroom: How it impacted me

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 - *Many journals/conferences indicate that authors can use GPT to edit their work (not do it for them)*
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 - *I modified my writing assignments to include oral components, where Q&A helped to demonstrate knowledge of their writing*

In the classroom

- In general having GPT complete work for students is not seen as acceptable
 - Most do not want students typing in a prompt to submit written work
- How can we leverage GPT to improve learning?

Commonality when used well

***People with a strong background augmenting their
intelligence and workflow (not replacing it)...***

Information literacy as a core concept to GPT-usage

- Understanding GPT-based results and checking that it is accurate is critical
- Knowing how to use a tool as a support for learning
 - How do we ask good questions (revising prompts) for GPT?
 - How do we edit outputs?

History instructional design example

- Teacher traditionally assigns a paper on a historical event
- ChatGPT adaptation
 - Has ChatGPT write a paper for the students
 - Assignment 1: Students review all of the sources and determines why they are strong sources and how the information is contextually accurate (review original source)
 - Assignment 2: Have students identify additional sources that could be useful to support an argumentative paper on the subject.
 - Assignment 3: Write a final paper using all sources gathered (both independently and through ChatGPT)

A collection of white coffee cups on saucers, some containing black coffee and one with a latte topped with brown powder. The text "How can we get started?" is overlaid in the center.

How can we get started?

Let's try

- Example together: Let's find out why Google Scholar has articles published in the year 2030

The screenshot shows the Google Scholar interface. At the top, the search bar contains 'management practices' and a magnifying glass icon. To the right of the search bar is a 'SIGN IN' link. Below the search bar, the results are displayed as 'Articles' with 'About 288 results (0.04 sec)'. On the right side of the results area, there are links for 'My profile' and 'My library'. On the left side, there is a filter menu with the following options: 'Any time', 'Since 2023', 'Since 2022', 'Since 2019', and a 'Custom range...' section. The 'Custom range...' section is highlighted with a red box and contains a date range selector with '2030' and '2050' in input fields, a minus sign between them, and a 'Search' button below. Below the filter menu, there are three sorting options: 'Sort by relevance', 'Sort by date', and 'Any type'. The 'Any type' section has a 'Review articles' link and two checkboxes: 'include patents' (unchecked) and 'include citations' (checked). At the bottom of the filter menu, there is a 'Create alert' checkbox which is checked. The main results area shows three articles. The first article is titled '[PDF] PRODUCTIVITY, PROFITABILITY AND EFFICIENCY OF WEED MANAGEMENT PRACTICES IN TRANSPLANTED CHARIF PADDY' by P Behera, P Mishra, S Jena, RK Paikaray... - ... And Genome-Wide ... , 2030 - researchgate.net. The second article is titled '[PDF] Management Practices (RAMP) Deployment within Ghanaian Construction Related Medium & Large Sized Enterprises (MLEs)' by A Agyakwa-Baah, N Chileshe - Proceedings 5" Built Environment ... , 2040 - researchgate.net. The third article is titled '[PDF] HighTech and Innovation' by V Hinkka, R Mäkinen, J Eckhardt, T Lastusilta - 2030 - corealis.eu. Each article entry includes a star icon for saving, a magnifying glass icon for citing, and a link to 'Related articles' and 'All 2 versions' or 'All 3 versions'.

Try a Generative AI tool to support your classroom

- Tools for reference
 - Chatbots: [ChatGPT](https://chat.openai.com) (chat.openai.com), [Bing Chat](https://bing.com/chat) (bing.com/chat),
 - Art generators: [Image creator](https://bing.com/create) by Bing (bing.com/create)
 - Pair programming: [GitHub Copilot](https://github.com)
- Consider
 - How could I use the tool to help me teach?
 - How would my students likely use the tool?
- Report back (in chat or in person)
 - What tool did you use?
 - How does it impact you as an educator?
 - How does it impact your students?



Questions?

Feedback, Please!

<https://go.hawaii.edu/Bfy>



Thank you!

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INFORMATION AND COMPUTER SCIENCES

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