# AI Toolkit for Educators

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Prepared by: Stella Lee, PhD,
in collaboration with Inge de Waard, PhD.


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# 1. Introduction

Artificial Intelligence (AI) is all around us. From the personalized recommendations of movies and music on streaming platforms, to predictive text and voice assistants on our phones, to traffic predictions in our GPS systems, AI algorithms work quietly behind the scene to shape our everyday experiences. When used effectively and thoughtfully, the integration of AI has the potential to transform education. This toolkit is designed to guide you through this process. Our target audience includes university professors at varying levels of familiarity with AI - from those just beginning their AI journey to those who have already integrated AI tools into their teaching and research. The toolkit aims to provide a comprehensive understanding of the myriad ways AI can be used to streamline administrative tasks, conduct research, enhance personalized support, improve learning and assessment quality, and more. Designed as a practical guide, this toolkit not only demystifies the concept of AI but also provides practical guidance for implementing AI in your academic work. By exploring this toolkit, you can gain insights into how AI can enhance the teaching-learning process, augment your research capabilities, and prepare your students for the AI-driven future.

**NOTE:** This toolkit was assembled as part of a workshop for EIT InnoEnergy teachers. The idea for the toolkit emerged from the various needs expressed by the teachers. In addition, an AI for Teachers LinkedIn community was launched to ensure a sustainable knowledge exchange between educators inside and outside of EIT InnoEnergy.

# 2. Current AI Landscape in Education

The current landscape of AI in education is in constant flux and teeming with diverse solutions. As per the AI tool repository, There's An AI for That, there are over 7,579 AI tools available, catering to 2,083 tasks (at the time of this writing). This vast array of options represents the extensive capabilities of AI across numerous domains. Futurepedia, another AI resource platform, lists more than 228 tools under the Education Assistant category alone. These tools offer support for an array of tasks that span automated grading, adaptive learning, intelligent tutoring, and beyond. This dynamic landscape reflects the growing acceptance of AI as an integral component in education.

## *2.1 Why Use AI?*

There are many benefits of using AI in education. Below, we dig deeper into why AI is a beneficial asset to higher education, focusing on its role in personalization, resource variety for learners, and faculty support.

### Support Learners with a Variety of Resources

AI offers a plethora of resources to support students' learning. Intelligent tutoring systems can provide instant, personalized feedback. AI-powered assessment tools can track learning progress and highlight areas for improvement. Research and writing aids can streamline information gathering and improve writing quality. Translation tools can help students engage with materials in multiple languages, and AI can even assist in generating innovative ideas, all contributing to a richer learning experience.

### Personalized Approach

AI has the potential to facilitate learning and it can offer both students and professors a personalized approach, particularly in a one-to-one interaction. Typically personalized learning is expensive, not feasible in a large class size situation, and there is a shortage of qualified teachers and increased classroom size.

### Real-time Monitoring and Intervention

Through the use of learning analytics tools, AI can monitor student performance in real-time, identifying areas of difficulty as well as areas where learners find useful. The real-time monitoring approach allows teachers to provide rapid feedback and other appropriate interventions.

### Support Faculty in Administration, Research, and Teaching

AI can be a valuable tool for faculty members, assisting with administrative tasks, enhancing research capabilities, and refining teaching strategies. The next section will include relevant AI tools that can assist with administrative tasks, expedite research, and refine teaching strategies.

# 3. AI Application in Education

AI is increasingly becoming an integral part of the higher education landscape, offering novel opportunities to extend the capabilities of faculty in significant ways. As we navigate the expanding frontier of AI applications, we find they predominantly fall within three key areas:

- Admin/workflow automation
- Research
- Teaching and Learning

AI-driven admin and workflow automation can streamline operational tasks, allowing faculty to dedicate more time to high-value activities. In the realm of research, AI opens up new ways to generate research ideas, conduct literature research, evaluate different methodologies, and assist writing and editing. Finally, in teaching and learning, AI can support teachers by finding new ways to collaborate with students, designing interactive learning content, and providing personalized feedback and learning experiences.

We will examine the three key areas in more details as follow:

## *3.1 Administrative Tasks and Workflow Automation*

One of the most immediate benefits of AI is in administrative tasks and workflow automation. AI tools are increasingly being used to handle repetitive and time-consuming tasks, freeing faculty to focus on more complex and personally rewarding work. For example, AI-powered grading systems can handle large volumes of assignments, providing timely and consistent feedback. Similarly, AI can assist in coursework preparation by collating and organizing relevant resources, thereby reducing prep time. When it comes to report writing and grant proposals, AI tools can streamline the process by gathering and analyzing necessary data, even assisting in drafting the reports or proposals. Furthermore, faculty tasked with writing numerous letters of recommendation can leverage AI to generate personalized letters efficiently.

### Selected AI Tools for Administrative Tasks and Workflow Automation

| Administrative Tasks | AI tools |
|---|---|
| **Grading and Learner Analytics** | **Gradescope** – https://www.gradescope.com/<br>An online grading tool designed to assist and streamline the grading process across different types of assignments and exams. Once a few examples are graded manually, the AI can learn and apply the grading scheme to the rest. The platform also allows for flexible rubric creation, which can be altered even after grading has begun, and changes are automatically applied to papers that are already graded. Gradescope also provides analytics and learns your feedback to |

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| | provide initial comments to students. Freemium account.<br><br>**GPTZero** – https://gptzero.me/<br>Checks text to see if your students' work is AI generated and provides analysis. Free to use. |
| **Coursework Preparation** | **ChatGPT (or any of the chatbots available in the market, see the comparison list in Appendix A)**<br>ChatGPT can be used in preparing syllabi, generating course ground rules, set up reading lists, study schedules, etc.<br><br>**Gamma -** https://gamma.app/<br>AI-powered presentation app that generates a slide deck or illustrated document with images and layouts from text prompts. Educator-focused. Free to use. |
| **Grant Writing** | **Grantable** - https://grantable.co/<br>Grant writing assistant. Freemium account. |

## *3.2 Research*

AI offers a range of support across different phases of research such as generating ideas, conducting literature searches, providing writing aids, grammar checks, and creating graphics. For the initial stages of research, AI can help in generating ideas by analyzing existing data sets and identifying patterns or areas of interest that may warrant further exploration. Moreover, AI can play a role in research data cleansing. It can automatically identify and correct errors or inconsistencies in datasets, ensuring reliable and consistent datasets for analysis. For literature review, AI can trawl through the vast expanse of academic databases, journals, and articles, honing in on the most relevant and recent works. In the writing phase, AI can offer assistance in several ways. AI-powered writing aids can help to paraphrase sentences, structure arguments, and do advanced grammar checks that ensure linguistic accuracy and clarity. In the final stages of research, AI can support the creation of graphics, diagrams, and presentations to effectively communicate complex data and disseminate results.

### Selected AI Tools for Research

The table below breaks down the research process and the respective AI tools that can assist each phase:

| Research Process | AI tools |
|---|---|
| **Idea Generation** | **ChatGPT (or any of the chatbots available in the market, see the comparison list in Appendix A)** |
| **Literature Review** | **SciSpace** - https://typeset.io/<br>Reading aid/writing aid. Has several different AI |

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|---|---|
| | tools. For literature search, it provides insights from top 5 papers, allows users to ask questions via a chatbot interface, generate citations, and has an AI detector. Free to use.<br><br>**Elicit** - https://elicit.org/<br>AI research assistant that can help find relevant papers, summarize takeaways from the papers specific to your question, and extract key information from the papers. Free to use.<br><br>**Explainpaper** - http://explainpaper.com<br>Helps readers understand academic papers by uploading a paper and highlighting any confusing text they come across and it will provide an explanation and analysis. Freemium account. |
| **Draft Paper/Edit** | **SciSpace** - https://typeset.io/<br><br>**copy.ai** – https://www.copy.ai/<br>AI writing tool that generates various types of content, and helps users with the writing process. It has templates and can write content based on a certain tone you select. Freemium account.<br><br>**QuillBot** - https://quillbot.com/<br>Grammarly "tone rewrite suggestions". Freemium account. |
| **Images and Diagrams Generation** | **Midjourney AI App -** https://midjourney-app.com/<br>Create images by entering text prompts. Free to use. Mobile based. Download from Google Play Store or Apple App Store<br><br>**Zoo -** https://zoo.replicate.dev/<br>AI generated image tool that allow users to put in a prompt and get results from six different AI image generators. Free to use. |
| **Dissemination/Presentation** | **Gamma -** https://gamma.app/<br>Presentation app that generates a slide deck or illustrated document with images and layouts from text prompts. Educator-focused. Free to use. |

## *3.3 Teaching and Learning*

There are multiple ways that AI can support teaching and learning. In course preparation, AI can facilitate the creation of adaptive learning content and personalize educational materials to cater to the unique needs and pace of individual students. In class discussions, AI-powered tools, such as intelligent tutoring systems and chatbots, can help mediate and stimulate meaningful dialogue, providing immediate feedback, and answering queries around the clock. Furthermore, AI enhances collaboration by fostering a more interconnected learning community. Tools like AI-driven project management systems can streamline group tasks, delegate responsibilities, and monitor progress, ensuring effective coordination and communication among students.

### Selected AI Tools for Teaching and Learning

| Teaching and Learning Tasks | AI tools |
|---|---|
| **Content Creation** | **ChatGPT (or any of the chatbots available in the market, see comparison list in Appendix A)**<br>Consider how ChatGPT can be used in your course to bring interactivities and collaboration among students.<br><br>**Nolej - https://nolej.io/**<br>A French generative AI ed tech startup called Nolej (pronounced "knowledge") has made its new OpenAI-based instructional content generator for educators publicly available. Upload a video or a document and it will provide a transcript, quiz questions, flash cards, concept cards, crossword puzzle and more. Mostly suitable for asynchronous e-learning rather than face-to-face classroom learning. Freemium account.<br><br>**Coursebox** - https://www.coursebox.ai/<br>AI course creator that helps create online courses and generate content automatically. Mobile friendly. Mostly suitable for asynchronous e-learning rather than face-to-face classroom learning. Freemium account. |
| **Discussion/Providing Feedback** | **Packback Questions** - https://www.packback.co/product/platform/<br>Inquiry-driven discussion platform that provides instant feedback and ensures that the discussions |

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| | stays on track and are of quality. Paid version only. |
| **Collaboration** | **Perusall** - https://www.perusall.com/<br>Perusall is a free social reading platform that turns reading into a collaborative task. It allows students to read and collaboratively annotate the assigned text, highlighting passages, asking questions, and answering each other's questions while reading. It integrates AI to assess student engagement and quality of questions and responses to the reading. Free to use.<br><br>**Fermat** - https://fermat.app/<br>Visual brainstorming, ideation, and collaboration canvas tool that generates images/proof of concept for products. Target market is mainly fashion design, interior design, and product design teams, but can be applied across domains. Make use of ChatGPT, Dall-E, and other AI tools. Freemium account, US and Canada only for the time being. |
| **Interaction with Content** | **Transvribe** - https://www.transvribe.com/<br>By copy and pasting URLs from YouTube, you can interact and ask questions about the video and interact with the content. Can be slow if the video is lengthy. Free to use. |

# 4. Challenges and Limitations

AI tools hold significant potential for revolutionizing education. However, it is crucial to acknowledge the challenges and limitations that accompany the integration of AI in education.

## Unequal Access

One of the significant challenges we face is the unequal access to AI tools for education. While some learners may have the financial resources to access advanced AI technologies, others may be left at a disadvantage. For instance, if certain AI tools require expensive subscriptions or access fees, it can create an unfair advantage for students who can afford them (or organizations/countries where they can afford the fees). This inequality can further widen the digital divide and perpetuate educational disparities.

**Case study:** How AI Tools Both Help and Hinder Equity

## Geographical Disparity

Navigating the geographical disparities in AI tool accessibility presents another challenge. Some jurisdictions impose restrictions or bans on certain AI technologies, limiting their potential benefits for learners in those regions. For example, at the time of writing, access to ChatGPT is restricted or banned by many countries such as Afghanistan, Russia, China, North Korea, Cuba, Iran, Syria, and Italy (Italy has recently lifted its ban on ChatGPT after data privacy improvement).

**Case study:** Countries Where ChatGPT is Currently Banned

## Reliance on Data Sources

AI tools are only as good as the data sources they are trained on. However, it is not always possible to control, review, and edit the data sources to ensure good quality and diversity. As a result, AI is vulnerable to biases embedded in the data it learns from. If the training data is skewed or unrepresentative, the AI can reproduce and amplify these biases, leading to unfair or inaccurate outcomes. Moreover, AI systems can sometimes "hallucinate," or generate information that doesn't exist in the input data, leading to false results.

**Case study:** GPT Detectors are Biased Against Non-native English Writers

## Labor-intensive Nature of AI

The development and maintenance of AI tools often involve significant manual labor. This raises concerns about fair compensation, working conditions, and the ethical treatment of individuals involved in tasks such as data labeling, annotation, and content creation tasks that require human intervention. AI companies often outsource these tasks to human workers, sometimes through crowdsourcing platforms, where workers are paid low wages for repetitive and labor-intensive work.

**Case study:** Cleaning Up ChatGPT Takes Heavy Toll on Human Workers

## Lack of Regulation and Policy

The rapid advancement of AI tools has outpaced the development of comprehensive regulations and policies. This lack of guidance can create uncertainty and hinder the widespread adoption of AI in education. Additionally, AI-driven platforms that rely on user-generated content, such as artworks that are generated by AI, can inadvertently exploit users' unpaid labor without their knowledge or consent. Essentially, artists (and other content creators) contribute their work without receiving fair compensation or have enough creative control, even though their contributions fuel AI algorithms and generate significant profits for tech companies. Currently, the product of a generative AI model cannot be considered copyrightable (as stated by the US Copyright Office).

**Case study:** Generative AI Has an Intellectual Property Problem

## Demanding Different Skillsets and AI Literacy

Effectively utilizing AI tools in education demands a new set of skills and AI literacy from educators and learners alike. Educators must acquire the expertise to evaluate the validity and credibility of AI-generated information and navigate the limitations and potential biases of AI systems. Likewise, learners need to develop critical thinking skills to ask relevant questions and engage with AI tools effectively. At the time of this writing, there is no dedicated and agreed upon AI literacy framework.

**Case study:** AI Literacy Might be ChatGPT's Biggest Lesson for Schools

# 5. Developing AI Literacy

The imperative for AI literacy skill in university settings is driven by the need to stay relevant and competitive in an increasingly digital and automated world. Professors and learners alike must develop foundational knowledge of AI, understanding not only its technical underpinnings but also its broader implications. This includes grappling with the ethical, social, and practical dimensions of AI. By developing a deep comprehension of AI, we will be better prepared to navigate its benefits and challenges.

The following are the key areas of focus for AI literacy (Figure 1):

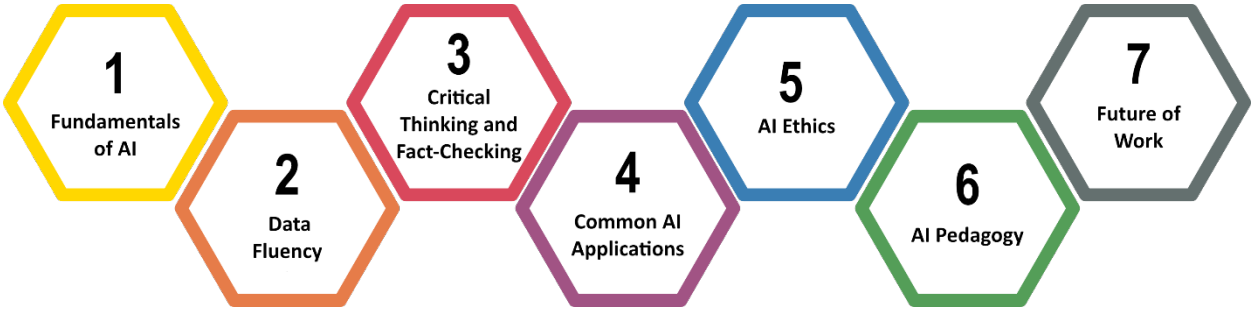


Figure 1: The 7 key areas to focus for AI literacy

## Fundamentals of AI

This involves building a solid foundation of what AI is, the history of AI, the current AI landscape and some common techniques. For instance, understanding the difference between machine learning and deep learning, and how these technologies can be applied for educational purposes.

**Activity Idea:** Assign homework whereby learners watch a documentary on the history and evolution of AI, follow by an in-class discussion.

**Resources:**

- 25 Best Documentaries About Artificial Intelligence

## Data Fluency

Since AI relies heavily on data, we need to develop abilities to understand, interpret, and work with data. Some examples of developing data fluency would be that we know how to ask questions about the quality of data, how data is being cleaned and prepared for training machine learning models, and how to interpret data visualizations to derive insights.

**Activity Idea:** Provide tools and practice opportunities in handling data, offer hands-on sessions where students can work with datasets relevant to the subject domains.

**Resources:**

- Kaggle has free and open datasets to download
- OpenRefine, an open-source tool to try your hand in data cleansing
- The Data Playbook by PrepareCenter.org, a resource to learn about data literacy with ideas and activities

## Critical Thinking and Fact-Checking

AI chatbots are known to return false results with confidence, generate misinformation, and to be prone to hallucination problems. For example, chatbots can return made-up case studies or incorrect references when conducting literature searches. It is essential for us to teach students critical thinking and problem-solving skills to identify and flag such issues so that we are not blindly accepting outcomes generated by AI, and to make informed discussions on how we can best use AI in education.

**Activity Idea:** Create simulation exercises or use case scenarios where learners encounter AI-generated results with potential errors and have to determine whether they will trust the results or not in order to proceed with the activity. Challenge them to critically analyze the results, identify anomalies, and come up with solutions. For example, play a game of Real or Fake Text with your students, follow by discussion on why they think the text is machine generated or human generated.

**Resources:**

- Roft, a real or fake text game platform (learners need to identify which text has been written by a computer or by a human)
- CheckGPT, a tool that allows users to check text to see if it is AI generated.

## Common AI Applications

To gain a broader view of AI's impact to society, we need to explore real-world applications of AI across various fields. For instance, the use of AI in autonomous vehicles for navigation and safety, chatbots for customer service in retail, predictive analytics in finance for risk assessment, or machine learning algorithms in healthcare for disease prediction and personalized treatment plans. This helps us to gain insights about the potential as well as the limitations of AI as AI becomes more prevalent in our society.

**Activity Idea:** Have learners research and present to the class different real-life AI applications across disciplines. Follow by discussion and reflection.

**Resources:**

- Top 10 Real-World Applications of Generative AI, an article on how AI is being used across different domains: https://blockchainmagazine.net/top-10-real-world-applications-of-generative-ai/
- Real-World Examples of Machine Learning (ML), an article by Tableau: https://www.tableau.com/learn/articles/machine-learning-examples

## AI Ethics

Discussions about AI should always include the ethical aspects, such as privacy concerns, bias in AI algorithms, digital citizenship, and the potential societal impacts of AI deployment. This could include studying the issues around privacy when using AI in exam proctoring and how that might violate students' privacy. Furthermore, we should teach students about the responsible use of AI, such as recognizing and reporting AI-enabled deepfakes or misinformation.

**Activity Idea:** Create ethical debate sessions or roundtable discussions centered on real-world AI ethical dilemmas. These could include topics like the fairness of AI algorithms in law enforcement or the potential biases in AI-driven recommendation systems.

**Resources:**

- Artificial Intelligence: Examples of ethical dilemmas by UNESCO - https://www.unesco.org/en/artificial-intelligence/recommendation-ethics/cases

## AI Pedagogy

AI pedagogy focuses the need for us to address the role of AI in education. It challenges us to engage our students in critical conversations on the capabilities and limitations of AI, and to know what pedagogical principles AI tools should use. Furthermore, AI pedagogy needs to include practical examples and hands-on experience on how people can co-create and collaborate with AI.

**Activity Idea:** Introduce an AI tool (e.g. a chatbot, an AI-driven content curation system, or a predictive analytics tool) that's relevant to your teaching and learning context. Each group gets a task to co-create or modify content using this tool. This could involve asking a chatbot to provide feedback on a piece of writing based on a certain criteria or rubric.

**Resources:**

- Futurepedia, an AI tool repository: https://www.futurepedia.io/
- There's an AI for That, another AI tool repository: https://theresanaiforthat.com/

## Future of Work

As AI continues to advance, it will significantly impact the job market. Students need to be aware of the skills they'll need in an AI-dominated future, and the emergence of new roles being created. An example would be understanding how AI can automate routine tasks in different industries, but also recognizing that new jobs like AI Ethicist or AI Data Analyst are being created as AI becomes more prevalent in our society.

**Activity idea:** Conduct a "Future of Work" seminar or workshop (this might be better organized at the university-wide level for bigger impact). Invite industry experts to discuss the changing job market due to AI.

**Resources:**

- AI and the Future of Work – A Cross-Disciplinary Workshop Notes, by the British Academy: https://www.ucl.ac.uk/public-policy/sites/public_policy/files/ba_ucl_ai_workshop_notes.pdf
- The Future of Jobs Report 2023 by the World Economic Forum: https://www.weforum.org/reports/the-future-of-jobs-report-2023/

# 6. Additional Resources

## *Tool Lists*

- **There's an AI for That:** https://theresanaiforthat.com/
- **AI Tools Directory Updated Daily** https://www.futurepedia.io/
- **Teach with GPT** https://www.packback.co/labs/
  Teach with GPT is a free resource provided by Packback to give educators tools to incorporate ChatGPT into their courses in interesting and inspiring ways that help prepare students to succeed in a post-AI world.
- **Poe.com:** www.poe.com
  It allows you to access different chatbots including GPT4

## *Teaching Ideas and Resources*

**100+ Creative Ideas to Use AI in Education** -
https://docs.google.com/presentation/d/1wVgLWgeEvJm3fznlm0aV8ZiuWsW3o3aUQUCcvuM5vxQ/edit#slide=id.g252f294a89d_43_0
A collection of ideas curated by #CreativeHE (with contributors from 19 countries) between January to March 2023, and it is made available as an Open Educational Resource (OER)

**AI in Education Resource Directory (ongoing)**
https://docs.google.com/document/d/1E8b-aY6R-CUMgXe0UTCsdyHWHDatBa1DaQBvdcuA_Kk/edit?usp=sharing

**An ongoing collaborative list of different AI policies -**
https://docs.google.com/document/d/1RMVwzjc1o0Mi8Blw_-JUTcXv02b2WRH86vw7mi16W3U/edit

**Discipline-specific Generative AI Teaching and Learning Resources** –
https://docs.google.com/document/d/1lAFHJO6iffMyi5ar0jqZrjf_UL5vB443CBCrms-jIgQ/edit#heading=h.70ovjca47bg9

**Incorporating AI in Teaching: Practical Examples for Busy Instructors** -
https://danielstanford.substack.com/p/incorporating-ai-in-teaching-practical?r=bejrw&utm_campaign=post&utm_medium=web
A list of learning activities that encourage instructors to experiment with AI in class.

**Learning with AI: Strategies** - https://docs.google.com/spreadsheets/d/1MCN-JLcwjfqzKccl0n5YIbZ6YKxswCNKqVenXBRLjhk/edit#gid=1700346260

**Prof2Prof** - https://www.prof2prof.com/
A website where professors can share resources. Free to join.

**University of Maine Learning with AI Toolkit –**
**https://umaine.edu/learnwithai/**

## Courses

**Exploring Emerging Technologies (by State University of New York) –**
https://emtechwiki-sandbox.apps.buffalo.edu/
It consists of two parts: a course in Corsera, and a Wiki. Everyone is welcome. Free resource.

**AI in Education: Course Design Workshop –**
https://canvas.instructure.com/courses/7198843
Free resource under Creative Common License agreement. Covers areas on Universal Design for Learning (UDL), AI text, images, audiovisuals, presentations, and search tools.

**Generative AI Prompt Literacy** –
https://umflintpd.pdx.catalog.canvaslms.com/browse/ode/courses/generative-ai-prompt-literacy
By the University of Michigan. Free self-paced course.

# Appendix A – Commonly Used Chatbots

Here is a list of the most commonly used chatbots and related information.

**Note:** Which Chatbot tool you use depends a lot on personal preference and access – e.g. some institutions don't support Google's Bard, and some find Microsoft's Bing easier to use as it is built-in to the Edge browser and it can answer the content of the window, especially useful for pdf research articles. Some prefer Bard because of Google, and others prefer ChatGPT as the de facto chatbot.

A useful productivity tip is to maintain a primary or default generative AI tool readily open on your desktop. Additionally, utilizing Google search can be beneficial, as it provides the flexibility to select and delve deeper into the sources that pique your interest.

| Chatbot | Description | Pros | Cons | Pricing Model |
|---|---|---|---|---|
| ChatGPT | By Open AI, access requires account creation with OpenAI | Human-like text, fine-tuning ability, large language model<br><br>Capable of more complex reasoning and good at contextually relevant response, creative tasks and idea generation | Draws only from a finite set of internet data up to 2021<br><br>Lacks source references<br><br>Potential for harmful, biased, and incorrect content. Also problem with hallucinations and it confidently generates misinformation<br><br>Text-based only | Free (for now, described as a "research preview") |
| GPT-4 | Latest version of GPT by Open AI | More powerful than ChatGPT with fewer hallucinations<br><br>Plug-ins add a lot of functionality to the chatbot (including the creation of graphs, able to upload files, run analysis and code, etc.) | Requires a monthly fee<br><br>Still cannot produce image outputs | $20 USD/month subscription |

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|---|---|---|---|---|
| | | Has Advanced Data Analytics function<br><br>Integrate with DALL E (can analyze image inputs)<br><br>Performs well all around | | |
| Bing Chat | Based on the ChatGPT engine, integrated with Microsoft's search tool Bing. Can be set to one of three modes: Creative, Balanced, or Precise | Works as a web co-pilot in the Edge browser – more seamlessly integrated<br><br>Can generate images based on text description | Has daily limits (30 chats per session and 300 chats per day)<br><br>Chat responses are generally shorter than other chatbots. | Free with ads |
| Bard | Google's version of ChatGPT, uses their own language model. | Draws real-time information from the internet for its responses<br><br>Can search for images<br><br>Provides multiple responses to questions with source<br><br>Integrates with G Suite | Lacks contextual coherence<br><br>Occasionally produces irrelevant or nonsensical responses<br><br>Lacks source references<br><br>Inconsistent responses<br><br>Limited generative capabilities (limited in its ability to write long articles) | Free (Need a Google account to sign up.) |
| Preplexity | Simple and minimalist ChatGPT alternative trained on OpenAI's API. Branded as a conversational search engine that provides information through a chatbot style interface. | Provides a concise and detailed response and real references (provides citations on all research results) | Does not always provide accurate or reliable answers<br><br>Does not handle subjective or ambiguous questions well | Free (beta version) and doesn't need account |

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|---|---|---|---|---|
| Claude 2 | The latest model of AI chatbot by Anthropic. Uses a technique called Constitutional AI to ensure safe and helpful dialogue that reduces potential harm or unethical conversations. | Trained on more up-to-date data than ChatGPT<br><br>Will clarify ambiguities and confess knowledge gaps (instead of making up false information)<br><br>Safe and more cautious responses<br><br>Less prone to mistakes | Due to its limited availability, it is not as popular as other AI chatbots<br><br>Only supports English language<br><br>More conservative and lacks creative writing skills | Available for beta testers in the UK and US only. (There is a plan to make it more widely available later on) |

# Glossary of Terms

**Alignment:** refers to the degree to which the model's behaviors and outputs align with human values, goals, and intentions or a potential, underlying, hidden goal of the LLM.

**Algorithm:** As defined by Association for Computing Machinery, algorithm is "a self-contained step-by-step set of operations that computers and other 'smart' devices carry out to perform calculations, data processing, and automated reasoning tasks."

**Application Programming Interfaces (API):** A set of rules and protocols that allows different software applications to communicate with each other.

**Artificial Intelligence (AI):** A field of computer science dedicated to creating machines and software that mimic human intelligence. This can include tasks like learning, problem-solving, perception, and language understanding. AI can range from simple rules-based systems to complex machine learning (ML) and deep learning models, which can adapt and learn from their experiences much like humans do.

**Artificial General Intelligence (AGI):** Sometimes referred to as strong AI, is the concept of a machine that has the ability to understand, learn, and apply knowledge across a wide range of tasks at a level equivalent to a human being. Unlike narrow AI, which is designed to perform a specific task, AGI could transfer knowledge from one domain to another, solve complex problems using abstract thinking, and even exhibit self-awareness and consciousness.

**Bias:** In the context of machine learning, bias refers to the model's tendencies to consistently learn incorrect associations from the training data, often due to imbalances or systemic issues within the data itself. This can lead to skewed or unfair outcomes in model predictions.

**Chatbot:** A software application designed to simulate human conversation. By leveraging technologies such as AI, machine learning, and natural language processing, chatbots interpret and respond to text or voice inputs from users. They are commonly used in customer service, marketing, and other interactive tasks to automate responses, provide information, or guide users through specific processes.

**ChatGPT:** An AI language model developed by OpenAI. It's a version of the GPT (Generative Pretrained Transformer) designed specifically for generating conversational text. By processing prompts or questions provided by users, ChatGPT can generate relevant responses, engage in conversation, offer explanations, generate creative content, or answer queries in a variety of domains.

**Deepfake**: A technique that uses AI to create or alter video, audio, or image content, making it appear as if someone has said or done something they have not.

**Freemium:** A pricing model where a basic product or service is provided free of charge, but money (a premium) is charged for additional features, services, or virtual goods. This model aims to attract users with the free version and entice them to upgrade to the premium, paid version for more benefits.

**Generative Artificial Intelligence (GAI):** A type of AI that creates new data from existing ones. It is used in a variety of applications, including text generation, image creation, and voice synthesis, and underpin models like OpenAI's GPT series, which can generate human-like text based on prompts.

**Generative Pre-trained Transformer (GPT):** A type of transformer model that's pre-trained on a large body of text data and can generate human-like text. It can be fine-tuned for specific tasks, like translation or question answering.

**Hallucinations:** In the context of language models, hallucinations refer to instances when the model generates information that isn't based on its training data or the input provided. This is often seen as the model making things up, creating output that appears creative or novel but can also be misleading or incorrect.

**Large Language Models (LLM):** These are machine learning models trained on a vast amount of text data. They learn to predict the next word in a sentence and, in doing so, acquire a wide range of knowledge about the world and language.

**Machine Learning (ML):** A subfield of AI that involves the development of algorithms that allow computers to learn and make decisions or predictions based on data. Instead of being explicitly programmed to carry out a certain task, these systems are trained using large amounts of data and statistical methods to progressively improve their performance on a specific task over time. It's this learning ability that underlies many modern AI applications, from recommendation systems to self-driving cars.

**Narrow AI:** Also known as Weak AI, it refers to AI systems that are designed to perform specific tasks or sets of tasks. These systems can include anything from recommendation algorithms used by online streaming services to voice recognition systems like Siri or Alexa. Although they can often perform their assigned tasks at or above human level, their understanding and capabilities are limited to those specific tasks and they cannot apply their knowledge to a broader context.

**OpenAI:** Founded in 2015, OpenAI is an AI research lab made up of both for-profit and non-profit arms. Notably, it's the developer of GPT (Generative Pre-trained Transformer) models, including GPT-3 and GPT-4, which are advanced language processing AI models.

**Prompts:** Input text that the user provides to the model to guide its output. It sets the context for the model's response, triggering it to generate text that follows logically or thematically from the prompt. Prompts can range from single words to complete sentences and even multiple paragraphs, depending on the complexity of the desired response.

**Prompt Engineering:** a technique used with AI language models, like GPT, where the input (or 'prompt') is carefully designed to guide the AI's output. This process involves crafting prompts in a way that maximizes the likelihood of the desired response.

**Strong AI:** see Artificial General Intelligence (AGI)

**Transformer:** A machine learning model widely used in natural language processing (NLP). It utilizes an "attention" mechanism to understand context and relationships in language, forming the base for models like OpenAI's GPT.

**Weak AI:** See Narrow AI