VIA AFRIKA DIGITAL EDUCATION ACADEMY

Getting to the Fourth Industrial Revolution (4IR)

SESSION 10

An Introduction to Generative AI and ChatGPT

CLASS NOTES

SACE provider number: **PR0000008139**
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Course 10 content

Teaching for the Fourth Industrial Revolution (4IR)

Getting to the Fourth Industrial Revolution (4IR)

Session 10: An Introduction to Generative AI and ChatGPT

Class Notes

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Abbreviations and terms

Bloom's Revised Taxonomy: A pedagogical framework for eLearning. [See pedagogy, See eLearning]

eLearning: Learning that is supported by, enhanced by, or facilitated through Information Communication Technologies (ICTs), and that is supported by reconsiderations of content, and a relevant pedagogy. [see ICT]

ICT: Information and communication technologies.

PD Points: Professional Development Points [See SACE]

Pedagogy: The how and why of what we do in the classroom. The method and practice of teaching, especially as an academic subject or theoretical concept.

PedTech: Pedagogical Technology for what happens when we want to use technology in the classroom

RAT: Replace, Amplify, Transform. A pedagogical framework for eLearning. [See pedagogy, See eLearning]

SACE: South African Council for Educators. Awards Continuous Professional Development Points (CPDP) to teachers.

SAMR: Substitution, Augmentation, Modification, Redefinition. A pedagogical framework for eLearning. [See pedagogy, See eLearning]

TPACK: Technological, Pedagogical and Content Knowledge. A pedagogical framework for eLearning. [See pedagogy, See eLearning]

Contents

Outcomes and content

Outcomes of the session

By the end of the session, the participant will be able to:

- explain what AI, Generative AI and ChatGPT are
- discuss the similarities and differences between Generative AI applications: Google Bard, Microsoft Copilot
- talk about the pros and cons of using Generative AI
- access ChatGPT on the web and apps
- create a basic prompt and understand how output is created
- understand the importance of verifying information from Generative AI
- understand what prompt engineering is and why it is important to do skilfully
- create various prompts

Content of the session

This session will focus on:

- AI, Generative AI and ChatGPT
- Generative AI applications: Google Bard, Microsoft Copilot
- The pros and cons of using Generative AI
- ChatGPT: how to access it, how to use it
- Prompt engineering

For your information, here is detail about the next session.

Outcomes of the session Taking Generative AI and ChatGPT into education

By the end of the session, the participant will be able to:

- appreciate the use of AI in education as not necessarily cheating
- develop an acceptable and unacceptable use of AI policy
- appreciate how to use Bloom's Taxonomy Revised (Reviewed for AI)
- use AI to personalise learners' education: interactive tutor, reading aid
- use AI to create effective explanations, examples, analogies
- appreciate the use of MagicSchool.ai as an application of Generative AI
- use AI for planning: lesson planning
- use AI for content development: conceptual understanding generator, common misconception generator
- use AI to create assessment tools: multiple choice quizzes, rubrics
- use AI to create a simple animation

Content of the session Taking Generative AI and ChatGPT into education

- Effectively using AI in education: acceptable and unacceptable use of AI policy; Bloom's Taxonomy Revised (Reviewed for AI); interactive tutor; reading aid; creating effective explanations, examples, analogies; for lesson planning; conceptual understanding generator; common misconception generator; multiple choice quizzes, rubrics
- MagicSchool.ai as an application of Generative AI
- Animated Drawings as an AI application

Overview

Welcome to An introduction to Generative AI and ChatGPT. This session will introduce you to the concept of Generative AI, and develop the skills and knowledge you need to work effectively with Generative AI like ChatGPT.

We will cover three topics:

1. An introduction to AI, Generative AI and ChatGPT
2. A Focus on ChatGPT
3. Prompt engineering

This session provides an introduction to the next session in this course, Taking Generative AI and ChatGPT into education.

Please be aware that this session was written in October and November of 2023. The field of AI is changing all the time. This session though will give you enough knowledge to go about finding out about the latest developments by yourself.

Introduction to AI, Generative AI and ChatGPT

AI, Generative AI and ChatGPT

Artificial Intelligence, or AI, and Generative AI systems like ChatGPT, can be leveraged as tools to enhance teaching and learning.

What is AI?

Artificial Intelligence, or AI, is like a computer system that can do tasks that usually need human brainpower. It can do things like recognizing images, understanding and processing language, making decisions, solving problems, and learning. AI systems can do things that are very similar to what humans do, like having conversations, translating languages, analyzing data, or creating new content.

Types of AI

We can think of AI as having two main types: Artificial General Intelligence and Narrow AI.

Artificial General Intelligence or AGI is still considered to be theoretical because it would mean that a computer, when faced with an unfamiliar task could find a solution. In other words, an AGI system would be able to perform any task that a human being is capable of. How far away that is though, is a matter for debate. Narrow AI, on the other hand is like a specialist. It's really good at one specific thing. There are a number of types of Narrow AI.

Machine learning – Recommendation engines

Have you ever been suggested a product by Takealot or Amazon? Or maybe Netflix suggested what you should watch next? These are all examples of recommendation engines.

Computer vision

Computer vision is used for image recognition and video analysis. It is often used in the production process to check the quality of products. It is also used for self-driving vehicles.

Robotics AI

Robotics combines different AI skills like computer vision, controlling movement, and understanding the situation to make robots that can do complex tasks on their own. For example, in car factories, robots use these skills to do precise tasks like putting parts together and welding.

Generative AI

Generative AI is a subset of artificial intelligence that uses machine learning models to produce new content. It's capable of generating data that can mimic any kind of data: images, music, speech, or text.

This is achieved by training these models on a large amount of data in a specific domain or area of knowledge and allowing them to learn the underlying patterns and structures of this data. Once trained, these models can generate new data that follows the same patterns and structures, effectively creating new, original content that is similar to the training data.

Generative AI has wide range of applications, from creating art and music, to writing text, and even designing new molecules for drug discovery.

Conversational AI

Conversational AI is a subfield of Generative AI that focuses on enabling machines to engage in human-like conversation. It uses natural language processing, machine learning, and other AI technologies to understand, process, and respond to human language in a natural and intuitive way. Conversational AI can be implemented in various forms.

Chatbots: These are typically used on websites or in apps to answer customer queries, provide information, or guide users through processes. The most famous chatbot is ChatGPT, but there are others like Bard, Claude, and Microsoft Copilot, which was called Bing Chat.

Virtual Assistants: These can understand and carry out complex voice commands, like Apple's Siri or Amazon's Alexa.

Messaging Apps: These can understand and respond to text messages in a conversational manner, like Facebook Messenger bots.

The goal of Conversational AI is to create a seamless and natural interaction between humans and machines, allowing for more efficient and intuitive user experiences.

How Conversational AI works

Conversational AI systems use a machine learning approach rather than hand-coded rules and logic.

They are trained on a massive dataset of online books, articles, forums, and other texts to recognize patterns about how we humans communicate and use language.

Given a text prompt, the AI's neural network model predicts the most likely words to come next based on these learned patterns. It generates responses aimed at coherently answering questions, admitting mistakes, following up sensibly, and providing helpful information.

Rather than relying on rigid rules, Conversational AIs develops a statistical understanding of language much like humans do through our own experiences. This training process enables the AI to hold surprisingly natural conversations and generate high-quality text tailored to specific prompts and contexts.

ChatGPT and other Conversational AIs, work by recognizing linguistic patterns from their training data.

ChatGPT

ChatGPT is one of the newest and most advanced AI conversational systems publicly available today. It was created by the AI research company Open AI.

Some key attributes that make ChatGPT novel compared to previous Conversational AIs are its ability:

- to understand context
- to admit mistakes
- to refuse inappropriate requests
- to generate high-quality human-like text.

It builds on top of GPT-3, an earlier text generation model created by OpenAI and was trained on vast datasets of online material. ChatGPT aims to provide a safe, beneficial conversational experience compared to predecessors like Microsoft's Tay chatbot that went awry.

While not perfect, ChatGPT represents major progress in natural language AI. It can answer questions, explain concepts, summarize texts, write essays, generate code, and more based on natural conversations.

ChatGPT is available as a free service and a paid service. The free service has a data cut-off date of January 2022, and it cannot access the internet.

This means that it will not be able to answer questions or respond to prompts about anything that has happened recently.

Bard

Google's conversational AI is called Bard. Launched in 2023, Bard aims to provide helpful, high-quality responses to natural language questions and conversations.

Some key features include:

- understanding context and nuance in dialogue
- providing detailed, factual answers to queries
- supporting sensible, back-and-forth conversations.

Bard is still in the very early stages of development, so the depth of its knowledge and capabilities will continue improving over time.

Image AI

Powerful Generative AI image models like DALL-E 2, Stable Diffusion, and Imagen can generate amazingly realistic and creative images based on short text descriptions. This has applications ranging from digital art to media design, and quality continues improving rapidly.

Reflection

- What do you think about AI being used in your context?
- Is there anything you are worried about?
- What advantages can you see in using conversational AIs like ChatGPT in your context?

The good, and the (possible) bad and ugly of Generative AI

We need to explore the pros, cons, and responsible use strategies for leveraging these emerging technologies in education.

Benefits of using ChatGPT

There are a wide range of possible uses for an AI like ChatGPT that can generate original text on demand.

- It can answer basic questions on a broad range of topics by summarizing information from its training data. This provides a quick way to get an overview of unfamiliar topics.
- You can prompt it to summarize long articles or texts into concise summaries, acting as a virtual assistant.
- You can brainstorm ideas for creative projects, lessons, or problem-solving by having a conversation with ChatGPT.
- It serves as a conversational practice partner, able to roleplay dialogues on request.
- ChatGPT can even take on the role of a virtual tutor, answering your questions, explaining concepts, and providing writing support.

The key is ChatGPT's conversational nature which means you can guide it into assisting with almost any task involving generating text. While not a perfect expert, it is a powerful text generation tool.

Benefits of using ChatGPT in education

There are many exciting possibilities for incorporating AI systems like ChatGPT into teaching.

- You can use it to quickly answer common learner questions on the fly by describing the situation and asking ChatGPT to respond as if it were the teacher.
- ChatGPT is an endless source of personalized quiz and test questions on any covered topic that learners can use for self-assessment.

- Prompting ChatGPT with a particular learner's needs and learning goals allows it to tailor lesson explanations, examples and recommendations to that individual.
- ChatGPT can be used to help with administrative tasks. Automatically marking written work or assisting with lesson planning could allow teachers more time to focus on high value-added activities like discussion, critical thinking, and relationship building. Of course, human oversight is still essential, but AI productivity tools may enhance education.

The key is finding uses that augment human teaching abilities such as personalized feedback, creativity, and true expertise rather than fully automating instruction.

The drawbacks of using ChatGPT

It's important to be aware of ChatGPT's current limitations and weaknesses.

Its training data only covers material up until 2022, so its knowledge does not encompass very recent events and discoveries. Any prompt relying on up-to-date information risks inaccuracy.

As a statistical model, ChatGPT can occasionally generate incorrect or nonsensical information, requiring human evaluation. It sometimes confidently provides false facts that are called hallucinations.

ChatGPT has limited reasoning and comprehension skills outside of its text generation abilities. It cannot truly learn, adapt, or make judgments as humans do.

Its outputs reflect the biases and flaws present in its original training data, requiring caution particularly around issues of race, gender, culture and more.

While a powerful text generation tool, ChatGPT lacks true intelligence, expertise, or common sense. It is an AI assistant, not an omniscient oracle. Evaluating its outputs and understanding its weaknesses are important when integrating it into real-world applications like education.

Using ChatGPT sensibly

It is essential to carefully evaluate any output ChatGPT generates before using the output. Here are some tips.

- Double check any facts or statistics ChatGPT provides against trusted reference sources. Given its cut-off training data, inaccuracies are likely.

- Watch for responses that don't directly answer the question, seem generically templated, or provide information that is illogical, inappropriate or untrue.
- Review writing quality carefully. While often impressively coherent, ChatGPT can make grammatical mistakes or have stylistic weaknesses.
- For creative writing, ensure the originality and value of ChatGPT's outputs. Reworking or extending its drafts is often needed.
- Ask the same prompt in multiple ways to check consistency and minimize novelty-seeking responses.

The key is not to fully trust ChatGPT as a perfect expert. Leverage its strengths in draft generation, while correcting any substantive errors, weaknesses in reasoning, or lack of common sense. The aim is augmenting human abilities, not replacing human judgment.

And the future?

While advances in Generative AI like ChatGPT are concerning to some, this technology has immense potential to improve human life if developed responsibly. At its core, it is about empowering people by automating tasks and providing insights from data.

Developments like natural language generation and creative applications can augment human skills rather than replace them. However, humans must remain firmly in control through research into aligning systems with human values and ensuring transparency.

Although not without risks, with thoughtful coordination across public and private sectors, Generative AI can enable innovations in education, healthcare, business assistance and solving complex global challenges. The future will be what we make it. With public engagement, ethics and responsible development, Generative AI can usher in an age of progress, convenience and understanding for all.

Task

- You have been asked to do a talk to your staff meeting about ChatGPT. Make brief notes on the pros and cons and then make a proposal based on your opinion.

Focus on ChatGPT

Accessing ChatGPT

ChatGPT is designed to be accessible, user-friendly, and available on various platforms. Whether you're using a computer, a tablet, or a smartphone, ChatGPT is just a click away, ready to assist you in your educational endeavours.

Access via Web App

The main way to access ChatGPT is through its web application. By simply navigating to the ChatGPT website, you enter a world of interactive learning. The web app provides a seamless interface where you can type your questions, explore topics, and engage in meaningful conversations. It's designed to be intuitive, making it easy to dive into the vast realm of knowledge.

Tips for using ChatGPT

- You can find the ChatGPT website at chat.openai.com
- Create an account to use ChatGPT using your email.
- Type your questions (prompts) in the textbox on the homepage. This is where you can type your questions and prompts to ChatGPT.
- After entering your question, press the Enter key on your keyboard, or click on the Send button located near the text box. This action signals ChatGPT to generate a response based on your query. The response will appear below the text box in a chat-like format.
- If you have a follow-up question, simply click again in the text box, type your new query, and press Enter.
- You can enter multiple lines of text in the chat interface by pressing Shift and Enter at the same time. This feature allows you to create a natural flow in your questions, just like you would in a conversation. It's a good way to ask complex questions or provide context for a more detailed response.

ChatGPT Mobile App

ChatGPT offers a convenient mobile application. Available for both iOS and Android devices.

Integration with Messaging Platforms

ChatGPT integrates with various messaging platforms like Microsoft Teams, Slack, and other messaging applications. ChatGPT can be invited into these platforms as a chatbot.

Microsoft Copilot Search Integration

ChatGPT is integrated into Bing, Microsoft's search engine as Microsoft Copilot. When users search for topics, ChatGPT augments search results with AI-generated information, providing users with a comprehensive and reliable knowledge base. This integration enhances the search experience.

Task

Create an account on ChatGPT.

Try these prompts to experience Generative AI.

- Please write me a poem to my [insert who – husband, wife, son, daughter, ...]
- Write an email to my landlord explaining that my rent will be late.
- Please give me a recipe for supper using beef steak and tomatoes.

Verifying information from ChatGPT

While ChatGPT is a powerful tool, critical thinking and fact-checking remain essential skills in the digital age.

Cross-referencing with reliable sources

One effective strategy for verifying information is cross-referencing. When ChatGPT provides a response, especially on complex or critical topics, cross-check the information with reliable sources. Encourage your learners to consult textbooks, academic articles, or trusted websites. By comparing ChatGPT's response with established knowledge, learners can confirm the accuracy of the information.

Encouraging critical questioning

Another approach is to nurture a culture of critical questioning. Encourage your learners to ask follow-up questions and dig deeper into the topic. By questioning ChatGPT's responses and exploring various perspectives, learners develop analytical skills. This critical approach not only validates information but also fosters a habit of discernment, a valuable life skill in today's information-rich world.

Fact-checking websites and tools

Introduce your learners to reputable fact-checking websites and tools. Websites like Snopes, FactCheck.org, and PolitiFact specialise in verifying information and debunking misinformation. By utilizing these resources, learners can independently verify claims and statements they encounter, ensuring the accuracy of the information they use in their research or assignments.

Collaborative learning and discussion

Promote collaborative learning and discussion. Encourage your learners to discuss ChatGPT responses within study groups or with the whole class. Engaging in group discussions allows for diverse perspectives and insights. Learners can collectively evaluate the information provided by ChatGPT, refining their understanding through shared knowledge and critical analysis.

Real-life application of fact-checking

Emphasize the real-life application of fact-checking skills. Show examples of how fact-checking is crucial in everyday situations, from evaluating news articles to deciphering online claims. By connecting these skills to their daily lives, learners understand the practical significance of critical evaluation, empowering them to be discerning consumers of information.

Building digital literacy

Highlight the importance of building digital literacy. In today's digital age, being able to navigate vast information sources is a vital skill. Teach learners how to judge the credibility of websites, understand biases, and identify misinformation. These skills not only validate information from ChatGPT but also equip learners to make informed decisions in various online contexts.

While ChatGPT is a valuable educational tool, empowering learners and educators alike, it is essential to instil the importance of critical thinking and verification. By cross-referencing, encouraging questioning, utilising fact-checking tools, fostering collaborative learning environments, emphasising real-life applications and building digital literacy, we equip our learners with the skills to navigate the digital landscape responsibly.

Reflection

- How might your learners benefit from using ChatGPT? Consider simple activities where learners can access ChatGPT to find answers to their questions.

Prompt engineering

What is prompt engineering and why is it important?

Prompt engineering is the process of crafting precise and clear queries when interacting with AI systems. Think of it as the language bridge between us and the vast sea of knowledge encapsulated within AI. By mastering this skill, educators can harness the full potential of AI, making it a valuable ally in the realm of education.

Well-crafted prompts are the foundation of productive interactions with AI and the key to accurate and relevant information. They enable us to refine our enquiries and specify exactly what we're looking for, leading to responses that are tailored to our educational needs.

Key elements of educational prompts

Educational prompts should be clear, relevant, and context specific. Clarity ensures that the AI comprehends the query accurately, relevance aligns the response with the educational goal, and context provides a specific framework for the query.

Practical strategies for crafting educational prompts:

1. **Be Specific:** Specify the topic, subject area, or concept you want to focus on. The more specific you are, the more precise the AI's response will be.
2. **Use Guiding Words:** Incorporate words like explain, describe, or analyse to guide the AI's response in a particular direction.
3. **Include Context:** Provide context relevant to the educational task. Contextual prompts yield responses tailored to the given situation.
4. **Iterate (make small changes and improvements to the way we ask questions or give instructions to get better results) and Refine:** Don't hesitate to iterate and refine your prompts. If the initial response isn't what you're looking for, adjust and try again until you get the desired outcome.

The CETO Model for prompts

The CETO model provides a useful guide for crafting effective prompts.

Context: Set the stage by explaining why you're asking for something. It defines the purpose and scope of the information required. Providing context could involve specifying the target audience, subject area, or even the desired depth of the response.

Expert Persona: Define the area of expertise and the tone and depth of the response. For instance, an AI can respond in a casual tone or a professional, academic one within the defined area of expertise. This specification ensures that the response aligns with the expected level of formality, making the interaction more effective.

Task: Say what you want the AI to do. It could involve generating creative content, summarizing complex information, analysing data, or even providing step-by-step explanations. Being explicit about the task ensures that the AI understands the request accurately.

Output: Say how you want the information presented. It includes parameters like length, format, and style. For instance, you might request a concise summary, a detailed essay, or a structured list.

The CETO model is based on the work of ChatGPT Tutorials. You can follow them on YouTube (https://www.youtube.com/@ChatGPT-GPT). ChatGPT Tutorials call the model CEDO, replacing Task with Do.

Reflection

- How can you apply the techniques of prompt engineering, specifically the CETO model, in your context to enhance the learning experiences of your students? Consider different subjects, grade levels, and types of interactions with AI in your response.

Engineering a prompt for an art AI

Use the following pointers when engineering a prompt for an art AI.

Describe the content type (photograph, illustration, etc). Specifying if it should look realistic or more graphic is helpful. Provide any framing or orientation details.

Specify the subject matter in detail. Get very specific about the subject, like the type of animal or a particular person. Include the subject's pose if relevant.

Add relevant descriptive details like colours, shapes, textures. Details like warm, geometric shapes and fuzzy textures make the prompt more vivid. Mention any patterns and prominent features.

Indicate the desired style like abstract, minimalist, surrealistic. Referencing a specific artist or artwork helps convey the style. You can also list eras like impressionist, or cubist for example.

Define the composition including lighting, viewpoint, aspect ratio. Composition details like low angle shots and wide aspect ratios make a big difference. Add any desired focus areas.

Use adjectives and avoid conflicting terms. Using adjectives like "smooth" and "bright" while avoiding opposites creates a clear vision. Use adverbs like "slightly" to refine descriptions.

Keep prompts concise using 3–7 words. Breaking the prompt into short, clear phrases improves prompt engineering. Split very long prompts into separate, smaller prompts.

Use keywords the AI will recognize. Draw from terms used in AI training data to maximize recognition. Check the AI's documentation for recommended vocabulary.

Let other AI tools help generate prompts. Leverage other AI systems like ChatGPT to workshop prompt ideas. Collaborate with others to improve prompts.

Research the specific AI art generator's capabilities. Look at what outputs it can handle well, like portraits or landscapes. Consider any limitations around realism, abstraction, etc.

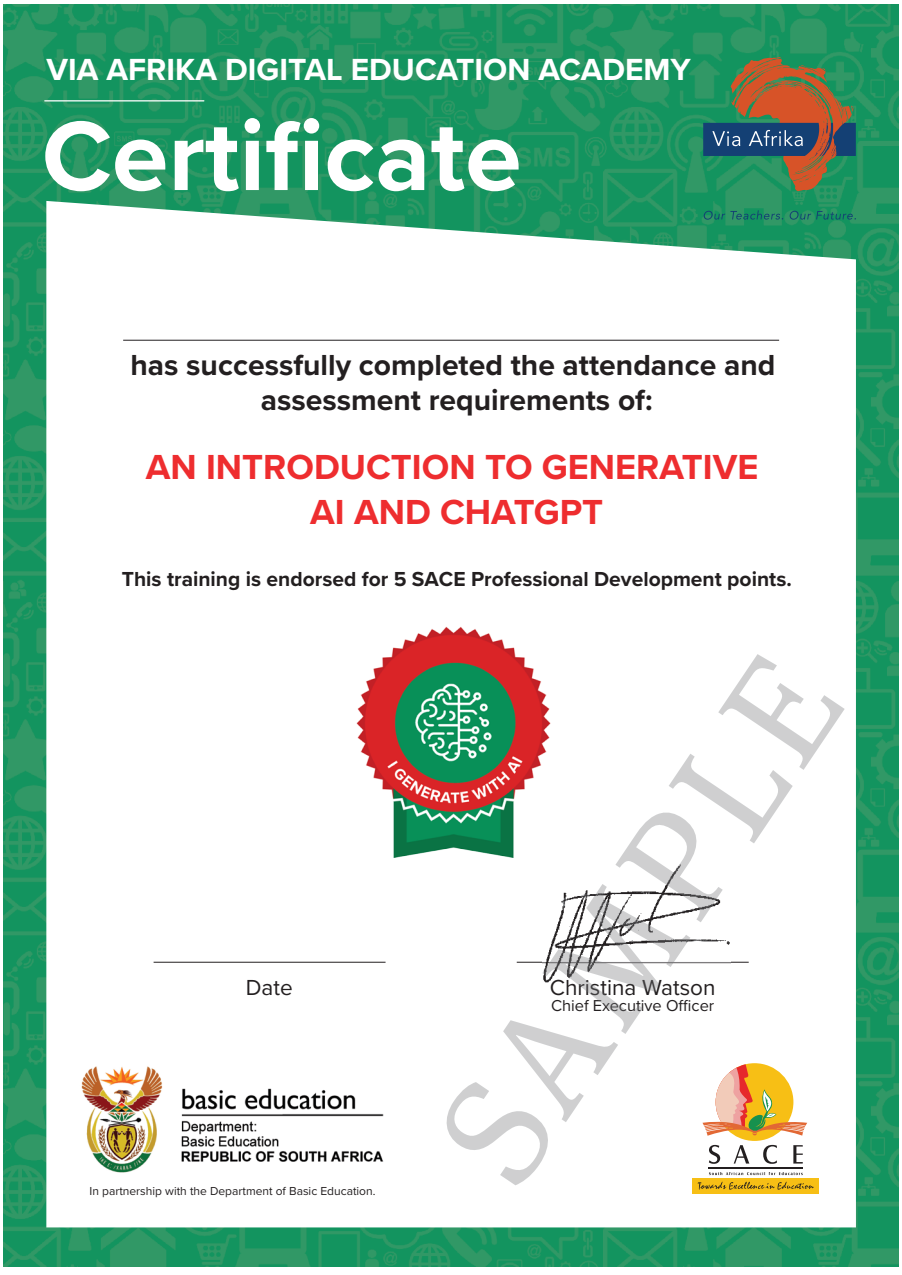
Task

- Create two prompts using the CETO model and use them in your ChatGPT prompt. If you need to, iterate until you get the result you want.

About the Final Assessment

At the end of this training session, you will be asked to complete the Final Assessment.

If you complete the Final Assessment successfully, you will qualify for your virtual badge and certificate. You can see a sample here.



Final Assessment

Indicate the ONE correct response for each question.	
1	What is the key difference between ChatGPT and Microsoft's Bing Chat?
a	Bing Chat is more accurate in its responses.
b	Bing Chat can access the internet in its free version.
c	ChatGPT has more capabilities than Bing Chat.
2	What is the main limitation of ChatGPT in terms of its text generation abilities?
a	It lacks the ability to generate coherent responses.
b	It sometimes generates false facts, known as hallucinations.
c	It doesn't understand context in text prompts.
3	Which statement about how AI is expected to impact the role of human teachers is not true.
a	AI will easily replace human teachers entirely.
b	AI will automate routine tasks and enhance human capabilities.
c	AI will not have any impact on the role of human teachers.
4	What is the main concern regarding the use of AI in the classroom?
a	Learners use it to cheat.
b	It enhances learner skills.
c	It has no impact on education.
5	How can ChatGPT be accessed?
a	Only through a desktop computer.
b	Only through a mobile app.
c	Through various platforms including web browsers and mobile apps.
6	Why is verifying information from AI sources important?
a	To be honest, it's not important.
b	AI sources never provide inaccurate information.
c	To empower students to be discerning consumers of information.

Final Assessment (continued)	
Indicate the ONE correct response for each question.	
7	Which of the following is NOT a practical strategy for crafting educational prompts?
a	Being specific.
b	Using guiding words.
c	Avoiding any changes to the prompt.
8	In the CETO model for prompts, what does the "CETO" acronym stand for?
a	Context, Expertise, Take aways, Output
b	Clarity, Expertise, Delivery, Output
c	Context, Expert Persona, Task, Output
9	What is a helpful way to make prompts concise?
a	Use a long, descriptive sentence.
b	Use short, clear phrases.
c	Avoid breaking long prompts into smaller ones.
10	What should you consider when engineering a prompt for an AI art generator?
a	Only consider the type of artwork you want.
b	Don't consider any limitations of the AI.
c	Research the AI's capabilities and limitations.
11	What are the key elements of educational prompts?
a	Clarity, relevance, and context.
b	Length, format, and style.
c	Subject matter, colours, and shapes.
12	How can you enhance prompt engineering for an AI art generator?
a	Use conflicting terms for clarity.
b	Keep prompts lengthy for better recognition.
c	Specify composition details and utilize keywords.

Final Assessment (continued)	
Indicate the ONE correct response for each question.	
13	What does the "E" in the CETO model represent?
a	Explanation
b	Expertise
c	Engineering
14	How does Generative AI work?
a	It generates new content by learning patterns from a large dataset.
b	It relies on hand-coded rules and logic.
c	It mimics human brainpower for tasks.
15	Which type of AI is focused on enabling machines to engage in human-like conversation?
a	Machine learning AI
b	Conversational AI
c	Generative AI

Acknowledgements

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