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GUIDELINES FOR FACILITATING THE LEARNING OF ARTIFICIAL INTELLIGENCE BY SCHOOL STUDENTS OF GRADES 7-12

Module 3.7: **AI Profession Orientation Chatbot**

FACILITATE – AI: Guidelines for facilitating the learning of Artificial Intelligence (AI) by School Students of Grades 7-12

Module 3.7- AI Profession Orientation Chatbot

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IASA

C2 Training Course

12-15 July 2023

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Module 3.7
AI Profession Orientation Chatbot

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- Can an AI-based chatbot help students choose the profession they want to follow?
- What are the AI fields used for chatbots development?
- How to create an AI-based chatbot for that purpose?

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L&C Plan Goals

- Teachers firstly understand and then present to students the underlying technology of AI chatbots
- Explore tools for creating a profession orientation AI chatbot
- Ages: 16-18, 6-7 hours

⇒ Students will value the importance of using AI to support career guidance and get familiarized with cognitive intelligence

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Motivation

- Career guidance in the era of fast changing employment world is crucial for today's young students.
- Engaging students in understanding how an AI chatbot is created to cover one of their most important needs, such as profession orientation, can serve as an educational motive for exploring AI technology and its capabilities.

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Why is Profession Orientation important

- AI will create around **12 million new jobs** globally across various sectors by **2025**. (*World Economic Forum, 2020 Report*)
- **Educational Planning**. Helps students understand the educational requirements and qualifications needed for specific professions=> better academic pursuits.
- **Job Market Awareness**. Students can prepare themselves to meet the requirements of future employment.
- **Career Planning**. Students explore and understand their interests, strengths, and goals, which is crucial for effective career planning to set realistic and achievable career goals towards greater job satisfaction and fulfillment.

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L&C Implementation activities

- **Activity 1**: Introduction to AI Chatbots: Applications and Underlying Technology, by teachers (60 min).
- **Activity 2**: Exploring existing AI-based chatbots and experiment with ChatGPT4 (40 min).
- **Activity 3**: Exploring existing AI chatbots used for profession or career orientation (60 min).
- **Activity 4:** Students get familiar with the Juji and other platforms to develop a chatbot on their own. They form groups and assign roles for the design, development, and testing steps (60 min).
- **Activity 5:** Students develop their own AI chatbot that will provide profession orientation (120 min).
- **Activity 6:** Students present their chatbots to everyone (classmates and teachers) (60 min)

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A1. Introduction to AI Chatbots: Applications and Underlying Technology

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What are AI chatbots

- AI chatbots are computer programs that use AI techniques to interact with users in a conversational manner. They are designed to understand and respond to user queries and engage in **natural language conversations**.
- They can interact with users via text or voice-based interfaces.

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Popular Applications of Chatbots

Customer Support

Resolving inquiries and complaints efficiently.

E-commerce

Assisting customers with product recommendations.

Healthcare

Answering medical queries and providing basic health advice.

Banking and Finance

Assisting with account inquiries and transactions.

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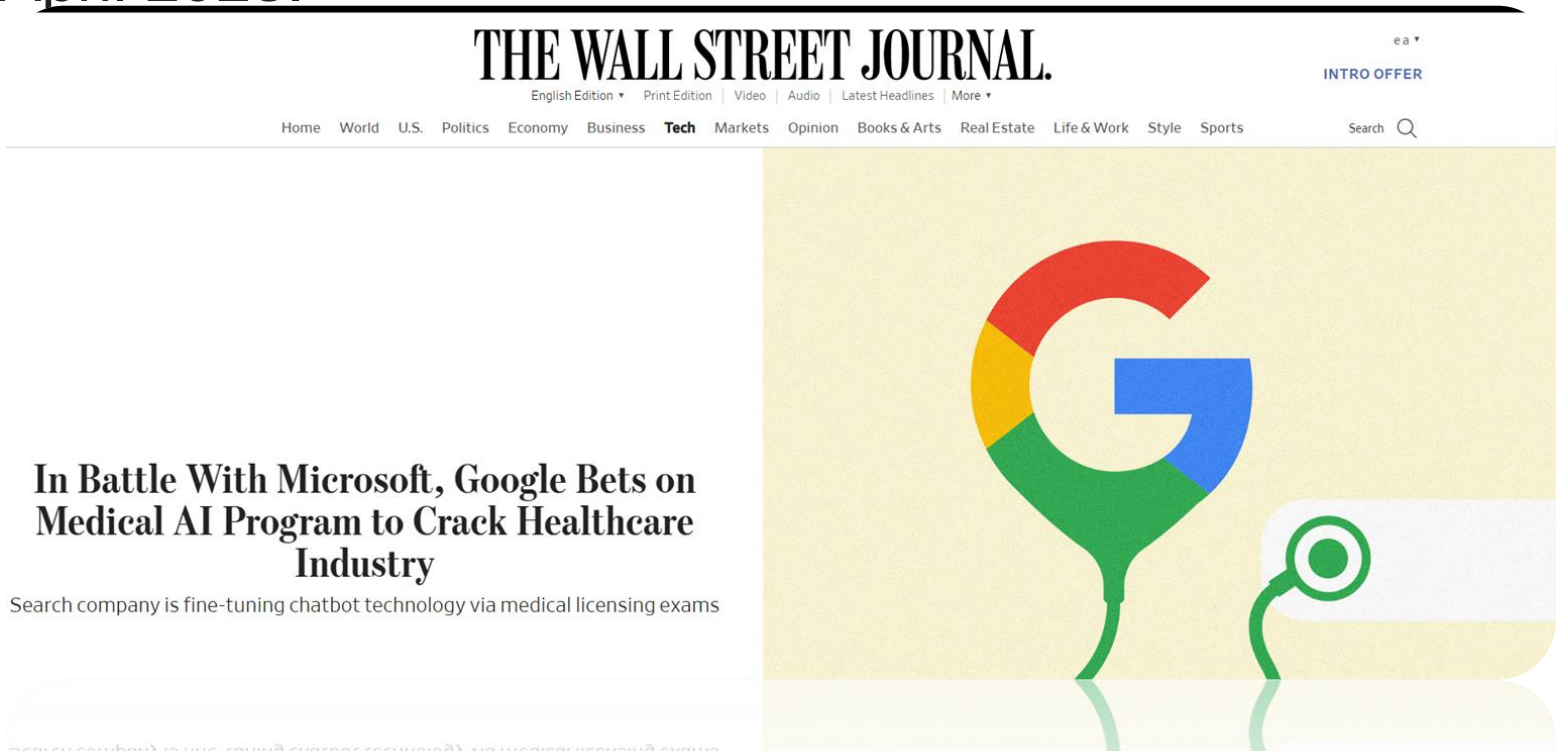
Chatbots in Healthcare today

- Google is testing a chatbot called **Med-PaLM2**, trained to expertly answer medical questions in order to be used widely by clinicians (WSJ, July 8, 2023). System testing began in the research hospital Mayo Clinic in April 2023.



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Underlying technology

- AI chatbots are typically powered by **Machine Learning algorithms**, **Natural Language Processing (NLP)** techniques, and **Deep Learning** models.
- They are trained on large (sometimes at the petabyte scale) datasets of human-generated conversations and texts, allowing them to learn patterns, understand language nuances, and generate relevant responses.

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ML in chatbots

- Machine Learning (ML) algorithms play a crucial role in AI chatbots since they can be trained on large datasets to learn patterns, identify intents, and generate responses based on the input data. **Supervised learning**, **unsupervised learning**, and **reinforcement learning** are commonly used techniques in training chatbots.

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Supervised Learning

- Supervised learning is a ML technique where a model learns to make predictions or classify data by being trained on labeled data. Labeled data consists of input examples paired with corresponding output labels or target values.
- Example: label a cough to predict pneumonia

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Unsupervised learning

- Unsupervised learning is a ML approach where a model learns patterns and structures in data without explicit labels or guidance.
- Example: consider a dataset consisting of patient health records (symptoms, medical test results, and demographic information). Using unsupervised learning techniques, the data can be analyzed to **identify groups or clusters of patients with similar characteristics** and therefore tailor personalized treatments.

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Reinforcement Learning

- Reinforcement learning (RL) is a type of ML that involves training an agent to make a sequence of decisions in an environment in order to maximize a cumulative reward. The agent learns through **trial and error**, interacting with the environment and receiving feedback in the form of **rewards or punishments**.
- Applications: games, robotics, recommendation systems, autonomous vehicles, and more. It is a powerful technique for training agents to learn optimal behaviors in complex and dynamic environments.

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Natural Language Processing (NLP)

- NLP is a field of AI that focuses on the interaction between computers and human language. It involves tasks such as **speech recognition**, **language understanding**, **language generation**, and **sentiment analysis**. NLP enables chatbots to understand and process user input and generate appropriate responses.

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Deep Learning

- Deep Learning (DL) is a subset of ML that utilizes Artificial Neural Networks (ANNs), particularly **Deep Neural Networks (DNNs)** with multiple layers. Deep learning models, such as recurrent neural networks (RNNs) and transformers, are employed to process and understand sequential data, such as text input. They enable chatbots to **handle context**, **maintain conversation history**, and **generate more coherent responses**.

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Deep Learning

- DNNs are inspired by the structure and functioning of the human brain and attempt to mimic the way neurons in the brain process information and communicate with each other.
- The human brain consists of **billions of interconnected neurons** that transmit electrical signals to communicate information. Similarly, deep neural networks consist of interconnected artificial neurons (nodes), organized into layers. Each node receives input signals, performs a mathematical operation, and passes the output to the next layer.
- Latest ChatGPT4 is said to be based on 8 models with **220 billion parameters** each, for a total of about **1.76 trillion** parameters.

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A2. Exploring existing AI-based chatbots and experiment with ChatGPT4

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ChatGPT

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- ChatGPT (**Generative Pre-trained Transformer**) is designed to generate human-like text based on the input they receive. It is trained on vast amounts of text data from the internet, which enables them to understand and generate coherent and contextually relevant responses.
- Uses the Transformer architecture, which allows it to process and generate text by paying attention to different parts of the input sequence.
- OpenAI has trained ChatGPT using **reinforcement learning** from human feedback, where human AI trainers provide demonstrations and rank model-generated responses for various prompts.

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ChatGPT Facts

- Version 4 Release Date: March 14, 2023
- 1 million users in just five days
- 100 million users two months after launch
- **Unprecedented take-up may make AI chatbot the fastest-growing consumer internet app ever, analysts say**

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A3: Existing profession orientation chatbots

1. **YouScience** is an online platform which utilizes an AI-driven virtual career coach to help students explore their strengths, interests, and career options. Website: https://www.youscience.com/
2. **Xello** is an online platform that helps students in grades 6-12 explore career and college options though an interactive chatbot. Website: https://xello.world/
3. **MyMajors** is an online resource that assists students in discovering their academic and career paths. It features a chatbot that engages with students to identify their interests, strengths, and goals, and provides recommendations for potential majors and careers. Website: https://www.mymajors.com/
4. **ChatGPT** can be used as a resource for professional orientation. It can provide information on different careers, answer questions, and offer guidance based on the knowledge it has been trained on. – Students explore
5. **Bard** generative artificial intelligence chatbot developed by Google, based initially on the LaMDA family of large language models and later the PaLM LLM https://bard.google.com/

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A4: Explore tools for developing AI chatbots

- Juji Studio combines cognitive AI with intuitive graphical user interface (GUI), enabling you to build the best AI chatbots without code (https://juji.io/no-code-ai-chatbot-builder/)
- **Flowxo** supports building chatbots for multiple messaging platforms, including Facebook, Messenger, Slack (https://flowxo.com/)
- **Botsify** is a chatbot development platform that allows students to build AI chatbots without coding (https://botsify.com/)

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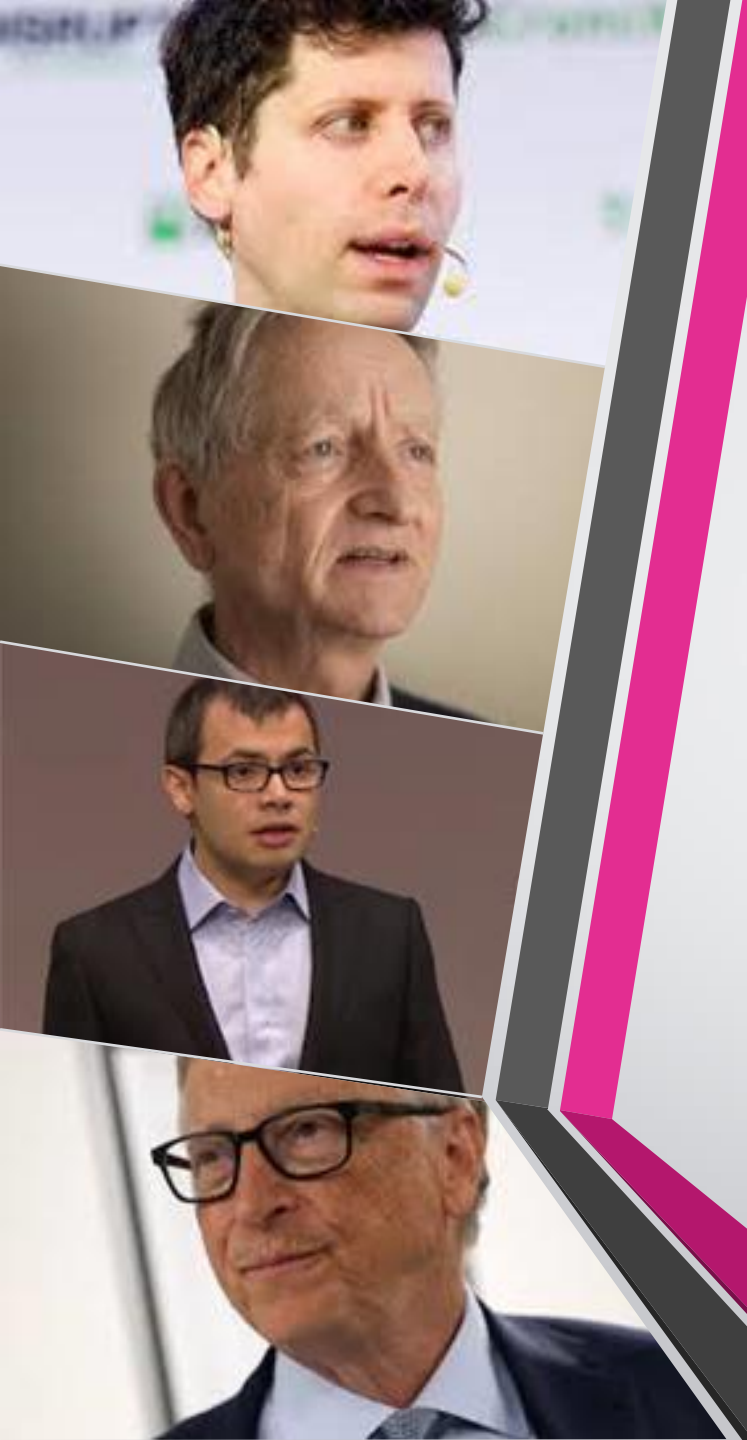
Challenges

- **Natural Language Understanding (NLU)**:
  - Improving accuracy and context awareness.
  - Handling ambiguity and complex queries.
- **Ethical Considerations**:
  - Ensuring chatbots behave responsibly and avoid harmful actions or biased responses.



Ethical Considerations

“Mitigating the risk of extinction from AI should be a global priority alongside other societal scale risks such as pandemics and nuclear war.” Center for AI Safety (CAIS)

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Extra activity

- Discuss with students how an AI chatbot for profession orientation purposes could be biased
- For instance, if the chatbot suggests certain careers are more suitable based on gender, ethnicity, or other protected characteristics, it can reinforce stereotypes and limit opportunities.

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New profession created by AI

- **Prompt engineering** entails optimizing textual input to effectively communicate with large language models
- No1 “job of the future” (World Economic Forum)
- Open AI CEO Sam Altman characterized it as an “amazingly high-leveraged skill”
- *A more enduring and adaptable skill is **problem formulation** meaning the ability to identify and analyze problems*

(Harvard Business Review)

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Thank you for you attention

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- [1] https://openai.com/blog/chatgpt/ A new cutting-edge AI chatbot that can be used as motivation for the purposes of this L&C Plan.
- [2] https://juji.io/ This is Juji Studio that will be used for deploying an AI chatbot for the purposes of this L&C Plan.
- [3]https://eic.eismea.eu/challenges/solution/jobiri-1degai-based-digital-career-advisor/about This is the first AI based digital career advisor, Jobiri. It can be used as a first reference on what is available for profession orientation.
- [4] Introduction to Large Language Models, Google, https://www.cloudskillsboost.google/course_templates/539

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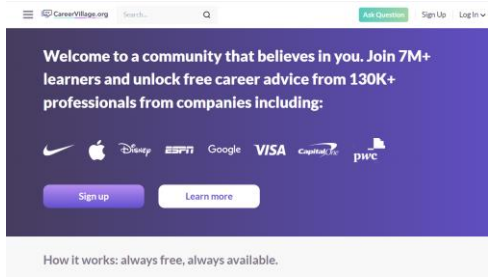
Backup slides

- CareerVillage is an online platform that connects students with real professionals who can answer their career-related questions. While it's not a chatbot, it offers a community-driven approach where students can seek advice and guidance from professionals in various fields. Website: https://www.careervillage.org/



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Additional tools that can be used

- Wordpress can be used for chatbot creation, with various plugins and integrations.

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Students can create their own chatbots by following these general steps:

1. Define the Purpose: Identify the specific purpose or task the chatbot will serve. Determine if it will provide information, answer questions, offer recommendations, or assist with a particular domain or topic.
2. Plan the Chatbot's Features: Outline the key functionalities and features the chatbot should have. Consider the types of questions it should be able to handle, the information it will provide, and any specific interactions or prompts it should support.
3. Choose a Platform or Framework: Select a platform or framework suitable for building the chatbot. There are various options available, ranging from no-code chatbot builders to programming languages and libraries specifically designed for building chatbots.

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General steps for creating chatbots:

4. Design the Conversation Flow: Map out the conversation flow by considering possible user inputs and the corresponding chatbot responses. Determine how the chatbot will handle different scenarios and prompts and create a dialogue structure accordingly.

5. Gather and Prepare Data: If the chatbot will require training data, collect and prepare a dataset that matches the intended functionality. This may include questions, possible user inputs, and the corresponding expected responses.

6. Build and Train the Chatbot: Use the chosen platform or programming language to build and train the chatbot. Implement the conversation flow, integrate the necessary components, and train the chatbot using the prepared data or techniques like supervised learning if applicable.

7. Test and Refine: Test the chatbot extensively to identify any issues, errors, or areas for improvement. Gather feedback from users or peers and iterate on the design and functionality to enhance the chatbot's performance.

8. Deploy and Interact: Once the chatbot is refined and tested, deploy it to a platform or website where users can interact with it. Make sure it is accessible and user-friendly.

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