

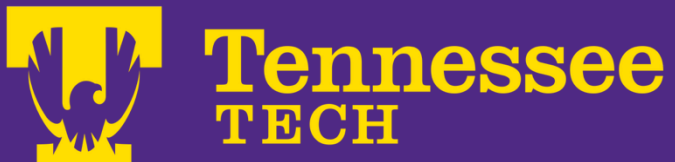
The Power of Prompting



Summer Intensive 2025
Session 2

Agenda

9:15-9:45



3 Types of Prompts



Personas and Tone/Style



Choosing the Right AI for the Task



AI in Action

The power of AI prompting:



Why Prompting Matters

AI vs. Google

Artificial Intelligence

- Conversation
- Human-like responses
- Remembers earlier conversations
- Can create original content
- Best for teaching and brainstorming
- Requires sources to be checked by the human

Google

- Keywords
- Links to sites or articles
- Isolated searches
- Finds what's already been published
- Best for researching and verifying facts
- Requires sources to be checked by the human

According to Watson (2024), "But talking **with** AI is different than talking **at** a web browser" (p.50).





AI Prompting Refresher

- It's important to safeguard your personal information and student information.
- When interacting with AI tools, please ensure that you do not include any personal or sensitive information in your prompts.
- If you wouldn't post it on the web, don't put it in a prompt.



3 Types of Prompts

Direct Prompts



Image generated with Canva on April 17, 2025

- Clear, specific instructions given to AI to generate desired response
- Avoids vagueness and provides explicit details

Ex: "Summarize the key themes of this text in one paragraph"

Direct Prompts

Faculty

Prompt: Create a 10-question multiple choice quiz over this syllabus

Syllabus Quiz: AI Tools for Educators

1. What is the preferred method of communication with the instructor?

- A. Phone call
- B. In-person office visit
- C. Email or Microsoft Teams chat
- D. Text message

Answer: C

2. Which of the following is a prerequisite for this course?

- A. Completion of an AI certification
- B. Employment at Tennessee Tech and access to D2L (iLearn)
- C. Prior experience with ChatGPT
- D. At least one semester of teaching online

Answer: B

3. What is the format of this course?

- A. Fully in-person with scheduled lectures
- B. Hybrid with mandatory live sessions
- C. Self-paced asynchronous online format
- D. Synchronous Zoom classes only

Answer: C

4. What is the main goal of this course?

- A. To teach programming with AI tools
- B. To create fully automated AI courses
- C. To empower educators to effectively integrate AI into their teaching
- D. To develop AI software for higher education

Answer: C

5. What is required to fully participate in this course?

- A. Only a printed textbook
- B. A computer and D2L instructor access
- C. Smartphone with TikTok installed
- D. Lab coat and safety goggles

Answer: B

Direct Prompts

Students

Prompt: Use this syllabus to help create an outline on what I need to accomplish and do this semester



Semester Outline: AI Tools for Educators

General Notes



- **Course format:** Self-paced, asynchronous
- **Time commitment:** 3–5 hours per week
- **Tools needed:** D2L access, a computer, and optionally a microphone & recording software
- **Final deliverable:** A lesson plan incorporating AI tools into assignments/assessments

Module Breakdown

Module 1: Intro to the Course

-  Complete:
 - Discussion post: How will this course better your teaching practices?
 - Intake form: How do you plan to use AI this semester?
 - Syllabus quiz
-  Objective: Understand the course structure, key topics, and expectations

Module 2: Choosing the Right AI for the Job

-  Complete:
 - Discussion post
 - View lecture slides
 - Quiz: Types of AI tools
-  Objective: Learn the origins of AI & match AI tools to tasks

Open-Ended Prompts



Image generated with Copilot on April 21, 2025

- Allows broad, creative, or exploratory responses rather than a predetermined answer.
- Encourage AI to generate diverse ideas, elaborate on concepts, or provide insights

Ex: "Suggest innovative ways to teach calculus to college freshmen."

Open-Ended Prompts

Faculty

Prompt: Suggest innovative ways to teach algebra to college students

Gamification & Interactive Learning

1. Algebra Quest Game

Build a semester-long narrative where students earn "XP" (experience points) for completing problem sets, passing quizzes, helping peers, etc. Use a leaderboard, badges, and unlockable "boss battles" (cumulative challenges).

2. Escape Room Challenges

Use digital tools (like Google Forms with locked sections) or physical setups where students must solve algebra puzzles to "escape" a scenario.

3. Algebra Olympics

Host team-based competitions (like relay problem-solving or timed factoring challenges). Encourage collaborative problem-solving and peer teaching.

Tree of Thought / Exploratory Thinking

4. Multiple-Path Problem Solving

Pose a problem and have students explore **different ways to solve it** (e.g., graphing, substitution, elimination, etc.). Use "Tree of Thought" diagrams to map strategies and evaluate pros/cons.

5. What If Wednesdays

Once a week, give students a solved problem and ask, "What if we changed this variable/condition?" Push them to explore how the math changes when the context or parameters shift.

Real-World Integration

6. Data-Driven Projects

Have students collect real data (e.g., sports stats, environmental data, personal finance figures) and model it with algebraic equations. This gives meaning to abstract symbols.

7. Algebra in Your Major

Connect content directly to their field (e.g., slope as rate of change in business, biology, or psychology). Let students design small presentations on where algebra shows up in their discipline.

8. Personal Finance Simulation

Teach linear equations, percentages, and systems through simulated budgeting, saving, and investing scenarios.



Open-Ended Prompts

Students

Prompt: I am a student writing a fantasy story, but I am struggling with a setting. Can you suggest a list of unique fantasy worlds or settings I can use?

Here's a list of unique fantasy world settings that a student might use for their story:

1. A Floating Archipelago:

- An entire world made up of floating islands suspended in the sky. Each island has its own distinct culture, ecosystem, and magic, and travel between them requires special flying creatures or airships. The islands might be drifting closer or further apart due to a mysterious force, creating tension between them.

2. A Forest That Grows Backwards in Time:

- The trees and creatures in this vast forest age in reverse, with younger versions of life forms appearing further into the woods. A group of explorers could enter the forest in search of an ancient relic, but they must navigate the peril of encountering past versions of themselves or events they've already lived through.

3. A World Where People Live in the Walls of Giant Creatures:

- The inhabitants of this world live inside the walls of enormous, slow-moving beasts that roam a barren landscape. These creatures provide shelter, food, and resources, but they are gradually dying, forcing the people to find a new way of life or another creature to survive on.

4. A Desert Made of Glass:

- A vast, shimmering desert where everything—sand, dunes, and even the sun—is made of glass. Strange, ancient beings live here, and the reflective surfaces have magical properties, distorting time or revealing hidden secrets. Explorers must uncover its mysteries while avoiding the dangers that the glass holds.

5. A World Inside a Giant Tree:

- This world exists within the branches and roots of a gargantuan, ancient tree. The tree is so large that it houses entire civilizations, each living in different levels or areas of the tree, from the canopy to the deep roots. The tree is slowly dying, and the residents must figure out how to save it or adapt to a new way of life.

6. A Planet Where the Laws of Gravity Shift Regularly:

- On this world, gravity fluctuates, causing objects, people, and landscapes to constantly change in direction or weight. One day, everything might float in the air, and the next, gravity pulls things sideways or even causes waterfalls to reverse. The instability forces the inhabitants to develop ingenious solutions for survival, and the shifting laws could be connected to a deeper mystery.

Iterative Prompts

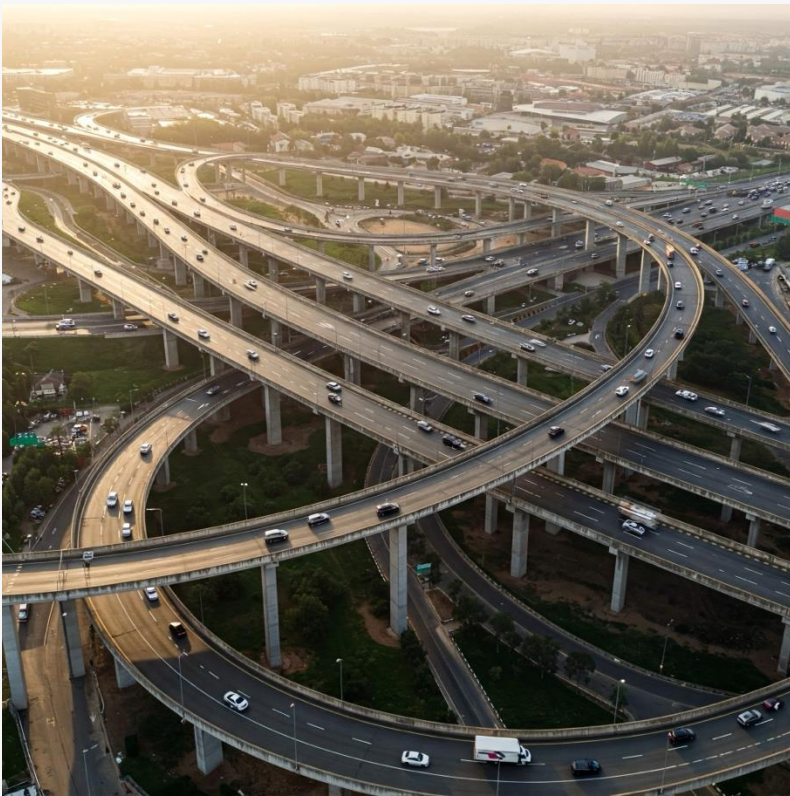


Image generated with Gemini on April 25, 2025

- Process of refining and adjusting prompts over multiple interactions to improve accuracy, relevance or depth
- Provides feedback, rephrasing, or adding details to guide AI toward a desired output

Ex:

- **"Explain the engineering design cycle"**
- **"Make the explanation simpler for college freshmen to understand"**

Iterative Prompts

Faculty

Prompt: Explain the steps of photosynthesis

Provide a metaphor that compares photosynthesis to a factory assembly line, where sunlight is the raw material and glucose is the final product

1. Absorption of Light

- **Location:** The process begins in the chloroplasts, primarily in the leaves of plants.
- **Pigments:** The chloroplasts contain chlorophyll, a green pigment that absorbs light, mainly in the blue and red wavelengths, and reflects green light. This is why plants appear green.
- **Light energy:** Light energy is absorbed by chlorophyll and other pigments.

2. Water Splitting (Photolysis)

- **Location:** Thylakoid membranes in the chloroplast.
- **Action:** The absorbed light energy splits water molecules (H_2O) into oxygen (O_2), protons (H^+), and electrons (e^-).
- **Byproduct:** Oxygen (O_2) is released as a byproduct of this reaction.

3. Production of ATP and NADPH

- **ATP (Adenosine Triphosphate):** The electrons released from the splitting of water are passed along the electron transport chain, leading to the production of ATP through a process called **photophosphorylation**.
- **NADPH (Nicotinamide Adenine Dinucleotide Phosphate):** Electrons are also transferred to NADP^+ , reducing it to form NADPH. Both ATP and NADPH are energy-rich molecules that are used in the next phase of photosynthesis.

4. Carbon Fixation (Calvin Cycle)

- **Location:** Stroma of the chloroplast (the fluid-filled space surrounding the thylakoid membranes).
- **Action:** The enzyme **RuBisCO** fixes carbon dioxide (CO_2) from the atmosphere, attaching it to a 5-carbon molecule called ribulose biphosphate (RuBP).
- This results in a 6-carbon compound that immediately splits into two molecules of 3-phosphoglycerate (3-PGA).

5. Synthesis of Glucose

- **ATP and NADPH use:** The 3-PGA molecules are then converted into glyceraldehyde-3-phosphate (G3P) using the energy from ATP and NADPH produced in the light-dependent reactions.
- Some G3P molecules exit the cycle and are used to form glucose ($\text{C}_6\text{H}_{12}\text{O}_6$), while others regenerate RuBP to continue the cycle.

6. Final Output

- **Glucose:** The primary product of photosynthesis. It can be used immediately for energy or stored as starch.

Imagine photosynthesis as a factory assembly line where sunlight is the raw material and glucose is the final product.

1. **Raw Material (Sunlight):** The factory receives sunlight (raw material) as its main energy source, much like how a factory uses raw materials like metal or plastic.
2. **Reception and Breakdown (Chlorophyll as Workers):** Workers (chlorophyll in the leaves) absorb the sunlight and use it to power the assembly line, just like workers in a factory use energy to run machines.
3. **Water Processing (Water Splitting):** In the factory, water is like an ingredient that is broken down into parts. The workers (chlorophyll) break down water into oxygen (which is released into the air) and electrons (which power the factory's machines).
4. **Assembly Process (Calvin Cycle):** The carbon dioxide from the air enters the assembly line (through small openings in the leaves called stomata). The workers use the energy from the sunlight and the electrons to put together a simple product, G3P (like a half-finished product on the line).
5. **Final Product (Glucose):** Finally, the assembly line completes the product—glucose—a high-energy sugar, which is stored or used by the plant just like a factory product is stored or shipped out.

So, the factory takes sunlight (raw material) and processes it through different stages (using water, carbon dioxide, and energy) to produce glucose (the finished product).

Iterative Prompts

Students

Prompt: I am a student in a college level biology course; can you please explain the process of cellular respiration?

Iterative prompting involves refining and building upon previous responses to get more specific, detailed, or focused results. Here's an example of how a student could use this style of prompting in a college-level biology course:

Step 1: Initial Prompt

Student Prompt: "Can you explain the process of cellular respiration?"

AI Response:

"Cellular respiration is a process by which cells break down glucose to produce ATP (adenosine triphosphate), the energy currency of the cell. It occurs in three main stages: glycolysis, the citric acid cycle, and oxidative phosphorylation (which includes the electron transport chain and chemiosmosis)."

Step 2: Follow-up Prompt (Building on the Initial Answer)

Student Prompt: "Can you explain the citric acid cycle in more detail?"

AI Response:

"The citric acid cycle, also known as the Krebs cycle, occurs in the mitochondria. It begins with the combination of acetyl-CoA and oxaloacetate to form citric acid. Through a series of reactions, citric acid is broken down, releasing CO₂, generating high-energy molecules such as NADH and FADH₂, and producing ATP. This cycle plays a crucial role in energy production and connects to the electron transport chain."

Step 3: Further Refinement (Focusing on Specific Details)

Student Prompt: "How does NADH contribute to the electron transport chain?"

AI Response:

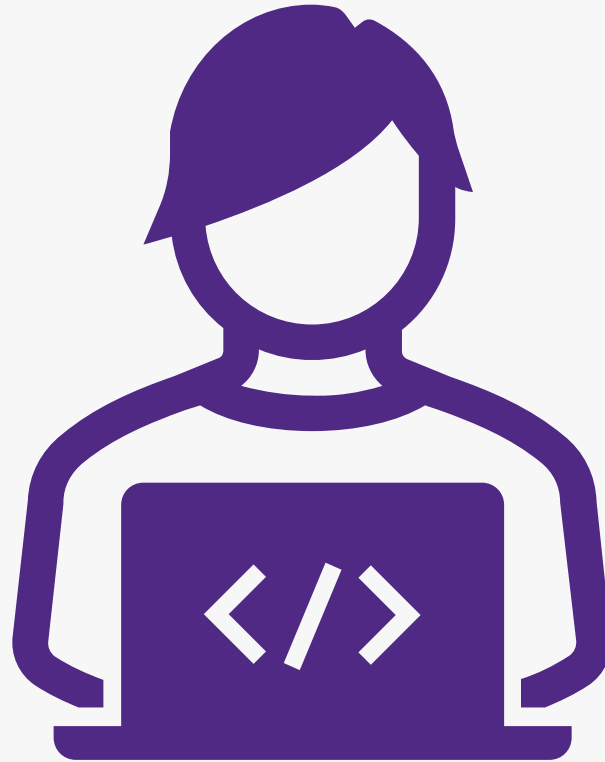
"NADH donates electrons to the electron transport chain, a series of proteins located in the inner mitochondrial membrane. The electrons from NADH are passed through these proteins, ultimately contributing to the pumping of protons (H⁺) across the membrane, creating a proton gradient. This gradient powers ATP synthesis via ATP synthase."

Step 4: Clarification or Deeper Exploration

Student Prompt: "Can you explain how ATP synthase works in more detail?"

AI Response:

"ATP synthase is an enzyme embedded in the inner mitochondrial membrane. It consists of two main parts: the F₀ portion, which forms a channel for protons to flow through, and the F₁ portion, which synthesizes ATP. As protons flow through the F₀ channel, they cause the F₁ portion to rotate, driving the conversion of ADP and inorganic phosphate into ATP."



Personas

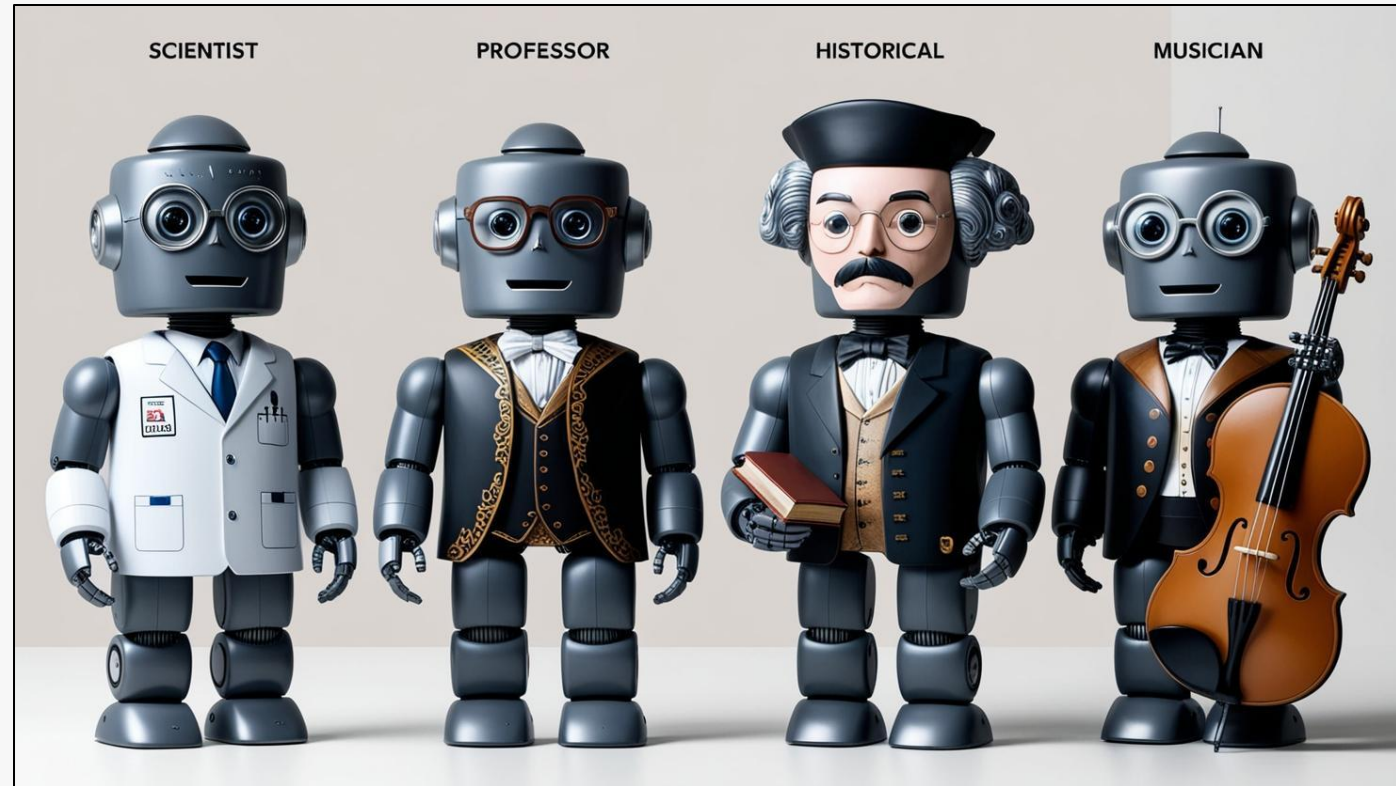
Prompt Personas

What is it?

- Assigning the chatbot a particular expert identity within the prompt to guide the response

Why use it?

- Adds a level of authenticity and depth to a response along with detail drawn from specialized knowledge and experience



Examples of Personas

Professor

Engineer

Musician

Famous
Speaker

Fictional
Author

Historical
Figure

Lawyer

Scientist

Instructional
Designer

Personas



You are an engineer professor in higher education, give me 5 tools that I can use to enhance student engagement in class



Take on the role of a biology professor and explain the steps in photosynthesis using a metaphor to compare the process to an assembly line



You are a student who is acting as a tutor, use this study guide to give me a 15-question practice test



Act as an instructional designer in higher education, provide a list of 5-7 strategies faculty can use to enhance student engagement in a lecture style course



Tone & Style

Tone and Style

What is it?

- Providing chatbot with the desired voice, tone or language style to match the theme of the prompt

Why use it?

- Help create a more engaging and personalized experience for the user to convey a certain mood or emotion that aligns with the topic



Image generated with Copilot on April 14, 2025

Examples of Tone and Style

Formal

Creative

Professional

Celebratory

Casual

Persuasive

Gentle

Quirky

Shakespearean

Tone and Style



Create a warm and welcoming message for students, letting them know the syllabus is available and encouraging them to read it before our next session



Summarize the key points from these meeting notes, keeping it brief and formal



Generate 5 creative and slightly humorous multiple-choice questions on {topic} to make the quiz more engaging



Simplify this paragraph from my lecture on {topic} so it's in plain language and would be clear to students with different learning styles



Image generated with Canva on April 15, 2025

Which AI is Right for the Task?

AI	Best Used For	Limitations
ChatGPT	<ul style="list-style-type: none"> Interactive conversations for brainstorming ideas Course materials generation (quizzes, summaries, objectives, etc.) Answering questions or clarifications on topics Personal tutoring or coaching Writing assistance 	<ul style="list-style-type: none"> May provide generic or vague responses Sometimes struggles with specialized academic topics Can provide inaccurate or biased information without sources Limited understanding of sarcasm/humor unless they are very clear
Copilot	<ul style="list-style-type: none"> Writing suggestions for assignments and papers Automating repetitive tasks in teaching Integrates with Microsoft 365 products well Generate slides in PowerPoint based on topic 	<ul style="list-style-type: none"> Most effective when used within Microsoft ecosystem Content generation is still generic or limited in creativity Processing speed may be slower when dealing with large documents May not be as helpful for non-technical subjects
Gemini	<ul style="list-style-type: none"> Multi-modal tasks (e.g., image and text) Complex analysis or research generation Lesson plan drafting Language translation Answer complex queries based on context and past interactions 	<ul style="list-style-type: none"> Newer model, may have occasional bugs or limitations May offer more generalized responses on specific topics Most effective when used within Google ecosystem Can't generate images with people
Claude	<ul style="list-style-type: none"> Creativity and content generation (e.g., essay ideas) Peer review or feedback on assignments Interactive dialogues Synthesis of information 	<ul style="list-style-type: none"> Struggles with highly technical or specialized queries Limited contextual understanding for deep subject-specific queries No real-time data or live updates Limited originality
Grok	<ul style="list-style-type: none"> Conversational AI with a focus on information retrieval Task automation Emotion recognition Integration with other platforms 	<ul style="list-style-type: none"> Limited training in niche areas like advanced math or science May not handle long-form or highly academic responses well Limited memory Sensitive to input quality
Perplexity	<ul style="list-style-type: none"> Research support (sourcing articles, summarizing) Quick answers to factual questions Quiz generation Document analysis 	<ul style="list-style-type: none"> Accuracy of sources may vary; sometimes pulls outdated references Less conversational than others; more focused on short-answer responses Not ideal for scientific or mathematical focus areas



AI in Action

Examples



Image generated with Canva on April 25, 2025

- Create a 10-question fill in the blank quiz on {subject}
- Explain {concept} at a beginner level, put this information in a bullet list
- Write an outline for {topic}
- Use this syllabus to make the language more inclusive
- Generate 5 case studies on {topic}
- Suggest 5 creative ways to make {subject} more engaging for students
- You are a (persona/role) speaking to (audience). Your goal is to (objective). Write/explain (topic or task) in a (tone/style) way.

Key Takeaways

- Remember the more specific and clear your prompt is, the better the AI response will be
- Consider AI's limitations and potential biases
- There is no "one size fits all" approach to prompting
- AI is your collaborative partner, don't be afraid to experiment and try new things!



References & Resources

Watson, J. M. (2024). *Learning with AI: The K-12 Teacher's Guide to a New Era of Human Learning*. John Hopkins University Press.

Bowen, J. A., & Watson, C. E. (2024). *Teaching with AI: A practical guide to a new era of human learning*. Johns Hopkins University Press.

Norton, K. (2023, September 19). *Prompt personas - Generative AI Productivity Hacks with Miss Excel* [Video].

LinkedIn. <https://www.linkedin.com/learning/generative-ai-productivity-hacks-with-miss-excel/prompt-personas?u=26115762>

- [Prompt Library – AI for Education](#)
- [Prompt Engineering](#)
- [Chatbot Cheat Sheet-AI for Education](#)
- [Prompt Collection by Dave Birss](#)
- [Student Guide to Artificial Intelligence](#)