Hidden Markov Model (HMM) Write-Up for Capstone: AI-Powered Creative Learning Platform

1. What Can the Model Observe?

- How their voice sounds (like tone, pitch, or speed)
- The mood in their spoken or written words (positive, negative, excited)
- Facial expressions (Not A Certain Feature)

The goal is for the model to understand how the user is feeling or how engaged they are. Based on this, the system can recommend creative learning content, such as music, spoken word, or storytelling, that matches their mood or helps guide their emotions.

2. What Type of HMM Problem is This? This is an unsupervised HMM problem because we don't know the user's emotional states in advance, as they are not directly observable. We can observe things like their voice and words, but their true emotions (like frustration, curiosity, or excitement) are hidden. The model's job is to figure out these hidden emotional states from what it can observe.

3. How Will the Model Learn?

a. What We Already Know: The features we can measure include metrics like audio signals and sentiment from text. We can guess or set the number of possible emotional states (like happy, curious, frustrated).

b. What the Model Needs to Learn: The actual hidden emotional states, how likely it is to move from one emotional state to another (for example, from frustrated to curious), How likely it is to observe certain signals (like a loud voice or positive words) when in a particular emotional state.

4. What the Model Will Keep Updating:

- **Transition Matrix:** The chances of switching from one emotional state to another.
- **Emission Matrix:** The chances of seeing certain signals (like voice features or text mood) when in a particular emotional state.
- **Initial State Probabilities:** The chances of starting in each emotional state.