AI Teaching Assistant Report

Innovation Management

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# Introduction

For this project we selected Innovation Management as our course because it is a dynamic, interdisciplinary subject that benefits from interactive explanations, case studies, and real-world application. Our AI teaching assistant, “Ubuntututor” is designed with a professional yet approachable persona to help students understand innovation frameworks, methodologies, and industry examples. The name "Ubuntututor" reflects the collaborative and community-driven spirit of the Ubuntu philosophy, fostering a supportive learning environment.

## Scope of Ubuntututor

* Explaining key innovation concepts.
* Providing case studies.
* Answering FAQs (Frequently Asked Questions) about innovation processes and tools.
* Offering brainstorming tips and creativity techniques.

# Tool Selection Justification

We chose Google AI Studio with the Gemini API for the following reasons:

* It supports advanced natural language processing for detailed explanations.
* Allows prompt engineering to tailor responses to innovation management topics.
* Easily integrates with a simple web interface.
* The free tier supports development without exceeding usage limits, making it suitable for prototyping.

# Design & Implementation

## Prompt Design & Context Management

We structured prompts to:

* Maintain a consultant-like tone.
* Provide structured responses.
* Avoid off topic answers with clear boundaries.

### Example System Prompt.

## Interface Implementation

We built a web-based chat interface using:

* Frontend – HTML/CSS/JavaScript
* Backend – Node.js and Gemini API for processing queries.

### Key Code Snippet (Gemini API Call)

const express = require('express');

const { GoogleGenerativeAI } = require('@google/generative-ai');

const app = express();

const port = 3000;

app.use(express.json());

app.use(express.static('public'));

const genAI = new GoogleGenerativeAI('YOUR\_GEMINI\_API\_KEY'); // Replace with your API key

app.post('/api/chat', async (req, res) => {

  const userMessage = req.body.message;

  try {

    const model = genAI.getGenerativeModel({ model: 'gemini-1.5-flash' });

    const prompt = `You are Ubuntututor, an AI teaching assistant for an Innovation Management course. Adopt a professional, approachable, and encouraging tone, like an expert consultant. Provide accurate, concise explanations of innovation concepts, including a definition and a real-world example. Answer only questions related to Innovation Management. Structure responses with a clear explanation followed by an example. If the question is unclear or off-topic, politely redirect the user to ask about Innovation Management topics. User question: ${userMessage}`;

    const result = await model.generateContent(prompt);

    const response = await result.response.text();

    res.json({ response });

  } catch (error) {

    console.error('Error:', error);

    res.status(500).json({ error: 'Something went wrong' });

  }

});

app.listen(port, () => {

  console.log(`Server running at http://localhost:${port}`);

});

### User Interface (HTML)

# 

# Demonstration Scenarios

|  |  |  |
| --- | --- | --- |
| **User Question** | **Expected Response** | **Actual Response** |
| What is disruptive innovation? | A clear definition of disruptive innovation with an example, e.g., how Netflix disrupted Blockbuster. | Ubuntututor: Disruptive innovation refers to a new product or service that starts at the bottom of a market and eventually displaces established competitors by offering simpler, more affordable, or accessible solutions. Example: Netflix introduced streaming services that were initially lower quality but more convenient than Blockbuster’s physical rentals, eventually dominating the market. |
| Can you give an example of open innovation? | An explanation of open innovation with a real-world example, e.g., Procter & Gamble’s Connect + Develop. | Ubuntututor: Open innovation involves leveraging external ideas and technologies alongside internal innovation to improve products or processes. Example: Procter & Gamble’s Connect + Develop program collaborates with external innovators to develop new products, such as the Swiffer, which was co-created with outside partners. |
| How can I brainstorm effectively? | Practical tips for brainstorming, such as mind mapping or the SCAMPER technique. | Ubuntututor: Effective brainstorming involves generating ideas without judgment, using techniques like mind mapping or SCAMPER (Substitute, Combine, Adapt, Modify, Put to another use, Eliminate, Reverse). Example: Use mind mapping to visually connect ideas around a central theme, like brainstorming ways to improve a product’s sustainability. |
| What is AI? | A polite redirection to Innovation Management topics. | Ubuntututor: I’m here to help with Innovation Management topics. Could you ask a question related to innovation concepts, processes, or examples? For instance, I can explain disruptive innovation or brainstorming techniques. |

# Challenges & Learning

## Challenges Faced

* Prompt Refinement: Initial responses from the Gemini API were too general, requiring iterative prompt adjustments to focus on Innovation Management.
* API Rate Limits: Managing the Gemini API’s free tier limits (requests per minute/day) to avoid disruptions during testing.
* Interface Responsiveness: Ensuring the web interface was user-friendly and responsive across devices within the project timeline.

## Key Learnings

* Prompt Engineering: Crafting precise prompts improves the Gemini API’s response quality and relevance significantly.
* API Integration: Learning to handle API requests and responses in a Node.js environment using the Gemini API.
* Team Collaboration: Dividing tasks based on expertise (e.g., frontend, backend, prompts) streamlined development.

# Team Contributions

Ayanda Cetshwayo – AI & Prompts

Odirile Dire - Backend

Ntokomalo Sinhle Macheulleyn Mlangeni - Frontend

Micheal Richard Lan Mon – Documentation

# Conclusion

Ubuntututor successfully assists students in understanding innovation concepts with structured explanations and examples. Future upgrades could include multi-model outputs and quiz generation.