# Project Proposal for Generating Course Material

Team Number: 16
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## 1 Overview

Our project goal is to develop a responsive web application powered by generative AI for educators which would represent a significant step towards the future of adaptable and personalized learning. By combining cutting-edge technology with user-centric design, we aim to empower educators to create, modify, and optimize course materials that foster a dynamic and effective learning experience.Our Application would help educators save time and resources by automating content generation and having access to a vast library of adaptable materials.Educators can collaborate with peers to co-create and review course materials, fostering a community of knowledge sharing and best practices. This initiative is poised to revolutionize education and benefit both educators and students alike.The project will be developed in multiple phases, with an initial prototype available for testing within the **first six months**.Here are the key components of the MVP:

1. User Registration and Authentication:
   1.1) Users can register for an account with basic information.
   1.2) Users can log in securely.

2. User Dashboard:
   2.1) Upon login, users are presented with a simple dashboard.
   2.2) The dashboard displays basic user profile information.

3. Content Creation:
   3.1) Educators can create basic course materials using a simplified text editor.
   3.2) Materials can be saved and edited.

4. Content Preview:
   4.1) Educators can preview the course materials they create, including AI-generated suggestions.
   4.2) The preview provides a basic representation of the materials' appearance.

5. Mobile Responsiveness:
   5.1) Ensure that the application is responsive and usable on both desktop and mobile devices.

### 1.1 Envisioned Usage

The users, which are Teachers or private tutors, can use this application to generate learning materials for their students for the subject based on the resources they have. These can be explained using the following concepts:
Scenario 1:
Mr Styles, a Political Science teacher wants to assign homework assignments that asses students based on different difficulty levels. Using the AI tool, he can input the level of difficulty and the topics he wants to cover.

Scenario 2:
Ms. Bella, a Chemistry teacher wants to create engaging and customized lessons for her class. With the AI tool, she can input the topic, grade level, and learning objectives. It can generate lesson plans, notes, and interactive activities, helping her save time on developing the curriculum while ensuring material aligns with educational standards.

Scenario 3:

A Chinese language tutor named Dwayne Johnson uses generative AI to assist his students in learning the language. He provides the AI with students' current proficiency level and their learning goals. This tool can generate vocabulary lists, exercises, and tests based on student's learning levels so it caters to their particular needs.

Scenario 4:

A private tutor, Dean Ambrose, doesn't have many resources and wants to gather resources for his students. With the application, he could connect to a community of teachers and professors who share their resources and templates for assignments. He could then use these to either completely use the resources as such or use the AI tool to generate more material from that.

## 2 Major Milestones

| **Deadline** | **Deliverable** |
| --- | --- |
| Term 1 week 9: Mini Presentation | - Project Management: Trello setup and initial task assignment. <br> - Technical Direction: Time Estimation for each feature, Decisions on programming choices. <br> - System Architecture Design: Initial drafts and considerations. <br> - User Interface Design: Preliminary mockups focusing on user-friendly navigation and visual hierarchy. |
| Term 1 week 13: Design submission | - Feature 1: User Registration and Authentication setup. <br> - Feature 2: Basic User Dashboard development. <br> - CSS Development: Beginning styling and theming, including decisions on neutral color themes. <br> - Database Setup: Initial database configuration and setup for user profiles and content. |

| | |
|---|---|
| Term 2 week 4: Peer Testing | - Feature 3: Content Creation tools and UI. <br> - Feature 4: Content Preview capabilities. <br> - Feature 5: Offline Content Access functionality. <br> - Feature 6 & 12: Mobile Responsiveness and Responsive Design. <br> - Feature 7 & 8: Notes sharing and Private Notes modules. |
| Term 2 week 8: Peer Testing | - Feature 9: Thumbnails for profile pics. <br> - Feature 10: Enhancements for User-friendly navigation. <br> - Feature 13: Dark mode design and development. <br> - Feature 14: Visual Hierarchy refinement. <br> - Feature 15: Typography and Readability enhancements. |
| Term 2 week 13: Final project submission | - Feature 16: Notification Center for completion of slide generation. <br> - Feature 17: Integration of Interactive Elements. <br> - Feature 18: User Onboarding guide and tutorials. <br> - Maintenance: Overall app health, bug fixes, and refinements. <br> - Design & Final Reports: Creation and editing of design videos, team, and individual reports. |

Table 1: Proposed Project Milestones: Provide any explanation necessary to make your milestones understandable. These milestones need to make sense of the number of people in your team and the number of weeks between each milestone.

# 3 Technology Stack

Technology used by the user

- Web browser
- Any smartphone

Front-end Development

- React
    - We are choosing React because of its ease of use due to the component-based architecture. React can also be easily integrated with other JS libraries and frameworks. In addition, It is one of the most favored skills to have when looking for developer jobs.
- HTML 5 and CSS3
    - HTML5 and CSS3 are widely accepted in the industry and are supported by all modern browsers, which ensures a web application that is consistent on different platforms and devices.
    - Both combine to result in faster loading times and improves the overall performance by eliminating the need for heavy JS libraries and other plug-ins,
- Redux
    - In addition to being the most popular state management library on React and valued in the full-stack developer job market, Redux DevTools provide powerful debugging capabilities (time-travel debugging), making it easier for us to maintain and debug this web application.
- Bootstrap
    - Bootstrap allows us to add interactive functionality to our web application as it integrates seamlessly with JavaScript libraries.
    - Bootstrap is also designed with web accessibility standards (WCAG) in mind, which will ensure a broader audience as it will allow us to create a web application that is easily usable by people with disabilities.
    - As Bootstrap is already popular among many organizations, having expertise in this framework can make us attractive candidates for web development jobs in the future.

Back-end Development

- Python
    - Python has a strong ecosystem for AI, which makes it a solid choice since we plan to use GPT 3. This allows us to easily integrate Python-based AI libraries (Open AI's Python library) into our back-end.
    - In addition, since python has a very active community, it will be easier for our team to find resources, libraries, and examples.
- Node Js.
    - Since we are using JavaScript on the front-end (React), using Node.js on the back-end provides consistency in the tech stack.

Database

- MongoDB
    - In addition to being able to scale to any workload, MangoDB is open source, which allows the team to use it without licensing fees.

Generative AI

- Open AI's GPT 3 API
    - GPT - 3 is capable of understanding and generating human-like text in natural languages. It also provides consistent and objective responses.

Authentication and User Management

- Passport.js
    - Passport.js is very flexible. It allows us to choose from different authentication methods such as username/password, OAuth, OpenID, and so on and so forth.

- JSON Web Tokens for secure token-based authentication
    - JWT's are good for web applications because they are very secure (they provide a way to verify the integrity of data within the token to be sure it has not been tampered with).

Deployment

- Docker
    - Docker creates an environment that ensures consistency, highly scalable and simplifies development.
- Kubernetes
    - Kubernetes ensures high availability and efficient resource utilization while simplifying updates.

Data Storage and Processing

- Amazon S3
    - Amazon S3 securely stores the assets at scale. It reduces load on web servers and improves user experience.

# 4 Teamwork Distribution and Anticipated Hurdles

| Category | Harsimar | Dhairya | Bolu | Vinu | Gurbir Amrit |
|---|---|---|---|---|---|
| Experience | I have worked on creating front end for websites. Other than that I have created dashboards using python, tableau and servicenow | Worked on a project involving Mobile app development, worked on front and back end of a website project | I have worked on designing and implementing various user interfaces using React.js, HTML/CSS. | I have experience relating to front end dev (js, html, css). I also have a small amount of experience in Python.In addition,I did 2 co-op terms for the TCM team at UBC vancouver(IRP project) | Experience in data analysis, front-end development, VBA Scripting |
| Good At | C , Java , Python , Github , SQL , Figma , HTML , CSS , JavaScript , Tableau | Java, Python, SQL, Android Studio,PHP, Github, Tableau, | Java, HTML/CSS, SQL, Github, Android Studio, Tableau | Java, js, html, css, Python, Github, SQL, Tableau | JS, JUnit testing, JAVA, SQL |

| | | | | | |
|---|---|---|---|---|---|
| Expect to Learn | I am keen on learning latest front end frameworks for website building.Other than that I wanna learn machine learning and Artificial intelligence. | I expect to learn various language models, CICD, various Java Script frameworks, ReactJS, TensorFlow/PyTorch | I expect to learn how to develop the backend of an application properly and also utilize OpenAI API. Also learn improve on React.js | I'm eager to learn the process behind developing the front and back end of an application.I'm also looking forwaard to familiarizing my self with the Open AI API. | I am hoping to learn and implement deep learning frameworks in PyTorch and API implementation for generative AI. |

Table 2: Team Experience, Expertise, and Areas of Learning: Give the reader some context and explanation about your table. It can be short and described in the caption, but it needs to help the reader how to interpret what's in the table.

| Category of Work/Features | Harsimar Singh | Gurbir Amrit | Dhairya Bhatia | Bolu Yomi-Adeyemi | Vinu |
|---|---|---|---|---|---|
| Project Management: Trello Maintenance | ✓ | ✓ | ✓ | ✓ | ✓ |
| Technical Direction: Time Estimation, Making Programming Choices | ✓ | | | | |
| Technical Help: Finding Technical Solutions | ✓ | | | | |
| Troubleshooting: The Go-To When Others Are Stuck | | ✓ | | | |
| System Architecture Design | | ✓ | | | |
| User Interface Design | ✓ | | | | |
| CSS Development | ✓ | | | ✓ | |
| Feature 1: User Registration and Authentication | | | ✓ | ✓ | |
| Feature 2: User Dashboard | | ✓ | | | |
| Feature 3: Content Creation | | | ✓ | ✓ | |
| Feature 4: Content Preview | | ✓ | | | |
| Feature 5: Offline Content Access | | ✓ | | | |
| Feature 6: Mobile Responsiveness | | | ✓ | | |
| Feature 7: Notes sharing | | | | ✓ | |
| Feature 8: Private notes | | | ✓ | | |
| Feature 9 : Thumbnails for profile pics | | ✓ | | | |
| Feature 10 : User friendly navigation | ✓ | | | | |
| Feature 11 : Neutral Color themes | ✓ | | | | |
| Feature 12 : Responsive Design | ✓ | | | | |
| Feature 13 : Dark mode | ✓ | | | | |
| Feature 14: Visual Hierarchy(highlight imp content) | ✓ | | | | |
| Feature 15:Typography and Readability | ✓ | | | | |
| Feature 16:Notification Center:Completion of slide generation | | | | | |
| Feature 17:Interactive Elements | | | | | |
| Feature 18:User Onboarding | ✓ | | | | |
| Database Setup | | ✓ | ✓ | | ✓ |
| Presentation Preparation | ✓ | | ✓ | | ✓ |
| Design Video Creation | ✓ | | | | |
| Design Video Editing | ✓ | | | ✓ | |
| Design Report | | | | ✓ | |
| Final Video Creation | ✓ | ✓ | | ✓ | |
| Final Video Editing | ✓ | ✓ | | | ✓ |
| Final Team Report | | | ✓ | ✓ | ✓ |
| Final Individual Report | ✓ | ✓ | ✓ | ✓ | ✓ |

Table 3: Expected Areas of Contributions: Explain how things are assigned in the caption like this, or put the explanation into a separate paragraph so the reader understands why things are done this way and how to interpret your table.