SIH PROJECT - ID 1326

Problem Statement - Ideate and implement a system to enhance the quality of education in rural areas.

Objectives mentioned in the Problem Statement - Ideas

- **Elevate the communication skills and knowledge of the targeted society**
  A separate **chat room** for peers to improve their language and communication skills.They can use this chat room to discuss doubts, share problem photos, and engage with one another which fosters a sense of being in a **real classroom**. In this chat room, students can create user profiles with unique usernames, similar to Google Classroom. With these usernames, they can engage in **discussions with their peers**. Also this feature provides communication tips to the students. For implementation, we use HTML, CSS, JavaScript and its libraries, either **MongoDB or Firebase** for the database, depending on the requirements.

- **Study materials and mentor access**
  We'll be creating a **centralized repository** of study materials providing easy access to the students. We can use **React for UI** and **Node.js** for data retrieval and storage. Selected database to store the resources. For faster retrieval of the resources - **searching and categorization features** using Javascript libraries. In the profile section , we'll be having three subdivisions - Teachers or Educational Institutions(Both Govt and private), Students and Mentors (Look at the flowchart attached). Interested mentors or mentors appointed by the Govt can help students which also provide employment opportunities to the people from their regions/villages itself(offline mode also). Allowing mentors to upload their content (through the separate mentor's profile section and give access to the students . For this we take help of open resource platforms like **OER(Open Educational Resources)** , a very useful initiative by UNESCO. We can also ask for **licenses from open EdTech** platforms. This idea increases the resources. We can include a **doubt clearing system** here where the students should be able to reach mentors directly asking for doubts.

- **Monitoring skill progress**
  First we'll decide **what skills** we monitor, to monitor these skills, we'll introduce some quizzes, assignments and other tasks. We can use **LMS(Learning Management System)** API's for this. Then displaying the results through the user interface. We can include a **feedback system** in this both for mentors and students. Mentors should be able to give feedback based on the student's performance. Students should be able to give feedback whether the quizzes, assignments etc are easy ,difficult etc. We'll also utilize **data visualization** techniques to create **skill heatmaps**. These visual representations can help individuals understand their strengths and weaknesses in different subjects or skills. This provides the students with much needed **SWOT** (Strengths, Weakness, Opportunities, Threats) analysis It could also help mentors tailor their guidance more effectively.

- **Bridge the digital divide**
  1. A section in our website which contains a form to **apply for a tablet**. Students need to provide some valid documents for ID and address proof. Then, we need to verify their documents if valid or not. We also need to make sure that one student gets a tablet once. Internet facilities will be taken care of by the Government but if there is no Internet facility to any children. He or she should fill out this feedback while applying for the tablet, so that we can inform the government officials about this.
     We can provide them with a starting guide for the students to get themselves familiar with the basic features of the tablet.
  2. We'll also create a **mobile version** of our application which will be useful for most of the student rural population so that they can access the app from their mobiles also.

- **Provide information about Grants, Loans and Incentives**
  Money provides the **material foundation** for the success of our vision. And we need to ensure awareness is full fledged regarding the availability and offering of this resource amongst the school directors, and new aspirants planning to come up with their own educational institutions. To this end we shall:-

1. Devote a section in our web app where the **funding agencies and corporations** (as part of their **CSR** programme) willing to help the rural schooling system can put up their desire to help, and this will be well received with those in need of creating an efficient flow of information and exchange of money.
2. **NGOs** can register on our web app on a regional basis to keep track of the helping hands, and will also facilitate distribution of **government funds**, when available, to these NGOs as well to create healthy give and take relationships.
3. A webpage shall update with all the **government schemes** which would help in knowing the plans and schemes put forth by the government to help.
4. An **enhanced chain of banking** strengthened with online services so that **applying for loans** is made effortless and simple.

- **Offer connectivity to financial disadvantaged patrons**
  Providing internet access and technology resources to individuals in rural areas through **subsidized or free internet** connections. Also offline mode allows users to access educational content even without an active internet connection, increasing accessibility in areas with intermittent connectivity.We create a feature which allows users to **download content for offline use** . We implement a **local storage system** to store downloaded content securely. This can be done with technologies like **IndexedDB** to save downloaded content.
  A basic walkthrough of implementation detail is provided below:-
  1. Learners have the option to view the contents online using network bandwidth.
  2. When network speed is high, it is advisable they save the contents for offline viewing.
  3. The contents are not saved to their local file system, rather they are stored into their browser's indexedDB.
  4. Using service workers, we **cache the web pages** that pertain to accessing the offline materials saved to far.
  5. The user can thus view the offline resources, customize them as per their own needs and keep their learning on even if the network is gone.

- **Help individuals with employment opportunities**
  All schools need teachers, working staff and support staff for various programmes etc. To make up the bridge with all tiers of society hand in hand, transparency and advertisement of opportunities is very much in essence the need of the hour. With our platform, we present to whomsoever it may concern, about the following:-
    1. **Vacancies for teachers** of particular grade, the required eligibility, the subject of concern and the salary offered is made available via the teaching tab of our online portal.
    2. **Vacancies for female** and male support staff are brought out on the assistance tab of our portal, along with the hours of work and wage clearly specified.

  This is for the teachers' employment opportunities. We'll separately have a section for **career guidance** where experts can join this platform and guide students by making them understand the importance of education, their careers in the present world and also how this changes their lives. Any experienced student or mentor can join this and guide students. We can also provide recorded videos for the same with auto generated captions or videos in their own language. We use Amazon Transcribe's **ASR (Automatic Speech Recognition) service** to convert speech to text. We first extract audio from the video, send this audio to the ASR service that will be used, receive the transcribed text, synchronize the transcribed text with audio and check for accuracy and errors, then we export the file and embed it directly into the video. This feature explains the importance of education for students in rural areas and also encourages the interested ones.

- **Research and Development**
  Research well and develop something phenomenal. Research and development in education sector deals with the following:-

    1. What to teach- developing **curriculum**
    2. How to teach - development of **teaching models**
    3. How to assess - develop **assessment models**
    4. Must include **survey and reference** to past R&Ds to take guidance and improve rather than to reinvent the wheel.

- **Access to material resources**
    1. A feature called **LBM(Low Bandwidth Mode)** allows the app to detect and adapt to slower internet connections. It optimizes data usage by loading essential content first and deferring non-essential elements. This feature provides a smooth user experience even in areas with slow or limited internet connections, ensuring accessibility for all users**.** To implement this, we use a front-end framework like **React with Javascript.**
    2. We use **content-compression tools** like image and video compression libraries. Once a mentor or an educational institution uploads an audio or a video, it gets compressed by this feature which reduces the loading times and provides a better user experience. Also it helps in the rural areas with low connectivity. We can use **HLS technologies(HTTP Live Streaming)** which adjusts the quality of a video stream in real-time according to the viewer's network conditions. Here a video file is broken down into smaller chunks of a few seconds each. With a different bitrate and quality, multiple versions of each chunk are created. Then a playlist is created from all these chunks. After all this, the main task is now the video player which reads this playlist and decides which chunks to download and play based on the current network conditions. This can be done using **hls.js technologies.**

Here is a small description of all the **important features** that we'll be adding to our website and how they are useful to the students in rural areas.

- Voice Assistant

  We'll be adding a normal **voice assistant feature(in English)** and integrating it into the website using Cloud platforms like **Dialogflow**. Since we are focussing on rural areas, many students might not be comfortable with English, so we'll be prompting an option which asks for in which language the user wants to use the voice assistant, then it gives the results in that language. That is adding a **local language Voice assistant** features so that the students can access the website

- Enhancing English Proficiency
  We'll be providing resources using **Google Translator API** and **DialogFlow** which help students to learn and improve their English speaking skills from their local languages, like we have many books on 'Translation from some Kerala to English', then from 'Tamil to English' etc which helps students from all states.
  We believe that the most effective way to enhance proficiency in any language is to actively use and speak it. So we create a separate chat room for peers to improve their language and **communication** as already mentioned above.

- Resource Recommendation Engine
  We use **recommendation algorithms** based on user behavior, preferences, and past interactions(we use **cookies** to track this) with resources to suggest relevant content considering collaborative filtering and content-based filtering techniques. To develop these algorithms, Machine Learning libraries like **scikit-learn, TensorFlow** can be used. This helps students increase their **learning experience** based on one's own interests and goals.

- Commodity Forums and Discussions
  We integrate a **discussion platform** where users can ask questions and discuss educational topics. This enables students to engage in discussions and improve their learning. This also enables students to communicate with their peers, teachers, mentors etc. For this we can use some platforms like **Discourse**, create a feature and **integrate** this into our website. Also for each message in this forum, we can create options for **liking**, **commenting**, **voting** and **search** functionality using UI/UX and frameworks like **React** for creating interactive elements. We implement a **notification** system for likes, comments etc which enhances the user experience. We store the user details, comments, likes, **threads** etc in the database designed by us. We should also integrate **authentication** techniques to allow users to log in, sign up etc.

- Raise Concern Button
  We'll include a special feature called **'Raise Concern**' for all users with different functionalities. Here explicitly for students, what we can do is use

the '**DialogFlow**' platform, we can make this feature available for particular phone numbers and messages also using required API's in the DialogFlow platform and students can directly access this feature through normal calls and messages. Students can raise any concern not only regarding the website but also the problems which are **stopping them from not accessing** the app or offline educational facilities thereby having a chance to improve/ solve these other problems like health, travel, nutrition issues etc. In the further development of this project, we can even address these and add a separate section which monitors these and improves these facilities and problems.

- Chatbot

  A chatbot is implemented on the home screen sidebar to assist every user in **reaching their desired destination** on the website. For example, when a user arrives, the chatbot greets them and inquires about their well-being. It also asks them what section of the website they would like to visit, such as the lecture section, quiz section, or for other assistance purposes. This is beneficial for students, as it helps them easily **find the information they need without the frustration of navigating complex educational websites**. We build a chatbot according to our website needs using the CloudPlatform called 'DialogFlow' and integrate it into our website.

- Groups section

  1. This is a very **important and useful feature** of our website. Individual professional volunteers or the ones which are selected by the Govt or the organization have a **special focus** on students who don't even have basic facilities at their homes.
  2. Government should establish community centers near the targeted communities. These centers can make use of the '**Groups**' feature and have a special focus on students who don't even have basic facilities at their homes and also focus and support students who don't know how to use the technologies. This is another important but useful dependency on the organization.

- Virtual labs & Experimentation

  Another effective way of learning is through projects, labs and experimenting. Here a dependency is to collaborate with science

educators to develop virtual lab environments . This feature ensures that the simulations accurately replicate real-world experiments.

The important point here is that even if we create a website with extraordinary features and ideas, if it doesn't reach the target audience, then it wouldn't be useful. Since the targeted section here are the rural areas, there are many dependencies on the government and the involved organizations. In the rural areas, power and internet facilities should be provided. We can use technologies like Wifi-locators that help users locate nearby community Wi-Fi hubs. We can implement a **website clone** designed for individuals with **color blindness**. In this implementation, we prioritize using **black and white color schemes**. Instead of relying on images, we use plain text and other accessible content formats to ensure that valuable information is easily accessible to all users, regardless of their color vision. For Physically Handicapped students, a separate section is made and we provide resources in **braille language**. For students who cannot write audio or video support can be given for asking doubts, submissions , quizzes etc. Also **voice recognition software** (like Voice Assistant) can be created separately which helps students who cannot write. **Volunteer section** can be useful for these Physically handicapped students - **special focus** on them. We'll also make sure that our website can be accessed with minimal data.

" If we want to reach real peace in this world, we should start educating children."
- Mahatma Gandhi