Department of Electrical and Computer Engineering
North South University

Senior Design Project

Closing the gap in educational assistance with PORAO - an Educational Platform

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Spring, 2024

LETTER OF TRANSMITTAL

June, 2024

To

Dr. Rajesh Palit
Chairman,
Department of Electrical and Computer Engineering
North South University, Dhaka

Subject: **Submission of Capstone Project Report on "Closing the gap in educational assistance with PORAO - an Educational Platform"**

Dear Sir,

With due respect, we would like to submit our **Capstone Project Report** on **"Closing the gap in educational assistance with PORAO - an Educational Platform"** as a part of our BSc program. The report deals with giving a solution of an online educational platform. This project was very much valuable to us as it helped us gain experience from reading some amazing research papers, doing surveys online and learning some new things and applying them in real life. We tried to the maximum competence to meet all the dimensions required from this report.

We will be highly obliged if you kindly receive this report and provide your valuable judgment. It would be our immense pleasure if you find this report useful and informative to have an apparent perspective on the issue.

Sincerely Yours,

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ECE Department

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Masud Hassan

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APPROVAL

Samia Akter (ID # 2013248042), Masud Hassan (ID # 2012897042), Abir Md. Fuad Hasan Anan (ID # 1931120642), Rudro Mozumdar (ID # 2014233042) and Jannatul Ferdous Sithi (ID # 2012365042) from Electrical and Computer Engineering Department of North South University, have worked on the Senior Design Project titled "Closing the gap in educational assistance with PORAO - an Educational Platform" under the supervision of Dr. Nova Ahmed partial fulfillment of the requirement for the degree of Bachelors of Science in Engineering and has been accepted as satisfactory.

Supervisor's Signature

……………………………………….

Dr. Nova Ahmed

Professor

Department of Electrical and Computer Engineering

North South University

Dhaka, Bangladesh.

Chairman's Signature

……………………………………….

Dr. Rajesh Palit

Professor

Department of Electrical and Computer Engineering

North South University

Dhaka, Bangladesh.

DECLARATION

This is to declare that this project is our original work. No part of this work has been submitted elsewhere partially or fully for the award of any other degree or diploma. All project related information will remain confidential and shall not be disclosed without the formal consent of the project supervisor. Relevant previous works presented in this report have been properly acknowledged and cited. The plagiarism policy, as stated by the supervisor, has been maintained.

Students' names & Signatures

1. Samia Akter

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2. Masud Hassan

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3. Abir Md. Fuad Hasan Anan

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4. Rudro Mozumdar

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5. Jannatul Ferdous Sithi

ACKNOWLEDGEMENTS

ABSTRACT

Closing the gap in Educational Assistance with PORAO - an Educational Platform

Introducing PORAO, our user-friendly learning platform aimed at providing a dynamic community of enthusiastic learners worldwide. Drawing inspiration from successful educational initiatives globally, PORAO facilitates direct engagement between users and subject experts, allowing seamless knowledge exchange. Through intuitive Q&A and interactive modules, users can explore diverse subjects and access insights from professionals. Emphasizing inclusivity, our platform integrates a user-driven review system, enabling feedback contribution and cultivating a supportive learning culture. Leveraging advanced technology, PORAO offers personalized one-on-one sessions via various channels, ensuring tailored learning experiences. Additionally, it provides user-friendly tools and resources catering to different learning styles, promoting an engaging journey for all. Our mission is to establish an interactive, empowering space for collaboration and knowledge sharing among learners.

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Chapter 1 Introduction

1.1 Background and Motivation

Physical or offline educational systems often fail to provide individualized instruction that takes special care of the unique learning styles and pace of each student. The huge amount of information available online can be overwhelming for learners, making it difficult to identify reliable sources and synthesize knowledge effectively. Many students struggle with self-learning, particularly when faced with complex topics or unfamiliar concepts. Without proper guidance and support, they may give up easily or develop ineffective learning habits. We propose PORAO, an innovative educational platform that revolutionizes the way individuals learn and connect with experts. PORAO's core concept lies in developing a collaborative learning environment that empowers learners to take control of their educational journey. PORAO specifically addresses the challenges faced by students in Bangladesh, where many struggle with basic skills and lack access to quality personalized learning opportunities. By providing a platform for self-learning, starting from the basics, students can learn at their own pace and receive expert advice when needed. Additionally, PORAO's focus on personalized instruction and collaborative learning can help students develop effective learning strategies and overcome their weaknesses.

We noticed that students in Bangladesh, at different levels such as SSC, HSC or Undergraduate, face academic challenges due to the lack of quick and accessible online study resources. Many peers shared similar concerns, prompting us to research existing solutions. Inspired by initiatives like 'Esho Shikhi' [2], Kathmandu Living Labs [4], Khan Academy [14] and Quora [22] etc., we developed PORAO to address these issues within the Bangladeshi context. Our user-friendly platform and the embedded tools makes the experience very interactive and effective and enables those in need of academic help to receive assistance whenever and wherever needed.

1.2 Purpose and Goal of the Project

The main goal of our app, PORAO is to empower students to take control of their learning, overcome challenges they face in the physical classroom, and achieve academic success. In today's fast-paced educational environment, many students face challenges that prevent them from fully understanding concepts and excelling academically. Whether it's vague lectures, hesitation to ask questions in a crowded classroom, or lack of access to relevant information online, these barriers can significantly affect their learning experience. The goal of this project is to provide a safe and supportive environment for students to ask questions and seek clarifications on any issue. The platform is designed to provide a collaborative and interactive learning experience, ensuring that students have access to the resources and support they need to succeed. PORAO offers a variety of learning options, including text post, audio calls, video calls, and conversations with experts, a whiteboard system next to the chat box, which caters to learning preferences. Both students and experts can create and edit their profiles on PORAO. They have the flexibility to add bios and other relevant information to their profile, allowing them to showcase their interests, skills, and achievements. This resource not only contributes to a sense of community but also enables students to find and engage with experts who match their learning needs and learning styles. Students can easily rely on PORAO finding solutions to their academic problems. The platform is designed to be user-friendly and intuitive, making it easy for students to navigate and find the guidance and support they need. Whether they are struggling with complex math problems, seeking clarification on scientific concepts or need guidance on writing assignments, PORAO is ready to help. Our project is committed to providing comprehensive support programs for students. By leveraging technology and expertise, PORAO aims to bridge the gap between physical classroom learning and the needs of today's students. Through PORAO, students can overcome the challenges they face in their academic journey.

1.3   Organization of the Report

We've divided the report into 8 chapters total. Chapter-1 presents the introductory part of our project where we discussed the background and motivation of the project. The purpose of our project and the goal of the project which contains about the goal we've in our mind about this project. Lastly, the organization of the project where we discussed the chapters we've provided in this report. Chapter-2 presents the Research Literature review where we discussed the existing research papers we've read and analyzed so far that are from, all over the world, apps and the features in them or how they worked in their projects, and got some ideas of how we can relate their doings to our project. We compared existing apps with our app and then we wrote similarities and differences with the existing papers to our project. Lastly, here we discussed the survey that we did while doing the project and wrote the analysis of the survey and the knowledge based analysis on the basis of both survey and literature review of the project. Chapter-3 presents the methodology of our project where we discussed the system design of our whole project in the section of project design and the app design called PORAO. Here, we also discussed the software components that we needed to make the app, PORAO or how we implemented the app and discussed the hardware components as well that we needed while making the project or the app. Chapter-4 presents the result and analysis we got so far making the project and the discussion of the app or project. Chapter-5 presents the impacts of the project on society. environment and sustainability. Chapter-6 presents the planning and timeline of the project where we discussed how many days we took to implement the app. Chapter-7 presents the complex engineering problems, activities and UNDP SDGs. We explained all of them in this chapter that are related to our project purpose. In chapter-8, we discussed the conclusion of the project where we kept the summary, limitations and the future improvement of the project.

Chapter 2 Research Literature Review

2.1 Existing Research and Limitations

Our proposed app, PORAO, is a bit unique in its own domain. So, there aren't many apps or software that are direct replicas or ancestors. However, we can divide our app's use cases in different domains and find related works there. We have procured related works from different regions of the world. PORAO is an educational app aimed at serving primarily as a Q/A platform that allows its users to ask questions regarding a particular matter. Any experts present on the particular matter on our platform can answer those questions if the person wishes so.

2.1.1 Peer-to-Peer Education

In the context of Bangladesh, there are a few projects that dealt with peer learning. The Adolescent Participation in Learning and Opportunities for Networking (APON)[1] project in Bangladesh, launched in May 2000, aimed to empower adolescent girls through education, skill development, and enhanced awareness of sexual and reproductive health. The project successfully established Reading Centres, providing educational resources and employment opportunities to thousands of girls, fostering confidence, leadership skills, and a supportive peer network. Similarly, the "Esho Shikhi" project[2], operating in rural and marginalized communities, emphasizes inclusive education through learning centers and innovative teaching methods, aligning with Sustainable Development Goal 4. Both initiatives represent pivotal efforts in promoting education and fostering social progress, aiming to empower individuals and communities for a more equitable and inclusive society. In the larger South Asia region, we can see some prime examples too. The Citizens Foundation (TCF)[3] has been a leading non-profit organization in Pakistan, dedicated to providing quality education and promoting gender equality, notably through its peer-to-peer education programs that foster collaborative learning and community engagement. In a similar vein, Kathmandu Living Labs (KLL)[4] in Nepal has been at the forefront of utilizing technology and data for sustainable development, emphasizing peer-to-peer education to empower local communities and drive positive change. Both organizations have demonstrated a strong commitment to fostering inclusive learning

environments and leveraging innovation for societal well-being, thereby inspiring visions of a more empowered and educated society in their respective regions. Even in some other asian or poorer countries, we see implementations of this system. In Japan, many universities are considering the peer tutoring[5] system as a potential source of benefit to the Japanese Educational system. It also analyzes their social hierarchies surrounding the education system. Despite a newer concept and approach compared to the traditional educational system, Japan admits to seeing potential in this approach and is still investigating this matter. In the rest of the world, this concept is not new and thus people are mixed in their opinions regarding it. In the academic realm, Joshua M. Cuerdo's study[6] scrutinizes the impact of peer education on student learning in higher education, highlighting its potential to enhance academic skills, leadership abilities, and public speaking proficiency. Stressing the importance of implementing best practices, the study underscores the significance of holistic program design to foster students' cognitive and affective development. Concurrently, Shekhar Chandra and Shailendra Palvia's article[7] in the Journal of Information Technology Case and Application Research investigates the rise of peer-to-peer learning as a transformative model in online education, emphasizing its capacity for personalized and interactive learning experiences. They highlight the various technologies facilitating professor-student interactions in online settings and emphasize the potential of peer-to-peer learning to revolutionize the digital education landscape, fostering more engaging and effective learning outcomes for students.

2.1.2 Educational Networking and E-learning

In the context of Bangladesh, the papers also present a review of related research on e-learning in Bangladesh, with a focus on the benefits [10] [11] challenges [8] [9] [10] [4] and prospects of this emerging mode of learning [10] [12] [13]. The papers also discuss the findings of studies on the Teachers' Portal [10] in Bangladesh, an online platform designed to support teacher professional development, and the challenges and potential of e-learning in higher education in Bangladesh[13]. Despite challenges, e-learning has the potential to improve the quality of education and increase access to learning opportunities, but it also faces challenges such as a lack of digital literacy, limited access to technology [8], and difficulties in adapting to new learning methods [8][9]. The survey results [9] showed that most students have access to technological

devices or internet connection, which positively impacted their academic achievements. Teachers' Portal [10] offer benefits for teachers, such as access to professional development opportunities and a platform for providing their knowledge. PORAO app also offers some unique benefits for teachers, such as the ability to communicate directly with students through chat, voice call, and video call. Both e-learning in higher education in South Asia [12] [13] and the PORAO App have the potential to provide students with access to high-quality education. For example, the PORAO App can be used on mobile devices, which are more accessible and affordable than computers for many students and teachers in Bangladesh.

2.1.3 Related Apps Comparing

The study on EdTech applications has been of interest for some time. Earlier successful projects on the EdTech section such as Udemy, Khan Academy etc. have proven that online based learning is very much effective in self studying. A study in Khan Academy[14] has shown that accessibility over all regions and income affects the usability of the platform. It also showed that personalized features and empowered teachers help create better learning content. Another study on 10 Minute School[15] showed that Student engagement, Assessment and Teacher-student interaction plays an effective role in concentration when learning. Communication while teaching makes students relate with the topics and learn more effectively. Some other studies on Udemy[16], Duolingo[17] and Coursera[18] have shown similar results. According to those studies, for an EdTech app to be effective and successful it should be flexible, affordable and contain a variety of content. Meaning every variety of content should be fulfilled with quality contents. We found some key issues with some failing apps like BYJU's. According to a study on BYJU's[19], The main reason for their failure is overpricing and not providing the services they promised while subscribing. They provided a poor learning experience that initially attracted some users, but in the long run it ended up losing trust.

2.1.4 Similarities and Differences

When we look at Peer-to-Peer learning/education around the world, we often see a mixed reception often turning a bit toward positive views. In the context of Bangladesh and broader South Asia, education-centric projects, such as APON, "Esho Shikhi" in Bangladesh, TCF in Pakistan, and KLL in Nepal, underscore a shared commitment to fostering inclusive learning environments and empowering marginalized communities. These initiatives prioritize collaborative learning and community engagement, striving to create equitable educational opportunities. Conversely, in Japan, the potential of the peer tutoring system is being assessed within the context of existing social hierarchies. While acknowledging its potential benefits, Japan scrutinizes the compatibility of this system with its established educational structure. Internationally, views diverge, with research by Joshua M. Cuerdo highlights the positive impact of peer education on student development, and Shekhar Chandra and Shailendra Palvia work focusing on the transformative role of peer-to-peer learning in digital education, emphasizing its potential for interactive and personalized learning experiences.

In the matter of educational networking and e-learning both the paper discusses the impact of such as mobile devices and online learning environments [13], on student engagement and motivation, while our app provides a platform for students to ask questions and communicate with teachers through chat, voice call, and video call. Teacher's portal [10] focuses on the higher education sector in Pakistan, while Porao app is a platform that can be used by students and teachers from different countries and educational levels. The paper does not provide a specific solution or platform for e-learning, while our app is a specific platform designed for students to ask questions and receive answers from teachers or other students [12].

Chapter 3 Methodology

3.1 System Design

In this chapter, we discussed and showed the design of our whole project overall. We've divided this chapter into two sections. One is project design where we've kept our flow of work step by step such as the paperworks, survey, literature review, user testing and feedback. The other one is our app design where we've kept the overall design of the app and how it works step by step.

3.1.1 Project Design

The project started thorough comprehensive paperworks and planning how to build the project. This section outlines the goals, objectives and target audience. We also identify the key features and services that PORAO added to meet student's needs and provide an effective learning environment. We conducted an extensive survey to gather valuable insights and understand the specific needs and preferences of our targeted audiences. This survey included 20 questions designed to capture information about the challenges students face in the physical classrooms, preferred methods and the problems they struggle with. Then we collected responses from students, primarily from engineering backgrounds and conducted survey analysis. This includes quantifying responses, identifying patterns, and extracting key ideas. For example, we found that 70% of students face difficulties in understanding concepts in offline classes due to factors like complexity in explanations and hesitation to ask questions. Based on the survey analysis, we gathered feedback that highlighted the importance of creating an interactive learning environment. We read around 65 research papers and wrote literature reviews to understand the existing educational and learning platforms. This helped us to get some ideas of PORAO's features and user experiences. By getting the insights from the survey feedback and literature reviews, we finalized the feature list for PORAO. Then we got the user testing from our friends and family first then some students to evaluate PORAO's overall user experience. They were asked to perform different tasks, provide feedback. Based on the feedback from user testing, we made some important adjustments in the project.
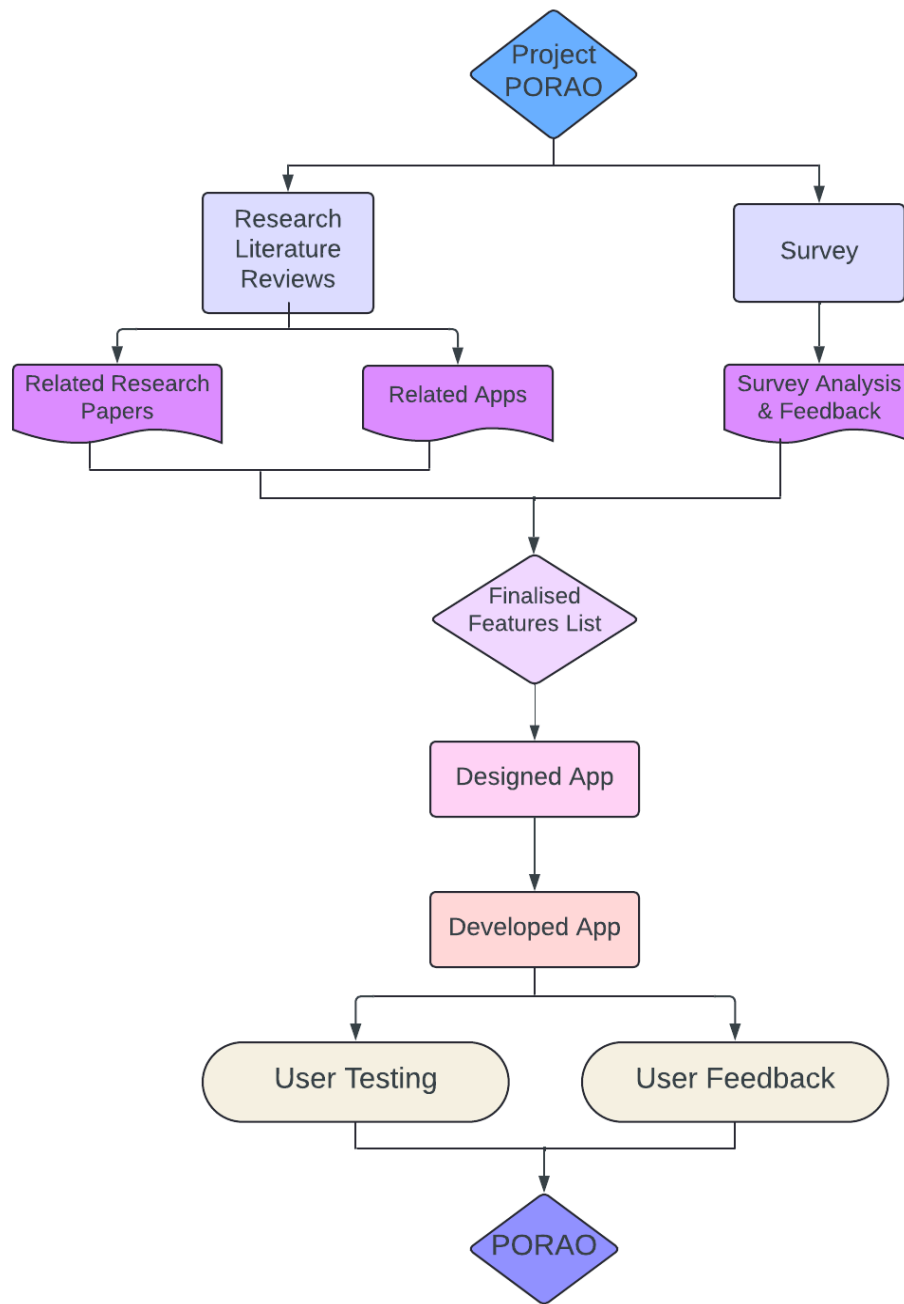
Figure 1. Project Design of the Project

3.1.2 App Design

In this section, we discussed the design process of our app. First, users need to sign up or sign in. Homepage will appear. In homepage, there will be the key features like profile where users can create and edit their profile and bio, ask question providing the category of the question, diagram and title of the question, daily feed where all posts can be seen and checked, navigation bar where some sections are kept like search questions, homepage, threads where an individual's posts are stored and messages where users can start conversation with the experts and a slide panel where settings, about, feedbacks and logout sections are kept.
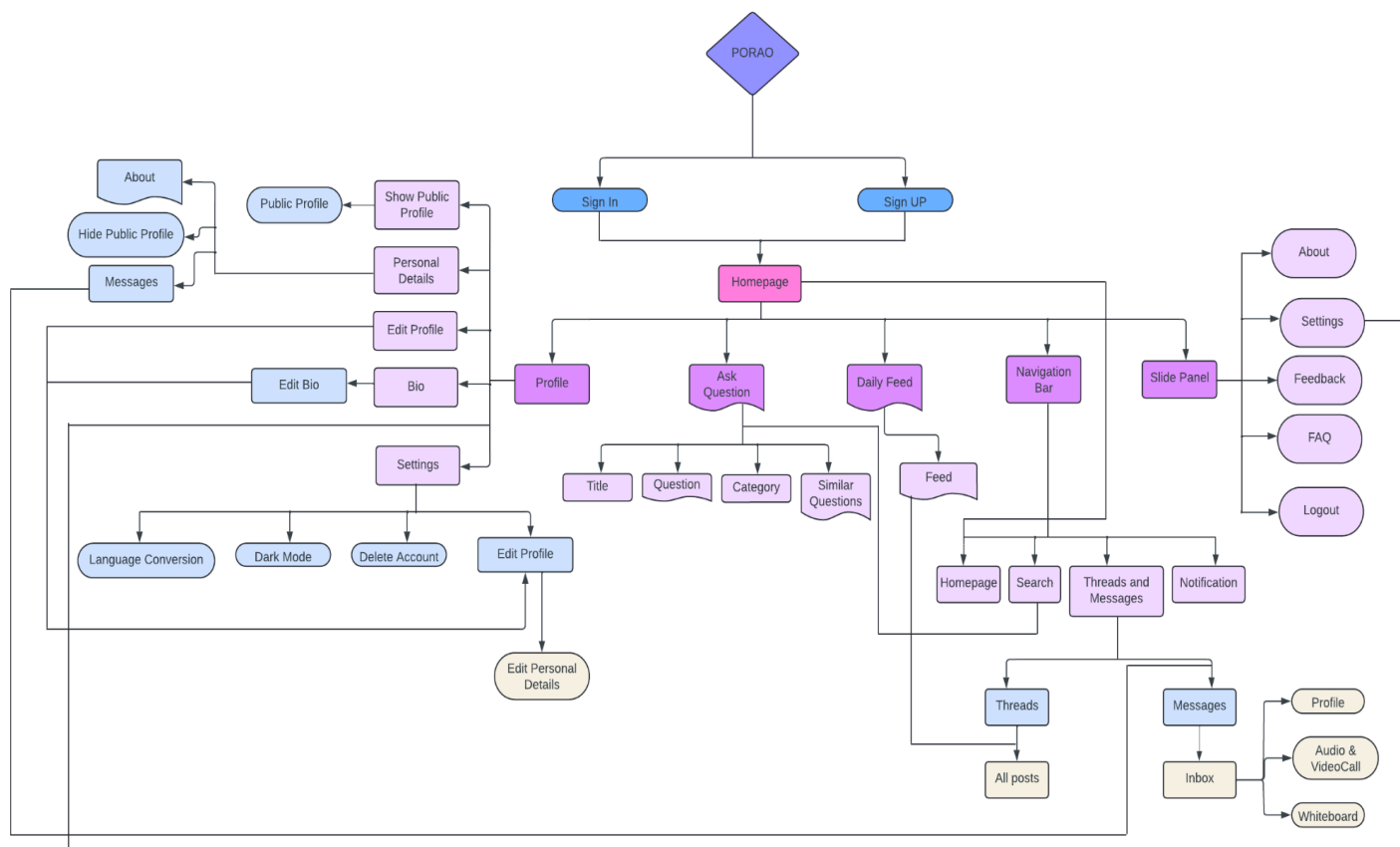
Figure 2. App Design of the Project

3.2 Hardware and/or Software Components

The table below lists the hardware components we have used for the project are listed below:

Table I. List of Hardware Tools

Tool	Details
CPU	AMD Ryzen™ 7 5700G
GPU	AMD Radeon™ RX 7600
RAM	16GB

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The table below lists the software components we have used for the project are listed below:

Table II. List of Software Tools

Tool	Details
Programming Language	Dart
Framework	Flutter
Frontend	Flutter
Backend	Flutter
Database	Google Cloud Firestore - Firebase

3.3 Software Implementation

Our platform PORAO, currently implemented as a mobile application, has been developed using Flutter for the main application development and as its database we used Google Firebase. We also designed our application to provide a seamless and efficient user experience for which we used Figma. In summary,

Technology Stack:

- **Flutter:** Used for Front-End as well as Back-End development of the mobile application.
- **Google Firebase:** Used for Back-End services like Database Management, Authentication and Cloud Storage.
- **Figma:** used to Design UI/UX design of the whole application, enabling the creation of interactive and visually appealing layouts.

Chapter 4 Investigation/Experiment, Result, Analysis and Discussion

In our project, the investigation would be the survey that we conducted to get some important insights from the user's highlighted ideas of features, problems they face solving their academic issues while studying in existing online platforms and offline classes. We analyzed their responses and used it to complete the project and implemented the app, PORAO. In offline classes, students mostly suffer from concentrating for long periods of lectures, hesitation of asking questions due to shyness. So, we decided to keep the Q&A session and the experts will answer the questions in the comment box and if needed the students can carry the conversation with the expert ahead and decided not to keep live lectures of experts because that will be similar to offline classes. In existing online platforms, students do not get facilities altogether in one single platform like we have in PORAO such as Q&A session and 1:1 session for both students and experts.

4.1 Survey Analysis

We conducted a survey to gather user requirements and assess the effectiveness of such a platform, at least in the context of Bangladesh. In this survey, we got 35 responses overall with various opinions. The main audience of this survey were undergraduate students. We've kept 20 questions in the survey about the features, the problems or challenges they face while online learning or self-learning, their ability to find relevant information on the internet, subjects most of them are interested in asking questions on our platform, about the cost, mode etc.

We've got responses from different university students who are mostly from engineering background(60%). In the first 2 questions we asked about the complexity of understanding concepts in offline class and we got yes(70%) and no(33.33%) which means students face problems in understanding in offline classes. The main reasons are Complexity in explanations (25%) like students struggle with unclear explanations or fast pacing. Shyness/hesitation to ask questions or repeatedly ask questions(25%) like some students hesitate to clarify doubts due to shyness or fear of interrupting. Attention span (25%) like short attention spans or long class

times can lead to difficulty concentrating. Visualizing concepts (25%) like some students require specific visualizations or examples to grasp complex concepts. Sometimes, they miss one or two classes and can't cope up with the topic. 99% students take help from online resources(such as youtube or efficient websites and apps) when they come across unfamiliar/challenging topic rather than taking office hours from the faculty. They're highly dependent on youtube because they prefer video sessions more likely in PORAO we're implementing video session option. From the response, 60% students are usually able to find relevant and accurate information online, 24% are neutral like they find sometimes and 10% are not able to find. Also there are some challenges students face while online learning are lack of interaction with the teacher(70%) because they get to learn only through youtube videos and can't ask questions. 95% students think that the good sides of online learning are that they can learn anytime of their preferred schedule according to their convenience, can get different approaches to a single question, and get the opportunity to learn from expert instructors from around the world. We've got some suggestions as well that'll be used to implement features such as interaction option, arranging quizzes, polls, group discussions to keep students engaged, Q&A platform, practical experimental videos or simulations, 1:1 session. 97% would prefer to seek help from online Q&A platforms. We've got some idea of features to implement Q&A platforms such as chat, voice and video call option and record them, rate the provided answers to ensure best answers right to the top, report to misleading answers, upload images, diagrams and videos alongside Q&A, whiteboard option, comment/voting section, eye catching and simple interface, dark mode, points/badges, saving progress. 80% of students are okay with the chat history between student and teacher being stored for other user's reference. 98% of students think that it'll be very helpful if we provide pre-made lectures on specific topics and provide them on our platform. 100% students want auto word correction like Grammarly. The percentage of most preferred topics of students are math, physics, computer programming and then biology and chemistry. 89% students are comfortable in taking help via voice or video call. 60% students are very likely to create a profile and biography on this platform influenced by the reviews one can get from others, 10% are neutral and 30% are likely to prefer. 60% of students think this platform should be a paid service.

In conclusion, we can say that this survey indicates strong potential for an online Q&A platform for undergraduate students in Bangladesh, especially engineering students. Students face challenges in offline learning due to complexity of lectures, shyness, and attention issues. They rely heavily on online resources like youtube but struggle with finding accurate information and lack of interaction. The proposed platform addresses these needs with features like video sessions, Q&A, quizzes, and 1:1 session. Students prefer flexible learning schedules, diverse perspectives, and access to expert instructors, all of which the platform can provide.

4.2 Knowledge-based Analysis

The survey that we did with university students, we found that they are interested in SRL(Self-Regulated learning), direct communication through video and voice calling, private chat features, and recorded live sessions. They also want to become experts and are more interested in computer science. Most of the students approve of online/peer-to-peer education systems. These data suggest that university students are increasingly interested in innovative and personalized learning experiences. Students struggle with understanding in offline classes due to explanation complexity, shyness, and attention span. They crave online resources but face problems finding accurate information and interacting with teachers. This platform has potential to address these needs with features like video sessions, Q&A, quizzes, and 1:1 sessions. Students prefer flexible learning schedules, diverse perspectives, and expert instructors, which the platform can offer. There is a high demand for such a platform among Bangladeshi undergraduate students, especially in engineering. Overall, the feedback points to a high demand for a well-designed, interactive online Q&A platform catering to Bangladeshi undergraduate learning needs.

4.3 Discussion

PORAO is an innovative educational platform designed to empower students to take control of their learning, overcome the challenges they face in physical classrooms. The app provides students with a safe and supportive environment to ask questions and seek clarifications on any

learning issue. This includes text posts, audio calls, video calls, and conversations with experts. Additionally, features such as a whiteboard system next to the chat box, create and edit profiles.

We faced some challenges while making the project and overcame them as well with some innovative ways. Initially it was difficult to collect responses from some groups of students. To gain meaningful insights, we needed to ensure a representative sample, which required extensive dissemination and follow-up. We overcame this challenge by creating an online survey of students and emphasizing the importance of their feedback that helped increase response rates. Integrating various communication features such as video calling, whiteboard system and real-time chat into a seamless user experience is technically complex and requires significant development and testing effort to ensure that these elements work well together. We used some existing development of the call and live stream system systems and thorough testing for each feature before integrating them. It was a challenge to create an interface that was simple and easy to use for both students and experts. It needed to be iterative, balancing simplicity and functionality to make it easy to use for all age groups and technical levels. We conducted user interface (UI) and user experience (UX) according to the feedback we got from the survey and the related works we've done from existing research papers. It was necessary to implement a system to maintain quality of information and prevent misleading information. To overcome this, we developed a report system mechanism to report for misleading information. Designing the pilot intervention and collecting usable data was a time-consuming process. We scheduled regular user testing sessions and developed a data collection protocol.

We've learned a lot while developing the project. We've learned the need of user feedback developing the designs to make or look the app user-friendly. The project refined our technical problem solving skills, especially in integrating multiple communication features into an integrated system. We've learned project management because of good coordination between teams, including development, design and user testing. We've learned to balance multiple tasks, prioritize well and maintain clear communication to keep a project on track. We've learned to maintain the content quality and platform integrity of robust quality control. The importance of flexibility in user feedback and continuous improvement was emphasized. We've learned to iterate quickly on design and implementation based on user feedback.

Chapter 5 Impacts of the Project

5.1 Impact of this project on societal, health, safety, legal and cultural issues

PORAO's user-friendly learning platform has the potential to make a positive difference across several societal, health, safety, legal, and cultural issues. For each one, potential benefits may be summarized as follows:

5.1.1 Societal Impact

Normalizing Education: PORAO's main strength lies in its accessibility. Direct conversations through audio and video calls and chat with subject experts through Q&A supported by the given learning materials empower individuals regardless of socioeconomic status or location. It is a platform for more equitable education that can bridge the gap between privileged and underprivileged communities.

Analyzing Critically: PORAO's question-driven approach encourages users to analyze information, seek clarification, and develop independent learning habits. This critical thinking allows individuals to navigate an information-rich world, allowing them to make informed decisions in various aspects of life.

Empowering Underprivileged Communities: PORAO can be a lifeline for individuals in remote areas or with limited access to traditional education. It provides valuable resources and connects them with experts who can meet their specific learning needs. This promotes development for all and creates lifelong learning opportunities for all.

5.1.2 Health Impact

Promote Health Literacy: Users can seek answers to health related questions directly from relevant experts on the platform. Access to this reliable information can empower individuals to make informed health decisions and improve overall well-being.

Mental Health Issues: PORAO's emphasis on developing a supportive learning community could well contribute to mental health. Using a variety of learning materials and positive interactions can promote a sense of belonging and reduce feelings of isolation, potentially improving psychological well-being.

Crucial Caveat Combating Misinformation: Since users are driven by PORAO, robust systems are needed to detect and deal with potential misinformation, especially health-related solutions. Ensuring that users receive reliable information from competent professionals is paramount in quality health literacy.

5.1.3 Safety and Legal Considerations

User's Safety: Protecting users, especially young children, from inappropriate content or inappropriate interactions is important. Strong safeguards such as age verification and internal controls are critical to ensuring a safe and secure learning environment.

Data Privacy: Since PORAO handles user data, data privacy should be paramount. Clear policies on data collection, storage and use, as well as compliance with relevant legislation, are essential to ensure user confidence.

Content Moderation Matters: A system for evaluating experts and managing resources is critical. This helps prevent the spread of misinformation, harmful content, or intellectual property infringement. PORAO's guidelines on possession and disposition should be clear and well defined.

5.1.4 Cultural Impact

Bridging the Cultural Divide: By connecting students across geographic boundaries and disciplines, Porao can promote a deeper understanding and appreciation of cultural diversity. Exposure to diverse perspectives and cultural awareness can lead to a more tolerant and inclusive global society.

Preservation of Cultural Heritage: The platform can be a valuable repository of cultural knowledge and heritage. This helps preserve cultural heritage for future generations, ensuring that the richness of human history is not lost.

Potential Concerns about Cultural Bias Awareness: Porao should be aware of potential cultural biases in its content and actively promote diverse expert voices. This ensures that everyone is included with a balance of cultural perspectives.

So, the societal, health, safety, legal, and cultural impact of PORAO depends on its responsible use. Prioritizing user security, data privacy, content management, and inclusion is paramount. By promoting a safe, ethical, and cultural learning environment, PORAO can be a powerful tool to empower students, promote positive societal change, and create a more connected and knowledgeable world.

5.2 Impact of this project on environment and sustainability

While PORAO's focuses primarily on education and knowledge sharing, its impact on the environment and sustainability seems to go unnoticed. However, by encouraging a culture of lifelong learning and critical thinking, Porao has the potential to make a significant contribution to a sustainable future in many ways:

5.2.1 Environmental Awareness and Knowledge Dissemination

Platform for Environmental Education: Porao's question and answer format and various learning materials can be used to raise awareness about environmental issues. Users can ask questions about sustainability practices, climate change, pollution control and green technologies. Experts can provide reliable information and insights, creating a more environmentally conscious user base.

Promoting Sustainable Practices: By sharing knowledge and experience of sustainable living, eco-friendly practices and responsible consumption, they can be provided users are able to incorporate these practices into their daily lives. This can include discussions around issues such as waste reduction, energy conservation, sustainability and responsible waste disposal.

5.2.2 Sustainable Learnings

Reduced Reliance: Porao's digital platform can significantly reduce the reliance on paper-based learning resources such as textbooks and printed papers This can reduce the deforestation associated paper production to help achieve a more sustainable resource management system

Promoting E-Learning: Access to online resources and learning materials enables users to share and reuse information effectively. This eliminates the need for individual prints, reducing paper waste and the associated environmental impact.

5.2.3 Enabling Collaboration and Innovation

Bringing together sustainability experts and students: By facilitating networking between sustainability experts and students, Porao will be able to facilitate collaboration on developing innovative solutions to deal with the environment and meet the challenges. Crowdsourcing and knowledge can lead to innovative waste management, conservation, and pollution prevention strategies.

Encourage innovation and sustainable development: Collaboration and knowledge exchange on sustainable technologies, renewable energy, and environmentally friendly design principles can stimulate users and experts to develop and implement solutions that reduce our environmental footprint.

5.2.4 Environmental Decision Making

Critical Thinking for the environment: The question-driven approach of the platform encourages users to explore information, test ideas, and develop critical thinking This can be particularly valuable in environmental contexts, where complexity and conflicting opinions exist. With a strong focus on user awareness, they can make informed decisions about environmental impacts and hold businesses and governments accountable for sustainable practices of the eternal existence.

Promoting Responsible Consumption: Critical thinking encourages consumers to question the environmental impact of consumption of goods and services. Porao can facilitate discussions about sustainable manufacturing, product life cycle analysis, and the environmental costs of consumption. This can empower users to make informed choices and encourage more responsible consumption.

5.2.5 Sustainability Challenges and Considerations

Power consumption and data centers: Although Porao is a digital platform, it requires power consumption to run servers and data centers. The use of energy-efficient and renewable energy practices can reduce these environmental impacts.

Digital divide and accessibility: Not everyone has an internet connection or reliable tools to use PORAO. The digital divide still needs to be addressed by ensuring equal access to the platform and its potential benefits for sustainable development.

So, PORAO's contribution to environmental sustainability lies in its potential to empower learners and foster a culture of environmental awareness, critical thinking, and responsible decision-making. By promoting knowledge sharing, collaboration, and innovation around sustainability solutions, PORAO can contribute to a future where environmental responsibility is integrated into all aspects of our lives.

Chapter 6 Project Planning and Budget

The planning of the project with a sample Gantt chart is given below:
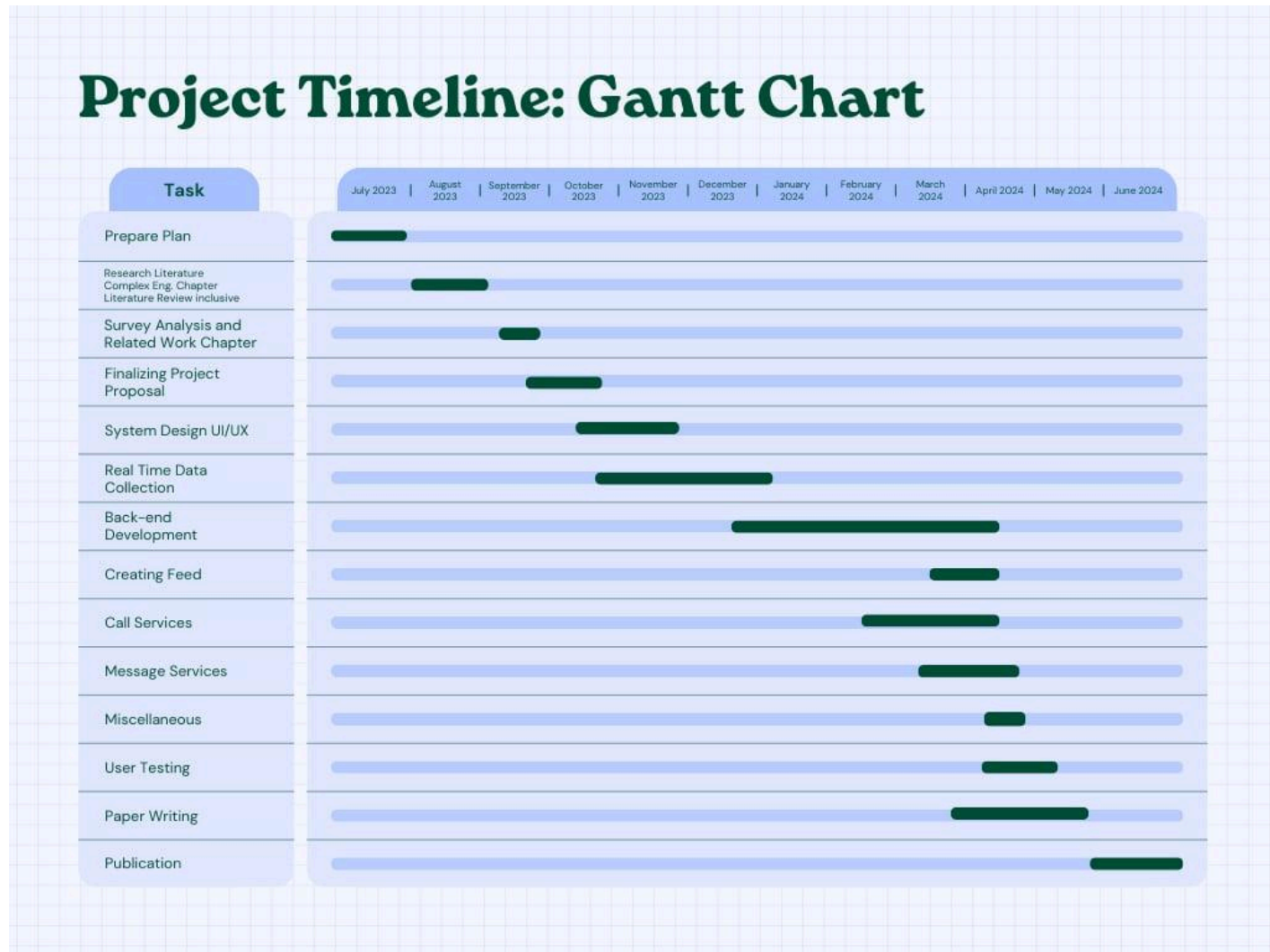

Figure 3. Timeline Gantt Chart.

Chapter 7 Complex Engineering Problems and Activities

7.1 UNDP SDGs

This project follows some UNDP SDGs such as:

4. Quality Education

Our app "PORAO" will ensure the quality of education by giving correct answers by qualified teachers. We'll even arrange seminars or special events for students on the topic of women's personal problems, ethics and manners, teasing etc so that students can acquire more education outside of academic studies. That's how we'll try to maintain quality education through our project. It also aims to provide equal access to affordable vocational training, to eliminate gender and wealth disparities, and achieve universal access to a quality higher education.

5. Gender Equality

We'll ensure gender equality while providing tuition through our app. In our country, male tutors are more prioritized than female tutors due to their mobility. But in our app, anybody either a male or a female, can help students by giving answers to their questions or teaching them. Because we believe that encouraging more women will help achieve greater gender equality. So, it'll be a great opportunity for female teachers to help others and students as well to get help in their study.

8.Decent Work and Economic growth

As the global economy continues to recover, we are seeing slower growth, widening inequalities, and not enough jobs to keep up with a growing labor force. From this application a lot of students will start getting help in their study. Unemployed educated persons or graduated students can teach or get tuitions through our app and it will help them earn money and the country's unemployment rate will reduce as well. Since mostly women are unemployed, it'll empower them and we believe that empowering women and girls helps economic growth and development.

UNDP SDG's that our project follows:

Table III. UNDP SDGs

UNDP SDG Number	UNDP SDG Name
04	Quality Education
05	Gender Equality
08	Decent Work and Economic growth

7.2 Complex Engineering Problems (CEP)

Our project follows three complex engineering problems. They are:

P1: Depth of knowledge: Project requires study of existing apps with similar goals and data collection from research papers **[K8; Research Literature],** knowledge of design of app and its interface and solving problems that involve creativity, experience and disciplinary knowledge **[K3; Engineering fundamentals & K5; Engineering design].** We're working on it.

P6: Extent of stake-holder involvement and conflicting requirements: This project definitely needs requirements from people. Like, we already talked with 2-3 university students about their wants or requirements that we're working on. Also, we've already started an online survey.

P7: Interdependence: Project involves a number of interdependent subsystems (programming tools), such as, data collection, survey, data analysis, app testing, front-end & back-end application development, marketing etc

Complex Engineering Problem Attributes that our project follows:

Table IV. Complex Engineering Problem Attributes

	Attributes	Addressing the complex engineering problems (P) in the project
P1	Depth of knowledge required (K3, K5 & K8)	Project requires study of existing apps with similar goals and data collection from research papers [K8; Research Literature], knowledge of design of app and its interface and solving problems that involve creativity, experience and disciplinary knowledge [K3; Engineering fundamentals & K5; Engineering design]. We're working on it.
P6	Extent of stake-holder involvement and conflicting requirements	This project definitely needs requirements from people. Like, we already talked with 2-3 university students about their wants or requirements that we're working on. Also, we've already started an online survey.
P7	Interdependence	Project involves a number of interdependent subsystems (programming tools), such as, data collection, survey, data analysis, app testing, front-end & back-end application development, marketing etc.

7.3 Complex Engineering Activities (CEA)

Our project follows three complex engineering activities. They are:

A1: Ranges of resources: We are using various resources such as people (for working on our project and testing and getting viewers or people into our app), money (for marketing and earning as well), materials (research papers and visiting other websites and apps to get ideas), information (gathering interests of people like which topics they're commonly interested to learn) and technology (like we're using Firebase and Flutter for UI interface and Database and Dart as language).

A2: Level of interaction: A good level of interaction is needed in this project among the students and the teachers to come to an agreement and to receive feedback. So, here, interaction of student communication, teamwork and technical connections are needed.

A4: Consequences for society and environment: This project will be really good for society and will be used for people's help and it's not harmful for society. It could dissolve primitive methods for tuition and cause them to go obsolete.

Complex Engineering Problem Activities that our project follows:

Table V. Complex Engineering Problem Activities

Attributes		Addressing the complex engineering activities (A) in the project
A1	Range of resources	We are using various resources such as people (for working on our project and testing and getting viewers or people into our app), money (for marketing and earning as well), materials (research papers and visiting other websites and apps to get ideas), information (gathering interests of people like which topics they're commonly interested to learn) and technology (like we're using Firebase and Flutter for UI interface and Database and Dart as language).
A2	Level of interactions	A good level of interaction is needed in this project among the students and the teachers to come to an agreement and to receive feedback. So, here, interaction of student communication, teamwork and technical connections are needed.
A4	Consequences for society and Environment	This project will be really good for society and will be used for people's help and it's not harmful for society. It could dissolve primitive methods for tuition and cause them to go obsolete

Chapter 8 Conclusions

8.1 Summary

PORAO is a user-friendly learning platform designed to create an active and inclusive learning community. It strives to empower students by providing them with a variety of ways to interact directly with subject matter experts:

Users can ask questions on various topics and get answers from established professionals.

Engaging content (text, video) addresses different learning styles and provides in-depth insights into topics.

Users can connect with experts for personalized learning experiences via text, audio or video calls.

Feedback on experts and learning modules contributes to the quality of the platform and makes recommendations relevant.

8.2 Limitations

Although PORAO offers a promising approach to education, there are limitations to consider:

Robust evaluation procedures and data management techniques are essential to ensure the validity and reliability of expert conclusions and to prevent.

Content and user interaction can be susceptible to unconscious bias. Strategies to promote diversity and encourage respectful communication among experts.

Unequal access to technology and the Internet hinders inclusion. To bridge the digital gap, PORAO needs to consider accessibility features and partnerships.

To effectively manage large numbers of users and networks of experts while maintaining good communication requires scalable infrastructure and effective management tools.

Encouraging long-term users and knowledge retention requires continuously creating engaging content, developing supportive communities, tracking progress, and implementing incentives for students.

8.3 Future Improvement

Based on PORAO's foundation, more improvements can be envisioned:

Using AI and machine learning to personalize learning journeys by recommending the right experts, learning modules and content based on the user's interests and previous interactions.

Use gaming technologies such as points, badges, leaderboards and targeted rewards to increase user motivation and engagement.

Put together workshops, discussion boards or group learning activities to encourage collaboration and knowledge sharing among students.

Empowering users to contribute contents such as articles, videos, quizzes to enhance the platform's knowledge base and create a collaborative learning environment.

Enabling users to download learning modules or access archived content for offline learning should cater to users with limited internet connections.

Expanding language options to a wider global audience and encouraging inclusion of students from diverse backgrounds.

By addressing limitations and implementing these changes, Porao can develop into a powerful educational tool, empowering students, developing vibrant learning communities, and ultimately contributing to an informed and inclusive society of all men.

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