








EduBridge: An Advanced E-Learning Application for Transforming India's Educational Landscape

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Abstract. The research aims to enrich education by empowering students in a holistic manner, transcending the confines of traditional textbooks. The objective of this work is to provide students with a diverse array of resources seamlessly integrated into their studies, where success is measured not only by career prospects but also by personal and professional development. The primary goal is to foster innovation and cultivate new perspectives through EduBridge. This platform comprises six modules designed to nurture students' innovative ideas and enhance their knowledge. Each module encompasses various components: 1) well-crafted course content, fostering meaningful interaction between instructors and learners, and providing comprehensive support to instructors. 2) Cultivation of a sense of community within the online learning environment. 3) Advancements in technology and the enhancement of the quality of higher education. This study analyses the opinions of the students and aims to contribute to the improvement of higher education, as well as student enrollment and retention rates as per the needs.

Keywords: Online education · online teaching · online learning community · Textbooks · online higher education · modules · communication skill

1 Introduction

Online education can become transformative when teachers and students synthesize information across subjects and experiences, critically weigh significantly different perspectives, and incorporate various inquiries [1]. These online platforms have been increasing in popularity [2], some may not be available to attend the schools or the colleges they are able to utilize the opportunity, it encourages the capability of the students to enhance the education in a proper way. This work has been developed for the utmost utilization of the online resources by the students across the globe. In this fast era, growth is an important aspect for every human being. The idea behind this work is to provide services to the students who can't afford to purchase the existing contents to learn technology and the subject in their expertise. Also, this platform serves the purpose of covering all the contents for the school, college and general knowledge.

Many people in this modern world are still underdeveloped and uneducated due to the lack of availability of free resources [3]. The new age made everything expensive for an ordinary man, including education. To reduce this and bring a change in this world, The creators brought life to this work. Hence, it was introduced and developed to enhance the skill of the students in various aspects.

Still in the developed digital era of the world, education has been developed as a proof that many scientists have been evolved and working in different areas [4–7], but still, many of the schools and college students have no access to the proper content for their prospective syllabus and no other option to evaluate themselves in a tool. Hence, in order to provide a single access to the users, we come up with a solution where learning, assessment and evaluating comes on the same platform. The users/students can easily access via secure login system. Education has always been one of the most important things a human being can have. One common way people gain knowledge and get themselves educated is by going to educational institutions, but in the current scene the resources available for a human to get himself educated or learn new things got heavily commercialized [8]. The Quality Resources available in the markets all have a price tag on them. of the tools available in the market, but charging them with some fees to learn the courses. But tools are to provide the complete content in a class wise manner. We are planning to reach the rural people free of cost.

Already, some platforms provide the courses through the Government of India platforms, but no such tool is available to provide ALL IN ONE content like access to resources, assessment, evaluations, questionnaires, funds, research opportunities, job searching opportunities etc. The identified problem is the limited access to quality education, especially for students in rural or remote areas. The main outcome of this research is to develop an online education platform that addresses this issue by providing accessible and flexible learning opportunities for all students, regardless of their location or background.

What makes this research unique is its focus on leveraging technology to overcome geographical barriers and enhance educational accessibility. By creating a platform that caters to diverse learning needs and preferences, this research aims to democratize education and empower students to succeed academically. The basic concept revolves around providing a comprehensive solution for education in the digital age. It aims to address the lack of access to proper learning materials and evaluation tools for students in schools and colleges. This is achieved by creating a single platform where users can access learning materials, take assessments, and evaluate their understanding of the content. The key idea is to streamline the educational process and make it more accessible and efficient for students. The proposed solution encompasses offering students a versatile platform with diverse facilities, including access to offline content for those in remote areas. This solution caters to a broad spectrum of users, from students to working professionals. The outcome is enhanced accessibility to education, especially during challenging times like the COVID-19 pandemic. The platform empowers students to continue their learning remotely, ensuring they can access knowledge whenever and wherever they need it. The reason behind the idea is that because many students living in rural areas don't have access to quality education.

With the COVID pandemic, the schools were shut down, highlighting the need for the online learning platforms [9]. The goal is to bridge the gap by providing the students with a reliable way to learn online, ensuring they have the same opportunities as their urban counterparts to succeed academically.

This specific online education system is important because education holds significance in today's world. This particular platform has the potential to bring about widespread positive change in the current educational landscape. Its accessibility and versatility make it beneficial for numerous children, addressing the diverse learning needs of students across various backgrounds and circumstances. The main aim is to make education more accessible and impactful for a larger number of children, thereby contributing to their overall academic success and future prospects. This online education system fits well with modern teaching ideas. It's all about letting each student learn at their own pace and making education accessible to everyone.

In practical terms, it's great because it helps students from faraway places access education. It's also flexible, so it works for different types of learners and schedules. Plus, there are lots of fun tools and resources to help students learn better. Overall, this system makes learning easier and more enjoyable for everyone. In the upcoming session, there will be extensive literature work planned. Following that, the methodology of the proposed model will be explained in detail. Subsequently, the session will feature a results and discussion section where a survey has been conducted.

In reviewing existing works, analysis encompasses various educational platforms such as Udemy, Coursera, and resources like the Vidyalakshmi portal, highlighting differences from the proposed platform [10, 11]. The distinct advantage of the proposed platform is its integration of all facilities within a single portal, offering convenience and efficiency to users. Learning from existing works has provided insights into platform design and the provision of student services across different domains. Considerable thought has been given to enhancing the platform in multiple aspects. The analysis evaluates the efficacy of study materials, online classes, communication tools, testing methods, and loan features, aiming to identify strengths and areas for improvement. This approach has been chosen for its ability to enhance user experience and improve learning outcomes within a multifaceted educational platform. Focusing on these aspects fosters innovative ideas and empowers users, thereby providing a competitive edge in the educational technology market.

2 Methodology

EduBridge offers a wide range of features to meet people's educational needs. The Application assists the user from grain until he reaches his peak, it will be the user's friend along the path helping in his growth and honing his skills. This project comprises six key modules, each having its own uniqueness. The modules are built in a convenient way that can be accessed by people of different backgrounds. With the focus on supporting individuals from the initial stages of learning to their peak potential, the application is designed to be intuitive and supportive.

Each of six modules is designed to meet the specific needs of users, ensuring accessibility and usability for individuals from diverse backgrounds as in Fig. 1. Through its

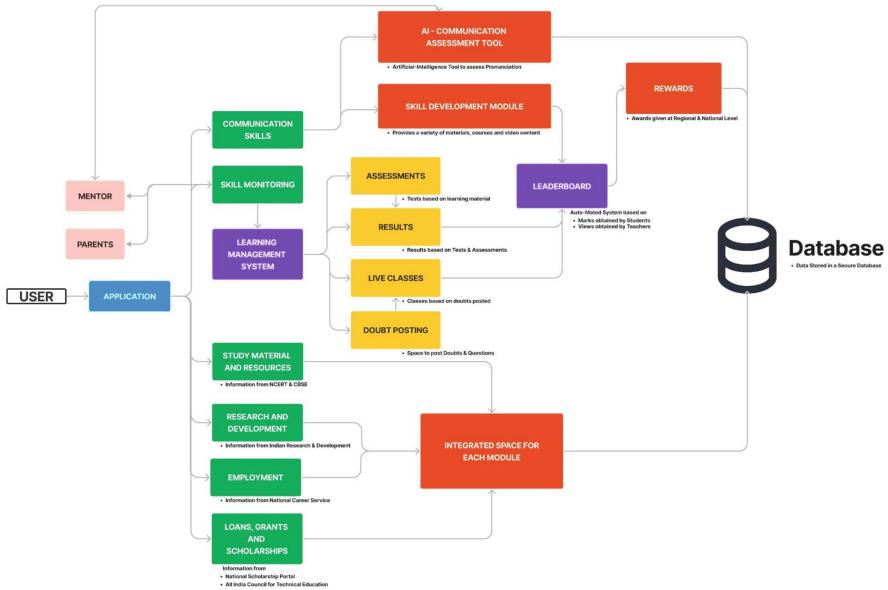


Fig. 1. Architecture of the E- Learning application (EduBridge)

user-friendly design and comprehensive features, EduBridge aims to help users learn and improve their skills effectively.

2.1 Communication Skills

The Communication Skills module aids in helping people develop their communication skills by providing course content consisting of audios, videos etc. and also have Fluency Assessment Tool which first gives the user a paragraph to read out loud and then captures the audio as input, then the tool checks the level of fluency and returns the output by generating a score based on their language fluency. The Speech to Text Web Application Program Interface is used for this tool.

2.2 Study Material

A place where users can access a wide range of resources on a variety of topics is the study materials module. The materials can be utilized for the wide needs of the user. The resources are vast enough to meet the requirements of the people. They also consist of textbooks from NCERT, State Board books, private course materials etc.

2.3 Skill Monitoring

The Skill Monitoring module is vast. Users can take texts and assessments on a weekly and monthly basis; they can also post their doubts for teachers to answer and above all

the unique leaderboard system for both the teachers and students based on their performances. The students are rated based on their performance in the tests & assessments. The teachers are judged based on their live class views and also on how often they take classes and clear the doubts of the students. Students will have a unique section for them to post their doubts and all the teachers on the platform can see the doubts posted by the students. Teachers can opt to clear that particular doubt or take a class.

2.4 Employment

Online classes users can gain employment and internship opportunities through the application. The application offers wide access to opportunities in a more effective way. Job seekers can create their personalized profiles, display their skills and also upload resumes. People can apply for jobs based on their interests and roles. Companies and hiring firms can create their company profiles and send job requirements, notifications and look for skilled people.

2.5 Research and Development

In the research and development module, users can showcase their research work and collaborate with other users for the same. People can post articles, research journals, research papers etc. this content can also be viewed by other users on the platform. This module aims to be a one stop destination for all research & development related work. The module is web scrapped to <https://www.india.gov.in/topics/science-technology/research-development>.

2.6 Grants and Loans

The Grants, Loans and Incentives module, lets users know about the government provided Grants and incentives. The government provides the students loans for the better education. The module offers various services like the module can apply for loans; we have redirected the module with the Vidya Lakshmi Portal.

3 Implementation

The application consists of several unique modules which will be useful to the students. It provides many facilities for students which can be utilized by many knowledge seekers. The content available Online can also be downloaded as offline content in order to help people in low network and rural areas.

3.1 Speech to Text-Based Project Assessment Tool

The communication module includes a feature that allows users to convert speech into text (Fig. 2). This is achieved using an Application Programming Interface (API), which is essentially a set of rules and protocols that enables different software applications to

communicate with each other. In simpler terms, the API acts as a bridge between our program and another service that specializes in speech recognition.

Additionally, the module utilizes the Python programming language to handle the conversion process. Python is a popular and beginner-friendly programming language known for its simplicity and readability [12]. It provides various libraries and tools that facilitate tasks like text processing and interacting with APIs.

The conversion of speech to text is facilitated by an API, acting as a connection between our communication module and specialized speech recognition services:

$$\text{Speech_to_Text_Transcription} \rightarrow \text{API}(\text{Spoken_Input})$$

Python is utilized to efficiently manage the conversion process, leveraging its versatility as a programming language:

$$\text{Python_Code} \rightarrow \text{Speech_to_Text_Conversion}(\text{Spoken_Input})$$

The pronunciation assessment algorithm evaluates factors such as phonetic accuracy, intonation, and fluency of the transcribed text:

$$\text{Pronunciation_Score} \rightarrow \text{Evaluate_Pronunciation}(\text{Transcribed_Text})$$

Through the integration of APIs and Python, our communication module enhances efficiency and accuracy in speech-to-text conversion and pronunciation assessment:

$$\text{Efficiency} \rightarrow \text{Improved}(\text{Speech_to_Text_Transcription}) + \text{Enhanced}(\text{Pronunciation_Score})$$

This integration represents a significant advancement in communication technology, ensuring clear and accurate interaction between users and their devices.

Once the speech is converted into text, the module evaluates the pronunciation accuracy of the spoken words. This assessment helps to determine how well the speaker articulated the words. Based on this evaluation, the module assigns a score to indicate the level of correctness in the pronunciation.

By leveraging APIs and the Python programming language, the communication module offers users a convenient way to convert spoken words into text and assess pronunciation accuracy as in Fig. 2.

Study. The platform provides many reference textbooks, it contains online classes for the students and they can even clear their doubts with their respective faculty, there are so many facilities that can be utilized by the students in an appropriate way.

It also contains a wide range of materials, from class one to PG. The discussion associated with practice problems was optional, but students could receive bonus points by sharing insightful ideas, answering questions, even asking questions that would lead to a better understanding of the topic.

Practice. In this practice module, it consists of many mock tests for the students to improve their grades, due to these tests they can improve their knowledge and they can select their own course which they are interested in after the practice of mock tests they can view their results. It also contains badges for the students for their performances, as it

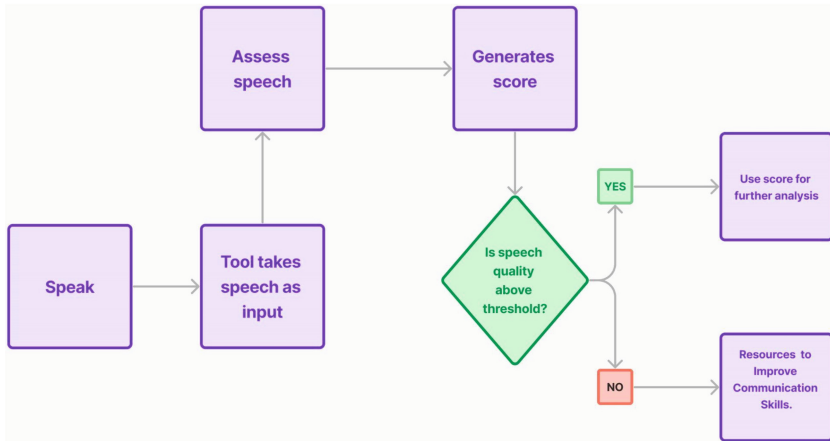


Fig. 2. Speech to text-based fluency assessment tool

improves the confidence of the students. The teacher can also view the student's progress. After watching the instructional videos, students were required to answer both conceptual and numerical questions related to the topic covered and to reflect on what they had learned in the videos. Despite their simple logic, some conceptual questions could be quite challenging specifically for novice learners who are just getting introduced to the topic. During the in-person class, instructors typically design active learning activities such as think-pair-share or other forms of activities to encourage students to share their ideas, learn from each other, and deepen their understanding.

Interact. The subject-specific teacher can conduct the tests for the students, they can create their own question papers for the students. To promote interaction, an online discussion component - providing access and engaging a diverse group of students located in different geographical locations and time zones - was developed and implemented. In many online discussion forums, students can post questions, answer each other's questions or share ideas and hints. The developed online discussion tool was a standalone web application, but it could be integrated with LMS.

Exams. The platform consists of different type of exams, such that students can also access through it and even a job holder can practice through these exams, and the job holder can also apply for jobs. This part of the questionnaire includes three main questions concerning the use of social networking platforms and their influence on students' educational achievement through cooperative learning. The subjects of the questions are as follows: the use of social networking platforms for interactions among students, interactions with lecturers, and knowledge sharing with peers to enhance students' educational achievement. Even after completion of the exam the students can share their ideas and engage in the discussion so that there will be many more interactions in the platform, which is useful for the students. The discussion will be done according to the doubt posting done by the students. The idea sharing can also be done by the students among them.



Fig. 3. Learning management system flow

Results. Once the results are announced, each student receives badges corresponding to their scores. These badges serve as recognition of their achievements and are displayed on the dashboard. The allocation of badges is directly linked to the performance of students. The rewards will be declared accordingly to each and every student by allocating the badges to the students the student can improve their skill.

Design. The online platform or system provided offers students a convenient and centralized means to view their exam grades and performance, enhancing their overall educational experience. Through this platform, students can easily access their results, allowing for timely feedback and reflection on their academic progress.

Furthermore, the platform as in Fig. 3, implements a badge system, which visually represents students' achievements or skills. These badges are earned based on their performance in exams and signify various accomplishments such as high scores, improvement, subject mastery, or other criteria established by the educational institution. By awarding badges, the platform aims to recognize students' hard work and academic achievements, thereby motivating them to strive for further success. Built on a robust infrastructure to meet the diverse educational needs of students, parents, and mentors, the platform offers a comprehensive suite of modules. At its core is the Study Material and Resources section, which draws on some of the resources, like NCERT

and CBSE, to ensure access to high-quality educational content crucial for academic growth [13]. Additionally, the platform encourages active engagement in Research and Development, empowering students to explore various research projects into existing topics. Recognizing the importance of preparing students for their future careers, the platform provides an employment module where students can access job opportunities and career-related resources. Financial aid is also facilitated through the Loans, Grants, and Scholarships section, ensuring students have the necessary support to pursue their education effectively. To further enhance students' communication skills, the platform integrates an AI-based assessment tool that evaluates pronunciation and other aspects of communication [14]. Moreover, the Skill Monitoring module offers tools to track and improve student skills, including assessments, live classes, and a platform for posting doubts and questions, fostering an interactive learning environment. Within the Skill Monitoring module, students can gauge their understanding of learning materials, track their progress, and engage directly with instructors and peers. Doubt posting capabilities enable students to seek clarification and deepen their comprehension of covered topics. A standout feature of the platform is the inclusion of a leaderboard as in [15], which serves as a central hub for tracking student performance. This feature provides students with visibility into their marks and rankings, motivating them to excel, while also enabling teachers to monitor progress and offer targeted support. The leaderboard data is securely stored, facilitating historical tracking and recognition through badges for notable achievements. The platform's database architecture ensures secure storage of student results and teacher activities. Additionally, data integrity is maintained through regular backups and validation processes, preventing data corruption or loss. Overall,

Table 1. Questionaries data to collect the responses

Q. No	Questionaries
Q1	Do you prefer online education platforms where resources are freely accessible?
Q2	Have you encountered any online education platform that provides both employment and internship opportunities?
Q3	Do you prefer online education platforms that offer skill monitoring and progress tracking features?
Q4	Have you gone through any online education platform with interactive learning features such as quizzes, discussions and live sessions combinedly?
Q5	Would you prefer free mentorship and guidance features to be added directly within course materials on online education platforms?
Q6	Have you ever learned or utilized financial aid options such as grants, scholarships, loans to support your online education endeavors through any online education platforms?
Q7	Have you come across any online education platform that offers all comprehensive range of features like skill monitoring & development, free access to diverse resources, Employment opportunities, Information on grants, loans, and incentives etc. for educational advancement on a single platform?

the platform serves as a reliable repository for all educational data, supporting teaching and learning activities effectively.

During the survey, many people across the areas have responded to all the questionnaires that have been provided in the Table 1. Most of the people are the students who are familiar with the online platform where they have shared their experience regarding the information.

4 Results and Discussion

The following graph (Fig. 4) shows the results of a survey about what students like and have experienced with online learning platforms. The questionnaire comprised seven straightforward yes or no questions, covering various aspects such as resource accessibility, employment opportunities, skill monitoring, interactive learning features, mentorship options, financial aid utilization, and the availability of comprehensive educational features on online platforms. Studying these results helps us to understand what students need from online platforms, so we can make them better.

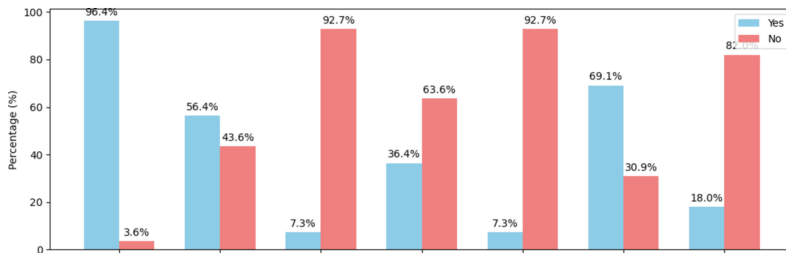


Fig. 4. Opinion/responses about proposed E-Learning platform by 55 students

The total responses (Always True) are represented as,

$$\mathcal{X} + \mathcal{Y} = 100 \tag{1}$$

Where, \mathcal{X} represents the percentage of “Yes” responses and \mathcal{Y} represents the percentage of “No” responses. This Eq. (1) ensures that the total percentage of responses for “Yes” (\mathcal{X}) and “No” (\mathcal{Y}) always sums up to 100%, indicating that all responses fall into either “Yes” or “No” categories.

Relative favorability represented as,

$$Favorability\ Ratio\ \mathcal{Z} = \frac{\mathcal{X}}{\mathcal{Y}} \tag{2}$$

where \mathcal{Z} represents the ratio of students favoring the platform to those opposing it. This formula from Eq. (2) calculates the favorability ratio, representing the ratio of students favoring the platform to those opposing it. It gives an indication of the overall sentiment towards the platform based on the survey responses.

Advanced scenarios (Hypothetical) are represented as in Eq. (3):

$$\text{Impact on Favorability Ratio } \Delta \mathcal{Z} = \frac{\mathcal{X}_{new} - \mathcal{X}}{\mathcal{Y}} \quad (3)$$

where $\Delta \mathcal{Z}$ estimates the change in the favorability ratio (\mathcal{Z}) due to a hypothetical increase in “Yes” responses \mathcal{X}_{new} . It helps in predicting how changes in survey responses may affect the favorability ratio.

Logistic Regression (assuming data on student demographics):

$$\mathcal{P}(Yes) = \frac{1}{1 + e^{-\beta_0 + \beta_1 \text{GradeLevel} + \beta_2 \text{LearningStyle} + \dots}} \quad (4)$$

Where, $\mathcal{P}(Yes)$ is the probability of a student responding “Yes”.

β_0 is the intercept (a constant term). β_1, β_2, \dots are coefficients associated with independent variables like GradeLevel (categorical) and LearningStyle (could be categorical or numerical depending on how it’s measured). e is the base of the natural logarithm (approximately 2.718). This Eq. (4) allows to predict the likelihood of a “Yes” response based on a student’s grade level, learning style, and potentially other factors captured in the additional data.

The students haven’t come across any online education platform that offers all comprehensive range of features like skill monitoring & development, free access to diverse resources, employment opportunities, information on grants, loans, incentives, etc. for educational advancement on a single platform, which makes the platform special in all the aspects. The platform provides a wide range of facilities for the students. Through this survey it explains the need of the online platforms in present days.

5 Conclusion

This research is done on an application which aims to enhance the education in India and bring a new change for the modern world. The researchers found out that there is a need of an education platform that acts as the one stop solution for all educational needs. The World needs a change, this application will revolutionize the whole scene of education. This application will assist humans, right from the stage of a rice grain. The application will be a friend in the user’s life long journey. All the people who want to learn new things, progress in life, people with educational needs, each and every user using this application will be benefited by utilizing this application. The research paper can be further improved by researching more on each module of the application. A discussion platform for enhancing students’ interaction in the online education.

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