

Schools-Hub



Final Year Project
by

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In Partial Fulfillment Of the Requirements for the degree Bachelor of
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Declaration

We hereby declare that this project report entitled **Schools Hub**, submitted to the **Computer Science Department, Sukkur IBA University**, is a record of original work done by us under the guidance of Supervisor **Mr. Ismail Mangrio**, and that no part has been plagiarized without citations. Additionally, this project work is submitted in partial fulfillment of the requirements for the degree of Bachelor of Computer Science.

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Dedication

We dedicate this to our parents who taught us to think clearly and motivated us to try our hardest in everything we do, without them we could not have reached our goals. This thesis is also dedicated to all those who believe in the power of learning and willpower.

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Our heartfelt thanks go to ALLAH for having given all the necessary knowledge to plan and execute this project and the curriculum. There was never a scarcity or a need. During all this development, He took control of all that might have hindered us and helped us even in our hardest moments.

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Abstract

The proposed web platform seeks to revolutionize the process of selecting the desired educational institution for children by creating a comprehensive and user-friendly interface that connects schools with prospective parents. This innovative platform will serve as a centralized schooling hub, hosting profiles of various schools, enabling end users to select school and make well-informed decisions for their children's future with respect to their needs. In this digital age, the school selection process can be overwhelming for parents seeking the optimal learning environment for their children. Our platform aims to simplify this process by allowing schools to create and maintain detailed profiles, showcasing their facilities, curriculum, faculty, extracurricular activities, and other essential information. Users, primarily parents and guardians, will have the ability to search, filter, and compare schools based on a variety of parameters such as location, teaching methodology, available facilities, tuition fees, and academic performance. The platform will also incorporate reviews and ratings from current students and parents, providing valuable insights and perspectives on each school. The proposed platform aims to bridge the information gap between schools and parents, leading to a more easy and effective decision-making process.

Chapter 1

Introduction

In a rapidly evolving educational landscape, the process of selecting the optimal educational institution for children has become increasingly complex, time taking and overwhelming. Parents or guardians face many difficulties when it comes to finding the optimal/desired school for their children. They may have to go from school to school, get suggestions from others, and spend a lot of time. This can be a very stressful and time-consuming process. This report outlines the development of a groundbreaking web platform that will transform the way parents and guardians choose schools for their children. By creating a user-friendly and centralized hub, this platform aims to bridge the information gap between schools and parents, making informed school selection decisions a seamless process.

1.1 Purpose of the Project

The proposed web platform seeks to revolutionize the process of selecting the desired educational institution for children by creating a comprehensive and user-friendly interface that connects schools with prospective parents. This innovative platform will serve as a centralized schooling hub, hosting profiles of various schools, enabling end users to select school and make well-informed decisions for their children's future with respect to their needs. In this digital age, the school selection process can be overwhelming for parents seeking the optimal learning environment for their children. Our platform aims to simplify this process by allowing schools to create and maintain detailed profiles, showcasing their facilities, curriculum, faculty, extracurricular activities, and other essential information. Users, primarily parents and guardians, will have the ability to search, filter, and compare schools based on a variety of parameters such as location, teaching methodology, available facilities, tuition fees, and academic performance.

1.2 Problem Statement

The current school selection process for parents and guardians is complicated and time-consuming due to the lack of centralized and reliable information about educational institutions. This project aims to simplify and streamline this process by creating a user-friendly web platform that provides comprehensive school profiles, ultimately helping parents make informed decisions about their children's education.

1.3 Project Scope

The project scope includes the development of a web and AI-based platform that connects educational institutions (schools) with parents or guardians. This section outlines the project's boundaries and limitations.

1.3.1 In Scope Features

User Management

- User registration for parents, guardians, and students.
- User authentication and authorization.

School Management

- School registration for educational institutions.
- School profile creation and management.
- School authentication and authorization.

AI Guide

- Parents will be able to get suggestions and recommendation from AI by asking them questions regarding their child interests.

Search and Filtering

- School search based on criteria such as location, tuition fees, etc.
- Advanced filtering options.

Reviews and Ratings

- User-submitted reviews and ratings for schools.
- Display of reviews and ratings on school profiles.

1.4 Not in Scope

The following functionalities are not within the scope of this project

- Financial Transactions: The project does not involve financial transactions.
- Direct Integration with External Databases: No direct integration with external school databases is included.
- Curriculum Creation and Management: The project does not cover curriculum creation.
- User-to-User Messaging: The platform does not include user-to-user messaging features.
- This short and clear section specifies what is explicitly excluded from the project's scope.

1.5 Stakeholders

Stakeholders of our system are:

- Parents/Children: Parents who are looking for desired institution for their children future.
- Development Team: Team from Sukkur IBA University that develops the software
- Supervisor: Faculty of SIBAU that supervises and guides the development.
- FYP Committee: Faculty of SIBAU that evaluates the development.

Chapter 2

Literature Review

This literature Review is carried out on three Research based articles from well known journals and website articles. Extracted data from these articles is mentioned below.

2.1 Reasons Influencing Selection Decision Making of Parental Choice of School

In this research article, the author delves into the multifaceted factors shaping parental decision-making processes regarding school selection. The author explores various influences such as school quality, academic reputation, proximity to home, extracurricular offerings, and the alignment of school values with parental preferences. Through a comprehensive analysis, the article highlights the nuanced considerations that parents weigh when choosing an educational institution for their children [1].

2.2 How Do Parents Engage in School-Choice Decisions?

The author offers insights into the cognitive and behavioral aspects of parental engagement in the school-choice process. By employing qualitative research methods, Valentine uncovers the decision-making strategies employed by parents, including information gathering, deliberation, and consultation with various stakeholders. The article underscores the dynamic nature of parental involvement in school-choice decisions and the importance of understanding these processes for effectively supporting parents in navigating educational options [2].

2.3 What do Parents look for when choosing a School?

This article examines the key considerations that drive parents' choices in selecting schools for their children. Through surveys and interviews with parents, the author identifies factors such as academic rigor, safety, teacher quality, and the availability of extracurricular activities as primary determinants of parental decision-making. The article emphasizes the diverse preferences and priorities among parents and underscores the need for schools to understand and cater to these varying needs to effectively attract and retain students [3]

2.4 Which school? A study of parents' choice of secondary school

The study by Janet B. Hunter explores the factors influencing parents' choice of secondary schools for their children. Through semi-structured interviews, it identifies four key aspects that parents prioritize: discipline and well-behaved children, emphasis on good exam results, preference for single-sex schools, and proximity to home. The study reveals variations in preferences among different ethnic backgrounds, with African or Caribbean parents valuing exam results, Asian and 'other white' parents preferring single-sex schools, and 'other black' parents emphasizing discipline. Notably, the majority of parents who prioritize single-sex schools are those with daughters [4].

2.5 Factors Influencing Parents' decision when choosing a Private School in Alberta

This research investigates the varying influences on parents' decisions when selecting a private school for their child, with a focus on schools in Johannesburg, South Africa. While factors such as school reputation and academic performance have been noted globally, this study emphasizes the significance of location and convenience, particularly in the context of schools' unique positioning. The analysis highlights that while quality education is a common expectation, the distinct competitive advantage of a private institution lies in understanding and catering to the specific needs and decision-making processes of parents. Ultimately, this research underscores the importance for educational institutions to recognize and leverage their competitive advantages to effectively meet the expectations of parents and students [5].

2.6 Determinants of school choice: Understanding how parents choose elementary schools

Rational choice theory suggests that parents are utility maximizers who make decisions from clear value preferences, that they are able to demand effective action from local schools and teachers, and that they can be relied upon to pursue the best interests of their children. This paper presents a different perspective and argues that parents invest a mixture of rationalities when selecting schools. Based on the results of a survey of 1,500 parents of students in 11 private, eight public and 10 alternative elementary schools in Alberta, Canada, this paper explores the logic, values, and concerns that inform parental decision making in the selection of an elementary school for their children and discusses implication for policy and educational reform [6].

2.7 Factors Influencing Parents' Decision in Choosing Private Schools

This research examines the factors considered by parents when deciding to enroll their children in private schools. Based on literature review, some eight factors have been

identified, but this research only deals with four. According to the data analysis, parents part emphasizing on the importance of private schools' syllabus, schools' environment and facilities when selecting to enroll their children in private schools. The academic performance of the school was placed third in preference, with fourth factor considered being the quality teachers that the school possessed [7].

Collectively, these articles provide valuable insights into the complex and dynamic nature of parental decision-making in school selection.

2.8 Project Background

In today's digital age, choosing the right school for children can be overwhelming. Understanding this challenge, our team set out to create an innovative web platform to simplify the process. Stemming from personal experiences and research showing gaps in existing solutions, we aimed to bridge the gap between schools and parents. The result is Schools-Hub, a user-friendly hub connecting schools with prospective parents. Through collaboration and dedication, we've built an easy-to-use interface allowing parents to access detailed school profiles, personalized recommendations, and user-generated reviews. Our commitment to excellence ensures Schools-Hub empowers parents to make informed decisions about their children's education, promising to redefine the school selection journey for a brighter future.

2.9 Existing Systems

These are the few Platforms that are serving the same purpose and are available on the web:

- SchoolDigger.com
- Niche.com
- GreatSchools.org

2.10 Development Environment

It will rely on modern web technologies and frameworks, leveraging the MERN stack, which comprises MongoDB, Express.js, React, and Node.js. Users will require internet connectivity to access and interact with the system

Chapter 3

Problem Definition

The current landscape of selecting the optimal educational institution for children poses significant challenges and complexities for parents and guardians. There is no one place to get all the details they need, so they spend a lot of time searching. This confusion leaves parents unsure about which school is best for their child's needs, like academics and extracurricular, including diverse curriculum, teaching methodologies, and facilities increases the difficulty of making informed decisions. Parents and guardians are inundated with a multitude of questions and considerations, ranging from the alignment of school values with their own, to practical concerns such as accreditation, student demographics, and academic performance track records.

Traditional methods of gathering information, such as brochures, websites, and word-of-mouth, often yield incomplete or inconsistent data, leading to time-consuming and sometimes ineffective decision-making processes. Additionally, the absence of a centralized platform for comparing and evaluating schools further compounds the challenge, potentially resulting in uninformed decisions and mismatches between a student's needs and the educational environment.

3.1 Target Audience

- Parents and Guardians
- Kids
- Schools

The target audience for the proposed web platform encompasses parents and guardians who are actively engaged in the process of selecting an educational institution for their children.

3.2 Proposed Solution

The proposed solution is a user-friendly web platform designed to streamline the process of selecting educational institutions for children. By centralizing detailed profiles of schools and offering robust search, filter, and comparison functionalities, the platform empowers parents and guardians to make well-informed decisions tailored to their children's

needs. Leveraging Artificial Intelligence, the platform provides an AI bot that enables the parents to engage with AI for informed decisions of their child, while incorporating reviews and ratings from diverse stakeholders enriches the decision-making process with real-world insights. Through these features, the platform bridges the information gap between schools and parents, facilitating easier and more effective decision-making to ensure that every child finds the optimal learning environment for their growth and success.

Chapter 4

Methodology

For this project, we will prefer to use Agile methodology. Agile methodology utilizes iterative development and prototyping are widely used in variety of industry projects as a light weight development method which can satisfy to the changes of requirements. Short iterations are used that are required for efficient product delivery. Traditional software development processes are not much efficient to manage the rapid change in requirements.

Illustrative flow of the agile methodology is depicted in Fig. 1

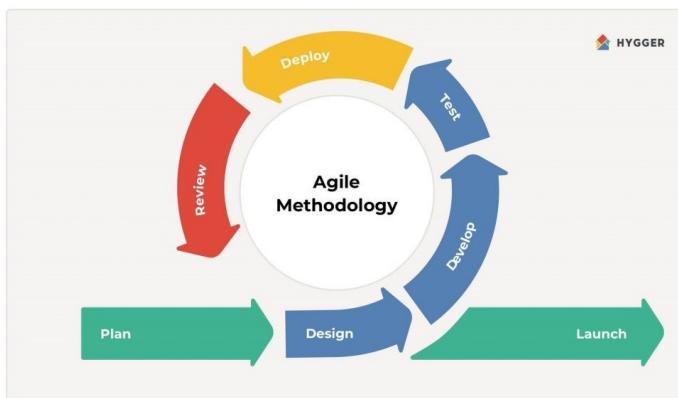


Figure 4.1: Agile Methodology [?]

4.1 Agile Methodology

Agile methodology is mostly used for web development projects with a clear and predefined scope, with a fixed time frame for project completion with many iterations or revisions. It splits the project into small incremental components. These components are provided in iterations. Duration of each iteration lasts from about one to three weeks or may vary depending on iteration.

- Planning and Requirements Analysis.
- Interface Design.

- Development and Coding.
- Testing.
- Reviewing.
- Launching.

4.2 Research and Requirements Analysis

- The project initial phase starts with analyzing the requirements of schools, teachers, parents and students. It involves conducting in-depth research and consultation with educational experts, parents, and school administrators to identify the essential features and functionalities of the platform according to their needs. For this phase, we will design a separate questionnaire survey for schools and for parents/guardians. Based on the insights from existing literature and survey data, we will design the project
- Study and exploring different AI models and algorithms to implement in our platform for enhancing our features for users. Analyze different machine learning algorithms on our data and use the best fit model.

4.3 Interface Design

- This phase involves creating a user friendly and engaging interface that will be simple and attractive for the diverse needs of users, as shown below in figure 4.2.



Figure 4.2: Home Page

- This phase includes to select and design a robust platform architecture to accommodate the large numbers of schools and their related data.

- An architecture that will be implementable for our main features which is rating and reviews.
- The architecture will be scalable so platform can grow alongside its vast schools and user data base.
- Some of the parents might be less familiar with technological usage. The design phase will translate users requirements into an engaging and appealing GUI that ensures efficient interaction and easy to use for anyone.

4.4 Website Development and Coding

Our web platform interface will consist of three different users

4.4.1 Admin

The main user who can see all registered school and end users data. Admin can verify, add, delete and modify user's profiles and data.

4.4.2 Schools

The schools can register on platform and maintain their profile. Adding details about school and all other important details that student and their parents are looking for before applying for admission.

4.4.3 End Users

Parents, guardians or students can browse through the school details and can search schools according to their needs using different available filters. End users have to register account on our platform and can use our AI based feature to select optimal schools for their future career path by filling form about student characteristics, interest, skills etc.

We will develop this web platform using MERN stack. MERN stands for MongoDB, Express, React, Node, after the four key technologies that make up the stack

- MongoDB.
- ExpressJs.
- React.
- NodeJs.

The selected MERN stack will be implemented with interactive and easy to use interface for our users. Developing different components for our features and functionalities to embed in our web platform. Each feature will have its own and separate components that can engage with other components as well.

4.5 MERN Stack Development

The MERN architecture allows you to easily construct a three-tier architecture (front end, back end, database) entirely using JavaScript and JSON as shown in figure 4.3.

4.5.1 Front End Tier

For the front end we will use React.js [2], the declarative JavaScript framework for creating dynamic client-side applications in HTML. React helps us to build up complex interfaces through simple Components, connect them to data on our backend server and render them as HTML.

4.5.2 Server Tier

The next level down is the ExpressJs server-side framework, running inside a NodeJs server. ExpressJs bills itself as a “fast, minimalist web framework for NodeJs,” and that is indeed exactly what it is. ExpressJs has powerful models for URL routing (matching an incoming URL with a server function), and handling HTTP requests and responses. By making XML HTTP Requests (XHRs) or GETs or POSTs from our React.js front-end [2].

4.5.3 Database Tier

MongoDB [3] is an open source NoSQL database management program. NoSQL is used as an alternative to traditional relational databases. NoSQL databases are quite useful for working with large sets of distributed data. MongoDB is a tool that can manage document-oriented information, store or retrieve information. We will use MongoDB Atlas for our application, MongoDB Atlas is a fully managed cloud database that handles all the complexity of deploying, managing, and healing your deployments on the cloud service provider of your choice (AWS , Azure, and GCP). MongoDB Atlas is the best way to deploy, run, and scale MongoDB in the cloud.

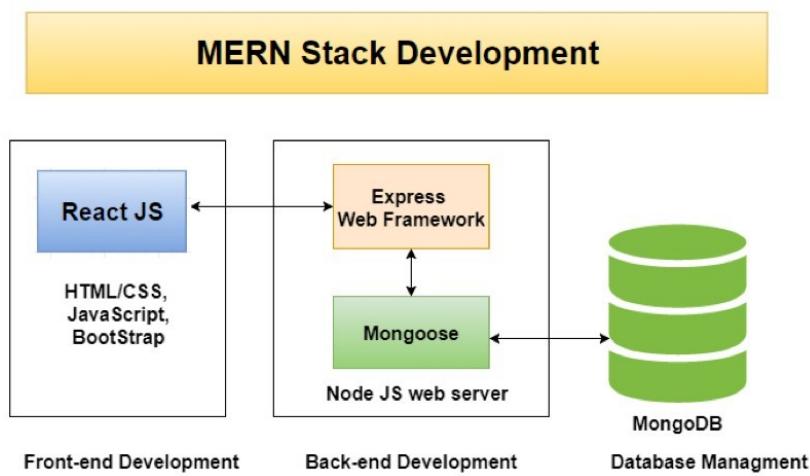


Figure 4.3: Mern Stack [?]

Chapter 5

Detailed Design and Architecture

5.1 System Architecture

In our project, the architecture is every simple. It has 3 type of user which are parent/child, school, and an admin as depicted in Figure 5.1. The role of parent is to find desired school for the better future of their children. Parent can use available features to filter out the desired schools that are fulfilling the needs and conditions of parents. The role of schools is to manage and update their profile up to date information. Finally, the role of admin is to manage all the school's profile registration and also managing the end user data.

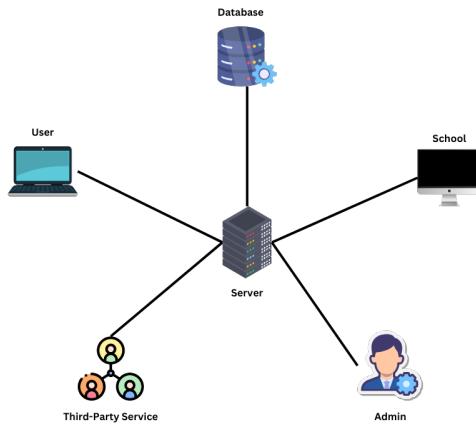


Figure 5.1: System Architecture

5.1.1 Architecture Design Approach

The architecture design of our innovative web platform for selecting educational institutions is thoughtfully designed to deliver a robust, scalable, and user-friendly solution that

bridges the gap between schools and prospective parents. This architecture (as shown in Fig. 2) encompasses a range of technologies and components to ensure the platform's efficiency, security, and seamless user experience.

5.1.2 Architecture Design

The figure 4 below depicts the overall system architecture of our Schools-Hub Project. This is a 3-tier architecture i.e. it has three layers of architecture

- Presentation Layer.
- Business Layer
- Data Layer

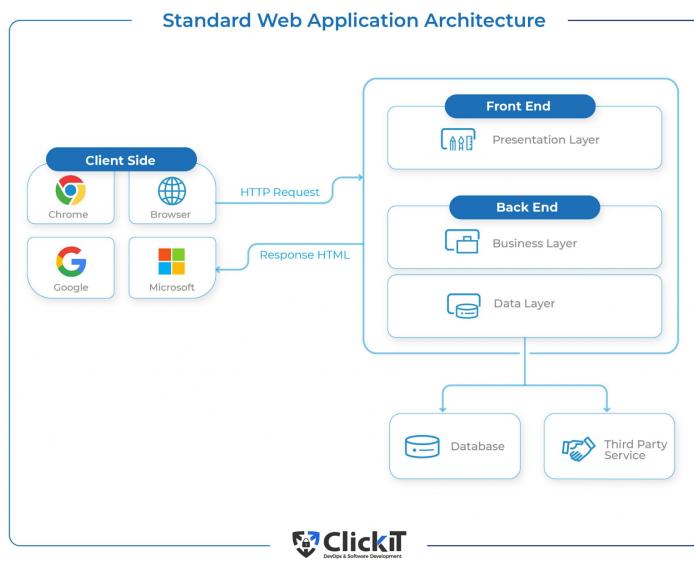


Figure 5.2: Design Diagram [?]

5.1.3 Subsystem Architecture

The subsystem architecture of the platform is designed to ensure seamless functionality and efficient interaction between its various components. Each subsystem is responsible for specific tasks related to user interaction, school profile management, search and filtering, and review and rating management.

The User Interface Subsystem serves as the primary interface for users, providing them with intuitive tools to navigate the platform, search for schools, and access relevant information. The School Profile Management Subsystem enables schools to create and manage their profiles, ensuring that accurate and up-to-date information is available to prospective parents.

The Search and Filter Subsystem empowers users to refine their school search based on specific criteria such as location, curriculum, facilities, and academic performance. The Review and Rating Subsystem facilitates user-generated feedback, allowing parents, students, and teachers to share their experiences and insights about schools.

- Top Level Data Flow Diagram: The top-level DFD in figure 5.3 illustrates the flow of information between various subsystems and external entities.

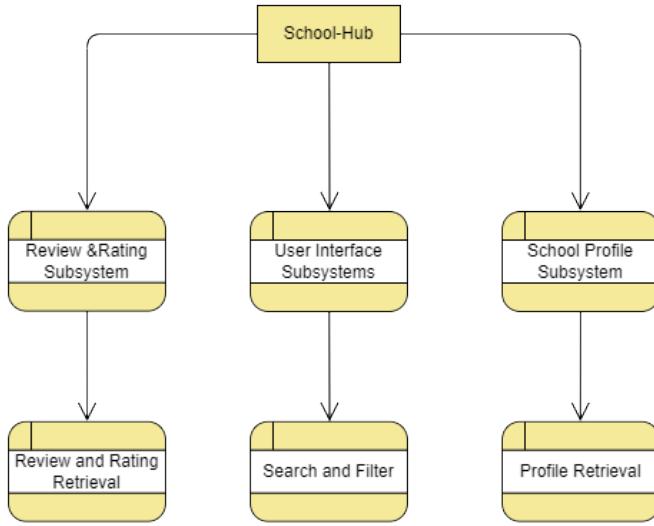


Figure 5.3: Top-Level DFD

Together, these subsystems work in harmony to create a comprehensive and user-friendly platform that simplifies the process of selecting educational institutions for children, ultimately empowering parents to make well-informed decisions about their children's future.

5.2 Detailed System Design

5.2.1 Classification

The components within the system architecture can be categorized as subsystems and modules. Subsystems represent functionalities such as user interface management, school profile management, and user feedback aggregation. Modules, on the other hand, encapsulate specific features within each subsystem, such as search algorithms, filtering mechanisms, data storage handlers, and AI recommendation algorithms.

5.2.2 Definition

- User Interface Management This component is responsible for overseeing the presentation layer of the platform, providing users with an intuitive and visually appealing interface to interact with. It encompasses the design and layout of web pages, navigation controls, and user input handling, ensuring a seamless and engaging user experience.
- School Profile Management The school profile management component focuses on the creation, storage, and retrieval of detailed profiles for educational institutions. It

aims to provide comprehensive information about each school's facilities, curriculum, faculty, extracurricular activities, and other essential details to help users make informed decisions.

- Recommendation System This component employs machine learning algorithms and data analysis techniques to generate personalized school recommendations for users based on their preferences and historical data. It aims to match users with educational institutions that best align with their needs and preferences, enhancing the decision-making process.
- Search and Filtering Mechanisms Responsible for enabling users to search for schools based on specific criteria such as location, teaching methodology, facilities, and academic performance. It provides robust search algorithms and filtering mechanisms to facilitate efficient information retrieval, empowering users to find relevant schools easily.
- User Feedback Aggregation This component aggregates and analyzes user feedback, including reviews and ratings from current and former students, parents, and teachers. It aims to present this information in a structured format to help users gain insights and perspectives on each school, aiding in their decision-making process.
- Data Retrieval and Storage The data retrieval and storage component manages the retrieval and storage of various data entities within the platform, including school profiles, user data, feedback, and system configurations. It ensures efficient data access and storage management to maintain system performance and reliability.
- Security and Access Control Responsible for implementing security measures to protect user data and ensure system integrity. This component manages user authentication, authorization, and encryption to safeguard sensitive information and prevent unauthorized access, maintaining trust and confidentiality.

5.2.3 Responsibilities

Components within the system have clear responsibilities:

- User Interface Management This component is responsible for providing an intuitive and visually appealing interface for users to interact with the platform. It manages page rendering, navigation controls, and user input handling to ensure a seamless user experience.
- School Profile Management: This component oversees the creation, storage, and retrieval of detailed profiles for various educational institutions. It ensures that accurate and up-to-date information regarding school facilities, curriculum, faculty, and extracurricular activities is available to users.
- Search and Filtering Mechanisms: These components enable users to search for schools based on specific criteria such as location. They provide robust search algorithms and filtering mechanisms to facilitate efficient information retrieval.
- User Feedback Aggregation: Responsible for aggregating and analyzing user feedback, this component gathers reviews and ratings from parents, and teachers. It

presents this information in a structured format to aid users in making informed decisions.

5.2.4 Constraints

Constraints include limitations on timing, storage, and component state:

- Timing Constraints: Ensuring that operations such as search queries and recommendation generation meet predefined response time thresholds.
- Storage Constraints: Efficiently managing storage resources to store school profiles, user data, feedback, and other relevant information.
- Data Handling Constraints: Adhering to predefined data formats, access rules, and privacy regulations to ensure data confidentiality and integrity.
- Interaction Rules: Enforcing predefined interaction rules to maintain system integrity and consistency, such as user authentication and data access protocols.
- Scalability Constraints: Designing the platform to accommodate potential growth in user base and data volume, including scalable architectures and load balancing mechanisms.
- Compatibility Constraints: Ensuring compatibility with a wide range of devices, browsers, and operating systems to provide a consistent user experience.
- Regulatory Constraints: Compliance with educational standards, accreditation criteria, and privacy regulations, ensuring legality and trustworthiness of the platform.

5.2.5 Composition

Within the proposed web platform for school selection, each subsystem and module is composed of distinct subcomponents that collectively contribute to the functionality and performance of the system. Here's a breakdown of the composition

- User Interface Management Subsystem:
 - Page Rendering Module: Responsible for rendering user interface elements such as menus, buttons, forms, and interactive elements.
 - Navigation Control Module: Manages user navigation within the platform, including menu navigation, page transitions, and breadcrumb trails.
 - User Input Handling Module: Handles user interactions such as form submissions, button clicks, and input validation to ensure data integrity and usability.
- School Profile Management Subsystem:
 - Profile Creation Module: Enables administrators to create and edit detailed profiles for educational institutions, including information on facilities, curriculum, faculty, and extracurricular activities
 - Profile Storage Module: Stores school profiles in a centralized database, ensuring accessibility and data consistency across the platform.

- Profile Retrieval Module: Retrieves school profiles based on user queries and search criteria, providing relevant information to users in real-time.
- Search and Filtering Subsystem:
 - Search Algorithm Module: Implements efficient search algorithms such as keyword search, fuzzy search, or semantic search to retrieve relevant school profiles based on user queries.
 - Filtering Mechanism Module: Enables users to filter search results based on various criteria such as location, teaching methodology, facilities, tuition fees, and academic performance.

5.2.6 Uses/Interactions

Components interact with each other to fulfill system functionalities. For instance, the user interface management subsystem utilizes data retrieval modules to fetch school profiles and user feedback for display.

- User Interface Management Subsystem:
 - Interaction with School Profile Management: The user interface management subsystem interacts with the school profile management subsystem to retrieve and display school profiles based on user queries and search criteria.
 - Interaction with Recommendation System: It communicates user preferences and selections to the recommendation system to refine personalized recommendations presented to users.
- School Profile Management Subsystem:
 - Interaction with User Interface Management: Provides school profile data to the user interface management subsystem for display, ensuring that users have access to up-to-date and relevant information about educational institutions
 - Interaction with Search and Filtering Subsystem: Retrieves school profiles based on user search queries and filtering criteria, facilitating efficient information retrieval and presentation to users.

5.2.7 Resources

Components manage and utilize various resources such as memory, processors, databases, and external libraries. Data storage handlers manage database resources to store and retrieve school profiles, user data, and feedback efficiently.

- Memory: The platform requires memory resources to store and manipulate data structures, cache frequently accessed information, and execute application code. Memory management techniques such as garbage collection and memory optimization are employed to efficiently utilize available memory resources.
- Processors: Central processing units (CPUs) are essential resources for executing computational tasks within the platform. Multi-core processors and parallel processing techniques may be utilized to improve system throughput and responsiveness.

- Databases: Storage resources are necessary to store persistent data such as school profiles, user data, feedback, and system configurations. Relational databases or NoSQL databases may be employed to efficiently store and retrieve large volumes of structured and unstructured data.

5.2.8 Processing

Components employ specific algorithms and processes to fulfill their responsibilities. For example, Data retrieval modules utilize optimized querying techniques to fetch relevant information from databases effectively.

- Data Handling: Processing involves handling various types of data within the platform, including school profiles, user preferences, feedback, and system configurations. This includes data retrieval, storage, manipulation, and transmission to ensure efficient data management and accessibility.
- Algorithm Execution: Processing also involves executing algorithms for tasks such as search, data analysis, and user feedback aggregation. This includes implementing algorithms for search queries, and for feedback aggregation.
- System Operations: Processing encompasses system-level operations such as user authentication, authorization, session management, and error handling. This includes validating user credentials, enforcing access control policies, managing user sessions, and handling exceptions to ensure system reliability and security.

5.2.9 Interface/Exports

Each component exposes a set of services and interfaces to interact with other components. The user interface management subsystem provides interfaces for user interaction, navigation, and data presentation. Similarly, the recommendation system module exports interfaces for receiving user preferences, processing data, and delivering recommendations.

- User Interface Services: The platform offers a user-friendly interface for interaction with users, including features such as search bars, filters, navigation menus, and interactive elements. This interface allows users to explore school profiles, submit feedback, and receive personalized recommendations.
- School Profile Page: Detailed profiles of educational institutions are provided to users, including information on facilities, faculty, curriculum, extracurricular activities, and student demographics. This includes structured data presentation, multimedia content such as images or videos.

5.2.10 Detailed Subsystem Design

In the proposed web platform for school selection, detailed subsystem design involves a comprehensive breakdown of each software component, including subsystems and modules. This breakdown includes detailed descriptions of component structure, behavior, data flow, and interaction patterns to provide insights into the system's design and functionality. Here's an overview of the detailed subsystems design:

- User Interface Management Subsystem:
 - Component Structure: This subsystem comprises modules for page rendering, navigation control, and user input handling.
 - Behavior: The page rendering module renders user interface elements based on templates and data retrieved from the backend. Navigation control manages user navigation between pages and sections within the platform. User input handling validates and processes user interactions such as form submissions and button clicks.
 - Data Flow: User interface elements interact with backend APIs to retrieve and display relevant data to users. User input is validated and sent to backend services for processing.
 - Interaction Patterns: Components within the subsystem interact with each other and with backend services to ensure a seamless user experience. For example, navigation controls trigger page transitions, while user input handling validates and processes user interactions before sending requests to backend APIs.
- School Profile Management Subsystem:
 - Component Structure: This subsystem includes modules for profile creation, storage, and retrieval.
 - Behavior: The profile creation module allows administrators to create and edit detailed profiles for educational institutions, while the storage module manages the persistent storage of school profiles in a centralized database. The retrieval module retrieves school profiles based on user queries and search criteria.
 - Data Flow: School profiles are created and edited by administrators through the profile creation module. These profiles are then stored in the database and retrieved when requested by users through the retrieval module.
 - Interaction Patterns: The profile creation module interacts with the storage module to store newly created profiles, while the retrieval module interacts with the database to fetch profiles based on user requests.
- User Feedback Aggregation Subsystem:
 - Component Structure: This subsystem comprises modules for feedback collection and analysis.
 - Behavior: The feedback collection module collects user feedback, including reviews, ratings, and testimonials, while the analysis module analyzes this feedback to extract valuable insights and sentiments.
 - Data Flow: User feedback is collected through feedback forms or rating scales and stored in the database. The analysis module then processes this feedback to generate insights and summaries for presentation to users.
 - Interaction Patterns: The feedback collection module interacts with user interface elements to collect feedback from users, while the analysis module interacts with the database to retrieve and process feedback data.

5.3 Sequence Diagrams

- User SignUp:

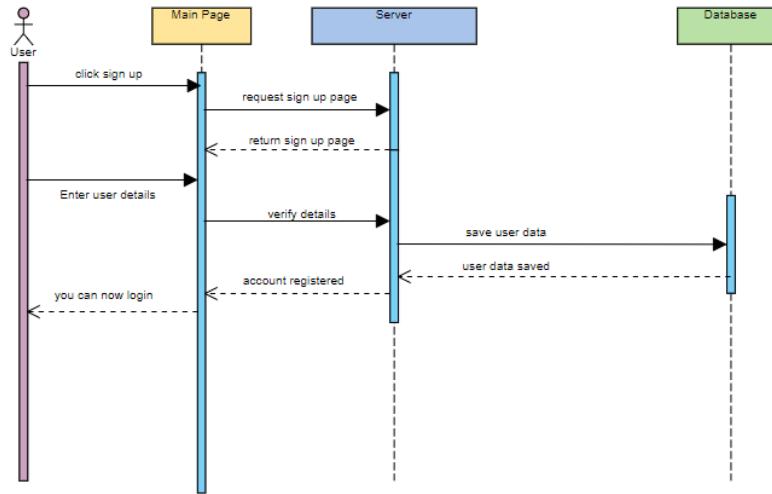


Figure 5.4: Sequence Diagram User SignUp

- User Authentication:

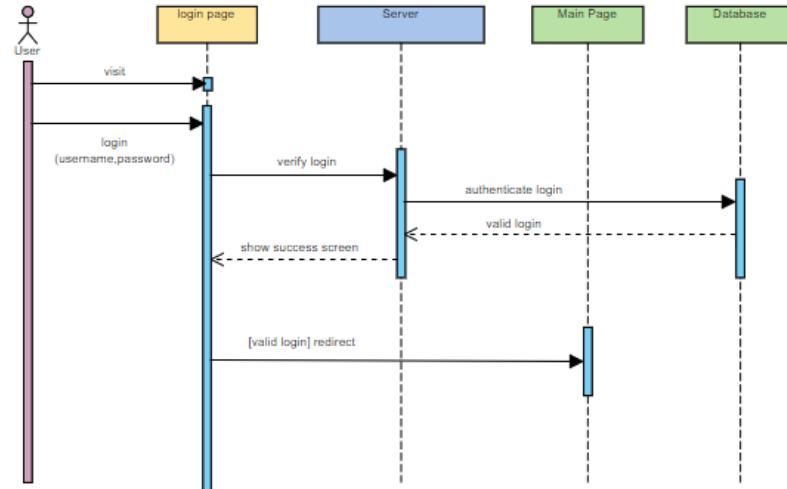


Figure 5.5: Sequence Diagram User Authentication

Searching:

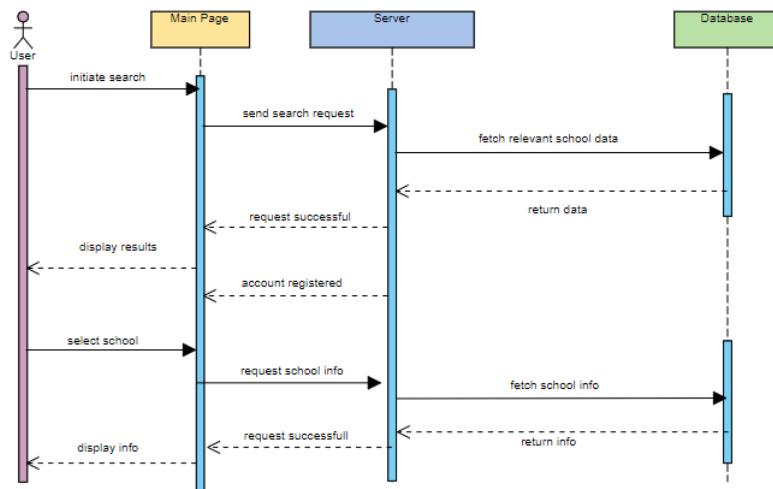


Figure 5.6: Sequence Diagram Searching a School

5.4 Class Diagram

The class diagram for the educational institution selection platform illustrates the core components and relationships within the system. It primarily focuses on representing the key classes and their interactions. This class diagram in Fig. 4 illustrates the key components of the platform, their relationships, and the central role of the User class. It serves as a foundation for the software development and helps in visualizing how data and interactions flow within the system



Figure 5.7: Class Diagram

5.5 ER Diagram

Entity-Relationship Diagram (ERD) in the Fig. for the Schools-Hub project involves identifying the entities and their attributes. Here's a simplified ERD highlighting the entities and their attributes:

- Entities:
 - User
 - School
 - Admin
 - Review
- Relationships:
 - User-Review Interaction: Users can create reviews and ratings for school.
 - School-Review Interaction: Schools can view multiple reviews.
 - School-Admin Management: Admins manage and oversee school profiles. -
 - User-Admin Management: Admins manage and oversee school profiles.

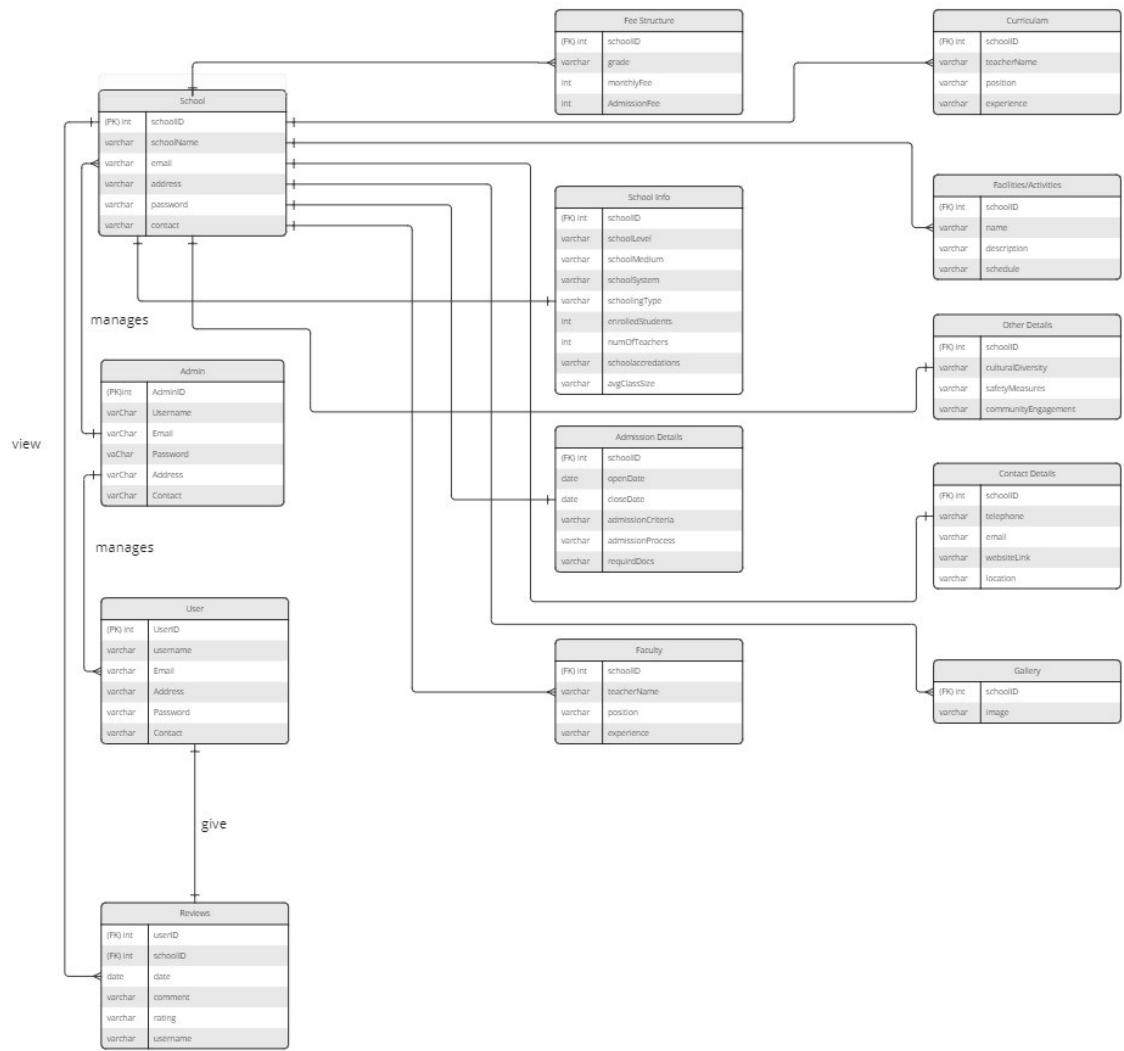


Figure 5.8: ER Diagram

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Chapter 6

Implementation and Testing

The implementation of the whole project is dependent on two categories, one is Data Collection and other is implementing our web based Platform. Firstly, data collection involves gathering comprehensive information about various educational institutions, including details about their facilities, curriculum, faculty, extracurricular activities, academic performance, and student demographics. This process may involve compiling data from multiple sources such as school websites. Secondly, the implementation of our web platform involves designing and developing the user interface, backend systems, and database architecture. This includes creating intuitive user interfaces for browsing and comparing schools, implementing backend services for data retrieval, storage, and processing, and setting up a scalable and efficient database infrastructure to store and manage school profiles, user data, and feedback.

6.1 Survey Form

To gather the data we needed a generalized survey form which is included in Appendix A below, that form included the necessary information of the Schools that parent look-up to when choosing a School for their child. For this job we read a few articles that gave us enough information that we could make a generalized survey form for our data collection. These are the articles which helped us in this process [3,5–10] .

Following are the factors that were found to be most influencing for parents' when selecting school for their child, all of the below factors are found through proper and detailed research. All the research articles are mentioned above as well. Here are few factors:

- School Curriculum.
- School Facilities.
- School Academic Performance.
- Fee Structure.
- Admission Process.
- School Overview.
- Quality of Education.

6.2 Data Collection

The data collection process began with the preparation of a comprehensive survey form distributed electronically via Google Docs and in hard-copy format. This survey form was designed to capture essential information about various educational institutions, including facilities, curriculum offerings, faculty composition, extracurricular activities, academic performance metrics, and student demographics. Our team then physically visited targeted schools within our geographical reach to collect the required data. During these visits, team members filled out the survey forms, ensuring accurate documentation of relevant information. Through direct engagement with school administrators, faculty members, and staff, we obtained firsthand insights into the operational dynamics and distinctive features of each educational institution.

6.3 Data Processing

Following the physical data collection from targeted schools, our team initiated the data processing phase to digitize the collected information obtained in hard-copy format. This involved systematic conversion of the filled-out survey forms into digital records, ensuring consistency and accuracy throughout the process. Subsequently, the digitized data underwent validation and verification procedures to rectify any discrepancies and ensure data integrity. This approach to data processing enabled us to integrate the collected information into our web platform, facilitating efficient retrieval, analysis, and presentation of school profiles to users.

6.4 Tools Used

In implementing our web platform, we seamlessly integrated frontend, backend, middleware, and database components to create a cohesive system. For developing such a system we always need certain tools. Below are the detailed description of the tools we used in this project.

6.4.1 Visual Studio Code

Visual Studio Code is a free and open-source code editor developed by Microsoft. It is widely used by developers for various programming languages, including JavaScript, Typescript, Python, Java, C, and many others. One of the unique features of Visual Studio Code is its ability to Support multiple programming languages in the same editor. This makes it a popular choice among Developers who work on multiple projects and programming languages.

6.4.2 React

React.js is an open-source JavaScript library used for building user interfaces. React.js allows developers to create reusable UI components and build applications using a declarative approach, where the developer specifies what the UI should look like based on the current state of the application and react takes care of updating the UI as the state changes.

- Component based Architecture.
- Virtual DOM.
- JSX.
- Unidirectional data flow.

6.4.3 NodeJs

Node.js is an open-source, cross-platform, back-end JavaScript runtime environment built on the V8 JavaScript engine of Google Chrome. It allows developers to use JavaScript on the server-side, instead of just on the client-side in web browsers. Node.js is designed to be scalable, fast, and lightweight, making it an excellent choice for building real-time web applications that need to handle many concurrent connections.

6.4.4 MongoDB

It's a popular NoSQL database management system. MongoDB is known for its flexible document model, which allows for data to be stored in a JSON-like format called BSON. This makes it easy to work with data that has a dynamic structure, and it can also help to reduce the complexity of querying and updating data. MongoDB is often used in web and mobile applications, where it can store large volumes of data and provide fast, scalable access to that data. It also has built-in support for many programming languages, making it easy for developers to integrate MongoDB into their applications.

6.5 Frontend Development

- In the frontend development phase, we focused on creating a user-friendly interface for the web platform. We utilized modern web technologies such as HTML, CSS, and JavaScript frameworks like React.js or Angular.
- To streamline styling and enhance development efficiency, we incorporated Tailwind CSS, a utility-first CSS framework. Tailwind CSS provided a wide range of pre-designed utility classes for rapid prototyping and responsive design.
- Additionally, we integrated Daisy UI, a UI component library, to implement consistent design patterns and user interface elements. Daisy UI offered a collection of pre-designed components, including navigation menus, search bars, and interactive elements, facilitating the development of a visually appealing and intuitive interface.
- By leveraging Tailwind CSS and Daisy UI, we ensured a seamless and efficient frontend development process, resulting in a user-friendly web interface optimized for usability and responsiveness.

Below are few snippets from "Schools-Hub's" user friendly interface:

Home Page The home page as shown in figure 6.1, serves as the gateway to the platform, welcoming users with a visually appealing layout and intuitive navigation. It provides a brief overview of the platform's features and functionalities, inviting users to explore further services.

The screenshot shows the homepage of the School-Hub platform. At the top, there is a dark header bar with the "Schools Hub" logo on the left and "Home" "Schools" "Blogs" "About" menu items on the right. There are also "Log In" and "Sign Up" buttons. Below the header is a large, semi-transparent image of a young boy in a classroom setting, focused on a task. Overlaid on this image is the main title: "Connecting Parents to Educational Possibilities With School-Hub" in large white font, with a subtitle "Learn the Future" below it. A small "Explore" button is visible at the bottom left of the image area. To the left of the main content, there is a "Welcome to our Platform" section with a short description of the service. To the right, there is a "Our Mission" section with a circular graphic featuring a smiling boy and the words "IMAGINE BELIEVE ACHIEVE". Below these sections is a large blue call-to-action button with the text "Choose Ideal Schools For Your Child". At the bottom, there are four service highlights, each with an icon and a brief description:

- Comprehensive Schools Profile**: Detailed information about schools, including facilities, curriculum, fee structure, and extracurricular activities.
- Ask-AI Child Guidance**: Engage with our AI for personalized child guidance and schooling queries.
- Public Feedback & Reviews**: Evaluate schools with ratings, and feedback from parents and students. Also, share yours.
- Read Blogs Engage With Others**: Stay informed with educational blogs covering trends, tips, and insights for a holistic schooling experience.

Figure 6.1: Home Page

Login and SignUp Page The sign up and login page allows users to create an account or sign in to access additional features and functionalities. Secure authentication processes ensure the privacy and security of user accounts.

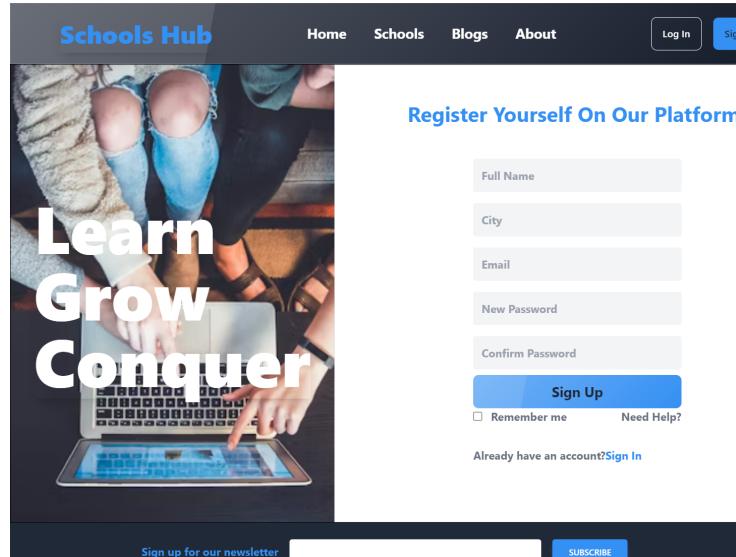


Figure 6.2: SignUp Page

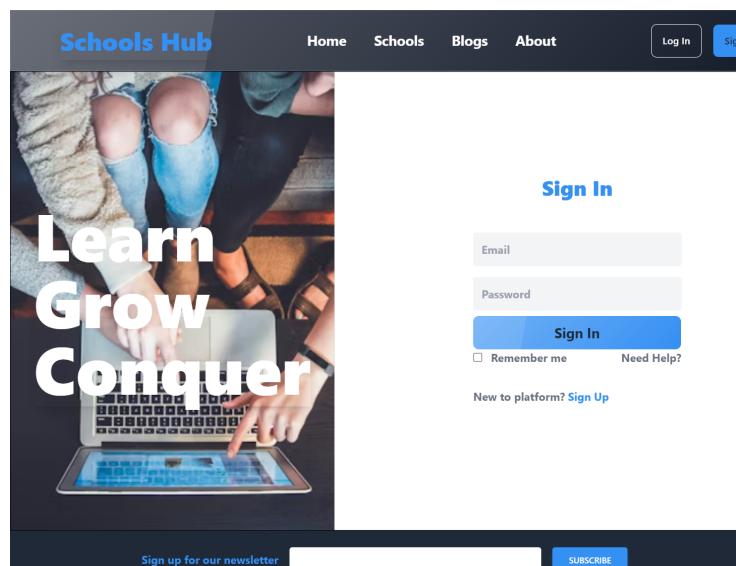


Figure 6.3: Login Page

School Searching Page The School Searching Page enables users to find educational institutions based on location, School Type, facilities, fees, and medium. With intuitive filters, users can refine their search to match specific preferences, accessing detailed school profiles for informed decision-making.

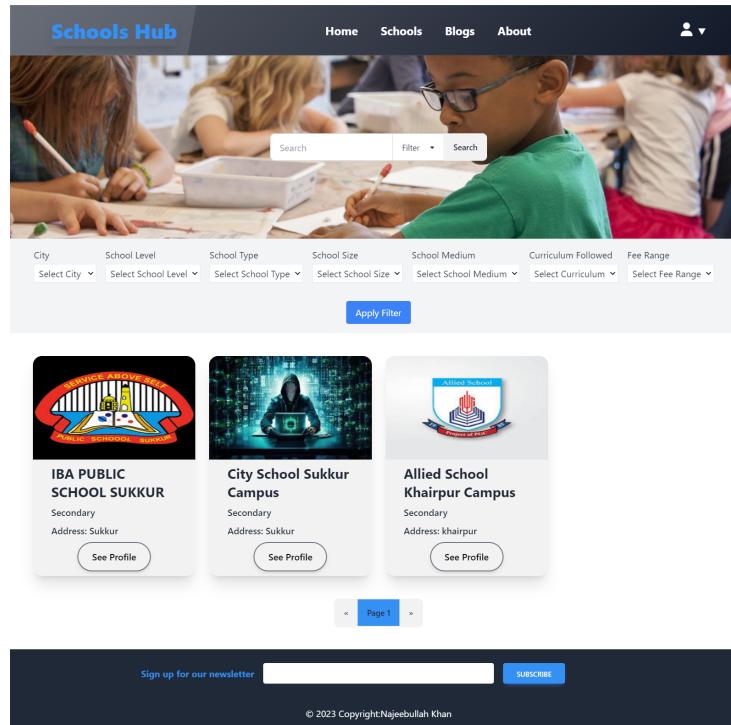


Figure 6.4: School Searching

Edit School Profile The Edit School Profile feature empowers administrators to maintain accurate and up-to-date information about educational institutions. With this tool, administrators can effortlessly update details such as facilities, faculty, curriculum, and contact information.

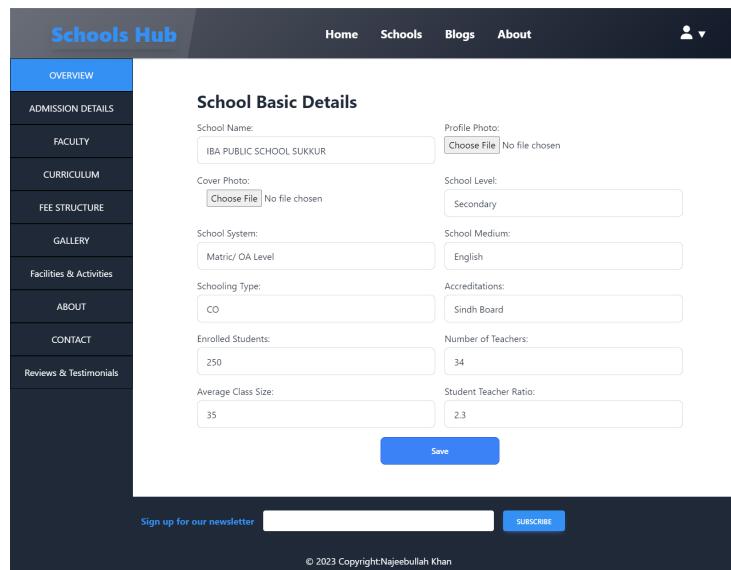
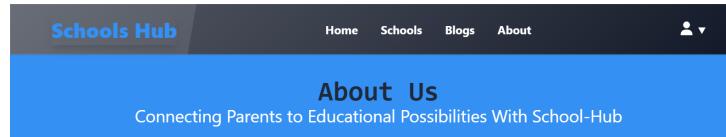


Figure 6.5: Edit Profile

About Us Page The About Page offers a comprehensive overview of our platform, its mission and our motive. Visitors can learn more about the company's vision, values, and goals, as well as its commitment to empowering parents and educators in making informed decisions about children's education.



Our Mission

The mission at hand is to revolutionize the process of choosing the right school by focusing on three pivotal aspects: user-friendly profiles, AI intelligence, and authentic insights. It aims to simplify the overwhelming task of school selection by providing easily accessible, comprehensive profiles of educational institutions. These profiles serve as a one-stop resource, offering detailed information about facilities, curricular, faculty, and extracurricular activities, presented in an intuitive and easily understandable format. Moreover, the integration of Artificial Intelligence augments this process by analyzing user preferences and data trends, offering personalized recommendations tailored to individual needs and preferences. Importantly, the mission emphasizes the delivery of genuine insights derived from credible sources, including user reviews, statistical data, and expert evaluations. By ensuring transparency and reliability in the information provided, the mission strives to empower parents, guardians, and students to make well-informed decisions that unlock the full potential of each child's educational journey, ultimately paving the way for academic success and fulfillment.

[Join Us & Help Us](#)



Figure 6.6: About Page

AI Bot The AI Bot enhances user experience by addressing inquiries and providing prompt responses. Users can engage with the AI Bot to seek information, assistance, or recommendations regarding educational institutions.

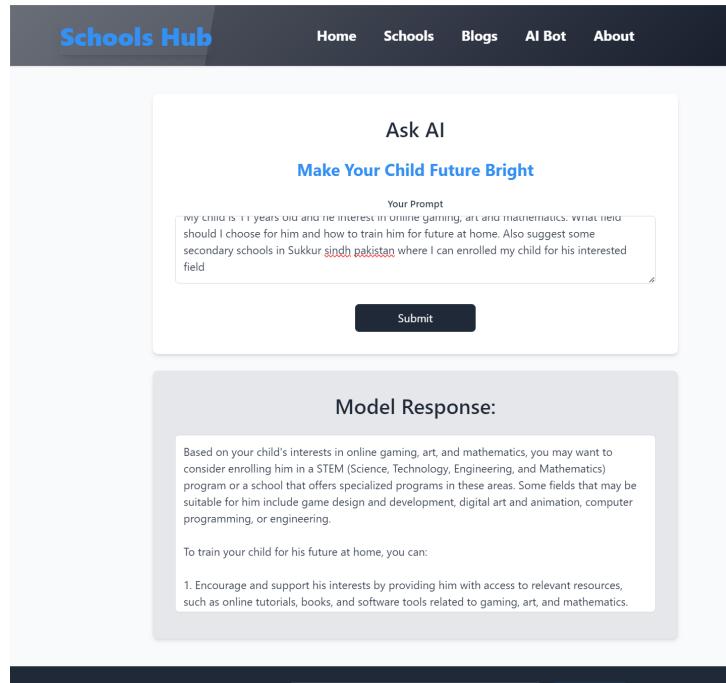


Figure 6.7: AI Bot Page

Blogs Page The Blog Page serves as a dynamic hub of knowledge and insights, featuring a diverse range of articles, updates, and discussions related to education and child development.

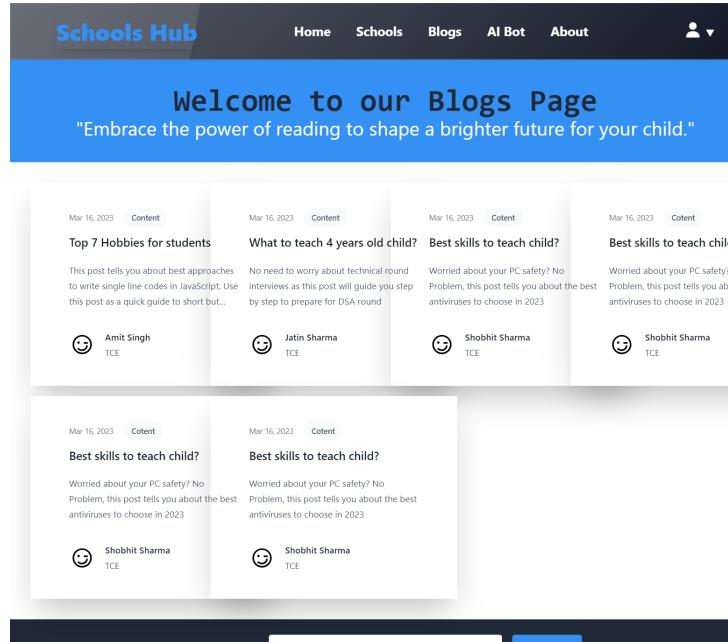


Figure 6.8: Blogs Page

6.6 Backend Development

During backend development, we opted for the MERN (MongoDB, Express.js, React.js, Node.js) stack, renowned for its versatility and scalability in building modern web applications.

- MongoDB served as our database solution, providing a flexible and scalable NoSQL database for storing and managing the extensive dataset collected during the data collection phase. Its schema-less nature facilitated agile development and seamless integration with the backend.
- Express.js, a minimalist web framework for Node.js, was utilized to build robust and efficient backend APIs and services. Express.js streamlined the development process by providing a lightweight and flexible framework for handling HTTP requests, routing, and middleware integration.
- Node.js served as the runtime environment for our backend, enabling server-side JavaScript execution. With its non-blocking I/O model and event-driven architecture, Node.js facilitated high-performance, asynchronous operations, ensuring optimal responsiveness and scalability.
- By leveraging the MERN stack, we ensured a cohesive and streamlined development workflow, enabling seamless integration between frontend and backend components. This comprehensive stack provided the foundation for building a robust and scalable web platform for school selection, capable of meeting the diverse needs of users while maintaining performance and reliability.

6.7 Middleware Development

- Within the middleware layer, we employed Express.js alongside Node.js to facilitate seamless communication between the frontend and backend components.
- Express.js, a lightweight and flexible web application framework for Node.js, played a pivotal role in handling middleware functionalities such as request parsing, response formatting, error handling, and logging.
- Leveraging Express.js, we were able to swiftly configure middleware functions to intercept incoming HTTP requests, preprocess data, and execute business logic before routing requests to the appropriate backend endpoints.
- Node.js, serving as the runtime environment for our middleware layer, ensured efficient execution of server-side JavaScript code, enabling the implementation of asynchronous operations and event-driven architecture crucial for handling concurrent requests and maintaining responsiveness.
- By integrating Express.js and Node.js within the middleware layer, we established a robust foundation for managing the communication and interaction between the frontend and backend systems, ensuring optimal performance, reliability, and scalability of the web platform.

6.8 Database Setup and Management

- For database management, we opted for MongoDB, a powerful NoSQL database solution renowned for its flexibility and scalability.
- MongoDB served as the backbone of our data storage infrastructure, providing a schema-less environment conducive to agile development and seamless integration with the backend systems.
- Leveraging MongoDB, we designed and implemented database schemas tailored to accommodate various types of data collected during the data collection phase, including school profiles, user information, feedback, and system configurations.
- The setup process involved configuring MongoDB clusters or instances based on the project's scalability requirements, ensuring optimal performance and reliability of the database infrastructure.
- Throughout the development lifecycle, we employed robust data management practices, including data validation, indexing, and backup strategies, to maintain data integrity and availability.
- By leveraging MongoDB for database setup and management, we established a scalable and efficient data storage solution, capable of handling the extensive dataset collected during the data collection phase while ensuring seamless integration with the backend systems of the web platform.

6.9 Testing

During the development phase of our web platform, rigorous testing was conducted to ensure the reliability and functionality of key features. This encompassed testing various critical functionalities, including the user authentication processes such as login and signUp, the core functionality of school searching, the effectiveness of the advanced search filter, the accuracy and responsiveness of the AI Bot for personalized recommendations, and the seamless creation of school profiles. Each functionality underwent thorough testing using predefined test cases, scenarios, and test data. Expected results were compared against actual outcomes to identify any deviations or discrepancies. This testing approach aimed to validate the robustness and performance of the platform, ensuring a seamless user experience and enhancing confidence in its reliability and efficacy. The gathered results are shown below 6.9.

No .	Test Scenario	Test Case	Pre - Condition	Test Steps	Test Data	Expected Result	Actual Results
1	Check Login Functionality	Check response on entering valid username and password	School-Hub website should be open on a browser	Connect to internet. Enter Username, Password, Click login button	Username Password	Login must be successful.	Login Successful.
2	Check SignUp Functionality	Check reponse on creating an account on School-Hub.	School-Hub website should be open on a browser	Connect to internet. Enter Username, Email, Password, Click SignUp button	Username Email Password Other Details.	User Account is created.	SignUp Successful.
3	Check School Search Functionality	Searching a School on School-Hub	School-Hub Website Home page must be opened by user.	Connect to internet, Login, Enter School Name, Click Search Button	School name	Searched School Appears	School Searching Successful
4	Create School Profile.	Creating a new School Profile.	School Profile can only be created by Admin.	Connect to internet, Enter School info. Click on Create Profile	School info.	School Profile will be created.	School Profile Creation Successful.
5	AI Bot Funtionality	Giving Prompt to the Bot	School-Hub Website Home page must be opened by user.	Internet connection User Prompt,	User Prompt	AI responds to the user query.	User gets AI reponse.
6	Advanced Search Filter	Apply Filters to user's searching	School-Hub Website Home page must be opened by user.	Internet connection, must be a user account.	city, school level, type, medium, fee	User gets the desired schools	Filtered school appears

Table 6.1: Test Cases and Scenarios

Chapter 7

Results and Discussions

The System underwent a thorough evaluation to gauge its efficacy in simplifying the school selection process and addressing the information gap between schools and parents. The evaluation encompassed user feedback, usability testing, and performance analysis.

7.1 User Feedback

Feedback was gathered from 10 users who utilized the platform to select educational institutions for their children. This feedback was collected through a Google Form comprising of three sections: Section 1 focused on General Feedback on Platform Design and Interface, Section 2 on Feedback on Specific Features, and Section 3 on Additional Feedback and Suggestions. Users expressed high satisfaction with the platform's user interface, noting its intuitive design and ease of use. They particularly appreciated the depth of information provided about each school, which they found comprehensive and helpful in making informed decisions. Key feedback highlighted the centralized school profiles and the ease of navigation as significant strengths of the platform. Users also praised the platform for its detailed school profiles, which they found instrumental in comparing and selecting schools for their children.

7.1.1 General Feedback on Platform Design and Interface

How user-friendly do you find the Schools-Hub platform?

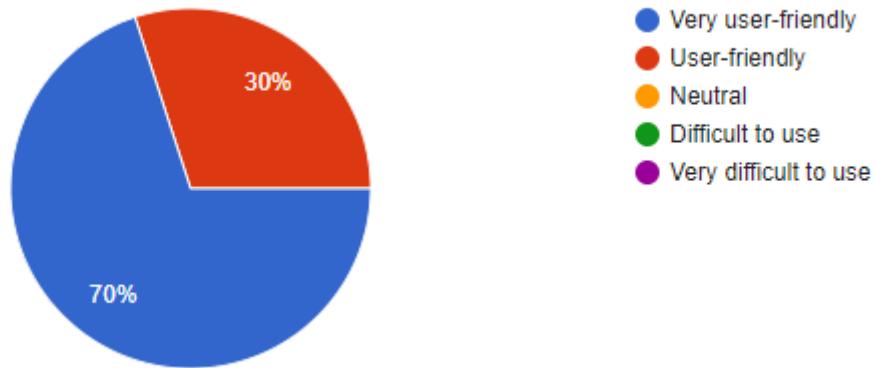


Figure 7.1

How visually appealing is the platform's design?

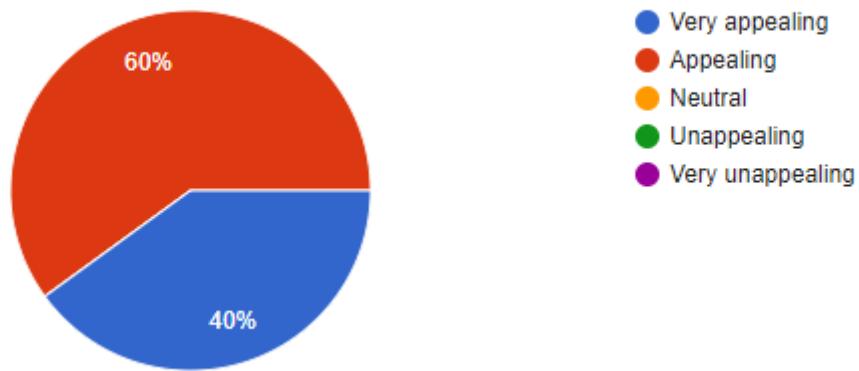


Figure 7.2

How easy is it to navigate through the platform?

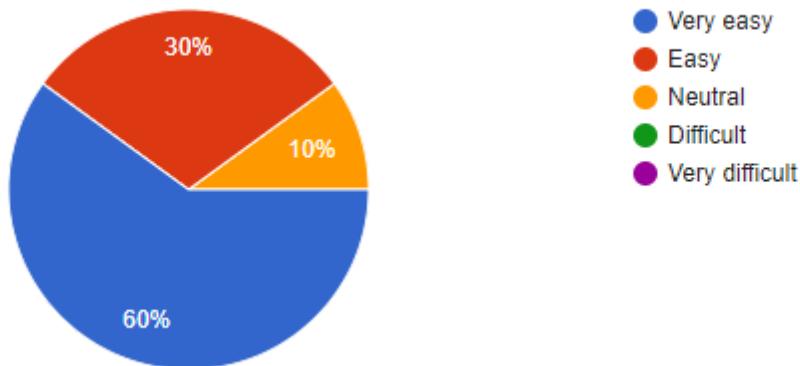


Figure 7.3

7.1.2 Feedback on Specific Features

How useful do you find the "Search Schools using advanced filters" feature?

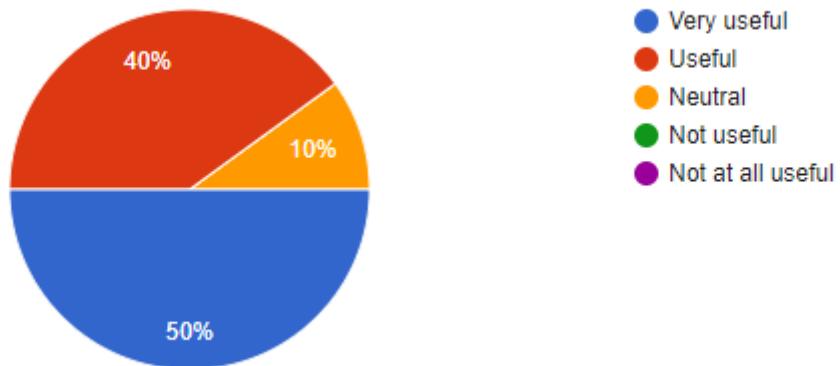


Figure 7.4

How accurate is the "Get schools nearby location" feature?

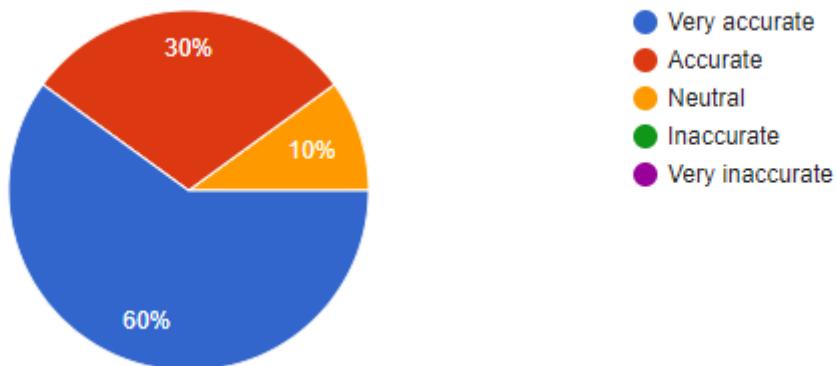


Figure 7.5

How informative do you find the blogs on the platform?

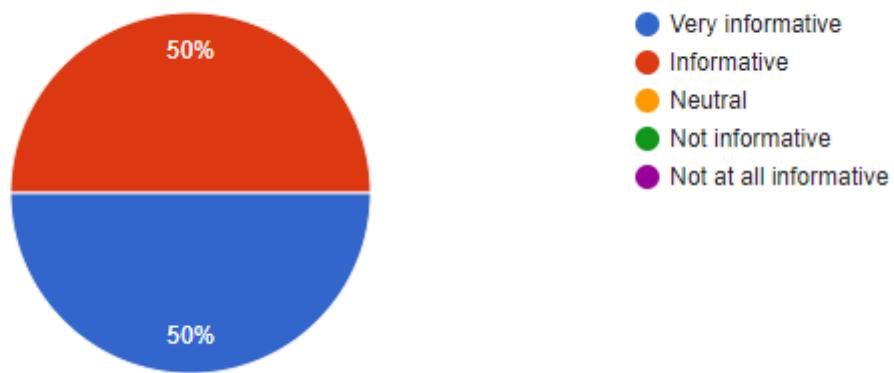


Figure 7.6

How helpful is the AI chatbot in answering your queries?

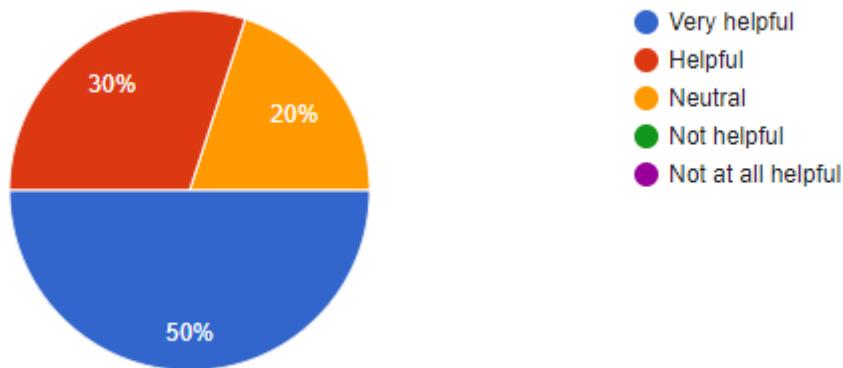


Figure 7.7

How comprehensive are the school profiles on the platform?

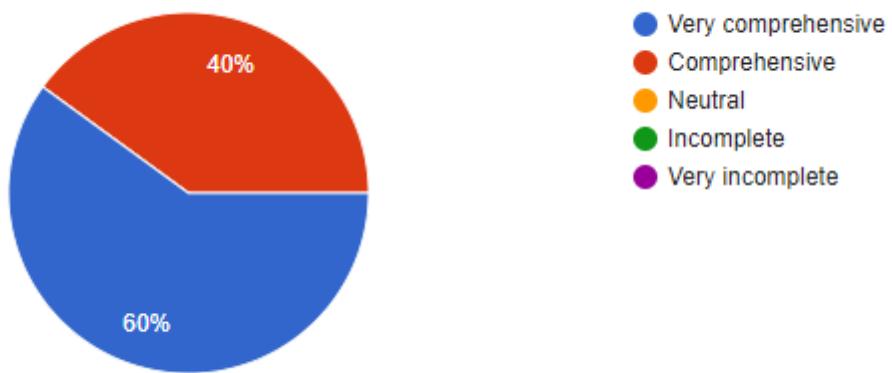


Figure 7.8

7.1.3 Additional Feedback and Suggestions

What additional features would you like to see on the platform?

6 responses

No

There should be some features for parent teachers meeting between school and teachers

Do add a feature like where parents can post there questions and other users answers it, like a discussion platform

Display admission open tag in search page for schools i

None

need a bit improvement in chatbot

Figure 7.9

Any other comments or suggestions?

5 responses

No

I think all fine

Good work!

Nothing

Application is very helpful. And it will be very successful if launched in market.

Figure 7.10

7.2 Usability and Testing

Usability testing sessions were conducted to assess the platform's ease of use. Participants were tasked with common actions such as searching for schools and viewing school profiles. Results indicated that the platform performed well in terms of intuitiveness and efficiency. Participants were able to navigate the platform with ease and complete tasks without encountering significant obstacles.

7.3 Performance Analysis

Performance analysis was conducted to evaluate the platform's responsiveness and reliability under various usage scenarios. Metrics such as response times and server uptime were monitored and analyzed. The platform demonstrated robust performance, with minimal latency observed during peak usage periods. Scalability tests suggested that the platform could handle increasing user loads effectively.

Chapter 8

Conclusion and Future Work

8.1 Conclusion

In conclusion, the proposed web platform represents a significant advancement in addressing the complexities of selecting educational institutions for children. Through a user-friendly interface that consolidates school information and facilitates comparisons, we have streamlined the decision-making process for parents and guardians. The platform's ability to bridge the information gap between schools and parents has empowered families to make informed choices about their children's education. The positive feedback and results from our evaluations underscore the platform's effectiveness in alleviating the stress and uncertainty associated with school selection, marking a noteworthy achievement in improving educational outcomes for students.

8.2 Future Work

Looking ahead, there are opportunities for further enhancement of the web platform. One potential avenue is the integration of a comprehensive extracurricular activity database, allowing parents to explore the diverse range of activities offered by each school. Additionally, incorporating features for alumni networking or parent communities could provide valuable insights and support networks for families navigating the education system. Furthermore, implementing a robust resource center within the platform, offering educational articles, guides, and expert advice on various aspects of schooling, could empower parents with the knowledge they need to make informed decisions. Collaboration with educational institutions and stakeholders to expand the platform's offerings and refine its features will be essential in ensuring continued relevance and impact in the realm of school selection.

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Appendix A

Survey Form

DETAILED SCHOOL PROFILE

We are excited to inform you about our revolutionary web platform **School-Hub** designed to transform the school selection process for parents seeking the ideal educational institution for their children. Our platform aims to create a centralized hub that connects schools with prospective parents, offering a comprehensive and user-friendly interface. To make this platform truly impactful, we are inviting schools like yours to provide essential information that will be used to create detailed profiles on our platform. Your school's profile will showcase its unique features, facilities, curriculum, faculty, extracurricular activities, and other vital details that parents often seek during the decision-making process. Your cooperation in filling out the provided Google form is crucial to the success of this initiative. By doing so, you are actively contributing to bridging the information gap between schools and parents, ultimately facilitating a more straightforward and effective decision-making process.

We appreciate your support and look forward to featuring your school on our platform, making it a part of this innovative and impactful educational community.

* Indicates required question

School/College Name:*

Name of the Person Filling this Form*

Email:*

School Basic Details:

School Level:*

- Secondary
- Primary
- Higher Secondary
- All of Above
- Other:

Figure A.1: Survey Form Page 01

School System*

- Matriculation
- Cambridge

Curriculum Followed:*

- Federal Board
- Sindh Text Book Board
- Oxford
- Aga Khan Board
- Other:

School Medium:*

- English
- Urdu
- Sindhi
- Other:

School Type:*

- Co-Education
- Boys School
- Girls School

Average Class Size (Number of Students):*

- 0-20
- 20-30
- 30-45
- Other:

Figure A.2: Survey Form Page 02

Number of Enrolled Students:*

- <150
- 150-300
- 300-400
- >400
- Other:

Number of Teachers:*

- 10-25
- 25-40
- >40
- Other:

Student to Teacher Ratio (the number of students who attend a school divided by the number of teachers in the school)

Accrediations/Affiliations (if any)

Admission Details:

Admission Start Date (Tentative)*

Date

Figure A.3: Survey Form Page 03

Admission Closing Dates (Tentative)*

Date

Admission Fee*

Important Documents Required for Admission:*

- Leaving Certificate of Previous School**
- Form-B/ CNIC**
- Domicile Certificate**
- Passport Size Photos**
- Report Card of Previous School**
- Parent/Guardian ID card Copies**
- Other:**

Admission Criteria:

School Facilities/Activities

Extra-Curricular Activities at School:*

- Sports Day**
- Debating Competition**
- Martial Arts**
- Spelling Bee Competition**
- Painting**
- Drama**

Figure A.4: Survey Form Page 04

- Parties
- Other:

Facilities at School:*

- Computer Labs
- Sports Facilities
- Play Ground
- Science Labs
- Canteen
- Medical Room
- Medical Room
- Auditorium
- Staff Room
- Other:

Describe few Co-Curricular Activities at your School:

School / College Images (Upload Images of Classes And School Building)

Upload Images of Events and Activities Held at School

Figure A.5: Survey Form Page 05

Fee Structure:*

Pre School (Play Group, Nursery, KG) Monthly Fee*

Class 1-5 Monthly Fee*

Class 6-8 Monthly Fee*

Class 9-10 Monthly Fee*

Class 11-12 Monthly Fee*

School Contact

School Contact Number*

School Address*

School Official Email*

School Website Link

School Social Media Handles Links

Figure A.6: Survey Form Page 06