Android Based E-learning Applicaion Using Flutter Framework

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ABSTRACT: Mobile learning, which combines e-learning and mobile computing, offers resources that can be accessible from anywhere and offers full support for efficient learning and performance-based assessments, as well as a top-notch search system and rich interaction. Its independence from location and time is another one of its characteristics.
Android is an open-source operating system that is simple to create for, and it has been the market leader in smartphones. These factors have led to its selection for the use of mobile learning. The platform will assist individuals in selecting digital learning over conventional teaching techniques. There will be two sides to this application's interface: the admin, who will use the desktop web-based application

Keywords : E-Learning, Flutter Framework, Dart, LMS, Flutter, Firebase, Android.

1. INTRODUCTION :

For a long time, we have depended on conventional teaching techniques, which entail a teacher speaking to a class of students in a classroom with four walls. The degree to which education can no longer be imparted in this manner is contingent upon the teacher's capacity to assist pupils in visualizing intricate ideas in the absence of appropriate resources. But in the early days of the Fourth Industrial Revolution, we are starting to move toward a future where a lot of activities are done with the help of digital technology. Over the past few years, a few online learning forums have expanded to help make learning easier, easier, easier.
Using the mobile learning principle, interactive learning may make learning more engaging and less boring. Mobile learning, which involves using portable media such smartphones running Android, iOS, or Windows Phone, is a recent development in e-learning. It is thought that using mobile learning to enhance the learning process is crucial for increasing the flexibility of the teaching and learning process. As a result, learning can occur at any time or place. The purpose of this study is to introduce Android-based mobile learning information.

2. LITERATURE SURVEY:

a) Li-Ling Hsu (2014) put out a plan for how we might use internet resources to deliver practical medical knowledge. It makes use of a simulation-based physical examination and health assessment program that may give a risk-free learning environment where errors are accepted and opportunities for discussion, criticism, and introspection are presented. These are essential for the development of clinical skills and knowledge. As students develop their clinical competence, this simulation-based training can offer them structured direction and feedback and assist them in connecting simulation to actual clinical practice. The report essentially outlines two approaches: the first is asynchronous and autonomous learning, which involves creating a navigable content that allows students to select the specific tasks they want to do.

b) According to Rose NJOROGE and David NZUKI (2017), e-learning is one of the newest ideas in the world today since it ensures that everyone with a reliable internet connection may access education.
They employed an e-learning induction model that is well-grounded in theory and practice, which is a reliable method of maintaining the dynamic functioning of educational technology. However, because e-learning is always evolving, learners encounter many difficulties when adjusting to the Learning Management System (LMS).

c) Open Educational Resources (OERs) are typically inaccessible to developing countries due to unexpected differences in technology and education fields between students from developed countries and low-income earners (LICs), despite the fact that developed countries commend the new eLearning platforms for their

strength and performance. This was highlighted by James Rea and Anandha Gopalan (2021). Word2Mouth is specifically made to satisfy the requirements of its intended LIC users. Because to the deficiency in communication and IT infrastructure, Word2Mouth can only be accessed through smartphones

d) According to Dr. Mrs. S. Prasanna (2017), the Internet of Things has transformed the education industry and produced new channels for teacher-student communication. This broadens the context in which students can study and paves the path for the advancement of the teaching and learning process. The Internet of Things (IoT) is a network made possible by the Global Standards Initiative of the International Telecommunication Union that consists of all types of embedded sensors, electronic devices, software, etc. that are connected to the Internet. The term "Internet Learning Materials" refers to the use of IoT "learning" in which educators and students will learn how to measure and share data using new IoT technologies in ways that enhance student engagement, directly link to the curriculum, and ultimately influence the design of schools for the future.

e) According to Korn Poonsirivong and Chanintorn Jittawiriaynukoon (2018), association rules are used by most data analysis systems to identify different patterns in the data. Simple data curation tools like WEKA, which include classification, clustering, association rules, and other functions, are used to build association rules. Since the association rule is relevant to unstructured formats, it may generally be used to big E-learning datasets. This study examines the use of association rules following years of student data collection from learning management systems (LMS). The activities of students allow the e-learning systems to gather a vast quantity of data over time.

f) A cross-platform framework called Flutter is designed to make mobile application development for high performance easier. Google made Flutter available to the general audience in 2016. Flutter runs on Fuschia in addition to Android and iOS. Flutter runs on Fuschia in addition to Android and iOS. Google selected Flutter as the application framework for the upcoming operating systems. Every view component in Flutter is rendered using a powerful rendering engine of its own. A cross-platform framework called Flutter is designed to make mobile application development for high performance easier. .

3. PROPOSED SYSTEM:

The suggested approach can get beyond the drawbacks of the current one, which limits dawdling by allowing appropriate access to learning resources in a single application. Students can use the sharing and downloading features to help You can study offline at any moment. Pupils can obtain outstanding project ideas and aptitude papers for reference. This lowers the anxiety and risk of students missing or losing their classes, regardless of the operating system they use.

System Architecture Suggestion

Front-end (application for Flutter) User Interface (UI) Components: To guarantee a consistent user experience across many devices, design and implement responsive UI components using Flutter's widget architecture. Login and Registration: Safe user verification with social network login choices. Dashboard: Customized dashboard showing progress, notifications, and courses. Course Content: Viewer for interactive course materials, including quizzes, PDFs, and videos. Discussion Boards: Combined discussion boards for peer-to-peer and student-teacher interactions. User profile management includes setting and customizing profiles.

Backend Server: To manage API requests, use a backend server built using Django or Node.js. For secure user sessions, utilize JWT (JSON Web Tokens) for authentication. Database: To store user data, course material, progress, and interactions, utilize a scalable database solution such as Firebase Firestore, MongoDB, or PostgreSQL. Use cloud storage for file storage.

Integrations and APIs RESTful APIs: Create RESTful APIs to facilitate communication between the backend server and the Flutter application. Payment Gateway Integration: For course purchases, integrate payment gateways such as PayPal or Stripe. Notification System: Use Firebase Cloud Messaging (FCM) to implement push notifications for real-time updates.

Characteristics Authorization and Authentication of Users: Safe registration, login, and user roles (administrator, teacher, and student). The administration/teacher panel is used to create and oversee quizzes, modules, and courses. Content Delivery: Present PDFs, watch live lectures, and access other learning resources. Follow a user's progress as they go through modules and courses. Tests and Evaluations: Interactive tests that provide instantaneous feedback. Discussion boards: Let students talk about and ask questions about the course topic. Certificates: After the course is finished, create and distribute certificates. Reports and Analytics: Offer reports and analytics for

Authentication of Users and Profiles : Use secure user authentication techniques, such as third-party logins, social network accounts, and email. Permit users to quickly retrieve their passwords. To organize courses, keep track of progress, and see accomplishments, create thorough profiles for both teachers and students.

All-inclusive Learning Administration : Give teachers the ability to design and modify courses with interactive elements like quizzes and assignments. Give students access to a classified and searchable course catalog so they can peruse and sign up for classes.

Interactive Learning Modules: Provide a range of educational tools, including downloadable reading materials, interactive quizzes, and assignments, as well as video lectures with controls for playback. Add discussion boards to facilitate communication between students and teachers and improve the educational process.

Alerts and Memorandums Description: Use push and in-app alerts to alert users to messages, new course releases, and impending deadlines. Make sure pupils remain interested in the app and are informed of any upgrades or noteworthy events.

Integration of Payments and Monitoring of Progress Description: Use safe gateways like PayPal and Stripe to integrate a variety of payment methods, including subscriptions and one-time purchases. Give teachers and students dashboards to monitor progress in the course, impending due dates, and accomplishments. Certify students who have successfully completed a course.

4. SYSTEM ARCHITECTURE:

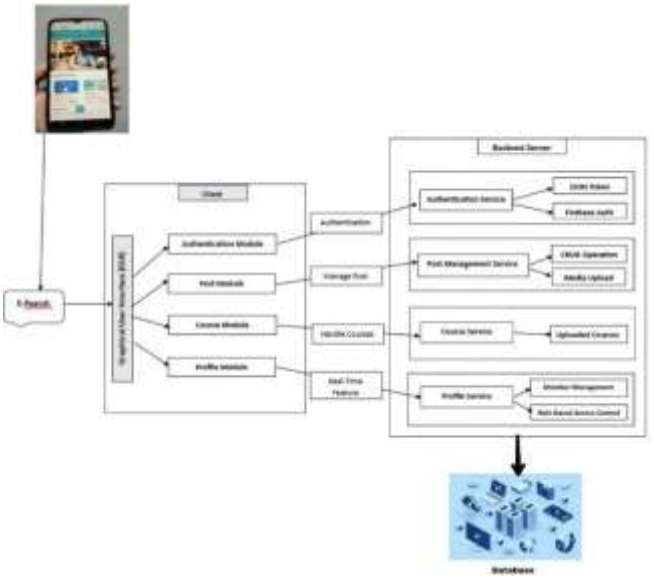

Fig 4.1 :- System Architecture

A Flutter-built e-learning application's system architecture consists of multiple interconnected parts that work together to deliver a smooth and effective user experience. Flutter and Dart are used in the frontend development process to ensure a uniform and responsive experience from a single codebase on both the iOS and Android platforms.

A RESTful API powers the backend, handling data processing, user authentication, and business logic. Firebase is widely used, and its database, Firebase Firestore, is used to store user profiles, course information, and progress monitoring.

Firebase Storage manages the storage of multimedia material. For effective and scalable content distribution, Furthermore, users can securely log in and register using Firebase Authentication, and real-time notifications via Firebase Cloud Messaging help users stay up to date on crucial events and developments.

Middleware and Services Description: Firebase Auth or OAuth will be used for user authentication, Firebase Cloud Messaging will be used for notifications, and PayPal or Stripe will be integrated for payment processing. These services will guarantee that crucial application functionalities are handled securely and effectively.

5. RESULT :

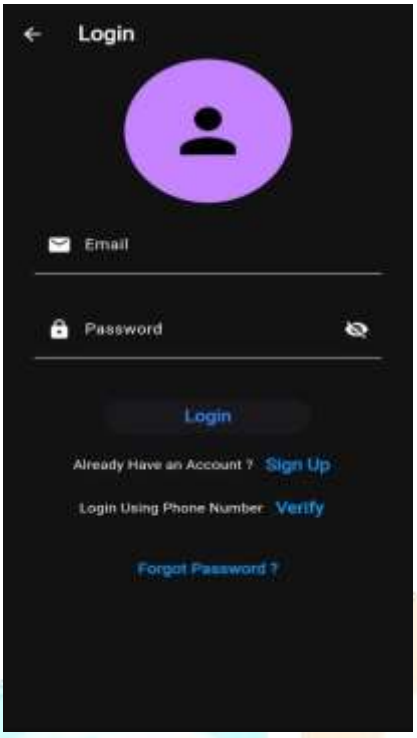

Fig 5.1 : Login

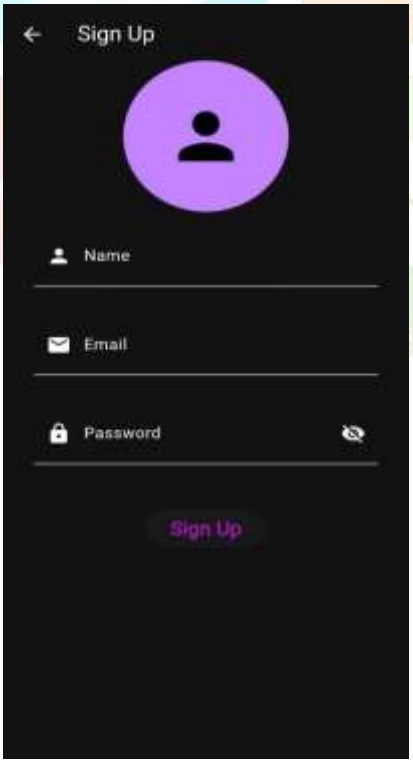

Fig 5.2 : Sign-Up

Fig 5.3 : Home Page

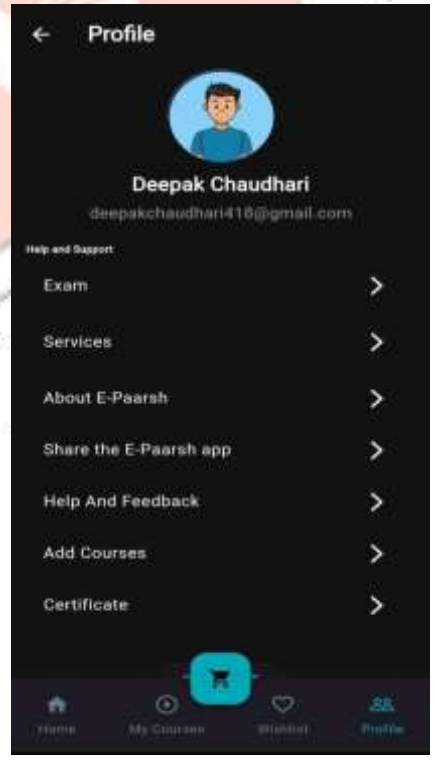

Fig 5.4 : Profile Page

Fig 5.5 : Update Profile

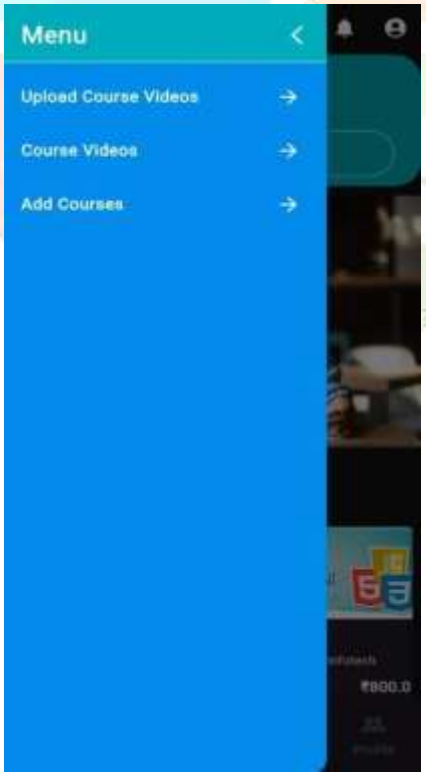

Fig 5.6 : Admin Module

Fig 5.7 : Signup using Phone no

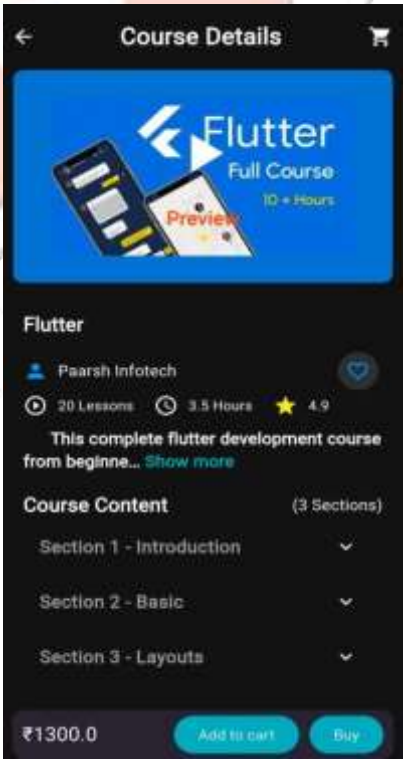

Fig 5.8 : Course Details.

Fig 5.9 : Wishlist.

Fig 5.10 : Shoping Cart.

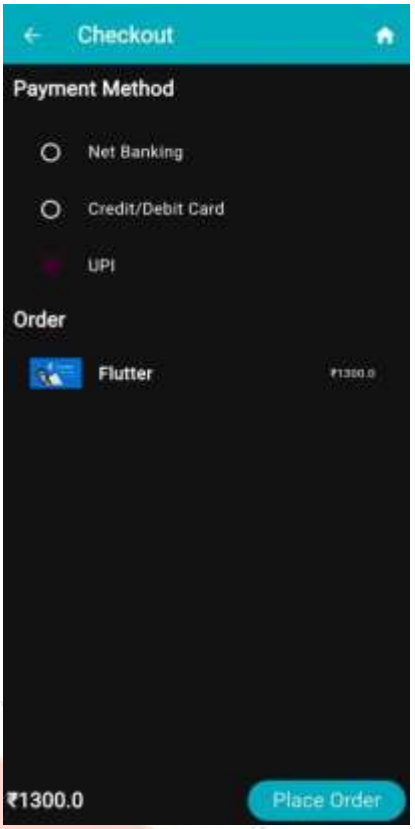

Fig 5.11 : Checkout & Place Order

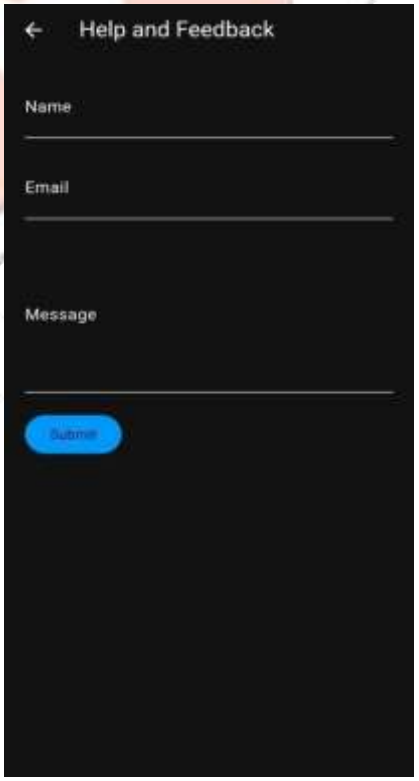

Fig 5.12 : Help & Feedback.

6. ADVANTAGES :

i. **Cross-Platform Development** - Single Codebase: To cut down on time and effort, create a single codebase for both iOS and Android. **Web Compatibility:** Flutter's web support expands the application's reach by enabling it to operate in browsers.

ii. **High-quality and Consistent UI/UX** Customizable Widgets: Flutter provides an extensive collection of customizable widgets that guarantee a high-quality and consistent user interface on all platforms
.**Hot Reload:** During development, it allows for rapid iterations and real-time UI adjustments, which increases productivity.

iii. **Performance** :-Native Performance: Flutter offers performance that is comparable to native apps because it compiles to native ARM code. **Quick Rendering:** The Skia graphics engine makes sure user interfaces are responsive and fluid.

iv. **Cost-Effective** -Reduced Development Costs: By targeting numerous platforms, a single development team can reduce staffing and resource allocation costs.
Lower Maintenance: Updating and maintaining a single codebase rather than several native ones is easier.

v. **Scalability and Flexibility** - Modular Architecture: By encouraging modularity, the suggested architecture facilitates application scalability and extensibility.
Integrations with Third Parties: Simple integration with a wide range of services (such as cloud storage, payment gateways, and authentication providers).

7. APPLICATIONS :

Social Exchanges Having drawn-out registration procedures could turn off visitors. Go for social interactions like Google or Facebook logins instead. It will expedite the registration process and enable your clients to discuss and exchange ideas on a range of subjects.

Filters and search bars If you have a lot of online courses or items, you need have a sophisticated search bar with the appropriate criteria. With a few clicks, users ought to be able to locate what they're looking for.

Gateway for Payments When an app allows users to pay for goods or services within it, they adore it. Provide a variety of payment methods for the courses they select, along with a fast checkout page so they can pay right away. High-end third-party payment gateways are available for speedy checkouts.

Educational Resources Provide students with easily accessible learning resources by means of live streaming lectures, recorded lectures from the classroom, text evaluations, theoretical audio or video courses, etc.

Instruments for creating tests It should be possible for teachers to design various examinations, including assessments and quizzes. A program that generates tests automatically ought to exist. Students should take the tests, and teachers should keep an eye on the results.

Cross-Platform Assistance and Cloud Integration Through cloud connectivity, users and administrators should be able to save and sync different types of data, such recorded lectures, tests, and so on, for later access.

8. FUTURE SCOPE:

The future scope for an e-learning application is vast and can be enhanced by incorporating several advanced features and technologies to meet evolving user needs and market trends. Here are some potential areas for future development:

Advanced Analytics: By using advanced analytics, the application will be able to monitor and evaluate user behavior, learning trends, and advancement. Actionable insights for tailored instruction, improved curricula, and focused interventions to improve student results can be gained from this data.

Virtual Reality (VR) : By creating immersive, interactive environments, integrating VR technology can completely transform the educational process. This can make learning more effective and engaging for disciplines that call for actual experience, including science labs, historical site excursions, or technical training.

Integration of Artificial Intelligence (AI): AI can

improve e-learning platforms by providing intelligent tutoring systems, adaptive learning pathways, and personalized content recommendations. More advanced chatbots for immediate assistance can be made possible by natural language processing (NLP), and machine learning algorithms can recognize and handle

Improvements for Mobile Learning: Accessibility and convenience can be increased by further tailoring the software for mobile usage. Learning can be more flexible and accommodate students with different schedules and connectivity problems with features like offline access, microlearning modules, and push alerts for updates and reminders.

Collaborations and Partnerships: Establishing alliances with academic institutions, content producers, and business titans can help the app grow its content collection and allow users access to a wide variety of excellent courses. Partnerships can also lead to opportunities for unique content, certification courses, and accreditation, all of which can raise the app's profile and attractiveness.

9. CHALLENGES:

Content Management and Quality –
Difficulty: It can be difficult to guarantee current, varied, and high-quality content that satisfies academic requirements. Continuous effort is needed to maintain a large library of information and keep them correct and relevant. –
Impact: Outdated or low-quality content might harm the platform's credibility and the opportunities for learning.

User engagement and retention –
Difficulty: Because e-learning platforms frequently experience significant dropout rates, it's imperative to maintain user involvement over time. To keep people engaged and motivated, it might be difficult to provide engaging, dynamic, and diverse learning experiences**.**
Effect: Poor rates of engagement and retention might result in fewer satisfied users and a less successful platform.

Technical and Performance Issues –
Difficulty: It can be difficult to make sure the app functions properly on a variety of hardware and operating systems. Bugs, technical difficulties, and performance problems might make using the product less enjoyable.
Impact: Frequently occurring technical issues might irritate users, which can result in unfavorable reviews and decreased app usage.

Data Security and Privacy –
Challenge: It's imperative to protect user data, including learning progress and personal information. It is crucial but difficult to have strong security measures in place to guard against hacks, data leaks, and breaches.
Impact: Inadequate data security can result in a decline in user confidence, legal problems, and serious harm to one's reputation.

Scalability and Infrastructure –
Challenge: It's critical to make sure the platform can handle growing loads without sacrificing speed as the user base develops. This entails database management and backend infrastructure optimization.
Impact: Insufficient scalability might limit the platform's potential for expansion by causing sluggish performance, outages, and an inability to accommodatean increasing number of users.

10. CONCLUSION :

E-learning is becoming increasingly prominent in higher education. All available evidence points to growing subscriptions and provision though from low to low. However, after the excitement of the new economy, growing dissatisfaction with e-learning has replaced extreme enthusiasm. The failure of e-learning performance, at least temporarily, has dampened our hopes of expanding and adapting to higher education, innovating new teaching aids, and lowering the costs once covered by e-learning

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