



Virtual Academic Management System using Django and Flutter

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ABSTRACT

The pandemic has shaken the entire world, and the education sector is one of the worst-hit during this ongoing crisis. This is a serious setback for students and teachers who can not access learning resources through the normal model of education. As a result, the way of education has changed dramatically, with the distinctive rise of virtual learning as an alternative, whereby teaching is undertaken remotely and on digital platforms. Virtual learning is a method to access and share study resources, for students independently at their own pace without being hindered by other learners. There has been an increase in involvement from students and faculties on online courses, which emphasizes the importance of managing learning systems efficiently to keep up with the current scenario. This paper intends to provide an ultimate solution to enhance the educational process in an institute by integrating essential learning and management facilities in one mobile application. In this regard, we have introduced a Virtual Academic Management System that develops a learning platform for efficient course delivery and management which is helpful for students and teachers. Virtual Academic Management System provides some new features of content management while improving from the features on currently existing ones. This system uses a mobile application available on both Android and iOS for the students, which is developed using Flutter and a web application with more comprehensive features, targeted towards the teachers, which is developed using the Django framework.

Key words: Django, Flutter, Learning, Virtual Academic Management System.

1. INTRODUCTION

The changes that happen in a span of a century are huge, however, one thing that has barely undergone any change is the education system. The type of educational institutions and the ways of teaching we see today have been around since forever. These same traditional methods have been followed till now, but the time has changed and technology has advanced so much and so should the education system. This advancement is what we are trying to contribute to with our work, Virtual Academic Management System (VAMS). Convenience of the students to access the study resources as and when they need as well as the instructors to provide their students with the assistance they require are the primary focus of this system. This convenience can be easily achieved by bringing the system into smartphones which quite literally brings it to the palms of the users. The ability to avail the services and resources to assist education at the convenience of the learner opens a wider learning opportunity for them.

The traditional learning method has been of a teacher tutoring a classroom of students, each of different calibres, abilities and interests. While this might be intended to be adequate for the average student, the average student is never the whole class. While some students require more time to grasp and understand an idea or a topic, others can gather more information in a relatively shorter time. This brings a need for a difference in the assistance that is ideal for a student so that they are neither hindered nor overwhelmed in their education process.

Virtual Academic Management System (VAMS) fills this gap by providing a unique experience for each

student enabling them to educate themselves at their own convenience and pace with assistance as and when required. It provides the necessary assistance and resources that can be availed at any time by the user. In addition to the smartphone application, VAMS also provides a web-app for a more accessible and feature rich interface tailored for a desktop, giving the user the option to make use of the services as per their schedule or on the go. Some of the primary features include (i) a portal for the instructors to conduct classes online for the students, which can be viewed by the students as per their convenience if the instructor desires, (ii) a space showing all new circulars and news from the college, which the students can choose to get notifications from, (iii) an instant messaging tab where students can contact the instructors for their doubts and clarifications in private or as a classroom chat, the interface of which has a design that is identical to that of widely used chat platforms such that the users would not find any difficulty in getting used to it, (iv) automatic attendance logging with the instructors having the option to manually override in case of any discrepancies, (v) a list of all assignments, both completed and pending along with timely reminders of due dates and new assignment notifications. Study materials for the courses can be provided by the instructors for the students and tests can be assigned for them to evaluate their progress. These features are intended to meet our goal towards offering a modern, convenient and intuitive way of teaching and learning to the teachers and students.

The smartphone application for VAMS will be available for both iOS and Android platforms, developed using Flutter framework. Flutter is an open-source cross-platform UI development framework from Google which allows the simultaneous development of applications for both platforms. The web application is developed using Django, an open source web development framework. With this work, we intend to provide an efficient new way of teaching and learning for educational institutions.

2. RELATED WORKS

Online learning management system for e-learning [1] in this paper the learning management system provides a management system for centralized control of course content. This application has a secure system to record lectures and is a highlight feature of this application. This feature would be accessed through a web camera and mobile recording. These features are mainly designed for an e-learning environment. In addition to it, an integrated learning management system with a platform for social activities and student assessment analysis was developed. User personas include student features like live and recorded classes, assignments, events, teacher features are scheduled lectures, evaluate

assignments, discussion and research. Virtual classrooms that use online learning play an essential aspect in education and studying. This would reduce cost and provide flexibility in learning without degradation of the learning process and its quality. Also, synchronous learning and lecture accessibility are still factors that virtual classrooms maintain. In addition, the audio-visual representation of information makes the procedure of studying interesting and interactive for learners. OLMS provides several features for E-learning on a mobile application, with features like recording lectures which makes it convenient for teachers and students. Notice board feature is a platform for social media discussions and chat. Users can publish a video hosted on a public domain or cloud database [3]. The profile management is effective and secure. Application is designed to be capable of tolerating large-scale data like video recordings.

In recent years, there has been increasing demand in joining new technologies into educational processes. Learning Management System (LMS) as a web-based technology in educational programs, provides support to instructors to organize course contents and support students. This study [3] is an attempt to investigate the factors that influence the success of LMS. The research model was developed to examine the relationship between students' outcomes and information quality, system quality, and readiness for online learning through system use and user satisfaction. The respondents chosen for this study were undergraduate students from the Limkokwing University of Creative Technology in Malaysia. Sample of this study identified based on the number of students in each faculty. The quantitative data are gained through questionnaires. The analysis of data indicated that all relations from independent variables to dependent variables are significant, except the relation between readiness for online learning and system use. The most influencing path was information quality on user satisfaction and perceived usefulness and the least influencing path was readiness for online learning, system use and perceived usefulness.

Motivating the students to use the system is important by forcing them to frequently use the system and making the system part of the continuous learning process. This could be achieved by adding new features and by motivating lecturers to be more active in the system. Increasing system use will enhance the students' satisfaction which will increase the LMS success. In general LMS success can be enhanced by increasing the quality of the content and the features of the system.

V-Buddy [3] this software is useful for different users such as students, placement coordinators, academic coordinators, exam coordinators, faculties, etc. for

fulfilling their requirements. The user accesses the system through his unique login id and password and then gets information according to the access rights established in the system. Students will be able to get information related to placements, holidays, announcements from faculties, events, timetable, etc. through the Android app and faculties will have access to the system through a web portal from which information will be shared. A student is an important entity in college management. And other entities like exam coordinator, academic coordinator, placement coordinator, and faculty have to provide information to students on a regular basis. This can be achieved only by efficient management of the available resources. Handling these data is a very tedious and difficult task and requires proper control over the information. Using a server and an Android app, a system can be developed which does this job very efficiently. V-Buddy is the solution for handling the large database with ease and convenience. The project is made for solving the difficulties faced by a student, it makes work very easy by getting the information in a few clicks, thus making his job simple, easier and more convenient. The V-buddy systems aim to give user-specific notification to the user. Students will get notifications depending on the branch, semester or division he belongs to. This saves user time by preventing them from getting unwanted notifications and helps the user to get important notifications. The V-Buddy system helps students to get information in a well-organized form so that students can access it easily. With the help of this system, faculties can send notifications related to exams, placements, lectures to the students. This helps students to get notified regarding current activities in college.

3. METHODOLOGY

Mobile learning as an intersection of mobile computing and e-Learning, providing resources that can be accessed from anywhere has the capability to be an exceptionally portable system with rich interaction and full support towards an efficient Learning and performance based assessment. The implementation of mobile learning is often done through the Android OS or iOS ecosystem. A virtual learning management platform is what we will be presenting, which can help people choose digital learning over traditional learning methods. This application will have two sides of interface: admin which will use a web-based application on the desktop and students which will use an Android application. In this application, tests and tutorials supporting various subjects and topics are often provided by the faculty to the students and therefore the progress and performance of individual students are displayed.

Interactive learning using the Mobile learning concept is something that makes learning more interesting and not monotonous. A replacement trend in e-learning nowadays is the use of portable media like smartphones either using the Android OS or iOS. The utilization of mobile learning to support the training process is taken into account. Thus, the training process is often done anywhere and anytime. The aim of this project is to introduce a new mobile learning platform primarily by means of both Android and iOS platforms.

In this paper, we introduce an innovation to the way students learn and the way teachers manage academics. Our project consists of three modules (i) admin module (ii) faculty module (iii) student module. To expand on the features of these modules, the admin module has an administrator who has the privileges to manage all the contents and users that come under the umbrella of the institution. The administrator can set up the degree type, syllabus, subjects and also can assign users their roles, both for students and faculties. So basically all the managerial decisions of the entities using VAMS are made by the administrator. While comparing to a real life example of an educational institution, the administrator role can essentially be compared to the principal or the manager of the institution as they are the authorised personnel who makes the important decisions that coincide with the privileges of the administrator in our system design. Due to the extent of access and privileges held by the administrator, they play an important role in the functioning of the entire system.

The faculty module is intended for the teachers, and the features are designed to assist them in managing all the academic affairs like conducting classes, marking attendance of the students, assigning works, evaluating them, etc. The faculty can provide students with materials they require to learn the subject, which they can utilize should they choose to, host live class sessions with students or record lectures of the subjects for later reference of the students, interact with the students through chats and group discussions and thus clear their doubts and queries. There are also features to conduct tests to evaluate the students' progress in the subject. The resources and guidance available to the students are provided by teachers with the help of the features provided by the faculty module.

The student module is designed to provide the students with the features and information they require to assist their learning process. We recognized that the user experience of the mobile application must be desirable to spend time in and should provide an easy-to-use interface where they can find all the important features and information straight away. Main highlighted features of the student module include the ability to attend online

classes hosted by the lecturers, view all the assignments together with their due dates and the option to scan and submit the assignments, setting notifications and reminders for upcoming classes, assignment due dates, events, the addition of new classes or assignments etc. Students can also access shared study materials for the subjects and take part in discussions and clear doubts and get clarifications from the instructor in a private chat or through a class group discussion. The module also provides the students updates on the new circulars and news released from the college. Additionally, to make the students feel at ease they have the option to learn from their peers and share knowledge by the forum and peer to peer instant messaging studies show that peer learning is the way forward. They can participate and host events via this application.

We live in a time of amazing technological advances which helped us to live in this modern world. A focus on optimizing the interface and experience is also important to give the user an excellent experience. In most of the cases, we are only focused on the technology so that in most of the cases we forget to think about the humans who use this technology. Whatever the product be, we are building it for the users who use it, so the primary focus should be on the people who use the technology. We should provide the users best user experience and user interface.

The importance of high quality and suitability of UI design of the mobile application is critical nowadays. A purposeful design can benefit users of the system with a powerful user experience and make them adapt to the new application really quickly. A functional product will assist both students and teachers. Data is an important aspect of the product. There has to be enough content that the user feels like using it. All menus should be easy to find and access. User characteristics majority of users will be students who are under 25 years old and comfortable with using technology so a mobile application might suit them better on the contrary teacher will prefer a feature rich web application for their convenience. Usability also is important, and the user should have the ability to learn at whatever pace they feel comfortable. The interaction should be intuitive for the users to be able to achieve their objectives easily. User experience goals like reliability, helpful, fast, simple help the feasibility and success of the product.

The reason we picked the Django framework for our backend and web application module Django is written in the fast and powerful Python language. Python works on any platform and is additionally open-source. By automating many features therefore the user can specialize in coding their app without fear about the aspect. Django offers one of the simplest security levels

of the currently available frameworks, ensuring that your project is kept safe. At an equivalent time, Django can also hook up with the massive number of third-party applications that exist, security systems out there, and it helps developers avoid common security issues, the developer does not need to worry about things like security including clickjacking, cross-site scripting SQL injection. Django includes a default admin panel to assist you to manage your application. Also saving you a substantial amount of your time, the panel makes the work dynamics between developers and non-technical staff much smoother as they will immediately start working together on content and processes. You can, of course, modify and adapt the panel to suit your needs. A Framework gives a structure and basic techniques to form the lifetime of an internet application engineer tons simpler for structure adaptable, versatile and viable web applications.

We choose flutter because it is an excellent tool for cross-platform application development. Flutter combines simple development with performance almost like native performance while maintaining visual consistency between platforms. Flutter uses a programming language called Dart, Flutter is also a free and open source software. At the moment, Flutter has equal popularity with React Native on both GitHub and Stack Overflow. Flutter has many advantages from having the ability to develop code quickly with some amazing features like : hot reload, widgets, minimal code and access to native features, to having the simplest architecture designed for building beautiful, custom UI. Main aim of Flutter is to build polished, custom app interfaces for a faster, more delightful experience for designers and developers. The best in cross-platform performance and resource consumption thanks to the compilation of native code and high-performance rendering engine. Better developer productivity is achieved at a minimal cost. Thanks to the greater productivity of Flutter developers, it takes less time to make an application, which suggests that compared to other programming languages and frameworks, applications in Flutter are written quicker and enter the market earlier with equal effort. Widget Strategy and Dart programming language in Flutter. The framework of Flutter, written within the Dart programming language, has the Flutter engine, foundation library, and widgets. Development in flutter is different as it uses widgets for UI writing. Here, there's a requirement to start out from the top, meaning before starting the event of some element, the user must have in mind an entire picture of what quiet UI it'll be. Many developers distinguish this UI writing as a more clear one, but it also causes certain difficulties for developers initially.

The main idea of Flutter is that developers can build the entire interface by simply combining different widgets. The appliance interface consists of various nested widgets, which can be any object. This is often applicable to anything from buttons to padding, and by combining widgets, the developer can customize the appliance radically. Widgets can influence each other and use built-in functions to reply to external changes within the state. Widgets are important elements of the interface and suit the design specifications of Android, iOS and traditional web applications. A RESTful API is a style of architecture for an application interface (API) that uses HTTP requests to access and use data. Flutter provides a HTTP package to consume HTTP resources, HTTP may be a Future-based library and uses await and async features. HTTP methods accept a url, and extra information through Dart Map (post data, additional headers, etc.). The request is sent to the server and the response is collected back in async/await pattern. It provides many high level methods and simplifies the event of REST based mobile applications. http class provides functionality to perform all kinds of HTTP requests. REST stands for “Representational State Transfer”, it determines what the API seems like. it's a group of rules that developers follow once they create their API. One among these rules states that you simply should be ready to get a bit of knowledge, called a resource, once you link to a selected URL. Each URL is named as a request while the info sent back is named a response.

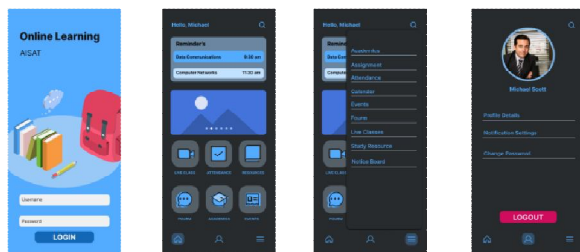


Figure 1 : VAMS application design and layout

4. CONCLUSION

The education system has been breaking out of the bounds of the traditional method of classroom teaching and the ongoing global pandemic has played a major role in accelerating this change. It has forced educational institutions to find other ways to provide their services while avoiding the necessity of the involved parties to gather at a common physical environment, i.e., the institution, instead of achieving the same objective through platforms that allow forms of virtual interaction that is remote and avoids proximal physical presence and is also more convenient for the teachers as well as the students to utilise the provided services. This method of education also eliminates the need for a physical

establishment which also reduces the cost of education significantly. VAMS is a platform that brings all the essential requirements, services and other necessities for the process of providing and acquiring education under a single system, which is also intuitive, easy to use and is easy to transition to from the current traditional method of teaching and learning. A virtual learning platform provides an experience that is more flexible in terms of time and place of learning and can potentially provide as much information for the learner as they require. The flexibility attained in this process of learning makes it a more relaxing and less stressful experience.

The Virtual Academic Management System (VAMS) provides a platform that enables a better way of learning by giving the users the freedom of choice in the time and place for their education, making education more accessible and less restrictive. This platform was developed using various development frameworks and languages, which are, Django: a high-level Python Web framework that encourages rapid development and clean, sublime design, Flutter: a mobile UI framework which is used for cross platform application development, Bootstrap: a massive collection of reusable and versatile pieces of code which are written in CSS, HTML and JavaScript, PostgreSQL: a powerful, open source object-relational database management system.

As the result of our combined effort and hard work, the Virtual Academic Management System - VAMS has turned out to be an efficient and feature rich system with an application that has an intuitive, user-friendly and visually appealing interface.

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