# Design And Implementation of Virtual Classroom System

Ankit Kumar[1], Rahul Kumar Jha[2], Prashant Kumar[3], Anshika Baranwal[4] and Ankita Jaiswal[5]
[1]*Assistant Professor, R.D. Engineering College*
[2,3,45] *Department of Computer Science & Engineering*
*R.D. Engineering College, Uttar Pradesh, India*

***Abstract*—Education has experienced great strides forward with technological innovations over recent decades, especially computer-aided learning programs which could potentially transform teaching and learning methodologies. The World Wide Web (WWW) has become an indispensable asset in academic circles worldwide for storage and dissemination of data. Traditional classroom-based teaching typically entails instructors delivering course material at specific locations at specific times, creating time and place restrictions both for them as instructors as well as their students. Furthermore, human factors arising from traditional classroom models may impede an instructor from exerting his/her best effort when creating and delivering course content. As this can result in inconsistency of teaching styles and approaches due to repetitiveness in learning process, this paper seeks to create a virtual classroom system to enhance campus learning experiences. Utilizing PHP and MySQL server-side programming and database management respectively for server management of virtual classroom web server, this interactive e-learning model uses multimedia and hypermedia for course materials delivery**.

***Index Terms*—Virtual classroom, e-learning, multimedia education and online learning.**

## I. INTRODUCTION

With the increase of networked computers and internet use as well as advances in communication technologies, e-learning has quickly gained prominence as an efficient method for education and training [1]. Traditional higher education methods remain prevalent across many educational institutions in developing nations despite its continued expansion, while rapid expansion of e-learning has encouraged both teachers and students alike to explore innovative means of knowledge acquisition [2]. The World Wide Web (WWW) is widely studied as an educational platform, acting as an effective method to store and disseminate information quickly for fast access by educational communities worldwide. As our societies shift from digitally divided societies to knowledge societies, traditional educational models no longer meet the academic demands of modern societies. Additionally, economies across the world are transitioning into knowledge-driven economies**.**

Population boom and college admission demand international has positioned additional stress on academic assets throughout many areas, straining both human and fabric assets to educate an ever-increasing student frame. College age candidates in a few areas have seen numbers surge extensively whilst only a fraction is admitted [3]. To deal with this venture effectively it's miles vital to set up a brand-new gaining knowledge of surroundings which fosters autonomy and flexibility in addition to verbal exchange throughout cultures and know-how centres ensuring smooth get entry to for all contributors of a understanding-based society [4].

Traditional classroom teaching normally includes lectures at particular times and locations, putting both instructor and pupil under stress. Due to human factors, instructors may not constantly dedicate sufficient attempt toward creating path substances and presenting lectures**;** furthermore, direct interplay between teacher and college students becomes tough due to so many college students desiring their interest straight away.

As part of an overall approach to address these challenges, new learning techniques must incorporate modern technologies, like the internet and WWW, alongside traditional classroom teaching methods. An efficient means of doing this is via virtual classrooms: these offer conducive environments within cyberspace that facilitate sharing information between educators and learners while offering tools necessary for sharing thoughts between instructors and pupils alike. Virtual classrooms represent one unique form of e-learning

which enhances traditional methods via diverse technology platforms ([5], for instance).

The virtual classroom concept emerged from studies on computers in education, which encompass computer-mediated instruction and multimedia as instructional tools. This field encompasses hypermedia like web-based hypertext as well as non-internet educational software like interactive CD-ROMs or media-based tutorials. As virtual classrooms develop online versions for schools there will undoubtedly be various challenges related to interface design, integration of computers into course designs and social issues surrounding computing which must be overcome for successful web-based virtual classroom development.

Present-day technologies enable virtual classrooms to be created on the internet using its associated resources, creating virtual schools with great ease. One major benefit of using the web as a virtual classroom platform is its capacity for storing information securely. Virtual classrooms (VCR) offer flexible access to high-quality learning technologies [6]. Students may additionally get right of entry to statistics stored electronically at their own tempo and download documents at their enjoyment - putting off time and space regulations related to traditional lecture room coaching. Distance mastering employs conversation technologies for teaching functions, allowing the transmission and reception of various texts, voice recordings, movies and many others [7]. Virtual lecture rooms (with stay online displays) as a mastering platform and lecture room have visible increasing use by means of numerous educational companies, even as social networking services have come to be indispensable additives of e-gaining knowledge of environments [8].

Goal of this challenge: Presenting an internet-enabled, interactive version of e-studying where path substances are added thru multimedia and hypermedia. Organization of paper: Section 2 provides literature review; Section 3 details system design/modeling process and implementation plan; while section 4 discusses system implementation details before concluding section 5.

## II. LITERATURE REVIEW

A lot has been published about e-getting to know, distance mastering and digital mastering - regularly used interchangeably - which gives some very promising study's findings. According to [9], digital getting to know or "e-learning" refers to any form of education conducted over an electronic community for delivery, interplay or facilitation functions - whether or not that be transport through computer systems and networked lecture rooms; allotted education structures or distance schooling fashions are all sorts of electronic mastering that facilitate information acquisition in this way. Computer-Based Training (CBT) usually makes use of laptop networks while Web-Based Training (WBT) makes use of the internet. CBT can also consist of either synchronous, asynchronous instructor-led codecs or combos thereof; Multiple universities across Africa have implemented a success e-mastering systems. One such university, Nairobi University College has followed three awesome mastering management structures over 5 years: Wedusoft, Chisimba and Claroline. Wedusoft became designed and built internally with the aid of considered one of our body of workers, while Chisimba became carried out via collaboration with improvement partners. Claroline is currently being utilized by the university. More extensively, coaching and getting to know structures often rely upon gear like email, wikis and bulletin forums for pupil interactions at the same time as others make use of Learning Management Systems (LMSs) [10]. At University of Cape Town, Sakai LMS branded as Vula has grown to be its number one LMS machine; prior to this implementation they used Moodle and WebCT; however they hold to look for virtual learning platforms which meet most in their requirements [10]. Early research on virtual classrooms explored their historical development, architectural layout and implementation; provision of disabled pupil e-mastering systems; as well as presenting distance education structures. A paper by [7] designated this component of distance schooling as well as cutting-edge demanding situations faced in distance mastering settings as well as four key regions where improvements may arise along with curriculum adjustments, new styles of interaction with others within businesses in addition to evolving roles members inside both commercial enterprise and educational distance-gaining knowledge of environments.

[8] presents an effective model to advance online education systems for both teachers and learners. This

framework facilitates more accurate evaluations and effective assessments of learning processes. This model encompasses logistical systems for managing textbook and material shipments directly to distance learners. [11] discussed an architectural design for an integrated virtual learning system, detailing its components, techniques, and recommendations for system implementation. Design of this system includes a multi-tier, modular and scalable architecture adaptable to database middleware suites. System functionalities are delivered using web services communicating over industry standard XML messaging channels with all functionality accessible exclusively through browser access.

[12] examines the creation & evaluation of a Virtual Classroom Module (VCM) using various authoring tools, while survey results demonstrated its success among students. In comparison, [2] presents research conducted at an Australian university to further enhance understanding of students' experiences using Adobe Connects specific online learning technology; similarly [14] explores this subject matter at length using its case study method.

Additional research [13] examined the effect of virtual classrooms on learning and teaching in Norway. A student Master class participated in two virtual classroom sessions before being observed by observers before interviewing themselves afterwards using framework [ Activity Theory] for this research study. Research [14] sought to measure various e-learning activities' effects on student development of learning outcomes.

Findings suggest that participation in virtual classroom classes appreciably contributes to college students' very last grades. In this paper, information mining techniques are brought and carried out so as to investigate internet usage data within digital getting to know environments. [15] explores why teachers adopt virtual study room era and their use after adoption; most often listed by means of respondents for adopting it had been institutional resource availability, multiplied social presence, advanced student learning effects and technological accessibility.

At many tertiary establishments, students experience various limitations that restrict their participation and learning experiences. Some may also have bodily disabilities; hospitalized for scientific problems; or may require being profitable to satisfy economic responsibilities. Web-primarily based gaining knowledge of offers valuable opportunities and democratic benefits for those students [16], at the same time as different studies have tested supplying assistive technology for bodily disabled newbies. One study [17-18] addressed voice-based getting to know structures designed specifically for visually impaired students. Furthermore, [19-20] supplied a centralized studying device meant to assist teachers of deaf people as well as deaf-impaired humans dwelling in Jordan in teaching and getting to know activities.

## III. VIRTUAL REALITY-INTERACTIVE CLASSROOM BASED ON DEEP LEARNING ALGORITHM

Interactive teaching activities powered by deep learning algorithms can effectively address individualized learning requirements while supporting teachers to conduct their activities seamlessly. Virtual reality-interactive classrooms with their unique qualities classify learning activities into in-class and after-class segments [12,13].

## IV. SYSTEM DESIGN AND MODELLING

Figure 1 depicts a data flow diagram (DFD). In particular, Figure 1 represents the user validation module using DFDs; specifically, this DFD shows its user validation process as its centre point, followed by multiple same-level processes catering to three distinct user categories: System Administrators, Lecturers and Students.

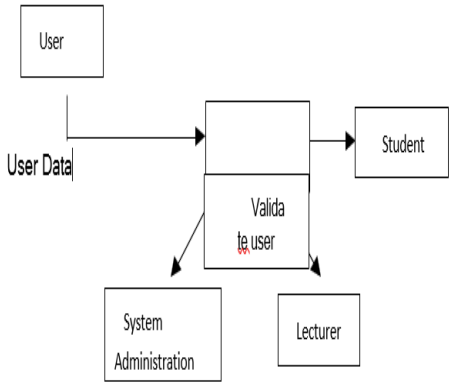


Figure 1: Data flow diagram showing the User validation module.

Figure 2 illustrates a data flow diagram depicting information exchange between lecturer and user modules.

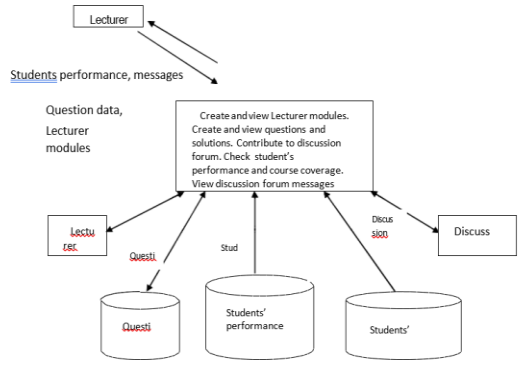


Figure 2. Data flow diagram showing the Lecturer user module.

Figure 3 depicts data flow at a student user level and highlights various modules involved, including lecture modules, answering and viewing solutions to questions posed, performance tracking capabilities, contribution tracking abilities in forums as well as viewing discussion and forum messages.

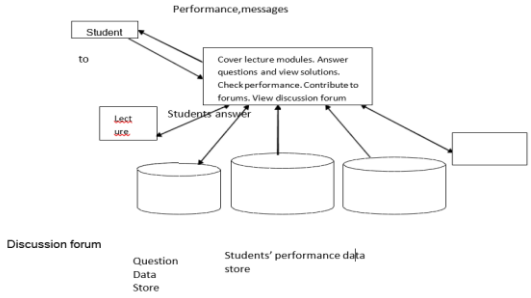


Figure 3. Data flow diagram showing the student user module.

## V. SYSTEM IMPLEMENTATION

This system was constructed using HTML for its frontend, PHP for server-side programming language use, Apache as middleware and MySQL database as backend storage solution. Figure 4 displays user interface for viewing course page; in Figure 5, user interface of exam page interface can be seen.

Effective use of virtual learning systems requires users to adhere to several operational steps from start to finish, starting from activating their virtual tutor and logging onto course sessions until following instructions given by instructors [20]. Benefits of the Virtual Classroom may include flexibility, convenience, cost savings, enhanced interaction and retention rates among teams as well as post-course reinforcement sessions with online reference materials [20].

Project Description for Three Modes of System

This system application comprises of three distinct groups. They are as follows: (Admin mode; Teacher mode and Student mode.).

[A] Admin Mode

Admin Registration: In this application's first step is registering Heads of Department (HODs), staff members, and teaching faculty with our system database. Users then provide their phone's IMEI number along with its email ID and password for registration before an OTP (One Time Password) code will be sent directly from our administrators or faculty for verification purposes.

Logging In as the Administrator: After registration, administrators may log into the system using their account IDs to access an administrative homepage with options like taking attendance, uploading results and notifying students as well as viewing attendance records and uploaded results.

[B] Teacher Mode:

Upload Circular: Utilizing this feature, teaching staff can easily upload notices for students so they have easy access to important notifications such as exam schedules or holidays.

Upload Attendance Records: Teaching staff can upload attendance records so students can see whether their attendance fulfills attendance criteria.

[C] Student Mode:

Student Attendance Records: Attendance data uploaded by faculty/HOD can be seen by students anytime as PDF reports allowing quick and convenient access.

View Circulars Sent by Teachers: Notices are often distributed via HOD or admin to students by way of notices that include useful information, college updates and important notices that could benefit their education. Students can view them anytime using their registered accounts to view these notices.

Existing System

- Whilst currently, teachers still take attendance manually on paper - an outdated practice which

frequently results in discrepancies among attendance records - leaving many students uncertain and uncertain as to their attendance statuses.
- Whenever students require urgent leave for any urgent matter, they are forced to fill out and submit a leave application; an outdated and laborious process.
- Student data in each branch are manually entered in notebooks.
- Records for performance tests aren't being properly kept or kept an eye on by students.

Advantages:
- Students can easily and conveniently view their attendance and marks anytime, anywhere.
- The app will include features to allow students to apply for leave or request approval in urgent matters.
- This app notifies students when their attendance drops below 75%, helping to ensure they remain up-to-date and informed of what's going on with their studies.
- All student data is digitally stored on an application server for effective data management.
- This software was intended solely to be utilized by its administrator and authorized users, who only the administrator may add new accounts or generate passwords for. All authorized users must log-in using valid username and password credentials before accessing the system.

Disadvantages:
- This system takes too much time.
- To maximize efficiency, your system must be fully automated and paperless.

PROPOSED SOLUTION

The system proposes Android applications as platforms on which teachers can manage student information such as daily attendance and performance data, which in turn enables students to monitor their academic progression on an semester-by-semester basis.

1. User Module: Within this module, users are authenticated by providing valid username and password combination that are verified to gain entry to their respective interfaces. In order to identify unique Android device IDs uniquely among all the users authenticated in a session, this data can then be utilized by our system for user identification purposes and granted access. Once verified, unique device IDs may also be stored on our server to allow accurate verification before giving access.
2. MySQL database module: Our proposed system utilizes MySQL due to its ease and versatility as its database storage solution, housing all information regarding students, faculty and operations in one convenient spot while guaranteeing proper data management for every user and task at any given moment in time.
3. Staff Module: Created specifically to serve staff, this module enables faculty members to manage attendance, upload results, and post notifications for students. Staff enter admin details into an encrypted system before sending it out for verification by our server; only after successful authentication can they perform such actions - otherwise our system restricts access.
4. Attendance Module: The Attendance Entry Module enables lecturers to take attendance using mobile phones. Lecturers first select the branch, semester and year before proceeding to an attendance page where they mark students as present or absent. Attendance can only be taken during lectures by authorized personnel; when lectures change or additional sessions are added the Head of Department (HOD) may permit other faculty members to take attendance by temporarily or permanently changing timetable logic.

SECURITY

Our security protocols ensure that software can only be managed by its administrator and authorized users, with only the latter possessing authority to create new accounts or generate passwords; other users can only gain entry when authenticated through valid username and password credentials.

Data Flow Diagram of Check and Manage SYSTEM:

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figure :- 1 (Zero Level Diagram)

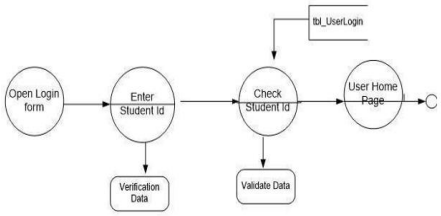



figure :- 2 (Login Diagram)

Admin Details Data Flow:-

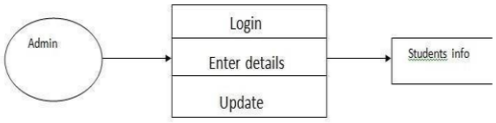



figure :- 3 (1st level)


figure :- 4.1 (2nd Level)

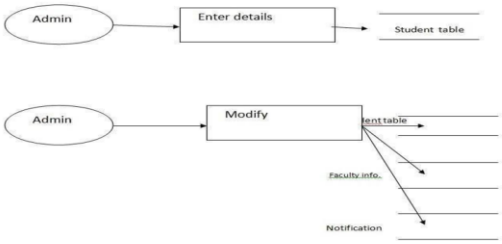



figure :- 4.2 (2nd Level)

Student Details Data Flow:-

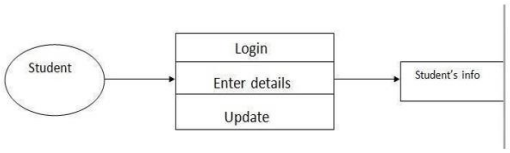



figure :- 5 (1st level DFD)

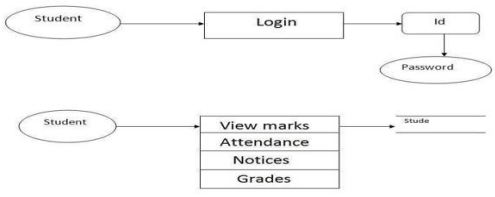



figure :- 6 (2nd level DFD)

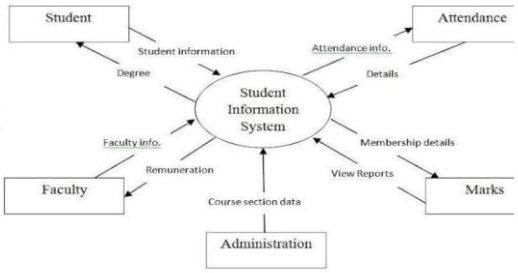
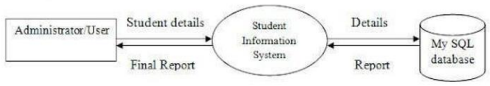



figure :- 7 (DATA FLOW DIAGRAM OF Check And Manage SYSTEM )

Level 0 DFD :




Level 1 DFD:

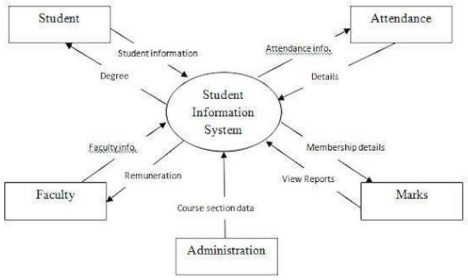



figure :- 9 (O LEVEL dfd FOR CHECK AND MANAGE SYSTEM PROJECT )

Benefits of the Check and Manage System Proposed:

The proposed system offers numerous benefits for administrators and users alike. Administrators gain access to student records across branches and departments; they can quickly retrieve detailed information for any student or employee at any time, making this efficient means of handling college-related functions, benefitting both current students as well as past ones by giving access to both current and past records when required. In addition, various records such as admission details, fee details and exam results are easily maintained using this system, making tracking attendance records and accounting reports much simpler for college management.

## VI. CONCLUSION

In this paper we present a virtual learning gadget designed to cope with the shortcomings and flaws observed inside existing systems. Integrating open studying techniques derived from modern technologies (in particular World Wide Web) with conventional study room teaching methodologies should make getting to know greater flexible, attractive and handy to any area that has internet get

entry to - hence enriching college students' reviews as they enhance sources available to them through a more advantageous digital school room revel in and improve assets to be had inside it.

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