

# Improving Education Communication and Efficiency Through a Dynamic Community Management System

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## Abstract

Dynamic Community Management System (DCMS) is a new program that aims to improve communication and expedite administrative operations in educational institutions. DCMS serves as a central communication centre for parents, teachers, and students, promoting effective information exchange and collaboration. It also controls academic records, such as attendance and grades, offering a one-stop shop. DCMS simplifies the leave request procedure, allowing students to more readily explain their needs. The program also includes instructional reels, which allow students and staff to easily share educational advice and information. One of DCMS's significant innovations is the integration of unique external technology, such as a class management panel placed outside classrooms. This panel uses cameras and facial recognition technology to track class attendance in real time, providing data on the current class composition, present students, absentees, and staff on duty. This function is especially useful for changeable timetables, which ensure precise attendance tracking. In addition, the app includes food ordering features, enabling students and staff to order from the cafeteria. This enhances convenience and efficiency, particularly during busy hours. Overall, DCMS is a comprehensive solution that promotes communication while also increasing administrative efficiency in educational institutions.

**Keywords:** Dynamic Community Management, Visual learning, Educational advice, Effective collaboration, Real-time attendance tracking, Food ordering features

## 1. Introduction

Dynamic Community Management System (DCMS) is a transformative solution that aims to change the manner in which colleges handle communication, records and collaboration. In contrast to this is traditional college environment where there is often disaggregated ineffective communication among parents, teachers, students and administrators leading to misunderstanding, lost opportunities and lack of community engagement [1]. Additionally, manual record keeping processes are prone to errors, time consuming and contribute to the burden of administration. Hence DCMS provides a centralized platform for communication, automation of record management procedures and team work between its users [2]. With messaging functionally; automated attendance tracking; leave requests processing; educational content sharing etc., DCMS enhances operational efficiency at the college level as well as improving its general experience [3]. Because its user-friendly interface allows all stake holders navigate through it with ease therefore utilizing the system efficiently. Otherwise DCMS cannot be seen as a static solution

but rather dynamic so that it can adapt itself according to any changing requirement from various colleges or universities where this software exists. On the other hand, future updates like integration with emerging technologies such as AI and IoT give it an edge over other similar systems when innovation in college community management is concerned [4].

The Dynamic Community Management System (DCMS) is an innovative system that combines communication features, record management, and collaboration tools in one platform. Previous software systems required separate tools for communication features, record preservation, and collaboration tools, often leading to users not getting information on time, misunderstanding, missed opportunities, and a lack of engagement in the community. The DCMS approach merges these tools, allowing for more effective communication and a centralized record management tool that can manage records automatically [5]. In addition, the system provides collaborating opportunities for users. The system design includes messaging features, automatically time and attendance, leave

and on-duty request process feature, educational short/reel content sharing as well as the ability for the cafeteria to provide food orders and find its users location by saving time instead of the user standing in long lines or leaving the location to find food [6]. Thus, the DCMS platform will contribute to the college's operational efficiency and improve the student experience.

DCMS is not a static solution, but a dynamic solution that can change with the changing needs of colleges. It has the potential for future development, such as integration with emerging technologies, including artificial intelligence and Internet of Things, confirming that it remains innovative in the field of college community management. According to the findings of this study, the Dynamic Community Management System (DCMS) is a far-reaching development in the management of college communities. The interface has a user-friendly aspect and potential for future developments, which signifies that it will be of real use to colleges who wish to make their educational environment more connected and efficient.

#### **Features of DCMS**

Dynamic Community Management System (DCMS) targets for entire college-level functionality with necessary and some other additional features that support communication, management, and collaboration in a very responsive way. We intent to have a closer look at the Features of DCMS [8].

##### *Messaging functionality*

- Direct message between parents and teachers and parents and students, as well as announcement for students from administrators.
- Announcements, reminders and group discussions through group messaging.
- Quotes which displays message deliver and read receipts.

##### *Record management*

- Real-time attendance tracking for parents, teachers & students
- Teacher Introduction of Recording and Release of Grading System
- Student and parent academic records organizer.

##### *Leave request management*

- Learn about leave request submission by students with approval workflow using email to teachers and staff
  - Leave request status updates through automated notifications
  - Easy to track/ reference single record of leave request instead of having a pile of records
- Centralized view

##### *Free educational content sharing*

- A platform used to exchange educational items, advice and multimedia materials.
- Educational reels for creating short educational videos, lectures, and tutorials
- Interactive, Collaborative student and teacher nexus for developing, sharing and conversing on educational content.

##### *Easy-to-use interface*

- Intuitive GUI designed for ease of navigation and visibility
- Customizable user profiles; to provide for a more personal and unique user experience;
- User-friendly responsive design.

##### *Integration custom external technologies*

- Automated attendance tracking using face recognition-based class management panel.
- Cafeteria ordering system integration for seamless and easy meal selection.
- External hardware integration for better functionality and user experience.

##### *User-friendly interface*

- Simple, discrete form fit to any device.
- Customizable settings to adjust subject perception to user liking.
- Global World Web response.

##### *Integration of custom external technologies*

- An extension class control displays with a face image-recognizing function to monitor attendance
- The school lunch module has ties to utilize an app to constantly place and check one's lunch
- Outside app compatibility developer kit (ACK) is linked to add-on extras to support user interaction and experience

##### *ERP Tools*

- A terminal view to control all things "Teacher," like how control user & Company, content type, and Child copy.

- Analytics and outcomes journal to monitor the child's progress.

#### *Technical assistance and training*

- User guides and instructional resources for first-time users.
- Professional development and technical assistance for administrators, teachers, and students.
- Support desk and forums to receive feedback and to communicate with users.

#### **User Interface**

To ensure that the system is not just easy to use and navigate but also seamless and instinctive for all users such as guardians, educators and learners, Dynamic Community Management System(DCMS) has a user interface(UI) designed with a lot of care. This makes the UI an important factor in improving customer satisfaction [9]. Here are some key features of DCMS UI in detail. The UI design for this application can be found in Figure 1 and 2.

#### *Dashboard*

- Upon logging in, users are greeted with a clean and organized dashboard that serves as a central hub for accessing various features and information. The dashboard provides an overview of recent messages, upcoming events, and important announcements, allowing users to quickly stay informed about relevant updates.

#### *Navigation*

- The navigation menu is strategically placed for easy access, featuring clear and intuitive labels for different sections and features of the system. Users can easily navigate between messaging, record management, leave requests, educational content, and other key areas of DCMS.

#### *Messaging interface*

- The messaging interface is designed to resemble popular messaging apps, with threaded conversations, multimedia support, and real-time notifications. Users can easily compose messages, attach files, and manage their message history, making it convenient to communicate with other users within the system.

#### *Record management*

- The record management interface is user-friendly, allowing teachers to quickly take

attendance, record marks, and access student records. Parents and students can view attendance records, grades, and other academic information through a dedicated section of the UI.

#### *Leave request submission*

- The leave request submission process is straightforward, with a simple form for students to fill out with details such as the reason for leave and the duration. Once submitted, the request is forwarded to teachers and administrators for approval, with notifications to keep the student informed of the status of their request.

#### *Educational content sharing*

- The educational content sharing interface is made to foster collaboration and knowledge sharing, with capabilities for uploading, sharing and commenting on educational content. For instance, other users can find those educational reels, presentations or tutorials they want that have been shared by other students in the college.

#### *Customization options*

- User customizations — as notified by DCMS in a way of their choice concerning how they need the information or the structure of the dashboard and their profile preferences. These customization options help users tailor DCMS according to their own needs and choices thereby enhancing its usability to get the best user experience.

#### *Responsive design*

- DCMS is designed responsively; thus, its UI will adapt itself according to different screen sizes and devices, respectively. DCMS has a desktop version too which completes our previous sprints so that regardless of whether you are using your phone or tablet to access our platform it always feels like it's one consistent user experience throughout.

#### *Help and support*

- There are some resources for help and support within DCMS including user guides, FAQs and helpdesk contact details. In order to assist users in navigating through DCMS or finding solutions to frequently asked questions (FAQs), these resources can be accessed easily.

UI design (Ideation)

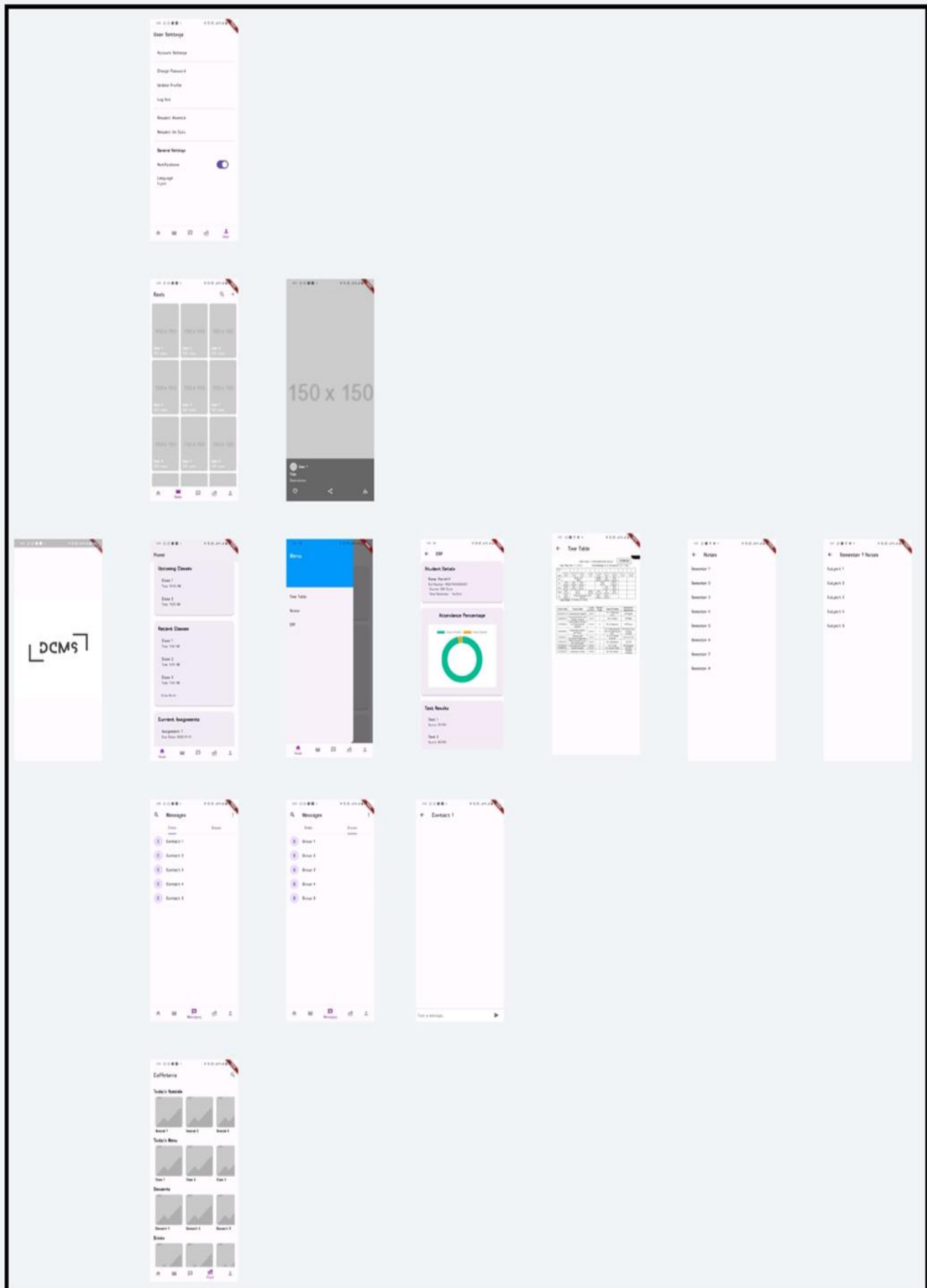


Figure 1. UI design



Figure 2. UI design

### User experience

Daily users of the Dynamic Community Management System should be able to interact with its usability perspective. Moreover, in order to make it look friendly and clean, DCMS architecture has been purposefully being built with greater emphasis on its usability for end users since it will be as simple and as efficient as possible [10]. Let us have a brief talk about several critical aspects of user experience that are present in DCMS.

#### Intuitive interface

- DCMS has one of the simplest layouts and anyone, technically, inclined or not, can easily work through it.
- The soft and hardware of the phone use labelled buttons and recognizable pictures around the interface to help the user to quickly find the necessary option and information.

#### Responsive design of DCMS

- It must also be noted that the layout of the site is fully responsive so that it can adjust to the current screen size and the device used by the client.
- Regardless of whether the site is being viewed on a full-sized computer, tablet or an even mobile phone, the audience is given a smooth experience.

#### Personalization

- This way users can choose their favourite videos and programmes by settings an preferences by DCMS.
- DCMS offers its users an option to change its settings and personalise the main page, notification settings, and other characteristics.
- Accessibility

- According to its objectives, DCMS is expected to be friendly to all the end users including the disabled ones.
- Some of the accessibility specifications include: provision of alt text for images in the system and accessibility by keyboard only.

#### *Performance*

- DCMS layout is designed ensuring that the website loads very fast and the page transition from one page to the other is very smooth.
- The overall design of the system must be capable of handling large amounts of data and user interactions and it has to be efficient.

#### *Feedback and Support*

- There are ways in which the users can contribute to updating, correcting and enhancing the information found in DCMS as well as seek help.
- Through the help of the feedback mechanism in the application, users have the opportunity to report problems, new ideas for development or request for assistance to be granted.

#### *Training and on boarding*

- Although unaccustomed to some of the concepts introduced by the application, DCMS gives its users an elaborate training that comes with manuals.
- It is a policy that assists users to maximize on the functions of the system increases their capability to use DCMS from the initialization point.
- DCMS undergoes constant refinement through user feedback and usability testing.
- This cyclical approach guarantees DCMS remains user-centric and adapts to the changing demands of college communities

#### **Algorithms**

The algorithms utilized within the Dynamic Community Management System (DCMS) are crucial elements that contribute to the system's functionality, particularly in managing attendance through facial recognition and directing messages. The Document Storage System, Absence/Holiday/Vacation Request, and Educational Material Database are also key components [11]. Below is a summary of the algorithms present in DCMS.

#### *Facial recognition for attendance management*

- DCMS uses the facial recognition system to maintain proper record of the attendance.
- Cameras mounted in classrooms take pictures of the students, and the algorithm uses their facial structure to recognize them.
- It compares the captured images with the student profile database to mark the attendance of the students mechanically.
- It also has a fast processing system that enhances the accuracy of the system with regards to attendance.

#### *Message routing algorithm*

- There is a message routing algorithm that makes it easy to deliver different messages to the targeted individuals in the shortest time possible within DCMS.
- The routing of the messages depends on the parameters that include the sender, recipient, message contents, and priority of the message.
- It also controls the queuing of the messages and the notification of messages that need to be delivered.

#### *Record management algorithms*

- DCMS uses algorithms for controlling records including those of attendance and marks. These algorithms assist in archiving records in a systematic way making them easily retrievable by the accredited users.
- They include functionalities such as –; creating reports; identifying attendance, and performance trends.

#### *Leave/On Duty request approval algorithm*

- Regarding the leave /On Duty request management, DCMS has invested in an automatic algorithm that helps in approval. There are certain conditions on which the algorithm tests to authorize the leave/on duty requests; they include the reason for the leave/on duty and the availability of replacement.
- It directs the request to the relevant power to either accept or decline it with notifications sent to the requester.

#### *Educational content recommendation algorithm*

- The DCMS feature incorporates artificial intelligence to generate and recommend educational content for users, tailored to their specific interests.

These algorithms are for increasing functionality and utility of DCMS for facilitating the communication, attendance, record management,

and education content distribution for colleges. A mind map depicting the algorithms can be found in figure 3.

### Mind map of algorithms

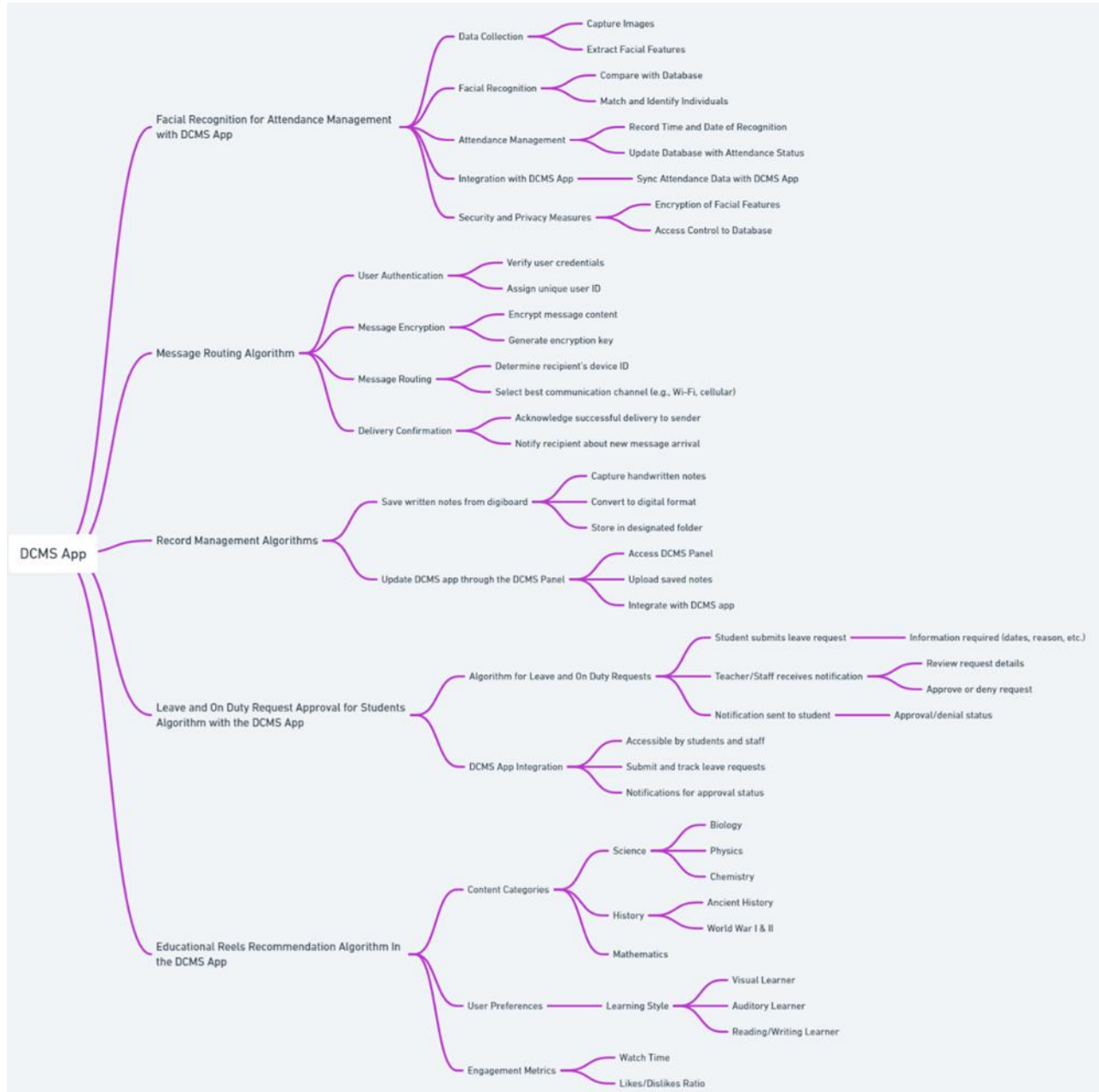


Fig 3. Mind map of algorithms

#### Custom external technologies

The Dynamic Community Management System (DCMS) utilizes custom external features that increase the versatility of the system as well as the users' satisfaction [12]. Such technologies as a class management panel which uses facial recognition and a cafeteria ordering system are developed in order to enhance efficiency and user experience in environments of colleges.

#### Class management panel with facial recognition technology

- Class management panel is fixed at outside of each class, and it consist of face recognition system.
- At the panel, one is able to find details like current class, total being present, total lacking, and total on duty.

- Some organizations incorporate the use of facial recognition where the system is able to capture attendance on its own; there is no need for someone to take attendance.
- Seriously, the presence of the panel means automatic and real-time attendance reportage and synchronization with the DCMS database.

#### *Cafeteria ordering system*

- DCMS incorporates a meals ordering system which makes it easy for the persons working in the cafeteria to order for meals.
- That way, the users can place the orders through the DCMS app, and there is no need for order taking to be done manually.
- Customized equipment placed in the cafeteria, linked with the DCMS application, shows orders and gives the cafeteria staff control over orders and their fulfilment.
- Users get notified when their orders are available for pickup thus cutting down on time they have to wait and the overall satisfaction level of the users is therefore made higher.

#### *Challenges and considerations*

- External technologies generated from customization may need to be installed and integrated, which may be costly and needs professional help especially in the areas of hardware and software systems.
- Quality alignment and integration with DCMS may be problematic, and sometimes they require testing, and adjustment.
- When implementing external customized technologies, security and privacy concerns stand out especially with facial recognition system and personal information.

#### *Future developments*

- At present, the primary tasks of DCMS are carried out, and plans are in place to incorporate custom external technologies in future projects to boost DCMS's efficiency and the user experience.
- Future advancements could include additional features based on user feedback and the expansion of current technologies.
- Therefore, DCMS remains dedicated to leveraging particular external technologies to improve overall communication, management, and collaboration within college communities

#### **Benefits of DCMS**

The Dynamic Community Management System (DCMS) offers a range of benefits to colleges and universities, parents, teachers, students, and administrators [13]. These benefits include enhanced communication, streamlined management tasks, improved integration, and increased productivity.

- *Improved communication*

By utilizing the benefits of the DCMS, which serve as a central platform for communication between parents, teachers, students, and even administrators, organizational communication is significantly enhanced. This is due to the elimination of the inconvenience associated with managing multiple messaging platforms to exchange messages.

- *Streamlined management processes*

It also helps in management chores like tracking students' attendance, records and leave applications. This cuts the time that could otherwise have been used by teachers and administrators on other tasks, makes work easier, and accurate.

- *Enhanced collaboration*

It also aids in management tasks such as tracking students' attendance, records, and leave applications. This streamlines the process, reducing time that might have otherwise been spent by teachers and administrators on other responsibilities. It makes work more manageable and ensures accuracy.

- *Increased efficiency*

By automating processes like attendance tracking and leave request management, DCMS boosts efficiency and lightens the manual workload. This, in turn, enables teachers and administrators to concentrate on more crucial tasks.

- *Reduction of workload*

There are routine tasks performed almost universally within organizations, such as attendance tracking and managing leave requests. These tedious tasks have been streamlined through automation in DCMS operations, thereby reducing the workload for employees. Consequently, this frees up teachers' and administrators' time for more critical tasks.

- *Transparency and accountability*

Given the varying degrees of centralization, public accountability can be high, thanks to DCMS's openness in interaction and documentation sharing. This is succinctly demonstrated by how Disclosure promotes accountability, thereby fostering trust within the college community.

- *Personalized learning*

DCMS, in essence, facilitates the sharing of diverse learning content to accommodate students' preferences and learning styles, making the learning experience more accessible and comfortable for them, tailored to their needs.

- *Enhanced parental involvement*

Moreover, DCMS significantly increases parental involvement in their child's education through timely updates on attendance, grades, and other essential details. This, in turn, improves harmony among parents, teachers, and students, and enhances student performance.

- *Cost-Effectiveness*

Therefore, the adoption of DCMS aids colleges and universities in reducing operational costs associated with paper-based communication and manual record-keeping. This, in the long run, leads to financial savings for educational institutions, thereby maximizing their resources.

### **Implementing and Integrating**

The task of designing and identifying the possibilities of using the Dynamic Community Management System (DCMS) in the context of college environments involves certain practical challenges and subtleties [14]. These steps include system setup in which the organization's current data is input into the new system, data conversion in which data from existing systems is transferred to the new system, user training in which employees are trained on how to use the new system and support when issues arise the new system is addressed. Here is a detailed overview of the implementation and integration process of DCMS

#### *System setup*

- The first step to play in the implementation of the DCMS is normally to put in place various hardware which include; servers, databases and networks.
- This includes the installation and setup of all the applications and packages that would need to

be availed to the client from the DCMS application.

- Rights administration also defines the users, their roles, and access rights within the system, as well as the processes of security and settings optimization for the college needs.

#### *Data migration*

- After this, it is followed by the migration of existing data in an organization to DCMS. These include student records, their attendance, the marks that they get as well as other related records.
- Depending on the conversion process there might be data migration, where data from other formats is converted into formats compatible with DCMS and if data has to be migrated during the conversion process then data integrity issues could also be involved.
- Migrating data poses certain risks that include data loss or corruption that is why migration should be well planned and done effectively.

#### *User training*

- Based on the implementation of DCMS, user training is a critical factor to be considered as all the users should be conversant with the operations of the system.
- Training for the teachers, administrators, students and parents should be carried out to explain them about the DCMS including its features and other aspects.
- Some of the training themes include; Messaging and Records Management; Leaves; E Learning; Administration; Content Release and Utilization; analytical.

#### *Integration with existing systems*

- Due to the application of DCMS it may be necessary to extend it to other existing systems adopted and being used by the college such as the SIS and LMS.
- Integration entails identifying and setting up points of sharing and exchanging information with the above mentioned systems with DCMS.
- Firstly, prior to integration, careful consideration and analysis has to be made so as not to affect the previous network structures.

#### *Testing and quality assurance*

- It is recommended to perform some feasibility studies and pilot testing before implementing DCMS in a large scale, to make sure there is no

problem, such as some function bug, in the system.

- Testing should be carried out thoroughly on the functionality, the performance, the security and the user interface and usability.
- It should be noted that, in terms of practice, QA should be a continuous process in which the best practices are subject to constant revision and analysis in relation to the feedback of users and the dynamics of the work of the system.

#### *Deployment and rollout*

- After testing is done and any problems that could be present fixed then DCMS can be implemented and distributed to users.
- There may be a situation where deployment is done gradually especially for efficient transfer and impact failure on your college.
- More so roll out should be followed by Communicational activities as well as training so that all the users are aware of the new system and how they are to use the same.

#### *Ongoing support and maintenance*

- One valuable advice to the program is that after the DCMS has been deployed, constant backing up and upgrading is imperative that maintains its floppiness.
- It contains features such as user help desk management, performance checking of the system and making modifications and improvements from time to time.
- Automatic The system should also be subjected to other routine activities that include backing up of data and updates to the security systems.

#### *User feedback and improvement*

- The authors conclude that public opinion is important for defining the further development of DCMS and for revealing its weaknesses.
- Colleges should seek feedback from the users frequently and implement such feedback to the regular update of DCMS.
- Such cycles of feedback and amendment are as follows in making certain that DCMS is pertinent and useful in fulfilling the requirements of college communities.

#### **Future developments**

As for updates of the DCMS, the following possibilities are planned in the future: Enlarging the range of the system's possibilities, optimizing it and adapting to the specific requirements of the

communities of different colleges. These developments will build upon advancements in technologies as well as effective practices that seek to advance the means through which related communications, administrative cogwheels, and inter-organizational collaborations are executed within colleges. Here is a brief overview of some potential future developments in DCMS

#### **Potential future developments in DCMS**

##### *Enhanced Communication Features*

- More future enhancements may be expected with additional working divas in the context of DCMS, including actual-time communicating programs for voice and video calls. Communication applications can be linked with virtual and augmented reality interfaces to support features like virtual classrooms interfaces and visually appealing presentations.

##### *Internet of Things (IoT) Integration*

- It integration with Internet of Things devices would allow DCMS to collect data from real-life sensors like smart attendance and Environmental Sensors to make better decisions.
- Something like tracking movements of a specific student within the college or campus can be effectively achieved to enhance on security and utilization of college facilities.
- Enhanced Security and Privacy Features
- Further advancements in DCMS will target strengthening the levels of security as well as the privacy of the users to support the protection and Data Protection regulation.
- This could include some things like; enhanced encryption, two factor, and better ways of controlling accesses.

##### *Enhanced analytics and reporting*

- Features of more complex analytical and reporting capabilities could be built into DCMS to allow for better assessment of the users and their activity, as well as the communication flow and academic results.
- It may assist colleges in making efficient decisions toward operations and learning results for the students.

##### *Enhanced Mobile Experience*

- There are still aspects about DCMS, which can be improved and make it more targeted for mobile devices, for instance, offline capabilities,

push notifications and enhancements of interfaces of the mobile variants.

- This would allow users to get access to DCMS at their own convenience at any time, from any location, and using any device of their choice thus making it more flexible.

#### *Integration with Emerging Technologies*

- DCMS could interface with other advances including, block chain, quantum calculation, and edge figuring to give more functionalities and enhance capabilities.

For example, block chain technology could be used to secure and authenticate academic credentials, while edge computing could improve the speed and efficiency of data processing.

#### **Conclusion**

Colleges have greatly improved their operations through the Dynamic Community Management Systems (DCMS). It helps as a messaging hub, manages administration and boosts cooperation throughout students, faculties and personnel. By doing that, it simplifies daily activities thereby increasing the value of education at college level. In this regard, its future development will revolve around enhancing its functionality through technology adoption for better user experience; hence to meet changing requirements in higher school communities. These changes will reinforce DCMS as an indispensable tool for higher learning institutions, in that they can manage communication, collaboration and administrative procedures within a dynamic global digital landscape.

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