
Knowledge & Information Management in Academia: A User-led approach

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Abstract.

In today's technology-dominated society, data and its various post-processed forms are considered an invaluable asset. Information or Knowledge that's derived from the raw data is of little or no value unless it is actionable. The user who dons multiple hats of author, viewer, and consumer of information hence is the most vital cog in the system. This is even more pronounced in academic institutions where sharing and transfer of knowledge are of prime importance, yet its execution remains extremely challenging. Knowledge Management System (KMS) is the platform deployed to facilitate information sharing and provide a smoother transition of information transfer and integration. Through this journal paper, we propose the development of an IT-enabled academic management platform wherein every feature is planned and designed keeping the user as the centrepiece. By doing so, technology will be the enabler and user the core of the underlying system working in sync with each other to create a seamless and unified interface to manage and control various aspects of learning in an academic institution like quizzes, assignments, regular assessments, and a document repository of learning resources for continual learning and reference. The KMS/LMS module along with other modules such as feedback, academic performance, etc. will be part of an umbrella ERP application providing greater flexibility and opportunities for analysis, engagement, and future scope for modifications that would benefit all the stakeholders who are part of the system.

Keywords. Enterprise Resource Planning, Knowledge Management System, Learning Management System, Information Systems, Explicit Knowledge Introduction

1. INTRODUCTION

Technology today is evolving at a rapid pace and has become synonymous with our everyday lives. From voice commands to set our morning alarm to apps that provide a dashboard view of our monthly spending pattern or academic progress charts, most aspects of our daily routine are technology-led. That being said, we the user form the crux of this ecosystem by generating, updating, and harvesting the humongous amount of data being created for various purposes. Emerging disciplines like data science, artificial intelligence, machine learning, etc. rely on human ability and intuition to sift and sort through the

available data and information to produce actionable insights and present knowledge patterns.

This creates a need for an effective solution that could collect, curate, and combine the information available. Knowledge management (KMS) is the collection of methods relating to creating, sharing, using, and managing the knowledge and information of an organization. It refers to a multidisciplinary approach to achieving organizational objectives by making the best use of knowledge gained.

Knowledge Management becomes even more crucial in academic institutions and other portals of learning where providing effective solutions to the persistent issues of the society through research, innovation, and serving as a pipeline of talent and skilled manpower is of prime importance.

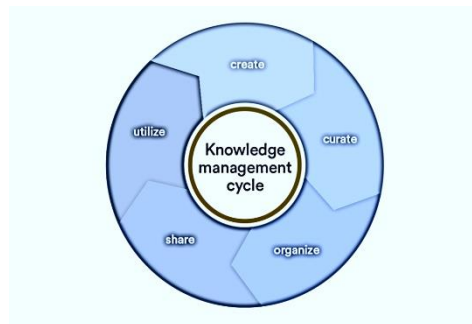


Fig 1.1 Knowledge Management Cycle

Tom Davenport defined Knowledge Management as the process of capturing, distributing, and effectively using knowledge. One of the most important aspects KMS is trying to achieve is rich, deep, and open communication not just internally within an organization but also with the outside world.

The proposed platform intends to be a one-stop shop for all the direct and indirect stakeholders of the academic community serving the various needs of the academic industry and enabling value creation, fostering innovation, and achieving set goals.

The eventual vision or objective of this project is to combine the processes of Knowledge Management with other modules such as the Feedback platform to acquire a deeper understanding of the areas that need to be streamlined and increase the effectiveness and utilization of the KM platform. This not only helps in enriching the KM effectiveness but also aids in improving the overall quality of the academic institution and paves the way to set new standards and benchmarks in learning

2. LITERATURE SURVEY

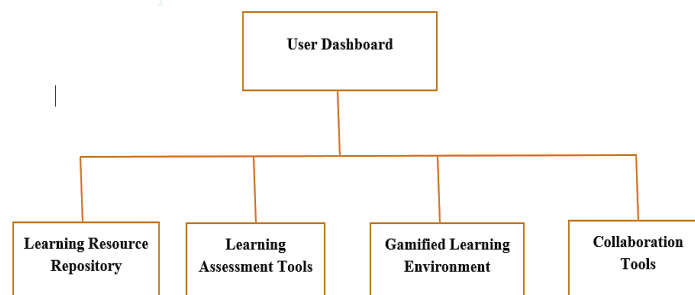
Knowledge Management System is based on the conviction that knowledge is a valuable core asset, and its effective utilization is critical to the goals of the institution. Knowledge constitutes an intangible and concrete asset and is acquired from lessons learned together with new ideas and concepts. As a strategic resource, knowledge requires ongoing

continual assessment of its use through effective and productive management to ensure that it is optimal.

A review by Jose Miguel Baptista Nunes, Saima Kanwal, and Muhammad Arif from the Sun Yat-Sen University, China [1] found that there is a clear awareness in academic circles about the importance of knowledge management more specifically in higher educational institutions. They also concluded that there is a need to include and integrate all stakeholders in an institution rather than just administrative staff.

A conceptual study by Dev Raj Adhikari [2] stated that the application of knowledge management concepts is important in achieving the goal of quality education in an educational institution.

A study of Knowledge Management practices in several higher education institutions across Europe, Asia, and Gulf countries by Nishad Nawaz, Susanne Durst, Hariharasudan A., and Zurabi Shamugia [3] opined that the involvement of academic faculty is crucial in strengthening the effectiveness and quality of universities and underlined the benefits of using integrated knowledge management systems that provide enhanced collaboration, easy accessibility and lead to improvement in knowledge management benefitting internal and external stakeholders.



Dr. Nanjundeswaraswamy T.S and D R Swamy from the JSS Academy of Technical Education in their January 2021 Emerald Insight research article [4] analyzed that favorable organizational cultural factors are essential to establish an efficient KM process in an organization. They also found clan culture to be a major influencing factor in higher educational technical institutions wherein employees were attached through high commitment and loyalty. The employees in such organizations were willing to share information with others and considered leaders of such organizations to be mentors. The employee morale in such organizations was high which directly resulted in positive output.

In this regard, an Enterprise Resource Planning system for academia appears to be a dream come true. These commercial software applications promise the seamless integration of all the information flowing through an institution. By integrating KMS with other systems like feedback modules, the systems can be made more intelligent and insightful.

Thomas H. Davenport in his 1998 Harvard Business Review article [5] noted that ERP systems can deliver great rewards but also carry great risks that can alter the strategic direction of an enterprise. According to him, A speedy implementation of an enterprise system may be a wise business move, but a rash implementation is not.

3. METHODOLOGY

The user database is the foundation of any ERP system on top of which all the other modules are built upon. The user who accesses the application is the most strategic piece of the entire puzzle as every function or purpose undertaken through the different modules of the system is driven by user-initiated action. Hence, we have used a top-down approach in building the application platform with the user serving as the source or starting point. The types of users might be students, Faculty, Administrative staff, etc.

The basic ERP application structure and functional blocks of the KMS application built on top of the user data stack are subdivided into multiple segments as represented below.

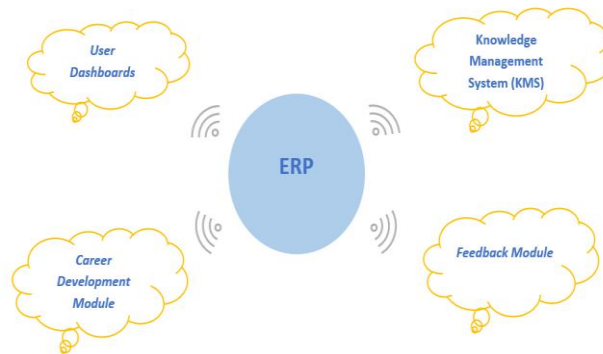


Fig 3.1 Basic structure of the ERP Application

Fig 3.2 Functional block diagram of KMS Module

- Learning Resource Repository: This would house various learning resources shared by faculty like subject notes, PowerPoint slides, e-textbooks, etc. that could be accessed by students for their learning needs.
- Learning Assessment Tools: This would have various tools for the creation of question papers, quizzes, and assignments for continual assessment of a student's learning journey and to track their progress.
- Gamified Learning Environment: This would consist of learning resources that use non-traditional methods like puzzles, trivia, finding the missing block, etc. to stimulate the creative side of the students while at the same time ensuring knowledge transfer of target content.
- Collaboration Tools: We intend to develop an information exchange platform to enable open and seamless communication between various stakeholders of the academic community to exchange ideas and other information worth sharing.

The above avenues of knowledge platform not just allow users to create information or access information shared by other users of the application, which is rudimentary on any data-sharing platform, it also encourages them to collaborate and involve themselves throughout the various phases of the knowledge management lifecycle thereby leading to higher levels of user engagement leading to greater efficiency and quality of knowledge insights generated off the platform.

We also intend to add a credit card-like reward structure by adding bonus points to users for various activities that they perform while accessing the application. This benefits both the user and the academic institution. From a user perspective, it motivates them to be more active and involved on the ERP platform since they get rewarded for the same. The academic institution benefits by allowing users to redeem their accumulated points for academic branded merchandise that would serve as an avenue for advertising, loyalty-building, and creating strong brand ambassadors with no considerable effort.

Furthermore, we plan to include options to share or transfer knowledge between academic institutions through the platform that would broaden the reach and increase collaboration that would mutually benefit the institutions themselves and the society at large.

4. FEATURES OF THE APPLICATION

The users of the application are broadly classified into Student, Faculty, and Administrative Staff. The features and options available would differ based on the category of the logged-in user.

Students: They are the end-users of the application who consume the various types of content created for their educational purposes.

Faculty: Users of this category are the teaching staff of the institution who also serves as the major source of all the data that is created for the students.

Administrator: These users are part of the college management, or the application support staff who manage and monitor the various functionalities of the application.

The various functional modules of the application in its current iteration are as mentioned below:

- **Registration module:** Student users requiring access to the application must navigate to the registration page and submit the form by filling in all the relevant information. Such requests would need approval from the corresponding faculty before they access the application. New faculty accounts are created by the administrator, post which they would be able to log in to the application with the supplied credentials.
- **Login Module:** User accounts that are approved and active can navigate to their respective login page and sign into the application. An option to reset the password is also

available on the login page as well as on the user dashboard.

- **Attendance Module:** This module allows faculty to update daily attendance. Students will be able to view their attendance report with the total number of classes held, classes attended, and classes absent.
- **Notes Module:** Faculty can upload study materials and notes for their subjects. Students will have the option to view the content uploaded by the faculty.
- **Syllabus Plan Module:** Faculty has the option to update the syllabus plan and schedule required days for completion. The same is viewable by the student.
- **Timetable Module:** Faculty and Admin users can schedule a timetable for each course or subject. Students will be able to view the published timetable.
- **Discussion Module:** This feature works like a Q&A platform wherein students can post their academic-related queries. Faculty or other students will be able to respond to the queries posted. This provides an open channel for communication between the students and faculty and aids in the quick resolution of posted queries. This also could be a place for discussions regarding various activities in the institution like cultural fests, technical conferences, social impact events, etc.
- **Feedback Module:** This module allows students to provide their opinion and feedback on academic topics, faculty, and other factors like campus infrastructure, etc. Students have an option to provide a rating as well as add their suggestions or comments that could help the management better analyze and act on the provided feedback.
- **Reporting Module:** This module provides an option to view reports regarding various parameters like attendance, feedback, examination, etc. This could be useful in providing a summarized view of the parameter that the user is trying to analyze and serve as a basis for creating an action plan, if necessary.
- **Quiz/Assignment Module:** This module allows the faculty to create and post quizzes and assignments to be attempted and completed by the students. Faculty will have the provision to set a deadline for the quizzes and assignments to be completed and could also include additional instructions if any.

The various technologies and tools used to develop and implement the ERP application are

as mentioned below:

HTML: An acronym for Hypertext Markup Language, this widely used web page design framework has served as the basis for the development of the application.

Cascading Style Sheets: CSS as its commonly called is the language used to style the web pages and structure the layout of various web pages across the application.

JavaScript: It is one of the most popular programming languages used along with HTML and CSS to develop web pages that are lightweight, dynamic, and provide interoperability.

PHP: It is an efficient server-side scripting language that is very useful when designing interactive and dynamic web pages such as the ones used in this application. It is widely regarded as the most popular language for web development.

MySQL: It is an open-source relational database management system. MySQL supports multiple OSes like Linux, Windows, Mac OS, etc. It is commonly used with PHP to create dynamic, fast, and powerful web-based enterprise applications. MySQL is popular as it is faster and has the ability to handle large data sets.

The database of the current version of the application is organized into the following tables:

- Admin
- Attendance
- Course
- Discussion
- Exam
- Faculty
- Feedback
- Notes
- Student
- Subject
- Timetable

5. CONCLUSION AND FUTURE SCOPE

We live in a world that is transitioning from a connected world to an age of augmented reality where the lines between virtual and real-life which are already blurry will be present yet invisible. Artificial Intelligence, Semantic Web, Cloud databases, big data, etc. are the technologies characterizing the next evolution of the way information will be used and handled that not only affects our digital world but also our reality.

The proliferation of metaverse and the flexibility it offers by allowing environments to be viewable on any device, be it a smartphone, wearables, etc., and the industry 4.0 that's been collecting a humongous amount of data for years combine to create immersive experiences and a more engaging user experience. Communication technologies like 5G and satellite links are ready to deliver the required bandwidth to ensure a smooth experience.

This convergence of various technologies and the user at the epicenter of it is the emergence of a new wave that could bring about a paradigm shift in the way we perceive real life. But all this is just the beginning of an era of experimentation that holds the key to unlocking new solutions and a better way to do things and where better than portals of learning as a testbed for it all.

From being a plain jane, IT-enabled Academic Management System to a whole suite of applications that can keep up with the industry trends, the opportunities are limitless. While Web 1.0 to 3.0 was focused on improvising communication, Web 4.0 will be all about collaboration. Considering the infinite churn of fresh minds that happens in academia, innovation is just the tip of an iceberg.

The future is all about the convergence of data availability and the genius of the user making optimal use of it to create something stunning. As a wise man once quoted "Too often we forget that genius, too, depends upon the data within its reach, that even Archimedes could not have devised Edison's inventions."

6. RESULTS

All the modules of the current iteration of the application are working fine after software design, development, implementation, and testing. Snapshots of the ERP homepage and backend database tables are as mentioned below.

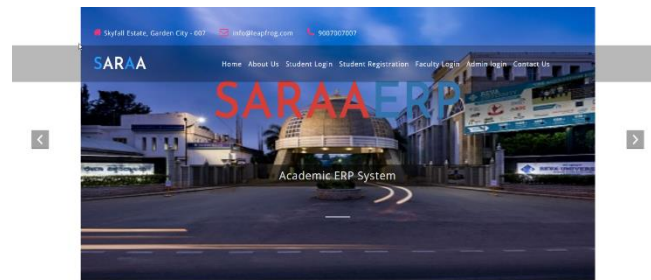


Table	Action	Rows	Type	Collation	Size	Overhead
admin	Browse Structure Search Insert Empty Drop	3	InnoDB	latin1_swedish_ci	16.0 K18	-
attendance	Browse Structure Search Insert Empty Drop	9	InnoDB	latin1_swedish_ci	16.0 K18	-
course	Browse Structure Search Insert Empty Drop	6	InnoDB	latin1_swedish_ci	16.0 K18	-
discussion	Browse Structure Search Insert Empty Drop	28	InnoDB	latin1_swedish_ci	16.0 K18	-
discussion_reply	Browse Structure Search Insert Empty Drop	25	InnoDB	latin1_swedish_ci	16.0 K18	-
exam	Browse Structure Search Insert Empty Drop	3	InnoDB	latin1_swedish_ci	16.0 K18	-
exam_result	Browse Structure Search Insert Empty Drop	42	InnoDB	latin1_swedish_ci	16.0 K18	-
faculty	Browse Structure Search Insert Empty Drop	1	InnoDB	latin1_swedish_ci	16.0 K18	-
feedback	Browse Structure Search Insert Empty Drop	13	InnoDB	latin1_swedish_ci	16.0 K18	-
notes	Browse Structure Search Insert Empty Drop	38	InnoDB	latin1_swedish_ci	16.0 K18	-
student	Browse Structure Search Insert Empty Drop	2	InnoDB	latin1_swedish_ci	16.0 K18	-
subject	Browse Structure Search Insert Empty Drop	7	InnoDB	latin1_swedish_ci	16.0 K18	-
timetable	Browse Structure Search Insert Empty Drop	98	InnoDB	latin1_swedish_ci	16.0 K18	-
13 tables	Sum	268	InnoDB	utf8mb4_general_ci	288.0 K18	0 B

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