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UniConnect: An Interactive Digital Learning System

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Abstract

This research paper presents UniConnect, an innovative interactive learning system designed to revolutionize the traditional teacher-student interaction within educational institutions. The aim of UniConnect is to seamlessly integrate pedagogical learning methodologies with a comprehensive university management system, thereby enhancing the educational experience for both students and educators.

The methodology employed in developing UniConnect involved a systematic approach, combining extensive research on educational theories and practices with advanced technological frameworks. Leveraging modern software engineering techniques and user-centric design principles, UniConnect was meticulously crafted to cater to the diverse needs of contemporary educational environments.

The results of implementing UniConnect have been promising, demonstrating significant improvements in teacher-student engagement, academic performance, and administrative efficiency. By incorporating features such as student assessment tools, attendance management systems, and gamification of learning, UniConnect has successfully transformed traditional classroom dynamics into dynamic, interactive learning experiences.

In conclusion, UniConnect represents a ground-breaking advancement in educational technology, offering a multifaceted solution to the challenges faced by educational institutions in the digital age. Through its innovative approach, UniConnect not only bridges the gap between teacher-student interaction and university management but also paves the way for a more engaging, efficient, and effective learning environment.

Introduction

In the realm of higher education, the winds of change have never blown so briskly as they do today. As advanced technologies are integrated into the learning ecosystem, traditional teaching, management and learning skills are being questioned or even eliminated altogether. This change is especially evident in the integration of the university management system and teaching methods that are important for interactive learning. This literature review aims to provide a comprehensive study of this positive interaction and see its impact and potential for change in today's education. The following are the main points from the literature review. Digital transformation of higher education has brought unprecedented opportunities and challenges. Originally developed as a management development project, university management has evolved into multi-platform, touching nearly every aspect of the organization's operations. From managing registration and appointments to student information and financial aid, this system has revolutionized the way people manage their businesses. Digitizing this system is not only efficient, but also opens up a lot of information, providing new insights into student performance and productivity. At the same time, modern education is supported by the necessity of teaching - interactive co-learning. Pedagogy is not limited to traditional classrooms but has expanded its horizons to include online and blended learning environments. Interactive learning includes collaborative work, simulations, gamification, and adaptive learning; It emphasizes collaboration,

personalization, and the development of positive thinking. Differentiating from the traditional disciplinary model, it offers students a quality and effective education that meets the needs of the digital age. There is a possibility of an intersection between these two major changes. The integration of university management and networking is more than simply the intersection of management and innovation; It represents a revolution in the way schools create, deliver and manage learning. Through this review, we seek to set the context for this integration and uncover the mechanisms through which university management facilitates communication while increasing administrative efficiency. In addition, we review empirical evidence and real-world case studies that demonstrate the transformative potential of collective action. As schools grapple with the challenges and opportunities presented by the digital age, understanding the relationship between university management and interactive communication is vital to determining the future of higher education. In a changing environment in higher education, the integration of technology and teaching experience has led to changes in teaching and administration. The integration of university management systems with interactive learning systems has become a powerful force in modern education. With the growth of digital technology and increased student learning, schools are turning to new systems to improve operational management while enhancing learning. This review clarifies the relationship between university governance and academic interaction, reveals their importance, and sheds light on their transformative potential when integrated. As schools strive to meet the needs of technology-savvy students, this review aims to identify trends in university management and interactive learning, providing insights into their unity and major impact on the future of higher education.

The research questions (RQs) of this study are as follows:

RQ1: What is the role of interactivity for digital education?
RQ2: Which are the different categories of interactive digital learning?
RQ3: How can we make digital learning interactive?
To solve the above problems, we conducted a literature review using the terms ‘College Digital Learning’, ‘Pedagogical Learning’, ‘Gamification of Learning’, ‘Virtual Classroom’, ‘Interactive Learning’ and ‘ERP’ research. TAK (Title, Abstract and Keywords) criteria were used in examining the articles. Brief information is divided into several categories to provide a better understanding of the research field.
The research objectives (ROs) of the paper are as follows:
RO1: Define the problem of interactive digital education.
RO2: Distribute digital works to understand current research topics.
RO3: Describe different methods for interactive learning.

The introductory chapter sets the stage for delving deeper into interactive digital learning through the subsequent chapter, which will conduct a comprehensive literature survey. This survey aims to explore existing research, theories, and perspectives pertinent to this study's focus. Through the literature survey, we aim to unearth insights, identify gaps, and lay the groundwork for our own contributions to the project.

Survey
Figure 1 shows the various stages of the study. The first stage focuses on identifying differences between categories and subcategories related to the project. The second phase focuses on identifying the different categories and subcategories of the first phase of research. Finally, in the third stage, the problems faced by categories and subcategories are discussed.

Figure 1: Research Methodology

This Study considers five significant areas as i) College Management System, ii) ERP ,iii) Interactive Learning, iv) Pedagogical Learning, v) Virtual Classroom, followed by research gap identification.

COLLEGE DIGITAL LEARNING

A College Digital Learning System, is a software solution that acts as a digital framework for schools. It is designed to make administration and education easier and more accessible by providing centralized management and efficiency in managing the day-to-day operations of colleges and universities.

In essence, a warehouse for students. information. Collects and stores detailed information including students' personal information, academic history, contact information and records. This feature simplifies the admissions, enrollment and registration process, making it easier for schools to manage their students. It also plays an important role in classroom management. It facilitates the creation and management of courses, academic calendars and course schedules. Teachers can use the system to organize learning materials, including lessons, assignments, and grade rubrics. This enhances the learning process and ensures that students and teachers are aware of important content in the classroom. It is easy to manage personnel information in the work of teachers and personnel management. Assists in recruitment, financial management, engagement and performance evaluation. Teacher schedules and schedules can also be effectively managed through the system to ensure efficient allocation of resources.

Another important part of this is attendance tracking. Teachers can use the system to record and track student attendance, providing valuable tools for assessing student attendance and enforcing attendance policies. Financial management is another aspect involved. It helps manage a company's finances, including billing, tracking expenses, budgeting, and financial reporting. This financial transparency is important for schools to be financially responsible and accountable. Additionally, many solutions today include online learning management. They integrate seamlessly with learning management systems (LMS) to support online courses, deliver content, test and grade in a digital learning environment. This integration supports the school's ability to deliver a differentiated and flexible learning experience.

In addition to these important functions, university digital education often includes communication tools to facilitate interaction between students, teachers and leaders. Messaging and notification features enable effective

communication in the learning community. It also has the ability to publish, analyze, generate reports and insights on student performance, homework productivity, and financial health. These data insights enable organizations to make informed decisions and continuously improve their operations. Security and data privacy are key concerns, and solutions include access control mechanisms to protect sensitive data. They restrict data access to authorized users and ensure the integrity and confidentiality of corporate data. Finally, the university's digital education system is a versatile tool that enables schools to operate efficiently, deliver quality education and adapt to the changing needs of the digital age. It promotes collaboration, transparency, and data-driven decision-making, making it a key asset for colleges and universities around the world.

ENTERPRISE RESOURCE PLANNING

Enterprise Resource Planning (ERP) is an integrated software system designed to simplify and optimize the management of various business processes in an organization. It works as a framework that connects different departments, functions, and operations, making it easier to share information and collaborate instantly. At its core, ERP software enables the integration of an organization's information and processes. Finance, HR, manufacturing, inventory management, supply chain, customer relationship management (CRM), etc. It includes various functions such as. ERP integrates these functions into a single system, allowing businesses to eliminate information silos and gain a complete view of their operations. One of the key benefits of ERP is the ability to optimize and improve business processes. This automation reduces data entry, reduces errors and streamlines daily operations. For example, it can improve financial processes such as accounting, budgeting and payments to ensure regulatory compliance and accuracy.

Additionally, ERP systems provide decision makers with instant access to information and analysis. This allows organizations to make informed decisions, improve resource allocation, and respond quickly to business changes. Transparency is also increased as relevant information and reports can be accessed by stakeholders at all levels. ERP applications are highly customizable, allowing organizations to customize the software to their specific needs and business needs. Whether a business operates in manufacturing, retail, healthcare or other industries, ERP can be customized to fit specific processes and operations. At its core, ERP is a powerful tool that allows organizations to increase efficiency, reduce costs, increase customer satisfaction and maintain competitive advantage. It works as an asset that supports growth and adaptability, helping companies navigate the complexities of today's business world.

INTERACTIVE LEARNING

Virtual classroom is a new digital learning environment that moves the traditional classroom online. It uses technology to connect teachers and students in a virtual environment, enabling instant communication and learning regardless of location. Essentially, it replicates many aspects of the physical classroom, such as live teaching, discussions, assignments, and assessments, all done online. The basis of the concept in the virtual classroom is only on-time or synchronous learning. Teachers can conduct live lessons through online conferencing or video conferencing tools, allowing students to participate, ask questions, and interact as if they were physically present. This interactive theme enhances the learning experience by encouraging participation and instant feedback.

In addition to live meetings, virtual classrooms often include a variety of digital resources and tools to support learning. These features may include multiple presentations, collaborative whiteboards, interactive capabilities, and the ability to share information. These features create a rich, multimedia-focused learning environment that makes learning different. The main advantage of virtual classrooms is their convenience. It provides an easy way for people to receive education and training, adapt to different times, and allows people to balance learning with other activities. Additionally, virtual classrooms overcome geographical barriers, making education accessible to a global audience.

Virtual classrooms have proven invaluable in the context of traditional schools and corporate training. They offer versatile and scalable solutions to deliver content, increase engagement, and measure learning outcomes. As technology continues to advance, virtual classrooms are expected to play an even more important role in future education and career development.

PEDAGOGICAL LEARNING

Pedagogical learning, often referred to as pedagogy, is an important subject in education that focuses on art and teaching. It includes a variety of teaching strategies, methods, and theories that teachers use to promote effective and meaningful learning for their students. At its core, teaching learning focuses on how students transmit, absorb, and retain information in a variety of learning environments. The word "pedagogy" comes from the Greek word "paidagogos" meaning servant who leads and educates children. It has also been turned into a comprehensive training program that includes the teaching methods used by teachers as well as the principles that carry this process. Learning to teach involves intellectual, social, emotional and cultural aspects of learning; It recognizes that good teaching requires a deep understanding of how students learn and develop.

One of the basic concepts of teaching and learning is that learning should be student-centered. This approach places students at the center of the learning process, including their own needs, interests, and prior knowledge. Effective teaching is about creating an integrated and supportive learning environment that encourages student engagement, critical thinking, and participation. Teaching to learn is not limited to a single teaching method; but it involves different types of teaching. Teachers may use methods such as lecture, group discussions, problem-based learning, project-based learning, and experiential learning, depending on the learning goals and the nature of the content shown.

Additionally, teaching learning extends beyond the classroom and formal learning environment. Online education is relevant to many topics, including workplace training and lifelong learning. As educational practices continue to evolve with advances in technology and our understanding of knowledge, critical learning is vital for educators and professionals. Design instructional research, adaptations, and improvements to ensure that students of all ages achieve quality and meaningful learning outcomes.

VIRTUAL CLASSROOM

Virtual classroom is a digital platform that revolutionizes teaching and learning. It represents a powerful, interactive online environment where teachers and students can engage in instant, collaborative learning even when they are physically apart. Fundamentally, it is a new response to the growing need for flexible learning and access in a continuous world. Central to the concept of the virtual classroom is the ability to replicate many aspects of the traditional physical classroom in a digital environment. Teachers can use web conferencing tools to host real-time meetings, deliver lessons, stimulate discussions, and interact with students just like them. Although participants are geographically isolated, the current engagement encourages participation, immediate feedback, and a sense of presence.

Additionally, virtual classrooms often include a variety of digital tools and resources to support learning. These features will include multimedia presentations, collaborative whiteboards, interactive capabilities, and the ability to share information, ensuring a quality and diverse learning experience and leading to diverse learning outcomes.

The main advantage of the virtual classroom is its simplicity. They make education accessible to people with different schedules and commitments by providing ease of access to education and training from anywhere with an internet connection. Additionally, virtual classrooms eliminate geographic barriers, enable schools to reach a global audience, and encourage lifelong learning. In both traditional schools and corporate training classrooms, virtual classrooms

have become an effective way to deliver content, encourage participation, and measure the effectiveness of learning. As technology continues to advance and adapt to the changing needs of educators and students, virtual classrooms will play an increasingly important role in the future of education, learning, and professional development by providing a diverse and comprehensive platform for effective teaching and learning.

Details of the research articles are included in the table below.

Sr. No	Publication	Year	Country	Category	Issues
1.	Shwetali Bhor, Wasudeo Rahane , Akanksha Sonar,Vaishnavi Belkire, Prajakta Nawale	2022	India	College Digital Learning	The management system can have an android app as the generation of smartphones is here.
2.	Ankit Sood	2020	India	College Digital Learning	System is provided high amount of accuracy and quick data generation
3.	Vaishnavi Patel, Sakshi Bhagwat, Shreya Ashtikar, Sakshi Kumbhare, Sharayu Deote	2023	India	College Digital Learning	In future system can include online fees collection, online admission procedure, and good backup facility.
4.	Aditya Shelar, Sudarshan Sawant, Abhishek Pacharne, Sahil Tike, Prof. Dipali M. Mane	2023	India	College Digital Learning	There is no design deep learning network structure, use adaptive learning rates and train on clusters of data rather than the whole dataset.
5.	Siddhesh R. Kumbhar, Prajakta Kambali, Shubham Morajka	2022	India	College Digital Learning	Having storage and huge backup
6.	Dr. Ritesh Patil1 , Vaishali Gentyal3 , Vaishnavi Mudaliar4 , Gauri Kanpurne5 , Devyani Ambi	2022	India	College Digital Learning	There will be different permissions to the admin and faculty.
7.	Chunmei Yu, Yun Wang	2022	China	College Digital Learning	Overall statistical status of data information.
8.	Dhanawade Phulabai Pandurang1, Mohite Damini Maruti2 , Sakhare Dipali Balu3 , S. T. Shirkande	2020	India	College Digital Learning	These types of CMS are already available in our markets, but it does not have the feature that we are providing to our college.
9.	Prithviraj Jain,1 , Powdan Jain K2 ,PranavSharma P	2020	India	College Digital Learning	We can customise the features and convert it to online system

	C3 , Prasanna P Hegde4 , Raghoottam Katti				
10.	By Jinhua Liu , Caiping Wang, and Yanhua Wu	2021	China	College Digital Learning	We can further optimise the information storage mode, query mode, and resource management, in order to conduct accurate query in the case of complex data.
11.	Avinash Gutte, Nikhil Kate , Ajay Raj Hulikere and Shrikant Kokate	2020	India	College Digital Learning	Appropriate use of ERP technology to fit their defined business needs and objectives.
12.	A. Suraj Kumar1, Y. Naga Surya Kiran2, P. Sirisha3, CH. Srinivas4, Sheik Gousia Begum	2020	India	College Digital Learning	Additional future can be added like online assignments submission and evaluations, online multi chat application for better scope.
13.	Mohd Abid Ur Rehman, Sayeed Bin Osman, Mohd Wasif Ur Rahman, Dr. Pathaan Ahmed Khan	2022	India	College Digital Learning	Future enhancement for an ERP system for college management could be the integration of artificial intelligence (AI) and machine learning (ML) technologies. This could involve the use of predictive analytics to forecast student enrollment and identify patterns in student behaviour and performance.
14.	Harshvardhan Shingade, Viraj Shedge, Suyog Bhise, Abhinay Salve	2022	India	College Digital Learning	These types of CMS are already available in our markets, but it does not have the feature that we are providing to our college.
15.	Shwethashree A, Bapuram Ramesh Rohith, Harshitha KG, KA Anusha, Keerthi H	2022	India	College Digital Learning	This system can fully be automated with existing system. It can also be developed on mobile mode.
16.	P. SUBHA,I.FEFINA, C.NIRANJANA DEVI,S.SURUTHIKA,K . SUSHMEENA	2022	India	College Digital Learning	More options are added to improve the performance of this process and to elaborate the college process fully automated.
17.	O.Swetha, I.Thrinesh, D.Madhu Babu	2021	India	College Digital Learning	A lot of features and functionalities that can be integrated in the proposed system, but the project scope has been limited to diligently resolve the problems as identified in the problem areas

18.	Rohit Jain, Aman Modi , Ishan Kashyap, Prof. Vandana Kate and Prof. Rachana Bahrawat	2023	India	College Digital Learning	Challenges such as resistance to change and the cost of implementation must be addressed to ensure the successful adoption and utilisation of CMS in colleges.
19.	Mr. Adith S. , Mr. Ajai Pranesh M. , Mr. Gunaseelaraman, Mr. Siva Kumar S. , Mr. Hemananth B.	2020	India	College Digital Learning	The system can be further developed and automated.
20.	Alvi H. A, Barate P. R, Siddhanath K. R, Prof. Suryawanshi A. P	2021	India	College Digital Learning	The main functionality such as ENTERING AND RETRIEVING of the attendance in the CMS will not be provided by the Companies who had developed the project earlier.
21.	Al-Amin Md., Md. Hossain T., Md. Islam J. & Biwas S.K.	2023	Europe	ERP	We can further implement this project on cloud computing
22.	Sreekumar A. Menon, Marc Muchnick, Clifford Butler & Tony Pizur	2019	US	ERP	Design, development, testing, and building of such complex interfaces are time-consuming.
23.	Florie Bandara, Uchitha Jayawickrama Maduka Subasinghage, Femi Olan	2023	US	ERP	Increased complexity of business processes and extended supply chains
24.	Ariya Pakinee & Kitti Puritat	2021	Thailand	ERP	Effect on engagement and motivation
25.	Arjun Reddy Kunduru and Ravikiran Kandepu	2023	USA	ERP	Data integrity and data retrieval becomes slow
26.	Md. Aftab Uddin, Mohammad Sarwar Alam, Abdullah Al Mamun, Tohid-Uz-Zaman Khan and Ayesha Akter	2019	Bangladesh	ERP	Data collection procedure poses several constraints,
27.	Mohammad Amini Valashani1, Arnold Mashud Abukari2	2020	Iran	ERP	Further implement this project on cloud computing
28.	Nikhitha Yathiraju	2022	Kentucky	ERP	Process of integrating AI into their cloud-based ERP and SaaS systems.

29.	Arif Razzaq, Siti Azirah Asmai, Mohammed Saad Talib, Nihad Ibrahim, Ali A. Mohammed	2020	Iraq	ERP	To introduce cloud-based ERP systems to meet the needs of SMEs.
30.	Alessio Faccia, and Pythagoras Petratos	2021	UK	ERP	lack of empirical data.
31.	Bo Zhao and Chunlei Tu	2021	China	ERP	Defects and problems that occur in the process of its application can be improved.
32.	Muhammad Isa Lufti, Rizaldi Mu'min, Jakfat Haekal	2022	Malaysia	ERP	Improvements to prevent threats
33.	Teodora Mirjana Marić Ivanović,	2021	Serbia	ERP	To use the latest ERP systems
34.	Mohammad Sarwar Alam, Md. Aftab Uddin	2019	Banglade sh	ERP	Resistance to change and effort expectancy are significantly associated with adoption and implementation of an ERP system
35.	Cruz-Torres, Alvarez-Risco Aldo	2021	Peru	ERP	Increased in performance
36.	Vijay Prakasha,, Claudio Savagliob , Lalit Gargc , Seema Bawaa and Giandomenico Spezzanob	2022	Malta	ERP	Edge computing reference architecture-based ERP system
37.	Moutaz Haddara, Sara Gøthesen, Marius Langseth	2022	Norway	ERP	customization, reliability issues, data security risks
38.	Nizar Mohammad Alsharari	2022	US	ERP	We can use cloud computing for better performance.
39.	The Author(s)	2023	Spain	Pedagogical Learning	The lecturers' inexperience, which may distort student opinions
40.	Indonesian Journal of Research and Educational Review	2022	Indonesia	Pedagogical Learning	Implementing on a larger scale
41.	EPRA International Journal of Multidisciplinary Research (IJMR)	2022	Philippin es	Pedagogical Learning	The educator's preparation time is disproportionate to the usefulness of the method
42.	International Journal of Learning, Teaching and Educational Research	2021	Slovakia	Pedagogical Learning	It requires more preparation time on the part of the
43.	LUMEN Publishing	2023	Turkey	Pedagogical Learning	Design challenges

44.	The Author(s)	2023	Algeria	Pedagogical Learning	the extreme lack of content gamification.
45.	Atlantis Press SARL.	2021	Indonesia	Pedagogical Learning	Lack of scientific mapping, meta-analysis, and bibliometric studies
46.	MDPI	2022	Switzerland.	Pedagogical Learning	standardised validation and evaluation tools need to be developed,
47.	MDPI	2023	Switzerland.	Pedagogical Learning	most of the studies reviewed are from Western countries, since these countries have greater access to technology and connectivity, which may limit the applicability of these findings to other cultural contexts.
48.	Participatory Educational Research (PER)	2019	Turkey	Pedagogical Learning	More research would be needed to identify and disseminate good practices of gamification across different educational settings.
49.	Frontiers	2022	Hong Kong	Pedagogical Learning	limited by small sample size and scope of the classroom observation.
50.	Master Thesis within Business Administration	2020	Sweden	Pedagogical Learning	TIme consuming for the teaching staff
51.	Informa UK Limited	2021	UK	Pedagogical Learning	limitation is the small number of game attributes such as points, badges and leader-boards
52.	Graduate Research and Creative Practice	2022	USA	Pedagogical Learning	the number of classes observed was too small of sample size to fully answer the research question because of low statistical power.
53.	Journal of Advances in Education and Philosophy	2022	United Arab Emirates	Pedagogical Learning	Limitations on obtaining reliable results on tailored gamified educational environments
54.	Scientific Research Publishing Inc.	2022	USA	Pedagogical Learning	Limited number of participants to gather data

55.	Springer Science+Business Media	2021	Thailand	Pedagogical Learning	The limitation of subjects
56.	Springers	2022	UK	Pedagogical Learning	Lack of Design effective tailored gamified educational environments
57.	Butuan Central Elementary School – SSES	2022	Philippines	Pedagogical Learning	limited to the examined studies in terms of the number of participants, levels of education, and design
58.	UIKTEN	2020	Saudi Arabia	Pedagogical Learning	Limitation on design aspect
59.	Contemporary Educational Technology	2023	SAUDI ARABIA	Pedagogical Learning	Lack of focus on cognitive, personal and social skills among science education students
60.	Journal of Technology and Science	2022	Peru	Pedagogical Learning	Limitation to the analysis of the student performance
61.	E-Learning and Digital Media	2019	Netherlands	Pedagogical Learning	Limitation on subjects to be tested for students
62.	Smiderle et al. Smart Learning Environments	2020	Brazil	Pedagogical Learning	It is not reasonable to generalise the results for the whole student population.
63.	International Journal of Interactive Mobile Technologies	2021	Indonesia	Pedagogical Learning	The study is limited to data collected from a single university.
64.	International Journal of Information Engineering and Electronic Business	2022	Indonesia	Pedagogical Learning	It is limited to the relationship between the three variables.
65.	Khaldi et al. Smart Learning Environments	2023	Algeria	Pedagogical Learning	Lack of validation of the proposed gamification approaches through statistical analyses.
66.	J. Krath et al	2021	Germany	Pedagogical Learning	Evaluation is based on the popularity of various theoretical foundations.
67.	IAIC Transactions on Sustainable Digital Innovation (ITSDI)	2021	Indonesia	Pedagogical Learning	The study lacks variety with a very small amount of research subjects.
68.	Journal of Educational Technology & Online Learning	2023	Tanzania	Virtual Classroom	Lack of interaction and engagement between the teachers and students
69.	International Journal of Engineering Applied Sciences and Technology	2020	India	Virtual Classroom	Does not provide hands on experience as required in some subjects/ courses
70.	ANNALS OF FOREST RESEARCH	2023	Saudi Arabia	Virtual Classroom	The sample of this research is limited to teachers of a particular region
71.	Hindawi Mathematical Problems in Engineering	2023	China	Virtual Classroom	Lack of research factors influencing the students experience in virtual classroom

72.	ResearchGate	2021	MALAY SIA	Virtual Classroom	Since virtual classrooms require the instructor and the students to be in the same space in real time, internet bandwidth and background noise can be the challenges faced by the users in which it may cause loss in focus
73.	ResearchGate	2022	India	Virtual Classroom	Limitation on the use for multiple platform
74.	Frontiers in Communication	2021	United States	Virtual Classroom	Lack of opportunities of cultivating communication skills
75.	International Research Journal of Modernization in Engineering Technology and Science	2023	India	Virtual Classroom	Lack of features for interaction and engagement between teachers and students
76.	Indian Journal of Pharmaceutical Education and Research	2020	India	Virtual Classroom	Limitation to transfigure student from dependent into independent learner who can interconnect with their instructors and peers
77.	International Research Journal of Engineering and Technology (IRJET)	2022	India	Virtual Classroom	Limitation with respect to its User interface
78.	J Hum Ecol	2020	South Africa	Virtual Classroom	Lack of socialisation with teachers and other students and that motivates the students to engage with one another
79.	Informa UK Limited	2022	MALAY SIA	Virtual Classroom	Lack of competence and skills
80.	Springer	2021	USA	Virtual Classroom	Lack of interest with in the students
81.	MDPI	2022	USA	Virtual Classroom	Virtual classroom lacks hands on experience as required in some subjects/ courses
82.	TEM Journal.	2022	Thailand	Virtual Classroom	Lack of features for interaction and engagement between teachers and students
83.	Creative Commons License	2022	Netherlan ds	Virtual Classroom	Lack of socialisation with teachers and other students and that motivates the students to engage with one another
84.	Mohit Shridhar, Xingdi Yuan, Marc-Alexandre Côté, Yonatan Bisk, Adam Trischler, Matthew Hausknecht	2021	USA	Interactive Learning	Lack of Comparative Analysis, Limited Evaluation Scenarios: The conclusion mentions zero-shot generalisation to embodied tasks in the ALFRED dataset.
85.	Yosa Novia, Muhammad Zaim, Yenni Rozimela	2022	Indonesia	Interactive learning	While the research discusses problems in implementing interactive learning, it

					does not offer potential solutions or strategies for addressing these issues.
86.	Jirarat Sitthiworachart , Mike Joy and Héctor R. Ponce	2023	Switzerland	Interactive learning	The Paper mentions quantitative and qualitative analyses but does not provide specific details about the methodology, sample size, or data collection methods used.
87.	Leire Ugalde , Maite Santiago-Garabieta , Beatriz Villarejo-Carballido	2021	Spain	Interactive learning	The research paper mentions 17 selected scientific articles, but it does not provide information on the total number of articles reviewed or the criteria used for selection.
88.	Faiz Tuma	2021	USA	Interactive Learning	This research paper mentions that technology can enhance engagement and participation, but it does not discuss the effectiveness of specific technology applications or provide evidence of their impact on learning outcomes.
89.	Subhechha Majumdar and Tanmay Bhowmik	2022	India	Interactive learning	Interactive tools also cannot do anything to make that course interesting to that student. This constraint was not considered in this study.
90.	Dr. Bhawna Sinha	2022	India	Interactive learning	The paper assumes access to mobile devices and reliable wireless networks. Not all students or educational institutions may have access to the necessary technology, potentially exacerbating existing disparities

Table 1: Literature Survey

Category wise and year wise publication of these 90 papers is shown in Figure 2 and 3, respectively.

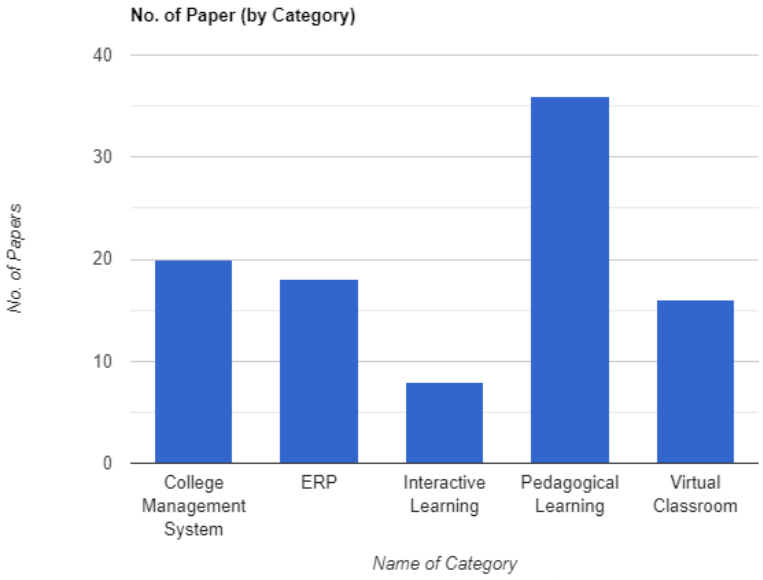


Figure 2: Category wise number of papers

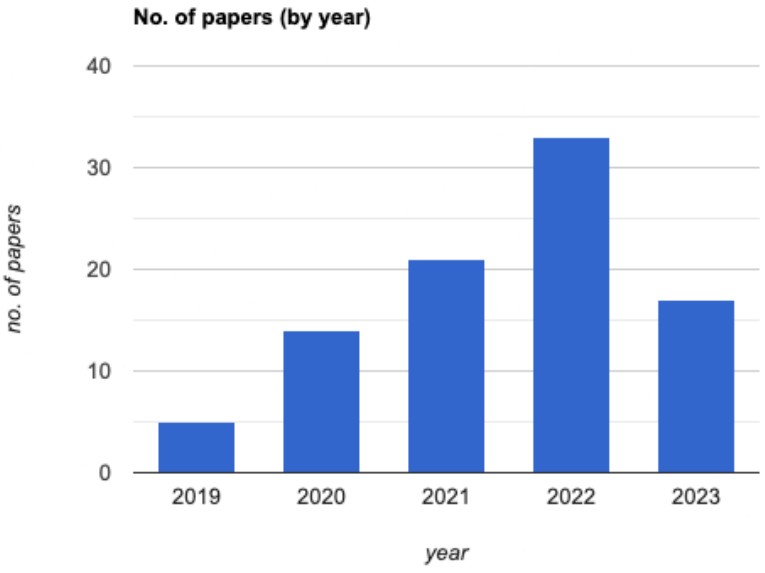


Figure 3: Year wise number of papers

FINDINGS

Based on the data analysis discussed in the previous section, it is clear that there are different research methods in existing digital studies. Below is a summary that provides new directions for research.

Impact of Technology: Examine the impact of new technologies (e.g. artificial intelligence, blockchain, Internet of Things) on academic discussions of university administration. Evaluate whether these technologies are effective or ineffective and their effectiveness in improving student performance and engagement.

User-centered design in systems development: Explore the degree of application of user-centered design principles in system development to create a school management system with interactive learning functions. Identify differences in user input, feedback, and usability testing that may impact performance.

Data Privacy and Security: Examines specific data and security issues faced by organizations that interact with school administration. Identify weaknesses in existing security systems and policies that make student and home data vulnerable to attack.

Effectiveness of Gamification: Examine the effectiveness of gamification concepts in interactive communication and university management. Determine if there is a research gap in understanding which gamification strategies produce the best results in terms of student engagement and learning outcomes.

The literature survey serves as a critical foundation upon which the forthcoming methodology chapter will be built. Through an extensive review of existing research, theories, and methodologies relevant to this study's objectives, we have identified key insights and established a framework. As we transition into the methodology chapter, we will outline the specific approach, methods, and procedures that will guide our empirical inquiry for interactive digital learning.

Materials & Methods

In the modern educational landscape, the integration of technology has become indispensable, facilitating efficient management of academic processes and enhancing learning experiences. To address the evolving needs of education, this research paper proposes the integration of pedagogical learning features within the College ERP system, aiming to foster active engagement and personalized learning experiences for students. It begins with a user-friendly login page, providing access to three distinct modules: Teacher Login, Student Login, and Admin Login. Upon logging in, teachers gain access to a range of features aimed at enhancing pedagogical practices. Teachers can create educational games tailored to specific learning objectives and student needs. These games serve as interactive learning tools, promoting active participation and knowledge retention among students. Additionally, teachers can monitor student progress, assess learning outcomes, and provide personalized feedback through the integrated analytics dashboard. Students accessing the system enter into an immersive learning environment enriched with gamified educational content. Upon login, students can explore and engage with the games created by their teachers. These games are designed to complement traditional teaching methods, fostering a dynamic and engaging learning experience. Students can track their performance, receive instant feedback, and collaborate with peers through interactive features embedded within the system. Administrators possess comprehensive control over the College ERP system, overseeing user management, system configurations, and data analytics. Admins can create and manage teacher and student accounts, assign roles and permissions, and customize the platform to align with institutional objectives. Additionally, administrators can generate reports and insights derived from the system's data analytics capabilities, facilitating informed decision-making and continuous improvement initiatives.

The proposed system, UniConnect, is an innovative and interactive learning platform designed to revolutionize the way students learn and teachers teach. Integrating technologies with pedagogical principles, UniConnect aims to enhance student-teacher interaction, streamline administrative workflows, and provide a dynamic and engaging learning experience for all stakeholders.

PEDAGOGICAL LEARNING

Pedagogical technology of multi-level education allows you to create pedagogical conditions for the inclusion of each student in activities corresponding to the zone of his development. The need to use this technology is due to the fact that students with different levels of training come to vocational education. In the educational process, the teacher deals with individuals who have different inclinations, interests, needs and motives, temperament features, properties of thinking and memory. Teachers acquire knowledge of various pedagogical approaches for two purposes: to comprehend the experiences of their pupils and to create lessons that are more impactful. In this project, we have implemented one of the approaches of pedagogical learning that is gamification of learning.

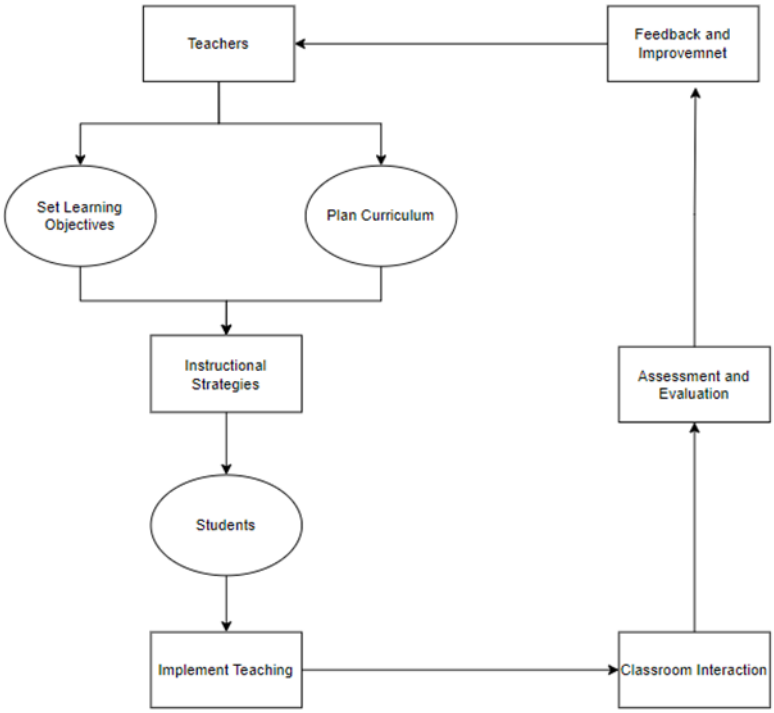


Figure 4: Pedagogical learning

ADMIN

Keywords: Dashboard, Classrooms, Teachers, Students, Assignments, Account

The admin is the hub of the project, where registration and all the details happen. First, we have our dashboard, where we can see a summary of the entire project, including the number of teachers, students, classrooms, and administrators. Teachers and students each have their own login. Every action within the system is under the admin's authority. They can read or alter the information as needed, and they can obtain specifics on every student and teacher. The administrator can make changes to the profile as needed and has access to his own account. The administrator has the ability to add or modify teachers and students, as well as see their activity. Through adaptive learning algorithms and individualized learning paths, students can progress at their own pace and focus on areas where they need improvement. This approach promotes student engagement and motivation by catering to their individual learning styles and preferences. In addition to gamification, the project integrates other innovative teaching strategies such as project-based learning, flipped classrooms, and collaborative learning environments. By leveraging a combination of these methodologies, educators can create dynamic and interactive learning experiences that enhance comprehension and retention of course material. The integration of technology into pedagogical practices not only facilitates the delivery of content but also fosters critical thinking, problem-solving skills, and digital literacy among students, preparing them for success in the 21st-century workforce.

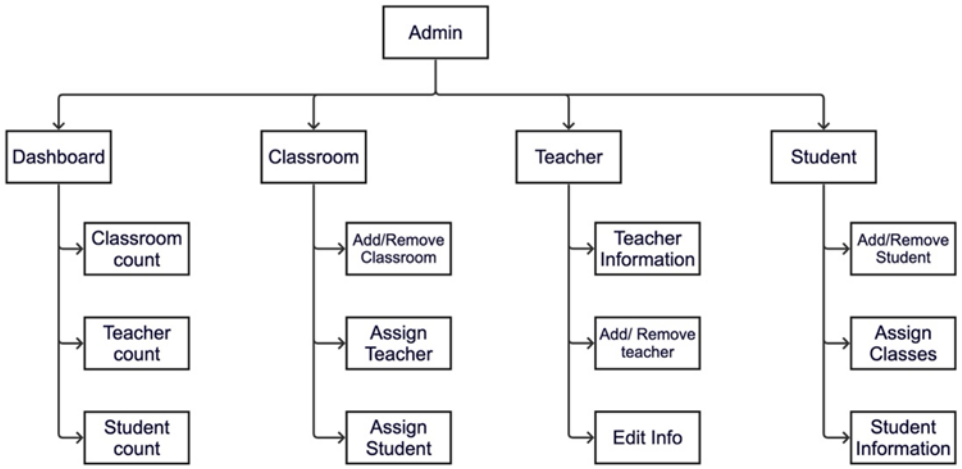


Figure 5: Admin Sitemap

STUDENT

Keywords: Dashboard, Notices, Games, Assignments, Attendance, To-do list

Students can log in to this student module using their login IDs, which they can obtain from the admin. They feature a dashboard where students can receive notifications on the most recent departmental and college updates. Students have the ability to view and turn in assignments that have been uploaded by teachers. They have access to their personal data and attendance information. Students can keep track of the number of tasks they have to do by using the ToDo list available on their dashboard. Engaging in pedagogical learning is one of the most important aspects of the student module. Here, the students must participate in the game that the teacher has uploaded to the system. . Additionally, students can access their grades and performance evaluations, fostering a transparent learning environment. The module emphasizes autonomy and self-directed learning, empowering students to take ownership of their education journey while providing support and guidance when needed. Through forums and chat features, students can interact with their peers and seek clarification on course material. The module also provides access to a digital library, enabling students to explore supplementary resources to enhance their understanding of topics. Regular feedback mechanisms are integrated into the module, allowing students to evaluate their progress and receive constructive criticism from instructors.

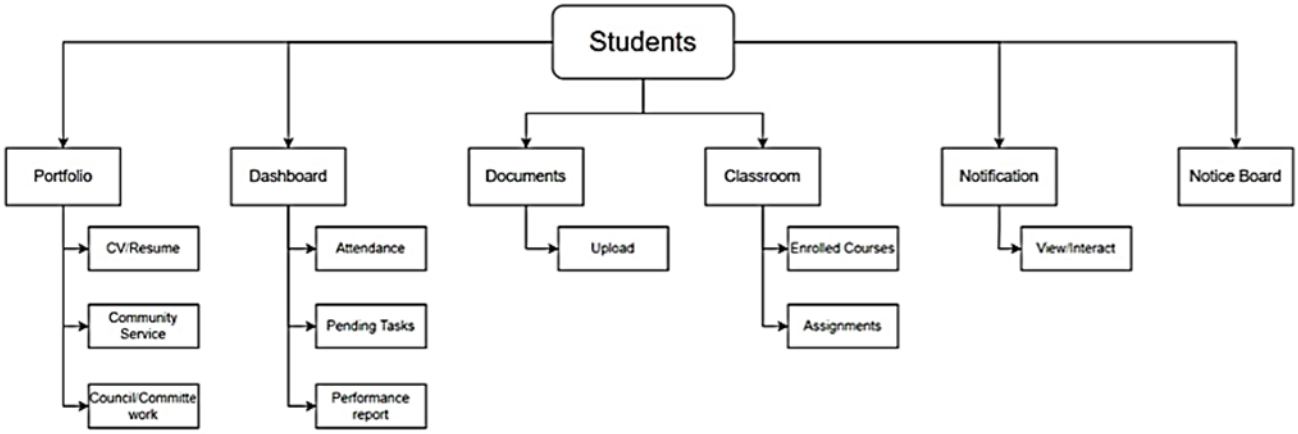


Figure 6: Student sitemap

TEACHER

Keywords: Dashboard, Student, Notices, Assignment, Attendance, Create Games

First, upon logging in to the teacher modules, we are provided with a teacher's dashboard that provides an overview of all the available features and functionalities. The instructor has access to the student's personal information, including their grade, CV, and other facts. Notices is another feature. Teachers submit any news or information about their curriculum in this part, which students can browse and access. Teachers have the ability to record and mark a student's attendance. The creation of games as a means of pedagogical learning is an important role. Our project includes two games that the teacher can design and assess, with the students providing the answers to the questions. Only when a game is posted by the teacher can students access it. This enhances learning in a fun and interactive way. Teachers can provide feedback on assignments and track student progress through the grading feature. Collaboration tools enable educators to work together on course content and share resources within the platform. The module also facilitates communication between teachers and students through messaging and announcement features, fostering a supportive learning environment. Integration with external resources and educational platforms enhances the versatility of the module, allowing for seamless integration of multimedia content and interactive learning materials. Overall, the teacher module serves as a comprehensive platform for effective teaching and student engagement, promoting innovation and excellence in education.

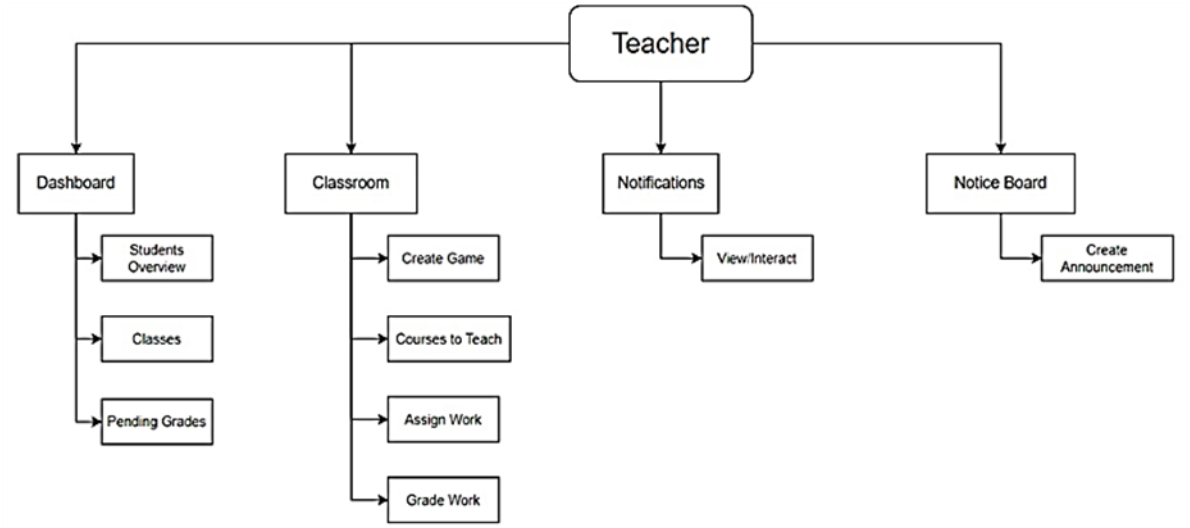


Figure 7: Teacher sitemap

Results

LANDING PAGE

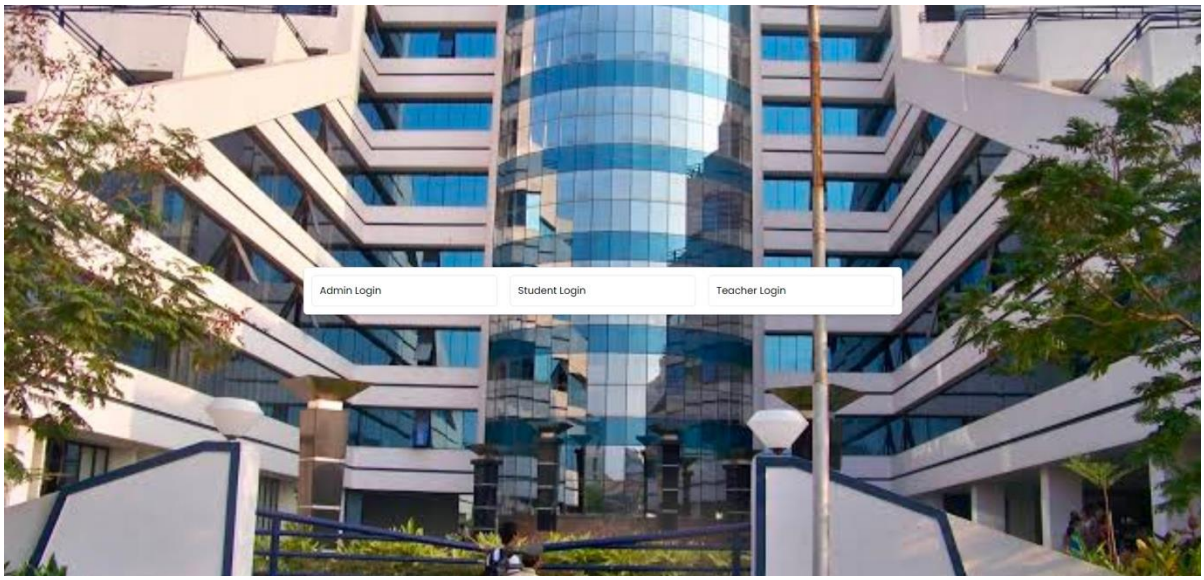


Figure 8: Home page

This is the project's home page, where users can log in using the credentials associated with each account. Our project consists of three primary modules: Admin, Student, and Teacher.

ADMIN PANEL

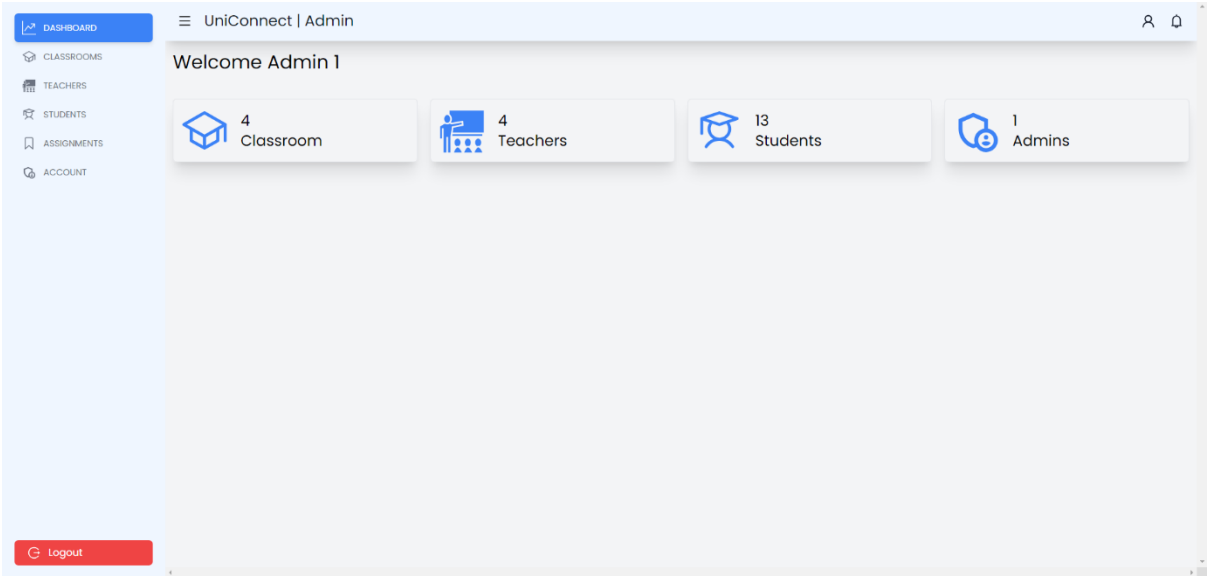


Figure 9: Admin dashboard panel

The admin dashboard offers administrators a centralized platform for efficiently overseeing various administrative tasks. With its intuitive interface and comprehensive functionalities, including management of students, teachers and classrooms along with assignments.

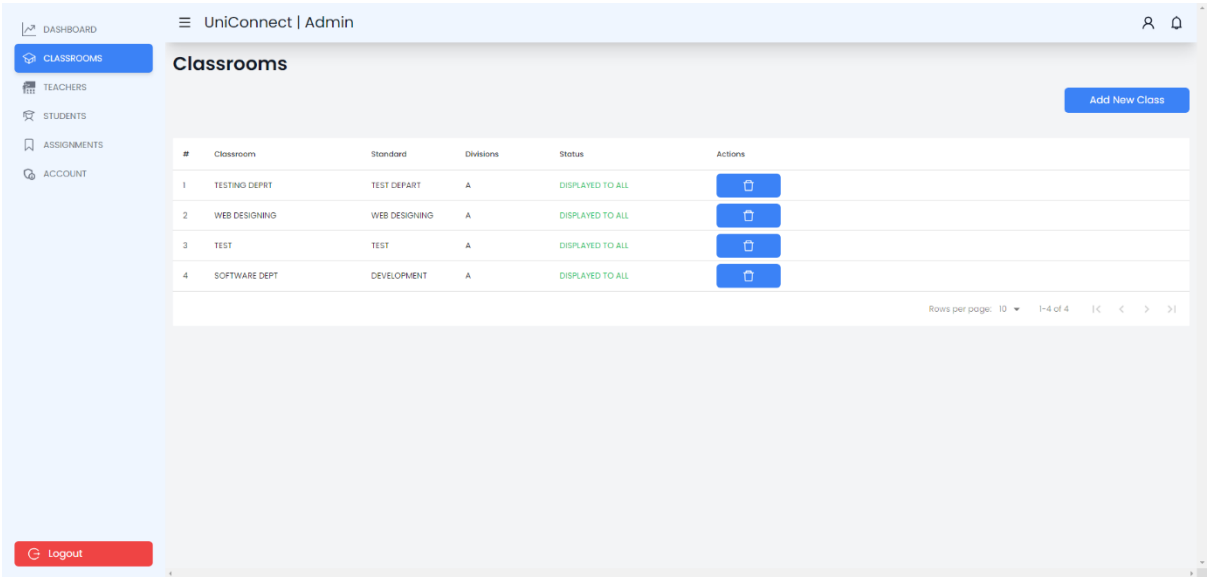


Figure 10: Admin classroom panel

The core functionality of the classroom section revolves around the seamless creation of classrooms within the admin panel. Administrators can easily define new classroom spaces, specifying details such as classroom name and department.

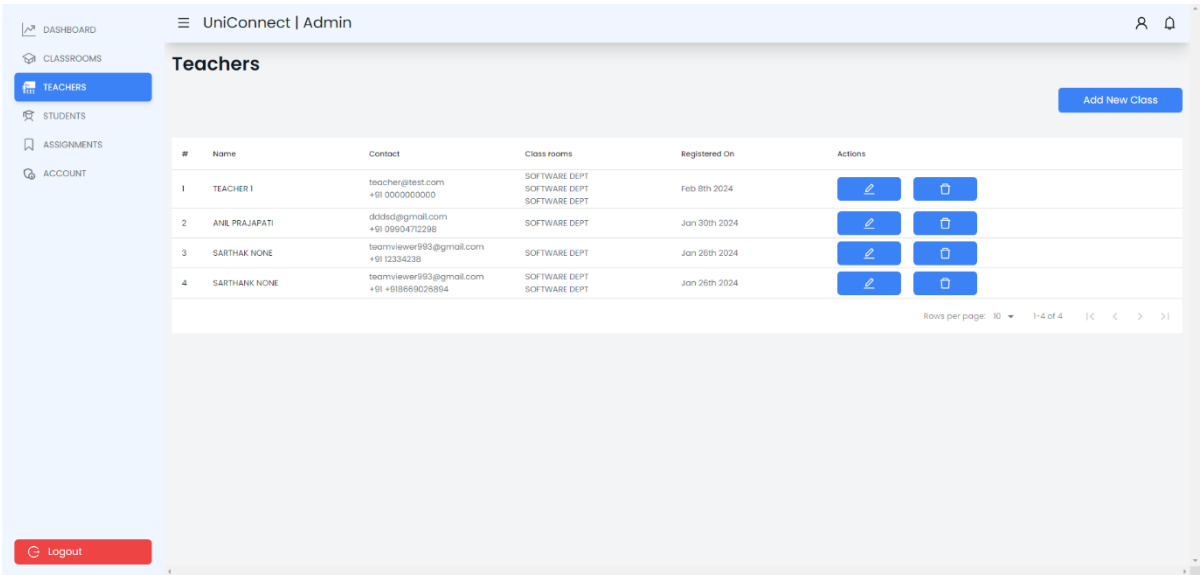
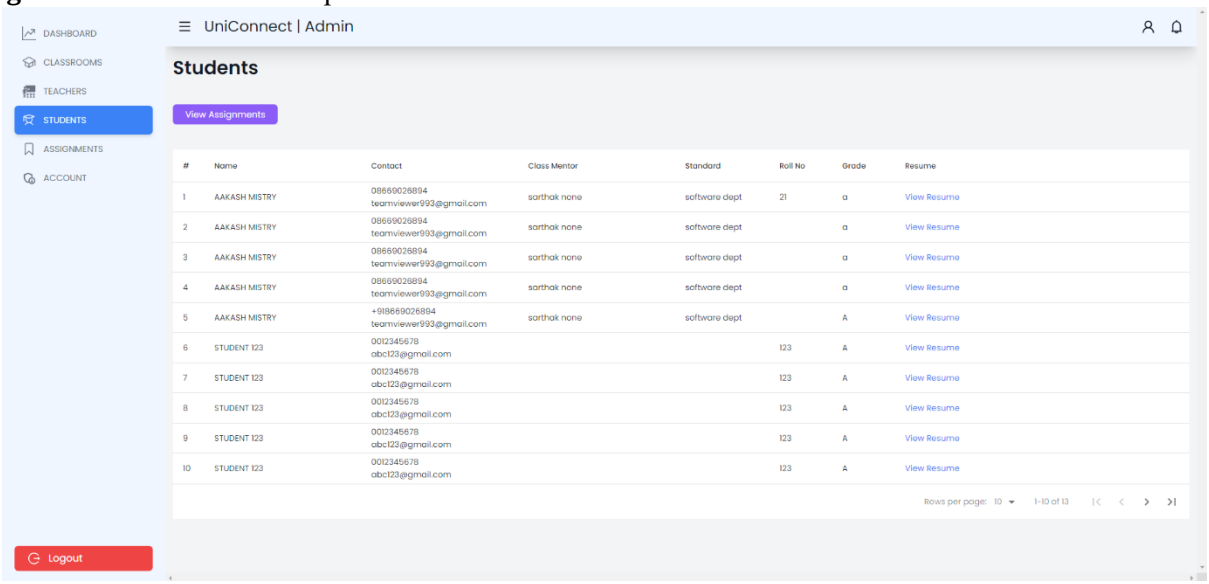


Figure 11: Admin teacher's panel

The teacher's section of the admin panel serves as a pivotal tool for efficiently managing faculty members. It facilitates the seamless addition, modification, and removal of teacher profiles, encompassing essential details such as personal information, qualifications, and classrooms handled by them.

Figure 12: Admin Student's panel



The student's section of the admin panel provides essential tools for efficient student management. Administrators can easily add, update, and remove student profiles, including pertinent information such as personal details, assignments, course enrollments, and attendance records.

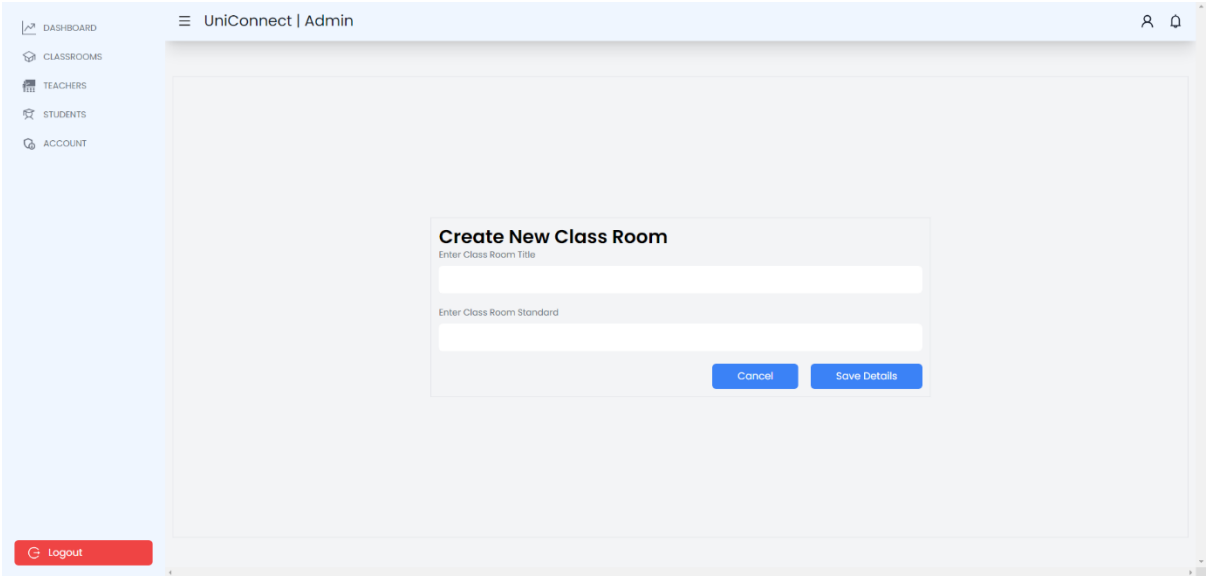


Figure 13: Admin Classroom creation

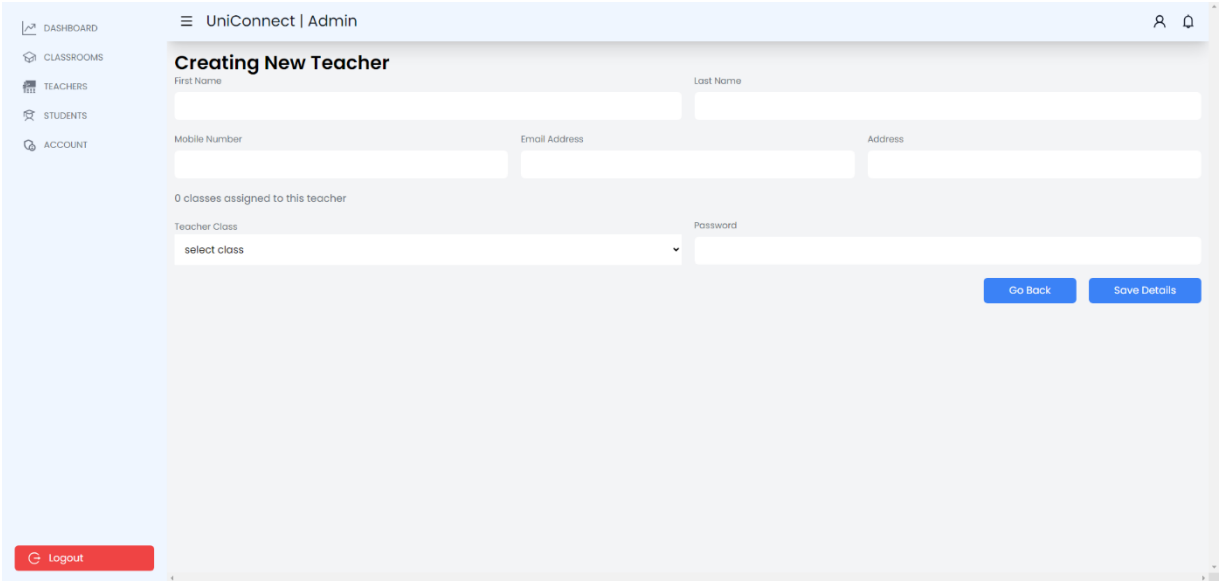


Figure 14: Admin Teacher account creation

The "Create New Teacher Account" interface in the admin module streamlines the process of adding new teachers to the system. It features fields for essential details like first name, last name, email, mobile number, and class assignments.

STUDENTS

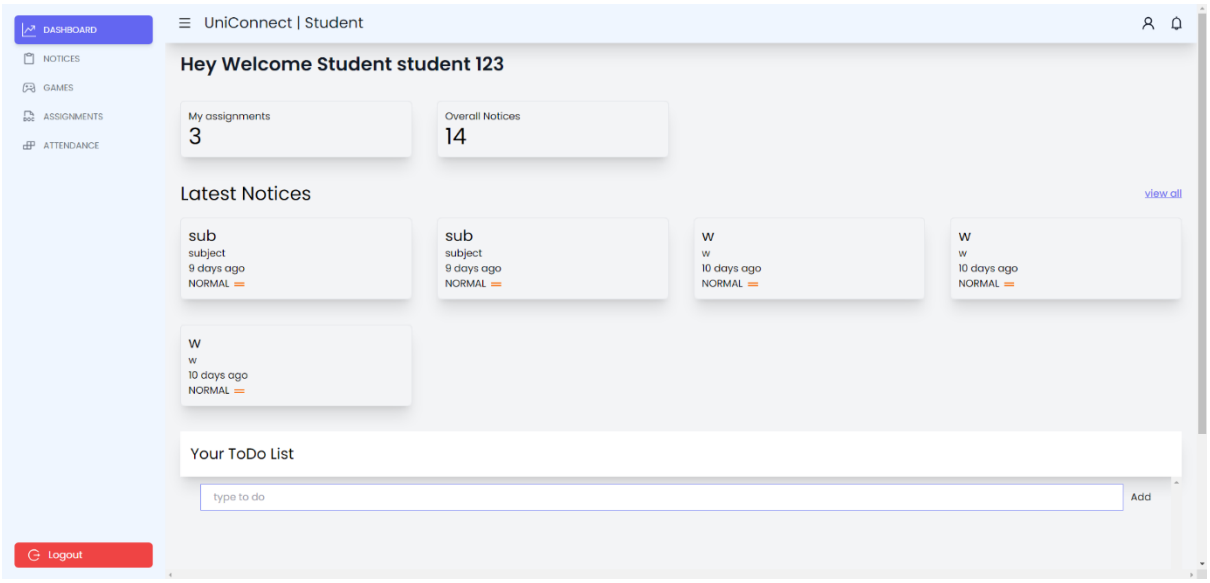


Figure 15: Student Dashboard panel

The student dashboard provides a centralized hub for students to access essential academic information and resources. It offers a user-friendly interface displaying personalized details such as course schedules, grades, attendance records, and announcements.

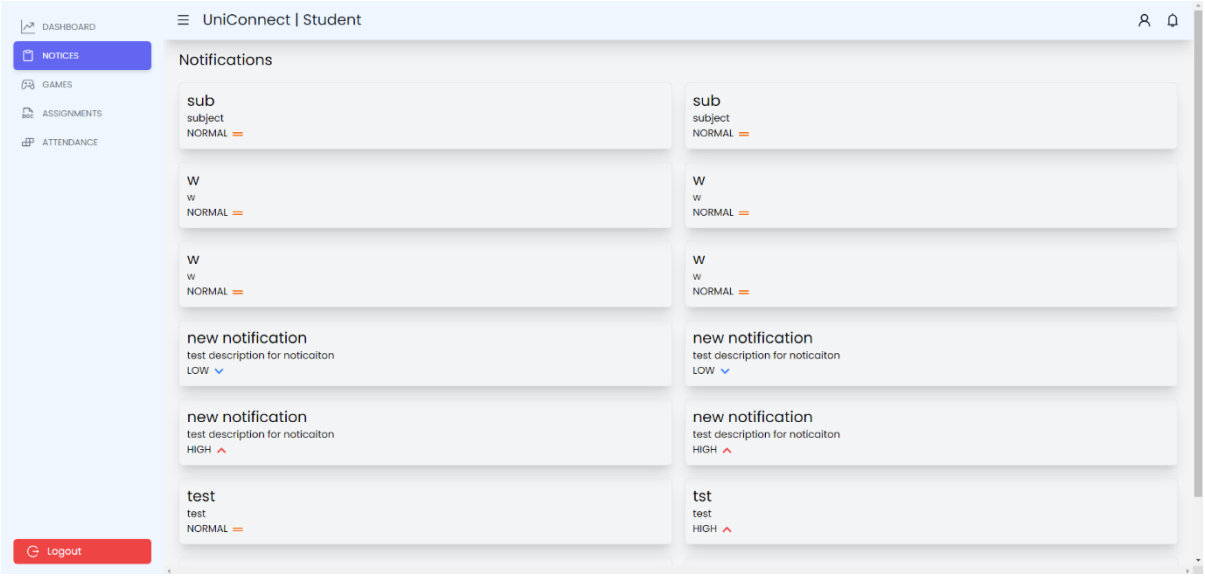


Figure 16: Student notice panel

Within the notices section, students can view important announcements, notifications, and updates from the college administration. This section serves as a communication channel for disseminating information about academic schedules, campus events, deadlines, ensuring students stay informed and engaged with the latest developments within the institution.

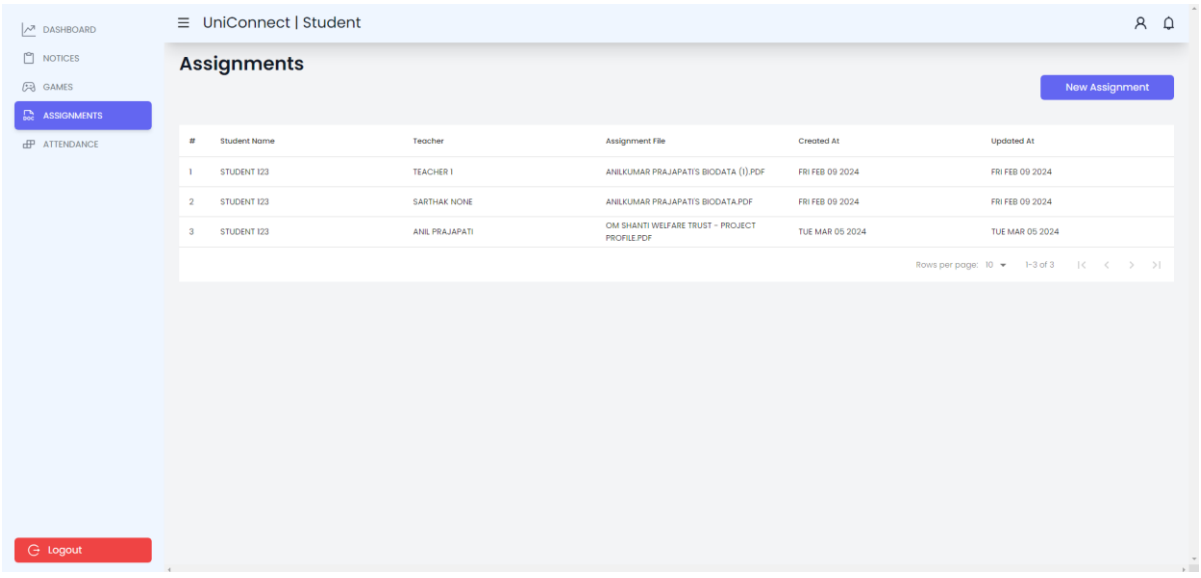


Figure 17: Student Assignments panel

The assignments section allows students to access and submit course assignments conveniently. It provides a centralized platform for viewing assignment details, deadlines, and instructions, enabling students to stay organized and manage their coursework effectively.

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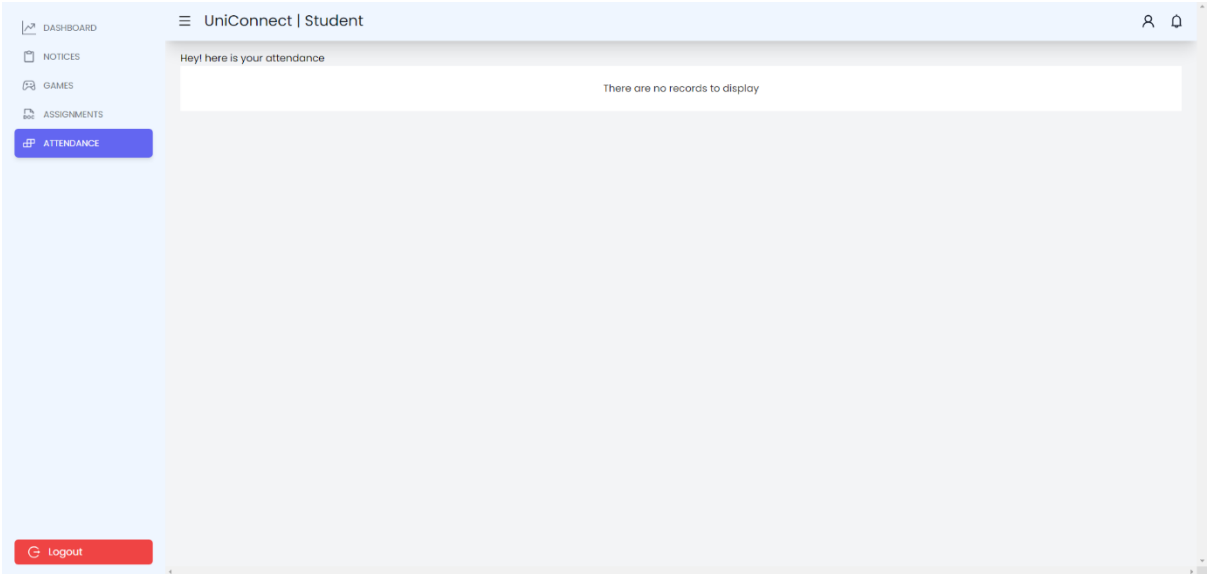


Figure 18: Student Attendance record

PEDAGOGICAL LEARNING

In the attendance section, students can monitor their class attendance records. This feature enables students to stay informed about their attendance status for each course, helping them to maintain consistent attendance and take necessary actions to improve their academic performance if needed.

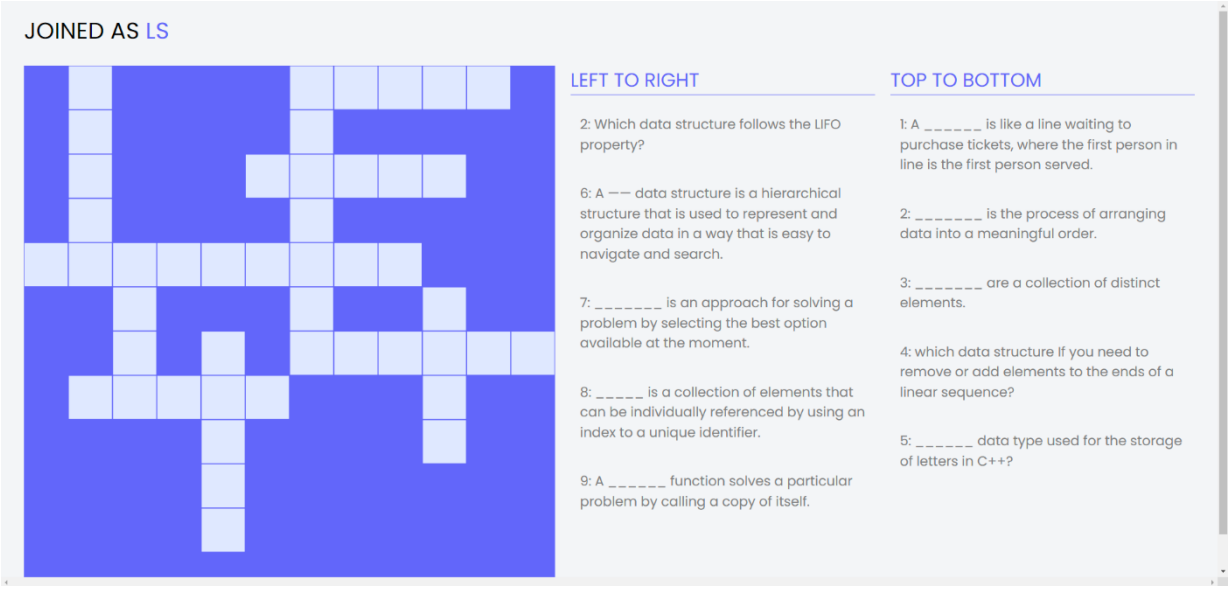


Figure 19: Game created by any teacher (crossword)

In the crossword game, the teacher acts as the creator, designing puzzles tailored to the curriculum. Students access the game through the platform, where they are presented with clues corresponding to the crossword grid.

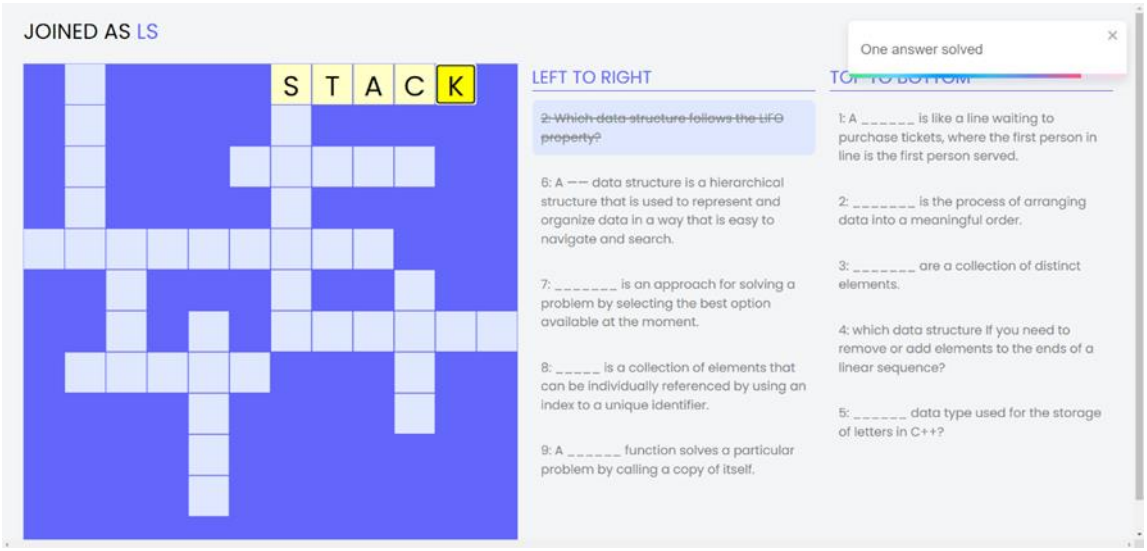


Figure 20: Game input based on a correct answer (crossword)

By inputting their answers into the grid, students engage in interactive problem-solving, reinforcing their understanding of course material. The game provides immediate feedback, allowing students to track their progress and review incorrect answers

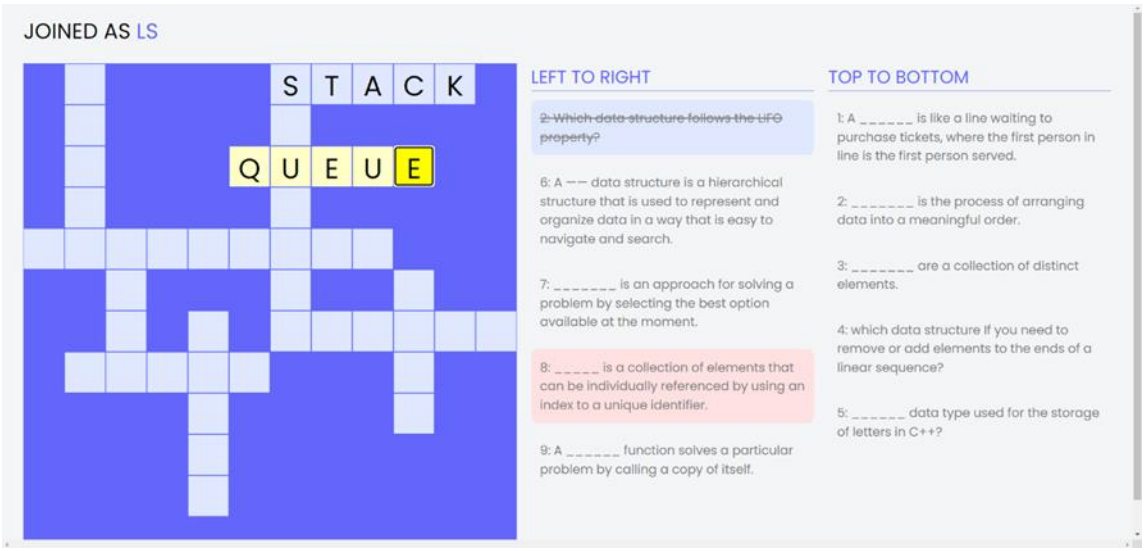
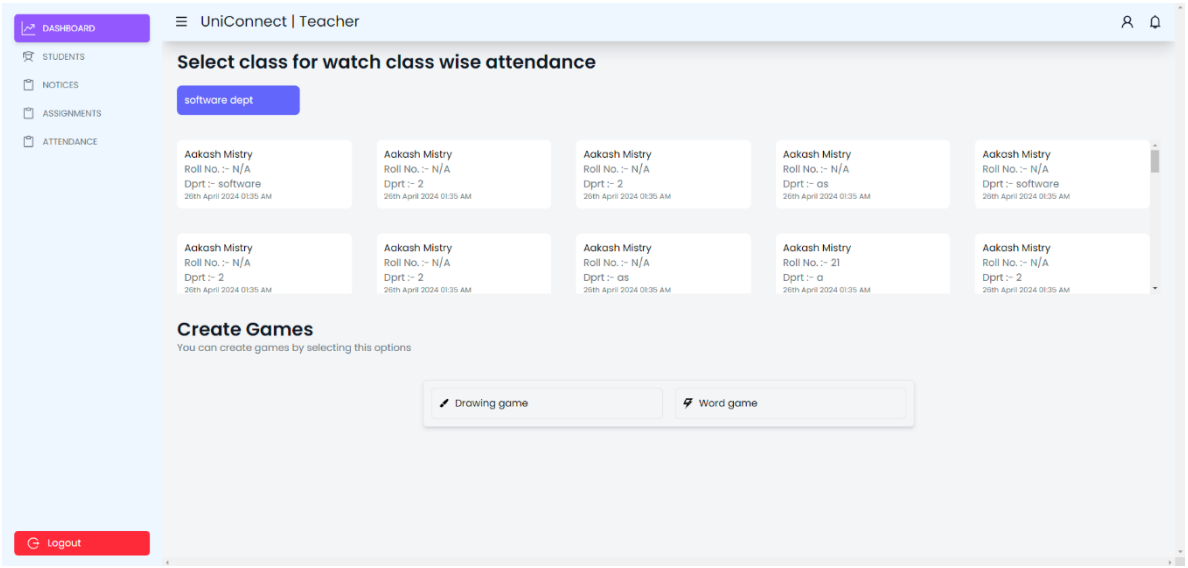


Figure 21: Game input completion (crossword)

As students successfully solve the crossword puzzle, the corresponding questions are automatically marked as completed. This dynamic feature ensures that students focus only on unanswered clues, streamlining the gaming experience. With each correct answer inputted, the related questions disappear from the interface, providing a clear indication of progress.

TEACHERS

Figure 22: Teacher Dashboard



This is the dashboard that we will see after logging into the teacher account. The remaining functions that the teacher can perform students, notice, assignment, and attendance—are displayed on the left side.

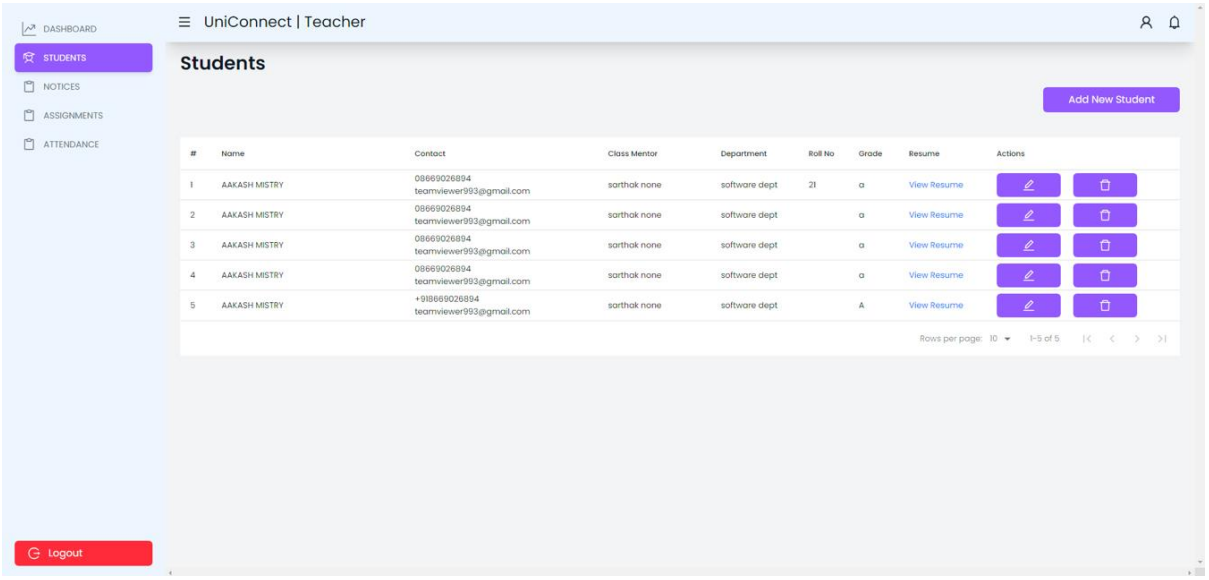
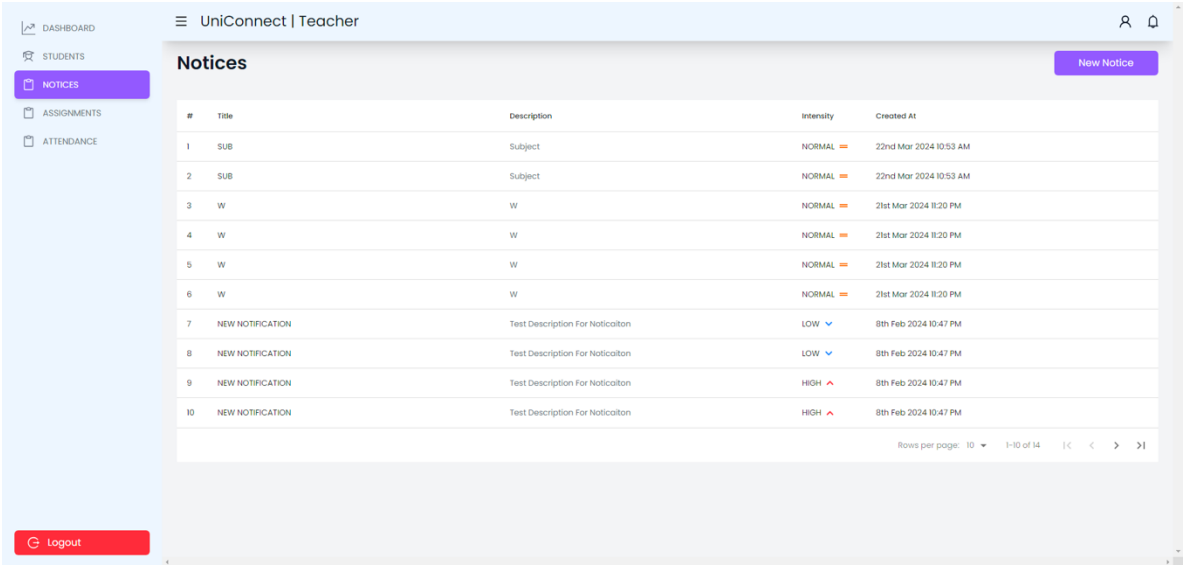


Figure 23: Student Panel

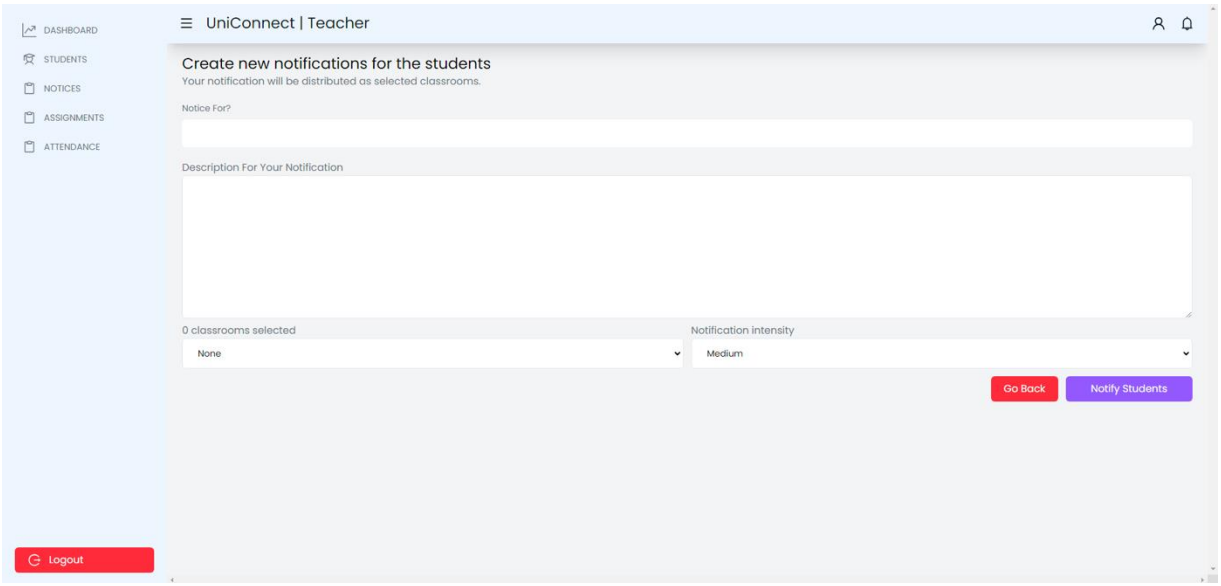
This is the student figure displayed on the dashboard. The teacher can access the student's information, including name, contact information, classmate, grade, and resume, after clicking on the student. They can even choose to modify any particular detail.

Figure 24: Teacher Notice panel



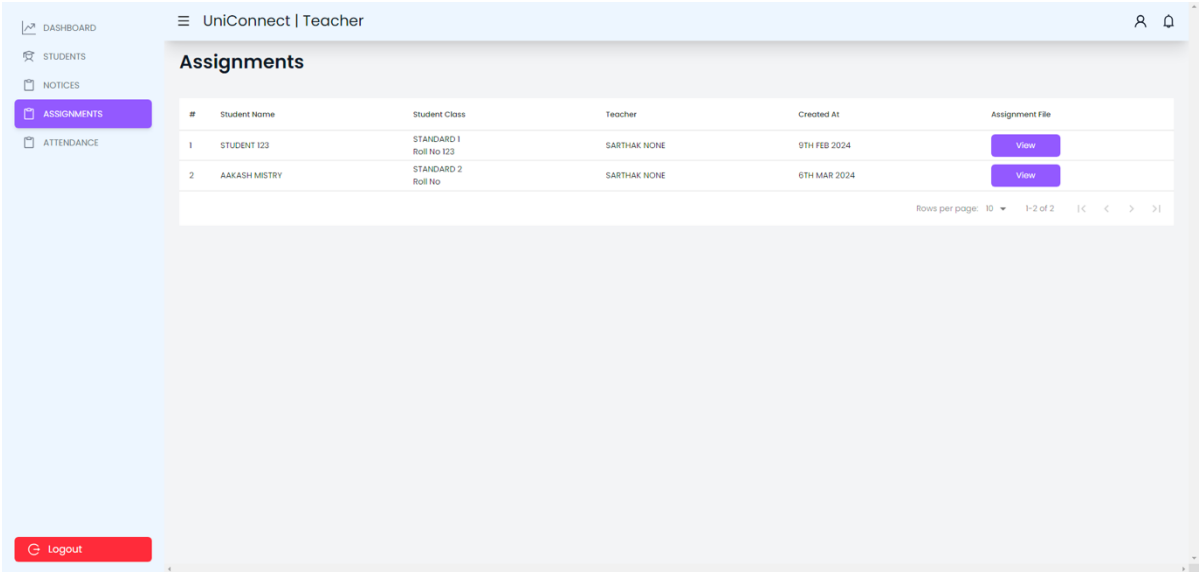
The notification display figure in the teacher module provides a comprehensive list of all notifications. It showcases details such as the notice recipient, description, target classroom, and notification intensity. Teachers can easily review and manage notifications, ensuring timely communication with students.

Figure 25: Create notice panel



The "Create New Notification" interface within the teacher module simplifies the process of disseminating information to students. It features fields for specifying the notice recipient, description of the notice, target classroom, and notification intensity.

Figure 26: Teacher Assignment panel



The assignment viewing figure within the teacher module presents a comprehensive list of assignments submitted by students. Teachers can easily navigate through assignments, accessing details such as submission dates, grades, and feedback.

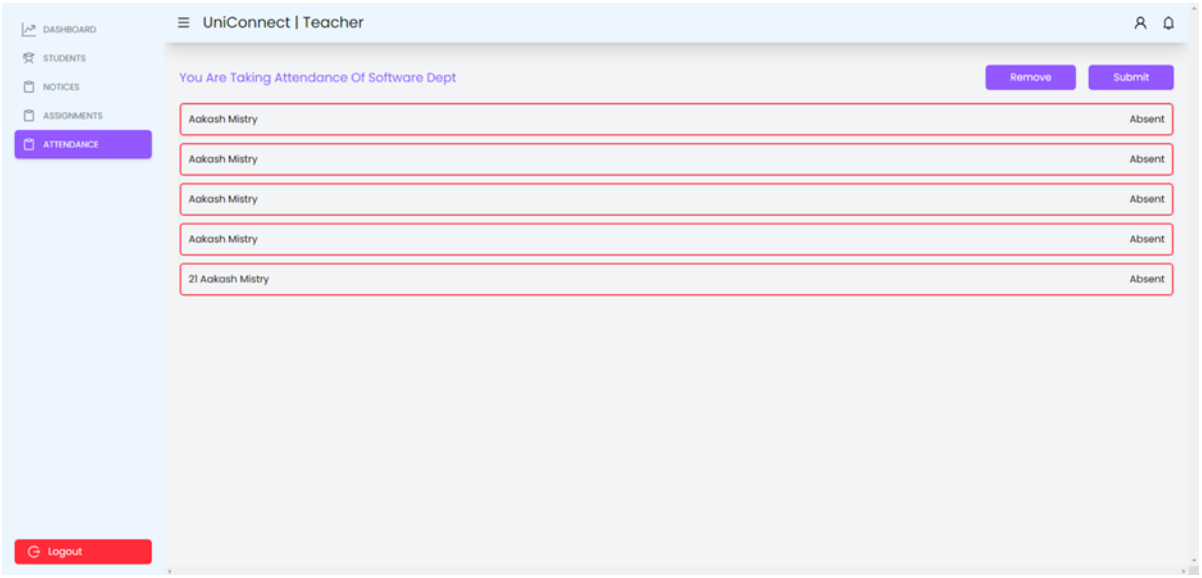


Figure 27: Teacher Attendance panel

The attendance marking figure within the teacher module displays a list of students enrolled in the class. Teachers can efficiently mark attendance by selecting individual students or using bulk selection options. The interface provides intuitive controls for toggling attendance status, such as present, absent, or late.

The results section has provided a comprehensive examination of the features encompassing the admin panel, students, teachers, and pedagogical tools. Through detailed descriptions of key sections such as classroom management, teacher management, student interface, and pedagogical resources, we have gained valuable insights into the system's capabilities. These findings lay the foundation for our subsequent discussion in the conclusion,

where we will reflect on the significance of these results, discuss their implications for educational institutions, and propose potential avenues for future research and system enhancement.

Discussion

The findings presented in the results section shed light on the effectiveness and potential impact of the college management system developed in this study. In this discussion, we delve deeper into the implications of these findings, exploring the significance of the system's functionalities and their implications for educational institutions.

The admin panel emerged as a central component of the college management system, offering administrators a powerful tool to streamline administrative tasks and enhance operational efficiency. By providing features such as user management, academic program management, financial management, and reporting tools, the admin panel enables administrators to effectively oversee various aspects of institutional management. This streamlined approach not only reduces administrative burden but also frees up valuable time and resources that can be redirected towards other critical tasks, ultimately contributing to improved productivity and organizational effectiveness within educational institutions.

The teachers section and pedagogical tools within the college management system play a pivotal role in empowering educators with innovative teaching methodologies and resources. Through features such as classroom management, assignment tracking, and communication tools, educators can create dynamic and engaging learning environments that foster collaboration, interaction, and personalized instruction. By leveraging these tools, educators can tailor their teaching strategies to meet the diverse needs of students, promote active learning, and facilitate continuous improvement in teaching practices. Additionally, the integration of pedagogical resources provides educators with valuable support and guidance, helping them to stay abreast of best practices in teaching and learning and enhance the quality of instruction.

The student dashboard emerged as a key component of the college management system, providing students with a centralized platform to access essential academic information and resources. Through features such as course schedules, grades, attendance records, and notices, the student dashboard empowers students to take ownership of their learning and stay informed about important updates and events. This increased transparency and accessibility not only enhance student engagement but also promote a culture of accountability and responsibility among students. Additionally, features such as assignment tracking and communication tools facilitate collaboration and communication between students and educators, fostering a supportive learning community where students feel valued and empowered to succeed.

The findings of this study have several implications for educational institutions seeking to leverage technology to enhance administrative efficiency, teaching practices, and student engagement. By investing in a comprehensive college management system, institutions can streamline administrative processes, empower educators with innovative teaching tools, and create dynamic and engaging learning environments that foster student success. However, successful implementation and utilization of such systems require careful planning, effective training, and ongoing support to ensure that all stakeholders are equipped to maximize the benefits of the system. Additionally, institutions must remain adaptable and responsive to evolving technological trends and pedagogical practices, continuously seeking opportunities for improvement and innovation to meet the changing needs of students and educators.

It is important to acknowledge the limitations of this study, including the scope of the college management system developed and the specific context in which it was tested. Future research could explore additional functionalities and features of the system, as well as its effectiveness in different educational settings and with diverse student

populations. Additionally, longitudinal studies could examine the long-term impact of the college management system on administrative efficiency, teaching practices, and student outcomes, providing valuable insights into its sustained effectiveness and potential areas for improvement.

In conclusion, the findings of this study highlight the transformative potential of a comprehensive college management system in enhancing administrative efficiency, empowering educators, and engaging students within educational institutions. By leveraging technology to streamline processes, support teaching practices, and promote student success, institutions can create dynamic and inclusive learning environments that foster excellence and innovation in education.

Conclusion

The development and implementation of the Interactive Learning System represent a significant milestone in the ongoing evolution of educational technology and pedagogy. Through a comprehensive exploration of the system's features, development process, outcomes, and future directions, this report has provided insights into the transformative potential of the Interactive Learning System in redefining the educational experience for students, educators, and administrators alike. The Interactive Learning System has demonstrated its ability to address the multifaceted challenges facing contemporary educational systems, ranging from passive learning paradigms and administrative burdens to inequitable access and limited interactivity. By providing a user-centric, technologically advanced platform that integrates interactive elements, personalized learning pathways, and streamlined administrative processes, the system has sought to empower stakeholders at every level of the educational ecosystem. By providing students with agency and autonomy over their learning journey, the system has empowered them to take ownership of their education, develop critical thinking skills, and achieve higher levels of academic success. Moreover, the Interactive Learning System has proven instrumental in enhancing the efficiency and effectiveness of administrative processes within educational institutions. By automating routine tasks such as attendance tracking, assignment management, and communication, the system has enabled educators and administrators to allocate their time and resources more strategically, focusing on instructional activities and student support. In conclusion, the development and implementation of the Interactive Learning System represent a testament to the power of technology to transform education and empower learners. Through its innovative features, user-centric design, and commitment to excellence, the system has demonstrated its ability to revolutionize teaching, learning, and administration in educational institutions around the world. As we look to the future, let us embrace the opportunities afforded by the Interactive Learning System to create a more engaging, inclusive, and impactful educational experience for all.

References

[1] Bhor, S., Rahane, W., Sonar, A., Belkire, V., & Nawale, P. COLLEGE AUTOMATION SYSTEM USING CLOUD COMPUTING.

[2] Sood, A., & Singh, Y. (2015). Online College Management System.

[3] Patel, V., Bhagwat, S., Ashtikar, S., Kumbhare, S., & Deote, S. A RESEARCH PAPER ON COLLEGE MANAGEMENT SYSTEM.

[4] Shelar, A., Sawant, S., Pacharne, A., Tike, S., & Mane, D. M. (2023). College Management System.

[5] Kumbhar, S., Kambali, P., Morajkar, S., & Devmane, M. (2022). College ERP System. Available at SSRN 4111869.

[6] Patil, R., Gentyal, V., Mudaliar, V., Kanpurne, G., & Ambi, D. (2022). College Website Using MERN Stack. Int J Res Appl Sci Eng Technol, 10(4), 1096-1098.

[7] Yu, C., & Wang, Y. (2022). College student management system based on k-means clustering algorithm. Int. J. New Dev. Educ, 4(2), 2663-8169.

[8] Pandurang, D. P., Maruti, M. D., Balu, S. D., & Shirkande, S. T. A Design On Central College Event Management System.

[9] Jain, K. P., Sharma, P. P., Hegde, P. P., & Katti, R. (2020). College Portal. International Journal of Advanced Research, Ideas, and Innovations in Technology, 6(1).

[10] Liu, J., Wang, C., & Wu, Y. (2021). Research on the management information system of college education and teaching based on the web. Security and Communication Networks, 2021, 1-8.

[11] Papashvili, & Elizabeth. (2019). Integration of electronic systems in education administration and teaching (Master's thesis, East European University).

[12] Kumbhar, S., Kambali, P., Morajkar, S., & Devmane, M. (2022). College ERP System. Available at SSRN 4111869.

[13] Rehman, M. A. U., Osman, S. B., Rahman, M. W. U., & Khan, P. A. (2023). Erp for College Management System. Mathematical Statistician and Engineering Applications, 72(1), 1525-1534.

[14] Harshvardhan Shingade, Viraj Shedge, Suyog Bhise, Abhinay Salve, "College Management System", International Journal of Scientific Research in Computer Science, Engineering and Information Technology (IJSRCSEIT), ISSN : 2456-3307, Volume 8, Issue 2, pp.469-475, March-April-2022.

[15] Shwethashree, A., Rohith, B. R., Harshitha, K. G., Anusha, K. A., & Keerthi, H. (2022). College Management Android Application. International Research Journal of Modernization in Engineering Technology and Science, 4, 73-79.

[16] Swetha, O., Thrinesh, I., Madhu Babu, D., Student, & Prof, A. (2019). COLLEGE MANAGEMENT SYSTEM. International Journal of Research in Engineering, IT and Social Science, 09(2).

[17] Suryawanshi, S. (2021). College Management System of the Creative Commons Attribution License (CC BY 4.0). International Journal of Trend in Scientific Research and Development (IJTSRD) International Journal of Trend in Scientific Research and Development, 5(4), 1155–1157.

[18] Subha, P., Fefina, I., Devi, C., Suruthika, S., & Sushmeena, K. (2007). COLLEGE MANAGEMENT SYSTEM. IJARCCE International Journal of Advanced Research in Computer and Communication Engineering ISO, 3297(5).

[19] Jain, R., Modi, A., Kashyap, I., Kate, & Rachana Bahrawat, P. (2023). Research Paper on College Management System. International Journal of Research Publication and Reviews Journal Homepage: Www.ijrpr.com, 4(2582-7421), 3430–3432.

[20] Al-Amin Md, Md, Hossain, T., Islam, J., & Biwas, S. (2023). History, Features, Challenges, and Critical Success Factors of Enterprise Resource Planning (ERP) in The Era of Industry 4.0. European Scientific Journal, 19(6), 31.

[21] Alam, M., & Uddin, M. (2019). Adoption and Implementation of Enterprise Resource Planning (ERP): An Empirical Study. 118 | Adoption and Implementation of ERP Journal of Management and Research (JMR), 6(1), 2019.

[22] Alsharari, N. (2022). THE IMPLEMENTATION OF ENTERPRISE RESOURCE PLANNING (ERP) IN THE UNITED ARAB EMIRATES: A CASE OF MUSANADA CORPORATION. International Journal of Technology, Innovation and Management (IJTIM), 2(1). https://doi.org/10.54489/ijtim.v2i1.57

[23] Amini Valashani, M., & Abukari, A. (2020). ERP SYSTEMS ARCHITECTURE FOR THE MODERN AGE: A REVIEW OF THE STATE OF THE ART TECHNOLOGIES. JOURNAL of APPLIED INTELLIGENT SYSTEMS & INFORMATION SCIENCES, 1(2). https://doi.org/10.22034/JAISIS.2020.103704

[24] Bandara, F., Jayawickrama, U., Subasinghage, M., Olan, F., Alamoudi, H., & Alharthi, M. (2023). Enhancing ERP Responsiveness Through Big Data Technologies: An Empirical Investigation. Information Systems Frontiers. https://doi.org/10.1007/s10796-023-10374-w

[25] Faccia, A., & Petratos, P. (2021). Blockchain, Enterprise Resource Planning (ERP) and Accounting Information Systems (AIS): Research on e-Procurement and System Integration. Applied Sciences, 11(15), 6792. https://doi.org/10.3390/app11156792

[26] Haddara, M., Gøthesen, S., & Langseth, M. (2022). Challenges of Cloud-ERP Adoptions in SMEs. Procedia Computer Science, 196, 973–981. https://doi.org/10.1016/j.procs.2021.12.099

[27] Ivanović, T., & Marić, M. (2021). Application of modern Enterprise Resource Planning (ERP) systems in the era of digital transformation. Strategic Management, 26(4), 28–36. https://doi.org/10.5937/straman2104028i

[28] Kunduru, A. R., & Kandepu, R. (2023). Data Archival Methodology in Enterprise Resource Planning Applications (Oracle ERP, Peoplesoft). Journal of Advances in Mathematics and Computer Science, 38(9), 115–127. https://doi.org/10.9734/jamcs/2023/v38i91809

[29] Lufti, M. I., Mu'min, R., & Haekal, J. (2022). DETERMINATION OF DIGITAL MARKETING STRATEGY WITH APPLICATION OF QUANTITATIVE STRATEGIC PLANNING MATRIX (QSPM) IN ENTERPRISE RESOURCE PLANNING (ERP) SYSTEM COMPANY'S SNELL X. Jurnal PASTI (Penelitian Dan Aplikasi Sistem Dan Teknik Industri), 16(1), 27. https://doi.org/10.22441/pasti.2022.v16i1.003

[30] Menon, S. A., Muchnick, M., Butler, C., & Pizur, T. (2019). Critical Challenges in Enterprise Resource Planning (ERP) Implementation. International Journal of Business and Management, 14(7), 54. https://doi.org/10.5539/ijbm.v14n7p54

[31] Pakinee, A., & Puritat, K. (2021). Designing a gamified e-learning environment for teaching undergraduate ERP course based on big five personality traits. Education and Information Technologies, 26(4), 4049–4067. https://doi.org/10.1007/s10639-021-10456-9

[32] Prakash, V., Savaglio, C., Garg, L., Bawa, S., & Spezzano, G. (2022). ScienceDirect-NC-ND license, Peer-review under responsibility of the scientific committee of the 3rd International Conference on Industry 4.0 and Smart Manufacturing 3rd International Conference on Industry 4.0 and Smart Manufacturing ScienceDirect-NC-ND license, Peer-review under responsibility of the scientific committee of the International Conference on Industry 4.0 and Smart Manufacturing Sc…. Procedia Computer Science, 200, 537–545. https://doi.org/10.1016/j.procs.2022.01.251

[33] Razzaq, A., Asmai, S., Saad Talib, M., & Abdullah, N. (2020). Digraph Representations of Machine Vision Workspace for Monitoring Worker's Behavior View project VANETs View project. International Journal of Advanced Trends in Computer Science and Engineering, 9(5), 7510–7516. https://doi.org/10.30534/ijatcse/2020/85952020

[34] Uddin, Md. A., Alam, M. S., Mamun, A. A., Khan, T.-U.-Z., & Akter, A. (2020). A Study of the Adoption and Implementation of Enterprise Resource Planning (ERP): Identification of Moderators and Mediator. Journal of Open Innovation: Technology, Market, and Complexity, 6(1), 2. https://doi.org/10.3390/joitmc6010002

[35] Yathiraju, N. (2022). Investigating the use of an Artificial Intelligence Model in an ERP Cloud-Based System. International Journal of Electrical, Electronics and Computers, 7(2), 01-26. https://doi.org/10.22161/eec.72.1

[36] Zhao, B., & Tu, C. (2021). Research and Development of Inventory Management and Human Resource Management in ERP. Wireless Communications and Mobile Computing, 2021, 1–12. https://doi.org/10.1155/2021/3132062

[37] Dewi, Y. N., Zaim, M., & Rozimela, Y. (2022). Interactive Learning Using E-Learning Module in Learning English for Senior High School: A Review of Related Articles. JELITA: Journal of Education, Language Innovation, and Applied Linguistics, 1(2), 125–134. https://doi.org/10.37058/jelita.v1i2.5306

[38] Majumdar, S., & Bhowmik, T. (2022). A Study on Effectiveness of Interactive Tools in the Online Teaching-Learning Process. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.4036562

[39] Pradono, S., Astriani, M. S., & Moniaga, J. (2013). A METHOD FOR INTERACTIVE LEARNING. CommIT (Communication and Information Technology) Journal, 7(2), 46. https://doi.org/10.21512/commit.v7i2.583

[40] Shridhar, M., Yuan, X., Côté, M.-A., Bisk, Y., Trischler, A., & Hausknecht, M. (2021). ALFWORLD: ALIGNING TEXT AND EMBODIED ENVIRONMENTS FOR INTERACTIVE LEARNING.

[41] Sinha, B. (2022). Augmented Reality: A tool for Interactive Learning Environment. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.4066684

[42] Sitthiworachart, J., Joy, M., & Ponce, H. R. (2023). Interactive Learning with Student Response System to Encourage Students to Provide Peer Feedback. Education Sciences, 13(3), 310. https://doi.org/10.3390/educsci13030310

[43] Tuma, F. (2021). The use of educational technology for interactive teaching in lectures. Annals of Medicine and Surgery, 62, 231–235. https://doi.org/10.1016/j.amsu.2021.01.051

[44] Ugalde, L., Santiago-Garabieta, M., Villarejo-Carballido, B., & Puigvert, L. (2021). Impact of Interactive Learning Environments on Learning and Cognitive Development of Children With Special Educational Needs: A Literature Review. Frontiers in Psychology, 12. https://doi.org/10.3389/fpsyg.2021.674033

[45] Agus, O., Shavab, K., Yulifar, L., Supriatna, N., & Mulyana, A. (2021). Gamification in History Learning: A Literature Review.

[46] Alahmari, M., Jdaitawi, M. T., Rasheed, A., Abduljawad, R., Hussein, E., Alzahrani, M., & Awad, N. (2023). Trends and gaps in empirical research on gamification in science education: A systematic review of the literature. Contemporary Educational Technology, 15(3), ep431. https://doi.org/10.30935/cedtech/13177

[47] Alzahrani, F. K., & Alhalafawy, W. S. (2023). Citation. Sustainability, 4613(15). https://doi.org/10.3390/su15054613

[48] Aries, A., Vional, V., Saraswati, L. A., Wijaya, L., & Ikhsan, R. B. (2020). Gamification in learning process and its impact on entrepreneurial intention. Management Science Letters, 763–768. https://doi.org/10.5267/j.msl.2019.10.021

[49] Bencsik, A., Mezeiova, A., & Samu, B. O. (2021). Gamification in Higher Education (Case Study on a Management Subject). International Journal of Learning, Teaching and Educational Research, 20(5), 211–231. https://doi.org/10.26803/ijlter.20.5.12

[50] Cavus, N., Ibrahim, I., Ogbonna Okonkwo, M., Bode Ayansina, N., & Modupeola, T. (2023). The Effects of Gamification in Education: A Systematic Literature Review. BRAIN. Broad Research in Artificial Intelligence and Neuroscience, 14(2), 211–241. https://doi.org/10.18662/brain/14.2/452

[51] Firas, L., Khaleel, Ashaari, N., Meriam, T., & Wook, T. (2019). An empirical study on gamification for learning programming language website Develope WBL-IE View project Designing Children Preferences and Interest of a Social Networking Site View project.

[52] Gaonkar, Dr. S., Khan, Dr. D., Manisha, M., & Singh, A. (2022). Impact of Gamification on Learning and Development. Journal of Advances in Education and Philosophy, 6(2), 63–70. https://doi.org/10.36348/jaep.2022.v06i02.003

[53] Hein, J. (2022). Impact of Gamification on an Online Middle School Classroom Impact of Gamification on an Online Middle School Classroom.

[54] Hutson, J., Fulcher, B., & Weber, J. (2022). Gamification in Education: A Study of Design-Based Learning in Operationalizing a Game Studio for Serious Games. Journal of Intelligent Learning Systems and Applications, 14(04), 115–131. https://doi.org/10.4236/jilsa.2022.144010

[55] Khaldi, A., Bouzidi, R., & Nader, F. (2023a). Gamification of e-learning in higher education: a systematic literature review. Smart Learning Environments, 10(1). https://doi.org/10.1186/s40561-023-00227-z

[56] Khaldi, A., Bouzidi, R., & Nader, F. (2023b). Gamification of e-learning in higher education: a systematic literature review. Smart Learning Environments, 10(1). https://doi.org/10.1186/s40561-023-00227-z

[57] Krath, J., Schürmann, L., & von Korflesch, H. F. O. (2021). Revealing the theoretical basis of gamification: A systematic review and analysis of theory in research on gamification, serious games and game-based learning. Computers in Human Behavior, 125, 106963. https://doi.org/10.1016/j.chb.2021.106963

[58] Lam, P., & Tse, A. (2022). Gamification in Everyday Classrooms: Observations From Schools in Hong Kong. Frontiers in Education, 6. https://doi.org/10.3389/feduc.2021.630666

[59] Lampropoulos, G., Keramopoulos, E., Diamantaras, K., & Evangelidis, G. (2022). Augmented Reality and Gamification in Education: A Systematic Literature Review of Research, Applications, and Empirical Studies. Applied Sciences, 12(13), 6809. https://doi.org/10.3390/app12136809

[60] Laura-De La Cruz, K. M., Noa-Copaja, S. J., Turpo-Gebera, O., Montesinos-Valencia, C. C., Bazán-Velasquez, S. M., & Pérez-Postigo, G. S. (2023). Use of gamification in English learning in Higher Education: A systematic review. Journal of Technology and Science Education, 13(2), 480. https://doi.org/10.3926/jotse.1740

[61] Macayan, V., Baguistan, D., & Golias, J. (2022). GAME-BASED ACTIVITIES AND GAMIFICATION IN THE MASTERY OF SCIENCE PROCESS SKILLS: A SYSTEMATIC LITERATURE REVIEW. In EPRA International Journal of Multidisciplinary Research (IJMR) -Peer Reviewed Journal.

[62] Montenegro-Rueda, M., Fernández-Cerero, J., Mena-Guacas, A. F., & Reyes-Rebollo, M. M. (2023). Impact of Gamified Teaching on University Student Learning. Education Sciences, 13(5), 470. https://doi.org/10.3390/educsci13050470

[63] Nurtanto, M., Kholifah, N., Ahdhianto, E., Samsudin, A., & Isnantyo, F. D. (2021). A Review of Gamification Impact on Student Behavioural and Learning Outcomes. International Journal of Interactive Mobile Technologies (IJIM), 15(21), 22. https://doi.org/10.3991/ijim.v15i21.24381

[64] Oliveira, W., Hamari, J., Shi, L., Toda, A. M., Rodrigues, L., Palomino, P. T., & Isotani, S. (2022). Tailored gamification in education: A literature review and future agenda. Education and Information Technologies, 28(1), 373–406. https://doi.org/10.1007/s10639-022-11122-4

[65] Öztürk, Ç., & Korkmaz, Ö. (2019). The Effect of Gamification Activities on Students' Academic Achievements in Social Studies Course, Attitudes towards the Course and Cooperative Learning Skills. Participatory Educational Research, 7(1), 1–15. https://doi.org/10.17275/per.20.1.7.1

[66] Pakinee, A., & Puritat, K. (2021). Designing a gamified e-learning environment for teaching undergraduate ERP course based on big five personality traits. Education and Information Technologies, 26(4), 4049–4067. https://doi.org/10.1007/s10639-021-10456-9

[67] Panyajamorn, T., & Suanmali, S. (2021). USING MOOC AND GAMIFICATION HYBRID LEARNING MODELS IN RURAL PUBLIC SCHOOLS IN THAILAND.

[68] PELEGRO, R. T. (2022). "GAMIFICATION IN ONLINE EDUCATION."

[69] Phung, Q. D. (2020). The negative effect of Gamification in E-learning in.

[70] Rivera, E. S., & Garden, C. L. P. (2021). Gamification for student engagement: a framework. Journal of Further and Higher Education, 45(7), 999–1012. https://doi.org/10.1080/0309877x.2021.1875201

[71] Sailer, M., & Homner, L. (2019). The Gamification of Learning: a Meta-analysis. Educational Psychology Review, 32(1), 77–112. https://doi.org/10.1007/s10648-019-09498-w

[72] Smiderle, R., Rigo, S. J., Marques, L. B., Peçanha de Miranda Coelho, J. A., & Jaques, P. A. (2020). The impact of gamification on students' learning, engagement and behavior based on their personality traits. Smart Learning Environments, 7(1). https://doi.org/10.1186/s40561-019-0098-x

[73] Soboleva, E. V., Suvorova, T. N., Grinshkun, A. V., & Bocharov, M. I. (2021). Applying Gamification in Learning the Basics of Algorithmization and Programming to Improve the Quality of Students' Educational Results. European Journal of Contemporary Education, 10(4). https://doi.org/10.13187/ejced.2021.4.987

[74] Soepriyatna, & Pangaribuan, C. H. (2022). The Direct and Indirect Influence of Gamification on Learning Engagement: The Importance of Learning Goal Orientation (A Preliminary Study). International Journal of Information Engineering and Electronic Business, 14(4), 39–46. https://doi.org/10.5815/ijieeb.2022.04.05

[75] Welbers, K., Konijn, E. A., Burgers, C., de Vaate, A. B., Eden, A., & Brugman, B. C. (2019). Gamification as a tool for engaging student learning: A field experiment with a gamified app. E-Learning and Digital Media, 16(2), 92–109. https://doi.org/10.1177/2042753018818342

[76] Yurissa, P., Kamadi, L., Haeruddin, S., Putri, N., Yurissa, M., & Timur, J. (2022). GAMIFICATION LEARNING FRAMEWORK FOR IMPROVING STUDENTS' LEARNING MOTIVATION. Indonesian Journal of Research and Educational Review, 1(2). https://doi.org/10.51574/ijrer.v1i2.285

[77] Adu, E. O. (2020). Virtual Classroom: Prospects and Challenges of COVID 19 Pandemic in South Africa. JOURNAL of HUMAN ECOLOGY, 72(1-3). https://doi.org/10.31901/24566608.2020/72.1-3.3280

[78] Chua, K. H., & Bong, W. K. (2022). Providing inclusive education through virtual classrooms: a study of the experiences of secondary science teachers in Malaysia during the pandemic. International Journal of Inclusive Education, 1–18. https://doi.org/10.1080/13603116.2022.2042403

[79] Greenan, K. A. (2021). The Influence of Virtual Education on Classroom Culture. Frontiers in Communication, 6. https://doi.org/10.3389/fcomm.2021.641214

[80] HAMAD, W. (2023). Students' experiences of learning in virtual classrooms facilitated by Google Classroom. Journal of Educational Technology and Online Learning, 6(2), 362–383. https://doi.org/10.31681/jetol.1250095

[81] Ibrahim, A., Elfeky, M., Yasien, M., & Elbyaly, H. (2023). © ICAS 2023 THE IMPACT OF VIRTUAL CLASSROOMS ON THE DEVELOPMENT OF DIGITAL APPLICATION SKILLS AMONG TEACHERS OF DIGITAL SKILLS IN NAJRAN REGION. Ann. For. Res, 66(1), 2044–2056.

[82] Khandelwal, A., & Chaturvedi, A. (2022). Effectiveness of Virtual Classroom : A Comparative Study of Theoretical and Practical Papers.

[83] Koyande, H., Kulkarni, A., Kulpe, A., & Ganorkar, A. (2022). VIRTUAL CLASSROOM SYSTEM. In International Research Journal of Engineering and Technology. IRJET.

[84] Liew, Y. P., Lim, L., & Tai, H. T. (2020). A STUDY ON STUDENTS' EXPERIENCE IN VIRTUAL CLASSROOM DURING COVID-19. ICERI Proceedings. https://doi.org/10.21125/iceri.2020.1307

[85] Maanvizhi, S., Jaiswal, J. N., Narayanan, R. R., & Rohit Jain, R. (2020). A Review on Virtual Classroom. Indian Journal of Pharmaceutical Education and Research, 54(3s), s433–s437. https://doi.org/10.5530/ijper.54.3s.141

[86] Rajab, A., & Biswas. (2020). TEACHING IN VIRTUAL CLASSROOM : CHALLENGES AND OPPORTUNITIES. International Journal of Engineering Applied Sciences and Technology, 5, 334–337.

[87] Sage, K., Jackson, S., Fox, E., & Mauer, L. (2021). The virtual COVID-19 classroom: surveying outcomes, individual differences, and technology use in college students. Smart Learning Environments, 8(1). https://doi.org/10.1186/s40561-021-00174-7

[88] Sharma, M., Singh, A., Raj, A., Yadav, A., & Rastogi, A. (2023). VIRTUAL CLASSROOM. In International Research Journal of Modernization in Engineering Technology and Science (pp. 2582–5208).

[89] Soodtoetong, N., & Rattanasiriwongwut, M. (2022). Educational Transformation with Virtual Classroom: Integrated between TTF and Social Motivation. TEM Journal, 439–445. https://doi.org/10.18421/tem111-56

[90] Van Dam, F., Kasch, J., & Rebel, K. (2022). Virtual classroom -student and teacher perceptions Evaluation 2021-2022