

## **Design a Learning Management System Platform for Primary Education**

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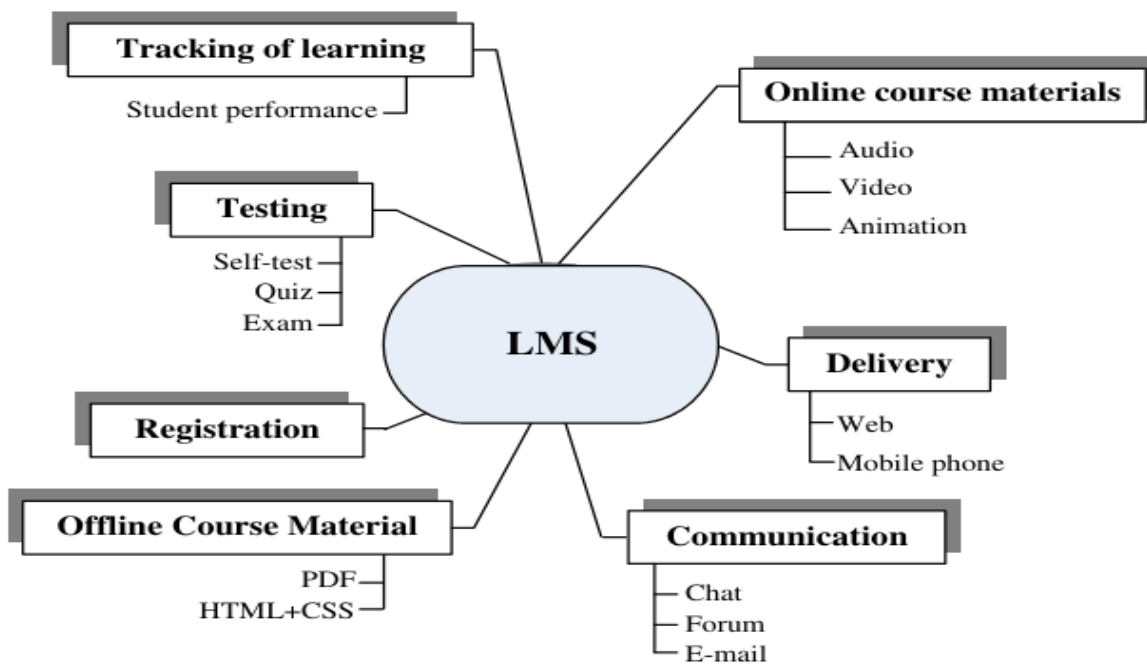
### **Abstract**

*E-learning systems have proliferated in recent years, particularly in the wake of the global COVID-19 pandemic. For kids, there isn't a specific online learning platform available, though. To do this, new conceptual models of training and learning software that are adapted to the abilities and preferences of end users must be created. Young pupils: those in kindergarten, preschool, and elementary school are unique subjects with little research history. From the standpoint of software technology, young students who have never had access to a computer system are regarded as specific users with high expectations for the functionality and interface of the software, social network connectivity, and instantaneous Internet communication. In this study, we suggested creating an electronic learning management system that is web-based and appropriate for primary school pupils. User-centered design is the fundamental technique that was applied in the development of the system that we are proposing. Test findings have demonstrated that students who are using the digital environment for the first time are studying more effectively thanks to the online learning management system.*

**Keywords:** *Learning Management System, Web, Education, Primary, Software development .*

### **1. Introduction**

The concept of a Learning Management Systems (LMS) dates back to the implementation of computer-assisted instruction in the 1960s. However, it wasn't until the internet and digital technologies became ubiquitous that LMS platforms saw widespread adoption. A LMS is a web based or cloud based software program which assist in teaching learning process and helps in effective delivery of instruction, training and development program with structure as shown in Fig. 1 [1].



**Figure 1. Structure of learning management system with main component and sub-component.**

In the period of the fourth industrial revolution, the integration of LMS in educational institutions—particularly in light of the Covid-19 pandemic—is progressively changing the nature of education, particularly in terms of creating an environment that is conducive to online learning for students. With a range of functions and resources designed to improve learning outcomes, these systems are essential in assisting students in their educational journey. Since many universities use LMS systems like Blackboard, it is critical to concentrate on their efficient use and assessment in order to maximize student involvement and learning objectives. It is critical to comprehend the various demands of elementary school pupils in the context of LMS design, since this necessitates a careful approach to integrating interactive and developmentally appropriate aspects that correspond to the stages of children's growth. Teachers and administrators can gain important insights to guide the design and implementation of an LMS platform that is customized to the particular needs of elementary school students by exploring the usage patterns and difficulties found in recent research. This will ultimately result in the creation of a more engaging and productive learning environment.

For elementary school pupils, a LMS is crucial in the current digital era. These platforms offer a single location for assignments, learning materials, and communication channels, all of which can improve the educational experience for new students. A LMS platforms facilitate self-directed learning and independence in elementary students by offering a digital space where students can access learning materials at any time and from any location. LMS systems also enable instructors to monitor student progress, tailor lessons, and give prompt feedback on exams, all of which contribute to better learning outcomes. Numerous studies have demonstrated the positive effects of integrating LMS technology into elementary education on student motivation, engagement, and achievement. In order to satisfy the increasing needs of contemporary education, it is crucial to provide an LMS platform for primary school children that is both age- and user-appropriate.

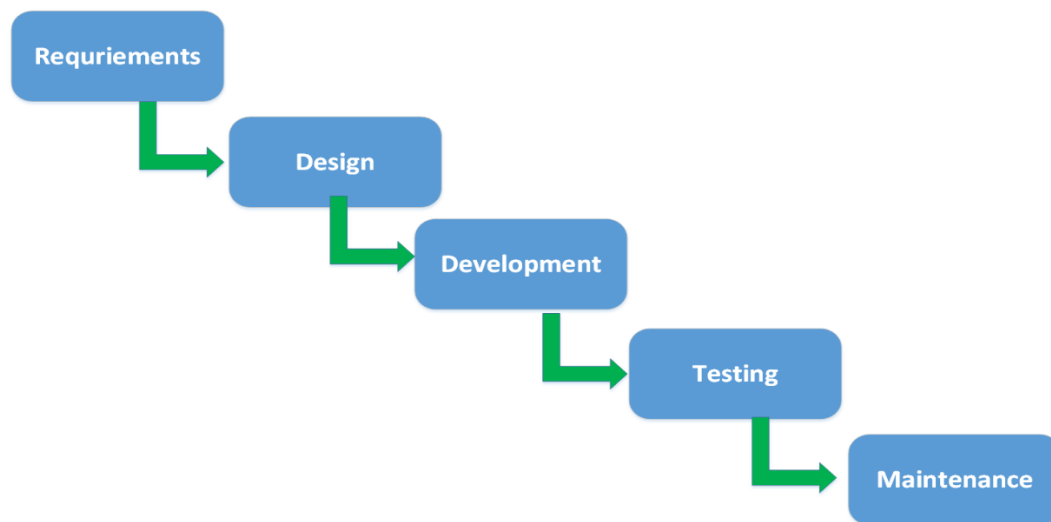
To construct an effective teaching tool, it is crucial to take into account the unique needs and traits of primary school pupils while designing a custom Learning Management System (LMS). Improving English education has placed a strong emphasis on the necessity of modifying LMS features to meet students' educational needs,

as evidenced by research from the U.S. Embassy-funded English Works project, which emphasizes the richness of teaching and learning through the use of the Canvas platform [2]. Additionally, studies conducted on Manila's private high school students revealed favorable opinions of LMSs in enhancing communication abilities and the caliber of online education, with a focus on enhancing the influence of technology integration on academic results [3]. Thus, in order to maximize elementary school kids' entire learning experience and development, the goal of creating a custom learning management system (LMS) should be to give priority to engagement, interaction, and accessibility. Studies reveal that elementary school pupils' cognitive development is a multifaceted process that includes the steady acquisition of abilities including memory, attention, critical thinking, and problem solving. When creating an LMS platform, instructors should take this level into account because it demonstrates that elementary pupils can understand abstract concepts and reason logically to a certain extent. Elementary pupils can develop deeper comprehension of academic information and improve their cognitive abilities by integrating chances for peer discussion and collaboration into the LMS. Additionally, encouraging students to solve problems and think critically will aid in the development of their cognitive skills. For primary school pupils, a well-designed LMS should be geared toward supporting their cognitive growth through the promotion of interactive learning opportunities and higher-order thinking abilities.

Numerous research have looked into how well LMS platforms work in elementary schools. LMS has been widely used to support students in a range of educational contexts, most notably in higher education [4]. According to research, LMS can increase student engagement, expedite administrative duties, and serve as a clearinghouse for instructional materials. When it came to reading comprehension assessments, elementary kids who could utilize an LMS performed better and showed higher levels of interest [5]. According to a study on LMS, teachers might accommodate a range of learning demands by using LMS to provide differentiated instruction [6]. From readings to lectures, the LMS offers a repository for a range of course resources. Regardless of their location or time zone, learners can easily access this resource [7]. By means of functionalities like message boards, chat windows, and email support, LMS facilitate improved teacher-student contact. Increased student involvement and improved education are both facilitated by this dynamic communication [8]. Furthermore, the LMS system is suitable for flexible and convenient use for education in the digital environment and online accessibility allows learners to engage with course content from any location with an internet connection [9]. The rate at which teachers and students adopt an LMS determines its efficacy. Adoption of this approach may be hampered by difficulties with the LMS interface's design and navigation. The introduction of Moodle in the classroom is covered here, however the organization of classes in middle and high schools using LMSs is not covered [10,11]. A teaching-learning model based on design-based research so that increased students' understanding and satisfaction with AI education was addressed by [12]. The in-depth analysis and design of LMS for elementary school students whose physiology and psychology are frequently confused when learning in a digital environment has not been covered in these studies. The article focuses on analyzing the requirements for the LMS system and designing it appropriately for elementary school students in the digital education era.

## **2. Materials and Methods**

The software builder method that will be used is using the waterfall model. It sometimes also called as the classic life cycle. It suggests a systematic, sequential or linear approach linear approach as shown in Fig.2 [12].



**Figure 2. Software life cycle of the waterfall model include six stages**

The six stages of the waterfall model are as follows:

1. Requirements: To determine the project's goals and scope, the first phase is obtaining requirements from stakeholders and evaluating them.
2. Design: The design stage starts as soon as the requirements are clear. To do this, a thorough design document outlining the system's components, user interface, and software architecture must be created.
3. Development: Coding the software in accordance with the design standards is part of the implementation phase of the development phase. Unit testing is another step in this process that makes that every part of the software is functioning as it should.
4. Testing: The program is tested comprehensively to make sure it satisfies the specifications and is error-free during this step.
5. Deployment: The program is put into the production environment after it has been accepted and tested.
6. Maintenance: The last stage of the Waterfall Model entails making sure the software keeps meeting the requirements over time and resolving any problems that may occur after it has been deployed.

#### + User Interface (UI) Design

Designing a LMS for primary education involves creating a user-friendly platform that caters to the needs of young learners, educators, and parents. The system must be user-friendly, engaging, secure, and supportive of diverse learning styles. Below is a detailed outline of the key features and functionalities of an LMS tailored for primary education.

#### + User-Friendly Design:

Intuitive Navigation: Simple, icon-based navigation suitable for young children.

Colorful and Engaging Themes: Bright colors and child-friendly graphics to make the interface appealing.

Responsive Design: Compatible with tablets, smartphones, and computers.

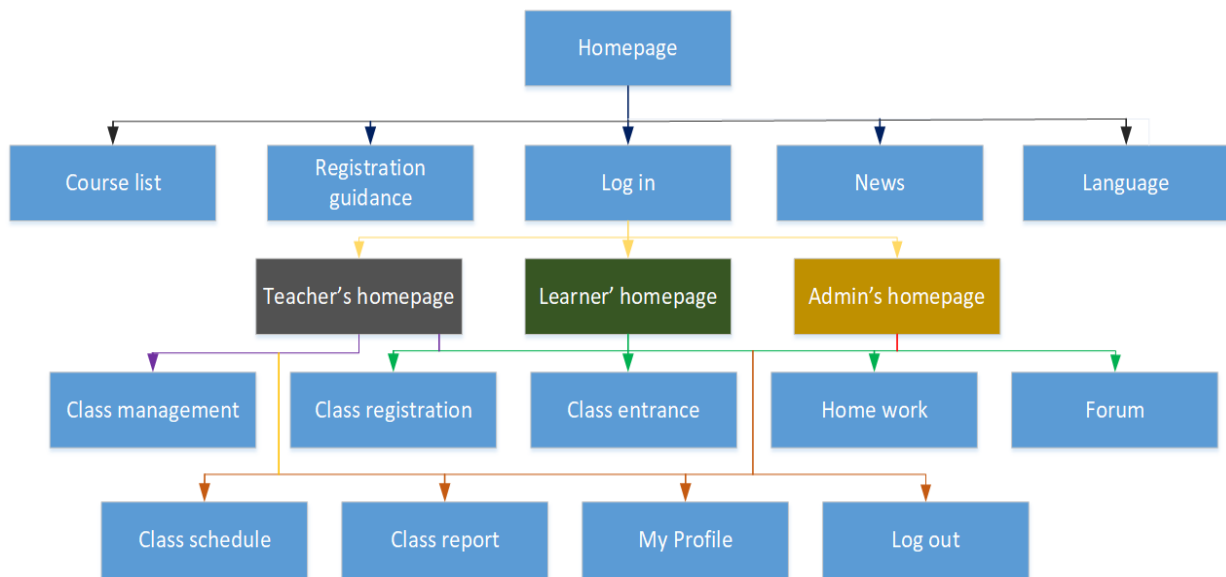
#### + User Experience (UX) Design

Personalization: Allow customization of avatars and learning paths to make the experience more personal for students.

Accessibility: Ensure the platform is accessible to all students, including those with disabilities, by following Web Content Accessibility Guidelines (WCAG) guidelines.

### 3. Results and Discussion

The proposed architectural model of an LMS platform is presented in Figure 3.



**Figure 3. Proposal of the architectural model of LMS with 3 types of user roles considered: administrator, teacher, student.**

The linkages and connections between a software application's communications and functionalities are represented by a software architecture model. Our system needs to have an intuitive and user-friendly interface because it is intended for preschoolers getting ready to start primary school. The functions of each potential user of the LMS system are taken into consideration when designing the architectural model. The system features that are made available to users are decided upon based on this. Three different user roles—administrator, teacher, and student—are taken into consideration based on an examination of the fundamental requirements for elementary school pupils.

Administrators have full control over the system, user accounts, and its content. They have the authority to approve or establish new accounts. The administrator is in charge of checking and approving the new user's role when they create an account. The user role will then determine which permissions are assigned to the user account. Administrators are also in charge of developing and keeping up study regimens.

Review of every student enrolled in a teacher-led course is possible through instructor accounts. They have the ability to add, modify, and remove topics, assignments (homework and projects for courses), and e-courses. By developing questions from which the system will automatically construct tests to hide or show these exams, teachers can define evaluation techniques. Teacher accounts can also be used to monitor student

assignments and assess students at the end of each class period.

Students can select class times, register for courses, and keep track of their schedules through their student accounts. Assignment submission to professors and homework tracking are features of student accounts.

Based on the described software architectural model, the UI of LMS platform is shown in Fig. 4.

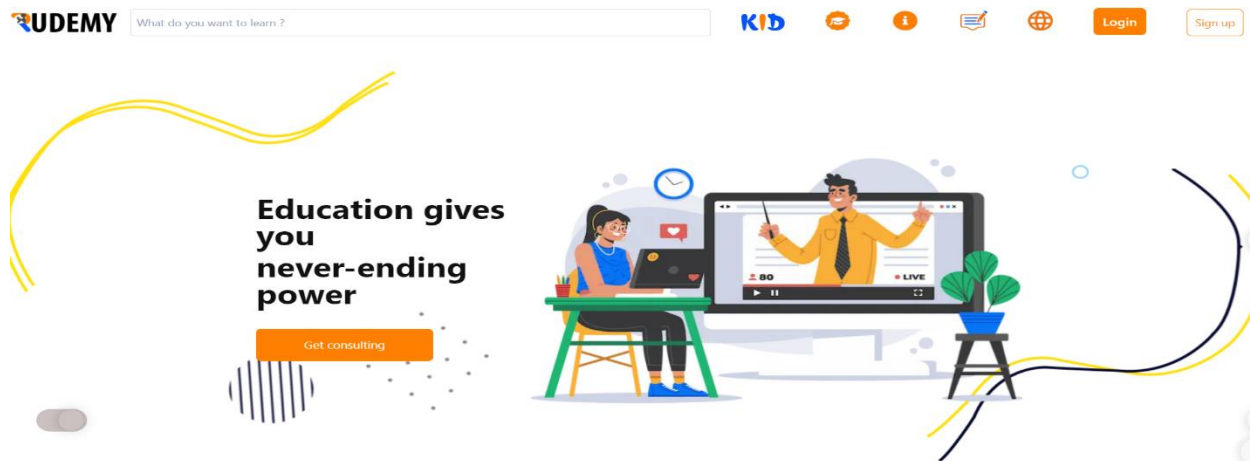


Figure 4. UI design of LMS platform with the main function based on the proposed architectural model

When the platform is opened, the Homepage will be loaded with the main menu in the top bar. For the student user, after registration the user, the homepage is show in Fig.5 (a) for course select function, Fig. 5(b) for online study, Fig. 4(c) for homework assignment check function and Fig. 4(d) for assignment submission.

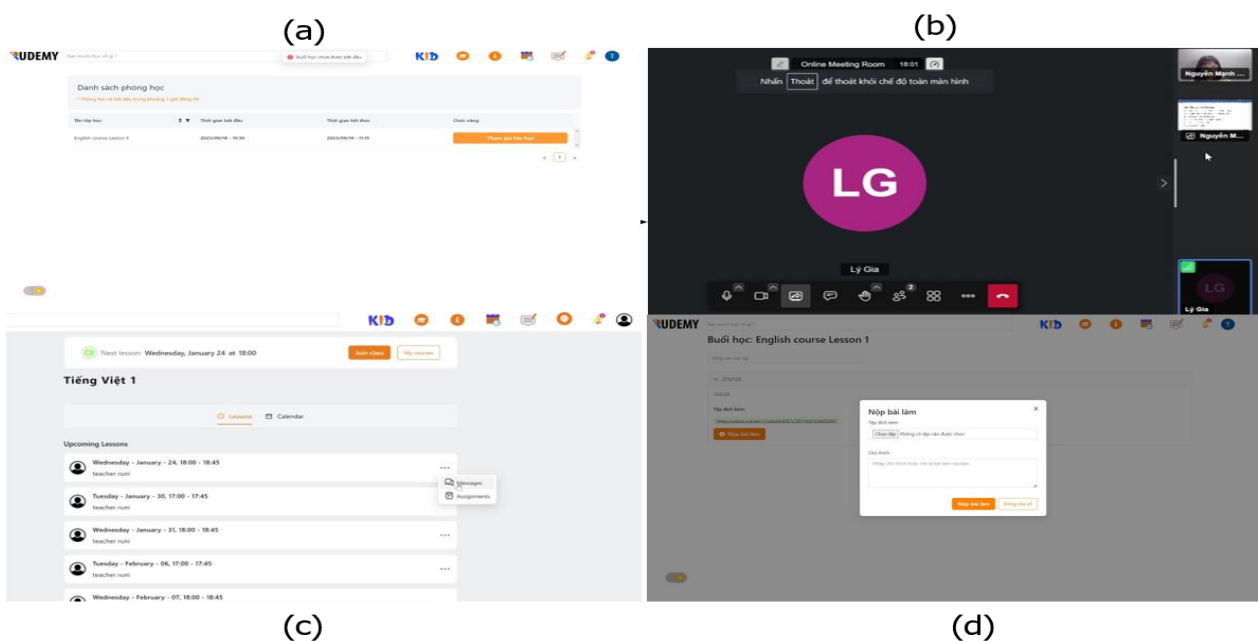


Figure 5. Architectural model of LMS of student's role such as (a) selected course, (b) online class, (c) homework assignment and (d) homework submission

For the teacher user, after registration the user, the homepage is show in Fig.6 (a) for course assignment function, Fig. 6(b) for class schedule, Fig. 6(c) for homework assignment function and Fig. 6(d) for homework creating.

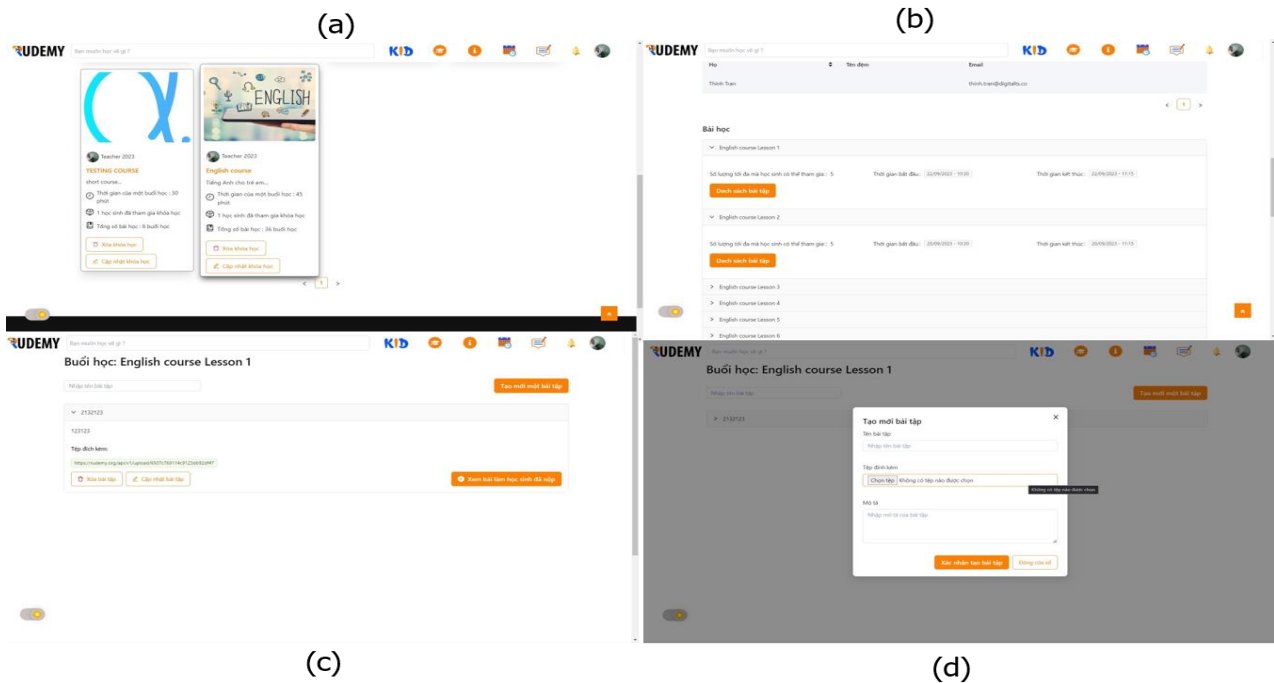


Figure 6. Architectural model of LMS of Teacher's role such as (a) assigned course, (b) class schedule, (c) homework assignment and (d) homework creating

For the Administration, the homepage is show in Fig.7 (a) for course assignment function, Fig. 7(b) for class schedule, Fig. 7(c) for homework assignment function and Fig. 7(d) for homework creating.

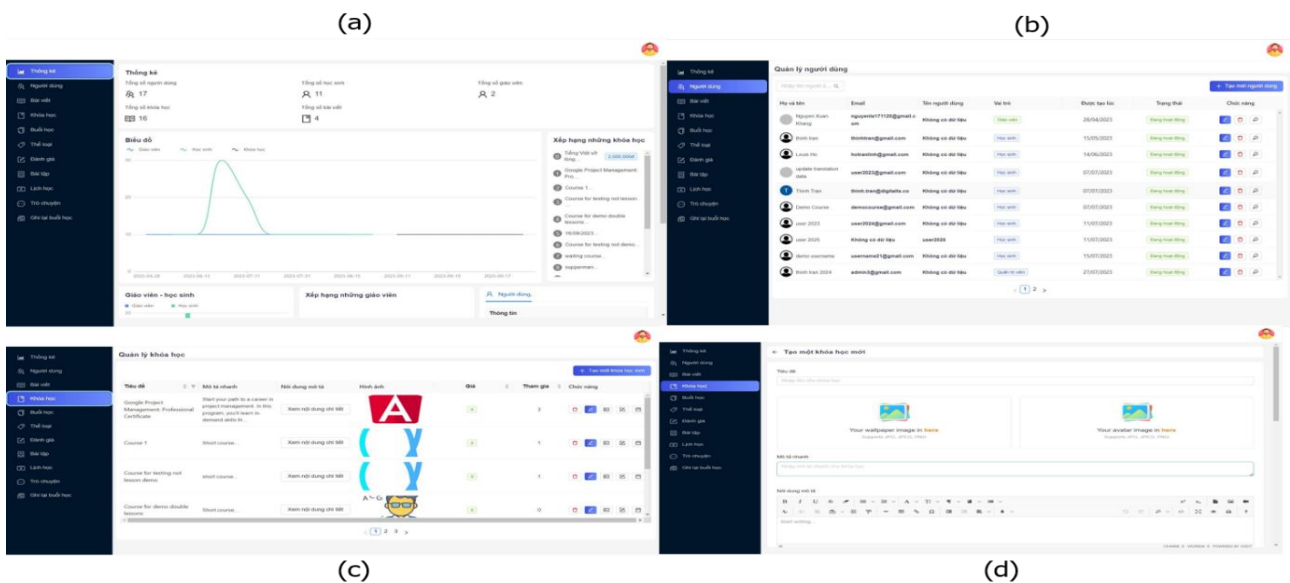


Figure 7. Architectural model of LMS of Admin's role such as (a) user registration statistics, (b) user management, (c) class management and (d) new class creating

Before this system can be widely used, it must first be tested. Some tests were conducted for Vietnamese children living in Korea who are preparing to learn Vietnamese. Learning management system application testing is performed using black box testing methods. Testing is needed as one of the implementation phases to check the minimum error level and accuracy of the designed software. Test results show that the system operates stably, the interface design is friendly and suitable for elementary school children.

## 5. Conclusion

Designing an LSM for elementary education involves a careful and comprehensive approach that takes into account the unique requirements and challenges of young pupils. By combining interactive material, assessment tools, communication features, and administration capabilities, an LMS for primary school can enhance the teaching and learning experience for students, instructors, and parents. As technology continues to play a major role in education, establishing innovative and user-friendly LMS systems for primary education will be necessary in the digital age. In this paper, we propose an LMS model based on a learner-centered systems approach, designed to serve elementary school students. To validate the LMS framework design and development approach, a demo version of the e-learning management system was developed. The software supports three types of users: administrators, teachers, students. From a design perspective, the user interface and system functionality are simplified for ease of use. Demo results have proven that the LMS platform has been effective for elementary school students' online learning when accessing the digital learning environment for the first time.

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