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Creating an Interactive and User-Friendly E-Learning Platform Using Php And Laravel

Rustamxon Mexmonov
Associate Professor of the Tashkent Branch of the University of Business and Science, Uzbekistan

Asilbek Shoyzaqov
Master's student of the Tashkent Branch of the University of Business and Science, Uzbekistan

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Abstract

This work covers the issues of creating an interactive and user-friendly e-learning platform based on Laravel/PHP technologies. It analyzes the possibilities of digitizing the educational process, delivering educational materials in electronic form, automating testing and assessment processes, monitoring student results, and enhancing interactive communication between teachers and students. It also describes the main modules of the platform - user registration, course management, placement of educational materials, testing and assessment, administrator panel, and results tracking system. The study is based on the fact that the MVC architecture of the Laravel framework, database management, security mechanisms, and user role management capabilities serve to form the educational platform as a stable and scalable system. This platform is aimed at increasing the activity of students in independent learning, developing programming competence, and improving the quality of education.

Keywords: e-learning platform, Laravel framework, PHP programming language, distance learning, digital learning, web programming, programming competency, MVC architecture, educational technologies.

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1. Introduction

Digital technologies are deeply penetrating all stages of the education system. In particular, the delivery of educational materials in electronic form in the process of continuous education, remote monitoring of student knowledge, organization of independent learning, and communication between teachers and students in an interactive environment are among the urgent issues. From this point of view, the topic "Creating an interactive and user-friendly educational platform using E-Learning and PHP" is an important scientific and practical direction aimed at digitizing the modern educational process, improving teaching methodologies, and automating assessment criteria.

The main content of this topic is to develop an electronic educational platform using the PHP programming language and the Laravel framework that manages the educational process, uploads educational materials, forms tests and assignments, automatically records assessment results, and has a user-friendly interface.

Laravel technology allows you to create web applications based on a fast, secure, scalable, and systematic architecture. Therefore, this technology is considered an effective tool in the development of educational platforms.

The interactive e-learning platform provides separate functional opportunities for teachers, students and administrators. The teacher posts subject topics, lecture texts, video lessons, practical assignments, test questions, and assessment criteria through the platform. The student takes tests and monitors the results through a personal account and monitors his results through his personal account. The administrator registers users, manages roles, organizes courses, and carries out general monitoring.

2. Literature Review

In the digital economy, the organization of the education system based on modern software tools is one of the urgent issues. Digital technologies introduce electronic resources, distance learning, automated assessment, and interactive communication into the educational process. This justifies the need to create e-learning platforms and introduce them into the continuous learning process [1-3].

In scientific sources, e-learning systems are analyzed from the point of view of digitizing the educational process, organizing distance learning, automating assessment criteria, developing programming competence, and creating a user-friendly interactive environment. Such systems complement traditional education, allow storing educational materials in electronic form, mastering them at any time, and regularly monitoring students' learning activity [4-8].

E-learning platforms developed based on PHP and Laravel technologies are important in developing practical skills in web programming, working with databases, creating user interfaces, and ensuring system security. The MVC architecture of the Laravel framework allows for logical separation of platform components, creating a system that is secure, stable, and scalable [9-10].

Also, e-learning systems include features such as course management, posting educational materials, creating tests and assignments, automatically calculating assessment results, personal accounts, forums, chats, and notifications that increase the efficiency of the learning process. Therefore, the development of e-learning platforms is not only a means of improving distance learning but also an effective approach to developing students' independent learning skills and programming competence.

Main Directions Of E-Learning Systems

E-learning systems are generally analyzed in the following main areas:

Digitization of the educational process. E-learning platforms integrate modern information technologies into the traditional teaching process. Educational resources are provided electronically, enabling students to study materials independently and effectively (Fig. 1.).

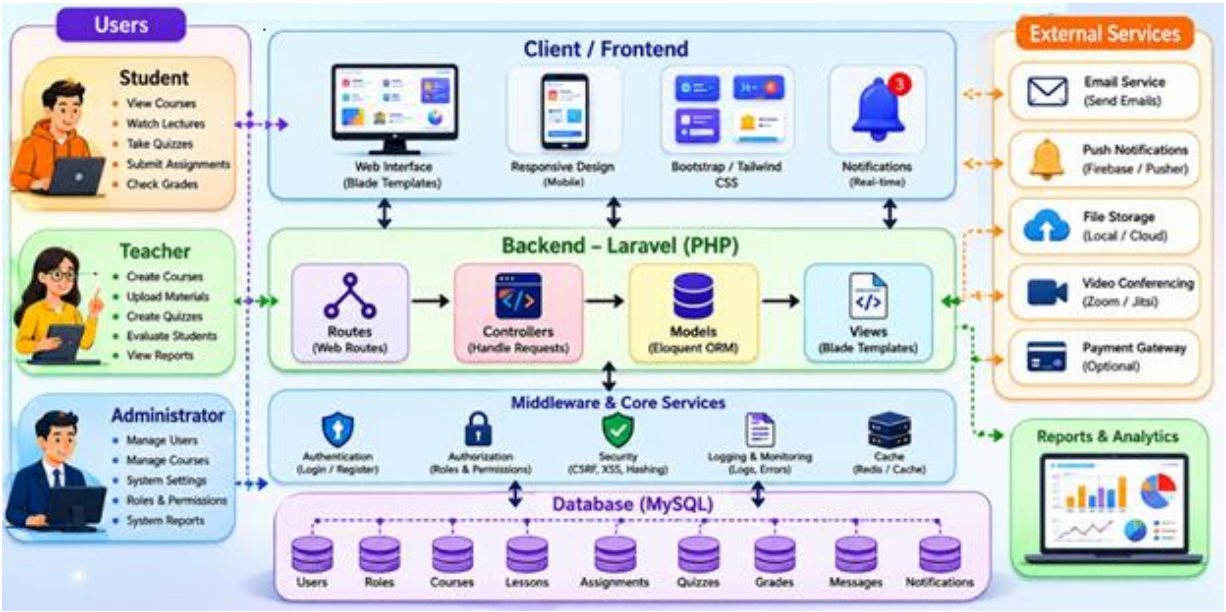

Fig. 1. General architecture of an interactive e-learning platform based on Laravel/PHP

Distance learning opportunities. E-learning systems eliminate geographical distance as a limitation. Students can connect to courses through the Internet, study learning materials, complete assignments, take tests, and monitor their results online.

Automation of assessment criteria. The platform allows automatic calculation of quizzes, midterm examinations, final assessments, and independent work results. This saves teachers' time, reduces assessment errors, and ensures transparency in evaluation.

Development of programming competence. Platforms developed using PHP and Laravel help students gain practical skills in web programming, database management, user interface design, and system security.

Interactivity and user-friendliness. A modern educational platform should not be limited to simple information sharing. It should provide interactive functions such as forums, chats, notifications, personal accounts, rating systems, assignment uploads, and online test result monitoring.

MVC Architecture of the Laravel Framework. The Laravel framework operates based on the MVC Model–View–Controller architecture. This architecture enables the logical separation of system components:

- Model — works with the database and manages the main system data.

- View — represents the user interface and ensures visual interaction between the user and the system.

- Controller — processes user requests, commands, and business logic.

The MVC approach ensures that the educational platform is organized, secure, stable, and scalable. It also makes it possible to integrate additional modules, services, and interactive features into the system in the future.

MAIN FUNCTIONAL CAPABILITIES OF THE PLATFORM

An interactive e-learning platform based on Laravel/PHP should include the following core modules:

User registration module. This module separates administrator, teacher, and student roles. Each user enters the system using a username and password [11].

Course management module. Through this module, teachers can upload subject names, topics, lesson plans, lecture materials, and practical exercises to the platform.

Educational materials module. The platform supports uploading PDF files, videos, audio materials, presentations, text lectures, and additional literature resources.

Testing and assessment module. This module enables the creation of test questions, open-ended questions, practical assignments, and automatic assessment criteria for evaluating student knowledge.

Results monitoring module. The system displays each student's learning performance, assignment completion status, test results, and overall rating.

Communication and collaboration module. This module provides forums, messaging systems, comments, and teacher–student interaction opportunities, strengthening communication within the educational environment.

Administrator control panel. The administrator manages users, courses, subjects, statistical data, and security settings of the platform.

Advantages of Laravel/PHP Technology. Developing the platform using Laravel provides several important advantages:

High-level security. Laravel offers authentication, password encryption, CSRF protection, and user role management capabilities.

Convenient database management. Using Eloquent ORM, information about students, teachers, courses, grades, and assignments can be managed efficiently and systematically.

Scalability of the system. The platform can later be expanded by integrating mobile applications, SMS notifications, electronic journals, video conferencing, or artificial intelligence-based recommendation systems.

User-friendly interface. Integration with Bootstrap, Tailwind CSS, or Vue.js allows developers to create modern, responsive, and understandable user interfaces.

Automation of teaching and assessment processes. Test results, assignment scores, attendance records, and final grades are calculated automatically by the system.

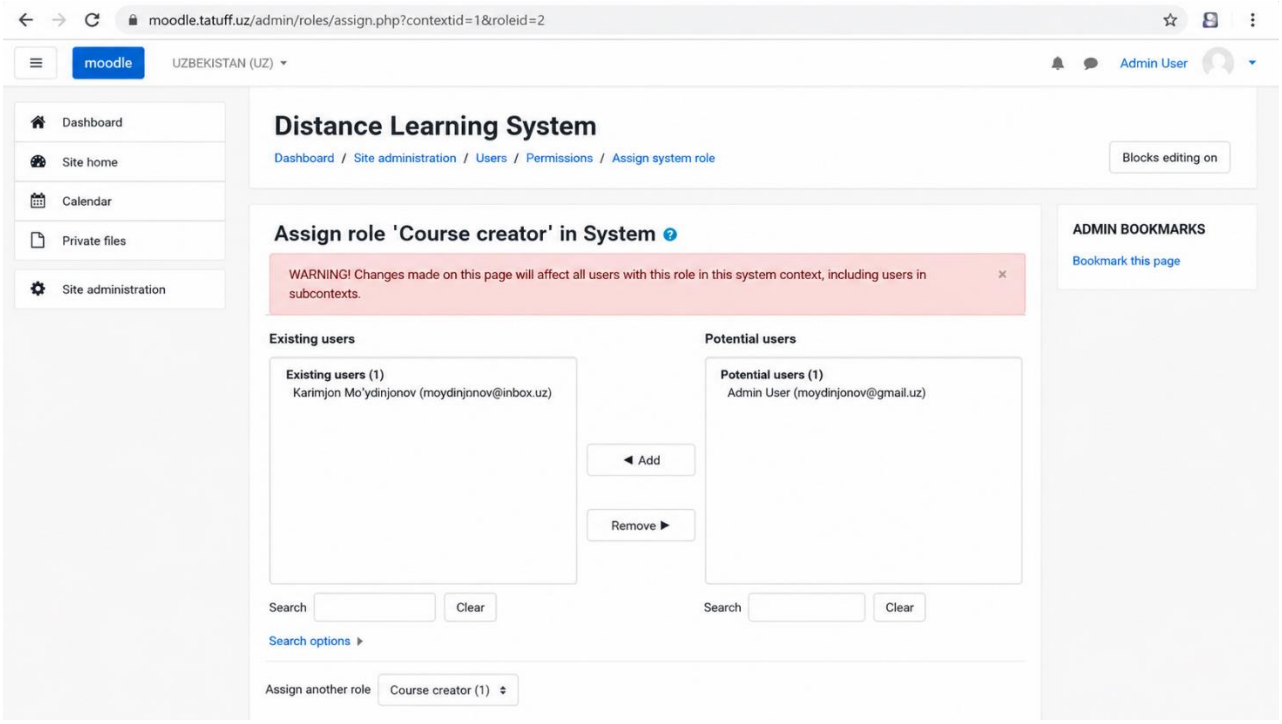

Fig. 2. User role management interface in the Moodle-based distance learning system

An interactive e-learning platform developed on the basis of Laravel/PHP technologies plays an important role in digitizing the educational process, strengthening teacher–student interaction, ensuring transparency in assessment, and improving students' programming competence (Table 1.).

Table 1. Classroom activities for developing a Laravel/PHP-based e-learning platform

Week	Online Learning Activity	Description
1	Formulating Expected Learning Outcomes	Teachers provided students with information about the expected learning outcomes of this course to help them prepare a plan to access learning materials and information from various sources to learn about real-life problems that lead to the origin and significance of the project. Teachers should also connect the content to real-life situations and encourage students to apply what they have learned to analyze and relate to problems they face in life or society.

2	Pre-test	Teachers asked students to take a programming test provided in Google Forms. After that, the programming instructors explained the importance of programming components. To increase student engagement and motivation, teachers used Kahoot to create an "Introduction to Programming" video tutorial for students. They completed this video tutorial to find the winner of the game.
3	Designing a Project Topic	The programming instructors and students discussed and identified real-life problems in today's society. The teachers and students then identified a project topic. The teachers explained that to complete the course, students would work in pairs to create an app with Thunkable.
4	Introducing Thunkable	The teachers introduced the students to how to use Thunkable. The content included a Thunkable component, a design page, a blocks page, and a live test.
5	Smart Workshop	The teachers demonstrated step-by-step how to create a rock-paper-scissors game. The students followed the teacher's demonstration. After completing the workshop, the students recorded their block pages and posted them to the class Facebook group. The blocks are shown in Figure 1.
6	Formulating a Project Proposal	The students submitted a project proposal that included a problem and solution, a framework, and a production timeline.

7	Flowchart Practice	The teachers taught the students about drawing symbols and how to create a diagram in draw.io. After that, the teachers assigned the students to create a flowchart that showed the process of solving a problem that would be tested for remote learning.
8	Flowchart Thunkable App	Each pair of students created a program outline and reported on the development plan.
9-10	Let's Create a Project	Each pair of students created a program. Students communicated with each other through online communication channels such as video conferencing and social media. If students encountered problems that they could not solve on their own, they immediately reported them to the teacher.
11	Presentation	The students demonstrated their Thunkable app. After that, they uploaded their project to a YouTube channel for anyone interested in building an app using Thunkable. Some examples of Thunkable apps were shown.
12	Evaluation	The teachers provided feedback to the students on their presentations and graded the entries based on a rubric score.
13	Post-test and Reflection	At the end of the course, the students were asked to retake the programming competency test. The teachers then allowed the students to reflect on their online learning experience via post-its on the wall in Padlet, as some students may not be able to fully express their

		thoughts. Writing anonymous comments can give teachers a great insight into past learning activities.

ASSESSMENT OF STUDENTS' PROGRAMMING COMPETENCE IN PHP AND E-LEARNING PLATFORM DEVELOPMENT

This study is aimed at assessing students' programming competence in the PHP programming language, the Laravel framework, and e-learning platform development. The assessment process focuses on evaluating students' theoretical knowledge, practical skills, algorithmic thinking, web application development abilities, database management skills, interface design competence, and their ability to create user-friendly learning platforms [12].

When assessing students' programming competence, the main evaluation criteria include test results, practical project work, development of functional modules, interface design, database management, and final project presentation. This approach enables a comprehensive assessment of students' knowledge, skills, and qualifications in the process of developing an interactive learning platform based on PHP and Laravel [13].

Principles of Programming Competence Assessment

The main purpose of the assessment is to determine students' competence in PHP programming, Laravel framework usage, database management, and e-learning platform development. The assessment tests and practical project tasks are designed for students of higher education institutions and serve to identify their level of preparation in web programming and e-learning system development. To evaluate theoretical knowledge, multiple-choice tests with four answer options are used. To evaluate practical competence, students develop either a small e-learning module or a fully functional educational platform project based on Laravel/PHP [14].

Each test or project element covers the following programming competence components:

- problem decomposition;
- algorithmic thinking;
- abstraction;
- database management;
- object-oriented programming;
- MVC architecture;
- authentication;
- user role management;
- interface design.

Types of Projects Developed by Students. As part of the study, students can develop the following types of e-learning projects using PHP and Laravel:

- Online test system — a module containing multiple-choice and "yes/no" questions, automatic result calculation, and rating table generation.
- Electronic course platform — a system for publishing lecture texts, video lessons, practical assignments, independent work, and downloadable educational materials.
- Student personal account — a module displaying students' courses, assignments, grades, test results, attendance, and overall learning performance.
- Teacher control panel — a module that enables teachers to create courses, add topics, assign tasks, create tests, define assessment criteria, and monitor student performance.
- Administrator panel — a system for managing users, assigning roles, controlling courses, ensuring platform security, and generating statistical reports.

Laravel/PHP Project Evaluation Criteria

The rubric for evaluating e-learning projects developed using Laravel/PHP is divided into the following criteria:

1. Programming concepts. Students are assessed based on their ability to correctly use PHP syntax, Laravel MVC architecture, routes, controllers, models, migrations, authentication, and database management.

2. System functionality. The platform is evaluated according to the availability of functions such as course creation, material uploading, test creation, assessment, user role assignment, result display, and monitoring.

3. Design and interface usability. The user interface is assessed in terms of simplicity, clarity, flexibility, responsiveness, and compatibility with mobile devices.

4. Creativity. Students' ability to add additional features such as notifications, rating tables, forums, chats, graphical reports, and personal accounts is taken into account.

5. Content and educational value. The relevance of educational materials, assignments, test questions, and assessment criteria to the educational process is analyzed.

6. Usability. The platform is evaluated according to ease of use for teachers, students, and administrators, logical menu organization, error prevention, and fast navigation capabilities.

7. Presentation and defense. Students are assessed based on the clarity of project presentation, demonstration of system functionality, and explanation of project goals and results.

Assessment Levels. The overall scoring system for evaluating an e-learning project based on Laravel/PHP is defined as follows:

- Basic level — students who score less than 15 points. In this case, some parts of the platform function properly, but there are shortcomings in functionality, design, or database management.

- Developing level — students who score between 15 and 20 points. In this case, the main modules function correctly and the user interface is formed, but some features still require improvement.

- Competent level — students who score more than 20 points. In this case, the platform is fully functional, secure, user-friendly, connected to the database, and suitable for real educational use.

A score above 2.5 points for each criterion indicates a competent level, a score between 2.01 and 2.5 points indicates a developing level, and a score below 2 points indicates a basic level.

3. Result and Discussion

The analysis of student-developed e-learning projects based on Laravel/PHP shows that most students achieve relatively high results in design, interface usability, and presentation. This is mainly because modern web frameworks allow developers to create user interfaces quickly and efficiently. However, results related to programming concepts, database management, security, authentication, and complete implementation of system functionality are often at the developing level.

The results of pre-test and post-test evaluations demonstrate that students' knowledge and practical skills in PHP and Laravel web application development significantly improved. In particular, students strengthened their competencies in working with MVC architecture, user roles, database migrations, testing modules, electronic assessment systems, and monitoring tools.

Therefore, project-based learning using Laravel/PHP can be considered an effective methodological approach for developing students' programming competence. The developed interactive e-learning platform plays an important role in organizing the modern educational process, expanding distance learning opportunities, automating teaching and assessment processes, improving user convenience, and enhancing the overall quality of education.

Table 2. Evaluation rubric for an e-learning platform project developed based on Laravel/PHP

Evaluation Criteria	Evaluation Criteria	Skill level - 2 points	Level of proficiency - 3 points
Programming Competency Concept	Programming Competency Concept	The student can use PHP basics, conditional operators, loops, functions, Laravel routes, controllers and views.	The student comprehensively uses PHP, Laravel MVC architecture, route, controller, model, migration, middleware, authentication and database work.

Design	Design	Most pages are organized, graphic elements and colors partially match the platform content, and the user interface is understandable.	All pages have a single design style, colors, menus, buttons and graphic elements fully correspond to the content of the educational platform.
Creativity	Creativity	The platform is useful and interesting, but the functions are presented mainly in a standard way.	The platform has creative and interactive features such as tests, ratings, notifications, personal account, chat/forum or statistical analysis.
Content	Content	Most of the training materials are relevant to the topic, but there are some spelling, formatting or content shortcomings.	All educational materials, tests, assignments and assessment criteria are arranged in a systematic and error-free manner, relevant to the topic.
Usability	Usability	The platform is relatively easy to use, pages load quickly, but some instructions are not clear enough.	The platform is easy to use, loads quickly, the menus are logically arranged, the instructions are understandable and user-friendly.
Presentation	Presentation	The student can explain the project in general, show the main pages and functions, but there are some interruptions in the explanation.	The student clearly, consistently and confidently presents the purpose, architecture, functions, database and user roles of the platform.

Table 3. Evaluation results of the e-learning platform project developed based on Laravel/PHP

	M	Note
programming competency concept	2.5	Developing
Design	2.5	Skill
Creativity	3.0	Developing
Content	1.0	Developing
Usability	3.0	Developing
Presentation	3.0	Skill
Total	15.0	Developing

According to this study, block programming and pair work can be incorporated into the "Innovations in Educational Technology and Mass Communication" course to improve students' programming competency. Such interventions help students perform better in the course and on their projects.

4. Conclusion

The study substantiated the scientific and practical significance of creating an interactive and user-friendly e-learning platform based on Laravel/PHP technologies. The platform serves to digitize teaching methodologies and assessment criteria in the continuous education system, enhance teacher–student interaction, systematically deliver educational materials, automate testing and assessment, monitor learning outcomes, and ensure transparency in knowledge evaluation. Its MVC architecture, database management, security mechanisms, and user role management capabilities make the system stable, scalable, and effective for the educational process. As a result, the developed platform helps improve the quality of education, increase students' independent learning activity, make the learning process more flexible, and develop programming competence.

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