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Project Summary

The "Design and Development of an Online Learning Hub for Enhanced Digital Education Access at Southern Philippines Institute of Science and Technology" aims to create a centralized online platform that addresses the need for accessible, engaging, and ICT-integrated learning. The project focuses on improving digital access to educational content and enhancing the overall learning experience for both students and teachers. By developing a user-friendly learning hub, the project seeks to modernize the school’s digital infrastructure and support effective teaching and learning practices.

Scope:

The project includes the design, development, and pilot implementation of a functional online learning hub that supports content delivery, assessments, and student-teacher communication.

Expected Outcomes:

A responsive and fully functional online learning platform

Improved student access to digital learning materials

Enhanced teacher capability in using ICT for instruction

Measurable student engagement through platform usage

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Target Audience

Students of SPISAT, particularly those with limited access to traditional classroom resources

Teachers, to assist in lesson delivery, assessment, and tracking student progress

School administrators, to oversee content and usage analytics

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II. Problem Statement & Research Questions

Problem Statement:

Southern Philippines Institute of Science and Technology currently faces challenges in delivering consistent, accessible, and engaging educational materials through digital means. With varying levels of ICT literacy and limited centralized digital infrastructure, both students and teachers struggle to adapt to modern learning environments. There is a need for an efficient platform that can bridge these gaps using ICT tools to enhance access, engagement, and learning outcomes.

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Research Questions (Quantitative-Focused):

1. What percentage of students are able to complete a given activity on the online learning hub without assistance after a short orientation session?

2. Which interactive ICT features (quizzes, videos, downloadable materials) receive the highest usage rate during the testing phase of the platform?

3. What is the average student satisfaction rating of the online learning hub based on a standardized post-use survey?

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III. Project Goals & Objectives

Project Goals:

The primary goal of this project is to design and develop a fully functional online learning hub that enhances digital access to education for students and teachers at Southern Philippines Institute of Science and Technology (SPISAT). By integrating ICT tools, the project aims to promote interactive learning, improve content delivery, and strengthen digital skills among users.

Specifically, the project hopes to:

Provide a centralized platform for digital learning materials and assessments

Improve the quality of student engagement and learning experience through ICT integration

Equip teachers and students with the skills to navigate and utilize online learning tools effectively

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Project Objectives (SMART):

1. Develop and deploy a functional prototype of the SPIST Online Learning Hub within four weeks, including user interface, content upload system, and interactive modules.

2. Conduct a one-day orientation and testing session for at least 30 students and 5 teachers, ensuring they can access and use the platform with minimal assistance.

3. Collect user feedback through a standardized survey and aim for at least a 75% satisfaction rating in terms of usability, accessibility, and content clarity.

IV. Project Methodology

Data Collection Methods:

To gather quantitative data and evaluate the effectiveness of the online learning hub, the project will use survey questionnaires featuring Likert scale questions. These surveys will be administered immediately after the platform testing session to both students and teachers who participated in the orientation and pilot use of the system.

The Likert scale will measure user perceptions and satisfaction across key areas such as:

Ease of navigation

Usefulness of content

Engagement level with ICT features (e.g., quizzes, videos, downloadable materials)

Overall user satisfaction

The survey results will help answer research questions related to feature usage, user experience, and platform effectiveness. The data collected will be tabulated and analyzed using descriptive statistics such as mean scores and percentage distributions to identify trends and user preferences.

Additional data such as completion rates of digital activities and usage frequency of platform features will also be collected through the platform’s activity logs to supplement the survey findings.

ICT Tools & Technologies

The online learning hub will be developed using the following ICT tools and technologies to create a fully functional, interactive, and user-friendly platform:

1. Web Development Technologies:

Tools: HTML, CSS, JavaScript

Function: These front-end technologies will be used to design and develop the structure, layout, and interactive elements of the website. HTML will define the content, CSS will handle the styling and responsive design, and JavaScript will enable interactive features such as quizzes, content display, and dynamic content loading.

2. Database Management:

Tools: MongoDB, Firebase

Function:

MongoDB will be used to store and manage dynamic content such as user data (students and teachers), learning materials, and quiz results.

Firebase will provide real-time data synchronization and user authentication, ensuring that the platform is secure and can track student progress, teacher uploads, and interactions seamlessly.

3. Learning Material Management System:

Function: This feature will be integrated with MongoDB to store the uploaded files and organize them based on courses or subjects.

Student Access: In the "Learning Materials" section, students will be able to view and download the uploaded files easily.

4.Quiz Section:

Function: The quiz section will consist of pre-coded quizzes, where the questions and answers are already integrated into the system. Teachers will not create or modify quizzes directly; instead, they will be predefined by the developers. Students can take these quizzes, and their responses will be tracked in MongoDB for grading and feedback purposes.

5. Development Environment:

Tool: Visual Studio Code

Function: Visual Studio Code will serve as the integrated development environment (IDE) for coding and testing the project. It will support development with features like code completion, debugging, and version control integration

Project timeline

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V. Project Activities

Detailed Project Plan:

1. Project Planning & Requirements Gathering (March 20 – March 24)

Conduct initial meetings with key stakeholders (teachers, administrators) to gather requirements.

Define the overall structure and features of the online learning hub (content management, quiz section, file uploads).

Develop a project timeline with specific milestones.

2. Website Structure and Design (March 25 – March 31)

Create wireframes and mockups for the website layout and design.

Finalize the UI/UX design to ensure ease of navigation and user accessibility.

Develop the front-end structure using HTML, CSS, and JavaScript.

3. Core Development (April 1 – April 10)

Implement core functionalities such as content uploading, file management, and the pre-coded quiz section.

Set up the MongoDB database to store user data, uploaded materials, and quiz results.

Integrate Firebase for real-time data synchronization and user authentication.

4. Integration of Features and Testing (April 11 – April 15)

Integrate all features, including upload system, learning materials section, and quizzes.

Test each feature for functionality, security, and user experience.

Debug any issues with code, functionality, or interface.

5. Finalization and Debugging (April 16 – April 20)

Conduct a full review of the website for any final bugs or issues.

Optimize the site for responsiveness on mobile and desktop.

Perform security testing to ensure safe data transmission.

6. Pilot Testing and Orientation (April 23)

Conduct the pilot testing session at the school bazaar with a select group of students and teachers.

Provide an orientation to help users understand how to navigate the site.

Collect user feedback through survey questionnaires with Likert scale questions.

7. Data Collection & Analysis (April 24 – April 25)

Collect survey data and usage statistics from the pilot testing.

Analyze the data to assess the effectiveness and user satisfaction.

8. Final Evaluation and Reporting (April 26 – April 30)

Evaluate the overall success of the project.

Compile a final report, including user feedback, data analysis, and suggestions for improvement.

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Resource Allocation

1. Human Resources:

Project Developer/Lead: Responsible for the overall development, coordination, and implementation of the project.

UI/UX Designer: Designs the website's layout, ensuring it is user-friendly and responsive.

Database Administrator: Manages the setup and maintenance of MongoDB and Firebase integration.

Quality Assurance Tester: Conducts testing and debugging to ensure smooth functionality.

Teachers/Users for Pilot Testing: Provide feedback on usability and effectiveness.

2. Financial Resources:

Software Tools: There may be costs for premium versions of tools such as Firebase or hosting services for the website.

Server/Hosting: Costs for hosting the website during development and testing.

Miscellaneous: Budget for printing survey questionnaires and other materials for the pilot testing.

3. Technological Resources:

Software: HTML, CSS, JavaScript, MongoDB, Firebase, Visual Studio Code.

Hardware: Computers and mobile devices for testing the site’s functionality across various platforms.

Internet Access: Needed for development, deployment, and testing of the online learning hub.

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Risk Assessment

1. Technical Risks:

Risk: The website may experience technical glitches or downtime.

Mitigation Strategy: Perform thorough testing and debugging before pilot testing. Use real-time monitoring to ensure the platform stays operational during testing.

2. User Acceptance:

Risk: Users (teachers/students) may have difficulty navigating the platform.

Mitigation Strategy: Provide an orientation and tutorial before the pilot test. Gather user feedback and continuously improve the user interface based on their suggestions.

3. Data Security:

Risk: The platform may be vulnerable to security breaches, particularly with user data.

Mitigation Strategy: Use Firebase's built-in security features for user authentication and data encryption. Regularly review security measures and implement updates as necessary.

4. Time Constraints:

Risk: There might be delays in completing certain tasks due to the complexity of the features or unexpected challenges.

Mitigation Strategy: Set realistic timelines and buffer periods for each task. If necessary, prioritize essential features for the pilot testing phase and complete secondary tasks later.

5. Technical Skill Gaps:

Risk: The project may require expertise in areas like MongoDB, Firebase, or front-end development that may not be immediately available.

Mitigation Strategy: Ensure continuous learning and research, and seek help from online resources or communities for any challenges. Alternatively, collaborate with more experienced developers if required.

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VI. Project Delivery & Evaluation

Project Delivery:

The project deliverables will be presented and disseminated through the following means:

1. Online Learning Platform:

The final version of the online learning hub will be deployed on a live server for full access by students, teachers, and administrators. The platform will be made available via a dedicated URL.

2. Training Materials:

Training materials, including user guides and video tutorials, will be provided to teachers and students on how to use the platform effectively. These materials will be uploaded to the platform itself for easy access and can be distributed in digital format.

3. Final Report and Documentation:

A comprehensive final report, documenting the development process, features of the platform, user feedback, and data analysis, will be created. This report will be shared with school administrators, faculty, and other stakeholders for review.

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Project Evaluation:

To evaluate the success of the project, the following methods will be used:

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1. Student Satisfaction Survey:

A structured survey using Likert scale questions will be administered to students after using the platform. The survey will assess key aspects such as ease of use, accessibility of learning materials, usefulness of the quiz section, and overall satisfaction with the online learning hub. Open-ended questions will also be included to gather qualitative feedback and suggestions for improvement.

2. Student Feedback:

The survey results will be analyzed to understand how students perceive the platform’s usability, content delivery, and impact on their learning experience. High satisfaction ratings and positive feedback will indicate success in meeting student needs.

3. Teacher Feedback:

Teachers will also be surveyed to assess the platform’s functionality from their perspective, particularly the ease of uploading resources, the clarity of the content layout, and the usefulness of the quiz section for student assessment.

4. Impact on Learning Engagement:

Platform engagement metrics such as the number of resource downloads, quiz participation rates, and active users will be analyzed. A high level of interaction and participation will suggest that the platform is effectively supporting student learning.

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Sustainability:

The sustainability of the project will be ensured through the following measures:

1. Ongoing Support and Maintenance:

The platform will be maintained by school IT staff or the development team for bug fixes, updates, and feature enhancements. Regular updates will ensure the system remains relevant and functional.

2. Integration into the School’s Daily Operations:

The platform will be integrated into the school’s teaching process, with teachers using it to upload and manage learning materials. It will become a part of the curriculum for both in-person and online classes.

3. User Training:

Teachers and students will receive training on how to use the platform effectively, ensuring they can continue to utilize it beyond the pilot phase.

4. Scalability:

As the platform is based on scalable technologies like Firebase and MongoDB, it can grow with the institution. New features can be added as needed, and additional users can be accommodated without significant changes to the architecture.

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VII. ICT Strand Focus

ICT Skills Development:

This project will contribute to the development of ICT skills among both students and teachers in the following ways:

1. For Students:

Digital Literacy: Students will learn to navigate the online platform, access learning materials, and take quizzes, which will improve their digital literacy skills.

Data Interaction: Students will interact with digital learning materials and submit quizzes, improving their ability to work with digital resources.

Collaboration Skills: Through discussions, feedback forms, and online learning interactions, students will develop collaborative skills, which are vital in a technology-driven world.

2. For Teachers:

Content Management: Teachers will learn how to upload, organize, and manage digital content using the platform, improving their skills in content delivery through ICT.

Assessment Tools: Teachers will gain experience using digital tools for assessing student performance (e.g., using pre-coded quizzes, tracking progress, and analyzing quiz results).

Technology Integration: Teachers will improve their ability to integrate technology into their teaching practices, including using online platforms for student engagement and assessment.

3. For Both Teachers and Students:

Problem Solving and Critical Thinking: Both groups will engage in problem-solving and critical thinking as they use and interact with the platform’s ICT tools.

Familiarity with Educational Technologies: This project will provide both teachers and students with exposure to educational technologies, which can help improve teaching and learning outcomes across the curriculum.

VIII. Review of Related Works/Systems

To contextualize the development of the SPISAT Online Learning Hub, it is helpful to examine existing educational platforms that serve similar purposes. One of the most recognized platforms in this field is Moodle (Modular Object-Oriented Dynamic Learning Environment), an open-source Learning Management System (LMS) used by schools and universities worldwide.

A. Moodle

Overview:

Moodle is a flexible, open-source LMS designed to help educators create personalized learning environments. It supports a wide range of features, including course creation, quizzes, file sharing, grade tracking, and user communication. Institutions can host Moodle on their own servers or use third-party hosting providers.

Key Features of Moodle:

Open-source and customizable

Supports quizzes, forums, assignments, and multimedia content

Role-based access (admin, teacher, student)

Gradebook and performance tracking

Mobile-friendly with dedicated apps

Large plugin library for extended functionality

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B. Key Similarities

Both platforms aim to support digital learning through online content delivery, assessments, and student progress tracking.

Each supports user roles (teachers, students, and administrators).

Both platforms can be customized and scaled based on user needs.

C. Key Differences

Complexity: Moodle is a robust system with a steep learning curve, while the SPISAT platform is simplified for easier onboarding, especially for users with limited ICT exposure.

Content Management: In Moodle, teachers create entire courses and assessments. In SPISAT’s hub, developers manage the quizzes, and teachers focus on uploading learning materials.

Customization Approach: Moodle’s customization is plugin-based and requires technical knowledge. The SPISAT hub is built from scratch, giving complete freedom in design and functionality.

Data Handling: Moodle offers in-depth analytics and grading systems, while SPISAT focuses on basic usage logs and survey-based evaluation for the pilot phase.

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D. Significance of Comparison

Moodle represents a comprehensive, globally-accepted LMS solution. However, for a small-to-medium institution like SPISAT, especially where ICT skills vary, a simpler, more focused platform may be more effective. The SPISAT Online Learning Hub provides a localized, lightweight alternative that prioritizes usability, accessibility, and relevance over feature density. This comparison highlights the rationale for building a custom solution tailored to specific educational and technological needs.

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Background of the Study

The integration of Information and Communication Technology (ICT) in education has significantly transformed teaching and learning experiences worldwide. As the demand for flexible, accessible, and technology-enhanced education grows, online learning platforms have become essential tools in addressing the digital divide and ensuring inclusive learning for all (UNESCO, 2020). However, many educational institutions, particularly in developing regions, still face challenges in fully adopting digital solutions due to limited infrastructure, varying levels of digital literacy, and a lack of localized platforms tailored to their specific needs (Anderson & Dron, 2011).

Southern Philippines Institute of Science and Technology like many other institutions, is confronted with these challenges. Teachers often lack centralized tools for content delivery and assessments, while students—especially those in remote areas—struggle to access quality learning materials consistently. These gaps hinder the potential of ICT to foster improved educational outcomes. Addressing this issue requires the development of a user-friendly and context-appropriate platform that supports digital learning through interactive content, streamlined communication, and effective resource management.

Existing systems such as Moodle and Google Classroom provide comprehensive learning management features, yet they can be complex and require substantial training for effective use (Al-Azawei, Serenelli, & Lundqvist, 2016). Moreover, these platforms may not align with the local context or address the specific resource constraints faced by smaller institutions. This highlights the importance of developing localized solutions that are both functional and accessible.

By creating a customized online learning hub tailored for SPISAT, this research seeks to enhance digital access and improve student engagement through ICT-integrated educational tools. The proposed platform emphasizes usability, accessibility, and targeted functionality to bridge the technological gaps in the current educational system. Through pilot testing, usage data, and user feedback, the study aims to assess the platform's effectiveness in supporting teaching and learning in a digitally inclusive manner (Means et al., 2014; Davis et al., 2019).

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