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E-Learning System in School Learning Process Using Agile Method (Case Study of SMK It Umamul Huda Malangbong)

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Abstract

This research intends to design and execute a web-based e-learning system utilizing the Agile methodology at SMK IT Umamul Huda Malangbong. E-learning is an excellent means of enhancing the flexibility and efficiency of the educational process in schools. This system incorporates interactive elements, including online examinations, live chat, real-time notifications, and an intuitive UI, all intended to satisfy user requirements effectively. The Agile methodology employs an iterative approach, wherein the development process is executed over several cycles of planning, development, testing, and assessment. Each iteration is modified according to user feedback, yielding a pertinent and practical system. The test findings utilizing the Black Box approach indicate that this system operates effectively and satisfies the standards for reliability, validity, and compatibility for application in the SMK IT Umamul Huda Malangbong learning environment. The system's adoption necessitates training for teachers and students to guarantee a comprehensive understanding of its usage. The beneficial effects of e-learning adoption encompass enhanced accessibility, improved efficiency in assessment, and the facilitation of real-time communication between educators and learners. This technology markedly enhanced student engagement in educational activities, particularly during online examinations and debates. Other obstacles were identified, including inadequate internet infrastructure and user acclimatization to novel technologies. The adopted solutions encompassed collaboration with local internet service providers and the provision of alternative offline access to educational content. The study's results indicate that the web-based e-learning system effectively addressed the educational requirements of SMK IT Umamul Huda Malangbong and positively impacted the quality of education. This study advocates for advancing system integration with mobile devices and learning analytics to enhance user experience and overall learning efficacy.

Keywords: *E-learning, Agile Methods, Educational Technology, Online Exams*

Introduction

In the contemporary digital age, information technology has emerged as a fundamental pillar across multiple facets of life, particularly in education. The extensive digital transformation has prompted educational institutions to integrate technology into learning, notably through e-learning systems. These systems enhance flexibility and efficiency while addressing numerous difficulties in education, including restricted access, the necessity for more participatory learning, and the requirement to deliver a contemporary learning experience.

E-learning is a technology-driven platform that facilitates both remote and in-person educational procedures. It provides real-time access to educational resources, communication, and assessments for educators and learners through internet networks and digital devices. At SMK IT Umamul Huda Malangbong, the adoption of e-learning is imperative because more flexible and innovative educational approaches are necessary to address the difficulties of the contemporary world. (Zhu, Kim & Shin, 2022; Anggraeni & Daito, 2022)

Traditional educational methods frequently encounter numerous challenges, including time constraints, spatial limitations, and resource deficiencies. The COVID-19 epidemic has expedited technology integration in education, with e-learning emerging as a primary approach to ensure the continuity of learning. The efficacy of e-learning implementation is significantly contingent upon its design and development, which must address the requirements of both educators and learners. Consequently, creating a web-based e-learning system at SMK IT Umamul Huda Malangbong utilizing the Agile methodology is a strategic initiative to guarantee that the resultant system effectively fulfills user requirements.

The Agile methodology was selected because it facilitates iterative and incremental software development. This method enables developers to adapt to evolving requirements informed by user feedback swiftly. This condition is crucial in education, where the requirements and anticipations of educators and learners may evolve. Agile offers the adaptability to implement incremental enhancements, ensuring that the resultant system possesses high stability and validity. (Kristianto, 2022; Kurnia & Wijaya, 2024; Aziiza, Darrel & Prijambodo, 2025)

This study involved the construction of an e-learning system with multiple interactive aspects to enhance the learning process. Online examinations enable educators to formulate and assess questions effectively, while students can conveniently access assessments from any location. Live chat facilitates direct communication between students and professors, ensuring sustained contact despite the online learning environment. Real-time notifications assist users in remaining informed about course schedules, assignments, and other significant announcements. The intuitive interface guarantees that the system is readily accessible and used by everybody, including individuals with less technological proficiency. (Ramadhani, Eltivia & Riwajanti, 2024; Wahyuni, 2024; Putri & Maulana, 2024)

The system's development occurred in multiple phases of the Agile cycle, encompassing planning, design, development, and testing. Each phase is executed with users' participation, including educators and learners, to guarantee that the generated system meets their requirements. User requirements are obtained during the planning phase via interviews and surveys. The acquired data is subsequently utilized to formulate the primary characteristics of the system. The design phase entails developing

a prototype visually illustrating the system's functionality. Users subsequently evaluate the prototype to obtain feedback for the development phase.

Considering the previously established feature priority, the development phase is executed in increments. The developer integrates specific features in each iteration and performs testing to verify their proper functionality. Testing is conducted using the Black Box method, which emphasizes evaluating system functionality without regard to the software's internal architecture. The test findings indicate that this e-learning system operates effectively, satisfies dependability standards, and is suitable for facilitating the learning process at SMK IT Umamul Huda Malangbong.

The deployment of this e-learning system offers numerous advantages for SMK IT Umamul Huda Malangbong. This method enhances learning flexibility by enabling students to access materials and assignments anywhere. This condition is crucial for facilitating independent learning, allowing students to progress at their own pace and according to their schedules. Secondly, this system enhances contact between educators and learners via live chat functionalities and real-time notifications, ensuring good communication despite the online learning environment. Third, this technology enhances the efficiency of learning assessment via the online examination feature, enabling educators to assess student performance swiftly and precisely. (Wahyudi, Irsyad & Azmi, 2023; Alfonsius, Ngangi & Kalua, 2023; Lailiah & Abdilah, 2023)

Furthermore, the use of e-learning aligns with SMK IT Umamul Huda Malangbong's vision and objective to evolve into an innovative and adaptive educational institution in response to technology advancements.

By incorporating technology into the learning process, this school enhances educational quality and equips students to confront problems in a competitive, technology-driven workforce.

Nonetheless, e-learning encounters numerous obstacles that must be addressed. A primary concern is the preparedness of infrastructure, including internet connectivity and the devices utilized by students and educators. Furthermore, educators require training to utilize the e-learning system effectively. A further difficulty is guaranteeing that this system is inclusive and accessible to all pupils, particularly those with restricted access to technology.

This research significantly contributes to the field of education, particularly in developing and implementing a web-based e-learning system for vocational high schools. This research employs the Agile methodology to create a functioning system that aligns with user requirements. The findings of this study are anticipated to serve as a reference for other educational institutions seeking to include e-learning in their pedagogical practices.

Research Method

This research employs a software engineering methodology utilizing the Agile framework to design and execute a web-based e-learning system at SMK IT Umamul Huda Malangbong. The Agile methodology was selected due to its adaptable iterative framework, facilitating active collaboration between developers and users throughout development. This study was executed in multiple organized phases to guarantee that the e-learning system fulfills user requirements and operates effectively.

The initial phase is needs analysis, entailing data collection via interviews, observations, and questionnaires directed at instructors, students, and school personnel. This analysis delineates the necessary elements, including online examinations, live chat, real-time notifications, and a user-friendly design. Upon identifying the requirements, the design process commences with developing a preliminary system design utilizing mockups and wireframes. This process entails the design of the user interface (UI) and user experience (UX) to guarantee usability.

The subsequent phase is system development, conducted iteratively using the Agile approach. Every iteration encompasses planning, development, testing, and evaluation. User feedback is gathered at each iteration to enhance the system by changing requirements. The employed testing approach is Black Box Testing, which verifies that each system feature operates by the specified requirements.

The concluding phase involves implementation and assessment. The e-learning system was instituted at SMK IT Umamul Huda Malangbong, and training was provided to teachers and students to ensure proficient utilization of the system. The evaluation was conducted via user satisfaction surveys and an analysis of the system's efficiency in enhancing learning quality. The findings of this assessment served as the foundation for subsequent enhancements to the system.

This study approach guarantees that the established e-learning system is both functional and pertinent to the educational requirements at SMK IT Umamul Huda Malangbong. Hence, it is anticipated to positively influence the quality of education at the institution.

Results and Discussion

This study effectively created and executed a web-based e-learning system utilizing the Agile methodology at SMK IT Umamul Huda Malangbong. This approach aims to enhance the educational process's flexibility, efficiency, and quality. System development is conducted iteratively, engaging several stakeholders, including educators, students, and school personnel, to guarantee that the finished system aligns with user requirements.

The creation of this e-learning system commenced with an assessment of user requirements, executed via interviews, questionnaires, and direct observation. The investigation results indicated that the essential elements comprised online examinations, live chat for instantaneous connection, automated notifications concerning schedules and duties, and a straightforward, intuitive user interface. Consequent to these results, the design phase involved the development of a preliminary prototype represented as a wireframe and mockup to solicit first user feedback.

During the development phase, the Agile methodology enables the development team to operate in an iterative cycle. Each iteration encompasses planning, development, testing, and assessment. In every iteration, modifications are implemented according to user feedback. In the initial version, the user interface was enhanced following feedback indicating that several design components were challenging for pupils to comprehend. This iterative method guarantees that the resultant solution optimally fulfills user requirements.

Upon completion of development, the system underwent testing utilizing the Black Box Testing methodology. This evaluation concentrated on the operational capabilities of each element inside the e-learning system, encompassing online assessments, live chat, notification dispatch, and user

data management. The test findings indicated that all features operated by the specified design criteria. No significant errors were identified during testing, suggesting that the system exhibits high reliability.

Furthermore, the trial was executed with the participation of end users, including instructors and students. Educators utilize the system to formulate schedules, allocate assignments, and administer assessments, whilst students employ the system to retrieve resources, complete examinations, and interact with educators via the live chat function. User feedback indicated significant satisfaction regarding the system's use and functionality.

The e-learning system was deployed at SMK IT Umamul Huda Malangbong after the testing phase. Before implementation, training was provided for instructors and students to ensure comprehension of the system's usage. The instruction encompassed an overview of the interface, methods for accessing resources, procedures for creating and undertaking examinations, and communication functionalities such as live chat.

The installation of the e-learning system has yielded numerous beneficial effects. A primary impact is enhanced learning flexibility. Students can access educational resources anytime and from any location, facilitating a more autonomous learning experience. Educators also gain advantages from automated functionalities, including schedule management and notifications, which conserve time and enhance productivity.

1. Implementation of Login Page



Figure 1. Implementation of Login Page

2. Implementation of Account Registration Page

a. Teacher Account Registration Page



Figure 2. Teacher Account Registration Page

b. Student Account Registration Page



Figure 3. Student Account Registration Page

3. Implementation of Password Recover Page



Figure 4. Implementation of Password Recover Page

4. Implementation of Admin Page



Figure 5. Implementation of Admin Page

5. Implementation of Teacher Page



Figure 6. Implementation of Teacher Page

6. Implementation of Student Page



Figure 7. Implementation of Student Page

7. Implementation of Class Data Page



Figure 8. Implementation of Class Data Page

8. Implementation of Subject Page



Figure 9. Implementation of Subject Page

9. Implementation of Teacher and Class Relationship Page



Figure 10. Implementation of Teacher and Class Relationship Page

10. Implementation of Quiz/Exam Page



Figure 11. Implementation of Quiz/Exam Page

11. Implementation of Assignment Page



Figure 12. Implementation of Assignment Page

The assessment outcomes indicate that this e-learning system enhances the quality of education at SMK IT Umamul Huda Malangbong. Student engagement in learning activities intensified, particularly during online

examinations and live chat discussions. The interaction between teachers and students intensified due to the system's capability for real-time communication. Educators indicated they could deliver feedback more promptly, enhancing students' comprehension of the topic.

Efficiency has also improved. Prior to the deployment of the e-learning system, the learning evaluation process was protracted due to its manual execution. This technology enables the automatic processing of exam results, accelerating the evaluation process. Real-time notifications assist students in remaining apprised of assignments and timetables, diminishing the likelihood of tardiness.

Despite the effective implementation of this e-learning system, certain obstacles were identified during the study. A primary concern is inadequate infrastructure, exemplified by disparate internet access among pupils. Sure, students encounter challenges in constantly accessing the system, particularly those residing in regions with inadequate internet connectivity.

To address this issue, the school partnered with local internet service providers to enhance internet accessibility in the vicinity. Furthermore, options were developed to facilitate offline access to the e-learning system, including providing downloadable material files that may be accessed without an internet connection.

A further difficulty is user acclimatization to a novel technology. Confident educators and learners first encountered challenges in utilizing the system. Nonetheless, this obstacle was surmounted by rigorous training and mentorship during the initial phases of deployment. After several weeks, teachers and students became accustomed to utilizing the system.

Conclusion

The research findings indicate that SMK IT Umamul Huda Malangbong successfully implemented a web-based e-learning system utilizing the Agile methodology. This system operates effectively and fulfills user requirements, as demonstrated by the test outcomes and elevated satisfaction levels among teachers and students. It positively influences flexibility, efficiency, and engagement in the learning process.

This study underscores the significance of employing the Agile methodology in developing educational systems to achieve alignment with user requirements. This study underscores the necessity for sufficient infrastructure to facilitate the introduction of e-learning systems, particularly in regions with restricted internet access. Future work should focus on enhancing capabilities, including mobile device connectivity and learning analytics, to facilitate more comprehensive monitoring of student progress by educators.

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