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Web-Based Monitoring Application to Enhance the Effectiveness of Character Building Training Mentoring in Higher Education

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ABSTRACT

Purpose of the study: This research aims to design and develop a web-based monitoring application to enhance the effectiveness of mentoring activities in the character building training program at Alauddin State Islamic University of Makassar by facilitating scheduling, digital verification, and real-time progress monitoring.

Methodology: This study employs a Design and Creation approach with a Waterfall development model. Data were collected through interviews with the character building training program head, participatory observations, and literature reviews. The application was developed using PHP with CodeIgniter framework, MySQL database, and tested using Black Box testing method on three user levels: students, lecturers/mentors, and program heads.

Main Findings: The resulting application successfully integrates resolution tracking, digital attendance verification replacing manual signatures, and real-time monitoring dashboard. Black Box testing confirmed all functions (login, registration, resolution checking, chat features) performed as expected without errors, enabling structured mentoring within the 40-day timeframe.

Novelty/Originality of this study: This research presents a novel integrated monitoring system specifically designed for character mentoring in higher education, combining personal resolution achievement tracking, digital verification mechanisms, and two-way communication features in one platform advancing beyond general academic monitoring systems by addressing the unique needs of character value internalization processes.

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1. INTRODUCTION

Character education is a crucial component of national development, aiming to produce graduates who are not only intellectually proficient but also possess strong personalities and noble morals. This is in line with the National Education System Law and is supported by research showing that an individual's success is determined more by attitude (87.5%) than technical ability (12.5%) [1]. In response, Alauddin State Islamic University of Makassar established the character building training program, a two-phase initiative consisting of intensive training followed by a mandatory 40-day mentoring period [2]. In this second phase, students are guided by a mentor lecturer over five sessions to internalize character values and achieve personal resolutions, with program completion being a graduation requirement.

Despite its noble goals, implementing the character building training mentoring phase faces significant challenges. The primary issue is the difficulty in coordinating the schedules of students and mentors, which often causes the mentoring process to exceed the 40-day time limit and reduces its effectiveness [3]. More critically, the lack of a structured monitoring system from program administrators has opened up opportunities for academic dishonesty, including forging mentor signatures to obtain character building training certificates without authentic participation [4]. Previous efforts to address monitoring issues in education have resulted in information systems for monitoring lectures and general student activities. However, these systems were not designed to accommodate the unique needs of character development, such as tracking the achievement of students' personal resolutions, a key component of successful character building training programs. This gap underscores the need for more specialized solutions [5].

Previous studies, such as those on lecture monitoring information systems on the effectiveness of monitoring and evaluation reporting systems, indicate that the focus of development remains on academic administration and general development evaluation. These studies have not specifically designed systems for the context of student character development, which emphasizes the achievement of personal resolutions, validation of mentoring attendance, and structured and fixed-term monitoring of the value internalization process [6]. Thus, there is a research gap in the lack of a web-based monitoring application specifically designed to support the effectiveness of mentoring in character building training programs. The novelty of this research lies in the development of a web-based monitoring application specifically designed to support mentoring in character building training programs. Unlike previous research, this study targets the process of internalizing values and achieving students' personal resolutions [7]. The developed system integrates structured scheduling within a 40-day timeframe, digital attendance validation to prevent fraud, and resolution achievement tracking as an indicator of character success. Therefore, this research is relevant and important to provide a more contextual, integrated, and accountable solution to support the success of character education in higher education.

The urgency of this research lies in the urgent need for a monitoring system capable of ensuring the accountability and effectiveness of structured character building training mentoring implementation**.** Without an integrated digital monitoring mechanism, the risk of process delays, failure to achieve personal resolutions, and the potential for administrative fraud will continue to occur, undermining the goals of character development [8]. Therefore, developing a dedicated monitoring application is a strategic step to ensure the process of internalizing values is authentic, measurable, and transparent. This research aims to address this gap by designing and developing a web-based monitoring application specifically for character building training mentoring activities. The proposed system serves a dual purpose: first, to facilitate scheduling and communication between students and mentors, and second, to provide a transparent mechanism for program leaders to monitor progress and verify resolutions in real time [9]. By enhancing accountability and minimizing cheating, this application offers a novel approach to supporting the effectiveness of character education programs through integrated and targeted technological interventions.

2. RESEARCH METHOD

2.1. Research Type

This study uses a Design and Creation approach, which is part of a qualitative research approach**.** This method was chosen because the primary objective of the research is not only to understand the phenomena occurring in character building training mentoring activities but also to produce a tangible product in the form of a monitoring application. The Design and Creation approach allows researchers to conduct an in-depth investigation of existing problems, then design and build appropriate technological solutions based on those findings [10]**.** This process involves an iterative cycle of problem-solving, analysis, solution design, implementation, and evaluation, ensuring that the resulting product truly meets user needs.

2.2. Research Subjects and Objects

The subject of this research is the Makassar City Culture and Tourism Office, located on Jalan Urip Sumoharjo, Makassar, South Sulawesi. This location was chosen based on the agency's role as the primary manager of tourism data and information in Makassar City [11]. The research object is data on the distribution of cultural and historical tourism potential in Makassar City, including tourist attraction locations, coordinates, types of tourism, and other supporting data such as sub-district and village boundaries, road networks, and rivers within Makassar City [12]. This research object will be the primary focus in the development of the upcoming geographic information system.

2.3. Data Sources and Data Collection Techniques

This study utilizes two types of data sources to ensure the completeness and accuracy of information. Primary data were obtained directly from the field through two techniques. First, semi-structured interviews were conducted with the Head of the character building training program to gain an in-depth understanding of the

program workflow, mentoring rules, and the challenges encountered in supervision [13]. Second, participatory observations were carried out during mentoring and administrative activities at the character building program institution to directly observe the practices taking place, including potential issues or irregularities encountered [14]. Secondary data were collected through a literature review from various scholarly sources. Previous research journals such as studies on monitoring systems, character building program documentation, and scientific articles relevant to character education, mentoring, and software engineering. This review serves to build a solid theoretical foundation and to ensure the novelty of the research [15].

2.4. Research Instruments

Research instruments are tools used to systematically obtain data to answer the research questions. In this study, which focused on the design of a monitoring application for character building training mentoring activities at Alauddin State Islamic University of Makassar, the instruments used included interviews, observations, and documentation studies [16]. Interviews are a data collection technique conducted through direct question and answer sessions between researchers and informants to obtain relevant information [17], [18]. Direct observations were conducted to observe the mentoring process, attendance recording mechanisms, and the reporting process for mentoring results [19]. Furthermore, documentation studies were used to review the character building training guidebook, participant data, and other supporting documents to ensure the system complies with applicable policies.

In addition to data collection instruments, this study also utilized system development tools in the form of hardware and software to support the web-based application design process. The hardware used was a laptop with adequate specifications to ensure optimal analysis, design, and system testing [20]. The software used included the Windows operating system, XAMPP, MySQL, PHP, and a supporting framework for building the monitoring application [21]. System testing was conducted using the Black Box Testing method, a software testing method that focuses on system functionality without looking at the internal structure of the program code (R, Esti, W, Hari, By using appropriate and structured instruments, this research is expected to produce an effective and efficient monitoring system that can minimize the occurrence of fraud in the character building training mentoring process [22].

2.5. Data Analysis

The data analysis technique used in this study is qualitative analysis. The data obtained from interviews, observations, and literature reviews are not numerical but consist of descriptive notes and documentation [23]. The analysis process is carried out in three stages: (1) data reduction, which involves summarizing and selecting key information relevant to the research focus; (2) data presentation, which organizes the information systematically in the form of narrative text or flowcharts to facilitate understanding; and (3) drawing conclusions, which interprets the analyzed data to identify system requirements, weaknesses in the existing system, and to formulate solutions in the form of software requirement specifications for the application to be developed.

2.6. Research Methodology

This study uses a Design and Creation approach, a qualitative method aimed at understanding the character building training program at Alauddin State Islamic University of Makassar and developing a monitoring application. The subjects include the program head, lecturers as mentors, and student participants, while the research object is the mentoring process, including scheduling, mentoring sessions, recording student resolutions, and reporting [24]. Data are collected from primary sources (interviews and participatory observations) and secondary sources (literature, journals, and program documentation). Qualitative analysis is applied through data reduction, presentation, and conclusion drawing to define system requirements. The research follows a Waterfall model with five stages: requirement analysis, system design, implementation, testing, and evaluation, ensuring the application effectively monitors mentoring activities.

Figure 1. Research Procedure (Waterfall Model)

3. RESULTS AND DISCUSSION

This research resulted in a web-based monitoring application designed to support character building training mentoring activities at Alauddin State Islamic University of Makassar. The application was developed using the waterfall method using the PHP programming language and a MySQL database, and tested using black

box testing [25]. The implemented system includes three user levels: students, lecturers/mentors, and character building training leaders, each

with its own interface and features. Key features include student registration, resolution recording, mentoring attendance checks by lecturers, and a chat facility between students and mentors. Furthermore, the character building training leaders can integrate the entire mentoring process in real time through a dedicated dashboard, enabling more effective oversight than the previous manual system.

System testing was conducted in three stages: unit testing, integration testing, and system testing using a black box approach. Test results showed that all functions functioned as expected, including the login form, registration, resolution display, and well-integrated chat feature. Testing proved that the system's modules interacted without error, while system testing ensured that the application was capable of operating in the intended environment. Thus, this application is deemed suitable for monitoring character building training mentoring activities and addressing the weaknesses of the previous system, which was vulnerable to conditions.

In conclusion, this monitoring application successfully facilitates the matching of mentoring schedules between students and lecturers, and allows for transparent monitoring of student resolution progress [26]. Lecturers can better understand student challenges, while the character building program can minimize the practice of forged signatures and delays in mentoring completion. This study also recommends further development, such as adding a certificate printing feature and expanding it to include other character building program programs, such as BTQ and PIBA. Thus, this application not only addresses technical needs but also contributes to improving the quality of character training on campus.

The results of this study are in line with the findings of several previous studies that also developed technology-based monitoring systems to support character formation. Emphasized the importance of an integrated monitoring and evaluation model in character education that includes components of self-awareness, social awareness, social skills, and self-management, which in this study were implemented through resolution recording features, chat interactions, and real-time monitoring by the character building training leader of student mentoring activities [27], [28]. In line with that, developed an Android-based Civics Caring Apps for monitoring the character of elementary school students with the Monte (Monitoring for friends) feature that makes it easier for teachers to monitor student development online, strengthening evidence that technology integration in character monitoring can increase the effectiveness of supervision even with limited direct interaction [29]. In addition, designed a web-based personal character formation monitoring system at the Star Model Agency that allows management to select models based on treatment scores and development statistics, in line with this study which allows lecturers and the character building training leader to monitor the development of student resolutions and minimize cheating such as signature forgery. Thus, this study not only strengthens previous findings on the effectiveness of web-based monitoring systems in character building, but also addresses a gap by integrating two-way communication (chat) and more comprehensive monitoring features within the context of student mentoring in higher education, contributing to the transparent and measurable improvement of character development [30].

This study successfully addresses a gap in previous research related to the development of character building monitoring systems by presenting an application specifically contextualized within the higher education environment for character building training mentoring activities. Unlike previous studies, which focused more on the commercial interests of agency models or the development of learning media for elementary school students, this study develops a web-based system with three levels of structured access that engages students, mentors, and program leaders within a single, integrated platform. This system not only facilitates monitoring student resolution achievement as an indicator of character development, but also features a digital verification feature that replaces manual signatures and real-time communication features to support more effective coordination [31]. More than just a conceptual model, this research technically implements the main components of character building into operational application features, such as self-management through the resolution feature, social skills through the chat feature, and social awareness through the real-time monitoring feature for program leaders [32]. Thus, the novelty of this research lies in the development of an integrated web-based monitoring system specifically designed for character building training mentoring activities in higher education, which combines the functions of character development monitoring, digital verification, and structured communication in one integrated platform.

The implementation of a web-based character building training mentoring activity monitoring application has significantly impacted the effectiveness and efficiency of the student character building process in higher education. Practically, the application facilitates mentors' digital verification of student resolution achievement, replacing manual signature systems that are vulnerable to manipulation and require lengthy administrative processes [33]. For program leaders, the real-time monitoring feature allows comprehensive oversight of student character development without having to wait for frequently delayed periodic reports, allowing for faster and more targeted intervention and mentoring. From the student perspective, the application facilitates monitoring progress toward personal resolutions and direct communication with mentors to coordinate mentoring schedules, ultimately increasing their motivation and active participation in character building activities. More broadly, this research has implications for the development of a character education monitoring system in higher education that functions

not only as an administrative tool but also as a pedagogical instrument supporting the creation of a transparent, accountable academic culture oriented toward holistic student character building.

This study has several limitations that need to be considered in interpreting the results and in future development. First, the application trial scope is still limited to one university environment, namely Alauddin State Islamic University of Makassar, so generalizing the results to other institutions with different characteristics requires further validation [34]. Second, the development of the new application includes basic monitoring and communication features, not yet integrating advanced analytical features such as automatic character development data

visualization or an artificial intelligence-based intervention recommendation system. Third, the relatively short trial duration does not allow for observing the long-term impact of application use on the sustainable development of student character. Fourth, this study focuses more on the functional and technical aspects of the system, so an in-depth exploration of the pedagogical effectiveness of the available features is still needed through a more comprehensive qualitative approach [35], [36]. These limitations open opportunities for further research to expand the scope of implementation, develop more sophisticated features, and conduct long-term evaluations to optimize the contribution of technology in supporting character education in higher education.

3.1. System Implementation

The research produced a web-based monitoring application for character building training mentoring activities at Alauddin State Islamic University of Makassar, developed using PHP with CodeIgniter framework and MySQL database [37]. The application features three user access levels: students, lecturers/mentors, and the program head. Figure 1 shows the login interface, which serves as the main entry point where users must enter a valid username and password to access the system according to their respective access rights.

After successful login, students are directed to the main page displaying profile information and two main menus. The "Resolution" menu allows students to monitor their personal resolution achievement progress, while the "Chat" menu facilitates communication with mentors for schedule coordination. Figure 2 displays the student main page interface

.

Figure 2. Login Interface

On the lecturer's main page, the "Resolution" menu displays a list of supervised students along with the resolutions they have created. Lecturers can "check" each resolution item that students have achieved as a form of digital verification, replacing the manual signature system. Figure 3 shows the resolution checking feature.

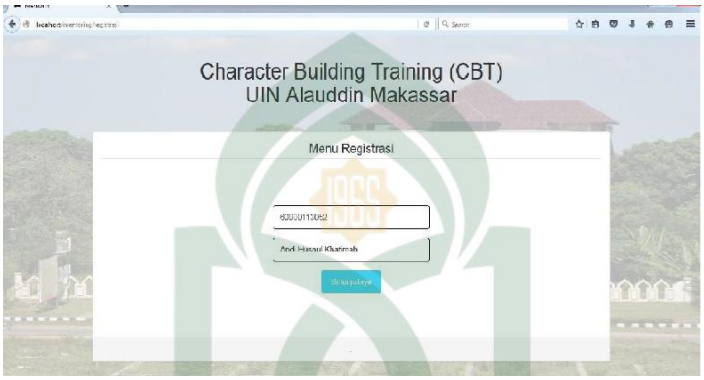

Figure 3. Student Main Page Interface

The program head's main page functions as a monitoring center. Through the "Resolution" menu, the program head can select specific mentors to view their supervised student lists and monitor each student's resolution achievement progress in real-time. Figure 4 displays the program head's monitoring interface.

Figure 4. Lecturer's Resolution Checking Interface

3.2. System Testing

The application was tested using the Black Box method, focusing on functional specifications without examining internal code structure [38]. Testing was conducted at unit, integration, and system levels. Figure 1 summarizes the unit testing results.

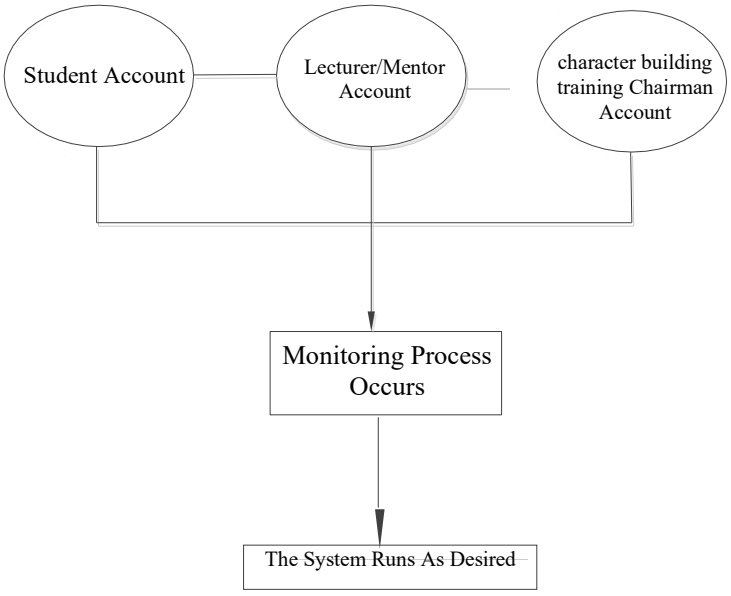

Figure 5. System Testing

3.3. Discussion

The implementation of this web-based character building training mentoring monitoring application has a positive impact on improving the effectiveness, transparency, and accountability of the mentoring process in higher education. The digital verification feature successfully minimizes administrative fraud practices such as mentor signature forgery, while the real-time monitoring system enables program leaders to supervise mentoring progress more efficiently and systematically. In addition, the integrated chat feature facilitates communication and schedule coordination between students and mentors, helping the mentoring process to be completed within the predetermined 40-day period. The resolution monitoring feature also encourages students to become more disciplined and responsible in achieving their personal character development targets. Therefore, the developed system not only functions as an administrative monitoring tool but also supports the internalization of character values in a more interactive, measurable, and sustainable manner.

However, this study still has several limitations that should be considered for future development. The implementation and testing process were conducted only within the environment of Alauddin State Islamic University of Makassar, limiting the generalization of the findings to other institutions with different mentoring

systems and organizational characteristics. In addition, the developed system still focuses on basic monitoring and communication functions and has not integrated advanced technologies such as mobile-based services, learning analytics, or artificial intelligence for personalized mentoring recommendations. Furthermore, the relatively short implementation period limits the observation of the long-term impact of the system on sustainable student character development. Therefore, future studies are expected to expand the scope of implementation, involve broader user participation, and develop more advanced features to optimize the role of technology in supporting character education in higher education.

4. CONCLUSION

This research has successfully achieved its objective as stated in the introduction, namely to design and develop a monitoring application for the character building training mentoring activities at Alauddin State Islamic University of Makassar. The resulting web-based application, equipped with three user access levels (students, lecturers/mentors, and program heads) and core features including resolution tracking, digital verification, and chat communication, has been proven through Black Box testing to function according to specifications. The application effectively addresses the identified problems by facilitating schedule coordination between students and mentors, minimizing signature forgery through digital verification mechanisms, and providing transparent real-time monitoring for program leaders. Future research prospects include expanding the system to cover other character building program components such as BTQ and PIBA, developing mobile-based applications, integrating automatic certificate printing, and conducting quantitative analysis on the application's impact on mentoring program effectiveness.

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