



TQM-BASED WEB APPLICATION FOR OPTIMIZING ACADEMIC PLACEMENT ASSESSMENTS

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Abstract :

This study aims to develop and analyze the effectiveness of a Total Quality Management (TQM)-based web application in optimizing academic placement assessments in Islamic boarding schools. The background of this study is based on general problems related to the low efficiency and accuracy of the manual placement test process. The study was conducted at the Darul Lughoh Islamic Boarding School using a descriptive qualitative approach. Data collection techniques include in-depth interviews, participant observation, and documentation, which are analyzed using the Miles interactive model, as well as the approaches outlined by Huberman and Saldaña (2014). The results of the study indicate that the implementation of a TQM-based system can improve the efficiency of assessment implementation, the accuracy of student placement based on initial competencies, and strengthen teacher and student participation in the entire assessment process. In addition, this system reflects TQM principles such as customer focus, continuous improvement, and data-driven decision making, which contribute to the creation of more measurable, transparent, and sustainable academic governance. These findings reinforce the urgency of developing a quality-based digital assessment system as a strategy to improve the quality of Islamic education. This study also recommends replication of similar models in other educational institutions as part of adaptive and technology-based academic management reform.

Keywords : Academic, Assessment, Placement, TQM

INTRODUCTION

In the era of digital transformation of education, academic placement assessment is one of the crucial components in ensuring the success of the teaching and learning process (Deroncele-Acosta et al., 2023; Olatunbosun Bartholomew Joseph et al., 2024). Inaccuracy in placing students at the appropriate learning level can lead to inequality of understanding, low motivation to learn and inefficiency in achieving curriculum objectives (Mejía-Rodríguez & Kyriakides, 2022; Radovan & Radovan, 2024). This phenomenon is often found in various educational institutions, including Islamic boarding schools, which are currently facing the challenge of modernizing the academic system (Asari et al., 2023; Jaenullah et al., 2022). Therefore, a systemic and quality-based approach is needed in designing and managing the placement assessment system in order to be able to answer the complexity of student needs (Najmi, 2022).

Total Quality Management (TQM) is present as a managerial approach that is oriented towards continuous quality improvement by involving all elements of the organization (Sofyan & Nugraha, 2023). In the context of education, TQM not only focuses on academic output, but also on optimizing the service process and utilizing technology to support decision making (Pham



& Van Tam, 2025; et al., 2023). Integrating TQM principles into a web application specifically designed for placement assessment is a strategic step to ensure efficiency, transparency, and accuracy in the process. This is supported by Deming's (1993) theory regarding the PDCA (Plan-Do-Check-Act) cycle which is relevant in the development of a quality-based digital education system (Ayu et al., 2025; Ojokheta, 2023).

The academic urgency of this research lies in the need for a technology-based assessment system that is not only functional but also standardized in terms of quality. By combining web applications and the TQM approach, this research is expected to offer innovative solutions that not only improve the quality of assessment but also provide a systemic impact on the quality of academic management as a whole. The main problem in this research is the less than optimal academic placement assessment process in many educational institutions, especially in institutions that are transitioning towards digitalization of the academic system. Many assessment processes are still carried out manually or using applications that are not integrated with a quality approach, thus risking a mismatch between students' initial competencies and the level of learning provided. This has an impact on low learning effectiveness, high teacher workload in adjusting materials, and potential failure in mapping student competencies. This research seeks to examine and design a web-based system with a TQM approach that specifically addresses this problem.

Although various studies have discussed both the application of TQM in education and the development of web-based assessment applications, very few studies have specifically examined the integration of the two for placement assessment purposes. This gap shows that the integrated approach between technology and total quality management has not been utilized optimally to improve the accuracy and efficiency of the student placement process. as research by Pham & Van Tam, (2025) & Schiavone et al., (2023) shows that the implementation of TQM in the education system can improve operational efficiency and user satisfaction, but has not touched on the implementation aspect of the digital assessment system. The novelty of this study lies in the development of a web-based application that not only functions as a medium for implementing placement tests, but is also designed with the principle of Total Quality Management. This application is built based on a continuous quality improvement cycle and involves the active participation of various parties in the assessment process. In addition, the integration of quality principles such as customer focus, quality assurance, and continuous improvement into the digital system makes this study unique and relevant. This study also provides a new approach to building an assessment system that is not only oriented towards results, but also on the process and quality of academic services.

This study aims to develop and evaluate the effectiveness of a Total Quality Management-based web application in optimizing academic placement assessments. This goal is important to achieve because an appropriate and quality-based assessment system will contribute directly to the achievement of

more efficient, accurate, and measurable learning. In addition, the implementation of TQM is expected to strengthen the culture of quality in educational institutions, especially in the process of digitalizing academic management. study by Hardison et al., (2025) & Yathiraju (2022) regarding web-based assessment systems emphasize speed and accuracy in the assessment process, but do not explicitly apply TQM principles in their management. The positive impact of this research is the creation of an assessment system model that is not only technically functional, but also managerially superior.

Darul Lughoh Islamic boarding school is implementing digital transformation in its academic system. This Islamic boarding school has unique characteristics with technological innovation, and is facing challenges in implementing placement tests efficiently and accurately. The existence of students with diverse academic competency backgrounds requires a fair, structured, and quality-based placement system.

RESEARCH METHOD

This research method uses a descriptive qualitative approach with the aim of exploring in depth the implementation of a Total Quality Management (TQM)-based web application in optimizing academic placement assessments. The research location is centered at Madrasah Aliyah Pesantren Al-Hikmah, an Islamic educational institution that is currently undergoing a digital transformation in academic management. Data collection techniques are carried out through in-depth interviews, participatory observation, and documentation of the placement test implementation process and responses from stakeholders, such as teachers, students, and system managers. The data obtained are analyzed using the interactive model of Miles, Huberman, and Saldaña (2014), which includes three main stages: data condensation, data presentation, and drawing and verifying conclusions. This approach allows researchers to understand the dynamics of system implementation, the obstacles faced, and their impact on the effectiveness of academic placement in the context of a value-based and innovation-based Islamic boarding school institution.

FINDINGS AND DISCUSSION

1. Assessment Process Efficiency Increases Significantly

The efficiency of the assessment process refers to the level of optimization of the use of time, resources, and procedures in the implementation of academic placement tests, so as to produce targeted output with minimal input. This increase in efficiency is reflected in the acceleration of the question distribution process, assessment automation, and the accuracy of student placement based on measurable initial competencies. Within the framework of Total Quality Management (TQM), efficiency is not only seen from the technical aspect, but also from continuous improvement of the process

carried out through a systematic approach such as the PDCA (Plan-Do-Check-Act) cycle. At the Darul Lughoh Islamic Boarding School, the implementation of a web-based application allows the implementation of assessments that previously took two to three days to be completed in a matter of hours without reducing the validity of the results. This efficiency has a direct impact on the readiness of the learning process, teacher allocation, and more accurate and equitable academic mapping for all students.

The use of TQM-based web applications significantly increases the efficiency of the academic placement assessment process. Before using this system, the student correction and mapping process took two to three days, but now it can be completed in less than one day. (SA_2025)

This system helps reduce the administrative burden because the assessment results are automatically classified based on the student's competency category. Meanwhile, the simple and integrated user interface makes it easy for teachers and students to access and understand the assessment results in real time. (HP_2025)

The placement test implementation runs more smoothly, with participant waiting times drastically reduced and post-assessment class distribution can be done immediately on the same day. This reflects an increase in the overall efficiency of the system. (NJ_2025)

The results of the interviews and observations above indicate that the efficiency of the implementation of placement assessments does not only occur in terms of time, but also includes improving the quality of academic management as a whole. Web-based applications designed with TQM principles are able to reduce administrative barriers, make educators more efficient, and accelerate the feedback cycle. This is in line with Deming's theory in TQM which emphasizes the importance of process optimization as the basis for achieving total quality. The involvement of various stakeholders in this system strengthens the assumption that efficiency is not only the output of technology, but also the result of integrating quality values into institutional practices. Thus, this application not only functions as a technical tool, but also as a strategic instrument in encouraging an efficient and data-based work culture. The resulting efficiency provides a strong foundation for the sustainability of digital innovation in Islamic boarding school education management.

The findings regarding increased efficiency through the implementation of TQM-based web applications at the Darul Lughoh Islamic Boarding School are in line with the research of Ramakrishna & Alzoubi (2022) & Taraza et al., (2024) which emphasizes that the application of the Total Quality Management principle in educational management can reduce wasted time and increase the speed of academic services. The study emphasized that efficiency can be

achieved if the entire process is designed with a systemic approach, involving technology, and based on continuous evaluation. In the context of Deming's theory (1993), the PDCA (Plan-Do-Check-Act) cycle is an important foundation in managing change and continuous quality improvement (Wang & Chen, 2025). The planning stage (plan) is carried out by designing a measurable assessment system; implementation (do) is implemented through a web application; evaluation (check) through analysis of assessment data; and follow-up (act) in the form of system improvements based on user feedback. At the Darul Lughoh Islamic Boarding School, this cycle appears to be running actively, as seen from system updates and feature adjustments based on input from teachers and participants. Efficiency not only means technical acceleration, but also leads to managerial effectiveness in academic decision-making. Thus, this study confirms that the integration of TQM and information technology is not only relevant, but also strategic in responding to the challenges of assessment efficiency in Islamic boarding school-based educational institutions..

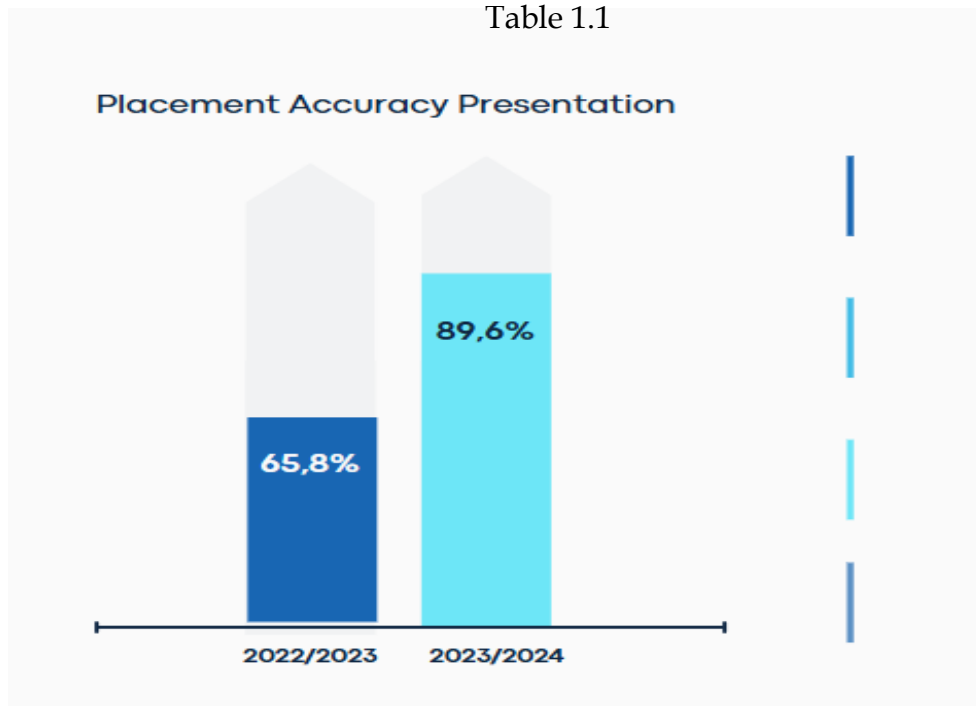
Based on the research results, it can be concluded that the implementation of a web application based on Total Quality Management (TQM) has a real positive contribution to optimizing academic placement assessments in Islamic boarding schools. This approach not only shows effectiveness in an operational context, but also strengthens the managerial foundation of the institution in managing the quality of academic services systematically. The efficiency achieved reflects the successful integration between technological innovation and sustainable quality principles, which in turn creates a responsive, adaptive, and standardized academic ecosystem. This study also emphasizes the importance of a holistic approach in designing an assessment system, where technical, strategic, and participatory dimensions must go hand in hand. Thus, this study not only provides a practical contribution to the development of a placement system, but also enriches the scientific discourse on the importance of synergy between digital technology and quality management in improving the quality of education, especially in value-based institutions such as Islamic boarding schools. These findings recommend the need to strengthen contextual and sustainable digital quality policies in similar educational institutions.

2. Placement Accuracy Increases Through Data-Driven Validation

Placement accuracy through data-based validation refers to the accuracy in determining the appropriate level or class for students based on assessment results that are analyzed objectively and systematically using digital data. In this approach, every placement decision no longer relies solely on intuition or subjective observation, but is supported by numerical evidence obtained from a web-based assessment system. At Pesantren Darul Lughoh, this concept is implemented through an application that integrates test results with a student competency database, so that teachers can map initial abilities with precision. Validation is carried out through a cross-checking process between test results, academic track records, and student profiles that have been stored in the system. With this method, errors in placement can be minimized, and each

student can be directed to a learning level that suits their potential. The application of data-based validation is a reflection of the principle of data-driven decision making in TQM-based education quality management.

Table 1.1



The graph above shows a significant increase in student placement accuracy before and after the implementation of a Total Quality Management (TQM)-based web application at the Darul Lughoh Islamic Boarding School. In the 2022/2023 academic year, with conventional assessment methods, the placement accuracy rate only reached 65.8%. After the web-based system with a TQM approach was implemented in 2023/2024, the figure increased sharply to 89.6%. This increase shows that the data-based validation system is able to produce more targeted, accurate, and objective placement decisions. These findings support the principles of TQM in education which emphasize the importance of evidence-based decision making and continuous quality improvement. The implementation of a digital system supported by systematic quality control and data analysis allows student competency mapping to be carried out more effectively. This has a direct impact on the efficiency of class grouping, teaching effectiveness, and improving learning experiences that are more in line with student needs.

The improvement of placement accuracy through data-driven validation in this study is in line with the findings of Bogbula & James Nwuke (2024) & Efendi (2022), which stated that the application of Total Quality Management (TQM) principles in the education system can improve the efficiency and reliability of the academic decision-making process. This study also strengthens Deming's (1993) idea of the Plan-Do-Check-Act (PDCA) cycle, where each stage of planning, implementation, evaluation, and improvement in the assessment system is carried out continuously (Fahrudin, 2025). The implementation of

data validation in student placement reflects the Check and Act stages in the cycle, where assessment results are used to evaluate the effectiveness of the instrument and systematically adjust the placement strategy. The principle of customer focus in TQM is also reflected in the increase in user satisfaction with placement accuracy, which directly benefits students and teachers. Thus, these findings not only strengthen the relevance of TQM theory in education but also add empirical evidence that the integration of technology and quality management can produce a more effective, adaptive, and accountable academic system.

Based on the research findings, it can be concluded that the integration of web applications with the Total Quality Management (TQM) approach provides a significant contribution to strengthening the academic placement assessment system in Islamic boarding school-based educational institutions. The implementation of this system not only provides technical efficiency, but also encourages the realization of more structured, measurable, and data-based assessment governance. The use of a systematic quality management approach through digital applications is able to form an academic work pattern that is responsive to the needs of students, as well as strengthen a fair and transparent decision-making process. This shows that digital transformation in the world of education, when framed with the principle of sustainable quality, can produce a more credible and effective evaluation system. Thus, this study recommends the importance of developing and replicating similar systems in various other educational institutions as part of a comprehensive academic quality improvement strategy, especially in the context of strategic initial assessment management that is oriented towards optimal development of student potential.

3. Teacher and Student Participation Increases

Teacher and student participation is the active involvement of both parties in the entire educational process, including planning, implementation, and evaluation of academic activities. In the context of educational quality management, this participation is an important element in creating an inclusive, transparent, and student-oriented system. At Pesantren Darul Lughoh, teacher and student participation has increased significantly since the implementation of a Total Quality Management (TQM)-based web application in the academic placement assessment. Teachers not only act as implementers, but also as compilers of assessment indicators, data managers, and evaluators of the process and test results. Meanwhile, students are given space to understand the system, provide feedback, and convey assessment experiences directly through the platform provided. This condition reflects the customer focus approach in TQM, where every element of the education system is seen as a major stakeholder. Thus, increasing teacher and student participation not only strengthens the quality of assessment, but also builds a collaborative culture and shared responsibility in the educational process.

Table 1.2

Participation Aspect		Before TQM (%)	After TQM (%)
Teacher Involvement in Question Preparation		42	88
Teacher Involvement in Result Evaluation		38	85
Students Access Assessment Results Independently		20	75
Students Provide Feedback to the System		15	68
Active Presence in System Socialization		30	90

The table above shows a significant increase in teacher and student participation after the implementation of the Total Quality Management (TQM)-based web application at the Darul Lughoh Islamic Boarding School. Teacher involvement in the preparation of questions and evaluations increased from 42% and 38% to 88% and 85%, reflecting a shift in the role of teachers from passive implementers to strategic actors in the assessment system. On the other hand, student participation also increased— independent access to results increased from 20% to 75%, and feedback on the system from 15% to 68%. Attendance at socialization activities also increased drastically, indicating enthusiasm and a sense of ownership of the system. These findings strengthen the relevance of the customer focus principle in TQM, where system users are positioned as the center of the quality process. With the active participation of all stakeholders, the assessment system becomes more democratic, transparent, and in line with the actual needs of users, especially in the Islamic boarding school educational environment.

The increase in teacher and student participation in the implementation of the TQM-based assessment system at the Darul Lughoh Islamic Boarding School is in line with the findings of (Martínez-Peláez et al., 2023) who emphasized that the success of the digital assessment system is greatly influenced by the active involvement of stakeholders. This strengthens the principle of customer focus in TQM theory, which places system users both teachers and students at the center of the planning, implementation, and evaluation of the quality process. In addition, the involvement of teachers and students in the Plan-Do-Check-Act cycle (Deming, 1993) creates a collaborative culture that supports continuous improvement (Fahrudin, 2025). Thus, active participation not only increases the technical effectiveness of the system but

also strengthens accountability, openness, and a sense of ownership of the assessment process, which are very crucial in the context of value-based education such as Islamic boarding schools.

Based on the results of the research that has been conducted, it can be concluded that the implementation of a web application based on Total Quality Management (TQM) in the academic placement assessment system provides a strategic contribution to strengthening educational governance at the Darul Lughoh Islamic Boarding School. This system is able to create an assessment mechanism that is efficient, accurate, and adaptive to the needs of value-based institutions. Improving the quality of the process is not only reflected in the assessment output, but also in the internal dimensions of the institution such as operational effectiveness, cross-role collaboration, and responsiveness to learning dynamics. With the TQM approach, the assessment system is not only an evaluation tool, but also an instrument for controlling the quality of education as a whole. This study shows that the integration of managerial and technological aspects in an integrated manner can produce a system that is sustainable, can be evaluated systematically, and is open to further development. These findings reinforce the importance of quality-based innovation in building a progressive, structured, and relevant academic ecosystem to the needs of the times.

CONCLUSION

This study shows that the integration of web applications with the Total Quality Management (TQM) approach can improve efficiency, accuracy, and transparency in the implementation of academic placement assessments, especially in Islamic boarding school education environments. The most important finding of this study is that data-based validation and the active involvement of all stakeholders—teachers, students, and management—can create an assessment system that is not only faster, but also fairer and quality-based. The main lesson that can be taken is the importance of synergizing technology and quality management values as the basis for transforming a more inclusive, participatory, and continuous improvement-oriented academic system.

The main contribution of this study lies in the renewal of perspectives in managing placement assessments through a combination of technology and TQM principles. This study enriches the literature by presenting a new approach that integrates the PDCA cycle and customer focus into the design of a digital academic assessment system. In terms of methodology, this study strengthens the use of a qualitative approach with the Miles, Huberman, and Saldaña analysis model in the context of Islamic boarding school-based education—a space that is rarely touched upon scientifically in the issue of digital quality management. Thus, this study contributes to the expansion of the application of TQM in the field of Islamic education, as well as opening up new space in the development of quality-based and contextual assessment systems.

Although it provides significant results, this study has limitations in the

scope of the case which was only conducted in one Islamic boarding school, so the generalization of the findings to other institutions needs to be studied further. In addition, the qualitative approach used emphasizes the depth of the context, but has not measured the quantitative impact longitudinally. This study also does not cover variations in the age of students or the integration of assessments across subjects. Therefore, it is recommended that further research be carried out with a quantitative or mixed-method approach in various types of educational institutions to test the effectiveness of similar systems more broadly. This is important to strengthen the validity of the findings and encourage the adoption of TQM-based assessment systems nationally and sustainably.

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