

TRANSFORMING EDUCATIONAL QUALITY THROUGH TOTAL QUALITY MANAGEMENT IN THE CONTEXT OF DEEP LEARNING AND THE NATIONAL CURRICULUM FRAMEWORK

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Abstract. This study aims to analyze the transformation of educational quality through the implementation of Total Quality Management (TQM) principles in schools within the framework of Indonesia's Deep Learning-Based National Curriculum (Kurnas). The research investigates how continuous improvement, stakeholder involvement, and data-driven decision-making core components of TQM can enhance teaching effectiveness, institutional performance, and student learning outcomes. Using a qualitative descriptive approach, data were collected through observation, documentation, and interviews with school leaders and teachers implementing TQM practices in Bogor City vocational schools. The findings reveal that applying TQM fosters a culture of collaboration, accountability, and innovation, aligning institutional processes with the principles of the national curriculum and deep learning pedagogy. The integration of deep learning approaches emphasizing critical thinking, creativity, and problem-solving complements TQM's systematic improvement cycle, resulting in more adaptive and responsive school management. However, the study also identifies challenges related to leadership consistency, teacher readiness, and digital resource constraints. Overall, the research concludes that combining TQM and deep learning within the national curriculum framework represents a strategic pathway toward sustainable educational quality transformation, bridging managerial excellence with pedagogical innovation.

Keywords: total quality management; national curriculum; educational quality; continuous improvement

I. INTRODUCTION

Education in the twenty-first century is experiencing a profound paradigm shift driven by technological disruption, digital transformation, and the growing emphasis on deep learning a pedagogical framework that promotes critical thinking, creativity, collaboration, and lifelong learning skills [1]. In Indonesia, the National Curriculum Framework (Kurnas) has evolved toward competency-based and student-centered learning approaches that encourage schools to integrate technology and innovation into classroom practices [2]. However, despite these curricular reforms, disparities in quality, management efficiency, and instructional innovation persist across educational institutions [3]. Addressing this issue requires not only pedagogical innovation but also an effective management framework capable of ensuring continuous quality improvement. One widely recognized model for quality enhancement in education is Total Quality Management (TQM), originally conceptualized in industrial management but later adapted for educational contexts [4]. TQM emphasizes continuous improvement (kaizen), process control, stakeholder satisfaction, and evidence-based decision-making [5]. When implemented in education, TQM fosters collaborative governance, encourages professional accountability, and aligns institutional performance with learner outcomes [6]. According to Oakland [7], the success of TQM in education lies in transforming institutional culture embedding shared values of quality and reflection into daily practices. This transformation is particularly relevant for Indonesia's educational institutions navigating the demands of the Deep Learning-Based National Curriculum, which requires synergy between pedagogical innovation and managerial excellence [8]. The integration of TQM and deep learning represents a strategic framework for holistic school improvement. Deep learning as an instructional paradigm develops cognitive and metacognitive competencies through inquiry, experimentation, and contextual learning [9]. When combined with TQM's managerial structure centered on the Plan-Do-Check-Act (PDCA) cycle this approach not only enhances teaching effectiveness but also ensures systemic monitoring and sustainability [10]. Studies have demonstrated that schools adopting TQM principles achieve higher levels of teacher motivation,

student engagement, and organizational adaptability [11], [12]. However, implementation challenges remain, including leadership inconsistencies, limited digital literacy, and insufficient resource allocation [13].

In the Indonesian context, the need for educational quality transformation is reinforced by national policy initiatives emphasizing continuous professional development and digital-era curriculum adaptation [14]. Vocational and general schools alike are encouraged to adopt a quality assurance mindset that aligns with both ISO-based educational management systems and national standards for quality education (Standar Nasional Pendidikan) [15]. The challenge, therefore, is not merely adopting managerial tools but developing a coherent model that unites quality assurance, deep learning pedagogy, and national curriculum goals within a sustainable framework for institutional growth. This study seeks to evaluate how Total Quality Management (TQM) can serve as a catalyst for transforming educational quality in schools implementing the Deep Learning-Based National Curriculum. Specifically, it examines the relationships among leadership commitment, process improvement, stakeholder engagement, and innovation in teaching and learning. By exploring the practical and theoretical intersections of TQM and deep learning, this research aims to provide insights into how educational institutions can balance managerial excellence and pedagogical relevance to achieve sustainable quality improvement. Total Quality Management (TQM), originally rooted in industrial quality assurance systems, has been widely adapted to the educational sector as a strategic framework for institutional improvement [16]. In education, TQM serves not only as a managerial approach but as a comprehensive philosophy aimed at achieving stakeholder satisfaction through continuous improvement and participatory management [17]. According to Goetsch and Davis [18], the essence of TQM in education lies in empowering teachers, learners, and administrators to collectively enhance the quality of learning processes and outcomes. TQM implementation in schools typically involves five key dimensions: leadership commitment, continuous process improvement, stakeholder involvement, data-based decision-making, and quality culture development [19]. Studies show that TQM significantly improves teacher professionalism, school governance, and student learning outcomes by institutionalizing systematic evaluation and innovation [20]. However, success depends on cultural readiness and leadership integrity; schools with hierarchical and bureaucratic management structures often struggle to sustain TQM initiatives [21].

Deep learning distinct from artificial intelligence terminology refers to a pedagogical approach emphasizing conceptual understanding, critical thinking, creativity, and collaborative inquiry [22]. According to Fullan and Quinn [1], deep learning develops six core competencies: character, citizenship, collaboration, communication, creativity, and critical thinking. In the context of curriculum reform, deep learning represents a shift from surface-level knowledge acquisition toward meaning-making and transformative learning [23]. Research has shown that schools adopting deep learning frameworks foster greater student engagement and adaptability to complex, real-world problems [24]. Teachers serve as facilitators and co-learners rather than information transmitters, thereby cultivating a more dynamic and personalized learning environment [25]. However, deep learning requires strong institutional support, adequate professional development, and an enabling culture that values experimentation and reflection. Without these, its implementation risks becoming superficial or fragmented.

The integration of TQM and deep learning creates a synergistic relationship between management excellence and pedagogical innovation. TQM's process-oriented framework supports the planning, monitoring, and evaluation mechanisms necessary for sustaining deep learning practices [26]. Conversely, deep learning's focus on creativity and collaboration revitalizes TQM by embedding humanistic and cognitive dimensions into quality assurance systems [27]. This integration ensures that educational quality transcends bureaucratic procedures, evolving into a culture of reflection and innovation. Empirical evidence suggests that the combined application of TQM and deep learning can lead to measurable improvements in learning effectiveness, stakeholder satisfaction, and institutional resilience [28]. For instance, the Plan–Do–Check–Act (PDCA) model, central to TQM, complements the learning design cycle in deep learning, enabling schools to link instructional strategies with continuous feedback and improvement [29]. This approach aligns with Deming's principle of *kaizen* incremental improvement through evidence and collaboration [30].

The Indonesian National Curriculum Framework (Kurnas) emphasizes competency-based education, digital literacy, and character formation, aligning with the principles of both deep learning and TQM [31]. The framework's implementation encourages schools to establish Internal Quality Assurance Systems (SPMI) that reflect continuous improvement processes consistent with TQM philosophy [32]. Furthermore, national policy initiatives, such as *Merdeka Belajar*, promote teacher autonomy and innovation in classroom practice—values directly resonant with deep learning [33]. However, several challenges remain. Many schools lack the managerial capacity to harmonize curriculum reform with quality assurance systems, leading to fragmented execution [34]. Additionally, insufficient professional development opportunities hinder teachers' ability to design deep learning experiences aligned with quality standards [35]. Therefore, the integration of TQM principles within the national curriculum context is critical for achieving both systemic coherence and pedagogical transformation.

While studies on TQM and deep learning have advanced independently, few have explored their integration as a holistic model for educational transformation. Most research focuses on either managerial quality assurance or pedagogical reform, rarely addressing how both domains interact synergistically. This study bridges that gap by examining how TQM's process-driven structure can institutionalize deep learning pedagogy, thereby fostering adaptive, data-informed, and human-centered educational quality systems. The proposed conceptual framework links continuous improvement (TQM) with transformative learning (deep learning), offering a pathway for systemic educational excellence in alignment with the National Curriculum Framework.

II. RESEARCH METHODS

This study employs a qualitative descriptive research design aimed at exploring and analyzing how Total Quality Management (TQM) principles are implemented to transform educational quality within the framework of the Deep Learning-Based National Curriculum in Indonesia. The qualitative approach was chosen to capture the contextual complexity of institutional practices, leadership behavior, and teacher experiences in applying continuous quality improvement in schools [36]. This method allows for an interpretive understanding of how managerial frameworks such as TQM intersect with pedagogical innovation rooted in deep learning.

Data were collected through triangulated techniques, including observation, semi-structured interviews, and document analysis. The participants consisted of school principals, teachers, and quality assurance coordinators from vocational schools and general education institutions in Bogor City that have adopted TQM-based quality management practices aligned with the national curriculum. Interview data explored the dimensions of leadership commitment, process improvement, and teacher engagement, while documentation such as internal quality audit reports, curriculum plans, and student learning outcomes was analyzed to validate the findings. Thematic analysis was conducted through coding and pattern identification, producing key themes on the alignment between TQM cycles (Plan–Do–Check–Act) and deep learning processes (Plan–Learn–Reflect–Improve) [37].

To ensure research credibility, data triangulation, member checking, and peer debriefing were employed, following Creswell's (2024) guidelines for qualitative rigor. Data interpretation was grounded in theoretical frameworks of TQM and transformational learning, enabling analytical generalization beyond descriptive reporting. The research process adhered to ethical standards by maintaining participant anonymity and informed consent. The findings are presented narratively and analytically to illustrate how TQM practices facilitate sustainable quality improvement and pedagogical transformation under the Deep Learning-Based National Curriculum framework.

III. RESULTS AND DISCUSSION

Implementation of TQM Principles in the National Curriculum Context

The findings reveal that the application of Total Quality Management (TQM) principles in Indonesian schools implementing the Deep Learning-Based National Curriculum (Kurnas) has significantly influenced institutional effectiveness, teacher professionalism, and student learning outcomes. The integration of Plan–Do–Check–Act (PDCA) cycles into school management ensures that quality assurance processes are aligned with curriculum design, instructional delivery, and evaluation mechanisms [38]. Schools adopting this model have reported enhanced communication between administrators and teachers, improved feedback systems, and stronger accountability for student-centered learning outcomes. Leadership commitment emerged as a decisive factor for successful TQM implementation. Institutions with transformational leaders those who promote vision sharing, participative decision-making, and continuous reflection showed greater adaptability to deep learning pedagogy [39]. The study also found that data-based decision-making is critical for sustaining quality improvements, particularly when integrated with digital platforms for tracking student performance and teacher evaluation. These results support previous research by Ulewicz [19], indicating that institutional leadership and stakeholder collaboration determine the degree of TQM effectiveness in educational reform.

Table 1. TQM Implementation Score at Bogor City Vocational School

TQM Indicator	Average Score (%)	Category
Effective Leadership	82.0	Excellent
Participant Satisfaction Educate	76.0	Good
Increased Sustainable Quality	71.0	Pretty Good
Komunikasi Efektif	68.0	Enough
Teamwork	79.0	Good
Total Average	75.2	Good

Deep Learning Practices and Quality Improvement Outcomes

The implementation of deep learning in classrooms has complemented TQM's focus on process improvement by reshaping teaching and learning interactions. Teachers who incorporated inquiry-based projects, collaborative tasks, and reflective assessments reported higher student engagement and better mastery of core competencies [40]. The deep learning approach fosters

metacognitive awareness and creativity two essential outcomes aligned with the goals of Indonesia's National Curriculum [31]. When supported by TQM's quality assurance structure, these pedagogical innovations become sustainable, as teachers engage in continuous planning, evaluation, and improvement cycles [41]. However, the study identified several barriers to effective implementation, including teachers' limited familiarity with data-driven evaluation and the lack of institutional training in quality management. Schools that failed to provide ongoing professional development exhibited inconsistent application of TQM principles. This aligns with findings by Ülker and Elci [26], who argued that professional capacity-building and leadership synergy are indispensable to institutionalizing a culture of quality.

Synergy between TQM and Deep Learning: A Transformational Framework

The integration of TQM and deep learning produces a transformational quality framework that unites managerial discipline with pedagogical innovation. Within this framework, the PDCA cycle functions as a structural mechanism for continuous improvement, while deep learning acts as the cultural and instructional driver of transformation [42]. The synergy between these two paradigms promotes both systemic consistency and adaptive learning addressing not only procedural quality but also the meaningfulness of education. Schools that implemented both frameworks holistically reported tangible outcomes, such as improved student achievement, enhanced teamwork among teachers, and greater stakeholder satisfaction. This reflects the "learning organization" concept, where schools evolve through reflection and feedback rather than through rigid compliance [43]. By embedding deep learning principles such as problem-solving, collaboration, and reflection into TQM processes, institutions transition from bureaucratic management toward human-centered quality systems.

Table 2. Integration of TQM with the Principles of Deep Learning

Integration Components TQM to Deep Learning	Score (%)
Leadership Support	82
Collaboration between Teachers	79
Use of Student Report Card Data	64
Reflection on Routine Learning	72
Learning Differentiation	68
Total Average	73

Strategic Implications for Educational Management

The results of this study underscore that effective TQM–deep learning integration requires systemic alignment across four dimensions: leadership, culture, process, and technology. Leadership must embody a commitment to evidence-based decision-making and inclusive collaboration [44]. Cultural transformation should emphasize openness, trust, and reflective learning. Process optimization through PDCA ensures that quality improvement remains measurable and iterative, while technology serves as an enabler for monitoring progress and disseminating best practices. These findings echo Oakland's [20] assertion that sustainable quality management depends on the interplay of structure and culture. Similarly, Goetsch and Davis [18] argue that organizational excellence in education arises when leadership vision, stakeholder participation, and continuous learning converge. Thus, the TQM–deep learning framework represents a strategic innovation for modern educational systems—bridging administrative efficiency with transformative learning to achieve long-term educational excellence.

For school leaders and administrators, the study underscores the importance of embedding TQM principles into institutional planning and evaluation mechanisms. Implementing PDCA-based cycles in curriculum design, instructional supervision, and teacher appraisal can sustain continuous improvement. Educational institutions should also invest in digital quality management tools to facilitate evidence-based decision-making and real-time monitoring of learning outcomes. Moreover, leadership training and teacher professional development programs are crucial to build capacity for deep learning pedagogical integration within a quality management environment. For policy makers, the results suggest that national curriculum implementation can be strengthened through frameworks that blend pedagogical innovation with organizational quality assurance. Policymakers should harmonize ISO-based and TQM-based standards with national education goals to create coherent and scalable quality systems. Collaborative partnerships between government, industry, and universities can further support innovation and adaptive learning models, ensuring that quality improvement initiatives remain inclusive and contextually grounded.

Theoretically, this study contributes to the emerging discourse on educational quality transformation by positioning the integration of TQM and deep learning as a dual framework that bridges management theory and pedagogical theory. It advances the argument that educational excellence requires both structural optimization and cognitive empowerment. The TQM–Deep Learning model proposed herein provides a foundation for future empirical research exploring correlations between management efficiency, teacher innovation, and student performance. Future research should employ mixed-method and longitudinal designs to assess long-term outcomes of TQM–Deep Learning integration across various educational levels and geographic contexts. Additionally, further exploration of the role of artificial intelligence (AI) and learning analytics in enhancing PDCA-based

educational management could provide new insights into data-driven quality improvement. In conclusion, transforming educational quality in the era of the Deep Learning-Based National Curriculum requires not only curriculum innovation but also the institutionalization of Total Quality Management as a living philosophy one that continually evolves with the dynamic needs of learners, educators, and society.

IV. CONCLUSION

This study concludes that the integration of Total Quality Management (TQM) and Deep Learning within the National Curriculum Framework provides a comprehensive and transformative model for improving educational quality in Indonesian schools. The findings confirm that the TQM framework anchored in continuous improvement, leadership engagement, and stakeholder collaboration serves as a powerful managerial structure to sustain quality assurance across institutional processes. Meanwhile, deep learning complements this model by enriching pedagogical practices through inquiry, creativity, collaboration, and critical thinking. Together, these paradigms establish a symbiotic relationship that unites systemic efficiency with meaningful learning experiences. The research highlights that effective implementation of the TQM–Deep Learning integration requires three essential components: (1) strong transformational leadership that promotes participatory management and reflective practice; (2) a quality culture that values innovation, accountability, and professional collaboration; and (3) the use of data-driven and technology-assisted decision-making to monitor progress and ensure transparency. While several institutions successfully demonstrated measurable improvements in student engagement, teacher performance, and institutional coherence, challenges remain—particularly in aligning bureaucratic structures, enhancing digital competence, and ensuring equitable resource distribution.

V. REFERENSI

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