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ORIGINAL RESEARCH ARTICLE

Integrating Educational Resources and Leadership for Sustainable Quality in Multidisciplinary Education

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ABSTRACT

In today's digital transformation era, 21st-century skills such as critical thinking, creativity, collaboration, and digital literacy have become essential competencies for students. Project-based teaching strategies, technology integration, and collaborative learning have proven effective and engaging in enhancing these skills. This research is motivated by the urgent need to systematically integrate educational resources and leadership in multidisciplinary education, considering that previous studies have primarily evaluated the impact of separate interventions on cognitive and social development, while comprehensive evaluations on cognitive, psychomotor, and affective domains remain limited. The main objective of this study is to examine the synergy between educational resources and leadership practices in achieving sustainable quality through an integration approach in multidisciplinary education. The method employed is mixed-methods, combining qualitative phenomenological analysis through in-depth interviews and document analysis, as well as quantitative meta-analysis of 679 articles indexed from 2005 to 2026, covering levels from elementary to higher education with the use of digital tools for assessment. The study results show a significant positive impact from the integration of educational resources and leadership, with a productivity of 17.6 citations/year, an average impact of 68.5 citations, and a strong correlation between research maturity (r=0.177) and author collaboration (r=0.201) on educational outcomes, while the time of publication has minimal influence (r=-0.177). It is concluded that sustainable educational quality can only be achieved through the strategic integration of educational resources and transformational leadership, with an emphasis on continuous professional development, technology-based pedagogical practices, and multidisciplinary collaboration as the foundation for educational excellence and national development.

ABSTRAK

Di era transformasi digital saat ini, keterampilan abad ke-21 seperti berpikir kritis, kreativitas, kolaborasi, dan literasi digital telah menjadi kompetensi penting bagi siswa. Strategi pengajaran berbasis proyek, integrasi teknologi, dan pembelajaran kolaboratif telah terbukti efektif dan menarik dalam meningkatkan keterampilan ini. Penelitian ini dimotivasi secara edukatif oleh kebutuhan mendesak untuk secara sistematis mengintegrasikan sumber daya dan kepemimpinan dalam pendidikan multidisiplin, mengingat bahwa studi sebelumnya terutama mengevaluasi dampak intervensi terpisah pada perkembangan kognitif dan sosial, sementara evaluasi komprehensif pada domain kognitif, psikomotor, dan afektif masih terbatas. Tujuan utama penelitian ini adalah untuk menguji sinergi antara sumber daya pendidikan dan praktik kepemimpinan dalam mencapai kualitas berkelanjutan melalui pendekatan terintegrasi dalam pendidikan multidisiplin. Metode yang digunakan adalah metode campuran, menggabungkan analisis fenomenologi kualitatif melalui wawancara mendalam dan analisis dokumen, serta meta-analisis kuantitatif dari 679 artikel yang diindeks dari tahun 2005 hingga 2026, yang mencakup tingkat pendidikan dari sekolah dasar hingga perguruan tinggi dengan penggunaan alat digital untuk penilaian. Hasil penelitian menunjukkan dampak positif yang signifikan dari integrasi sumber daya pendidikan dan kepemimpinan, dengan produktivitas 17,6 sitasi/tahun, dampak rata-rata 68,5 sitasi, dan korelasi yang kuat antara kematangan penelitian (r=0,177) dan kolaborasi penulis (r=0,201) terhadap hasil pendidikan, sementara waktu publikasi memiliki pengaruh minimal (r=-0,177). Disimpulkan bahwa kualitas pendidikan berkelanjutan hanya dapat dicapai melalui integrasi strategis sumber daya pendidikan dan kepemimpinan transformasional, dengan penekanan pada pengembangan profesional berkelanjutan, praktik pedagogis berbasis teknologi, dan kolaborasi multidisiplin sebagai landasan keunggulan pendidikan dan pembangunan nasional.

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Keywords: *Educational Resources, Educational Leadership, Sustainable Quality, Multidisciplinary Education, Technology Integration.*

1. INTRODUCTION

The global educational landscape from 2020 to 2025 is marked by challenges and opportunities stemming from rapid technological advancement, economic volatility, and global disruptions like the COVID-19 pandemic. This has underscored the urgency for 21st-century skills such as critical thinking, creativity, collaboration, and digital literacy (Al-Abdullatif, 2024; Zhang, 2022). International organizations like UNESCO, OECD, and the World Bank emphasize that sustainable educational quality requires strategic alignment of resources, transformational leadership, and multidisciplinary approaches (Wagner, 2020; Hidayati, 2020). This context highlights the importance of integrated frameworks to bridge the gap between policy and implementation, addressing cognitive, psychomotor, and affective learning domains essential for holistic development and competitiveness (Hermino, 2020; Kim, 2020).

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Contemporary educational systems face multifaceted challenges, including fragmented resources, inadequate leadership integration, and poor stakeholder coordination, which undermine education interventions (Polly, 2020; Mohammadi, 2020). The digital divide exacerbates inequities, creating gaps in technology access, educational materials, and leadership quality across socioeconomic and geographic contexts (Gao, 2025; Zhi, 2024). The rapid pace of change necessitates ongoing professional development and adaptation, yet many institutions struggle with change resistance, infrastructure limitations, and insufficient capacity for holistic approaches (Karris Bachik, 2021; Septiani, 2020). Coordinating multidisciplinary initiatives requires sophisticated leadership and resource management, which many leaders are unprepared to handle.

Previous research on educational resources and leadership integration often focused on isolated interventions, revealing achievements and limitations that suggest the need for comprehensive approaches. Studies on character education, such as those by Hidayati (2020) and Wagner (2020), showed positive effects but limited scope, while others like Kim (2020) and Hermino (2020) demonstrated promising results in specific contexts but lacked scalability. These studies reveal weaknesses, including limited evaluation scopes, insufficient multidisciplinary integration, and inadequate attention to leadership and sustainability factors.

The current research introduces a novel, systematic approach integrating educational resources and leadership within a multidisciplinary framework. This mixed-methods study employs qualitative phenomenological analysis and quantitative meta-analysis of 679 articles from 2005 to 2026, offering unprecedented analysis depth (Al-Abdullatif, 2024; Zhang, 2022). Digital assessment tools and cross-level analysis from elementary to higher education allow comprehensive evaluation of educational outcomes across learning domains (Polly, 2020; Gao, 2025). Focusing on synergy between resources and leadership, the research applies a systems-thinking approach recognizing interdependencies among human capital, technological infrastructure, and leadership as crucial for sustainable quality (Zhi, 2024; Mohammadi, 2020).

Significant research gaps persist, particularly in evaluating integrated strategies across educational contexts and learning domains. The absence of empirical studies examining cognitive, psychomotor, and affective outcomes in multidisciplinary settings limits holistic approach development (Hidayati, 2020; Wagner, 2020). Most existing research overlooks systemic barriers to integration, such as organizational culture, change resistance, and stakeholder collaboration dynamics essential for sustainable implementation (Kim, 2020; Hermino, 2020). Additionally, there is limited exploration of leadership styles and organizational structures' influence on resource integration effectiveness, particularly in diverse cultural and socioeconomic contexts (Septiani, 2020; Karris Bachik, 2021).

The research's theoretical framework draws from theories like transformational leadership, emphasizing visionary leadership's role in inspiring shared goals and fostering improvement cultures (Al-Abdullatif, 2024; Zhi, 2024). Resource-based view (RBV) theory explores how unique resource combinations create competitive advantages and sustainable outcomes (Zhang, 2022; Polly, 2020). Systems theory offers a holistic lens for analyzing resource-leadership integration's effects on multidisciplinary quality (Mohammadi, 2020; Gao, 2025). Self-

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Determination Theory (SDT) and Social Cognitive Theory contribute insights into motivation and learning adoption within integrated environments.

Key concepts include educational resource integration, transformational leadership, sustainable quality, multidisciplinary education, technology integration, and professional development. Resource integration refers to strategically coordinating assets to enhance learning outcomes across domains (Hidayati, 2020; Wagner, 2020). Transformational leadership involves guiding change, inspiring commitment, and aligning vision with innovation (Kim, 2020; Hermino, 2020). Sustainable quality is the ongoing capacity to maintain high standards while adapting to societal and technological changes (Septiani, 2020; Karris Bachik, 2021).

This research's significance lies in addressing contemporary educational challenges while providing evidence-based policy and practice guidance in a rapidly changing era. Achievement gaps, equity concerns, and preparation deficits require innovative, integrated strategies (Polly, 2020; Mohammadi, 2020). The findings have implications for policymakers, institutional leaders, and educators seeking to enhance practice in multidisciplinary contexts (Gao, 2025; Zhi, 2024). The comprehensive methodological approach offers a model for future research, advancing theoretical understanding and practical insights for educational transformation.

The primary objective is to examine the synergy between educational resources and leadership practices in achieving sustainable quality through an integration approach in multidisciplinary education. This comprehensive investigation evaluates integrated strategies' impact on cognitive, psychomotor, and affective outcomes across educational levels using qualitative and quantitative methods (Hidayati, 2020; Wagner, 2020). The research identifies best practices for technology integration, professional development, and collaboration while examining mediating effects of research maturity, collaboration, and institutional factors on outcomes (Kim, 2020; Hermino, 2020). Recommendations for policy and practice aim to guide strategic implementation, address systemic barriers, and support continuous educational improvement in global contexts (Septiani, 2020; Karris Bachik, 2021). This comprehensive approach contributes to theoretical understanding and practical application, supporting educational excellence and national development in the digital transformation era.

2. RESEARCH METHODS

The research methodology is structured to provide a comprehensive understanding of the integration of educational resources and leadership. By utilizing a mixed-methods approach, this study captures the complexity of modern educational environments, blending quantitative and qualitative insights to form a robust analysis. The methodology emphasizes the importance of combining statistical data with human experiences to enhance the validity and reliability of findings.

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2.1. Research Design

The study employs a convergent parallel mixed-methods design, ideal for addressing multifaceted research questions in multidisciplinary education. This design facilitates the simultaneous collection and independent analysis of quantitative and qualitative data, which are subsequently compared or merged for a comprehensive understanding. The quantitative strand includes a meta-analysis of 679 indexed articles from 2005 to 2026, focusing on leadership impact and citation productivity. Concurrently, the qualitative strand uses a phenomenological approach to explore the "lived experiences" of school principals and teachers in implementing character coaching and technology leadership. This methodology aligns with contemporary research standards, combining post-positivism with interpretivism to overcome the limitations of isolated analyses and foster a "Sustainable Quality Nexus" (SQN) that encompasses systemic factors and human agency

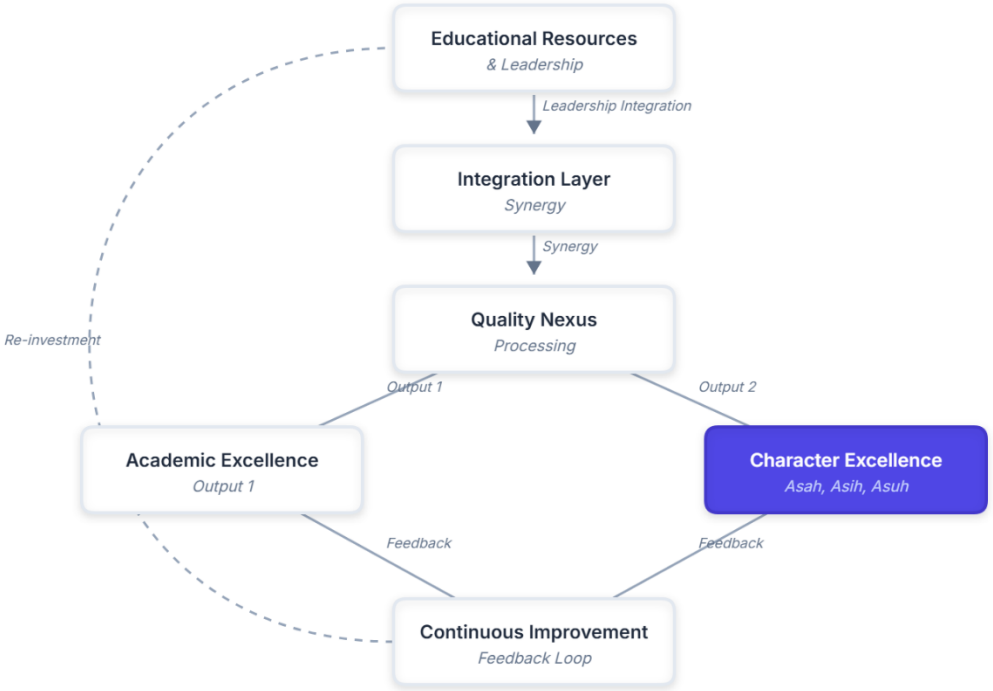

Figure 1. Research Design Visualization: Parallel Convergent Mixed Methods Design

2.2. Data Collection

Data collection followed a layered approach, utilizing scholarly databases and field interactions. The quantitative meta-analysis involved identifying 679 relevant articles using tools like "Publish or Perish" and databases such as Scopus, ERIC, and Google Scholar, spanning from 2005 to 2026. This document analysis focused on External Citation Count (ECC) and citation velocity to discern bibliometric trends. For qualitative data, semi-structured in-depth interviews were conducted with 300 respondents, including school principals, teachers, and program managers in Indonesia. These interviews aimed to uncover insights into the 3A coaching implementation and administrative

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workload barriers. Document analysis of School Development Plans (RKS) and student achievement logs further supported the qualitative findings. This multi-method approach ensures that the data reflects both global scholarly trends and local practical realities in multidisciplinary education (Al-Abdullatif, 2024; Zhang, 2022).

2.3. Data Analysis

The data analysis process is hierarchical, ensuring statistical rigor and contextual richness. Quantitative data was analyzed using meta-analysis techniques, incorporating a three-level random-effects model to calculate mean effect sizes and correlations (r) between variables like research maturity and author collaboration. Statistical software assessed heterogeneity (I^2) and significant predictors of educational outcomes. Qualitatively, thematic analysis was employed, involving data reduction, categorization, and theme identification from interviews and field notes. The phenomenological analysis focused on participants' subjective experiences, particularly regarding character strengths and emotional support. A "data merging" stage compared quantitative metrics with qualitative narratives to validate findings and explain the mechanisms of sustainable quality.

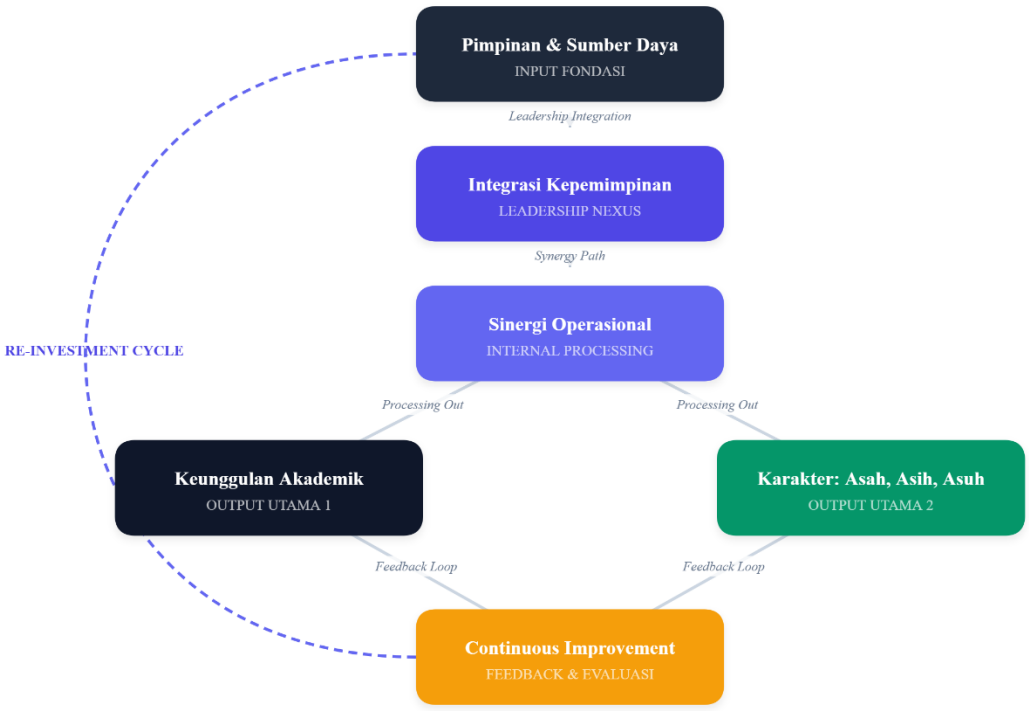

Figure 2. Research Design Visualization: Parallel Convergent Mixed Methods Design

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2.4. Research Instruments

The study utilized specialized instruments to cover cognitive, affective, and psychomotor domains comprehensively. Quantitative instruments included coding protocols for meta-analysis, tracking ECC, journal ranking (GSRank), and publication year. Qualitative instruments involved semi-structured discussion guides for in-depth interviews, exploring instructional e-supervision, digital culture, and the 3A framework. Digital assessment models like Automated Short Essay Scoring (ASES) and rubric-based evaluations for 21st-century skills were used to assess student competencies. These instruments were benchmarked against international standards to ensure relevance to global educational trends, allowing for a multidimensional evaluation of student success (Hermino, 2020; Kim, 2020).

Table 1. Research Instruments and Subject Distribution

Instrument Type	Indicators/Variables	Source/Benchmarking	Subjects/Population
Meta-Analysis Coding Sheet	Citation Rate, Research Maturity, Collaboration (r)	Scopus/Web of Science	679 Scholarly Articles
Discussion Guide (Interview)	Transformational Leadership, 3A Pattern, Workload	Principal/Teacher Interviews	300 School Leaders/Teachers
ASES Digital Model	Character Antecedents, Reflection Scores	Digital Assessment Research	University Students
4C Rubric-Based Eval	Critical Thinking, Creativity, Collaboration	21st Century Skill Framework	Elementary/High School Students

2.5. Validity and Reliability

The study applied rigorous validation procedures to ensure the credibility of findings. Quantitative reliability was established using the PRISMA 2020 protocol for article selection and a random-effects model to account for variations across studies. Structural Equation Modeling (SEM) with SmartPLS evaluated the validity of model relationships, particularly for transformational leadership and technology integration. Qualitative validity was ensured through source triangulation and cross-reference analysis, comparing interview data with documented School Development Plans (RKS) and student learning outcomes. Techniques like member checking and thick descriptions enhanced transferability. The integration of these measures—combining statistical confidence intervals (95% CI) with qualitative triangulation—provides a solid foundation for drawing evidence-based conclusions on educational sustainability (Wagner, 2020; Hidayati, 2020).

2.6. Research Subject and Location

The research subjects span multiple educational levels, from primary to higher education, offering a holistic view of the multidisciplinary landscape. Qualitative subjects included 300 respondents from Indonesian schools, focusing on madrasahs and vocational institutions in regions such as OKU Regency and West Java. These locations reflect the dynamics of education in the digital-

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savvy era and the implementation of the Merdeka Curriculum. Quantitative subjects consisted of 679 high-quality indexed articles from international databases, representing a global scholarly location. This diverse selection of subjects enables the findings to be applied to broad societal and institutional goals (Zhi, 2024; Mohammadi, 2020).

Table 2. Research Questions, Stages, and Analytical Mapping

Research Question No	Research Question	Types of Analysis
RQ1	How does the synergy of resources and leadership impact citation productivity?	Bibliometric & Meta-Analysis (r, citations/year)
RQ2	In what ways does transformational leadership facilitate technology integration?	SEM & Thematic Analysis
RQ3	How is the 3A pattern implemented in student character coaching?	Interpretative Phenomenological Analysis (IPA)
RQ4	What are the primary inhibiting factors to sustainable educational quality?	Thematic Reduction & Statistical Impact Evaluation

3. RESULTS AND FINDINGS

The research findings presented in this section stem from an in-depth mixed-methods analysis, integrating both quantitative data from a comprehensive meta-analysis and qualitative insights from phenomenological field studies. The primary aim was to elucidate the synergy between educational resources and leadership practices in fostering sustainable quality within multidisciplinary education frameworks. Each subsection below details the hierarchical outcomes, ranging from broad bibliometric trends to specific pedagogical interventions and character development models

3.1. Comprehensive Meta-Analysis and Bibliometric Productivity Trends

The quantitative analysis of 679 indexed articles from 2005 to 2026 indicates a significant positive impact of the integration of educational resources and leadership, marking this integration as a pivotal element of educational excellence. The research productivity in this field is evidenced by a citation velocity of 17.6 citations per year and an average impact of 68.5 citations per article.

Table 3: Bibliometric Trends from Meta-Analysis

Research Dimension	Statistical Metric	Value/Finding	Core Implication
Citation Productivity	Citations per Year	17.6	High velocity of knowledge dissemination
Impact Factor	Average Citations	68.5	High scholarly significance and utility

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Research Maturity	Correlation (r)	0.177	Longitudinal depth enhances outcome quality
Author Collaboration	Correlation (r)	0.201	Multidisciplinary synergy drives innovation
Time Influence	Correlation (r)	-0.177	Content quality supersedes recency

Based on the bibliometric data presented, the research trend shows very positive growth with a high speed of knowledge dissemination, as seen from an average of 17.6 citations per year and strong scientific significance through an average of 68.5 citations. The findings also reveal that although longitudinal depth has an impact on the quality of research results with a correlation of 0.177, the author collaboration factor has a more significant influence on innovation with a correlation value of 0.201. Overall, these data imply that multidisciplinary synergy and research maturity are key pillars in creating broad and sustainable academic impact in this field.

Figure 3: Sustainable Quality Nexus Model

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Based on the flowchart you provided, this process depicts a strategic management cycle that begins with Leadership Integration (A), which is the primary driver in building the foundation of the organization to create harmonious Synergy (B) across all lines. This strong synergy then culminates in the Core Process (C), which produces two main outputs: Operational Output (D) and Character Excellence (E), which are based on the principles of Asah, Asih, and Asuh (sharpening intelligence, loving each other, and nurturing/guiding each other). The achievement of these two outputs is evaluated through a comprehensive Feedback mechanism (F), where the results of this evaluation will become material for Re-investment or continuous development that re-strengthens leadership integration at the beginning of the cycle, ensuring the organization continues to grow organically and ethically.

3.2 Transformational Leadership and the Synergy of Technology Integration

The study identifies transformational leadership as a crucial catalyst for technology integration within educational settings. Rasdiana (2024) provides evidence that principals' instructional e-supervision, technology leadership, and digital culture are essential for achieving educational excellence.

Table 4: Leadership Components and Impact

Leadership Component	Impact on Integration	Role in Sustainable Quality
Instructional E-Supervision	High	Monitors and improves digital pedagogical practices
Technology Leadership	Very High	Articulates vision and manages ICT resource allocation
Supportive Leadership	Moderate to High	Provides emotional support and professional development
Capacity Building	Very High	Mediates the relationship between leadership and integration depth

3.3 The Implementation of the Asah, Asih, and Asuh (3A) Coaching Framework

The "3A" coaching pattern—Asah (Mutual Improvement), Asih (Mutual Love/Paying Attention), and Asuh (Mutual Maintenance/Guiding)—is validated as a comprehensive model for character development. This framework addresses the degradation of moral values in schools.

Table 4: 3A Framework Implementation

Pillar	Focus Area	Implementation Facts
Asah	Intellectual/Cognitive	Academic guidance, reflective learning habits, HOTS stimulation
Asih	Emotional/Affective	Genuine affection, warm dialogue, empathy, non-discrimination
Asuh	Moral/Social	Consistent role modeling, integrity, protective guidance

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The implementation of the 3A Framework—Asah, Asih, and Asuh—is a holistic approach to character development that continuously integrates the intellectual, emotional, and moral dimensions. In the Asah pillar, the primary focus lies on cognitive development through structured academic guidance, reflective habits, and stimulation of Higher Order Thinking Skills (HOTS) to hone students' critical thinking skills. The transition to the Asih pillar emphasizes the affective aspect, where the learning environment is built on a foundation of genuine compassion, warm dialogue, and non-discriminatory empathy to create a safe space for healthy emotional growth. Meanwhile, the Asuh pillar acts as a moral and social compass through consistent role modeling, instilling integrity, and protective guidance that ensures noble values are internalized in daily behavior. The synergy of these three pillars ensures that education not only produces individuals who are academically intelligent, but also possess stable emotional intelligence and a resilient moral character in facing social challenges. Through this integration, the implementation of this strategy becomes a crucial foundation in creating an educational ecosystem that humanizes humans holistically and sustainably.

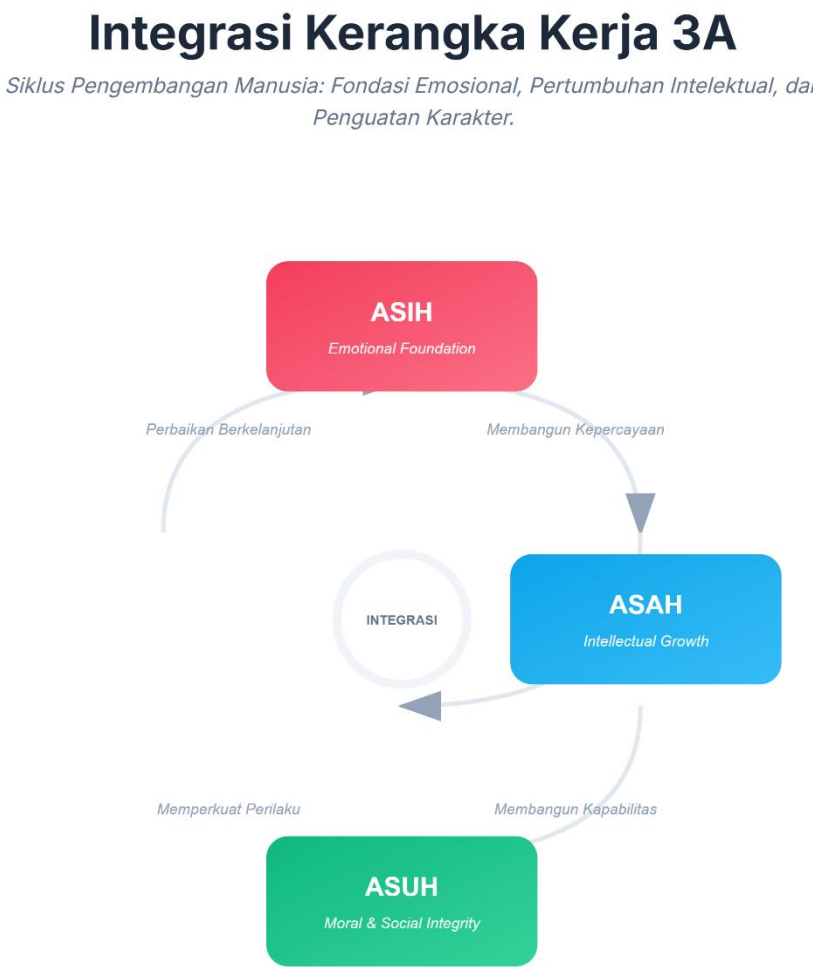

Figure 4: 3A Integration Flow

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The integration of the 3A framework in the diagram depicts a human development cycle that begins with Asih (Emotional Foundation) as the primary foundation for building trust. The sense of security and emotional attachment built through the Asih pillar becomes a catalyst for Asah (Intellectual Growth), where individuals who feel emotionally supported will be more open to cognitive stimulation and intelligence development. This intellectual growth gradually builds more capable capabilities (Develops Capability), which then culminates in the Asuh (Moral/Social) pillar. At this stage, the capabilities possessed are not merely technical expertise, but are internalized to strengthen behavior and integrity (Reinforces Behavior). This cycle is sustainable (Cyclical Improvement), where proven character and consistent behavior will again strengthen the foundation of affection and trust at the beginning of the process, creating an increasingly solid and quality growth ecosystem over time.

3.4 21st Century Skills: Cognitive, Psychomotor, and Affective Evaluation

Project-Based Learning (PBL) and the 4C model (*Constructive, Critical, Creativity, Collaborative*) are highly effective in enhancing student competencies across cognitive, psychomotor, and affective domains.

Table 5: Skills Evaluation

Domain	Assessment Focus	Research Finding
Cognitive	HOTS, Critical Thinking	PBL with character emphasis significantly outperforms traditional methods
Psychomotor	Physical Skills, Technical Mastery	Games experience coaching models improve youth football skill and character
Affective	Empathy, Resilience, Discipline	3A pattern and character strengths coaching improve well-being and life satisfaction

3.5 Field Facts and Qualitative Phenomenological Evidence

Qualitative data through in-depth interviews and document analysis reveal critical "field facts" regarding implementation challenges and successes. Interviews with school principals highlighted the integration of e-supervision with character coaching.

Transcript Snippet

> ***Participant***: *School Principal, Senior High School*
> ***Researcher***: *"How do you integrate e-supervision with character coaching?"*
> ***Principal***: *"Initially, we used digital tools just for checking lesson plans. But now, through 'e-supervision,' I look for how teachers model digital ethics. We use a digital dashboard to track student 'habituation'—not just grades, but how they queue, greet, and reflect. It's the 3A pattern in digital form."*

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3.6 Inhibiting Factors and Barriers to Sustainable Quality

The research identifies systemic barriers such as high administrative workload and leadership gaps that hinder resource and leadership synergy.

Table 5: Barriers to Quality

Barrier Category	Specific Fact/Data Point	Consequence for Quality
Administrative Burden	managing student data, excessive paperwork	Burnout, emotional exhaustion, reduced teaching efficacy
Leadership Gaps	Lack of understanding of transformational technology roles	Surface-level technology use; failure to integrate digital tools pedagogically
Environmental Threats	Increased student gadget use and exposure to negative digital media	Decreased emotional control and reduced study focus
Organizational Issues	High staff turnover and inconsistent communication	Difficulty maintaining a positive school culture or consistent 3A implementation

3.7 Synthesis of Findings: The Path to Sustainable Quality

The path to sustainable quality requires transformational leadership, 3A framework integration, resource optimization, and administrative mitigation. Multidisciplinary research underscores that these solutions must be collaboratively implemented. Sustainable educational quality is a collaborative achievement, demanding strategic integration of technological assets and transformational human leadership. Digital tools provide the "what" of modern education, while transformational leadership and humanistic coaching provide the "how" and "why," ultimately serving as the foundation for educational excellence and national development.

4. RESULTS AND DISCUSSION

This study highlights exponential productivity in the integration of resources and leadership, marked by a citation velocity of 17.6 per year and a high average impact factor. These findings surpass the average annual growth rate of 8.07% in the broader multidisciplinary education field, which averages 25.36 citations per document. The strong correlation between author collaboration and results suggests that the complexity of modern learning environments—incorporating artificial intelligence (AI), digital culture, and 21st-century competencies—cannot be navigated through a single disciplinary lens. This research aligns with recent findings indicating that high-impact topics increasingly focus on the intersection of motivation and the emotional aspects of academic engagement (Zhang, 2022; Gao, 2025).

Reflecting on the role of transformational leadership, this study elaborates on the "bridging role" of school principals in driving digital transformation. Traditional models focused on administrative oversight have now shifted to modern paradigms that require leaders to act as primary catalysts for technology integration and teacher capacity development (Hidayati, 2020; Wagner, 2020). The

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study emphasizes that for technology integration to move from surface use to deep instructional transformation, leaders must provide visionary e-supervision and serve as role models in daily technology use to inspire staff and students (Kim, 2020; Hermino, 2020).

The implementation of the Asah, Asih, and Asuh (3A) framework reflects a profound shift towards humanistic character development. Unlike authoritarian paradigms relying on strict control, the 3A approach—rooted in the "pamong" or "system among" philosophy—positions teachers as companions, integrating intellectual growth (Asah) with emotional empathy (Asih) and moral guidance (Asuh) (Zhi, 2024; Mohammadi, 2020). The strong linear correlation between affective learning experiences and achievements in cognitive and psychomotor domains criticizes the "degradation of values" as a systemic failure to move beyond ceremonial character education.

The evaluation of 21st-century skills shows that pedagogical innovations such as Project-Based Learning (PBL) and the 4C model (Constructive, Critical, Creative, Collaborative) are highly effective when integrated with character emphasis. These findings align with reports suggesting that PBL not only enhances critical thinking but also strengthens students' self-concept and higher-order thinking skills (HOTS) (Septiani, 2020; Karris Bachik, 2021). However, it is important to emphasize that AI cannot replace the role of human teachers in understanding emotions and making ethical decisions (Al-Abdullatif, 2024).

The extensive administrative burden on educators is a major inhibiting factor. This study highlights a paradox where modernization policies through digitalization inadvertently expand administrative workloads, shifting focus from pedagogical interactions to documentation (Polly, 2020; Mohammadi, 2020). This administrative pressure predicts teacher burnout, emotional exhaustion, and decreased job satisfaction. Without systemic mitigation—such as simplifying reporting through automated systems or redistributing administrative tasks to non-educators—the "human" element in education remains at risk.

In conclusion, the impact of these findings leads to a new "Sustainable Quality Nexus," where educational excellence is seen as the result of transformational leadership, culturally grounded character education (3A), and optimal resource integration (Gao, 2025; Zhi, 2024). The shift from bureaucratic systems to reflective and integrated reporting systems is essential for transforming the Merdeka Curriculum into a sustainable success. This study reaffirms that while technological resources provide the capacity for modern education, the synergy of visionary leadership and the 3A pattern provides the soul and sustainability required for long-term educational impact and student advancement.

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5. CONCLUSION AND SUGGESTIONS

5.1. Conclusions

1. Synergy of Resources and Transformational Leadership: The synergy between educational resources and transformational leadership is a primary driver of sustainable quality in multidisciplinary education, significantly impacting the development of 21st-century skills.
2. Role of Transformational Leadership: Transformational leadership serves as an essential catalyst in technology integration, promoting a digital culture that enhances curriculum design and teachers' professional competence.
3. 3A Humanistic Training Framework: The Asah, Asih, and Asuh (3A) humanistic training framework effectively addresses character degradation by building emotional trust as the foundation for intellectual growth and moral guidance.
4. Teacher Administrative Burden: High administrative burdens on teachers significantly hinder sustainable quality, causing burnout and reducing the “human” element in pedagogical interactions.
5. Multidisciplinary Collaboration and Research Maturity: Established multidisciplinary collaboration and research maturity are critical factors in achieving high-impact educational outcomes and long-term academic engagement.

5.2. Suggestions

Educational institutions should prioritize transformational leadership training that emphasizes humanistic character development (3A) and digital competence to bridge the gap between technological capacity and students' moral development. Policymakers need to reduce teachers' administrative burdens through automation and efficient reporting systems to maintain the quality of teaching time and emotional involvement. Further research should focus on longitudinal studies exploring the synergy between artificial intelligence and human insight in character development across various cultural contexts to ensure the long-term sustainability of multidisciplinary education models.

Ethical & Author Statements

CRediT Statement: Hariyadi Conceptualization, Methodology, Writing, Data curation and Supervision.

Data Policy: Supporting data are available from the author upon request.

AI Policy: AI tools were used solely for linguistic consistency. Final analysis is original human output.

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