



# Integrating Ki Hadjar Dewantara's Among System into Science Learning Management

Nenah Eja Widiawati<sup>1\*</sup>, Taufani Chusnul Kurniatun<sup>1</sup>

<sup>1</sup>Educational Administration Program, Universitas Pendidikan Indonesia, Indonesia.

Received: February 25, 2026

Revised: March 09, 2026

Accepted: May 16, 2026

Published: May 16, 2026

Corresponding Author:

Nenah Eja Widiawati

[nenahewidiawati@upi.edu](mailto:nenahewidiawati@upi.edu)

DOI: [10.29303/jppipa.v12i4.14683](https://doi.org/10.29303/jppipa.v12i4.14683)

 Open Access

© 2026 The Authors. This article is distributed under a (CC-BY License)



**Abstract:** Science learning in Indonesian schools continues to face structural and instructional challenges, particularly in laboratory management, inquiry-based implementation, science literacy development, and supervision of science instruction. Effective principal leadership plays a crucial role in ensuring that science learning is systematically planned, implemented, and evaluated. This study examines how Ki Hadjar Dewantara's Among System can be integrated into science learning management to strengthen principals' instructional leadership. Using a qualitative literature review approach, this study analyzes empirical research on science education leadership and Dewantara's educational philosophy. The findings indicate that Dewantara's leadership trilogy *ing ngarsa sung tuladha, ing madya mangun karsa, and tut wuri handayani*, supports science learning management through strategic laboratory planning, participative supervision of science teachers, collaborative curriculum development, and the promotion of inquiry-based learning. The Among System encourages structured autonomy in scientific exploration while maintaining professional accountability. However, institutional rigidity, limited laboratory facilities, and administrative constraints remain significant challenges. Integrating Dewantara's philosophy into science learning management provides a culturally grounded and humanistic leadership framework that enhances instructional quality, scientific literacy, and sustainable school improvement.

**Keywords:** Among System; Inquiry-Based Learning; Ki Hadjar Dewantara; Science Education Leadership; Science Learning Management.

## Introduction

Science education plays a critical role in developing students' scientific literacy, critical thinking skills, and problem-solving competence (Lathifah et al., 2025). However, science learning management in many Indonesian schools faces persistent challenges, including inadequate laboratory planning, limited supervision of inquiry-based instruction, insufficient integration of STEM approaches, and weak alignment between curriculum planning and science competency standards (Ferary, 2021; Sukmawati et al., 2023). These challenges highlight the need for effective principal leadership that goes beyond administrative control and emphasizes instructional management of science programs (Harini et al., 2023).

Ki Hadjar Dewantara, widely recognized as the father of Indonesian education, developed an educational philosophy deeply rooted in the values of nationalism, cultural identity, and human dignity. Central to his thought is the principle of "*Tut Wuri Handayani*," meaning "to guide from behind," which underscores the role of educators as facilitators who empower students to develop independence, responsibility, and self-directed growth (Rosydah & Manggopa, 2024). Dewantara advocated for education that respects the learner's cultural background and natural development, promoting a holistic approach that nurtures not only intellectual abilities but also moral and emotional growth. His educational philosophy is framed around the concept of "*Tri Ngesti Tunggal*," which aims at achieving a balanced development of the mind, body, and soul, fostering learners who are

### How to Cite:

Widiawati, N. E., & Kurniatun, T. C. (2026). Integrating Ki Hadjar Dewantara's Among System into Science Learning Management. *Jurnal Penelitian Pendidikan IPA*, 12(4), 859–868. <https://doi.org/10.29303/jppipa.v12i4.14683>

intellectually competent, ethically grounded, and socially conscious (Waworuntu, 2021).

Moreover, Dewantara introduced the Among System, a leadership model inspired by the traditional Javanese approach to guiding individuals with gentleness, respect, and moral example rather than through authoritarian control (Shabartini et al., 2023). This system underscores the importance of educators leading with care, patience, and wisdom, positioning themselves not as rulers but as mentors who nurture and inspire (Taufikin, 2021). His ideas challenge rigid, colonial-era education models by emphasizing education as a tool for liberation and self-empowerment, promoting national pride and cultural preservation (Fuadi et al., 2025; Supriadi et al., 2025). These foundational thoughts remain influential in Indonesian education today, offering valuable insights for modern school leadership, particularly in fostering inclusive, student-centered environments that encourage principals to act as supportive managers rather than mere administrators (Anggraini & Wiryanto, 2022).

Managerial competence among school principals is crucial, as it directly shapes the effectiveness and quality of school leadership, which subsequently influences student outcomes and overall school performance (Syahrul et al., 2024). Principals with strong managerial skills are able to plan strategically, organize resources efficiently, lead staff with clear vision, and control processes to ensure goals are met (Asyari et al., 2024). These competencies enable principals to create a positive school culture, handle challenges proactively, and foster collaboration among teachers, students, and the community. Without solid managerial competence, schools risk inefficiencies, poor communication, and low morale, which can undermine the educational environment (Rachmawati et al., 2020). Therefore, enhancing principals' managerial abilities is essential for achieving sustainable improvements in school operations and delivering quality education (Setyaningsih et al., 2024).

Ki Hadjar Dewantara's educational philosophy remains highly relevant in contemporary educational leadership because it emphasizes humanistic values, student-centered approaches, and culturally responsive practices elements that are increasingly recognized as essential in today's diverse and dynamic school environments (Hermawan & Tan, 2021). His concept of "*Tut Wuri Handayani*," which encourages leaders to support and empower rather than control, aligns closely with modern transformational and servant leadership models that prioritize collaboration, empathy, and capacity-building among staff and students. Dewantara's focus on respecting students' cultural backgrounds and fostering holistic development also

resonates with current calls for inclusive education that nurtures not only academic success but emotional and ethical growth (Ferary, 2021). By integrating Dewantara's thought, contemporary principals can cultivate supportive, adaptive, and ethically grounded leadership styles that better meet the complex needs of 21st-century schools.

Despite the critical role of school principals in shaping educational outcomes, many face significant challenges in developing effective managerial competence, including difficulties in strategic planning, resource management, communication, and leading diverse school communities. These challenges often result in inefficiencies, low staff morale, and suboptimal learning environments (Nugroho, 2021). Additionally, there is a noticeable gap in the practical application of Ki Hadjar Dewantara's educational philosophy within school management, despite its potential to foster more humanistic and culturally responsive leadership. This disconnect limits principals' ability to fully embody the empowering and student-centered principles Dewantara advocated, which could otherwise enhance their managerial skills and positively transform school leadership practices. Addressing this gap is essential to improving both the competence of school principals and the overall quality of education.

The urgency of strengthening science learning management has intensified in the context of rapid technological advancement, curriculum reforms, and increasing demands for STEM-oriented competencies. Principals are expected not only to manage administrative responsibilities but also to function as instructional leaders capable of overseeing laboratory governance, promoting inquiry driven pedagogy, ensuring safety standards, and aligning science instruction with national competency frameworks. Despite this expectation, many leadership models applied in schools remain generic and insufficiently contextualized to the specific demands of science education.

This study aims to critically analyze how Ki Hadjar Dewantara's Among System can be integrated into science learning management to strengthen principal leadership and managerial competence. By examining the practical implications of Dewantara's philosophy, particularly its principles of empowering leadership, cultural sensitivity, and structured student autonomy, this study explores how these values can address contemporary challenges in managing science education. Specifically, the study investigates how the Among System can enhance strategic laboratory planning, participative supervision of inquiry based instruction, collaborative curriculum coordination, and the development of scientific literacy. Through this

analysis, the research seeks to identify leadership strategies derived from Dewantara's philosophy that improve instructional management in science education and contribute to more effective, culturally responsive, and humanistic school leadership. The findings are expected to inform educational policy and principal training programs by offering a holistic framework for strengthening science learning management.

## Method

The methodology of this research employs a qualitative review approach, focusing on an in-depth analysis of existing empirical studies and illustrative case examples related to the application of Ki Hadjar Dewantara's educational philosophy in school leadership. This approach allows for a comprehensive understanding of how principals operationalize Dewantara's principles within their schools, emphasizing holistic development, cultural relevance, and humanism. By reviewing diverse studies, the research captures various contexts, challenges, and strategies used by school leaders to create environments that support not only academic success but also moral character and social responsibility among students. The qualitative nature of the review facilitates the exploration of nuanced insights and experiences that quantitative methods might overlook, particularly concerning leadership styles and culturally grounded practices.

Additionally, the selection of case examples provides concrete illustrations of Dewantara's philosophy in action, offering practical evidence of its impact on school culture and student outcomes. These cases highlight how principals implement participative and empathetic leadership, integrate local cultural values into curricula, and foster collaborative relationships among teachers, students, and the wider community. The methodological combination of broad empirical review and detailed case analysis strengthens the validity of the findings by triangulating data from multiple sources. This mixed qualitative framework supports a rich, context-sensitive interpretation of how Dewantara's vision can be effectively embedded in contemporary educational leadership, offering valuable lessons for policymakers and practitioners aiming to enhance school management through culturally responsive and humanistic approaches.

## Result and Discussion

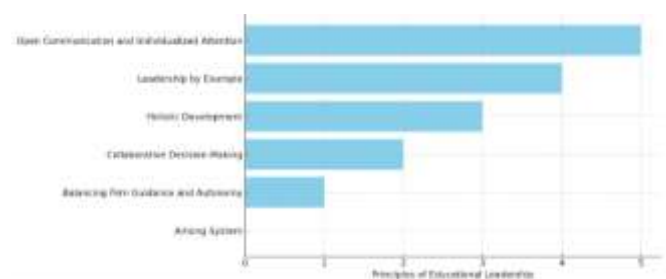
### Result

#### *Examples of practical application by principals*

The findings of this study indicate that integrating Ki Hadjar Dewantara's Among System into science learning management repositions principal leadership from administrative supervision toward instructional science leadership. Unlike conventional managerial models that emphasize procedural compliance, Dewantara's philosophy promotes a balanced approach combining structured authority and guided autonomy. This balance is particularly relevant in science education, where laboratory safety, curriculum alignment, and inquiry-based instruction must coexist with opportunities for student exploration and critical thinking.

Principals who apply Ki Hadjar Dewantara's educational philosophy in practice often emphasize creating a nurturing and student centered school environment. They act as "pamong" or facilitators, embodying Dewantara's leadership trilogy—leading by example from the front, building motivation in the middle, and providing support from behind (Apriliyanti et al., 2019). For instance, principals may foster collaborative decision-making by involving teachers, students, and parents in school governance, encouraging a shared responsibility for educational success. They also prioritize holistic development by integrating cultural values and character education into daily school activities, ensuring that learning extends beyond academics to include moral and social growth. This approach often translates into schools organizing cultural events, community service programs, and student-centered learning projects that reflect local traditions and values (Agus et al., 2021).

The graph as presented in Figure 1 visualizes the key principles of educational leadership based on Ki Hadjar Dewantara's philosophy, highlighting how these principles are applied in practice. The bar chart presents the principles in a sorted order, emphasizing areas such as "Leadership by Example," where principals lead through Dewantara's leadership trilogy, and "Collaborative Decision-Making," which fosters shared responsibility among teachers, students, and parents (Effendi, 2023). Other principles such as "Holistic Development" and the "Among System" showcase the importance of integrating cultural values and providing guidance while respecting student autonomy. The graph captures how these principles align with Dewantara's vision of education as a humanistic, culturally grounded process, fostering an environment that values communication, creativity, and trust (Muthoifin & Shobron, 2020).



**Figure 1.** Application of Ki Hadjar Dewantara's Educational Philosophy in Practice

#### *Alignment with Dewantara's principles*

The practical application of educational leadership by principals often closely aligns with Ki Hadjar Dewantara's core principles, especially the "Among system," which emphasizes guiding students with a balanced combination of leadership, encouragement, and support. Principals who embody Dewantara's philosophy lead by example ("ing ngarsa sung tuladha"), inspire and build motivation among teachers and students ("ing madya mangun karsa"), and provide supportive guidance from behind ("tut wuri handayani") (Khoir et al., 2025). This alignment fosters a respectful, learner-centered environment where students are empowered to develop their potential independently while feeling nurtured and valued. By promoting collaboration, cultural integration, and moral education, principals uphold Dewantara's vision of holistic education that nurtures not only intellect but also character and social responsibility (Susanti et al., 2020).

Furthermore, Dewantara's humanistic approach, which values respect for individual dignity and cultural roots, is reflected in how principals implement inclusive policies and practices that honor student diversity and local traditions. These leaders create a school culture that respects the community's social and cultural context, which Dewantara saw as essential to effective education (Dyahsih, 2021). The emphasis on freedom within structure, a hallmark of Dewantara's thought, allows principals to balance discipline with creativity, ensuring students have the liberty to explore their talents in a supportive framework. This congruence between theory and practice helps sustain Dewantara's legacy in contemporary education by fostering environments where students grow academically, morally, and culturally, thus actualizing the holistic ideals central to his philosophy (Harini et al., 2023).

#### *Improvement in planning, decision-making, communication, and leadership*

Improvement in planning within educational leadership is crucial for creating a clear vision and roadmap that guides a school toward its goals. Effective

planning involves setting specific, measurable objectives that align with the school's mission and the needs of its students and community. By incorporating data-driven insights and feedback from stakeholders, school leaders can anticipate challenges and allocate resources efficiently (Taufikin & Ma'shumah, 2021). Enhanced planning helps principals prioritize initiatives, balance short-term tasks with long-term development, and foster a proactive rather than reactive management style. This structured approach lays the foundation for all other managerial functions and is essential for sustaining continuous improvement and educational excellence (Anggraini & Wiryanto, 2022). In decision-making, improvement means adopting more inclusive, transparent, and evidence-based processes. Principals who enhance their decision-making skills seek input from teachers, students, and parents to ensure diverse perspectives are considered, which builds trust and buy-in. They analyze relevant data carefully to identify the best course of action and remain adaptable to changing circumstances. Improving decision-making also involves balancing decisiveness with reflection, avoiding impulsive choices while ensuring timely responses to pressing issues (Asyari et al., 2024). This strategic and participative approach leads to more effective solutions that reflect the collective interest of the school community and support a positive organizational culture.

Communication and leadership improvements are deeply interconnected and essential for fostering a supportive, motivated school environment. Effective communication means clearly conveying expectations, goals, and feedback while also actively listening to concerns and ideas from staff and students (Meyer et al., 2022). Principals who develop strong communication skills build stronger relationships, reduce misunderstandings, and promote collaboration. Leadership improvements involve inspiring and empowering teachers and students, modelling ethical behavior, and creating a shared sense of purpose. By demonstrating empathy, transparency, and vision, principals encourage innovation and resilience, making the school a dynamic place for learning and growth (Nasukah et al., 2020; Utami et al., 2024). Together, these improvements in planning, decision-making, communication, and leadership significantly enhance a principal's ability to lead schools toward success.

#### *Challenges in Implementation*

Cultural obstacles often arise from deeply ingrained beliefs, traditions, and social norms within the school community that may resist changes introduced by new educational philosophies or leadership styles. For example, in implementing Ki Hadjar Dewantara's

student-centered and holistic education principles, some schools face challenges because traditional hierarchical views on teacher authority and student obedience remain dominant (Rachmawati et al., 2020). These cultural expectations can limit open communication, innovation, and the freedom for students to explore learning independently, which Dewantara strongly advocated. Additionally, differences in cultural values between modern educational goals and local community practices may create tensions that principals and educators must carefully navigate to ensure respect and inclusion while promoting progress (Anggraini & Wiryanto, 2022).

Institutional and resource-based obstacles also significantly impact the effective implementation of educational reforms and leadership improvements. Many schools operate within rigid bureaucratic systems that limit principals' autonomy in decision-making, planning, and adapting programs to local needs. Insufficient funding and lack of adequate facilities, teaching materials, or professional development opportunities can hinder efforts to create supportive, innovative learning environments (Rosydah & Manggopa, 2024). Resource scarcity may force principals to prioritize administrative tasks over instructional leadership, reducing their ability to foster teacher growth or student-centered practices. Overcoming these

obstacles requires strategic advocacy, community engagement, and creative resource management to align institutional frameworks and resources with educational values and goals inspired by Dewantara's philosophy (Waworuntu, 2021).

*Opportunities and Best Practices*

Opportunities for implementing Ki Hadjar Dewantara's educational philosophy and enhancing school leadership abound, especially in the context of growing recognition of holistic, student-centered learning approaches worldwide. Schools have the chance to integrate Dewantara's principles of respect, cultural relevance, and humanism into modern curricula that emphasize not only academic achievement but also character building and social responsibility (Irawati et al., 2022). The rise of digital technologies and innovative pedagogies provides tools for personalized learning, active student engagement, and community involvement, all aligning well with Dewantara's vision of empowering learners to reach their full potential. Additionally, national education reforms in Indonesia, such as the Merdeka Belajar policy, create policy environments that support greater autonomy for schools and principals to experiment with Dewantara-inspired approaches, fostering creativity and responsiveness to local needs (Khoir et al., 2025).

**Table 1.** Implementing Dewantara's Educational Philosophy: Opportunities and Best Practices

Aspect	Opportunities for Implementation	Best Practices
Philosophical Focus	Integrate principles of respect, cultural relevance, and humanism into curricula emphasizing academics and character.	Principals and teachers act as role models promoting respect and shared purpose among students, staff, and parents.
Student-Centered Learning	Use digital tools and innovative pedagogies for personalized, active, and community-involved learning.	Foster student autonomy balanced with discipline through supportive relationships and continuous professional growth.
Cultural Integration	Embed local cultural traditions and values in teaching to connect learning with students' identities and motivation.	Schools nurture cultural pride by incorporating local customs into activities, strengthening student engagement.
Leadership Style	National reforms (e.g., Merdeka Belajar) empower school autonomy for experimentation with Dewantara-inspired methods.	Principals practice participative leadership involving collaborative decision-making with teachers, students, parents.
Community and Social Responsibility	Promote social responsibility alongside academic achievement in school missions and activities.	Build strong school communities with active involvement from all stakeholders to create meaningful learning climates.
Professional Development	Design training aligned with Dewantara's philosophy to develop educators' skills in balancing freedom and discipline.	Provide ongoing, philosophy-driven professional development to sustain transformative teaching and leadership.

Best practices that have emerged from schools successfully applying Dewantara's ideas often focus on participative leadership, cultural integration, and nurturing relationships. Effective principals serve as role models, promoting collaborative decision-making that involves teachers, students, and parents, thus building a strong sense of community and shared purpose. Schools

that embed local cultural traditions and values into their teaching and activities help students connect learning with their identity, making education more meaningful and motivating (Prasetyo et al., 2023). Moreover, continuous professional development tailored to Dewantara's philosophy equips educators with skills to balance discipline and freedom, fostering student

autonomy within a supportive framework. Such practices create positive learning environments where students thrive academically, socially, and morally, exemplifying the enduring relevance and transformative potential of Dewantara’s educational vision (Diana, 2024).

The table as presented in Table 1 effectively highlights how Ki Hadjar Dewantara’s educational philosophy can be integrated into modern school leadership and teaching practices by linking core values like respect, cultural relevance, and humanism with contemporary opportunities such as digital learning and national policy reforms. It shows a strong alignment between Dewantara’s principles and participative leadership styles that foster collaboration among teachers, students, and parents, emphasizing the importance of community and cultural identity in education. The emphasis on continuous professional development underscores the need to equip educators with skills to balance student freedom with discipline, which is essential for nurturing autonomy while maintaining a supportive environment. Overall, the table illustrates a holistic approach where leadership, pedagogy, culture, and policy converge to create meaningful, student-centered learning experiences that

build not only academic competence but also character and social responsibility.

*Discussion*

*How Dewantara’s philosophy contributes to managerial competence*

Ki Hadjar Dewantara’s educational philosophy contributes significantly to managerial competence in educational leadership by emphasizing a balanced and humanistic approach to guiding schools. His concept of the “Among system,” which advocates for leaders to act as nurturing facilitators rather than authoritarian figures, directly informs how principals can develop effective planning, organizing, leading, and controlling skills (Meyer et al., 2022). By adopting the role of a guide who leads by example, motivates from within, and supports from behind, school managers can foster a positive organizational culture that values collaboration, respect, and individual growth. This approach encourages principals to be adaptive and empathetic leaders who balance authority with freedom, enhancing their ability to manage resources and people in a way that aligns with the holistic development goals central to Dewantara’s philosophy (Nasukah et al., 2020).

**Table 2.** Leadership Philosophy Comparison: Dewantara vs. Modern Theories.

Leadership Aspect	Dewantara’s Philosophy	Transformational Leadership	Servant Leadership
Core Focus	Leading by example, intrinsic motivation, supportive guidance	Inspiring and empowering followers to reach full potential	Serving and uplifting others
Cultural Sensitivity	Deep respect for local culture and community values, contextually grounded	Moderate cultural awareness	Moderate cultural and community focus
Moral and Character Development	Strong emphasis on moral, character, and spiritual growth	Emphasizes personal growth and inspiration	Focuses on ethical leadership and serving others
Learner/Member Autonomy	Encourages autonomy and self-directed growth within supportive structure	High autonomy encouraged	Supports autonomy through service
Leadership Style	Balanced authority with empathy, guidance, and motivation	Inspirational and transformational	Empathetic and service-oriented
Integration with Education and Community	Holistic development blending education, culture, community, and spirituality	Focus on organizational culture and transformation	Focus on individual well-being and community support

Furthermore, Dewantara’s emphasis on cultural relevance and moral education enriches managerial competence by encouraging educational leaders to integrate local values and community involvement into school management. This cultural grounding helps principals tailor their decision-making and communication strategies to better meet the needs of their unique school environments (Agus et al., 2021). It also fosters trust and social capital, which are essential

for effective organizational functioning and resource mobilization. By prioritizing character development alongside academic achievement, Dewantara’s philosophy promotes a comprehensive leadership style that prepares principals to navigate complex social dynamics, motivate diverse stakeholders, and implement educational reforms in a manner that is both respectful and empowering (Muthoifin & Shobron, 2020). Overall, Dewantara’s educational thought offers a

strong philosophical foundation for principals to develop managerial competence that is both effective and culturally responsive.

#### *Comparison with other leadership theories*

Ki Hadjar Dewantara's educational leadership philosophy shares similarities with several modern leadership theories but also presents unique cultural and humanistic elements that distinguish it. For example, Dewantara's "Among system," which highlights leading by example, motivating from within, and providing supportive guidance, aligns closely with transformational leadership (Ferary, 2021). Both emphasize inspiring and empowering followers to achieve their full potential, foster intrinsic motivation, and build a positive organizational culture. However, Dewantara's approach uniquely integrates deep respect for local culture and community values, making it more contextually grounded than many Western leadership models (Thohir, 2021). His focus on moral and character development also resonates with servant leadership, where the leader's primary role is to serve and uplift others, but Dewantara's emphasis extends this by embedding education within a broader cultural and spiritual framework.

In contrast to transactional leadership, which relies heavily on rules, rewards, and punishments to manage performance, Dewantara's philosophy promotes a more flexible, learner-centered environment that values freedom within structure. While transactional leaders often emphasize external control, Dewantara encourages autonomy and self-directed growth, consistent with humanistic and progressive educational theories (Martinez & Leija, 2023). Compared to instructional leadership, which prioritizes improving teaching and learning through clear goals and accountability, Dewantara's leadership philosophy incorporates these elements but broadens the scope to include holistic personal development and community harmony. Overall, Dewantara's philosophy offers a more integrated, culturally sensitive approach to leadership that balances authority with empathy, autonomy with guidance, and academic achievement with moral growth (Utami et al., 2024).

The table as shown in Table 3 highlights the unique integration of Ki Hadjar Dewantara's educational leadership philosophy with key elements from major modern leadership theories while emphasizing its distinct cultural and humanistic foundation. Unlike transformational and servant leadership, which focus broadly on motivation and service, Dewantara's approach deeply roots leadership in local culture, community values, and spiritual growth, making it contextually relevant. While transactional leadership

relies on rules and external control, Dewantara encourages autonomy and learner-centered freedom within a supportive framework, aligning more with humanistic education (Siswadi & Murtiningsih, 2024). Compared to instructional leadership's focus on academic goals and accountability, Dewantara broadens the scope to include holistic personal development and community harmony. Overall, the table illustrates Dewantara's philosophy as a balanced and culturally sensitive model that harmonizes authority with empathy, structure with freedom, and academic achievement with moral and social growth, making it highly applicable for schools seeking integrated and meaningful leadership (Sandra & Juniar, 2021).

#### *Recommendations for integrating Dewantara's thought in leadership training*

Integrating Ki Hadjar Dewantara's educational philosophy into leadership training programs offers valuable opportunities to deepen the humanistic and culturally responsive capacities of school leaders. Educational policy should prioritize embedding Dewantara's "Among system" framework leading by example, motivating from the middle, and supporting from behind into principal preparation curricula (Jongyung, 2024). This could involve practical modules on empathetic leadership, cultural sensitivity, and community engagement, helping leaders balance authority with nurturing guidance. Training should also emphasize the importance of holistic education, encouraging principals to foster moral, social, and intellectual growth in their schools. By grounding leadership development in Dewantara's principles, policymakers can cultivate school leaders who are not only efficient managers but also compassionate role models deeply connected to their communities (Hunaepi et al., 2023).

In practice, leadership training programs should include experiential learning opportunities where principals engage directly with local culture, traditions, and community stakeholders to build trust and relevance. Case studies and reflective exercises based on Dewantara's philosophy can help leaders internalize the balance of freedom and structure, autonomy and guidance essential to his vision. Additionally, mentoring and peer collaboration frameworks could support ongoing development in the spirit of "tut wuri handayani," where experienced leaders guide emerging ones from behind. Policy efforts should also allocate resources for continuous professional development that reinforces these values, ensuring that Dewantara's holistic and culturally grounded approach to leadership remains a living, evolving practice in schools. Such integration would advance not only leadership

competence but also the broader goal of education as a force for character and community building (Iswahyudi, 2023).

Ultimately, Dewantara's educational philosophy remains profoundly relevant in today's complex educational landscape. Its integration into science learning management demonstrates that culturally responsive leadership can coexist with modern scientific rigor. By embedding the Among System into principal leadership development, schools can become not only centers of scientific inquiry but also nurturing communities that empower students to grow intellectually, ethically, and socially. Dewantara's thought invites educational leaders to reconceptualize science leadership as a balanced act of guidance, respect, and structured freedom essential qualities for preparing resilient, scientifically literate, and ethically grounded generations capable of addressing future global challenges.

Overall, this discussion highlights that Dewantara's Among System offers more than philosophical inspiration it provides a practical leadership framework capable of bridging cultural identity with contemporary science education demands. By integrating humanistic values with instructional accountability, principals can cultivate science learning environments that promote scientific literacy, ethical reasoning, and contextual problem-solving. The model therefore contributes not only to leadership theory but also to the advancement of culturally responsive science education in developing educational contexts. This study offers a novel contribution by specifically applying Ki Hadjar Dewantara's Among System to science learning management, an area that has received limited scholarly attention. While previous research has examined Dewantara's philosophy in general educational leadership, this study bridges cultural leadership theory with instructional management in science education, providing a contextualized leadership framework for strengthening scientific literacy and inquiry-based learning.

## Conclusion

This study concludes that integrating Ki Hadjar Dewantara's Among System into science learning management strengthens principal leadership through strategic laboratory planning, participative supervision of inquiry-based instruction, collaborative curriculum coordination, and the promotion of scientific literacy. Dewantara's leadership trilogy *ing ngarsa sung tuladha, ing madya mangun karsa, and tut wuri handayani* supports a balanced approach that combines structured autonomy, professional accountability, and humanistic

guidance in science education. The findings indicate that culturally grounded leadership can enhance instructional quality and foster inquiry-driven, student-centered science learning environments. However, institutional rigidity, limited laboratory facilities, and resource constraints remain significant barriers to full implementation. Overall, the Among System offers a contextually relevant and practical leadership framework for strengthening science learning management while promoting holistic, ethically grounded, and academically rigorous science education.

## Acknowledgments

The authors gratefully acknowledge all individuals and parties who have provided support, assistance, and valuable contributions throughout the research process.

## Author Contributions

Conceptualization, N.E.W and T.C.K.; methodology, N.E.W and T.C.K.; software, N.E.W and T.C.K.; validation, N.E.W and T.C.K.; formal analysis, N.E.W and T.C.K.; investigation, N.E.W and T.C.K.; resources, N.E.W and T.C.K.; data curation, N.E.W and T.C.K.; writing—original draft preparation, N.E.W and T.C.K.; writing—review and editing, N.E.W and T.C.K.; visualization, N.E.W and T.C.K.; supervision, N.E.W and T.C.K X; project administration, N.E.W and T.C.K.; funding acquisition, N.E.W and T.C.K. All authors have read and agreed to the published version of the manuscript.

## Funding

This research received no external funding.

## Conflicts of Interest

The authors declare no conflict of interest.

## References

- Agus, C., Saktimulya, S. R., Dwiarsa, P., Widodo, B., Rochmiyati, S., & Darmowiyono, M. (2021). Revitalization of Local Traditional Culture for Sustainable Development of National Character Building in Indonesia. *World Sustainability Series*, 347-369. [https://doi.org/10.1007/978-3-030-78825-4\\_21](https://doi.org/10.1007/978-3-030-78825-4_21)
- Anggraini, G. O., & Wiryanto, W. (2022). Analysis of Ki Hajar Dewantara's Humanistic Education in the Concept of Independent Learning Curriculum. *Jurnal Penelitian Ilmu Pendidikan*, 15(1). <https://doi.org/10.21831/jpipfip.v15i1.41549>
- Apriliyanti, F., Hanurawan, F., Yusuf Sobri, A., & Artikel Abstrak, I. (2019). Sistem Among dalam Penerapan Nilai-nilai Luhur Pendidikan Karakter Ki Hadjar Dewantara. *Jurnal Pendidikan: Teori, Penelitian, Dan Pengembangan*, 5(8), 1048-1055. Retrieved from <https://shorturl.asia/m2NWt>
- Asyari, H., Fangestu, I. W. F., & Al Husna, N. S. (2024). Managerial Competence of School Principals in

- Improving the Quality of Institutions. *Tadbir: Jurnal Studi Manajemen Pendidikan*, 8(1), 55. <https://doi.org/10.29240/jsmp.v8i1.10139>
- Diana, D. (2024). Realisasi Kompetensi Manajerial dalam Kepemimpinan Yang Efektif dan Visioner. *ALACRITY: Journal of Education*, 4(2), 64–78. <https://doi.org/10.52121/alacrity.v4i2.306>
- Dyahsih, A. S. (2021). Pendidikan Merdeka Dalam Perspektif Ki Hadjar Dewantara Dan Relevansinya Terhadap Merdeka Belajar Di Indonesia. *Literasi: Jurnal Ilmu Pendidikan*, 12(2), 115–122. Retrieved from <https://ejournal.almaata.ac.id/index.php/LITERASI/article/view/2076>
- Effendi, Y. R. (2023). Strategy for the Principal's Transformational Leadership Approach in Strengthening the Character of Indonesian Students. *Pedagogika*, 151(3), 5–33. <https://doi.org/10.15823/p.2023.151.1>
- Ferary, D. (2021). On Ki Hadjar Dewantara's philosophy of education. *Nordic Journal of Comparative and International Education*, 5(2), 65–78. <https://doi.org/10.7577/njcie.4156>
- Fuadi, D. A., Yuniarti, G., Nelesti, N., Heri, S., Carnolis, J., Hartati, M. S., & Susiyanto, S. (2025). Ki Hadjar Dewantara and the Philosophy of Education. *Indonesian Journal of Innovation Multidisipliner Research*, 3(1). <https://doi.org/10.69693/ijim.v3i1.324>
- Harini, R., Istiq'faroh, N., & Hendratno. (2023). Konsep pendidikan Ki Hadjar Dewantara dan implementasinya di Sekolah Dasar di Indonesia. *Journal of Contemporary Issues in Primary Education*, 1(2), 81–94. <https://doi.org/10.61476/yp2yaf42>
- Hermawan, A., & Tan, E. B. (2021). Philosophy of education: "Tut Wuri Handayani" as the spirit of governance process in Indonesia's educational organization. *International Journal of Humanities and Innovation (IJHI)*, 4(2), 82–85. <https://doi.org/10.33750/ijhi.v4i2.112>
- Hunaepi, H., Suastra, I. W., Tanjung, H. S., Laia, B., & Raharjo, R. (2023). The Synergies Between Educational Philosophy Streams and Ki Hajar Dewantara's Ideologies in the Mardeka Belajar Curriculum. *Reflection Journal*, 3(2), 49–63. <https://doi.org/10.36312/rj.v3i2.1734>
- Irawati, D., Masitoh, S., & Nursalim, M. (2022). Filsafat Pendidikan Ki Hajar Dewantara sebagai Landasan Pendidikan Vokasi di Era Kurikulum Merdeka. *JUPE: Jurnal Pendidikan Mandala*, 7(4). <https://doi.org/10.58258/jupe.v7i4.4493>
- Iswahyudi, I. (2023). The Existence of Taman Siswa Amidst the Domination of Colonial Education in the Dutch East Indies. *Randwick International of Education and Linguistics Science Journal*, 4(3), 583–596. <https://doi.org/10.47175/rielsj.v4i3.793>
- Jongyung, T. (2024). Components and Indicators of Educational Leadership. *Journal of Education and Learning Reviews*, 1(4), 33–48. <https://doi.org/10.60027/jelr.2024.793>
- Khoir, M. A., Widyaningsih, E., & Muharromah, F. (2025). Implementasi Pemikiran Ki Hajar Dewantara pada Dunia Pendidikan: Literatur Review. *Tsaqofah*, 5(1), 879–896. <https://doi.org/10.58578/tsaqofah.v5i1.4649>
- Lathifah, W., Sutapa, P., Syamsudin, A., & Christianti, M. (2025). Implementation of traditional games based on Ki Hadjar Dewantara's philosophy to develop social skills in early childhood. *Cogent Education*, 12(1). <https://doi.org/10.1080/2331186X.2025.2529419>
- Martinez, S. A., & Leija, N. (2023). Distinguishing Servant Leadership from Transactional and Transformational Leadership. *Advances in Developing Human Resources*, 25(3), 141–188. <https://doi.org/10.1177/15234223231175845>
- Meyer, A., Richter, D., & Hartung-Beck, V. (2022). The relationship between principal leadership and teacher collaboration: Investigating the mediating effect of teachers' collective efficacy. *Educational Management Administration & Leadership*, 50(4), 593–612. <https://doi.org/10.1177/1741143220945698>
- Muthoifin, N., & Shobron, S. (2020). Education and Leadership in Indonesia: A Trilogy Concept in Islamic Perspective. *Universal Journal of Educational Research*, 8(9), 4282–4286. <https://doi.org/10.13189/ujer.2020.080954>
- Nasukah, B., Sulistyorini, S., & Winarti, E. (2020). Peran Komunikasi Efektif Pemimpin Dalam Meningkatkan Kinerja Institusi. *AL-TANZIM: Jurnal Manajemen Pendidikan Islam*, 4(1), 81–93. <https://doi.org/10.33650/al-tanzim.v4i1.899>
- Nugroho, S. (2021). Ki Hadjar Dewantara leadership development and its effect on sustainable shareholder value moderated by it and business strategy alignment. *Journal of Data, Information and Management*, 3(2). <https://doi.org/10.1007/s42488-020-00038-8>
- Prasetyo, H., Roemintoyo, & Sukarno. (2023). Student-Centered Learning Based on the Principles of Ki Hajar Dewantara in the Implementation of the Merdeka Curriculum: A Case Study of Elementary Schools in Indonesia. *Journal of World Englishes and Educational Practices*, 5(3), 111–117. <https://doi.org/10.32996/jweep.2023.5.3.10>
- Rachmawati, Y., Suyatno, & Santosa, A. B. (2020). Principal's managerial competence in actualizing a creative school. *Universal Journal of Educational*

- Research, 8(8), 3406–3416.  
<https://doi.org/10.13189/ujer.2020.080814>
- Rosydah, A., & Manggopa, M. A. (2024). Filosofi Pendidikan Yang diusung Oleh Ki Hadjar Dewantara dan Evolusi Pendidikan di Indonesia. *Morfologi : Jurnal Ilmu Pendidikan, Bahasa, Sastra Dan Budaya*, 2(3), 145–154. Retrieved from <https://journal.aspirasi.or.id/index.php/morfologi/article/view/615>
- Sandra, L., & Juniar, D. R. (2021). Ki Hajar Dewantara's Educational Philosophy: Among and Student's Academic Performance. *Proceedings of the 2nd International Conference on Technology and Educational Science (ICTES 2020)*, 540. <https://doi.org/10.2991/assehr.k.210407.224>
- Setyaningsih, Hidayatullah, F., Asrowi, & Rahman, A. (2024). Integrating Ki Hadjar Dewantara's values in learning modules in elementary schools: Analysis of teacher and student needs. *Edelweiss Applied Science and Technology*, 8(6). <https://doi.org/10.55214/25768484.v8i6.2105>
- Shabartini, D. N., Hidayat, S., Jamaludin, U., & Leksono, S. M. (2023). Konsep Pendidikan Ki Hadjar Dewantara Dalam Penanaman Nilai-Nilai Multikultural Untuk Siswa Sekolah Dasar. *Jurnal Elementaria Edukasia*, 6(2), 964–973. <https://doi.org/10.31949/jee.v6i2.5325>
- Siswadi, G. A., & Murtiningsih, R. S. (2024). Kedudukan Pemikiran Ki Hadjar Dewantara Dalam Filsafat Pendidikan. *Padma Sari: Jurnal Ilmu Pendidikan*, 4(01), 43–57. <https://doi.org/10.53977/ps.v4i01.867>
- Sukmawati, E., Imanah, N. D. N., & Rantauni, D. A. (2023). Implementation and challenges of project-based learning of STEAM in the university during the pandemic: A systematic literature review. *JINoP (Jurnal Inovasi Pembelajaran)*, 9(1). <https://doi.org/10.22219/jinop.v9i1.25177>
- Supriadi, D., Purbonuswanto, W., & Maulida, A. (2025). Development of a Literacy Leadership Model Based on Ki Hadjar Dewantara's Leadership Trilogy at Tamansiswa College. *Jurnal Pendidikan Progresif*, 15(1). <https://doi.org/10.23960/jpp.v15i1.pp55-73>
- Susanti, L., Gistituati, N., Yasri, & Hadiyanto. (2020). Administrative Leadership Managerial Competencies in Higher Educations (Study on Planning Aspect). *2nd International Conference Innovation in Education (ICoIE 2020)*. <https://doi.org/10.2991/assehr.k.201209.240>
- Syahrul, S., Saefuddin, D., Bahrudin, E., Husaini, A., & Raharjo, A. B. (2024). Teacher Personality Competence According to KH. Ahmad Dahlan and Ki Hadjar Dewantara: a Comparative Study. *Formosa Journal of Applied Sciences*, 3(1), 243–254. Retrieved from <https://shorturl.asia/v2PB9>
- Taufikin, T. (2021). How To Be An Ideal Teacher?: A Content Analysis of Ki Hadjar Dewantara's Thoughts. *Southeast Asian Journal of Islamic Education*, 4(1). <https://doi.org/10.21093/sajie.v0i0.3771>
- Taufikin, T., & Ma'shumah, L. A. (2021). Ki Hajar Dewantara's Perspective on The Concept of Independent Education and Its Relevance to The Independent Learning in Indonesia. *Edukasia Islamika*, 6(1), 90–110. <https://doi.org/10.28918/jei.v6i1.3210>
- Thohir, M. M. Bin. (2021). Kepemimpinan Ki Hadjar Dewantara dalam Manajemen Dakwah. *Dakwatuna: Jurnal Dakwah Dan Komunikasi Islam*, 7(2). <https://doi.org/10.54471/dakwatuna.v7i2.1214>
- Utami, B. Y., Nelitawati, N., & Al-Kadri, H. (2024). The Influence of Principal Transformational Leadership on Teacher Performance and Learning Quality in Schools. *International Journal of Educational Dynamics*, 6(2), 555–559. <https://doi.org/10.24036/ijeds.v6i2.488>
- Waworuntu, A. L. G. (2021). Ki Hajar Dewantara'S Actions and Thoughts: the Norms and Values of Modern Indonesian Education. *International Review of Humanities Studies*, 6(2). <https://doi.org/10.7454/irhs.v6i2.363>