JPPIPA 12(6) (2026)

Jurnal Penelitian Pendidikan IPA

http://jppipa.unram.ac.id/index.php/jppipa/index

Fostering Humanistic Decision-Making in Elementary Science Education Amid Artificial Intelligence Disruption: A Case Study of a School Principal

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Received: April 03, 2026
Revised: May 10, 2026
Accepted: June 25, 2026
Published: June 30, 2026

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DOI: 10.29303/jppipa.v12i6.15511

Abstract: The rapid development of Artificial Intelligence (AI) has created both opportunities and challenges for educational leadership, particularly in elementary science education. School principals are required to make decisions that not only support technological innovation but also uphold humanistic values in educational practice. This study aimed to analyze how the principal of SDN 06 Baruga develops humanistic decision-making in elementary science education amid Artificial Intelligence disruption. The study employed a qualitative approach using a case study design. Data were collected through in-depth interviews, observations, and document analysis involving the principal as the primary informant, supported by teachers and educational staff. Data were analyzed using the interactive model of data condensation, data display, and conclusion drawing. The findings revealed that the principal perceives AI as a valuable educational tool that can enhance science learning and broaden access to knowledge. However, technology is positioned as a supporting instrument rather than a substitute for teachers' roles in education. Humanistic values, including empathy, fairness, responsibility, care, and character development, were found to guide decision-making processes. The principal also implemented various strategies to balance technological innovation with human-centered education while addressing challenges related to rapid technological change and students' dependence on digital tools. The study concludes that humanistic decision-making provides an effective framework for integrating Artificial Intelligence into elementary science education while preserving the fundamental values of education.

Keywords: Artificial Intelligence; Elementary science education; Humanistic decision-making

Introduction

The rapid advancement of Artificial Intelligence (AI) has significantly transformed various sectors of society, including education. AI is no longer perceived as a futuristic innovation but has become an integral component of contemporary educational practices, influencing teaching and learning processes, curriculum development, assessment systems, school management, and educational decision-making. The emergence of AI-powered platforms such as ChatGPT, Gemini, Copilot, and adaptive learning systems has enabled educators and students to access information more efficiently, personalize learning experiences, and support academic activities through intelligent assistance. Consequently, educational institutions worldwide are increasingly integrating AI technologies to enhance learning effectiveness, organizational performance, and educational innovation (Karakose, 2025; Sposato, 2025).

How to Cite:
Abubakar, Aspin, & Nurdiansyah, E. S. (2026). Fostering Humanistic Decision-Making in Elementary Science Education Amid Artificial Intelligence Disruption: A Case Study of a School Principal. *Jurnal Penelitian Pendidikan IPA*, *12*(6), 374–383. https://doi.org/10.29303/jppipa.v12i6.15511

Within the context of science education, AI presents substantial opportunities for improving learning quality and fostering twenty-first-century competencies. Science learning in elementary schools frequently involves abstract concepts that are difficult for students to observe directly, resulting in challenges related to conceptual understanding and scientific reasoning. The integration of AI technologies provides opportunities to transform abstract scientific concepts into more concrete, interactive, and meaningful learning experiences. Recent studies have demonstrated that AI-supported learning environments contribute positively to students' motivation, engagement, creativity, critical thinking, and problem-solving abilities, which are considered essential competencies for the twenty-first century (Parisu et al., 2025). Furthermore, the integration of emerging technologies such as the Internet of Things (IoT), ChatGPT, and augmented reality has been shown to enhance scientific literacy, conceptual understanding, and students' participation in inquiry-based science learning (Aspin et al., 2025; Parisu et al., 2025). These developments indicate that AI has become an important catalyst for educational transformation, particularly in science education, where technology can facilitate deeper understanding of scientific phenomena and support evidence-based learning.

Despite these benefits, the growing adoption of AI in education has also generated significant concerns regarding its implications for human development and educational values. While AI can improve efficiency and access to knowledge, excessive dependence on intelligent technologies may reduce students' opportunities to develop reflective thinking, independent reasoning, ethical judgment, empathy, and social responsibility. Recent discussions in educational research emphasize that technological innovation should not overshadow the fundamental purpose of education, which is the holistic development of human beings (Karpouzis, 2024; Porayska-Pomsta et al., 2024). Similarly, Chen (2024) argues that the integration of AI into educational systems requires careful consideration of ethical principles to ensure that technological advancement remains aligned with educational values and human welfare. In addition, Favero et al. (2026) highlight that discussions surrounding AI in education should extend beyond learning outcomes and encompass broader dimensions such as cognition, agency, emotion, ethics, and human development. These concerns indicate that educational stakeholders must balance technological innovation with human-centered educational principles.

In response to these challenges, the concept of humanistic decision-making has gained increasing attention in educational discourse. Humanistic decision-making refers to decision-making processes that prioritize human dignity, learners' needs, ethical considerations, empathy, justice, inclusiveness, and meaningful educational experiences. From this perspective, technology is viewed as a tool that supports human growth rather than a substitute for human interaction and educational relationships. Educational success is therefore measured not only through academic achievement and technological competence but also through character development, moral awareness, social responsibility, and students' capacity to live meaningful lives within society (Chen, 2024; Ho, 2025). The humanistic perspective provides an important framework for understanding how educational institutions can integrate advanced technologies while preserving the fundamental values of education.

At the school level, principals occupy a strategic position in shaping educational policies, organizational culture, and school development initiatives. As educational leaders, principals are responsible for decisions related to instructional improvement, teacher professional development, resource allocation, technology adoption, and organizational change. In the era of Artificial Intelligence, principals are increasingly expected to lead technological transformation while simultaneously safeguarding the humanistic values that underpin educational practice. Their decisions influence how teachers utilize technology, how students experience learning, and how schools respond to emerging technological opportunities and challenges (Dai et al., 2025; Karakose, 2025). Consequently, educational leadership in the AI era requires not only technological awareness but also ethical judgment, strategic vision, and a commitment to human-centered educational principles.

Numerous studies conducted during the past five years have demonstrated the critical role of educational leadership in supporting digital transformation and technology adoption within schools. Abu Bakar et al. (2025) found a strong and significant relationship between visionary leadership and the adoption of science-based technologies in elementary schools, emphasizing that principals who communicate clear visions, encourage innovation, and support teacher development contribute substantially to successful technology integration. Similar findings were reported by Al Nuaimi et al. (2024), who highlighted the importance of principals' leadership capacities in facilitating digital transformation and organizational readiness. Likewise, Pietsch (2025) argued that successful educational transformation requires school leaders to develop digital mindsets capable of balancing innovation with institutional values. Furthermore,

Berkovich (2025) emphasized that AI-assisted instructional leadership is increasingly becoming a significant dimension of contemporary educational leadership, requiring principals to engage actively in technology-related decision-making processes. Collectively, these studies indicate that school leadership plays a fundamental role in shaping educational responses to technological change.

Meanwhile, research concerning Artificial Intelligence in elementary education has predominantly focused on instructional effectiveness, personalized learning, digital literacy development, and twenty-first-century competencies. Studies examining AI-supported learning environments have demonstrated positive impacts on student achievement, engagement, creativity, and higher-order thinking skills (Aspin et al., 2025; Parisu et al., 2025). In addition, researchers have explored the educational potential of ChatGPT, IoT, augmented reality, virtual reality, and other emerging technologies in supporting science education. Although these studies contribute significantly to understanding the pedagogical benefits of AI, most investigations focus primarily on students and teachers as technology users. Comparatively limited attention has been given to understanding how school leaders make decisions regarding AI implementation while maintaining ethical and humanistic educational values.

This situation reveals several important research gaps. First, existing AI-related educational studies largely position teachers and students as the primary actors in technology integration, while the role of principals as strategic decision-makers remains underexplored. Second, studies on educational leadership in the digital era predominantly focus on technology adoption, digital transformation, and organizational effectiveness rather than the humanistic dimensions of leadership and decision-making (Dai et al., 2025; Sposato, 2025). Third, there is a limited body of research that simultaneously integrates Artificial Intelligence, educational leadership, humanistic values, and elementary science education within a comprehensive analytical framework. Fourth, empirical studies investigating these issues within Indonesian elementary school contexts, particularly in Southeast Sulawesi, remain scarce. As a result, current scholarship provides limited understanding of how school principals navigate AI-related challenges while preserving human-centered educational values in local educational settings.

Based on these gaps, this study offers a novel contribution by introducing the perspective of humanistic decision-making into discussions of educational leadership in the era of Artificial Intelligence. Unlike previous studies that primarily focus on the effectiveness of technology implementation, this research positions school principals as central actors responsible for balancing technological innovation with humanistic educational values. The study further extends the literature by integrating perspectives from Artificial Intelligence, educational leadership, digital transformation, and elementary science education into a unified analytical framework. Through this approach, the study seeks to provide a deeper understanding of how school leaders construct and implement decisions that simultaneously support technological advancement and human development.

SDN 06 Baruga was selected as the research site because the school is currently experiencing educational changes associated with increasing digitalization and the growing influence of Artificial Intelligence in educational practices. In this context, the principal faces various decisions related to technology utilization, teacher professional development, organizational adaptation, and the preservation of humanistic values within educational processes. These circumstances make SDN 06 Baruga a relevant setting for investigating how humanistic decision-making is constructed and implemented amid AI-driven educational transformation.

Based on the foregoing discussion, this study aims to analyze how school principals develop and implement humanistic decision-making practices in elementary science education amid the disruption and opportunities presented by Artificial Intelligence through a case study of SDN 06 Baruga.

Method

This study uses a qualitative approach with a case study design to explore in depth how a principal develops humanistic decision-making practices in elementary science education amidst the increasing influence of Artificial Intelligence (AI). The qualitative approach is deemed appropriate because this study aims to understand the meanings, experiences, perspectives, and considerations underlying the principal's decisions regarding technology integration while maintaining humanistic values in educational practice. The case study design allows for an intensive examination of specific phenomena within a real-life context.

This research was conducted at SDN 06 Baruga, Kendari City, Southeast Sulawesi, Indonesia. This location was chosen intentionally because the school has begun engaging in digital transformation initiatives and technology integration in teaching and learning activities. In this context, the principal plays a central role in determining policies and strategies related to the adoption of educational technology. Therefore, the

school provides a relevant environment to investigate humanistic decision-making in elementary science education in the era of Artificial Intelligence.

Participants were selected through purposive sampling based on their involvement and knowledge of the phenomenon under study. The principal of SDN 06 Baruga served as the primary informant due to his responsibility in making strategic educational decisions. To increase the richness and credibility of the data, supporting informants included classroom teachers, science teachers, and educational staff directly involved in implementing school policies related to technology integration and science learning.

Data were collected through in-depth interviews, observations, and document analysis. In-depth interviews were conducted to explore principals' understanding of Artificial Intelligence, the values underlying decision-making processes, and strategies for balancing technological innovation with humanistic educational principles. Observations were conducted to examine leadership practices, school culture, interpersonal interactions, and the implementation of technology-related policies within the school environment. Document analysis involved reviewing school policies, strategic plans, meeting minutes, educational programs, and other relevant documents to support and verify the findings obtained from the interviews and observations.

In study qualitative , researcher play a role as instrument main person in charge answer in collection , management , and interpretation of data deep in accordance with context research . For support the process , used various instrument supporters , including protocol semi- structured interviews , guidelines observation , notes field , device audio recorder , as well as document relevant institutions with focus research . Use various instrument This allows researchers obtain rich, comprehensive , and contextual data (Lim, 2024). To ensure validity and credibility of data, research This apply triangulation sources, triangulation methodological, and member checking as a trustworthiness strategy that many recommended in study qualitative contemporary (Marlina et al., 2024). Triangulation source done with compare information obtained from head schools , teachers, and staff education , whereas triangulation methodological done through comparison results interviews , observations , and analysis documents . In addition , member checking is carried out with return results interpretation beginning to participants For get confirmation about accuracy the meaning and representation of the data that has been analyzed (Lloyd, 2024; McKim, 2023; Soysal & Türkmen, 2024). Data analysis follows the interactive model of Miles, Huberman, and Saldaña which includes data condensation, data presentation, and withdrawal and verification conclusion in a way sustainable to ensure consistency, credibility, and accuracy findings study .

Figure 1. Research Flowchart

Result and Discussion

Result

Principal's Understanding of Artificial Intelligence in Elementary Science Education

The findings indicate that the principal of SDN 06 Baruga possesses a positive and adaptive understanding of Artificial Intelligence (AI) in education. Based on interview results, AI is perceived as a technological innovation that can support the improvement of educational quality, particularly in elementary science education. The principal emphasized that AI facilitates access to information, enriches learning resources, and assists students in understanding scientific concepts that are often difficult to visualize through conventional teaching methods.

The principal further explained that the development of AI is an inevitable aspect of educational transformation in the twenty-first century. Therefore, schools are expected to adapt to technological changes in order to remain relevant to contemporary educational demands. This perspective demonstrates an awareness that digital transformation influences not only teaching and learning processes but also educational management and school development. Consequently, technology should be integrated strategically while preserving the fundamental purposes of education.

These findings are consistent with the views of Miao et al. (2021), who argued that AI can enhance

educational quality through improved access to information and personalized learning opportunities. Likewise, Zawacki-Richter et al. (2021) emphasized that AI contributes to educational innovation by increasing accessibility and supporting adaptive learning environments. Within science education, such opportunities are particularly important because AI can provide visualization, simulation, and interactive learning experiences that facilitate students' conceptual understanding.

Despite recognizing its benefits, the principal stressed that AI should function as a learning support tool rather than a substitute for teachers. Teachers remain central to the educational process because they provide guidance, emotional support, moral direction, and contextual understanding that cannot be fully replicated by technological systems. This perspective aligns with Chen (2024), who advocated a human-centered approach in which technology complements rather than replaces human interaction in education.

The findings also revealed concerns regarding excessive dependence on technology. According to the principal, unrestricted use of AI may reduce opportunities for students to develop independent thinking, creativity, and social interaction. Such concerns are particularly relevant in elementary education, where social-emotional development and character formation are essential educational goals. Similar concerns were expressed by Favero et al. (2026); Porayska-Pomsta et al. (2024), who highlighted the importance of considering ethical, emotional, and developmental dimensions when implementing AI in education. Furthermore, Karpouzis (2024); Tlili et al. (2023) emphasized that AI adoption should be guided by ethical principles that prioritize human welfare and educational values.

Table 1. Findings on the Principal's Understanding of Artificial Intelligence in Elementary Science Education

Findings Aspect	Research Findings
Understanding of AI	AI is perceived as a technological innovation that supports learning
Role of AI in Education	AI functions as a learning support tool rather than a substitute for teachers
Benefits of AI	Expands access to information and facilitates understanding of scientific concepts
Risks of AI	Potential technology dependence and reduced social interaction
Attitude toward AI	Adaptive while maintaining educational and humanistic values

The findings suggest that the principal adopts a balanced perspective toward AI integration by recognizing its educational benefits while maintaining a commitment to human-centered educational values and holistic student development.

Humanistic Values Underlying Decision-Making Processes

The findings revealed that the principal's decision-making processes are strongly influenced by humanistic values rather than solely by technical or administrative considerations. Educational decisions are consistently directed toward supporting the well-being and development of students, teachers, and the broader school community.

Empathy emerged as the most prominent value underlying leadership practices. The principal emphasized the importance of understanding the diverse needs and challenges experienced by students and teachers before implementing policies. This finding indicates that decision-making is viewed as a relational process requiring sensitivity to human experiences. Similar conclusions were reported by Shaked (2022), who identified empathy as a crucial element of effective educational leadership, Wang et al. (2022), who demonstrated that empathetic leadership strengthens trust and collaboration within educational organizations.

Justice was also identified as a central principle guiding decision-making. The principal highlighted the importance of providing equal educational opportunities regardless of students' academic abilities, socioeconomic backgrounds, or personal circumstances. This finding supports Khalifa et al. (2021), who argued that educational leadership should promote equity and inclusiveness through policies that address diverse student needs.

In addition, care and responsibility were found to be important dimensions of leadership. The principal carefully evaluates the potential impact of policies on students' learning experiences, teachers' professional growth, and the welfare of the school community. This orientation reflects responsible leadership that prioritizes educational well-being alongside organizational effectiveness. Walker & Qian (2022) similarly emphasized that ethical school leadership requires consideration of the consequences of decisions for all stakeholders.

Another significant finding concerns the principal's commitment to character development. Although technology is increasingly integrated into educational practice, character education remains a priority. Policies related to technology use are consistently accompanied by efforts to strengthen responsibility, discipline, respect, and social awareness among students. This finding is supported by Berkowitz & Bier (2021) as well as (Nucci et al., 2023), who emphasized that character development should be integrated with academic

learning to prepare students for responsible participation in society.

Table 2. Humanistic Values Underlying the Principal's Decision-Making Processes

Humanistic Value	Form of Implementation
Empathy	Understanding the needs of students and teachers
Justice	Providing equal opportunities for all students
Care	Prioritizing the well-being of school members
Responsibility	Ensuring educational benefits of policies
Character Development	Making character education a priority

These findings demonstrate that humanistic values constitute the foundation of the principal's leadership practices. Decision-making is directed not only toward administrative effectiveness but also toward nurturing students' intellectual, social, emotional, and moral development. This perspective supports the argument of Berkovich & Eyal (2021) that ethical and humanistic leadership remains essential for ensuring that educational transformation contributes to both institutional effectiveness and human flourishing.

Strategies for Balancing Technological Innovation and Humanistic Education

The findings revealed that the principal of SDN 06 Baruga implements several strategies to balance technological innovation and humanistic educational values. The principal acknowledged that Artificial Intelligence (AI) is an unavoidable part of educational transformation, but emphasized that technology should serve as a means to support the holistic development of students rather than become the primary focus of education.

A key strategy identified is positioning AI as a learning support tool rather than a replacement for teachers. The principal emphasized that teachers remain central to the educational process because they provide guidance, motivation, emotional support, and character development that cannot be replicated by technology. AI is therefore utilized to enrich learning resources and improve instructional effectiveness while maintaining teachers' primary educational roles. This finding is consistent with Bond et al. (2024), who argued that AI should complement human interaction, and Williamson et al. (2024), who emphasized that technological innovation must remain aligned with educational goals and human values.

Another important strategy is strengthening teachers' digital competencies. The principal encourages teachers to participate in training programs, professional development activities, and collaborative learning opportunities to improve their ability to integrate technology effectively into teaching practices. This finding supports Falloon (2023), who highlighted digital competence as an essential requirement for technology-enhanced learning, as well as Redecker & Punie (2022), who stressed the importance of continuous professional development.

The findings also indicate that character education remains a priority despite increasing technology integration. The principal consistently promotes values such as responsibility, honesty, discipline, cooperation, respect, and digital ethics. This aligns with Chiu (2024) who argued that future-oriented education should balance technological competence with human-centered values, and Williamson et al. (2024), who emphasized that educational innovation should contribute to human development.

Furthermore, collaborative learning is encouraged to ensure that technology does not reduce social interaction. Students are motivated to engage in discussions, group projects, and peer collaboration while using technology as a supporting resource. This finding is supported by Kim et al. (2023) and (Bozkurt et al., 2024), who emphasized the importance of maintaining collaboration and human interaction within AI-supported learning environments.

Table 3. Principal's Strategies for Balancing Technology and Humanistic Values

Strategy	Form of Implementation
Directed use of AI	AI is utilized as an additional learning resource
Strengthening teachers' roles	Teachers remain the primary facilitators and mentors
Digital competency development	Training and capacity-building programs for teachers
Integration of character education	Reinforcement of ethics, responsibility, and digital honesty
Collaborative learning	Encouraging interaction and cooperation among students

The findings demonstrate that the principal views technology and humanistic values as complementary elements. Through these strategies, AI is integrated into educational practice while preserving character development, social interaction, and the broader mission of human-centered education.

Challenges of Humanistic Decision-Making in the Era of Artificial Intelligence

The findings revealed several challenges faced by the principal of SDN 06 Baruga in implementing humanistic decision-making amid the rapid

development of Artificial Intelligence (AI). Although AI provides opportunities to improve educational quality, it also creates challenges that require adaptive and balanced leadership.

One major challenge is the rapid pace of technological development. The principal explained that new AI applications and digital platforms often emerge faster than schools can adjust their policies and institutional capacities. Consequently, school leaders must continuously adapt educational strategies to remain responsive to technological changes. This finding is consistent with Bond et al. (2024); Bozkurt et al. (2024), who emphasized that educational institutions frequently struggle to keep pace with the accelerating growth of AI technologies.

Another challenge concerns disparities in teachers' digital competencies. The findings showed that teachers possess varying levels of technological readiness. While some educators can quickly adopt new technologies, others require additional training and support. These differences may affect the consistency and effectiveness of technology integration in classrooms. Similar findings were reported by Falloon (2023), who identified unequal digital competence as a significant barrier to educational technology implementation, while Redecker & Punie (2022) highlighted the importance of continuous professional development for teachers.

The principal also expressed concern about students' dependence on technology. Although AI facilitates access to information and learning support, excessive reliance on technology may reduce opportunities for students to develop critical thinking, creativity, problem-solving abilities, and independent learning skills. This concern is particularly important in elementary education, where foundational cognitive skills are still developing. Selwyn (2023) cautioned about the long-term consequences of technology dependence, while Chiu (2024) emphasized the need to balance technological convenience with learner autonomy and active thinking.

Maintaining meaningful social interaction is another challenge. The principal noted that excessive use of technology may reduce direct communication between teachers and students as well as among peers. To address this issue, the school encourages collaborative learning and face-to-face interaction. This finding aligns with Kim et al. (2023), who emphasized the importance of collaboration in AI-supported learning environments, and Williamson et al. (2024), who argued that technology should strengthen rather than weaken human relationships.

Finally, the principal highlighted the importance of monitoring and regulating AI utilization. Effective technology integration requires continuous supervision, ethical guidance, and clear policies to ensure that AI is used responsibly and in accordance with educational objectives. Williamson et al. (2024) emphasized that educational leaders play a crucial role in ensuring that technological innovations remain aligned with human values and educational goals.

Table 4. Challenges of Humanistic Decision-Making in the Era of Artificial Intelligence

Challenge	Impact on Education
Rapid technological development	Requires continuous policy adaptation
Differences in teachers' digital competencies	Uneven implementation of educational technology
Students' dependence on technology	Potential reduction in creativity and learning autonomy
Declining social interaction	Reduced direct communication in learning processes
Monitoring AI utilization	Requires continuous supervision and guidance

Overall, the findings indicate that the challenges faced by the principal extend beyond technical issues and involve preserving humanistic values within technology-driven educational environments. Therefore, educational leaders must balance technological innovation with the broader mission of supporting students' intellectual, social, emotional, and moral development. These findings reinforce the importance of humanistic leadership in ensuring that AI contributes not only to educational efficiency but also to holistic human growth.

Discussion

The findings indicate that the principal of SDN 06 Baruga perceives Artificial Intelligence (AI) as an educational innovation that can support the improvement of elementary science education while remaining aligned with humanistic values. This perspective reflects a human-centered leadership approach that positions technology as a means to achieve educational goals rather than as an end in itself. According to Chiu (2024); Williamson et al. (2024), effective AI integration requires a balance between technological advancement and human development. The findings suggest that the principal recognizes both the opportunities and limitations of AI, ensuring that technological utilization remains focused on students' educational needs (Slade & Prinsloo, 2013).

The study also revealed that empathy, justice, responsibility, care, and character development constitute the foundation of decision-making processes.

These findings support the principles of ethical and humanistic leadership, which emphasize that educational decisions should prioritize learners' well-being and holistic development. Shaked (2022) highlighted empathy as a critical element of educational leadership, while Khalifa et al. (2021) emphasized the importance of equitable leadership practices in creating inclusive learning environments. Consequently, the principal's decisions are not solely driven by organizational effectiveness but also by moral and educational considerations. Furthermore, the strategies implemented to balance technological innovation and humanistic education demonstrate the importance of integrating digital transformation with pedagogical values. The strengthening of teachers' digital competencies supports sustainable technology integration (Falloon, 2023; Redecker & Punie, 2022), whereas the integration of character education and collaborative learning helps preserve social interaction and ethical awareness among students. These findings are consistent with Kim et al. (2023), who argued that collaboration remains essential in AI-supported learning environments. Despite these efforts, several challenges were identified, including rapid technological development, disparities in teachers' digital competencies, students' dependence on technology, and concerns regarding reduced social interaction. As noted by Selwyn (2023), educational leaders must continuously adapt to technological change while critically addressing its potential impacts on learning and human development. Therefore, humanistic decision-making becomes essential for maintaining a balance between innovation and educational values. Overall, this study demonstrates that humanistic decision-making provides a strategic framework for managing AI-driven educational transformation. The findings highlight that the successful integration of AI depends not only on technological capabilities but also on leadership practices that prioritize the holistic development of learners as the primary goal of education.

Conclusion

This study reveals that the principal of SDN 06 Baruga perceives Artificial Intelligence (AI) as an educational innovation with significant potential to enhance the quality of elementary science education. However, AI is not viewed as a substitute for human roles in education; rather, it is considered a supportive tool that can enrich learning experiences and expand access to educational resources. The principal positions technology within a human-centered educational framework that prioritizes the holistic development of students. The findings further demonstrate that the principal's decision-making practices are grounded in humanistic values, including empathy, fairness, responsibility, care, and character development. These values serve as the foundation for policies related to technology integration within the school. In practice, the principal seeks to balance technological innovation with humanistic educational principles through strengthening teachers' digital competencies, integrating character education, and promoting the purposeful use of AI in teaching and learning activities. The study also identifies several challenges, including the rapid pace of technological advancement, disparities in teachers' digital competencies, increasing student dependence on technology, and the need to maintain meaningful social interactions in increasingly digital learning environments. These challenges require school leaders to continuously adapt while ensuring that educational goals remain centered on students' personal and social development. Overall, this study highlights that humanistic decision-making provides a relevant and effective framework for navigating Artificial Intelligence disruption in elementary science education. The successful integration of technology depends not only on technological availability and sophistication but also on the ability of school leaders to ensure that educational innovation remains aligned with human values, character formation, and the holistic development of students.

Acknowledgments
The authors would like to express their sincere gratitude to the Principal of SDN 06 Baruga for granting permission and providing valuable support throughout this study. The authors also extend their appreciation to all teachers and educational staff who willingly participated and contributed important information during the data collection process. Special thanks are addressed to colleagues and academic mentors for their constructive feedback and encouragement during the preparation of this manuscript.

Author Contributions
Conceptualization, A.B. and A.A.; methodology, A.B., A.A., and E.S.N.; data collection, A.B.; formal analysis, A.B. and A.A.; writing—original draft preparation, A.B.; writing—review and editing, A.A. and E.S.N.; supervision, A.A. 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.

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