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Research/Review

The Influence of Epistemological Views and AI Technology Literacy on Teachers' Self-Efficacy in Carrying Out Leadership Tasks Study of SDN Penukal

Elya Widiyanti[1], Aliya Shabirah Budiman[2], Darwin Effendi[3]

[1] PGRI University of Palembang ; eliamocthar@gmail.com
[2] PGRI University of Palembang ; aliyashabirah59@gmail.com
[3] PGRI University of Palembang ; darwinpasca2010@gmail.com

* Corresponding Author : eliamocthar@gmail.com

Abstract: This study aims to analyze the influence of epistemological views and artificial intelligence (AI) technology literacy on teacher self-efficacy in carrying out leadership tasks in elementary schools. The background of this study is based on the challenges of digital education transformation in the Penukal District, Penukal Abab Lematang Ilir (PALI) Regency, which requires teachers to have adaptive and technology-based leadership skills. This study uses a quantitative approach with a causal associative design and Structural Equation Modeling-Partial Least Squares (SEM-PLS) analysis technique. The study population involved all 30 elementary school teachers in Penukal District, with a total sampling technique. The results showed that both epistemological views and AI technology literacy had a positive and significant effect on teacher self-efficacy. AI technology literacy made a greater contribution, indicating that understanding and skills in AI technology substantially increased teachers' confidence in leading change. These findings recommend the importance of teacher training programs that integrate strengthening epistemological thinking and digital skills to support sustainable educational transformation.

Keywords: Self-Efficacy, Leadership, AI, Epistemology.

1. INTRODUCTION

The rapid development of information and communication technology, especially in the field of artificial intelligence (AI), has brought major changes to various aspects of life, including in the world of education. AI has begun to be applied not only in the learning process, but also in aspects of school management and leadership [1]. The implementation of AI technology in education provides new opportunities to improve the effectiveness of school management, data-based decision making, and improve the quality of interaction and communication between education stakeholders [2]. With these technological advances, the role of teachers has also undergone a significant transformation. Teachers are no longer only tasked as educators in the classroom, but are also required to act as leaders who are able to manage change and innovation in the school environment effectively and adaptively (Leal Filho et al., 2018). In carrying out this dual role, self-efficacy or teacher confidence in their abilities is a key factor influencing the effectiveness of school leadership tasks. Self-efficacy is an individual's belief in their ability to take certain actions to achieve desired results [3]. Teachers with high levels of self-efficacy tend to be more confident, resilient to stress, and able to take the initiative in facing challenges, including adopting and utilizing new technologies such as AI in school leadership [4]. In contrast, teachers with low self-efficacy tend to feel hesitant, less motivated, and have difficulty managing the technological changes that occur [5]. In addition to psychological factors such as self-efficacy, cognitive and philosophical aspects also play an important role, especially the teacher's epistemological views. Epistemological views refer to a person's beliefs about the nature of knowledge, the process of acquiring knowledge, and the nature of the truth and validity of information [6]. Teachers with mature epistemological views usually understand that knowledge is dynamic, complex, and contextual [7]. This

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epistemological attitude encourages teachers to be more reflective, critical, and open to developments in science and technology, so that they are more adaptive in dealing with innovations, including technological literacy [8]. Teachers with a good epistemological outlook are usually able to adjust their way of thinking and leadership strategies to effectively integrate technology into their daily tasks [9].

This phenomenon is very relevant to real conditions in the field, especially in the Penukal District, Penukal Abab Lematang Ilir Regency (PALI), South Sumatra Province, which is currently in the early stages of digital-based education transformation. The local government together with educational units in this area are seeking strategic steps to improve the quality of education through modernizing the school governance system, including strengthening the leadership capacity of teachers in public elementary schools. One form of transformation that is starting to be introduced is the integration of information technology and artificial intelligence (AI) in school managerial activities, both for data management, compiling technology-based learning programs, to digital reporting and evaluation of school performance ([10].

This effort is based on the awareness that the challenges of education in the era of industry 4.0 and society 5.0 cannot be faced with conventional approaches. Therefore, schools are required to become institutions that are adaptive and responsive to technological developments, and led by teachers who are not only pedagogically competent but also have strong digital leadership capacities. However, in its implementation, significant challenges are still faced, especially related to the readiness of human resources, in this case teachers, who are the spearheads of this transformation. One of the main challenges is the low level of AI technology literacy among elementary school teachers. Most teachers do not yet understand in depth the working principles of AI technology, its applications in the world of education, and how to use it strategically in carrying out the role of school leadership. Teachers tend to still rely on manual work patterns, and find it difficult to integrate new technologies due to the lack of training and ongoing mentoring [11].

Teachers need to be positioned not only as technology users, but also as digital learning leaders who think critically, reflectively, and strategically in facing the complexities of today's education [12].

Therefore, the success of the digital transformation of education in areas such as Penukal Abab Lematang Ilir is highly dependent on two crucial factors: increasing AI technology literacy and developing teacher self-efficacy through an epistemological approach. When teachers have adequate technological skills and believe that knowledge is dynamic, contextual, and can be managed independently, they will be better able to take an active role as leaders in the change process [13]. The findings in this study are expected to strengthen the need for teacher empowerment policies and programs based on the integration of digital competencies and the formation of reflective mindsets, so that educational transformation can truly be carried out from the bottom up, not just policy jargon at the central level.

Meanwhile, previous studies tend to focus more on aspects of teaching and learning in the classroom, and only a few have comprehensively examined how epistemological views and AI technology literacy influence teacher self-efficacy in the context of school leadership, especially in areas undergoing a digital transformation process such as Penukal District. Therefore, a study on the Influence of Epistemological Views and AI Technology Literacy on Teacher Self-Efficacy in Carrying Out School Leadership Duties is very important to conduct. This study is directed at analyzing and understanding the extent to which teachers' epistemological views and AI technology literacy levels influence their self-confidence in carrying out leadership duties in Public Elementary Schools in Penukal District. By understanding the relationship between these three variables, it is hoped that a clearer picture can be obtained regarding the key factors that support teacher readiness as innovative leaders in the digital era. The findings of this study are also expected to be the basis for developing more targeted and effective teacher training programs and capacity building policies, so that they can support the acceleration of digital transformation in elementary schools as a whole.

2. PRELIMINARIES OR RELATED WORK OR LITERATURE REVIEW

Epistemological views are individual beliefs about the nature of knowledge and the process of acquiring it. In education, teachers' epistemological views influence how they understand learning, assess the validity of information, and respond to curriculum and technological innovations. Teachers who have advanced epistemological views will view knowledge as something complex, open to revision, and contextual, rather than as absolute facts that are fixed [6]. Thus, teachers with mature epistemological views will be more reflective in making decisions, open to renewal, and better prepared to face changes in a dynamic educational environment [7].

Artificial intelligence (AI) technology literacy reflects teachers' ability to understand, use, and evaluate AI-based technology in the context of learning and educational management. This literacy includes an understanding of the working principles of AI, ethical application, and its potential and limitations in education. Teachers who have a high level of AI technology literacy are not only able to operate AI-based software but can also integrate it critically and strategically into school leadership activities [14]. AI technology literacy is an important prerequisite in modern educational leadership that is data-based, adaptive, and responsive to the needs of students in the digital era [2].

Teacher self-efficacy is their belief in their ability to carry out tasks, manage classes, and face challenges in their professional context. Self-efficacy is seen as the main determinant of teacher behavior in taking initiative, surviving in difficult situations, and positively influencing the work environment [3]. In the context of leadership, teachers who have high self-efficacy will show active involvement in decision-making, are able to initiate learning innovations, and are confident in guiding colleagues [5]. Factors such as successful experiences, social support, and the ability to master technology also contribute to the formation of teacher self-efficacy [15].

Teacher leadership is a key aspect in school management and the formation of a productive learning culture. The role of teachers is not only limited to teaching duties, but also as agents of change who are able to inspire, lead collaboration, and encourage innovation in the school community. Effective teacher leadership is characterized by the ability to manage resources, build good interpersonal relationships, and make data-based decisions [1]. In the era of digital transformation, teacher leadership is increasingly required to integrate technological competence, reflective thinking, and ethical awareness in responding to contemporary educational challenges [16]. Therefore, strengthening teacher leadership capacity needs to be supported by a strong epistemological foundation, mastery of technology, and high self-confidence in their professional role.

3. PROPOSED METHOD

This study uses a quantitative approach with a causal associative research type, which aims to analyze the influence between two independent variables, namely epistemological views and artificial intelligence (AI) technology literacy, on one dependent variable, namely teacher self-efficacy in carrying out leadership tasks [17]. This design was chosen because it is appropriate for testing the relationship between complex latent constructs and providing an empirical picture of the extent to which independent variables influence dependent variables in the context of elementary education.

The population in this study were all State Elementary School teachers in Penukal District, Penukal Abab Lematang Ilir (PALI) Regency, totaling 30 people. Because the population size is relatively small and easy to reach, the total sampling technique was used, where all members of the population were used as research samples. This strategy aims to increase data representation and strengthen external validity in the local context being studied.

Data were collected using a closed questionnaire instrument compiled based on theoretical indicators of each construct. The measurement scale uses a five-point Likert scale, from 1 (strongly disagree) to 5 (strongly agree). The instrument covers three main constructs, namely epistemological views, AI technology literacy, and teacher self-efficacy, each measured by three indicators developed from the research conceptual framework. In addition, limited

interviews were also conducted with several respondents purposively to explore the depth of information related to the context of AI technology application in teacher leadership. Data analysis was carried out using the Structural Equation Modeling approach based on Partial Least Squares (SEM-PLS) through SmartPLS software version 3.0. This technique was chosen because it does not require normally distributed data, is able to handle small sample sizes, and is effective in analyzing relationships between latent variables simultaneously. The analysis was carried out in two main stages: testing the measurement model (outer model) to assess the reliability and validity of the construct through the outer loading value, AVE, and composite reliability; and testing the structural model (inner model) to assess the strength of the relationship between constructs through the R-square, f-square, and significance of the path coefficient tests [18].

4. RESULTS AND DISCUSSION

To examine the direct influence among variables in the structural model, a path analysis was conducted using the bootstrapping method. The test results of the relationships between exogenous variables (AI Technology Literacy and Epistemological Beliefs) and the endogenous variable (Teacher Self-Efficacy) are shown through the values of Original Sample (O), T Statistics, and P Values.

4.1. Path Analysis

The structural model analysis revealed two significant paths that explain the influence of independent variables on teachers' self-efficacy. These findings are supported by the results of the Partial Least Squares Structural Equation Modeling (PLS-SEM) as follows:

Table 1. Hypothesis Test Results

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
AI Technology Literacy → Teacher Self-Efficacy	0,499	0,477	0,160	3,119	0,002
Pandangan Epistemologis -> Self-Efficacy Guru	0,439	0,470	0,154	2,848	0,005

Source: Processed Data 2025

The results of the structural model analysis indicate that both AI Technology Literacy and Epistemological Beliefs have a positive and statistically significant effect on Teacher Self-Efficacy in performing leadership roles within schools. Specifically, the path coefficient from AI Technology Literacy to Teacher Self-Efficacy is 0.499, with a T-statistic of 3.119 and a P-value of 0.002, signifying a strong and meaningful relationship. This finding suggests that teachers who are more proficient in understanding and utilizing AI-based technologies tend to exhibit greater confidence in managing leadership tasks. Their ability to apply AI tools for instructional and administrative purposes strengthens their belief in their own capabilities, making them more adaptable and assertive in driving school transformation and innovation. In the context of 21st-century education, such technological competence is a key enabler for teachers to lead effectively amid ongoing digitalization.

Meanwhile, the relationship between Epistemological Beliefs and Teacher Self-Efficacy also demonstrates a significant and positive influence, with a path coefficient of 0.439, a T-statistic of 2.848, and a P-value of 0.005. This indicates that teachers who hold more advanced epistemological beliefs those who view knowledge as dynamic, evolving, and constructed through critical thinking are more likely to possess strong self-efficacy. These teachers tend to be reflective, open to change, and resilient when facing complex educational challenges,

qualities that are essential for effective school leadership. Their understanding of knowledge as contextual and uncertain fosters a mindset that embraces innovation and continuous learning, which in turn reinforces their confidence in guiding others.

Both variables satisfy the criteria for significance ($T > 1.96$ and $P < 0.05$), confirming that the research hypotheses are supported. Collectively, these findings highlight that enhancing teachers' technological literacy and epistemological awareness plays a vital role in strengthening their self-efficacy. When teachers are equipped not only with digital skills but also with critical and philosophical perspectives on knowledge and learning, they are more likely to emerge as competent, strategic, and confident leaders capable of navigating the complexities of educational transformation in the digital era.

5. COMPARISON

The findings in this study confirm that AI technology literacy plays a significant role in shaping and improving teacher self-efficacy, especially in the context of educational leadership in the digital era. In this context, technological literacy is not only understood as the technical ability to use artificial intelligence-based devices and applications, but also includes a conceptual understanding of the working principles of AI, critical ability in selecting and implementing relevant technology in learning and managerial activities, and mental readiness to face changes brought about by the digitalization of education.

Teachers who have a high level of AI technology literacy tend to be better prepared to respond to the demands of the digital curriculum, manage technology-based learning processes, and show initiative in integrating digital innovation into school leadership practices. This has direct implications for strengthening their self-efficacy, because teachers feel more capable, confident, and effective in carrying out their role as agents of change in schools. This finding is in line with Walter's study, which states that mastery of AI among teachers improves their ability to make data-based decisions, develop innovative learning strategies, and coordinate teams in a dynamic and technology-based environment [2].

Furthermore, teachers' epistemological views have also been shown to contribute positively to increasing self-efficacy. Teachers' epistemology refers to their beliefs about the nature of knowledge and the process of acquiring knowledge. Teachers with mature epistemological views namely those who believe that knowledge is complex, contextually evolving, and questionable—tend to think reflectively, be open to new information, and have cognitive flexibility in responding to change.

Teachers with this epistemological orientation are not only more adaptive to the dynamics of modern education, but also have a greater capacity to lead the process of transforming learning in schools. This is reinforced by the view of Hofer and Pintrich who stated that a developed epistemology allows individuals to deal with uncertainty and complexity in a more constructive way [6]. Erixon and Hansson also added that teachers with mature personal epistemology tend to show openness to innovation and are collaborative in decision-making two important characteristics of effective leadership in today's school context [7].

The synergy between AI technology literacy and epistemological views forms a strong foundation for the formation of teacher self-efficacy. The emerging self-confidence is not only internal psychological, but also the result of integrated cognitive readiness and professional competence. In the current educational context, which is marked by the acceleration of technological change, dynamic curriculum, and pressure to improve the quality of learning, teachers are required to have not only technical skills but also a flexible mindset and be open to new knowledge. Therefore, the combination of digital skills and epistemological understanding can strengthen teachers' capacity to navigate challenges, manage change, and lead innovation in schools.

These findings further reinforce Bandura's theory of self-efficacy, which posits that an individual's belief in their capabilities is shaped not only by prior experiences of success or failure, but also by the complex interplay between cognitive abilities, social environments, and challenging external conditions [7]. Within the context of this study, AI technology literacy

and epistemological beliefs emerge as two critical sources that significantly influence how teachers perceive their own effectiveness in leading and managing change within schools. Teachers who are both technologically literate and epistemologically aware are more likely to feel empowered and confident in taking on leadership roles, particularly in educational settings that demand agility and innovation.

The practical implications of this research are highly relevant for educational institutions and policymakers. It emphasizes the necessity of designing and implementing comprehensive teacher professional development programs that go beyond basic technological trainng. Such programs should also nurture reflective consciousness and philosophical insight regarding the nature of knowledge, the learning process, and the broader purposes of education. An integrative training model, which combines digital competence with epistemological development, is more likely to produce educators who are not only technically adaptive but also mentally resilient, strategically minded, and ethically grounded. These qualities are essential for teachers to lead effectively amid the increasing complexity and uncertainty that characterize 21st-century education..

6. CONCLUSIONS

Based on the research findings, it can be concluded that both epistemological views and AI technology literacy have a positive and statistically significant impact on teachers' self-efficacy in performing leadership roles within the school environment. This study affirms that the development of a teacher's philosophical understanding of knowledge, along with their technological competence, are both essential components in fostering the confidence and capacity needed to lead effectively in the context of modern education.

Teachers who demonstrate mature epistemological beliefs that is, who understand knowledge as dynamic, evolving, and context-dependent—tend to engage more deeply in reflection, demonstrate critical thinking, and remain open to pedagogical and organizational changes. These characteristics are essential for educational leaders who must make informed, adaptive decisions and manage complex leadership dynamics, particularly in an era where digital innovation is rapidly reshaping the learning environment. Teachers with strong epistemological foundations are more likely to embrace continuous learning, question traditional assumptions, and adopt innovative strategies to improve school practices.

Simultaneously, AI technology literacy plays a pivotal role in enhancing teachers' confidence and efficacy. This literacy includes not only technical proficiency in operating digital and AI-based tools but also encompasses a conceptual grasp of AI's capabilities, its ethical considerations, and its practical application in education. Teachers with high levels of AI literacy are better prepared to navigate data-driven environments, implement technology-integrated instruction, and lead digital transformation initiatives within their institutions. Their ability to utilize AI tools strategically reinforces their belief in their capacity to influence educational outcomes positively and to lead teams through change processes with greater confidence and effectiveness.

The integration of these two domains intellectual readiness through epistemological insight and practical competence through AI literacy creates a powerful synergy that equips teachers to become adaptive, visionary, and innovative leaders. These qualities are not only desirable but increasingly necessary as education systems around the world move toward digitalization, personalization, and innovation-driven reform. Without a strong foundation in both epistemological and technological domains, teachers may struggle to meet the complex demands of leadership in the 21st century.

Therefore, these findings have significant implications for teacher professional development policies and programs. It is imperative that training initiatives are designed not only to enhance technical abilities but also to promote critical thinking, philosophical reflection, and a deeper understanding of the nature and purpose of knowledge. Programs that merge digital skills training with epistemological development are likely to produce educators who are not only competent in technology use but also thoughtful, ethical, and capable of navigating the moral and strategic challenges of educational leadership.

In conclusion, developing epistemological awareness and AI technology literacy should be positioned as strategic priorities within any comprehensive framework for teacher empowerment and school leadership advancement. By strengthening both dimensions, educators will be better equipped to lead their institutions through innovation, respond to emerging educational challenges, and contribute meaningfully to shaping a future-oriented, technology-enhanced, and learner-centered education system.

REFERENCES

[1] Albert Bandura. (1997). *Self-efficacy: The exercise of control*. W.H. Freeman and Company.

[2] Y. N. Chandra, G. Wijayanti, C. D. Hartati, & B. R. Simbolon. (2025). Revolusi AI dalam pendidikan: Bagaimana ChatGPT dan teknologi lainnya mengubah metode pengajaran di. *Jurnal Papatung*, 8(1), 1–12.

[3] P. Erixon & K. Hansson. (2023). Teachers' personal epistemologies and professional development. *Journal of Further and Higher Education*, 47(3), 311–323. https://doi.org/10.1080/0309877X.2022.2124366

[4] J. F. Hair Jr, G. T. M. Hult, C. M. Ringle, & M. Sarstedt. (2021). *A primer on partial least squares structural equation modeling (PLS-SEM)*. Sage Publications.

[5] B. K. Hofer & P. R. Pintrich. (1997). The development of epistemological theories: Beliefs about knowledge and knowing and their relation to learning. *Review of Educational Research*, 67(1), 88–140. https://doi.org/10.3102/00346543067001088

[6] Y. Kajiwara & K. Kawabata. (2024). AI literacy for ethical use of chatbot: Will students accept AI ethics? *Computers and Education: Artificial Intelligence*, 6, 100251. https://doi.org/10.1016/j.caeai.2024.100251

[7] T. Karakose & T. Tülübaş. (2024). School leadership and management in the age of artificial intelligence (AI): Recent developments and future prospects. *Educational Process: International Journal*, 13(1), 7–14. https://doi.org/10.22521/edupij.2024.131.1

[8] W. Leal Filho et al. (2018). The role of transformation in learning and education for sustainability. *Journal of Cleaner Production*, 199, 286–295. https://doi.org/10.1016/j.jclepro.2018.07.017

[9] S. Mhlongo, K. Mbatha, B. Ramatsetse, & R. Dlamini. (2023). Challenges, opportunities, and prospects of adopting and using smart digital technologies in learning environments: An iterative review. *Heliyon*, 9(6), e16348. https://doi.org/10.1016/j.heliyon.2023.e16348

[10] D. T. K. Ng, E. K. C. Chan, & C. K. Lo. (2025). Opportunities, challenges and school strategies for integrating generative AI in education. *Computers and Education: Artificial Intelligence*, 8, 100373. https://doi.org/10.1016/j.caeai.2025.100373

[11] S. R. Neugebauer. (2017). Assessing situated reading motivations across content areas: A dynamic literacy motivation instrument. *Assessment for Effective Intervention*, 42(3), 131–149. https://doi.org/10.1177/1534508416666067

[12] S. P. Robbins. (2019). *Organizational behavior* (Vol. 11, No. 1). http://scioteca.caf.com/bitstream/handle/123456789/1091/RED2017-Eng-8ene.pdf

[13] Sugiyono. (2017). *Metode penelitian kuantitatif, kualitatif, dan R&D* (25th ed.). Bandung: Alfabeta.

[14] Joko Sutrisno. (2023). *Mengoptimalkan pembelajaran: Peran transformasi AI dalam dunia pendidikan*.

[15] D. H. Tong, B. P. Uyen, & L. K. Ngan. (2022). The effectiveness of blended learning on students' academic achievement, self-study skills and learning attitudes: A quasi-experiment study in teaching the conventions for coordinates in the plane. *Heliyon*, 8(12), e12657. https://doi.org/10.1016/j.heliyon.2022.e12657

[16] M. Ulum, Y. Riyanto, & S. Setyowati. (2024). Self-efficacy guru sebagai kunci keberhasilan pengajaran: Analisis berbasis kajian literatur. *Jurnal Pendidikan*, 6(2), 211–228.

[17] Y. Walter. (2024). Embracing the future of artificial intelligence in the classroom: The relevance of AI literacy, prompt engineering, and critical thinking in modern education. *International Journal of Educational Technology in Higher Education*, 21(1). https://doi.org/10.1186/s41239-024-00448-3

[18] S. Woodcock, E. Hitches, & A. Manning. (2023). "The hardest part is…": Teacher self-efficacy and inclusive practice. *International Journal of Educational Research Open*, 5, 100289. https://doi.org/10.1016/j.ijedro.2023.100289