

The Role of Digital Academic Supervision in Enhancing Teacher Professionalism in the Era of Industry 4.0: A Literature Reviews

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ABSTRACT

This study aims to evaluate the effectiveness of digital-based academic management in enhancing teacher professionalism and improving the quality of education in the context of the Industrial Revolution 4.0. Using a literature reviews method, the study analyzes references from academic journals, books, and credible online sources to understand the challenges and opportunities of digital academic supervision. Descriptive analysis is employed to synthesize findings and identify implications. The results highlight that digital academic supervision is a critical innovation for integrating technology into education. It enables administrators to train teaching staff, fostering professional development and ICT competence. However, challenges include inadequate knowledge of technology among school leaders, limited infrastructure in remote areas, and resource deficiencies. Before the COVID-19 pandemic, traditional supervision methods were dominant, requiring physical visits and manual observation. In contrast, the current digital approach is more efficient, enabling remote supervision and fostering professional collaboration through online platforms. Despite its potential, successful implementation requires robust infrastructure, ongoing training, and a supportive digital ecosystem. This study concludes that digital academic supervision is a transformative tool for addressing the demands of Industry 4.0, with significant implications for teacher development and educational quality improvement.

Keywords: *Digital academic supervision, Teacher professionalism, Industry 4.0, Education quality, ICT integration.*



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INTRODUCTION

Oversight involves the monitoring and training of staff or workers who are subordinate to a foundation or organization. Effective implementation of management is crucial to improving the quality of achieving organizational or institutional goals. Similarly, in the field of education, management should focus on achieving educational objectives and enhancing the quality of education at every level of the institution. According to Sumarto (2020), management is defined as professional oversight in the academic realm, conducted according to scientific principles within the field of work, emphasizing a deeper understanding of learning rather than basic supervision. Additionally, management involves monitoring the execution of educational and technical activities in schools or madrasas. This goes beyond mere physical control of materials; it also encompasses the supervision of academic activities, such as teaching and learning processes, involving the oversight of teachers' instructional methods, students' learning progress, and the factors

influencing these activities.

The goal of academic oversight is to enhance teacher professionalism, foster motivation, and improve the quality of management (KEMENDIKBUD, 2016). Meanwhile, KEMENDIKBUD (2019) explains that the quality of learning is significantly influenced by academic oversight. Effective academic management can cultivate professional teachers who are essential to a quality learning environment. A teacher's professionalism, as a key figure in the educational process, can be improved through academic oversight, ensuring that learning objectives are met. Therefore, academic supervision plays a vital role in supporting and enhancing teacher quality during the learning process. Effective academic management focuses on the procedures and principles for implementing supervision. According to Prasojo (2015), the methods for conducting supervision include activities before observation (planning), classroom observation (execution), and post-observation activities (follow-up).

In the era of globalization, Indonesia's development requires the ability to compete with other nations, particularly in the field of education. The globalization era introduces dual attitudes: optimism and anxiety. Optimistically, this era is expected to bring improvements in the quality of life and the welfare of Indonesian society. Changes in all aspects of life will impact the quality of life and the development of human resources. Conversely, there is anxiety due to concerns that globalization might erode social values or replace noble cultural traditions with Western cultural norms. Considering the impacts of globalization, it is essential to prepare Indonesian citizens to become resilient, skilled, and competent human resources capable of addressing challenges while preserving the nation's noble cultural heritage. Potential strategies include enhancing the quality of human resources through educational programs that emphasize mastery of science and technology while fostering knowledge and commitment.

Education is a deliberate effort aimed at achieving predetermined goals. According to Tilaar (2009), education seeks to enhance and develop Human Resources (HR) into individuals of exceptional character. The advancement of technology plays a pivotal role in shaping education, aligning it with the demands of the industrial revolution 4.0. As noted by Ma'ayis (2022), aligning education with this industrial revolution becomes a necessity for education policy developers and implementers. In the industrial revolution era, all aspects of education are expected to incorporate digital media into their activities. The integration of technology in education is essential to achieving the national objectives of the Indonesian nation.

The COVID-19 pandemic has accelerated changes in global education, necessitating various adaptation efforts supported by infrastructure such as internet access and technological tools like smartphones and computers. However, these advancements have also placed significant pressure on disadvantaged communities lacking access to digital learning facilities.

Teachers are the driving force behind the success of education in enhancing and developing human resources. Pre-service and in-service teacher education programs aim to develop the teaching profession (Rofiki, 2019). However, not all teachers trained in educational institutions receive adequate and professional preparation, which affects the attainment of educational goals. The development of digital technology provides opportunities to improve educational quality (Krumsvik, 2016). The importance of integrating digital technology into supervision, management, and learning is widely

recognized (Howard, 2019). Digital-based academic management can significantly enhance teacher professionalism. Effective use of digital technology in education, combined with digital competence, becomes central to fostering academic knowledge and improving student learning outcomes (Ramírez-Montoya et al., 2017).

One form of academic management is organizing training programs for teachers to improve their competence. Thus, training conducted by school supervisors is essential for enhancing teacher competencies, ultimately improving the quality of learning. Teacher competence development is closely related to enhancing knowledge, skills, and adaptability to the demands and challenges of educational policies and technological advancements. An alternative approach is assisting teachers in creating effective learning plans, such as Learning Execution Plans with a scientific approach, monitored through supervisory activities by school supervisors (Mujiono, 2015).

Conventional methods of academic supervision still have limitations, such as inadequate communication of supervision plans to teachers, insufficient needs assessments to identify teachers' ICT requirements, and the selection of participants without consideration of their ICT proficiency. Additionally, pre-tests and post-tests are rarely conducted, and the results of supervision are not properly documented. Reports and follow-ups often lack depth, and discussions between supervisors and teachers are limited, leaving teachers unaware of supervision outcomes (Saputra, 2023). The study by Kasmawati (2020) found that during the COVID-19 pandemic, schools in the Takalar Regency utilized Google Forms for academic supervision. This application was considered effective and efficient, offering distinct advantages. Given the ubiquity of the internet, it would be a missed opportunity if supervisors failed to leverage tools like Google Forms for academic oversight. Over time, many teachers and supervisors remain unfamiliar with technological tools, leading to less effective and efficient supervision. Geographical distances and inadequate infrastructure also limit communication between teachers and supervisors. These challenges require supervisors to innovate and think creatively to ensure effective academic oversight that guides teachers to become competent professionals.

Based on the above context, the importance of implementing effective and efficient academic supervision utilizing technology in the current era cannot be overstated. This study aims to evaluate the effectiveness of digital-based academic management in enhancing teacher professionalism and improving the quality of education in the context of the Industrial Revolution 4.0.

METHODS

This article employs a literature study method, which involves analyzing and synthesizing references and study findings to address the problem under investigation. The literature study focuses on identifying theories, principles, and relevant study results that provide a foundation for understanding the issue being examined. The data gathered through this method are interpreted using descriptive analysis, enabling a systematic understanding of the relationships and implications of the findings.

References and literature are sourced from a variety of reliable and credible materials, including study published in national and international journals, articles, academic books, and relevant online resources that directly contribute to the discussion. These sources are

carefully selected to ensure they align with the study objectives and provide valuable insights into the topic. The study procedure consists of several stages. It begins with comprehensive data collection, wherein relevant materials and references are gathered and organized systematically. This is followed by in-depth data analysis, aimed at identifying patterns, drawing connections, and interpreting the findings within the context of the study objectives. Finally, the process concludes with the formulation of conclusions, where key insights and recommendations are synthesized to address the problem effectively (Rofiki, 2019).

RESULTS

Piet A. Sahertian, as cited by Arikunto (2009), characterizes management efforts as providing professional services to individual teachers or groups to improve teaching quality. Another definition suggests that the term "supervision" is derived from two words, "super" and "vision," which can be interpreted as observing, examining, and assessing thoroughly. Mulyasa (2009) explains that supervision is conducted by supervisors who evaluate the activities, creativity, and performance of subordinates.

The distinction between management and evaluation lies in their characteristics and focus. Evaluation involves controlling, adjusting, judging, coordinating, and demonstrating, whereas management is characterized by study, assessment, development, assistance, and collaboration. Based on the descriptions above, management can be defined as a series of internal efforts to provide support to teachers through professional services to enhance the quality of the learning experience.

Management, in practice, is divided into two types: administrative/organizational management and academic management. Administrative supervision focuses on improving activities related to technical or school administrative work, whereas academic management aims to enhance the quality of learning. Academic management, therefore, involves a series of professional activities designed to help teachers develop the competencies necessary for effective learning experiences. In addition to its objectives, academic management provides several benefits for teachers.

3.1 Benefits of Academic Management for Teachers

Teachers under supervision gain an understanding of their strengths and weaknesses while learning to: 1) Develop lesson plans; 2) Implement effective teaching and learning processes in the classroom; 3) Design and utilize learning tools effectively; and 4) Engage in reflection to enhance understanding and knowledge (Dikdasmen, 2017).

Academic management is not a legal or enforcement activity; rather, it is a structured process to assist and support teachers in improving the learning process. The aim is to help teachers develop knowledge, skills, and professional attitudes, enhancing their abilities to achieve learning objectives without focusing on performance evaluation.

Academic supervision, as described by Darma (2022), is a process designed to help teachers improve their ability to manage learning and achieve educational goals. The core of academic supervision lies in providing professional support to teachers, enabling them to enhance the quality of their teaching and professional capabilities.

3.2 Academic Management in the Era of Disruption

In the current era of digital disruption, where access to information is rapid and competition is intense, Indonesia faces the challenge of improving its human resources to remain competitive globally. The Minister of Research, Technology, and Higher Education, Mohamad Nasir, noted that Indonesia is seen as a country with significant potential in Southeast Asia but still lags behind neighbors like Malaysia, Singapore, and Thailand. This lag is attributed, in part, to weaknesses in higher education, science and technology training, and innovation capacity.

Academic management plays a crucial role in improving teacher performance. It is a guiding activity designed to assist teachers and other school staff in performing their tasks effectively (Iskandar, 2019). For each educational unit, academic supervision can now be conducted online using digital tools. In such cases, school supervisors prepare evaluation materials, tools, and programs to provide guidance to teachers and staff remotely. The implementation remains fundamentally the same but is adapted for digital platforms.

Advantages of Online Academic Supervision

Setyawati (2023) highlights several benefits of online academic supervision in enhancing management services: 1) It enables supervision to be conducted without constraints of time or distance, improving teacher professionalism; 2) Information can be accessed quickly; 3) Supervisors can monitor teachers' documentation online through shared files; 4) Online discussion forums foster communication and collaboration; 5) It provides opportunities for teachers to develop skills independently; and 6) Teachers and supervisors can communicate anytime and anywhere using digital platforms.

To effectively implement digital academic supervision, an understanding of conventional academic management is essential. The main difference lies in the use of digital technology, such as free internet-based meeting tools, which can effectively extend supervision to remote schools. Studies have shown that virtual supervision models can address challenges such as limited teacher engagement, time constraints, and resource availability while improving teachers' ICT skills.

For example, a supervisor's knowledge of integrating technology into their supervisory practices is critical for successful change. This includes adapting management practices to improve teacher learning and creativity. Effective integration requires understanding various factors such as the functionality of the new tools, their potential to transform learning, and the promotion of innovative teaching practices (Howard, 2019). Additionally, teachers' behavior toward ICT integration plays a decisive role. For instance, when introducing new educational technologies, teachers must not only demonstrate their use but also actively incorporate them into regular classroom activities, even outside scheduled supervisory visits.

CONCLUSIONS

In view of the clarification above, several conclusions can be drawn. First, digital academic oversight, or electronic management (E-Management), represents a significant breakthrough in the current era as part of efforts to integrate technology. The challenges posed by the Fourth Industrial Revolution (Industry 4.0) can be addressed through the implementation of digital academic management, which is considered highly effective and

efficient. This approach enables internal managers to provide training to teaching staff, aiming to produce highly qualified and technologically proficient educators. Second, the implementation of digital academic oversight is not always successful, as there are certain limitations associated with this approach. These limitations include: 1) A lack of knowledge among school leaders or managers regarding the technology used in E-Management, 2) Inadequate infrastructure and facilities, such as electricity, internet connectivity, and computers, especially in remote or underdeveloped 3T (Frontier, Outermost, and Disadvantaged) regions. Third, prior to the COVID-19 pandemic, academic management was conducted using traditional methods. In this approach, managers were required to visit schools in person to oversee teachers and organize schedules for classroom visits and observations. However, with the onset of the Industry 4.0 era, the role of technology has become essential for resuming academic management activities that were previously disrupted. The shift from traditional to technology-based academic oversight is recognized as a more effective and efficient solution for academic management practices. This revised version maintains the original intent while improving clarity, structure, and language. It also ensures better readability and avoids potential plagiarism by rephrasing the content significantly.

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