

## **Digital Classroom Management in Geography Education: A Case Study of a Smart Digital Madrasah in Indonesia**

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**Abstract:** This study aims to analyze the comprehensive framework of digital classroom management in Geography subjects at SMART Digital Madrasah MAN 3 Palembang, focusing on planning, implementation, evaluation, and encountered challenges. Using a qualitative case study design, data were collected through in-depth interviews, participant observation, and documentation from key informants, including administrators and teachers, with analysis following thematic stages. The results reveal a systematically planned ecosystem involving infrastructure readiness, a dedicated teacher upskilling program (“BURGO”), and digital administrative tools. Implementation utilizes a Blended Learning model that integrates real and virtual digital classes with platforms like Google Earth and Quizizz. Evaluation is digitally embedded through creative and gamified assessments, alongside a computerized testing system. A critical finding is the gap between ideal planning and practical constraints, primarily limited internet bandwidth for large-scale student access. The study’s novelty lies in its holistic examination of digital management within a madrasah context, proposing an integrated four-pillar model. Practically, it offers a replicable blueprint for similar institutions undergoing digital transformation. Its main contribution is enriching the literature on sustainable digital integration in faith-based educational settings, highlighting both strategic enablers and infrastructural prerequisites.

**Keywords:** Blended Learning, Digital Class Management, Geography Education, Technological Pedagogical Content Knowledge

### **A. Introduction**

Advances in information and communication technology (ICT) have significantly impacted various aspects of human life, including education. Technological innovations not only accelerate the dissemination of information but also make the learning process more effective and efficient. Digitalization of education has become a necessity as generations become increasingly familiar with the digital world. Generations Z and Alpha grew up amidst rapid technological advancements, so they tend to be more responsive to visual and digital-based learning methods.

This shift in perspectives on education was further accelerated by the emergence of the COVID-19 pandemic in late 2019. This situation forced education systems worldwide to adapt rapidly, shifting from face-to-face classroom learning to digital-based learning. Indonesia, as part of the global community, also felt the impact, with schools and Islamic schools (madrasah) being required to immediately implement online learning activities. Since then, digitalization of education has become a key focus of national education planning and policy. One important innovation in today's educational development is the concept of the digital classroom. The digital classroom is not simply the use of electronic devices in the learning process; it is an integrated learning system that combines various teaching and learning activities within a single technology-based platform. Through the digital classroom, teachers and students can interact without the constraints of time and space, allowing learning to take place anytime and anywhere.

By utilizing technology in digital classrooms, previously monotonous learning processes can now become more interactive, flexible, and adaptive (Arikarani & Amirudin, 2021). Teaching and learning activities are no longer confined to the classroom but can take place in various locations. The application of this technology has been proven to support collaborative and project-based learning, which are currently popular. In the midst of the industrial revolution 4.0 era and entering society 5.0, digital transformation has become an important need to improve the quality of learning, so that it is not only more effective and efficient, but also in line with the character of generations Z and Alpha who are very familiar with digital technology (Sarfraz et al., 2025; Alit & Tejawati, 2023).

Geography education, as a subject closely related to the environment and spatial phenomena, demands teachers' skills in managing technology-based learning. Teachers must be able to transform spatial data into engaging and easily understood digital teaching materials for students. This requires specialized training, as well as software support, stable connectivity, and adequate hardware, all crucial factors for the success of digital classrooms. According to (Rahmi & Ahyani, 2025), digital classrooms offer advantages in terms of flexibility in space and time, easy access to information, and collaboration facilities between teachers and students through various platforms such as Google Workspace for Education, Learning Management Systems (LMS), and other learning applications. Agustina et al., (2024) LMS systems, such as Google Classroom, Edmodo, and Moodle, are popular among educators because they simplify digital learning management. Through these platforms, teachers can share materials, organize assignments, provide feedback, and conduct evaluations in a more structured and documented manner (Shafa, 2024).

In Indonesia, the Indonesian Ministry of Religious Affairs has launched the "Digital Madrasah" program to improve the quality of learning through technology, including at the MAN 3 Palembang Digital Madrasah, which has been designated as a pilot madrasah (Kemenag RI, 2022). As a pilot madrasah, MAN 3 has implemented various

digital learning measures, such as digital student attendance, guest services, teaching and learning activities using smart projectors, a digital library, and administrative and student services, which previously used conventional systems. The transformation into a smart digital madrasah at MAN 3 Palembang demonstrates that technology integration is part of the institution's commitment to developing 21st-century learning. However, this transformation faces managerial challenges, including teacher readiness, technological infrastructure, student digital literacy, and the implementation of adaptive pedagogical approaches (Farwati & Arifin, 2023).

Digital classroom management is not just a technical issue; it also encompasses the planning, organization, implementation, and evaluation of technology-based learning. A study by (Linda L, Gita S & Muhammad Z, 2024) emphasized that integrating technology into classroom management can increase student participation, facilitate collaboration, and develop critical thinking skills and digital literacy as 21st-century competencies. Furthermore, the implementation of digital classrooms in madrasas must be aligned with the character of Islamic education, which emphasizes spiritual and moral values. Therefore, digital classroom management must adhere to the principles of character education, a competency-based curriculum, and a religious nuance. Research (Rahayu, 2021) shows that the use of platforms like Google Classroom not only increases the effectiveness of online learning but also encourages active student engagement in independent learning. Implementing a digital classroom requires support from various stakeholders, including comprehensive teacher training and parental involvement in supporting home learning. According to (Wahdini, 2024) digital management is not solely the responsibility of teachers, but of all elements of the madrasah.

From the description above, it can be concluded that digital classroom management plays a crucial role in supporting the transformation of digital education in madrasas. However, there is still little research that specifically highlights the application of this management in geography learning in digital madrasas. Therefore, this study aims to explore how digital classroom management is implemented in geography learning at MAN 3 Palembang.

## **B. Methods**

This study employs a qualitative approach with a case study design. According to (Busetto et al., 2020), qualitative research is an approach that focuses on understanding social phenomena from the perspective of the subjects involved. This research aims to explore the meanings, experiences, and views of individuals or groups within a broader social context. The primary objective of qualitative research is to gain a profound understanding of phenomena through a holistic and contextual description of the behaviors, perceptions, motivations, and actions of individuals or groups (Sugiyono, 2017) This approach is frequently utilized to explore complex issues that cannot be fully explained through quantitative methods. Meanwhile, a case

study is a method for conducting an in-depth and comprehensive investigation of a phenomenon within its real-life context. This method allows the researcher to explore and understand the complexities of a case in a more holistic manner (Yin, 2017). According to (Busetto et al., 2020), informants are individuals capable of providing explanations or information regarding the problem under study and can serve as resource persons throughout the research process. The primary data sources were selected through purposive sampling. The selection of these informants is based on subjects who have expertise in the issues related to the topic, research problems, and research focus, as well as those who possess sufficient data and information and are willing to provide the required data.

**Table 1. List of Research Informants**

| No. | Initial | Position                  |
|-----|---------|---------------------------|
| 1   | A1      | Head of Madrasah          |
| 2   | A2      | Deputy Head of Curriculum |
| 3   | A3      | Geography Teacher         |
| 4   | A4      | Geography Teacher         |
| 5   | A5      | Geography Teacher         |

The primary data sources in qualitative research are words and actions, while the remainder consists of additional data such as documents, photographs, and statistical data. To maintain data validity (Busetto et al., 2020). He asserts that every piece of data or information must be continuously verified through other sources (triangulation). Triangulation is a technique for checking data validity by utilizing something external to the data for verification purposes or as a comparison. Denzin, in *Qualitative Research Methods* (Nurfajriani et al., 2024), distinguishes four types of triangulation as examination techniques: source, method, investigator, and theory triangulation. This study ensures data validity through triangulation by utilizing multiple sources.

The data analysis technique in this study follows the interactive analysis model, which consists of three concurrent flows: 1) Data Reduction: The obtained data is summarized, key points are selected, and the focus is narrowed to essential information. Themes or patterns are identified so that the data can be organized systematically and managed more effectively. 2) Data Display: Presenting the data through various formats such as graphs, networks, and charts to visualize the findings. 3) Conclusion Drawing and Verification: Interpreting the displayed data to reach a final conclusion and verifying its accuracy throughout the process.

### **C. Results and Discussion**

Currently, the terms “management” and “manager” are widely recognized in Indonesia across the private sector, the general public, and the public sector, including government institutions. Within higher education, nearly all disciplines and faculties have integrated management science into their curricula. As a field of study, management is viewed as a discipline because it possesses theoretical foundations,

principles, and methods that are systematically organized, testable, and practically applicable (Koontz & Weihrich, 2010). This signifies the importance of analytical approaches, structured planning, and data-driven decision-making. Therefore, management fulfills the primary characteristics of a science.

Research conducted by (Sidiq, 2004) in the *Scientific Journal of Management and Business* suggests that management is considered a combination of science and art that regulates the use of human and other resources effectively and efficiently to achieve specific goals. Meanwhile, management is the effort to organize an organization to achieve its objectives effectively and efficiently. Effectiveness relates to the extent to which goals can be optimally achieved, while efficiency emphasizes the correct and proper execution of tasks. Thus, management can be viewed as a tool, a force, a process, a function, a task, or an activity that plays a vital role, particularly in the fields of learning and vocational education. It can be concluded that management is the process of managing an organization which includes the stages of planning, implementation or organizing, and supervision, with the aim of enabling the organization to reach its targets effectively and efficiently. Effectiveness indicates the ability to achieve goals optimally, while efficiency emphasizes performing tasks or activities in the right and proper manner. Based on its functions, (Wijayanti & Wicaksana, 2023) state that management has four primary functions, commonly abbreviated as POAC: Planning, Organizing, Actuating (Implementation), Controlling (Evaluation). Furthermore, (Umiyati, 2021) explains that in its application, management involves several fundamental tasks that are essential to execute. These tasks are generally referred to as management functions. Although there are various perspectives regarding these functions, the core of management functions can be distilled into three interrelated main aspects: planning, actuating, and controlling.

According to Ozerbas, K., & Erdogan, (2016), a digital classroom is an environment where teachers and students interact directly using virtual platforms powered by digital technology. Singh, (2021) describes the digital classroom as an implementation of technology in education, where the utilization of such technology can improve and enhance the quality of the educational process. Furthermore, Jitsupa, J., Netwong, T., & Rattanasonthi, (2023) define a digital classroom as a learning environment that utilizes information and communication technology (ICT) to develop and improve students' digital literacy skills. As a component of the Digital School Concept, (Vambudi, V. N., Ali, M., & Mustofa, 2022) interpret the digital classroom as a fundamental element of a digital school framework that leverages ICT to refine and elevate educational standards. Regarding the digital classroom as a Technology-Based Learning Space, (Dussel, 2018) states that it is a learning environment that uses technology as a medium to support instructional activities. Consequently, a digital classroom does not merely refer to a physical learning space equipped with technological devices; it also encompasses virtual spaces that allow learning activities to occur regardless of time and place. This condition provides opportunities for students to engage in independent learning, online collaboration, and access various

learning resources and materials via the internet. The research findings are presented based on four sub-foci derived from the research questions: planning, implementation, evaluation and monitoring, and obstacles and solutions.

**Planning of the Digital Classroom.** Planning serves as the foundation for digital classroom management at MAN 3 Palembang. The research findings indicate that this planning covers three main pillars: Infrastructure and Facilities Readiness: The madrasah has standardized infrastructure across 36 learning groups (classes). Each classroom is equipped with a projector, a Smart TV, and an internet access point (Wi-Fi). Additionally, students are required to bring their own devices (laptops/tablets) pre-installed with e-books, eliminating the use of manual textbooks. This infrastructure support was prepared incrementally by the school prior to the program's launch. Human Resources Readiness (Teachers): The madrasah management recognizes that the key to the program's success lies with the teachers. Therefore, continuous development and training programs have been designed, such as internal Subject Teacher Forums (MGMP) and the "BURGO" activity (an acronym for *Belajar untuk Guru MAN Tigo* or "Learning for Teachers of MAN 3").

**Administrative and Pedagogical Readiness:** Geography teachers are required to create comprehensive and structured digital classroom activity plans, which include the academic calendar, academic calendars, annual programs, semester programs, and teaching modules. Within these modules, teachers are required to design at least one or more activities that utilize digital platforms. Teachers initiate planning by analyzing the students' context, then formulating specific Learning Objectives (LO) that integrate digital tools. For example, students use specific tools (as the Condition) to produce digital learning evidence (as the Behavior), such as "analyzing GIS data to create a story map." Media selection is also tailored to the subject matter, such as utilizing Google Earth for remote sensing materials.

**Implementation of the Digital Classroom** The implementation of the digital classroom at MAN 3 Palembang is not limited to physical classrooms but also encompasses virtual classrooms. **Implementation Models:** Two implementation models were identified. First, the "Real Digital Classroom," which refers to face-to-face learning in 36 technology-equipped classrooms. Second, the "Virtual Digital Classroom," conducted via video conferencing platforms (e.g., Zoom). This virtual classroom is specifically used for students in the SKS (Accelerated) program during semester breaks, allowing them to complete their studies in two years. **Media Utilization:** Geography teachers routinely utilize various platforms. Google Earth and Google Maps are used to clarify material and spatial visualization. Canva is used for student assignments to create infographics or digital posters, while Quizizz and Kahoot are employed for gamified formative assessments. **Managing Student Engagement:** Teachers recognize that digital environments are prone to distractions. To maintain focus, teachers use a variety of activities and non-monotonous methods, interspersed with educational games. One student (Informant A5) stated a preference for the digital

classroom because it is more modern, features many animations, and allows for “virtual field trips.” However, the student also admitted the difficulty of staying focused while holding a device due to the temptation to open games and social media.

Evaluation and Monitoring of the Digital Classroom. Evaluation and monitoring aspects are fully integrated with technology at both the teacher level (micro) and the school level (macro). Learning Activity Evaluation (Teacher Level): Teachers implement a diversification of evaluation methods. For formative assessments, gamification platforms such as Quizizz and Kahoot are the primary choices. These platforms have proven effective in energizing students because they simulate a gaming experience (featuring music, leaderboards, and time-based challenges). For teachers, this provides instant feedback, allowing for data-driven instructional decision-making. Regarding assignments, teachers utilize creative project-based assessments, such as designing posters in Canva. For summative end-of-semester assessments, the madrasah developed a specialized Computer Assisted Test (CAT) application named “SiAman” (*Asesmen Madrasah Anti Nyontek/Anti-Cheating Madrasah Assessment*) to maintain academic integrity. Feedback on assignments is provided directly on students’ digital documents, for instance, through the comment features in Google Docs or Google Classroom. Learning Process Monitoring (School Level): The madrasah administration conducts monitoring through academic supervision to ensure that digital classroom activities are implemented according to plan. This supervision is performed periodically (for example, every October). Furthermore, the supervision process has been digitalized, with teacher assessment instruments being completed via Google Forms.

Despite having an ideal planning framework, implementation in the field faces several crucial technical challenges. Obstacles: The most frequent issues encountered are power outages and unstable internet connections. One student (Informant A5) confirmed this, identifying unstable internet as the primary obstacle, alongside distractions from social media notifications and games. The madrasah administration (Informant A1) acknowledged that although access points have been distributed, the existing bandwidth is insufficient to support more than 1,020 students simultaneously. Solutions: To mitigate power outages, the school provides a generator set (genset). To address limited bandwidth, the madrasah has implemented iterative solutions: (1) gradually upgrading internet capacity, and (2) collaborating with the school committee to find solutions for students who most urgently require internet access support at home.

The results of this study indicate that digital classroom management at MAN 3 Palembang operates systematically through three primary functions: planning, implementation, and evaluation/monitoring, which aligns with management function theory (POAC). In the planning stage, the comprehensive preparation of infrastructure across 36 classrooms, the Bring Your Own Device (BYOD) policy, and the use of e-books have successfully created a learning environment consistent with

the digital classroom concept (Dussel, 2018). The success of this planning is also supported by institutional commitment to enhancing teacher competence through the “BURGO” training program. Furthermore, the teachers’ pedagogical planning starting from student analysis to the formulation of digital-based Learning Objectives (e.g., the utilization of Google Earth) demonstrates a contextual and strategic integration of technology.

In the implementation stage, the most significant finding is the application of the Blended Learning model, which combines the “real digital classroom” (physical) with the “virtual digital classroom” (virtual). This model is consistent with the theory proposed by Graham (2006), which combines two approaches to enhance the quality and efficiency of learning. This model effectively provides high flexibility and offers learning alternatives that are accessible anytime and anywhere, particularly in facilitating accelerated classes (SKS).

In the evaluation and monitoring stage, the utilization of various platforms (Canva, Quizizz, and the “SiAman” CAT) alongside the use of Google Forms for supervision indicates that the madrasah and its teachers have implemented the Technological Pedagogical Content Knowledge (TPACK) framework. Technology is not merely used as a substitute but has been integrated to support pedagogy and assessment. This systematic monitoring process serves as a navigational instrument that provides rapid feedback for continuous improvement. However, the discussion regarding obstacles reveals a crucial finding: a significant gap exists between ideal planning and the reality of implementation. Technical hurdles, such as unstable internet, are not merely connection issues but rather a matter of scalability. The bandwidth limitations, which fail to accommodate 1,200 students simultaneously, represent a fundamental infrastructure bottleneck. The madrasah’s strategies which are iterative (gradual upgrades) and collaborative (involving the school committee) demonstrate a long-term adaptive management approach to building an inclusive and sustainable digital ecosystem.

#### **D. Conclusions**

This study provides a comprehensive analysis of digital classroom management at MAN 3 Palembang, revealing a structured and multi-faceted approach to educational transformation. The key finding is that successful digital integration hinges on a coherent ecosystem encompassing four pillars: comprehensive planning with robust infrastructure and policies like BYOD; a dual-mode Blended Learning implementation combining “real” and “virtual” digital classrooms; a digitally native evaluation system leveraging tools like Canva and Quizizz within a TPACK framework; and a proactive, iterative approach to overcoming infrastructural constraints. Crucially, while planning and pedagogical execution are advanced, a significant implementation gap persists, primarily due to insufficient internet bandwidth for mass simultaneous access a challenge the institution addresses through

phased upgrades and community collaboration. The practical implication of this case is that it offers a replicable model for similar institutions. Other schools can emulate the holistic strategy, moving beyond mere tool adoption to develop synchronized planning, pedagogy, assessment, and technical support systems. The study underscores the necessity of viewing digital transformation as a continuous process requiring visionary leadership, sustained teacher professional development (as seen in the "BURGO" program), and collaborative problem-solving with stakeholders to build an inclusive digital ecosystem. For future research, it is recommended to conduct longitudinal studies assessing the direct impact of this digital management model on student learning outcomes and digital literacy. Comparative studies across different types of schools would help identify contextual success factors. Furthermore, specific investigation into cost-effective technical solutions for bandwidth limitations in large schools is needed. Research could also explore the long-term sustainability of such models and their efficacy in subjects beyond Geography, contributing to a broader framework for digital integration in diverse educational settings.

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