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Management Strategies for Optimizing Teacher Competencies to Enhance Learning Quality in Elementary Schools During the Digital Era

Rizki Normayunita[1*], and Nana Herdiana Abdurrahman[1]

[1] Universitas Islam Nusantara, Bandung, Indonesia
[*]Corresponding author: rizqnorma89@gmail.com

Abstract. Digital technology requires elementary school teachers to integrate technology into instruction, so that the quality of learning in the digital era depends substantially on how schools manage the development of teacher competencies. This study analyzes teacher competency management for improving learning quality, covering planning, organizing, actuating, and controlling, together with the supporting and inhibiting factors, at SDN 2 Cibogogirang and SDN Rawasari in Purwakarta Regency. A qualitative multi-site case study collected data from fourteen informants (principals, teachers, digital learning coordinators, and students) through in-depth interviews, non-participant observation, and document study. The data were analyzed with the interactive model of data reduction, data display, and conclusion drawing, and trustworthiness was established through triangulation, member checking, and peer debriefing. Planning was based on analysis of teacher competencies and student needs. Organizing relied on a teacher learning community at the larger school and a designated person in charge of digital learning at the smaller one. Actuating integrated digital tools into lesson design under principals acting as instructional leaders, and controlling used continuous academic supervision whose results informed subsequent training. Teachers reported more interactive, student-centered lessons, and the principal constraints were workload, time, and uneven digital literacy. Both schools lacked baseline indicators and aggregated supervision records. The study concludes that the managerial logic is consistent across sites while its instruments vary with staff size, so that schools should select instruments proportionate to their own conditions and strengthen the measurement of change.

Keywords: Digital Era, Educational Management, Learning Quality, Professional Learning Community, Teacher Competency.

1 Introduction

The rapid evolution of digital technology has produced a significant shift in the educational landscape, altering how instructional processes are organized in primary education. In the digital era, the traditional didactic model is no longer sufficient; education must move toward a framework that emphasizes critical thinking, creativity,

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collaboration, and digital literacy. Within this context, the quality of learning serves as a central indicator of educational success, and it is closely tied to the competencies of teachers as the primary designers of the pedagogical experience. The transition toward a digitally mediated education system requires not only technological infrastructure but also a substantial development of the professional skill sets of educators [1], [2].

Legally, the imperative for teacher competency enhancement is anchored in a regulatory framework. Law Number 14 of 2005 concerning Teachers and Lecturers mandates that professional teachers possess four essential competencies: pedagogical, professional, social, and personal [3]. Law Number 20 of 2003 concerning the National Education System underscores the necessity of providing quality education that is adaptive to technological advancement and oriented toward the development of student potential [4]. These regulations position teacher competency as a strategic element of national development, yet the realization of these standards in the digital age requires more than compliance; it demands a managerial approach capable of converting policy into practice at the level of the individual school [5], [6].

Consistent with these mandates, the Indonesian government has promoted educational transformation through the Merdeka Belajar initiative and school digitalization programs. The implementation of digital learning at the elementary level nevertheless continues to encounter obstacles. These include a persistent gap in teachers' digital literacy, suboptimal pedagogical use of available technology, and weaknesses in how schools manage professional development. The efficacy of educational policy is often undermined by the absence of systematic and sustainable management at the institutional level. Without a coherent strategy for optimizing teacher competencies, technological tools remain peripheral rather than central to the learning experience [7].

The nature of the competency required also needs to be specified, since digital competency is frequently reduced to the operation of devices. The TPACK framework holds that effective instructional use of technology rests on the interaction of technological, pedagogical, and content knowledge rather than on technological knowledge alone, which means that a teacher who can operate a platform but cannot align it with the content and the learners has not acquired the relevant competency [8]. Recent evidence from the Indonesian context supports this distinction: analysis of teachers' digital pedagogical competencies indicates that the weakest dimension is not technical operation but the pedagogical integration of digital tools into instructional design [9]. This has a direct managerial implication, namely that training oriented toward software operation will not by itself raise the quality of learning.

From an educational management perspective, the optimization of teacher competencies requires the application of the fundamental management functions of planning, organizing, actuating, and controlling. George R. Terry argued that organizational success depends on the integration of these functions [10]. In the school environment, the POAC cycle provides a framework for ensuring that professional development initiatives are not sporadic events but are aligned with the strategic needs of digital learning and have a measurable effect on instructional quality. Effective management involves creating an ecosystem in which teachers are encouraged to innovate and are given the technical and psychological support required to do so [11].

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Recent scholarship has identified a relationship between management-driven professional development and learning outcomes. Professional development rooted in real classroom needs and accompanied by sustained mentoring is considerably more likely to influence practice than isolated workshops [12]. The role of school leadership is likewise significant in fostering a culture of innovation under conditions of technological change: a kindness-based leadership strategy has been identified as effective in primary education, where supportive management reduces teacher resistance to change [1]. The integration of transformative education principles and 21st-century competencies into the curriculum further supports an environment in which digital literacy can develop [13]. Where such development becomes collective rather than individual, the school begins to function as a learning organization in which capability is held by the institution and not only by particular teachers [14].

Despite the existing literature, many studies examine teacher competency in a fragmented manner, addressing training or supervision in isolation rather than the complete management cycle from planning to evaluation. There is a need for closer examination of how specific management strategies, including deep-learning-based planning and organizational resilience, can be applied to optimize teacher performance in the digital era [15]. In particular, comparative evidence is scarce on how two schools operating under identical policy but with different resource profiles arrive at different managerial instruments for the same objective.

This research addresses that gap through an analysis of teacher competency optimization management in two elementary schools in Purwakarta Regency. The study is guided by five questions: how is the optimization of teacher competency planned; how is it organized; how is it actuated; how is it controlled; and which factors support or inhibit the process at each site. By examining the interplay between leadership, resource management, and instructional quality, and by comparing two schools with contrasting resource conditions, the study contributes theoretically to the discourse on educational management and practically to school practitioners navigating digital transformation [16].

2 Methods

2.1 Research Design and Sites

This study employs a qualitative approach in order to obtain an in-depth understanding of the management processes involved in optimizing teacher competencies to enhance learning quality in the digital era. The qualitative paradigm was selected because it focuses on meaning, process, and the interactions that occur within a natural educational setting, and because the object of inquiry is managerial practice rather than measurable frequency. Qualitative research seeks to interpret social phenomena through the direct involvement of the researcher as the primary instrument [17].

The research design, summarized in Fig. 1, is a multi-site case study conducted at SDN 2 Cibogogirang and SDN Rawasari in Purwakarta Regency. The case study design is appropriate for investigating contemporary phenomena in real-life settings where the

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boundaries between phenomenon and context are not clearly evident, and the multiple-case variant allows each school to be analyzed as a complete case before a cross-case synthesis is developed, so that the comparison rests on two independently grounded analyzes [18]. This approach permits examination of interrelated factors such as school policy, the role of the principal, teacher readiness, and infrastructure support [19].

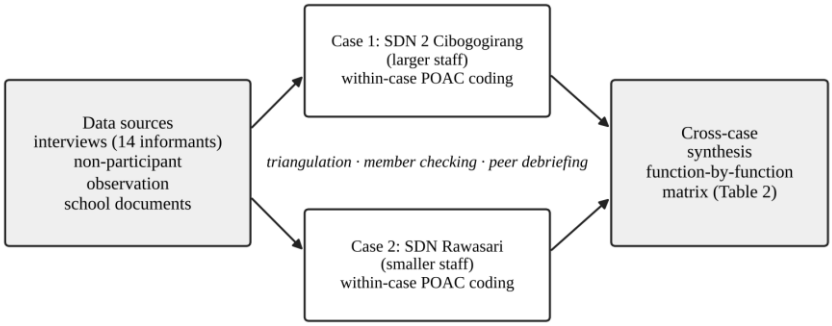


Fig. 1. Multi-site case study design: within-case POAC analysis of each school followed by a function-by-function cross-case synthesis.

The two sites were selected deliberately because they operate under the same national policy while differing in resource profile and managerial emphasis. SDN 2 Cibogogirang has comparatively well-established administrative documentation and a larger teaching staff, which permits the distribution of professional development through a collective forum. SDN Rawasari has a smaller staff and more limited facilities, which concentrates responsibility for digital learning in a smaller number of individuals. Holding the policy constant while varying these conditions allows the study to distinguish managerial elements that are invariant from those that are contingent on resources.

2.2 Informants

Subjects were selected using purposive sampling to ensure that the data collected were relevant to the research objectives. Informants were required to have been involved in the school for at least two academic years and to have direct experience of the school's professional development activities, so that they could describe change over time rather than a single snapshot. A total of fourteen informants participated, as presented in Table 1.

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Table 1. Distribution of research informants

No.	Informant	SDN 2 Cibogogiran g	SDN Rawasari	Data Focus
1	School principal	1	1	Policy, budget, and all POAC functions
2	Class teacher	3	3	Training experience and classroom integration
3	Digital learning PIC / community coordinator	1	1	Organizing and peer mentoring
4	Student	2	2	Experience of technology-supported lessons
	Total	7	7	14 informants

2.3 Data Collection

Data collection techniques comprised in-depth interviews, non-participant observation, and documentation study. Semi-structured interviews with principals and teachers explored each of the four management functions as well as the perceived obstacles to digital adoption, and interviews with students addressed their experience of technology-supported lessons. Observation was conducted in classrooms in order to record the actual instructional use of digital devices and platforms rather than their reported use, and was distributed across different subjects and days of the week. Documentation study covered the Annual Work Plan (RKT), the School Activity and Budget Plan (RKAS), teacher administration records, academic supervision instruments, and the records of the teacher learning community.

The three techniques were combined deliberately so that claims made in interviews could be tested against observed practice and against written records. This mattered particularly for the planning and controlling functions, where informant accounts of how needs were identified and how supervision was followed up could only be assessed by examining whether corresponding documents existed. Interviews were recorded with permission and transcribed before coding, and field notes were written immediately after each visit.

2.4 Data Analysis and Trustworthiness

Data analysis followed the interactive model of Miles, Huberman, and Saldaña, comprising data reduction, data display, and conclusion drawing or verification [20]. Coding proceeded deductively from the four management functions, with sub-codes emerging inductively for themes such as peer mentoring, digital literacy gaps, and workload. Data were then displayed in comparative matrices that juxtaposed the two sites function by function, which made convergent and divergent patterns visible, and conclusions were verified against the data corpus.

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Trustworthiness was established through the four criteria of credibility, transferability, dependability, and confirmability [21]. Credibility was pursued through source triangulation among principals, teachers, and students and through technique triangulation across interview, observation, and documentation, supported by prolonged engagement and member checking of interview summaries [22]. Transferability was addressed through thick description of each school's context, dependability through an audit trail of instruments, transcripts, and coding decisions, and confirmability through peer debriefing with colleagues in educational management not involved in data collection.

2.5 Research Ethics

Permission was obtained from the education office and from both schools, informants were informed of the purpose of the study and of their right to withdraw, consent was secured, and individual identities are not disclosed.

3 Results

3.1 Planning for Competency Optimization

The planning phase at both SDN 2 Cibogogirang and SDN Rawasari indicates that the integration of technology is rooted in the schools' strategic direction rather than treated as an adjunct activity. At SDN 2 Cibogogirang, planning is formalized and documented within the Annual Work Plan (RKT) and the School Activity and Budget Plan (RKAS). This reflects a techno-rational approach to administration, in which the school's vision is translated into structured and measurable development programs. The planning is grounded in an analysis of both teacher competencies and student learning needs, which means the school acts on the specific conditions of its own classrooms rather than only responding to external mandates [12].

SDN Rawasari exhibits a more developmental orientation in its planning by integrating continuous teacher development into the operational curriculum. This represents a shift from administrative planning toward deep learning-based planning, in which the focus extends beyond basic technical skills such as operating software to the cultivation of higher-order thinking skills and digital literacy [23], [24]. The optimization of teacher competency is consequently treated as an instrument for transforming the learning process rather than as an administrative requirement. The planning process involves the teacher council and the school committee in decision-making, which produced a shared sense of ownership that teachers later cited as the reason they engaged with training they had helped to design.

Document analysis nevertheless identified a limitation shared by both sites. Although needs analysis was conducted and recorded, neither school had established baseline indicators against which the effect of professional development could be compared across years. When asked how they would know whether a program had succeeded, informants at both schools answered in terms of general impressions of

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classroom practice rather than recorded change. The weakness therefore lies in the measurement of planning rather than in its substance, and it limits the information available to the controlling function at the end of the cycle.

3.2 Organizing Resources and Collaborative Learning Communities

The organizing function at these schools extends beyond the distribution of bureaucratic duties toward the creation of working structures and collaboration mechanisms. At SDN 2 Cibogogirang, the principal established the Motekar teacher learning community, which functions as a professional learning community in which teachers share practices, discuss instructional difficulties, and reflect on their experience with digital tools. This horizontal network supplements the hierarchical structure of school administration. By enabling teachers to learn from one another, the school reduces its dependence on external training events and becomes more responsive to the pace of technological change, as reviews of professional learning communities by Vescio et al. [25] have also reported.

At SDN Rawasari, the organizational strategy is more structural and includes the formal appointment of a Person in Charge (PIC) for digital learning. This division of roles gives teachers an identified source of support for both technical troubleshooting and pedagogical guidance, and the PIC functions as an expert peer mentor within the school. Sustained, job-embedded coaching of this kind is among the features most consistently associated with changes in teaching practice [12], and the arrangement ensures that teachers do not face the learning curve of digital integration in isolation.

The two arrangements carry different risks, which the research was able to identify precisely because the sites were compared (Fig. 2). The collective forum at SDN 2 Cibogogirang distributes capability widely but depends on regular meeting time being protected against competing demands; teachers reported that Motekar sessions were the first activity to be displaced when administrative deadlines accumulated. The designated PIC at SDN Rawasari guarantees availability of help but concentrates expertise in one person, and teachers acknowledged that support would be interrupted if that individual were reassigned. Neither school had documented a succession arrangement for the role.

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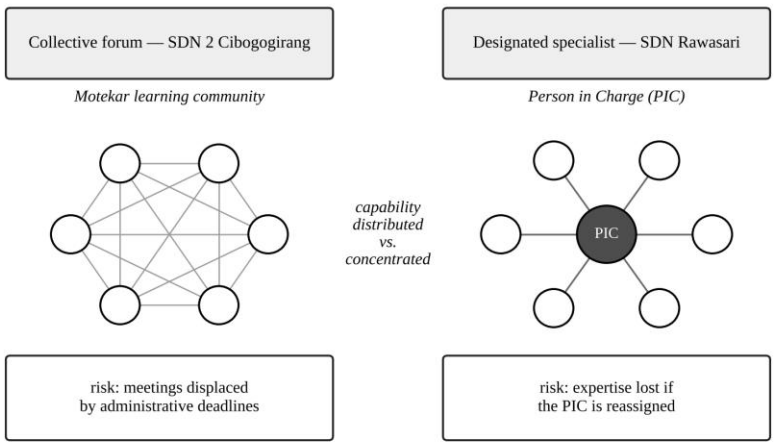


Fig. 2. Two organizing instruments for the same objective: a collective forum that distributes capability and a designated specialist who concentrates it.

3.3 Actuating: Classroom Integration and Instructional Leadership

The actuating phase at both schools provides evidence that digital competency has been embedded in daily classroom practice. Teachers use digital devices, learning platforms, and interactive multimedia as components of lesson planning and assessment rather than as optional additions. This supports a shift from teacher-centered instruction toward student-centered learning, in which students explore material through multimedia and collaborative project-based modules. Observation indicated that the quality of this integration varied with the subject: it was most developed in natural science and mathematics, where simulations and interactive exercises were used, and least developed in subjects where technology was limited to the display of text.

Driving this implementation is the principal, who functions as an instructional leader rather than solely as an administrative manager. The principals at both schools provided a visible model of digital adoption and cultivated a supportive school climate [26], which teachers described as the condition that made experimentation possible. A kindness-based leadership approach proved relevant here, since the willingness of teachers to attempt unfamiliar tools depended on their confidence that an unsuccessful lesson would be treated as part of learning rather than as a performance failure [1]. Teachers with lower initial digital literacy reported that this assurance mattered more to them than the availability of equipment.

3.4 Controlling: Supervision and Continuous Reflection

The controlling function is implemented through continuous academic supervision and reflective sessions. Evaluation at both schools is not treated as a punitive administrative

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burden but as an instrument for professional growth. Principals use direct classroom observation together with an informal walkaround approach to provide immediate feedback to teachers, which yields information about ordinary practice that scheduled supervision, prepared for in advance, does not reveal. The data gathered from these evaluations are fed back into the planning stage of the cycle, informing subsequent professional development priorities [2].

The connection between supervision and training is the clearest managerial strength observed. At both schools, weaknesses identified during supervision became the agenda of the next internal training or mentoring session, which closed the loop between evaluation and development rather than leaving supervision as a record-keeping exercise. The limitation, consistent with the planning weakness noted above, is that supervision results were recorded descriptively and not aggregated, so the principal could identify an individual teacher's difficulty but could not readily detect a pattern across the staff or demonstrate change over successive years [27].

3.5 Supporting and Inhibiting Factors and Cross-Site Comparison

The research identified a consistent set of supporting and inhibiting factors. Supporting factors comprise visionary principal leadership, teacher motivation, the availability of basic infrastructure, and the existence of school policy that allocates budget to digital development. Inhibiting factors comprise time constraints, the administrative workload borne by teachers, and differences in digital literacy among staff, which were most pronounced between senior and junior teachers. Teachers at both schools identified workload rather than attitude as the principal constraint, which indicates that interventions aimed only at motivation are unlikely to be sufficient.

Compared across sites, the schools converge on the substance of the four management functions and on the two documentation weaknesses identified above, while differing in the instruments through which each function is delivered, as summarized in Table 2.

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Table 2. Cross-site comparison of teacher competency management

Management Function	SDN 2 Cibogogirang	SDN Rawasari
Planning	Formalized in RKT and RKAS; needs analysis of competency and student data	Teacher development integrated into the operational curriculum; HOTS and digital literacy emphasized
Organizing	Motekar teacher learning community; capability distributed horizontally	Designated Person in Charge for digital learning; capability concentrated and accessed on demand
Actuating	Integration strongest in science and mathematics; principal models adoption	Mentoring by the PIC alongside classroom integration; principal models adoption
Controlling	Academic supervision plus informal walkaround; results feed internal training	Academic supervision plus mentoring follow-up; results feed targeted guidance
Shared weaknesses	No baseline indicators; supervision records not aggregated; no succession arrangement	No baseline indicators; supervision records not aggregated; no succession arrangement

The pattern in Table 2 indicates that resource profile influences the managerial instrument rather than the managerial logic. At SDN 2 Cibogogirang, a larger staff makes a collective forum viable, so capability is built horizontally and distributed across teachers. At SDN Rawasari, a smaller staff makes a designated specialist more efficient, so capability is concentrated and accessed on demand. Both produce observable classroom integration, which is the principal benefit of comparing the sites rather than studying either alone, and both leave the same gap in the measurement of outcomes.

4 Discussion

The findings indicate that the POAC management cycle, applied with a supportive leadership style, functions as a mechanism for digital transformation in elementary schools. The transition from conventional to digitally supported learning is in substantial part a management problem rather than a procurement problem. As observed at SDN 2 Cibogogirang and SDN Rawasari, the determining factor is not hardware but organizational resilience, that is, the capacity of the school to adapt its structures and human capital to changing conditions [15]. The use of deep learning-based planning aligns teacher development with the cognitive demands placed on students rather than with the inventory of available equipment [5].

The results also clarify what kind of competency the management cycle must target. Both schools moved beyond training in software operation toward the integration of technology into instructional design, which corresponds to the TPACK proposition that

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effective technology use rests on the interaction of technological, pedagogical, and content knowledge rather than on technological knowledge alone [8]. The subject-by-subject variation observed during implementation supports this reading: where teachers could connect a tool to specific content and to a specific learning difficulty, the integration was substantive, and where they could not, technology was reduced to presentation. This is consistent with evidence that the weakest dimension of Indonesian teachers' digital competency is pedagogical integration rather than technical operation [9], and it implies that management should commission training around instructional problems rather than around applications.

The role of the principal as a kindness-based leader is significant in this context. In a period of rapid change teachers face elevated workload and uncertainty, and a leadership strategy that attends to teacher wellbeing while providing a clear framework for growth increases both willingness to participate and the quality of what is produced [1]. The accounts of teachers with lower initial digital literacy are instructive here, since they identified psychological safety rather than equipment as the decisive condition. This human-centered dimension of management complements rather than replaces the technical dimension of digital literacy.

The organizational findings bear on the durability of these gains. The creation of a professional learning community such as Motekar moves the school toward functioning as a learning organization, in which knowledge is generated and held collectively rather than residing in individuals [14]. The comparison with SDN Rawasari qualifies this: a designated specialist delivers support efficiently but leaves capability concentrated, and neither school had arranged for succession. The practical implication is that the choice between a collective forum and a designated specialist should be made on the basis of staff size, and that whichever is chosen requires an explicit arrangement for continuity, which is a responsibility of school leadership [28].

The controlling function reveals the clearest asymmetry between practical effectiveness and measurement. Supervision at both schools was developmental and well connected to subsequent training, which is the condition under which supervision improves practice rather than merely documenting it [2]. However, the absence of aggregated records and of baseline indicators means the schools cannot demonstrate change over time or identify patterns across staff. Developing simple instruments for this purpose would strengthen both ends of the cycle at once, since the same data would supply the evidence that planning currently lacks [7]. Fig. 3 summarizes the cycle and this weak link.

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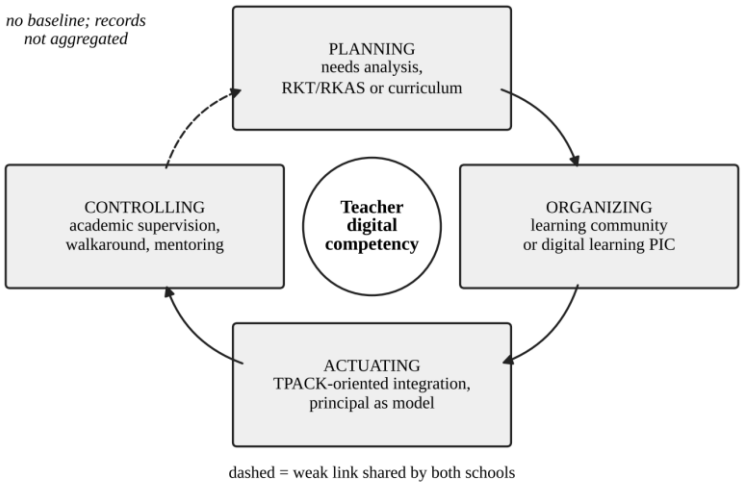


Fig. 3. The POAC cycle of teacher competency management at both schools; the dashed link marks the missing baseline and non-aggregated supervision records that limit feedback to the next planning cycle.

Taken together, the findings support three propositions. First, digital transformation in elementary schools proceeds through a complete management cycle; interventions that stop at training produce individual capability that dissipates, and interventions that stop at procurement produce unused equipment. Second, the competency to be managed is pedagogical integration rather than technical operation, which changes what training should contain. Third, the instruments of management must be proportionate to the school's staff size and resource profile, which is why the two sites arrived at different arrangements for the same objective [13], [16].

4.1 Limitations

Several limitations should be acknowledged. The study involved two elementary schools in a single regency, so the findings are analytically rather than statistically generalizable; improvements in learning quality were assessed through observation and informant accounts rather than through measurement of student outcomes; and the absence of longitudinal data means that conclusions about the durability of the observed changes remain inferential [18].

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5 Conclusion

The optimization of teacher competencies at SDN 2 Cibogogirang and SDN Rawasari is realized through a systematic and integrated management cycle. By applying planning, organizing, actuating, and controlling functions that are adaptive to the conditions of the digital era, both schools have improved the quality of learning and the motivation of students.

Specifically, planning was conducted on the basis of an analysis of teacher competency and student needs and was documented in the school work and budget plans; organizing was realized through a teacher learning community at one site and a designated person in charge of digital learning at the other; actuating proceeded through the integration of digital tools into lesson design and assessment, supported by the principal acting as an instructional leader and role model; and controlling was carried out through continuous academic supervision whose results informed subsequent training. Supporting factors were visionary and kindness-based leadership, teacher motivation, infrastructure, and budget policy, while inhibiting factors were time constraints, administrative workload, and disparities in digital literacy among staff.

The comparative dimension yields the study's most transferable conclusion. The managerial logic was identical at both sites, while the instruments varied with staff size and resources: a larger staff supported a collective professional forum, whereas a smaller staff was served more efficiently by a designated specialist. Schools adopting this model should therefore select instruments proportionate to their own conditions rather than replicating another school's programs, and should document a succession arrangement for whichever role carries the expertise.

The study also concludes that while implementation is effective, measurement requires strengthening. Neither school had established baseline indicators during planning or aggregated its supervision records, which limits its ability to demonstrate change across years. It is therefore recommended that schools define competency indicators with baselines at the planning stage, record supervision results in a form that can be aggregated, and commission professional development around instructional problems rather than around particular applications. Further recommendations include strengthening sustainable professional development programs and building school-parent synergy to support the digital learning ecosystem. Future research should examine the longer-term effect of these management models on student achievement using longitudinal or mixed-methods designs.

DECLARATIONS

Author Contributions

Conceptualization, R.N. and N.H.A.; methodology, R.N. and N.H.A.; investigation and data curation, R.N.; formal analysis, R.N.; writing—original draft preparation, R.N.; writing—review and editing, N.H.A.; supervision, N.H.A. Both authors have read and agreed to the published version of the article.

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Conflict of Interest
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Research Ethics and Informed Consent
Permission was obtained from the education office and from both schools, informants were informed of the purpose of the study and of their right to withdraw, consent was secured (with parental consent for student informants), and individual identities are not disclosed.

Data Availability Statement
Anonymized interview transcripts, field notes, and coding records are available from the corresponding author upon reasonable request. Data from student informants are not available because they concern minors.

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