Managing Teacher Professional Development for Deep Learning Pedagogy: A Multiple-Case Study of Vocational Schools in Indonesia

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Abstract
This study examines how teacher professional development is managed to support the implementation of Deep Learning pedagogy in Indonesian vocational schools. A qualitative multiple-case study was conducted at two vocational schools in Indonesia involving 10 participants, including school principals, vice principals for curriculum affairs, general and vocational-subject teachers, and school supervisors. Data were collected from August 2025 to July 2026 through semi-structured interviews, classroom observations, and document analysis, and analyzed through data condensation, data display, conclusion drawing, and cross-case comparison. The findings show that professional development was organized as a continuous process of evidence-informed planning, implementation, evaluation, and follow-up. Although both cases incorporated academic supervision, teacher reflection, collaborative learning, and classroom-based support, SMKN 1 Praya placed greater emphasis on contextual and project-based learning, teacher reflection, and internal professional learning, whereas SMKN 1 Pujut prioritized Deep Learning pedagogy, formative assessment, differentiated instruction, technology integration, psychological support, creativity, and higher-order thinking. Reported and observed practices included project-based, contextual, collaborative, formative, and reflective learning, although the available evidence does not establish consistent changes across all teachers or demonstrate sustained effects on student learning outcomes. Implementation was constrained by variations in teacher readiness, established teaching practices, technological competence, resources, time, and post-training support. The study concludes that managing teacher professional development for Deep Learning pedagogy requires a sustained organizational system that integrates needs assessment, differentiated professional learning, classroom application, collaborative reflection, instructional supervision, and systematic follow-up. The findings highlight the importance of examining school-level management processes and contextual differences when supporting teachers' professional learning in vocational education.

1. Introduction

Educational change increasingly requires teachers to move beyond the transmission of subject content toward learning experiences that enable students to develop meaningful understanding, apply knowledge in authentic situations, think critically, solve problems, collaborate, and reflect on their learning (J. B. Utomo et al., 2025). This shift places new demands on teachers because instructional change requires more than adopting new pedagogical concepts or preparing new learning documents. Teachers need to redesign learning activities, facilitate deeper student engagement, use appropriate assessment strategies, and create classroom environments that support active and reflective learning (Mohamad Sodikin, 2025). Consequently, the capacity of schools to manage continuous teacher professional development becomes an important condition for sustaining instructional change (Kapsalis & Klecker, 2026).

Teacher professional development is most meaningful when it is connected to teachers' actual instructional needs and provides opportunities to apply new knowledge, receive feedback, reflect on practice, and learn collaboratively (Bufasi et al., 2025). Professional development that is limited to short-term workshops may increase teachers' exposure to new ideas without necessarily producing sustained changes in classroom practice (Revina et al., 2023). The transition from professional learning to instructional change requires a broader process involving needs identification, program planning, classroom application, collaborative learning, supervision, evaluation, and follow-up. Thus, teacher professional development needs to be understood not

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simply as a training activity, but as an organizational process that connects professional learning with instructional improvement (Sapkota, 2025).

This issue becomes particularly relevant to the implementation of Deep Learning. In this study, Deep Learning refers to learning that emphasizes meaningful and contextual experiences, active engagement, reflection, critical thinking, creativity, collaboration, and problem solving (Rosidin et al., 2025). Its implementation requires teachers to reconsider how learning activities are designed, facilitated, and assessed. Teachers need to create opportunities for students to investigate problems, discuss ideas, apply knowledge, construct understanding, and reflect on their learning. These changes may create a gap between teachers' conceptual understanding of Deep Learning and their ability to translate its principles into consistent classroom practice (Shahat et al., 2022).

The challenge is particularly complex in vocational education. Vocational schools combine conceptual knowledge, practical skills, technology, and workplace expectations (Wagiran et al., 2023). Professional development for vocational teachers therefore needs to address project-based learning, teaching factory, authentic practical activities, problem solving, technological integration, and connections with the world of work (Okyranida et al., 2025). At the same time, teachers of general subjects within vocational schools require professional learning related to literacy, numeracy, formative assessment, differentiated learning, and higher-order thinking. Professional development consequently needs to be responsive to differences in subject characteristics, instructional responsibilities, and teacher readiness (Mukaddam & Suriagiri, 2025).

This challenge is evident at SMKN 1 Praya and SMKN 1 Pujut, two vocational schools in Indonesia that have strengthened teacher professional development in preparation for Deep Learning instruction. At both schools, Education Report Card data, academic supervision, teacher reflection, and school-level evaluation have been used to identify instructional needs. The resulting programs have included professional training, teacher learning communities, project-based learning, formative assessment, lesson study, coaching, technology integration, and vocational learning connected to workplace contexts. However, the implementation of these programs has not been uniform. Differences in teacher readiness, established instructional habits, facilities, technology access, and post-training support affect the extent to which professional learning is translated into classroom practice.

The evaluation of professional development presents a related challenge. Evidence of program participation or completion does not necessarily demonstrate that teachers have changed their instructional practices or that students have benefited from those changes. Evaluation therefore needs to connect at least three levels of change: professional learning, instructional practice, and student learning. At the two schools, evaluation has increasingly incorporated supervision, classroom observation, teacher reflection, instructional-material review, internal MGMP activities, and Education Report Card data. Nevertheless, the relationship between professional development activities, changes in teacher practice, and student learning outcomes has not yet been systematically established.

Existing studies have extensively examined teacher professional development, professional learning communities, instructional supervision, collaborative learning, and pedagogical innovation. However, these dimensions are often investigated separately, leaving less understanding of how they can be managed as an integrated process when schools are preparing teachers for Deep Learning, particularly in vocational education. More specifically, it remains insufficiently understood how data-informed needs identification, differentiated professional development, classroom application, collaborative reflection, instructional supervision, evaluation, and follow-up can be connected within a continuous management cycle.

Existing research has examined teacher professional development, professional learning communities, instructional supervision, and pedagogical innovation as important mechanisms for improving teaching practice (Murwaningsih & Fauziah, 2022). However, further investigation is needed to understand how these mechanisms are integrated and managed in schools preparing teachers to implement Deep Learning pedagogy (F. W. Utomo et al., 2025). In particular, limited understanding remains of how evidence-informed needs assessment, differentiated professional learning, classroom application, collaborative reflection, instructional supervision, evaluation, and follow-up operate as interconnected components of a continuous professional development process in vocational education (Amitiurna et al., 2025). This gap is important because vocational schools must accommodate different professional learning needs arising from the distinct instructional responsibilities of general-subject and vocational-subject teachers (Mulyanti et al., 2024).

This study addresses this gap by examining teacher professional development as an integrated management process in two Indonesian vocational schools. It explores how planning, implementation, evaluation, and follow-up are interconnected to prepare teachers for Deep Learning pedagogy across different school contexts. Rather than assuming that professional development automatically leads to instructional improvement, the study investigates how professional learning is translated into classroom practice and identifies contextual factors that facilitate or constrain this process. Through cross-case comparison, the study

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aims to provide context-sensitive insights into the management of continuous teacher professional development in vocational education. Specifically, it examines (1) how professional development is planned based on teachers' needs and instructional priorities, (2) how professional development activities are implemented and translated into classroom practice, and (3) how these activities are evaluated and followed up to support instructional improvement and student learning.

2. Method

2.1. Research Design and Case Selection

This study employed a qualitative multiple-case study design to examine the management of teacher professional development in preparing teachers for Deep Learning pedagogy at SMKN 1 Praya and SMKN 1 Pujut, two vocational schools in Lombok Tengah, West Nusa Tenggara, Indonesia (Vohra, 2024). The qualitative approach was selected to explore professional development processes within their natural school contexts, particularly how programs were planned, implemented, evaluated, and followed up. Each school was treated as an individual case, allowing an in-depth examination of professional development management practices within each setting and a subsequent comparison of similarities and contextual differences across the cases (Hermino & Arifin, 2020).

The two schools were purposively selected because both implemented teacher professional development initiatives in preparation for Deep Learning pedagogy. Their inclusion enabled the study to examine how professional development was managed in two vocational school contexts and how planning, implementation, evaluation, and follow-up were organized in response to teachers' professional learning needs. The multiple-case design facilitated the identification of common management processes and differences between the two schools without assuming that their organizational conditions and practices were identical.

2.2. Participants

Ten participants were involved in the study, comprising school principals, vice principals for curriculum affairs, vocational-subject teachers, general-subject teachers, and school supervisors from the two schools. Participants were selected purposively based on their roles and direct involvement in or experience with teacher professional development. Their inclusion provided managerial, instructional, and supervisory perspectives on the planning, implementation, evaluation, and follow-up of professional development programs. Participant identities were protected through anonymous codes. Table 1 presents the participant categories, codes, and main areas of information examined in the study.

Table 1. Research Participants

Position	SMKN 1 Praya	SMKN 1 Pujut	Main Focus of Information
School principal	KS-01	KS-02	Policy, planning, program management, evaluation, and follow-up
Vice principal for curriculum	WK-01	WK-02	Needs analysis, program design, implementation, monitoring, and evaluation
Vocational teacher	GK-01	GK-02	Professional learning and implementation in vocational instruction
General-subject teacher	GMP-01	GMP-02	Professional learning and classroom implementation
School supervisor	PS-01	PS-02	Supervision, monitoring, instructional change, and evaluation

2.3. Data Collection

Data were collected from August 2025 to July 2026 through semi-structured interviews, observations, and document analysis. These methods were used to examine professional development management from multiple perspectives and to compare participants' accounts with observed practices and documentary evidence. Semi-structured interviews explored teacher needs identification, professional development planning, program implementation, classroom application, teacher collaboration, instructional supervision, evaluation, and follow-up (WULANDARI et al., 2025) . The interviews involved school principals, vice principals for curriculum affairs, teachers, and school supervisors to obtain information about their respective roles and experiences in professional development.

Observations focused on professional development activities and classroom teaching practices. They were used to examine teacher collaboration, the application of learning strategies, and the relationship between professional learning activities and instructional practices. Document analysis covered Education Report Card data, professional development plans, supervision records, instructional materials, program reports, evaluation documents, internal MGMP records, and follow-up documentation, where available (Bingjie et al., 2024).

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Data collection involved examining relevant school documents, interviewing participants, and observing professional development activities and classroom practices. Document analysis provided information about formal priorities and program arrangements, while interviews explored how these priorities were established and experienced by participants. Observations provided additional evidence of professional learning activities and instructional practices (Bowen, 2009). Information from the three sources was compared to identify consistencies and discrepancies among planned activities, reported experiences, observed practices, and documented evidence.

2.4. Data Analysis

Data analysis followed an interactive process of data condensation, data display, and conclusion drawing and verification (Funa et al., 2022). Interview transcripts, observation notes, and documentary evidence were manually organized, coded, and analyzed according to four themes: planning, implementation, evaluation, and follow-up. These themes reflected the study's focus on teacher professional development as a continuous management process.

Manual coding involved reviewing the collected data, identifying relevant information, assigning codes, and grouping related codes into categories corresponding to the four analytical themes. Within each theme, the analysis examined needs identification, program design, teacher participation, classroom application, collaboration, reflection, supervision, evaluation, and subsequent professional development activities (Pramodana et al., 2024). The coded data were examined to identify relationships among management activities and evidence of implementation.

The analysis proceeded in two stages. First, within-case analysis examined how teacher professional development was planned, implemented, evaluated, and followed up at each school. Second, cross-case analysis compared the two schools to identify common management patterns, contextual differences, and gaps between program intentions and reported, observed, or documented practices (Kühl et al., 2023). Differences between the cases were retained in the analysis to account for variations in school contexts. Conclusions were reviewed against the available evidence to ensure that interpretations were grounded in the collected data.

2.5. Trustworthiness and Researcher Positionality

The credibility of the findings was strengthened through source and method triangulation (Ahmed, 2024). Source triangulation involved comparing information from school principals, vice principals for curriculum affairs, teachers, and school supervisors. Method triangulation involved comparing interview data with observations and documentary evidence (Morgan, 2024). Particular attention was given to discrepancies between planned activities, participants' reports, observed practices, and available documentation. The researcher acted as an external researcher without holding an official position at either school. The triangulated evidence was used to develop an integrated interpretation of management practices within each school and to identify differences across the two cases. This approach supported a context-sensitive understanding of professional development management without assuming that participation in professional learning necessarily resulted in sustained instructional change or improved student outcomes (Zizka et al., 2021).

2.6. Ethical Considerations

Permission to conduct the research was obtained from the participating schools, and consent was obtained from all participants. Participant identities were protected through anonymous codes in the presentation of research data. Information obtained through interviews, observations, and document analysis was used for research purposes, with attention to participant confidentiality and the responsible handling of research data.

3. Results and Discussion

3.1. Results

The analysis of data from SMKN 1 Praya and SMKN 1 Pujut indicates that teacher professional development was managed through three interconnected processes: planning, implementation, and evaluation. Across the two schools, professional development increasingly shifted from routine training and administrative activities toward a more data-informed and practice-oriented process. Education Report Card data, academic supervision, teacher reflection, instructional-material analysis, and internal curriculum discussions were used to identify professional learning needs and determine program priorities.

In the planning process, both schools used school-level performance data to identify areas requiring improvement in instructional practice. At SMKN 1 Praya, the planning direction was influenced by relatively low indicators related to instructional methods and teacher reflection. The school subsequently prioritized contextual learning, problem-based learning, project-based learning, critical reasoning, creativity, and student reflection. At SMKN 1 Pujut, planning responded to indicators related to learning quality, instructional methods,

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teacher reflection, psychological support, creativity, and higher-order thinking. These conditions were translated into professional development priorities that included *Deep Learning*, project-based learning, formative assessment, differentiated learning, literacy and numeracy, technology integration, and contextual learning.

Needs identification in both schools involved several mechanisms, including academic supervision, analysis of instructional materials, teacher reflection, internal MGMP discussions, and school-level evaluation. Professional development programs were also differentiated according to instructional responsibilities. General-subject teachers received development related to project-based learning, diagnostic and formative assessment, differentiated learning, literacy, numeracy, and higher-order thinking. Vocational teachers received professional development related to teaching factory, project-based learning connected with workplace contexts, technology integration, industry-oriented learning, and contextual practical activities. The planning process involved school principals, vice principals for curriculum affairs, heads of study programs, senior teachers, teacher leaders, school supervisors, internal teacher learning groups, and, for vocational programs, industry partners.

Despite the data-informed orientation, the planning process did not always translate identified needs into specific individual competency targets. Program indicators were generally established at a broader level, while differences in teacher readiness and the intensity of professional support required by individual teachers were not always explicitly differentiated. This condition was evident in both schools, although the specific priorities and implementation contexts differed.

Implementation extended beyond formal training. Teachers were encouraged to apply professional learning in classroom settings and to participate in internal MGMP activities, teacher learning communities, reflection, *lesson study*, coaching, and academic supervision. This process created a closer connection between professional development activities and classroom practice. At both schools, professional learning increasingly emphasized practical instructional strategies rather than theoretical or administrative content alone.

Changes in classroom practice included greater use of project-based learning, group discussion, contextual activities, formative assessment, reflective learning, and digital learning resources. At SMKN 1 Praya, these changes were supported by internal MGMP discussions, teacher reflection, *lesson study*, and follow-up supervision. Teachers were encouraged to develop or modify instructional materials and test new learning strategies in their classrooms before discussing their experiences with colleagues. At SMKN 1 Pujut, teachers increasingly incorporated group discussion, prompting questions, independent information seeking, project-based activities, formative assessment, and contextual learning. Vocational teachers also began to connect practical learning with problem solving, workplace situations, and the reasoning underlying practical tasks.

Teacher collaboration was an important component of implementation in both schools. Learning communities and internal MGMP forums provided opportunities for teachers to exchange practices, discuss instructional difficulties, reflect on implementation, and adjust learning strategies. *Lesson study* and peer learning further supported the sharing of classroom practices. However, the degree of implementation varied among teachers and classrooms. Differences in teacher readiness, established instructional habits, time constraints, student characteristics, technology access, facilities, and post-training support influenced the extent to which professional learning was translated into classroom practice.

Evaluation was conducted through multiple sources of evidence, including participation records, instructional-material review, classroom observation, teacher reflection, academic supervision, internal MGMP activities, and Education Report Card data. The evaluation process therefore extended beyond documenting whether professional development activities had been completed. It increasingly examined changes in instructional practices and classroom processes.

At SMKN 1 Praya, evaluation indicated that some teachers had begun to implement more active, contextual, and reflective learning approaches. Supervision was increasingly directed toward classroom interaction and the application of professional learning rather than administrative completeness alone. However, implementation remained inconsistent across teachers, and documentation of specific *Deep Learning* indicators was not yet fully developed.

At SMKN 1 Pujut, evaluation indicated improvements in several aspects of teacher practice. Reflection on teaching practice increased to 67.94, while classroom management reached 63.75. Several teachers increasingly used project-based learning, collaborative discussion, and formative assessment. Improvements were also identified in students' numeracy performance at the levels of knowing and applying. Nevertheless, support for teacher reflection remained at 50.78, while student creativity remained relatively low. These indicators pointed to continuing challenges in developing a strong and consistent culture of collaborative professional learning.

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The evaluation results were used to determine follow-up actions in both schools. At SMKN 1 Praya, follow-up emphasized teacher learning communities, practice-based mentoring, coaching, *lesson study*, and instructional supervision, including the development of internal teacher mentors. At SMKN 1 Pujut, follow-up included strengthening teacher learning communities, academic coaching, *lesson study*, peer teaching, and greater attention to teacher and student wellbeing, creativity, critical thinking, and student character.

Across the two cases, a consistent management pattern was identified. Both schools began with data and needs identification, translated identified needs into professional development programs, encouraged classroom application, supported collaborative reflection, and used supervision and evaluation to determine subsequent actions. The main difference concerned the emphasis of professional development. SMKN 1 Praya placed greater emphasis on contextual learning, project-based learning, teacher reflection, and internal professional learning, whereas SMKN 1 Pujut placed stronger emphasis on *Deep Learning*, formative assessment, differentiation, technology, psychological support, creativity, and higher-order thinking.

Table 2 Cross-Case Synthesis of Teacher Professional Development Management

Dimension	SMKN 1 Praya	SMKN 1 Pujut	Cross-Case Pattern
Planning	Education Report Card, supervision, teacher reflection, instructional-material analysis, and MGMP	Education Report Card, supervision, teacher reflection, and school evaluation	Data-informed needs identification
Program priorities	Contextual learning, PBL, assessment, reflection, *lesson study*, and vocational learning	*Deep Learning*, PBL, formative assessment, differentiation, technology, and vocational learning	Practice-oriented professional development
Implementation	Classroom application, MGMP, reflection, *lesson study*, and supervision	Classroom application, learning community, coaching, *lesson study*, and supervision	Professional learning connected to classroom practice
Teacher practice	Increased use of active, contextual, project-based, and reflective learning	Increased use of PBL, discussion, formative assessment, technology, and reflective practice	Positive but uneven instructional change
Evaluation	Supervision, reflection, instructional-material review, MGMP, and Education Report Card	Supervision, classroom observation, reflection, Education Report Card, and student learning indicators	Multiple sources of evaluation
Main constraints	Uneven teacher readiness and consistency of implementation	Uneven professional learning culture, teacher readiness, and impact measurement	Gap between professional learning and sustained change
Follow-up	Learning communities, coaching, *lesson study*, supervision, and internal mentoring	Learning communities, coaching, *lesson study*, peer teaching, and wellbeing support	Increasing emphasis on continuous professional learning

Overall, the results show that both schools have developed a professional development process that increasingly connects school-level data, teacher learning, classroom practice, collaborative reflection, supervision, and follow-up. At the same time, the process has not yet produced consistent changes across all teachers and classrooms, and the relationship between professional development and sustained student learning outcomes remains less systematically established. This pattern provides the basis for examining the implications of data-informed planning, practice-based professional learning, collaborative support, and impact-oriented evaluation in the following discussion.

3.2. Disscusion

3.2.1. Managing Professional Development as a Continuous Organizational Process

The findings from SMKN 1 Praya and SMKN 1 Pujut suggest that teacher professional development for Deep Learning can be understood as a continuous school-based management process rather than a series of isolated training activities (Badran & Toprak, 2020). In both cases, planning drew on Education Report Card data, academic supervision, teacher reflection, instructional-material analysis, and internal curriculum discussions (Purba et al., 2025). These sources provided a basis for identifying instructional priorities and relating professional learning to teachers' classroom needs. This pattern is consistent with research emphasizing that professional development is more relevant when it responds to teachers' actual instructional challenges and provides opportunities for application, reflection, and continued improvement (Bergmark, 2023). The present study extends this perspective by examining how these activities were connected within the management processes of two vocational schools.

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The comparison between the cases indicates that the use of school-level evidence did not lead to identical professional development priorities. At SMKN 1 Praya, the reported priorities emphasized contextual learning, project-based learning, assessment, reflection, critical reasoning, and creativity. At SMKN 1 Pujut, the priorities placed greater emphasis on Deep Learning, formative assessment, differentiated learning, technology integration, higher-order thinking, and contextual learning. These differences suggest that evidence-informed planning was interpreted in relation to each school's instructional priorities rather than implemented as a uniform program. In vocational education, this contextual responsiveness is important because teachers work with different subject requirements, practical learning environments, and connections to the world of work.

The distinction between general-subject and vocational-subject teachers further illustrates the need for differentiated professional learning. General-subject teachers required support related to literacy, numeracy, formative assessment, differentiated learning, project-based learning, and higher-order thinking, whereas vocational teachers required support related to teaching factory, workplace-oriented projects, technology integration, practical problem solving, and authentic learning activities (Sayekti & Anggriani, 2026). These differences indicate that a common pedagogical direction needs to be accompanied by professional learning suited to teachers' subject responsibilities. This interpretation is consistent with research emphasizing the importance of contextualized professional development and attention to teachers' differing professional needs (de Vries et al., 2022).

Nevertheless, the findings also reveal a limitation in the planning process. Although both schools used multiple sources of information to identify professional development priorities, the translation of these priorities into specific and measurable individual development targets remained limited. School-level plans provided general directions, but differences in teachers' readiness, prior experience, and support requirements were not systematically differentiated. This distinction highlights a gap between identifying institutional improvement priorities and determining the specific changes required in individual teachers' practices. The findings support the importance of more targeted professional development planning that links identified needs with explicit learning objectives, classroom-based activities, and follow-up support (Perry, 2022).

3.2.2. Translating Professional Learning Into Classroom Practice

The findings indicate that professional development in both schools extended beyond formal training through classroom application, internal MGMP activities, teacher learning communities, reflection, lesson study, coaching, and academic supervision. These activities created opportunities for teachers to examine instructional challenges, try different approaches, receive feedback, and reflect on their teaching. The findings therefore suggest that the connection between professional learning and classroom practice was an important feature of professional development management in both cases.

This pattern is consistent with research emphasizing the importance of linking professional learning to opportunities for application and collaborative reflection. The present study adds a school-management perspective by showing how classroom application, collegial learning, and supervision were incorporated into the broader professional development process. Rather than treating training participation as sufficient evidence of professional growth, the two cases illustrate the relevance of examining how professional learning was subsequently supported within school settings.

Reported and observed instructional practices included project-based learning, group discussion, contextual activities, formative assessment, prompting questions, independent information seeking, reflective learning, and the use of digital learning resources (Budiarto et al., 2024). In vocational subjects, learning activities were also connected with practical problems, workplace situations, and authentic tasks. These practices correspond to the pedagogical orientation of Deep Learning, which emphasizes meaningful engagement with learning content, critical reasoning, problem solving, collaboration, and reflection. The findings suggest that professional development provided opportunities for teachers to interpret and apply these principles in their instructional contexts, consistent with research highlighting the importance of translating pedagogical knowledge into classroom practice (Ngatmini & Suyitno, 2025).

However, the evidence does not establish that all teachers changed their practices consistently or that the reported changes were caused solely by professional development. Implementation varied according to teacher readiness, established teaching habits, available time, student characteristics, technological competence, facilities, and post-training support (Ketsman et al., 2025). Some teachers were reported or observed to experiment with different approaches, while others continued to rely on familiar instructional routines. This variation suggests that opportunities to attend training or participate in collaborative activities are not, by themselves, sufficient to ensure consistent changes in teaching. Sustained application appears to require continued opportunities for practice, feedback, reflection, and adaptation.

Teacher collaboration was an important part of this process. Internal MGMP activities, teacher learning communities, lesson study, peer learning, and coaching provided opportunities to discuss instructional

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problems, exchange experiences, and reflect on the suitability of new approaches for different subjects and students (Soraya & Supadi, 2022). These mechanisms helped connect formal professional learning with classroom realities. Nevertheless, their contribution depended on the continuity and intensity of implementation. Where collaborative learning and follow-up were less sustained, professional learning was more likely to remain an individual experience rather than become an established shared practice.

3.2.3. Evaluation, Follow-Up, and the Limits of Evidence

The findings indicate that evaluation in both schools extended beyond records of training participation to include academic supervision, classroom observation, teacher reflection, instructional-material review, internal professional discussions, and Education Report Card data (Roca-Campos et al., 2021). This approach provided several sources of information for examining how professional learning was reflected in instructional practice and identifying areas requiring additional support. It is consistent with research emphasizing the value of evaluating professional development through evidence of teaching practice rather than relying exclusively on participation or completion records (Abdurahman et al., 2024).

At SMKN 1 Pujut, the available findings indicated progress in teacher reflection and classroom management alongside the reported or observed use of project-based learning, collaborative discussion, and formative assessment. However, the relatively lower indicator concerning support for teacher reflection and continuing challenges related to student creativity suggest that progress in one dimension did not necessarily correspond to improvement across all dimensions. This pattern highlights the importance of multidimensional evaluation and cautions against interpreting individual indicators as evidence of comprehensive instructional improvement.

A similar pattern emerged at SMKN 1 Praya, where supervision and reflection indicated movement toward more active, contextual, and reflective learning, although implementation remained uneven across teachers and classrooms. These findings suggest that the central management challenge was not merely providing access to professional development but maintaining the organizational conditions needed for teachers to continue experimenting, reflecting, receiving feedback, and refining their instructional decisions.

Follow-up activities in both schools included teacher learning communities, coaching, lesson study, peer teaching, mentoring, and academic supervision. These mechanisms reflected an orientation toward continued support beyond formal training. However, follow-up remained variable in its intensity and systematic implementation. Time constraints and competing school responsibilities limited post-training monitoring, while evaluation was more developed in documenting program implementation and teaching practices than in establishing longer-term relationships between professional development and student outcomes.

The cross-case findings therefore point to a distinction among three analytical levels: participation in professional learning, changes in instructional practice, and student learning outcomes. The available evidence provided information about the first two levels, but the relationship between professional development and sustained student-level outcomes had not been systematically established. Consequently, the study cannot conclude that the observed or reported instructional practices improved student achievement, creativity, critical thinking, or other learning outcomes. Such conclusions require direct and appropriately designed evidence of student learning.

3.2.4. The Contribution of the Cross-Case Findings

The contribution of this study lies in its examination of how planning, implementation, evaluation, and follow-up were connected within the professional development management of two vocational schools. Previous research has addressed the relevance of teacher professional development, collaborative learning, supervision, and pedagogical innovation (Badran & Toprak, 2020). The present findings bring these dimensions together through a comparative examination of school-level management processes in the context of Deep Learning.

The comparison suggests that the four management dimensions were interconnected rather than operating as independent activities. Evidence from school evaluations informed planning; professional development activities were followed by opportunities for classroom application and collaboration; supervision and reflection provided information about implementation; and evaluation and follow-up identified issues requiring further professional learning. At the same time, the process was not consistently individualized or sustained across teachers. These findings extend the discussion of professional development by identifying the organizational connections and implementation constraints evident in the two cases, rather than claiming that a new management model has been conclusively validated.

The findings also indicate that the management process was iterative rather than strictly linear. Classroom experiences, supervision, and evaluation generated information that could inform subsequent professional development priorities. This interpretation suggests that schools preparing teachers for Deep Learning need to

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maintain feedback mechanisms connecting evidence-based planning, differentiated professional learning, classroom application, collaborative reflection, supervision, evaluation, and subsequent support. The effectiveness of this arrangement, however, was not tested experimentally; its significance lies in the patterns and management challenges identified through the qualitative comparison.

The role of school leadership and organizational conditions is central to this interpretation. Leadership support, teacher collaboration, supervision, instructional resources, access to technology, opportunities for reflection, and continuity of follow-up shaped the conditions under which professional learning was translated into classroom practice. This is consistent with research emphasizing the importance of organizational environments that support teachers' continuing professional learning (Admiraal et al., 2021). The findings further suggest that preparing teachers for Deep Learning involves not only developing individual competencies but also coordinating the school structures that enable teachers to apply, discuss, and refine new instructional practices.

Accordingly, the contribution of the two cases is not that increasing the quantity of training necessarily improves teaching, but that professional development management needs to connect training with differentiated learning needs, classroom application, collaborative reflection, supervision, evaluation, and sustained follow-up (Zeggelaar et al., 2022). The cases indicate progress toward such an integrated process while revealing continuing challenges in individualizing professional development, sustaining post-training support, maintaining consistent implementation, and establishing the relationship between teacher development and student-level outcomes (Finsa Muhamad Pratama et al., 2025).

3.3. Practical Implications

The findings have several implications for the management of teacher professional development in vocational schools.

First, school leaders should translate school-level evaluation findings into specific professional learning priorities and individual development targets. Education Report Card data, supervision records, teacher reflection, and instructional-material reviews can be used to identify shared needs, while discussions with individual teachers can clarify differences in readiness, experience, and support requirements. This would help schools connect general improvement priorities with more targeted professional learning.

Second, professional development should provide differentiated pathways for general-subject and vocational-subject teachers. General-subject teachers may require support in literacy, numeracy, formative assessment, differentiation, and higher-order thinking, while vocational teachers may require support in authentic practical tasks, workplace-oriented projects, teaching factory, and technology integration. Both groups should work toward the common pedagogical principles of Deep Learning, but their learning activities should reflect their respective instructional responsibilities.

Third, schools should establish a more systematic post-training follow-up process. Coaching, internal MGMP activities, lesson study, peer observation, and academic supervision can be scheduled as connected activities rather than occasional initiatives. Each activity should identify a specific instructional focus, provide opportunities for classroom application, and generate feedback that informs subsequent professional learning. School leaders should also allocate sufficient time and resources to sustain these activities.

Fourth, evaluation should distinguish between professional learning participation, evidence of instructional practice, and student learning outcomes. Schools can document teachers' application of new strategies through classroom observations, instructional-material reviews, and reflective records. Claims about student improvement should be based on separate and appropriate evidence of student learning rather than inferred from changes in teaching practices alone. This approach would strengthen the credibility of school-level evaluation and help identify which aspects of professional development require further support.

Finally, school leaders should use evaluation and follow-up as feedback for subsequent planning. Rather than treating the completion of a training program as the endpoint, schools can review implementation evidence, identify persistent constraints, revise professional learning priorities, and plan the next cycle of support. This would provide a practical basis for developing a more continuous and responsive approach to teacher professional development for Deep Learning.

3.4. Limitations and Future Research

This study has several limitations. First, it examined only two vocational schools in Lombok Tengah. The findings provide context-specific insights into professional development management and should not be generalized statistically to all vocational schools or other educational settings. Differences in leadership, resources, teacher characteristics, and organizational arrangements may shape professional development processes in other contexts.

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Second, the findings were derived from interviews, observations, and documentary evidence. Although source and method triangulation were used, interview accounts may have been influenced by participants' recollections, perceptions, or tendencies to present school practices positively. The external position of the researcher did not eliminate the possibility of interpretive bias. The findings should therefore be understood as an evidence-based interpretation of the two cases rather than an exhaustive or entirely objective account of every professional development activity.

Third, the study identified reported and observed instructional practices but did not systematically establish the causal relationship between professional development and student learning outcomes. The extent to which the practices contributed to sustained improvements in students' critical thinking, creativity, collaboration, problem solving, or academic performance remains untested. Future research could combine qualitative case studies with longitudinal classroom observations, teacher practice measures, and appropriate student-level assessments to examine how professional development processes relate to changes over time.

Further research could also examine additional vocational schools with different organizational characteristics and levels of implementation. Comparative studies across a larger range of settings would help determine which management practices are context-specific and which patterns recur across schools. Such research could refine the proposed integrated management perspective and examine its applicability without assuming that the processes identified in these two cases will produce equivalent outcomes elsewhere.

4. Conclusion

This study concludes that teacher professional development for Deep Learning in the two vocational schools was managed through four interconnected processes: planning, implementation, evaluation, and follow-up. Planning drew on Education Report Card data, academic supervision, teacher reflection, and school evaluation, with priorities adapted to the needs of general-subject and vocational teachers. Implementation extended beyond formal training through classroom application, teacher learning communities, internal MGMP activities, lesson study, coaching, and supervision. Evaluation focused increasingly on instructional practices through classroom observation, reflection, instructional-material review, and school performance data. Follow-up activities provided additional opportunities for professional learning, although their implementation varied across teachers and schools. Differences in teacher readiness, established teaching practices, technological competence, resources, time, and post-training support continued to constrain consistent implementation. Although the findings indicate the presence of an integrated management process, the relationship between professional development and sustained changes in student learning outcomes remains insufficiently established. The study therefore highlights the importance of aligning evidence-informed planning, practice-oriented implementation, instructional evaluation, and follow-up when managing teacher professional development for Deep Learning in vocational education.

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Data Availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declaration on AI Use

The authors declare that no artificial intelligence (AI) or AI-assisted tools were used in the preparation of this manuscript.

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