



Exploring English Teachers' Understanding in Developing Teaching Modules Based on Kurikulum Merdeka

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Abstract

This study investigates English teachers' understanding of and challenges in developing teaching modules based on the Kurikulum Merdeka at SMP Negeri 1 Kolaka, a designated Sekolah Penggerak in Southeast Sulawesi, Indonesia. Employing a qualitative case study design, data were gathered through semi-structured interviews and document analysis of teaching modules submitted by three English teachers who had completed Guru Penggerak training. Thematic analysis was applied to identify patterns across interview transcripts and documents. The findings reveal two major themes: (1) teachers' understanding, encompassing four sub-themes: conceptual understanding of teaching modules, the development process, classroom implementation, and evaluation and improvement; and (2) difficulties faced, encompassing seven sub-themes: aligning modules with the Alur Tujuan Pembelajaran (ATP), conducting needs analysis, selecting appropriate operational terms, determining module components, aligning Profil Pelajar Pancasila (P3) elements with Tujuan Pembelajaran (TP), maintaining flexibility during lesson plan implementation, and integrating technology in learning. While teachers demonstrated solid conceptual understanding and produced modules meeting minimum component requirements, document analysis revealed that student-centered learning remained partially underoptimized. Persistent challenges in needs analysis, operational verb selection, P3-TP alignment, and technology accessibility reflect systemic barriers to curriculum reform. Continued targeted training in these areas, alongside institutional support and expanded access to digital resources, is strongly recommended.

Keywords: Kurikulum Merdeka; Teaching Module Development; English Teacher Understanding; Sekolah Penggerak; Qualitative Case Study

Introduction

The Kurikulum Merdeka (Freedom Curriculum) represents one of the most significant curricular reforms in Indonesian education history, offering a flexible, student-centered learning approach tailored to the diverse needs, interests, and competencies of learners. As Nurani et al. (2022) explain, the Kurikulum Merdeka is a diverse intracurricular learning curriculum where content is optimized so that students have sufficient time to deepen concepts and strengthen competencies, with teachers free to select various instructional tools. Unlike its predecessor, the K13 curriculum, which was rigid and prescriptive, the Kurikulum Merdeka empowers teachers to adapt materials, select instructional approaches, and design assessment according to student characteristics and local contexts.

As a Sekolah Penggerak (Pioneer School), SMP Negeri 1 Kolaka has been designated as an early implementer and change agent of the Kurikulum Merdeka (Kemdikbud, 2021). One of the most distinctive features of this curriculum is the teaching module (modul ajar), which replaces the conventional Lesson Plan (RPP) from the K13 curriculum. Teaching modules are comprehensive instructional documents that outline learning objectives, learning activities, media, and assessments, all developed based on the Alur

Tujuan Pembelajaran (ATP). They must also incorporate the Profil Pelajar Pancasila (P3), the curriculum's framework for student character development (Maryam et al., 2022).

Despite the curriculum's flexibility, developing effective teaching modules poses significant challenges. Teachers must simultaneously navigate new terminologies, including Capaian Pembelajaran (CP), Tujuan Pembelajaran (TP), ATP, and P3 while applying differentiated instruction and integrating technology. Suryaningsih (2023) found that teachers face difficulties in creating teaching modules due to material selection challenges and limited understanding of new curriculum frameworks. Rachman (2023) identified further barriers, including difficulty interpreting CP, time constraints, and low technology proficiency among biology teachers in Sekolah Penggerak contexts. Critically, however, research specifically examining English teachers' understanding and challenges at the junior high school level remains limited, leaving an important empirical gap in the literature on Kurikulum Merdeka implementation.

This gap is significant not only academically but also practically. English, as one of the core subjects in Indonesian secondary education, plays a critical role in developing students' communicative competence and global literacy. Yet the challenges of aligning language-specific pedagogical needs with new curriculum structures have received insufficient scholarly attention. This study addresses this gap by employing a qualitative case study approach to explore: (1) how English teachers at SMP Negeri 1 Kolaka understand the process of developing English teaching modules based on the Kurikulum Merdeka; and (2) what difficulties they face in doing so. The findings are expected to contribute to improving the effectiveness of teaching module development and to informing context-sensitive training and institutional support for English teachers navigating curriculum reform.

The Kurikulum Merdeka is a learning approach designed around students' talents and interests, offering flexibility across intracurricular, co-curricular, and extracurricular learning activities (Sitoningrum, 2023). It was introduced to address Indonesia's prolonged learning crisis, further exacerbated by the COVID-19 pandemic, by promoting literacy, numeracy, and character development (Barlian et al., 2022). Widyastuti (2022) identifies three key characteristics: (1) project-based learning to develop skills and character aligned with Profil Pelajar Pancasila; (2) focus on essential content to ensure deep and meaningful learning; and (3) flexibility for teachers to tailor instruction to individual student abilities and local contexts. The Profil Pelajar Pancasila, encompassing faith and noble character, global diversity, cooperation, independence, critical thinking, and creativity, serves both as a learning target and a character development framework (Purnawanto, 2022).

Scholars have observed that while the Kurikulum Merdeka offers considerable promise, its successful implementation is heavily dependent on teacher capacity and institutional readiness. Rahayu et al. (2022) found that Sekolah Penggerak teachers who participated in structured training programs demonstrated greater confidence in module development, suggesting that professional development quality mediates curriculum reform outcomes. This insight underscores the importance of examining not merely whether teachers understand the curriculum, but how deeply their understanding translates into pedagogically sound practice.

The Sekolah Penggerak program was launched by the Ministry of Education, Culture, Research, and Technology (Kemdikbudristek) to accelerate quality improvement across Indonesian schools. It consists of five integrated interventions: consultative mentoring to local governments, training for school principals and teachers, adopting new learning paradigms, data-based planning, and school digitization (Fadloli, 2022). Sekolah Penggerak schools are expected to serve as change agents, role models, and sources of inspiration for other schools in translating the principles of the Kurikulum Merdeka into everyday educational practice (Kemdikbud, 2021). Critically, teachers in these schools are placed at the forefront of curriculum implementation and are expected to demonstrate professional agency in designing learning experiences that are adaptive and student-centered, a substantial expectation that presupposes adequate preparation and sustained support (Taruklimbong & Murniarti, 2024).

Teaching modules are systematically designed instructional tools developed from the ATP based on CP, with P3 as the overarching character target. They are structured according to learners' developmental phases (Triana et al., 2022). As outlined by Kemdikbud (2022), teaching modules are divided into three main sections: (1) General Information, including module identity, initial competencies, Profil Pelajar Pancasila, facilities and infrastructure, target students, and learning model; (2) Core Components, including learning objectives, meaningful understanding, triggering questions, learning activities, and assessment; and (3) Appendices, including student worksheets, teacher reading materials, glossary, and bibliography. Unlike the K13 RPP, which was often perceived as a compliance document, the

teaching module is intended to function as a living instructional guide that teachers actively refine based on student responses and learning outcomes (Maulida, 2022).

Kemdikbud (2022) outlines four key principles for developing teaching modules: (1) they must be grounded in the characteristics, competencies, and interests of learners; (2) they must account for differences in understanding levels and competency gaps; (3) they must adopt a student perspective, affirming each learner's uniqueness; and (4) they must balance intellectual, social, and personal development. Additionally, modules must be essential, engaging, meaningful, challenging, relevant, contextual, and continuous. Maulida (2022) emphasizes that teachers must internalize all of these criteria before developing modules, adapting them to student, teacher, and school contexts. McTighe and Wiggins' (2014) Understanding by Design framework offers a complementary theoretical lens, positioning learning objectives, diagnostic assessments, and differentiated instruction as inseparable elements of effective curriculum design, an alignment that mirrors the expectations embedded in Kurikulum Merdeka's module development guidelines.

Triana et al. (2022) describe a systematic six-step procedure for teaching module development: (1) Needs Analysis: examining curriculum (CP), student characteristics, available resources, and teacher capacity; (2) Identification of P3 dimensions relevant to the learning context; (3) Determination of TP based on CP; (4) Development of lesson plans, including activities, media, worksheets, and assessment instruments; (5) Implementation of learning based on the module; and (6) Evaluation and follow-up for continuous module improvement. This procedural framework reflects a cyclical view of curriculum development that aligns with Fullan's (2007) conceptualization of curriculum change as an iterative process requiring ongoing professional learning, contextual adaptation, and institutional support.

Research Method

Research Design

This study employed a qualitative research approach with a case study design. According to Creswell (2018), qualitative research investigates social phenomena and human issues through comprehensive portrayal, examining words and detailed reports from respondents' perspectives. A case study, as defined by Yin (2014), is a particularly appropriate strategy when central research questions concern 'why' or 'how' a contemporary phenomenon occurs within its real-life context. The case study approach enabled an in-depth, contextual exploration of how three English teachers at SMP Negeri 1 Kolaka, a Sekolah Penggerak, understand and navigate the process of developing teaching modules based on the Kurikulum Merdeka.

Research Informants

Purposive sampling (Sugiyono, 2019) was applied to select three female English teachers from SMP Negeri 1 Kolaka who had completed Guru Penggerak (GP) training related to teaching module development and had direct experience implementing the Kurikulum Merdeka. This criterion-based selection ensured that informants possessed sufficient knowledge and practical experience to provide rich, contextually grounded data. Their profiles are presented in Table 1.

Table 1. Profile of Research Informants

No.	Name (Code)	Age	Teaching Experience	Interview Date
1	RD	50	26 years	28 May 2024
2	R	46	21 years	29 May 2024
3	D	43	16 years	29 May 2024

Data Collection

Data were collected through two complementary methods. First, semi-structured interviews consisting of 36 questions organized into four thematic areas, including 30 main questions and 6 follow-up probes, were conducted in May 2024. Interviews were audio-recorded with participants' informed consent and transcribed verbatim. Semi-structured interviews, as described by Esterberg (2002), allow

for flexible, in-depth exploration of participants' perspectives while maintaining thematic coherence, making them particularly suitable for examining professional understanding and lived experience. Second, document analysis of the three teaching modules submitted by each teacher was conducted using a checklist adapted from the Buku Saku Penyusunan Perangkat Ajar (Kemdikbud, 2022) to systematically verify the completeness and quality of module components.

Data Analysis

Thematic analysis (Braun & Clarke, 2006) was applied following six iterative steps: (1) familiarization with data through immersive reading of all transcripts; (2) generating initial codes by systematically organizing meaningful units; (3) searching for themes by verifying and harmonizing coded data; (4) reviewing themes through assessment and refinement of initial theme clusters; (5) defining and naming themes by determining the essence of each; and (6) producing the final analysis report. Coding was organized using two primary categories: TM-DTM (Teachers' Understanding of Developing Teaching Modules) and D-DTM (Teachers' Difficulties in Developing Teaching Modules), with specific sub-codes for each sub-theme. This systematic approach ensured analytical transparency and enhanced the credibility of interpretations.

Data Validity

Source triangulation was employed to ensure data credibility (Sugiyono, 2019), cross-verifying information across the three teacher informants to identify convergent and divergent patterns. Methodological triangulation was also applied by comparing and synthesizing data from interviews and document analysis, ensuring that findings were comprehensive, consistent, and grounded in multiple data sources (Fiantika et al., 2022). Member checking was additionally considered as a means of validating interpretive accuracy, consistent with Lincoln and Guba's (1985) criteria for trustworthiness in qualitative inquiry.

Findings and Discussion

Findings

Thematic analysis of all interview transcripts and document analyses yielded two major themes encompassing eleven sub-themes in total, as summarized in Table 2.

Table 2. Research Themes and Sub-themes

No.	Theme	Sub-themes
1	English Teachers' Understanding in Developing Teaching Modules	1) Conceptual Understanding of Teaching Modules 2) The Development of Teaching Modules 3) Teaching Module Implementation 4) Teaching Module Evaluation and Improvement
2	Difficulties Faced by English Teachers in Developing Teaching Modules	1) Adjusting Teaching Modules with ATP 2) Need Analysis of Teaching Module 3) Appropriate Use of Operational Terms 4) Determining Teaching Module Components 5) Adjusting P3 Elements with TP 6) Flexibility in Implementing Lesson Plans 7) Challenge in Implementing Technology in Learning

All three teachers demonstrated solid conceptual understanding of teaching modules. Teachers 1 and 2 both conceptualized the teaching module as analogous to, yet substantively distinct from, the Lesson Plan (RPP) of the K13 curriculum. As Teacher 1 stated: "The teaching module is quite similar to the RPP in K13, but there are some differences in its content." Teacher 3 elaborated further on the structural organization, noting the phase-based arrangement in which junior high school falls under

Phase D. All teachers accurately identified the minimum components, learning objectives, assessment plans, learning steps, and media and could articulate the three-section structure of general information, core components, and appendices, consistent with Kemdikbud (2022) guidelines.

Regarding learning principles, Teacher 1 identified four central principles: student-centered learning, meaningful learning, enjoyable learning, and differentiated learning, the last of which is a defining characteristic of the Kurikulum Merdeka. Teachers 2 and 3 reinforced these perspectives, emphasizing that differentiated learning is essential given the significant variation in students' interests, backgrounds, and learning styles within a single classroom. This finding aligns with Zahri et al. (2023), who found that Sekolah Penggerak teachers in Bangkalan demonstrated comparable conceptual alignment with curriculum frameworks following GP training. However, the quality of conceptual understanding alone does not guarantee effective module development; as Anggriyani (2024) notes, deeper engagement with the theoretical underpinnings of the Kurikulum Merdeka is necessary for teachers to move beyond component compliance toward genuinely student-centered module design.

Teachers described a systematic, collaborative development process aligned with Kurikulum Merdeka guidelines. The initial step involved needs analysis through observation, student interviews, and diagnostic assessments. As Teacher 2 explained: "What we need at the beginning is to first analyze by conducting observations and interviews with students, then there is diagnostic assessment which identifies students' needs." This diagnostic approach reflects the first stage of Triana et al.'s (2022) development procedure, positioning needs analysis as foundational to module design.

For elaborating CP into TP and ATP, all three teachers emphasized collaborative work within the school learning community (komunitas belajar/kombel). Teacher 1 stated: "We collaborate and discuss within the learning community to break down CP into TP and jointly develop ATP for one phase, determining which materials and competencies belong to grades 7, 8, and 9." This collaborative model reflects what Fullan (2007) describes as professional learning communities as engines of curriculum change, peer dialogue and shared knowledge construction reduce individual cognitive load and promote more consistent curriculum interpretation across classrooms. Assessment design was described as closely linked to TP formulation, with Teacher 1 explaining that assessment types must be aligned with target competencies, echoing McTighe and Wiggins' (2014) backward design principle of determining acceptable evidence before designing learning experiences.

All three teachers demonstrated awareness of the need to integrate P3 dimensions into learning activities. Teacher 1 explained: "In the learning steps, we determine elements that can accommodate the selected P3 dimension. For example, if I choose the gotong royong dimension with the element of collaboration, learning activities must show teamwork through group discussions." This integration of character-based learning objectives into instructional design reflects a holistic, values-embedded approach to curriculum implementation consistent with the spirit of Kurikulum Merdeka.

For differentiated instruction, teachers employed varied strategies informed by diagnostic assessment results. Teacher 2 used multiple modalities including video presentations, games, and singing, asserting that "teachers must provide many varied learning models, not monotonous, not through lectures only." Teacher 3 utilized Wordwall for interactive quiz activities, finding it effective in enhancing student engagement and comprehension. Teacher 1 additionally employed peer tutoring, pairing students who had mastered content with those requiring support. Document analysis confirmed that all three modules integrated P3 dimensions; Independence, Creativity, Collaboration, and Critical Thinking, through activity-based, collaborative, and project-based learning approaches. However, a notable gap was observed: despite teachers' articulated commitment to differentiated instruction, module activities remained somewhat teacher-directed in practice, suggesting that aspirational understanding had not yet fully translated into differentiated design at the module level.

All three teachers engaged in evaluation through a dual process of teacher self-reflection and student feedback. Teacher 1 described: "At the end of each lesson, we conduct reflections and provide feedback. I do self-reflection on my classroom experiences and also ask students to give feedback on the learning process." Teacher 2 analyzed effectiveness through assessments, interviews, and written student feedback, treating unsatisfactory outcomes as indicators for module revision. This reflective practice aligns with the evaluative dimension of Triana et al.'s (2022) development procedure and reflects a professional disposition toward continuous improvement that is central to effective curriculum implementation (Fullan, 2007). Document analysis confirmed that all three modules included dedicated sections for teacher self-reflection and student feedback, providing structural support for ongoing module quality enhancement.

The most frequently cited difficulty was aligning the teaching module with the ATP. Both Teachers 1 and 2 described the challenge of translating the abstract, narrative CP into concrete TP, structuring these into a coherent ATP, and subsequently mapping the ATP into specific module designs. Teacher 1 articulated: "The first difficulty is how to compile the teaching module following the ATP. From translating CP into TP then into ATP, how we pour it into the teaching module, this is usually the difficulty." This finding converges with Putri et al. (2022), who note that the structural differences between K13 tools and Kurikulum Merdeka frameworks create significant cognitive friction for teachers during curriculum transition. More broadly, it reflects a tension between the curriculum's aspiration for teacher agency and the practical reality that exercising such agency requires a level of curriculum literacy that many teachers have not yet fully developed (Taruklimbong & Murniarti, 2024).

Needs analysis presented multi-layered challenges involving four sequential stages. Teacher 1 described: "First, curriculum analysis, examining CP. Second, student analysis, understanding their characteristics, needs, backgrounds, and learning styles. Third, resource analysis, what resources can I use, what facilities are available, how much time do I need. Finally, teacher needs analysis, assessing my own ability to determine appropriate methods." The complexity of this process is compounded by classroom diversity; Darmawan et al. (2024) confirm that the large number of students makes mapping individual needs particularly difficult, while Nurrahman (2023) notes that incomplete availability of Kurikulum Merdeka textbooks further constrains teachers' planning capacity. These findings suggest that needs analysis, as a practice, requires not only technical skill but also adequate time, resources, and institutional scaffolding, conditions that may be unevenly distributed across schools.

All three teachers identified difficulty in selecting appropriate operational verbs for TP and ATP formulation. Teacher 1 explained: "Choosing and selecting operational terms that can be used in TP and ATP is challenging because CP is still general, we need to sort through which operational terms are suitable to represent the general CP formulation in the module." Teacher 2 added: "We have difficulty determining, selecting, and sorting appropriate operational terms. We have to equalize the perception among teachers first." This challenge carries significant pedagogical consequences: as Budiastuti et al. (2021) note, the selection of operational verbs in TP directly shapes the assessment process and test design, meaning that imprecise verb selection can create misalignments between intended learning outcomes, instructional activities, and evaluation instruments, what Biggs (2003) terms a failure of constructive alignment.

Determining appropriate initial assessments and learning steps aligned with student needs and TP proved challenging. Teacher 3 noted: "In the preparation of assessments, we have difficulties because we have to adjust to student needs, we must determine the appropriate learning steps and assessments so that the TP is achieved." Teachers navigated this challenge by consulting multiple external references, including YouTube, Google, and the Platform Merdeka Mengajar (PMM), as well as reviewing examples of similar modules. While this resourcefulness is commendable, it also signals a structural gap in pre-service and in-service training: teachers should ideally enter curriculum implementation equipped with sufficient practical knowledge of module design to reduce reliance on informal, unverified online sources (Amelia et al., 2023).

Matching appropriate P3 dimensions and elements to specific TP and materials presented a nuanced challenge. Teacher 1 articulated: "We must first look at all dimensions in P3 and determine which elements align with the TP we will include in the module. In each dimension there are several elements, and determining which P3 element fits this particular TP and material is often difficult." Teacher 2 described additional complexity in situations where a single theme requires two or three P3 dimensions simultaneously. This difficulty reflects a broader tension in values-integrated curriculum design: the aspiration to develop character holistically can conflict with the practical need for clear, assessable learning targets (Intania et al., 2023). Nurrahman (2023) confirms that teachers frequently question whether all P3 dimensions must be represented in every module, suggesting a need for clearer guidance from curriculum developers on the scope and flexibility of P3 integration.

Even meticulously designed modules required real-time adjustment during classroom implementation. Teacher 1 explained: "We have designed the module as detailed as possible, but when implementing in the classroom, there are changes because students still need time for certain activities. We automatically add time for discussion and reduce time for subsequent activities." This dynamic tension between planning and enactment is well-documented in curriculum research; Darmawan et al. (2024) confirm that allocating appropriate time per instructional phase remains a persistent challenge,

particularly in mixed-ability classrooms where individual students may require significantly different durations for task completion. This finding reinforces the importance of designing modules with built-in flexibility mechanisms rather than prescriptive time allocations, an approach that is theoretically consistent with the Kurikulum Merdeka's own emphasis on adaptive instruction.

Technology integration presented two intersecting challenges: infrastructure connectivity and student device accessibility. Teacher 1 reported that unstable internet connections could disrupt application use mid-class, prompting a creative offline workaround: "Sometimes the internet suddenly disconnects while the application is running, that is a little disruptive." To address this, Teacher 1 operated the Wordwall application from a teacher laptop, allowing students to interact at the front of the class without requiring individual devices. Teacher 3 highlighted a more fundamental structural disparity: "We use technology, but students do not. We cannot require them to use mobile phones." This access disparity is particularly acute in schools serving lower-income communities and reflects broader inequities in educational technology infrastructure across Indonesia (Rosmana et al., 2023). Amelia et al. (2023) and Darmawan et al. (2024) confirm parallel challenges, noting difficulty with projector operation, PowerPoint creation, and educational video production. These findings suggest that technology integration in the Kurikulum Merdeka cannot be meaningfully realized without concurrent investment in digital infrastructure and equitable device access, areas that require policy-level attention beyond individual teacher capacity.

Discussion

The findings collectively demonstrate that English teachers at SMP Negeri 1 Kolaka possess solid conceptual understanding of teaching module development under the Kurikulum Merdeka, consistent with Zahri et al. (2023), who found that Sekolah Penggerak teachers in Bangkalan were able to formulate modules aligned with curriculum characteristics. The teachers accurately identified minimum components, articulated core learning principles, and demonstrated systematic development processes involving collaborative CP-ATP elaboration, P3 integration, and periodic evaluation. This level of conceptual understanding reflects the positive impact of Guru Penggerak training, which has been identified as a key mediating factor in teacher curriculum readiness (Rahayu et al., 2022). From a teacher education perspective, this finding suggests that formal training can successfully establish teachers' declarative and procedural knowledge of curriculum requirements. However, curriculum knowledge should not be understood simply as the ability to reproduce prescribed components. It should also involve the capacity to interpret curriculum intentions, make context-sensitive pedagogical decisions, and translate curricular principles into meaningful classroom experiences. Thus, the findings indicate a relatively strong foundation of curriculum literacy among the participating teachers, while also pointing to the need for continued professional learning that connects curriculum knowledge with pedagogical enactment.

However, document analysis revealed a critical gap between conceptual understanding and implementation quality: while modules included all required structural components, student-centered learning was not yet fully realized in practice, with activities remaining somewhat teacher-directed. This gap is theoretically significant. Anggriyani (2024) argues that surface-level compliance with module components does not necessarily reflect deep understanding of the Kurikulum Merdeka's pedagogical philosophy. McTighe and Wiggins (2014) similarly distinguish between 'coverage', addressing required content, and 'uncoverage', designing learning experiences that develop genuine understanding. The observed gap suggests that teachers are currently operating closer to the former, indicating a need for deeper, practice-focused professional development that moves beyond structural compliance toward authentic instructional transformation. In teacher education terms, the issue is therefore not primarily a lack of knowledge about what a teaching module should contain, but a challenge in converting curriculum knowledge into pedagogical design choices. This distinction is important because effective instructional design requires teachers to coordinate curriculum goals, pedagogical approaches, learner characteristics, assessment, and learning resources rather than treating these elements as separate technical requirements. Biggs (2003) similarly emphasizes the importance of alignment among intended learning outcomes, teaching and learning activities, and assessment. Consequently, professional development for teachers implementing the Kurikulum Merdeka should create opportunities for teachers to collaboratively examine actual modules, rehearse alternative student-centered activities, receive feedback, and revise their materials based on evidence from classroom implementation.

The seven difficulties identified parallel findings from Suryaningsih (2023), Rachman (2023), and Darmawan et al. (2024) across different subjects and regions, confirming that challenges in ATP alignment, operational verb selection, P3-TP mapping, and technology integration are systemic barriers affecting teachers implementing the Kurikulum Merdeka nationwide, rather than isolated local phenomena. From a teacher professional development perspective, Taruklimbong and Murniarti (2024) argue that sustainable curriculum reform requires not only initial training but also ongoing, job-embedded support that addresses the specific practical challenges teachers encounter during implementation. The findings of this study support this argument and extend it by highlighting the additional challenge of technology accessibility, a challenge that is particularly acute in schools serving underresourced communities in eastern Indonesia. This finding is also relevant to current understandings of digital competence in teacher education. Technology integration should not be reduced to teachers' ability to operate digital tools; rather, it involves making pedagogically appropriate connections among content, pedagogy, and technology. Mishra and Koehler (2006), through the Technological Pedagogical Content Knowledge framework, emphasize that effective technology integration depends on the interaction of these forms of teacher knowledge. Therefore, the difficulties reported by the teachers may reflect not only infrastructural limitations but also the complexity of developing context-sensitive digital pedagogical knowledge. In settings where internet connectivity or digital infrastructure is inconsistent, teacher competence also includes the ability to select appropriate alternatives, redesign digital resources for offline use, and maintain learning objectives despite technological constraints.

Positively, teachers demonstrated proactive and adaptive strategies for managing challenges: leveraging collaborative learning communities (*kombel*) for shared ATP development, utilizing PMM and YouTube as supplementary professional learning resources, employing peer tutoring for differentiated support, and creatively adapting technology tools for offline use. These coping strategies reflect what Priestley et al. (2015) describe as teacher agency, the capacity of teachers to act purposefully and constructively in response to institutional constraints. As Teacher 2 articulated, the Kurikulum Merdeka fundamentally aspires to develop teacher independence and contextual responsiveness in module design. Realizing this aspiration, however, requires institutional conditions that genuinely support such agency, including adequate time allocation, resource provision, and sustained mentoring beyond the initial training phase. The use of PMM, YouTube, peer collaboration, and offline adaptations also indicates that teachers are not simply passive recipients of professional development but active designers of their own professional learning. This pattern is consistent with broader work on teacher agency in educational technology, which highlights the importance of teachers' capacity to make purposeful decisions about technology within particular institutional and pedagogical contexts (Pathiranage & Karunaratne, 2023). In this sense, the teachers' adaptive practices can be interpreted as an emerging form of digital agency, particularly because they use available technologies selectively rather than assuming that effective digital learning requires continuous access to sophisticated infrastructure.

The findings further suggest that collaborative professional learning may be particularly important for sustaining curriculum implementation. Teachers' reliance on *kombel* for ATP development and problem solving indicates that curriculum reform is not necessarily an individual process; instead, it is socially mediated through professional interaction, negotiation, and shared experimentation. Such collaboration can reduce the distance between formal curriculum policy and classroom practice by allowing teachers to discuss how abstract curriculum principles can be interpreted within the realities of their own students and schools. This is particularly important in contexts where access to formal professional development is limited. The role of collaborative teacher learning therefore extends beyond solving immediate technical problems and may contribute to the gradual development of collective curriculum literacy and pedagogical confidence.

At the same time, the digital dimension of these findings has implications for the future development of teacher professional learning. The teachers' current use of PMM and YouTube represents relatively accessible forms of digital professional learning, but emerging technologies, including generative artificial intelligence, are likely to broaden the possibilities and challenges of curriculum and module development. This does not mean that AI should automatically be incorporated into current teaching modules. Rather, teacher education needs to prepare teachers to evaluate when and how AI-based tools can support lesson planning, resource creation, differentiation, assessment, and professional reflection while maintaining pedagogical judgment, ethical responsibility, and teacher agency. UNESCO's AI Competency Framework for Teachers emphasizes

that teacher competence in the AI era extends beyond technical use to include human-centered approaches, ethics, AI foundations and applications, AI pedagogy, and AI for professional learning (Miao & Cukurova, 2024). For the teachers in this study, this future-oriented dimension is particularly relevant because existing patterns of technology adaptation suggest that professional learning should focus not merely on introducing new tools but on strengthening teachers' capacity to judge whether a tool is pedagogically appropriate, feasible within local infrastructure, and aligned with curriculum objectives.

Overall, the findings indicate that teachers at SMP Negeri 1 Kolaka have developed a meaningful foundation for implementing the Kurikulum Merdeka, particularly in their understanding of module components and their willingness to adapt to practical constraints. The central issue is therefore not whether teachers understand the curriculum, but how effectively that understanding can be transformed into student-centered, context-responsive, and digitally informed pedagogical practice. The study consequently supports a shift in professional development from one-off training toward continuous, collaborative, practice-based learning in which teachers analyze curriculum documents, co-design modules, test instructional strategies, reflect on classroom evidence, and revise their practice. Such an approach would simultaneously strengthen curriculum literacy, teacher agency, pedagogical alignment, and digital competence. The findings also point to the importance of institutional support, because teacher agency can only be sustained when teachers have sufficient time, resources, collegial networks, and mentoring opportunities. Future research could therefore examine longitudinally how teachers' curriculum knowledge, digital competence, and pedagogical agency develop as they participate in sustained professional learning, including the responsible use of AI-supported tools. Such work would help clarify whether teachers' current adaptive practices can develop into deeper and more sustainable instructional transformation under the Kurikulum Merdeka.

Conclusion

This case study establishes that English teachers at SMP Negeri 1 Kolaka demonstrate solid conceptual understanding of teaching module development under the Kurikulum Merdeka. They can design modules incorporating all minimum components, learning objectives, assessment plans, learning steps, media, and articulate the principles of student-centered, differentiated, and meaningful learning. Their development process follows a systematic approach encompassing needs analysis through diagnostic assessment, collaborative CP-ATP elaboration within learning communities, P3 dimension selection, and periodic evaluation supported by self-reflection and student feedback.

However, seven significant and interrelated challenges persist: aligning modules with ATP, conducting multi-stage needs analysis, selecting appropriate operational terms, determining assessment and learning step components, matching P3 elements with TP, maintaining flexibility during implementation, and overcoming technology connectivity and device accessibility barriers. Document analysis further revealed that module design, while structurally complete, has not yet fully operationalized the student-centered pedagogical philosophy central to the Kurikulum Merdeka, suggesting a meaningful gap between conceptual knowledge and instructional practice.

These findings carry important implications for teacher education and curriculum policy. Continued and targeted in-service training, particularly focused on technology integration, needs analysis, differentiated instruction, operational verb selection, and ATP development is strongly recommended. Such training should prioritize practical, classroom-embedded learning rather than theoretical transmission, and should be accompanied by sustained institutional support from school administration and the local education office (Dinas Pendidikan). Addressing infrastructure inequities, particularly regarding student device access and internet connectivity, is equally essential to the meaningful realization of the Kurikulum Merdeka's vision in schools serving underresourced communities. Future research might profitably extend this inquiry to a broader sample of schools across the region, or examine longitudinal changes in teacher understanding and module quality following extended participation in professional development programs.

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