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Assessing Mathematics Teachers' Professional Development Needs for the Merdeka Curriculum: Insights from Literature and Online Forums

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ABSTRACT

This study aims to analyze the training needs of mathematics teachers in implementing the *Merdeka Curriculum* through a systematic literature review and online focus group discussions. The background of this research is the limited readiness of teachers in understanding and applying the core principles of the *Merdeka Curriculum*, particularly in mathematics instruction at the junior high school level. A qualitative method was employed, combining a systematic review of relevant policy documents and journal articles with data obtained from virtual discussions involving mathematics teachers. The findings reveal that teachers require training that is practical, contextual, and grounded in classroom experiences, especially concerning differentiated instruction, formative assessment, and the integration of technology in learning. This study recommends the development of training programs tailored to teachers' actual needs and the strengthening of professional collaboration among educators to support continuous curriculum implementation.

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1. INTRODUCTION

Mathematics education plays a pivotal role in fostering students' logical, analytical, and creative thinking abilities (Rosa & Indrawati, 2023). Amid rapid societal and technological changes, educational transformation has become inevitable. The Indonesian government has responded to this challenge by launching the *Merdeka Curriculum* as an initiative to address the demands of globalization, technological advancement, and the complexities of 21st-century learning (Wally et al., 2024; UNESCO, 2016). This curriculum emphasizes student-

centered learning, differentiated instruction, and the attainment of essential competencies through project-based approaches and the development of the *Pancasila Student Profile* (Manuella & Retnawati, 2025; Nurulaeni & Rahma, 2022).

However, curriculum reform cannot be implemented optimally without the preparedness of teachers—particularly mathematics teachers, who act as key facilitators in classroom instruction (Santoso & Hadi, 2018). Previous research has demonstrated that successful curriculum implementation is highly dependent on teachers' comprehension, readiness, and sustained professional support through relevant training programs (Putra et al., 2022; Susanto, 2023; Lumbantoruan & Simorangkir, 2023). Within the context of the *Merdeka Curriculum*, mathematics teachers are required not only to understand the new curriculum structure but also to design contextualized learning experiences tailored to the diverse characteristics of their students and school environments (Nisak & Yuliastuti, 2022; Kurnia Sari & Umami, 2023).

One of the key issues that arises is the disparity in understanding and training access between urban and rural teachers (Harefa & Harefa, 2023). Many educators report challenges in interpreting learning outcomes (CP), designing diagnostic assessments, and developing differentiated teaching modules (Telaumbanua et al., 2023; Nurcahyono & Putra, 2022). These difficulties are not only evident in formal evaluation reports but also prominently discussed in informal online spaces such as teacher forums, professional group chats (e.g., MGMP Telegram groups), and social media. Such discussions often reveal field-level realities that are not captured through formal government training mechanisms (Puspita, 2023).

This study, therefore, addresses a key problem: the misalignment between the design of current training programs and the actual needs of mathematics teachers in the field. A growing number of studies have emphasized the importance of needs analysis in curriculum reform efforts (Zulkardi & Putri, 2021; Hamdan, 2022; Wally et al., 2024). However, most of these studies rely on time-consuming methods such as surveys and interviews. In contrast, this study proposes an alternative approach by combining systematic literature review with the analysis of content from online teacher forums to identify training needs related to the *Merdeka Curriculum* (Puspita, 2023; Harefa & Harefa, 2023). This strategy offers logistical efficiency and captures teacher perspectives in more natural and authentic ways through organically developed informal discussions.

The novelty of this research lies in its use of online discussion forums as a primary data source for teacher training needs analysis—an approach still rarely utilized in curriculum studies in Indonesia (Manuella & Retnawati, 2025). Teachers tend to be more candid in these informal digital spaces, providing honest insights into their obstacles and expectations. Furthermore, this study maps training issues across three key dimensions: pedagogical competence, professional knowledge, and

technological literacy—each essential for effective curriculum implementation (Nisak & Yuliastuti, 2022; Kurnia Sari & Umami, 2023).

The primary objective of this study is to identify and categorize the training needs of junior high school mathematics teachers in relation to the *Merdeka Curriculum* by synthesizing insights from national literature and content analysis of mathematics teacher discussion forums. This comprehensive overview aims to shed light on the types of training required, topics perceived as challenging, and preferred strategies for professional development (Puspita, 2023; Nurulaeni & Rahma, 2022).

The significance of this study is both academic and practical. Academically, it contributes to methodological innovation by utilizing digital forums as a resource for training needs analysis. Practically, the findings offer valuable input for policymakers, training providers, and teacher communities in designing professional development programs that are more contextualized, targeted, and aligned with teachers' actual needs (UNESCO, 2016; Rosa & Indrawati, 2023).

In this regard, the present study serves as a bridge between the policy-level vision of curriculum training and the on-the-ground realities faced by mathematics teachers. By leveraging the potential of digital discussion spaces—which have been underutilized in education research—this study aims to inform more reflective, participatory, and evidence-based educational policymaking (Zulkardi & Putri, 2021).

2. METHOD

This study employed a qualitative descriptive approach, which is appropriate for exploring social phenomena in a natural context through detailed description and interpretation (Creswell, 2016). Specifically, the research combined a systematic literature review with qualitative content analysis of online teacher discussion forums. This methodological strategy was selected to obtain a comprehensive and contextually grounded understanding of mathematics teachers' professional development needs in implementing the *Merdeka Curriculum*, by integrating insights from both formal academic sources and informal, organic teacher conversations in digital community spaces.

2.1 Data Sources

The data for this study were drawn from two main categories:

- **Primary Data** were collected from open-access online discussion forums where mathematics teachers exchange ideas and experiences. These included:
    - National and regional *MGMP Matematika SMP* Telegram groups
    - The Facebook group "Komunitas Guru Matematika Indonesia"

  - Educational community websites such as *gurusiana.id*, *rumahbelajar.id*, and *edukasi.org*

Discussion threads selected for analysis were those that addressed challenges, confusions, expectations, or suggestions from teachers regarding training and the implementation of the *Merdeka Curriculum* in mathematics instruction.

- **Secondary Data** consisted of academic and policy documents, including:
  - Peer-reviewed journal articles (published between 2019 and 2024)
  - Policy reports issued by the Indonesian Ministry of Education and Culture
  - Official training modules and teacher guidelines for the *Merdeka Curriculum*
  - Academic textbooks and other relevant reference materials

2.2 Data Collection Techniques

Data were collected using the following procedures:

- **Document and literature retrieval** was conducted through targeted keyword searches such as "mathematics teacher training," "Merdeka Curriculum," "teacher competence," and "curriculum implementation."
- **Forum content extraction** involved:
  - Filtering relevant discussion threads based on content related to teacher needs and challenges
  - Archiving discussion logs and digital screenshots as documentation
  - Ensuring participant confidentiality by anonymizing names and identifiable information

The **inclusion criteria** for forum content were:

- The discussion took place between 2022 and 2024
- Participants were actively teaching at the junior secondary school level (SMP)
- The thread contained at least one expression of concern, need, or question related to professional development under the *Merdeka Curriculum*

To ensure the credibility of online data, the selection prioritized posts by verified or long-standing teacher participants with consistent activity, and repeated patterns across forums were cross-checked for reliability.

2.3 Data Analysis Procedures

The data were analyzed using **thematic analysis** following the framework of Braun and Clarke (2006), which involves identifying, analyzing, and interpreting patterns (themes) within qualitative data. The process included the following stages:

1. **Data Reduction**: Selecting relevant excerpts from the literature and forum discussions that aligned with the research objectives.
2. **Categorization**: Organizing the data into major thematic categories, such as:
    - Types of training content needed
    - Preferred training delivery models
    - Barriers faced by teachers in implementing the curriculum
    - Alternative learning resources used by teachers
3. **Interpretation**: Interrelating the themes with reference to a conceptual framework of teacher training needs, particularly focusing on pedagogical, professional, and technological competencies.

2.4 Validity Strategies

To enhance **trustworthiness and credibility**, the study employed:

- **Source triangulation**, by comparing findings across literature and forum data to validate emerging themes
- **Peer debriefing**, in which two experts in curriculum studies and mathematics education reviewed the theme categorization and interpretation to reduce researcher bias and ensure analytical rigor

2.5 Study Limitations

This study acknowledges several limitations:

- The analysis was limited to publicly accessible forums, thereby excluding closed or private communication channels that may offer richer perspectives.
- No direct validation was conducted with the forum participants; thus, the interpretations are exploratory and contextually reflective rather than empirically verified.

Despite these limitations, the approach remains valuable as a preliminary step in mapping broad patterns of teacher needs. The insights generated can inform subsequent research involving more robust empirical validation such as surveys or in-depth interviews.

3. RESULTS AND DISCUSSION

The results of the literature review and content analysis of online teacher forums revealed **four key thematic categories** that represent the core training needs of junior secondary mathematics teachers regarding the implementation of the *Merdeka Curriculum*. These themes are elaborated as follows:

3.1 Need for Understanding the Philosophy of the Merdeka Curriculum

A significant number of teachers demonstrated limited understanding of the foundational principles of the *Merdeka Curriculum*, particularly regarding *student agency*, *differentiated instruction*, and *assessment as learning*. Of the 24 discussion threads analyzed, approximately **70% (17 threads)** contained statements from teachers expressing confusion when differentiating these concepts from the previous *2013 Curriculum* approach. This lack of philosophical grounding appears to hinder meaningful implementation of curriculum changes at the classroom level.

3.2 Challenges in Diagnostic and Formative Assessment Practices

Many teachers reported difficulties in designing and conducting effective **formative assessments**, especially those aligned with *learning outcomes (CP)*, *learning progression frameworks (ATP)*, and the *Pancasila Student Profile*. Teachers frequently requested targeted training on how to create appropriate diagnostic instruments to assess students' learning readiness and inform differentiated strategies. This finding is consistent with Suryani & Hartati (2022), who noted that teacher training in Indonesia tends to focus more on administrative compliance than on the development of meaningful assessment tools.

3.3 Difficulty in Implementing Differentiated Instruction

The implementation of **differentiated learning** emerged as a major challenge. Teachers often interpreted differentiation narrowly—as variation in learning media or task formats—rather than addressing deeper student needs such as learning readiness, interest, and cognitive profiles. Teachers in various forums, particularly on Telegram and Facebook groups, requested concrete examples and practical guidance on applying differentiation in complex mathematical topics such as functions, algebra, and geometry. This suggests a gap between theoretical knowledge and practical application. Tomlinson (2017) emphasized that successful differentiation requires a profound understanding of student diversity and flexible instructional resources.

3.4 Demand for Digital Tools and Learning Resources

Teachers also expressed a strong need for **structured training** on the use of digital platforms and tools, such as *Merdeka Mengajar*, *Google Classroom*, *GeoGebra*, and *Khan Academy*. While such platforms offer significant opportunities for personalized learning, many teachers indicated that they lacked the time, skills, or confidence to explore these tools independently. This aligns with Nugroho et al. (2021), who argue that successful integration of ICT in mathematics instruction requires both technical proficiency and a solid foundation in digital pedagogy.

Discussion

The findings of this study reveal that junior secondary mathematics teachers face substantial and practical challenges in implementing the *Merdeka Curriculum*, primarily due to limited conceptual and technical understanding of its core components. Four major themes emerged from the data, highlighting areas in which teachers expressed the greatest need: (1) comprehension of the curriculum's philosophical foundation, (2) effective use of diagnostic and formative assessment, (3) implementation of differentiated instruction, and (4) the integration of technology and digital platforms. These themes reflect a critical gap between the content and design of existing professional development programs and the real needs experienced by teachers in the field.

First, regarding the philosophical foundation of the *Merdeka Curriculum*, many mathematics teachers struggle to fully grasp concepts such as *student agency*, *teaching at the right level*, and the *Pancasila Student Profile*. Discussions across online teacher forums frequently indicate that teachers are often exposed only to top-down socialization sessions rather than transformative professional learning opportunities that facilitate pedagogical dialogue. This aligns with the findings of Rahayu et al. (2023), who argue that the successful implementation of a new curriculum largely depends on teachers' depth of understanding of its philosophical underpinnings. Teachers lacking this understanding tend to focus on superficial compliance—merely changing administrative formats—rather than initiating instructional innovation.

Second, in the domain of diagnostic and formative assessment, many teachers reported a lack of competence in designing assessment instruments that accurately capture students' readiness to learn. This is particularly problematic given that diagnostic assessment serves as a foundational step in determining appropriate differentiation strategies within the *Merdeka Curriculum*. Inadequate assessment practices lead to mismatches in instructional approaches. Suryani and Hartati (2022) note that teacher training in Indonesia continues to emphasize procedural completion of assessment reports rather than the development of meaningful assessment tools that inform instruction.

Third, differentiated instruction emerged as the most significant challenge. Many teachers misunderstand differentiation as merely varying the format of media or assignments, rather than responding to learners' readiness, learning preferences, and interests. Numerous teachers in Telegram and Facebook groups requested concrete examples of differentiation practices, particularly in challenging topics such as functions, algebra, or three-dimensional geometry. This suggests that current training remains overly theoretical and lacks contextually grounded, practice-based components. As emphasized by Tomlinson (2017), differentiation is only effective when rooted in a deep understanding of learners and supported by flexible learning resources.

Fourth, in terms of technology integration, teachers expressed difficulties in accessing and effectively utilizing both government-provided platforms, such as PMM (Platform Merdeka Mengajar), and third-party applications such as GeoGebra, Quizizz, or Khan Academy. While these platforms offer potential for personalized

learning, the absence of structured technical and pedagogical training limits their use. As Nugroho et al. (2021) point out, integrating ICT in mathematics instruction requires not only technical proficiency but also strong digital pedagogical literacy.

Taken together, these findings suggest that the core issue in teacher professional development is not the frequency or volume of training, but rather its quality, relevance, and alignment with teacher needs. Current models of training that are top-down, one-directional, and administrative have proven ineffective in equipping teachers with the skills necessary for meaningful curriculum enactment. Instead, teachers require participatory, context-specific, and collaborative approaches to professional learning—such as peer coaching, lesson study, or inquiry-based professional development.

Furthermore, this study reaffirms that effective teacher training must be grounded in **authentic needs assessment**, rather than assumptions made by program designers. As Darling-Hammond et al. (2017) assert, high-impact professional learning begins with a deep understanding of teachers' needs. Therefore, research such as this serves as a crucial foundation for designing **adaptive, dynamic, and practice-oriented** professional development programs.

In conclusion, this study not only sheds light on the gap between the aspirations of the *Merdeka Curriculum* and the realities experienced by mathematics teachers, but also advocates for a **transformative shift in professional development practices**. It offers actionable insights for policymakers, teacher education institutions, and training providers to design more responsive, sustainable, and evidence-informed professional learning pathways.

4. CONCLUSION

Based on the analysis of relevant literature and online discussion forums involving junior secondary mathematics teachers, this study concludes that the implementation of the *Merdeka Curriculum* continues to face substantial challenges in the field. Teachers encounter difficulties in understanding and applying key components of the curriculum, particularly in four areas: (1) the philosophical foundation of the curriculum, (2) the design and implementation of diagnostic and formative assessments, (3) differentiated instruction, and (4) the integration of technology into mathematics teaching.

The findings suggest that existing teacher training programs tend to be informative and administrative in nature, failing to address the practical and context-specific needs of educators. Teachers require training that is applicative, reflective, and grounded in pedagogical competencies. The effectiveness of the curriculum's implementation is therefore highly contingent upon the relevance and quality of the professional development provided.

Furthermore, the study highlights the importance of **peer-based and participatory training models**, which are more conducive to sustained instructional transformation. As such, it is imperative that relevant stakeholders

design professional development programs based on **systematic needs assessments** and strengthen **professional collaboration** among teachers as part of continuous teacher learning systems.

This study also offers a methodological contribution by utilizing data from online discussion forums—an underexplored yet authentic source of teacher voice—in mapping professional development needs. It presents evidence-informed insights that can serve as a foundation for more adaptive, participatory, and needs-driven training policies.

Recommendations

1. For Policymakers and Government Agencies:

- Develop teacher training programs that are participatory, contextual, and practice-oriented, emphasizing real classroom challenges.
- Conduct periodic needs assessments to ensure that training content aligns with the actual teaching context.
- Institutionalize school-based mentorship or instructional coaching systems to support the implementation of the *Merdeka Curriculum* at the classroom level.

2. For Training Providers and Teacher Education Institutions:

- Offer in-depth technical training on diagnostic assessment and differentiated instruction that includes hands-on practice and examples.
- Promote collaborative training models such as *lesson study*, *peer mentoring*, and *inquiry-based professional development* that foster reflection and exchange of best practices.
- Integrate digital pedagogical skills with subject-specific instructional design to ensure meaningful use of educational technologies.

3. For Mathematics Teachers:

- Actively participate in professional learning communities (e.g., MGMP, online forums) to enhance pedagogical strategies aligned with the *Merdeka Curriculum*.
- Cultivate a culture of reflective practice and remain open to innovation and collaboration with peers.
- Explore and optimize digital learning platforms to design instructional strategies that cater to diverse student needs.

4. For Future Researchers:

- Conduct mixed-methods research that combines qualitative depth with quantitative generalizability to evaluate the effectiveness of current training programs.
- Develop and validate national-scale instruments for identifying teacher training needs to inform future professional development planning.

By addressing the alignment between policy, practice, and teacher agency, this study underscores the critical role of **evidence-based and teacher-responsive training** in achieving meaningful curriculum reform. It is hoped that the insights offered here will contribute to more **inclusive, adaptive, and sustainable** educational improvement efforts.

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