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IMPLEMENTING COGNITIVE DIAGNOSTIC ASSESSMENT TRAINING TO IMPROVE MIDDLE SCHOOL SCIENCE TEACHERS' ASSESSMENT PRACTICES IN LIMA PULUH KOTA REGENCY

Widia Kemala Sari[1]*, Selma Riyasni[1], Rani Oktavia[1]
[1]Universitas Negeri Padang, Padang, Indonesia
*widiakemalasari@fmipa.unp.ac.id

Abstrak: Asesmen diagnostik berfungsi mengidentifikasi kebutuhan belajar siswa secara tepat. Namun, guru-guru di Kabupaten Lima Puluh Kota masih menghadapi kendala dalam perancangannya. Tujuan kegiatan pengabdian ini adalah meningkatkan kompetensi guru IPA dalam menyusun asesmen diagnostik kognitif sehingga mereka mampu mengidentifikasi kebutuhan belajar siswa secara lebih akurat dan komprehensif. Pengabdian menggunakan metode PAR (*Participatory Action Research*) dengan kegiatan pelatihan terdiri dari beberapa materi yaitu: (1) Pengenalan *Anderson Krathwohl Taxonomy* (AKT) dan 24 Kotak Proses Berpikir, (2) Penyusunan ATP dengan AKT menggunakan *Scaffolding*; dan (3) Diagnosis keterampilan kognitif siswa dilakukan menggunakan teknik *Linear Extrapolation* (LE), yaitu metode statistik sederhana untuk memperkirakan level kognitif berdasarkan data yang tersedia. Data kegiatan pengabdian dikumpulkan dari tiga instrumen: 1) Angket respon kegiatan; Hasil angket menunjukkan tingkat kepuasan yang tinggi terhadap kegiatan, dengan 97% responden menyatakan tanggapan positif dan 3% bersikap netral. 2) Angket persepsi kemampuan diagnostik; mayoritas guru menilai dirinya memiliki kemampuan diagnostik yang tinggi, namun masih menunjukkan kebutuhan akan penguatan dalam aspek teknologi asesmen. Analisis gender dan profesionalitas guru secara statistik dengan uji-t menunjukkan tidak ada perbedaan yang signifikan. 3) *Pretest* dan *Posttest*; terjadi peningkatan pemahaman guru sebesar 29%, dari rerata skor 84,5 menjadi 118,5 dalam penyusunan asesmen diagnostik. Temuan ini menunjukkan bahwa pelatihan berbasis PAR efektif dalam meningkatkan keterampilan diagnostik guru, terutama dalam merancang asesmen kognitif berbasis taksonomi berpikir.

Kata Kunci: asesmen diagnostik, guru IPA, Participatory Action Research (PAR), scaffolding

Abstract: Diagnostic assessment functions to identify students' learning needs accurately. However, teachers in Lima Puluh Kota Regency still face challenges in designing such assessments. This community service activity aims to enhance science teachers' competence in developing cognitive diagnostic assessments to more accurately and comprehensively identify students' learning needs. The program employed the Participatory Action Research (PAR) method, with training activities consisting of several components: (1) an introduction to the Anderson–Krathwohl Taxonomy (AKT) and the 24 cognitive process cells; (2) the development of Learning Objective Flow (ATP) based on AKT using a scaffolding approach; and (3) the diagnosis of students' cognitive skills using the Linear Extrapolation (LE) technique, a simple statistical method for estimating cognitive levels based on available data. Data from the community service activities were collected using three instruments: (1) an activity response questionnaire, the results of which showed a high level of satisfaction, with 97% of respondents expressing positive responses and 3% remaining neutral; (2) a diagnostic ability perception questionnaire, in which most teachers rated their diagnostic ability as high but still indicated a need for strengthening assessment-related technological aspects. Statistical analysis of gender and teacher professionalism using a t-test showed no significant differences; and (3) pretest and posttest results, which indicated a 29% increase in teachers' understanding, with the average score rising from 84.5 to 118.5 in the development of diagnostic assessments. These findings demonstrate that PAR-based training is efficacious in improving teachers' diagnostic skills, particularly in designing cognitive assessments based on thinking taxonomies.

Keywords: diagnostic assessment, science teachers, Participatory Action Research (PAR), scaffolding

Introduction

Diagnostic assessment is a crucial component of the learning process, as it accurately identifies students' learning needs from the outset. Through this assessment, educators are able to map students' readiness, including cognitive aspects, attitudes, reasoning abilities, and individual potential prior to instruction (Firmanzah & Sudibyo, 2021; Nurdiyanti et al., 2025). Furthermore, diagnostic assessment plays an important role in detecting students' misconceptions, allowing the results to serve as a foundation for designing more adaptive and targeted learning experiences (Hasanah et al., 2022; Soeharto et al., 2019; Treagust, 2006).

Within the Merdeka Curriculum, diagnostic assessment serves as a key instrument for implementing differentiated learning (Maryani et al., 2023). This assessment is categorized into two forms: non-cognitive diagnostic assessment, which is generally conducted by school guidance and counseling teachers, and cognitive diagnostic assessment, which falls under the responsibility of subject-matter teachers (BSKAP, 2024; Forniawan & Wati, 2024). Educators with strong diagnostic assessment skills are better able to tailor instruction to students' learning conditions, enabling learners to exercise greater control over their learning processes and experience more positive learning outcomes (Soeharto et al., 2019; Treagust, 2006). In practice, although the government has facilitated diagnostic assessment implementation through the Merdeka Mengajar Platform (PMM), continuous professional development for teachers remains necessary (Sugiarto et al., 2023), as many teachers continue to experience confusion regarding the application of diagnostic assessment in classrooms (Febrianti, 2023; Purwati et al., 2023; Ulfha et al., 2025).

One key challenge in diagnostic testing in science learning is the breadth and complexity of the content, which requires teachers to possess adequate skills in designing appropriate diagnostic instruments. Science content can be classified into factual, conceptual, procedural, and metacognitive knowledge (Prihatni et al., 2016), each of which requires a distinct assessment approach. Therefore, mastery of cognitive levels—ranging from Lower Order Thinking Skills (LOTS: C1–C3) to Higher Order Thinking Skills (HOTS: C4–C6)—is essential in designing valid and informative diagnostic assessment instruments (Anderson & Krathwohl, 2001). Teachers' ability to construct assessment items that align with different types of knowledge across both lower and higher cognitive levels is crucial for accurately identifying students' prior understanding. A review of 17 articles by Nugroho et al. (2023) revealed that many teachers continue to experience difficulties in implementing diagnostic assessment, particularly across the stages from planning to feedback provision (Purwati et al., 2023).

Similar findings were also observed by the researchers in Lima Puluh Kota Regency, which comprises 61 junior high schools and equivalent institutions distributed across 13 districts. Among the 60 active science teachers affiliated with the Science Teachers' Working Group (Musyawarah Guru Mata Pelajaran/MGMP IPA), many reported having a limited understanding of the Merdeka Curriculum (Rahmah & Candradewini, 2023). One of the most prominent challenges faced by teachers is differentiating cognitive levels in assessment items, particularly those categorized as HOTS questions (Alfandry et al., 2021; Winarti et al., 2021). In addition,

time constraints and the habitual reliance on textbook-based questions, without alignment with specific learning objectives, have led teachers to rarely develop new assessment instruments independently. Item analysis practices remain primarily focused on measures such as item discrimination, difficulty index, and distractor effectiveness, with limited attention to the alignment of test items with students' cognitive levels (Sari et al., 2019). In fact, cognitive mapping is essential to support adaptive learning practices. Furthermore, there is currently no educational institution in West Sumatra that specifically focuses on the development of diagnostic assessment. The absence of academic programs in educational evaluation further constrains teachers' capacity development in this area (Supriyadi et al., 2022).

Beyond technical skills, teachers' mental readiness and perceptions toward diagnostic assessment constitute critical factors influencing its implementation (Rakhmawati et al., 2024; Yusron et al., 2024). Some teachers still perceive diagnostic assessment as an additional workload rather than as a strategic tool that facilitates learning. Findings from a preliminary study using a questionnaire indicate that 49% of teachers experience difficulties in constructing diagnostic assessments, while 31% report uncertainty about their ability to design them. The successful implementation of diagnostic assessment for mapping students' initial competencies is highly dependent on systemic support, including curriculum policies that encourage its utilization, sustained professional development for teachers, and the availability of contextualized examples of diagnostic assessment instruments. In response to these challenges, this community service program was designed using a Participatory Action Research (PAR) approach, enabling teachers to actively engage in processes of reflection, planning, and action (Ginting et al., 2025; Patriot et al., 2023). This approach was selected to support the enhancement of science teachers' competencies in designing cognitive diagnostic assessments grounded in thinking taxonomies and contextualized to their instructional practices.

Enhancing teachers' understanding of diagnostic assessment can be achieved through strengthening their conceptual mastery of the revised Bloom's Taxonomy proposed by Anderson and Krathwohl (AKT), which comprises two main dimensions: the cognitive process dimension (ranging from remembering to creating) and the knowledge dimension (factual, conceptual, procedural, and metacognitive). This taxonomy serves as a fundamental framework for designing instruction and assessment that emphasize the development of higher-order thinking skills. Teachers also need to be trained in using appropriate action verbs and in aligning them with the relevant knowledge dimensions of science topics through scaffolding techniques that provide gradual support to help learners achieve more complex learning outcomes. In addition, the introduction of the linear extrapolation method enables teachers to process diagnostic test data in a simple manner to estimate students' cognitive levels.

In the context of science teachers in Lima Puluh Kota Regency, the application of diagnostic assessment theory based on the revised Bloom's Taxonomy by Anderson and Krathwohl is particularly relevant, given the diverse characteristics of teachers and school conditions, including variations in resources, access to professional training, and readiness for implementing the Merdeka Curriculum. Most science teachers continue to rely on assessment items drawn from textbooks and the Merdeka Mengajar Platform (PMM) without carefully

considering the appropriateness of cognitive levels, resulting in initial assessments that have not yet comprehensively mapped students' learning readiness. By utilizing both the cognitive process and knowledge dimensions of the revised taxonomy, teachers are guided to systematically align science learning objectives with students' actual cognitive levels in their classrooms. A scaffolding approach is employed to enable teachers to progressively practice developing learning indicators, selecting appropriate action verbs, and constructing assessment items aligned with the content context and students' abilities. In addition, the linear extrapolation technique is selected for its suitability for teachers in regional contexts, as it offers a simple, practical, and easily applicable method for analyzing diagnostic assessment data without reliance on complex technological tools. Thus, the application of these theoretical frameworks is not merely conceptual but also serves as a contextual solution to enhance the quality of diagnostic assessment practices among science teachers in Lima Puluh Kota Regency.

Methods

This activity was conducted using a PAR approach, which emphasizes active collaboration between researchers and teachers as participants. PAR was selected because it positions teachers not merely as objects of training but as reflective practitioners directly involved in the planning, implementation, evaluation, and refinement of diagnostic assessment practices in their classrooms (Marlina et al., 2024).

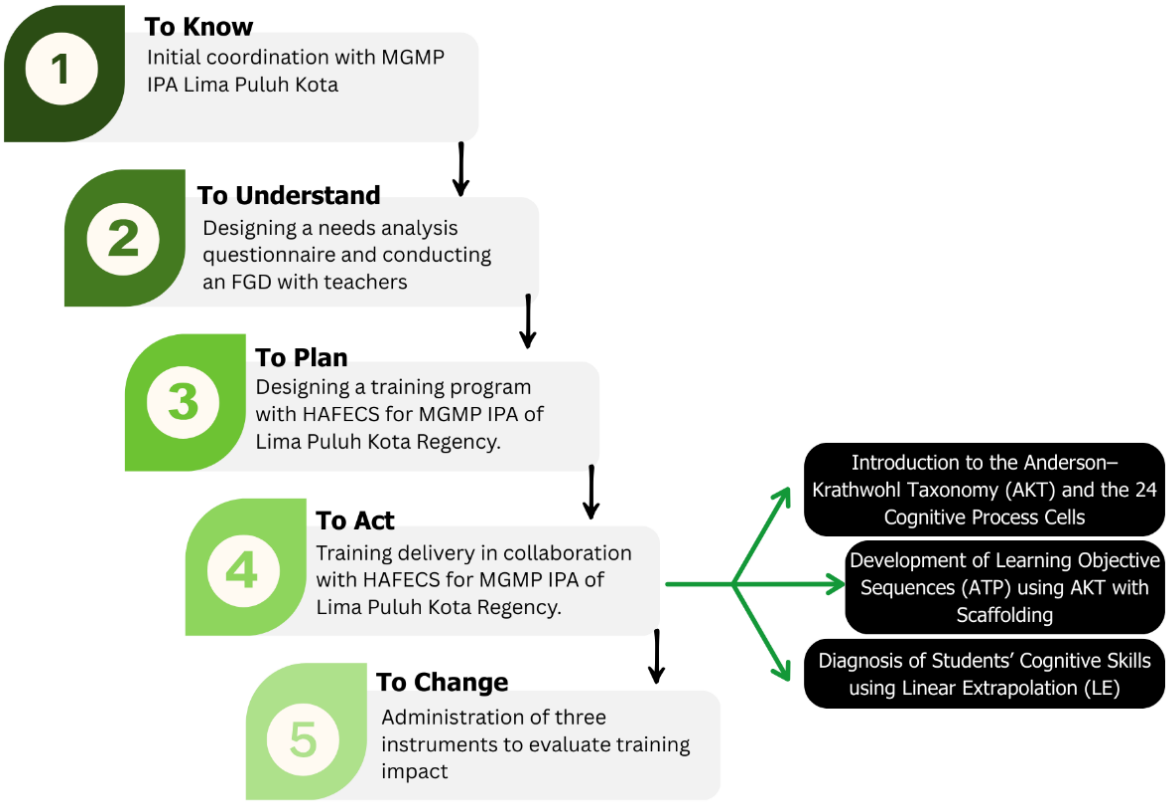

Figure 1. Stages of the Participatory Action Research (PAR) Method Implemented in the Community Service Program

This community service program consisted of five stages encompassing three main thematic areas, as illustrated in Figure 1. The figure depicts a structured, sequential framework for implementing community engagement activities aimed at transforming science teachers' professional practices. The process begins with strengthening coordination and developing a shared understanding of the local context, followed by a needs analysis that serves as the foundation for program design. The planning and implementation stages focus on enhancing teachers' competencies in understanding students' cognitive processes, systematically designing instructional assessments, and diagnosing cognitive skills in a structured manner. Subsequently, evaluation is conducted using measurable instruments to assess the program's impact, ensuring that the outcomes of the community service activities are not merely descriptive but also provide an empirical basis for continuous improvement.

This community service program was conducted over three months, comprising three training sessions: one face-to-face meeting and two online sessions. The participants were junior high school science teachers who are members of the Science Subject Teachers' Association (MGMP IPA) of Lima Puluh Kota Regency. Data were collected through questionnaires and teacher-developed assessment products. Specifically, the data consisted of: (1) participants' responses to the program, obtained through an online questionnaire administered via Google Forms; (2) teachers' perceptions of their ability to design diagnostic assessments, measured using a Likert-scale questionnaire; and (3) improvements in teachers' understanding of cognitive diagnostic assessment, assessed through a test administered at the beginning and at the end of the program. The collected data were analyzed descriptively to examine participants' responses and test results. At the same time, inferential statistical analyses were applied to teachers' perception data, examining differences across professional background variables using a one-way ANOVA and across gender using an independent-samples t-test. To address these challenges, the community service activities were organized into three interconnected stages that progressively build teachers' diagnostic assessment competencies.

First, one effective way to enhance teachers' understanding of diagnostic assessment is to strengthen their comprehension of the revised Bloom's Taxonomy developed by Anderson and Krathwohl (AKT), which represents an advancement on the classical cognitive taxonomy proposed by Benjamin Bloom. This revision introduces two primary dimensions of learning: the cognitive process dimension and the knowledge dimension. The cognitive process dimension consists of six hierarchically structured levels of thinking: remembering, understanding, applying, analyzing, evaluating, and creating. A significant change introduced in this revision is the shift from noun-based categories to active verbs, along with the reordering of the highest cognitive level from "evaluating" to "creating," reflecting the growing importance of higher-order thinking skills in 21st-century education. Meanwhile, the knowledge dimension comprises factual, conceptual, procedural, and metacognitive knowledge. This taxonomy serves as an essential framework for designing learning objectives, assessments, and instructional activities that emphasize the development of students' critical and creative thinking skills.

Second, teachers were trained to apply taxonomy-based action verbs by examining the knowledge dimensions of science topics through scaffolding techniques. Scaffolding is an

instructional approach that provides gradual support to learners to help them achieve higher levels of understanding and skills, in accordance with the targeted cognitive levels and types of knowledge. Through this training, teachers learned to identify and implement various scaffolding strategies to support the achievement of learning outcomes as targeted in the Merdeka Curriculum.

Third, teachers received training in linear extrapolation, a simple statistical data-processing method used to estimate students' cognitive levels from diagnostic test results. This approach aims to assist teachers in moving beyond raw score interpretation toward a more structured analysis of students' achievement patterns and projections of cognitive ability. Through this method, teachers are better equipped to determine more targeted instructional strategies, both for remediation and enrichment. The training also introduced teachers to basic principles of educational statistics, such as score distribution, score intervals, and the use of simple graphical representations, thereby enhancing their confidence and skills in quantitatively analyzing assessment data. The introduction of this method constitutes an important component in strengthening teachers' data literacy, particularly within the context of the Merdeka Curriculum, which emphasizes assessment as an integral part of adaptive, student-centered learning processes.

Results and Discussion

This community service program involved 53 junior high school science teachers who are members of the Science Subject Teachers' Association (MGMP IPA) of Lima Puluh Kota Regency. Of these participants, the majority were female, comprising 51 teachers (96%), while only 2 participants (4%) were male. The participants were drawn from 13 different schools across 11 districts within Lima Puluh Kota Regency, reflecting the diversity of geographical backgrounds and instructional contexts encountered by the teachers, as illustrated in Figure 2.

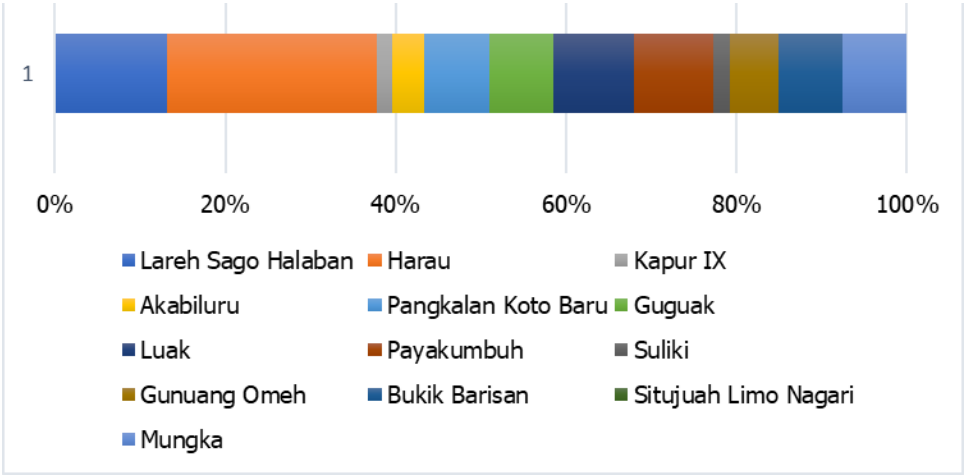

Figure 2. Distribution of Community Service Participants across Districts in Lima Puluh Kota Regency

In terms of professional background, 31 teachers (58%) had participated in the Teacher Professional Education Program (PPG), comprising 29 teachers who completed the in-service

PPG (Daljab) and 2 who completed the pre-service PPG (Prajab). Meanwhile, 22 teachers (42%) had not yet participated in the PPG program. These data indicate that although the majority of participants had undergone formal professional education, a substantial proportion of teachers had not received competency reinforcement through the PPG pathway. This diversity of professional backgrounds became an important consideration in designing a contextual, collaborative training approach. Previous studies also emphasize that training in diagnostic assessment remains necessary, even though the government has provided learning support facilities through the Merdeka Mengajar Platform (PMM) (Sugiarto et al., 2023). The community service materials were delivered through the following activities:

1. Re-introducing the Anderson–Krathwohl Taxonomy (AKT) and its 24 cognitive process cells, aimed at familiarizing teachers with a systematic structure for classifying learning objectives based on cognitive process and knowledge dimensions.
2. Training teachers to develop Learning Objective Sequences (Alur Tujuan Pembelajaran/ ATP) using the AKT framework, complemented by scaffolding techniques to strengthen the hierarchical logic of competency development.
3. Diagnosing students' cognitive skills using the Linear Extrapolation (LE) approach, a simple statistical estimation method that assists teachers in predicting students' cognitive levels based on response patterns.
4. Designing diagnostic assessment instruments grounded in the results of AKT and LE analyses.
5. Developing tangible products in the form of diagnostic assessment tools that are ready for classroom implementation.
6. Evaluating the developed assessment products in terms of taxonomic alignment, instructional context, and potential classroom applicability.

Teachers' Responses to the Program

The evaluation of teachers' responses indicates that the diagnostic assessment training conducted using a PAR approach achieved a very high level of participant satisfaction. Of the 30 teachers who completed the questionnaire at the end of the program, 97% (29 teachers) provided positive responses across the eight evaluated aspects, which included the quality and relevance of the materials, instructor quality, teaching methods and media, understanding of diagnostic assessment concepts, as well as technical aspects such as program duration and facilities. Only one respondent (3%) provided a neutral response, and no negative responses were recorded across any of the evaluated aspects. These findings strengthen the argument that PAR-based training is effective in fostering a participatory, reflective, and needs-oriented learning environment for teachers (Siswadi & Syaifuddin, 2024), as recommended by principles of adult learning (andragogy) and theories of engaged learning.

Furthermore, the high level of participant satisfaction not only reflects the effectiveness of content delivery but also indicates strong alignment between the training materials and teachers' actual classroom needs. This result is evident in the open-ended feedback from participants, in which 16 teachers expressed the expectation that the program be continued

through follow-up initiatives. Such feedback suggests that participants perceived the activity not merely as a one-off training session, but as the beginning of a broader and more sustainable professional development process. Teachers recognized that effective diagnostic assessment requires not only strong conceptual understanding but also repeated practice in designing contextual and valid assessment instruments (Suciati & Amirullah, 2017).

In addition, nine teachers suggested extending the duration of each training session, indicating that the materials were perceived as dense and required more time for deeper understanding. Several participants also provided feedback regarding the pace of content delivery, which was considered too rapid in some sessions. This issue warrants careful attention, as it directly affects learning effectiveness. In the context of professional learning for teachers, clarity, appropriate pacing, and sufficient opportunities for discussion and reflection are critical to ensuring optimal knowledge and skill transfer. Therefore, future training implementations should consider more flexible time arrangements, adjustments to content load, and adaptive delivery pacing that align with participants' needs. From a methodological perspective, perception data collected using a five-point Likert scale are inherently subjective. However, the high consistency of positive responses, accompanied by constructive open-ended feedback, may be considered a valid indicator that the program provided a meaningful learning experience for participants. At the same time, it should be noted that only 30 of 53 teachers completed the questionnaire, limiting the data's representativeness. Perception-based assessments are also susceptible to social desirability and expectancy biases, particularly in training contexts where evaluations are administered immediately after program completion.

Nevertheless, the findings overall indicate that the PAR approach is effective in enhancing teachers' active participation and fostering a collaborative and meaningful learning environment. This approach provides teachers with opportunities to reflect on their instructional practices, revisit their conceptual understanding, and directly engage in designing assessment instruments under guided support. Accordingly, the development of follow-up programs is strongly recommended, including classroom practice–based training, sustained coaching, and mentoring to support the actual implementation of diagnostic assessment in real classroom settings. In addition, developing modules or digital platforms as self-directed learning resources may further strengthen the sustainability and long-term impact of the training program.

Teachers' Perceived Ability to Design Diagnostic Assessments

Table 1. Descriptive Statistics of Teachers' Perceptions of Diagnostic Assessment

Aspect	n	Minimum Score	Maximum Score	Mean	SD
Teachers' Perceptions toward Diagnostic Assessment	53	19.42	30.50	25.10	2.66

The results of teachers' perceived competence in designing diagnostic assessments (as shown in Table 1) indicate a mean score of 25.10 (with a maximum score of 30.50 and a minimum score of 19.42), accompanied by a standard deviation of 2.66. This mean score

suggests that, overall, teachers reported a high level of perceived diagnostic assessment competence. In terms of the categorical distribution, 36 teachers (68%) were classified in the high category, while 17 teachers (32%) were classified in the moderate category. The normal distribution of the data further supports the validity of this descriptive interpretation.

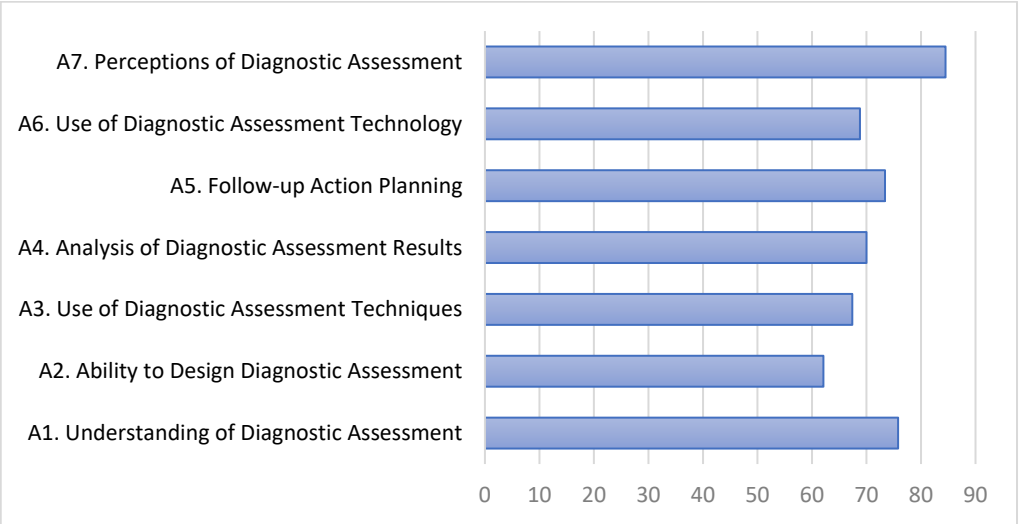

Figure 3. Overview of Teachers' Perception Aspects Related to Diagnostic Assessment

Figure 3 presents an overview of teachers' perceptions across seven aspects of diagnostic assessment. The results indicate that teachers demonstrated the highest level of agreement on the importance and overall perception of diagnostic assessment (A7), suggesting strong conceptual acceptance of its role in learning. Similarly, teachers showed relatively high scores in understanding diagnostic assessment (A1) and follow-up action planning (A5), reflecting positive awareness of assessment-informed instructional decisions. In contrast, lower scores were observed in the ability to design diagnostic assessments (A2) and the use of diagnostic assessment techniques and technology (A3 and A6), indicating gaps in practical and technical competencies. These findings suggest a discrepancy between teachers' conceptual understanding and their practical readiness to implement diagnostic assessment effectively, highlighting the need for targeted, skill-oriented professional development

An independent-samples t-test was conducted to examine whether there were significant differences in teachers' perceived diagnostic assessment competence between male and female teachers. The results indicated that there was no significant difference in perceived diagnostic competence between male and female teachers ($p = 0.123$), nor between teachers who had participated in the Teacher Professional Education Program (PPG) and those who had not ($p = 0.706$). A one-way ANOVA based on teaching experience was performed to determine whether there were significant differences in the mean scores of the examined variable across three categories of teaching experience (novice, intermediate, and experienced). The results likewise revealed no significant differences ($F = 0.82$; $p = 0.454$). These findings suggest that positive perceptions of diagnostic assessment competence are relatively evenly distributed among teachers, regardless of gender, professional status, or length of teaching experience. Interestingly, the finding regarding gender contrasts with the results reported by Muhson et al.

(2025), whereas the findings regarding professional status are consistent with those study.

Nevertheless, although teachers expressed high levels of confidence at the perceptual level, reflective activities during the training revealed a continued need for strengthening practical skills, particularly in instrument development and the use of assessment technologies. This finding is consistent with Kim (2019), who argues that positive perceptions do not necessarily correspond to actual competence, especially in the absence of sustained practice and systemic support. Therefore, future training initiatives should place greater emphasis on technical reinforcement, including the application of cognitive taxonomies in item construction, the use of digital assessment platforms, and the implementation of data-driven, context-based diagnostic practices. In this way, teachers' strong perceptions of diagnostic assessment can be more closely aligned with their actual capacity for classroom implementation.

Pretest–Posttest Results of Teachers' Understanding of Diagnostic Assessment

The results indicate that the training program had a positive impact on enhancing teachers' competence in designing diagnostic assessments. The increase in the mean score from 84.5 to 118.5, representing a 29% improvement, demonstrates a significant difference between participants' initial and final levels of understanding. Furthermore, the N-Gain analysis revealed that the majority of participants (60%) experienced a moderate level of improvement, indicating the effectiveness of the training in strengthening teachers' competencies. The Wilcoxon statistical test further confirmed a statistically significant difference between pretest and posttest scores.

Beyond these quantitative gains, qualitative changes were also observed in teachers' assessment design practices. Prior to the training, most teachers tended to construct assessment items focused on lower-order cognitive levels and had not systematically mapped the alignment between learning objectives and students' cognitive processes. Following the training, teachers began to apply the cognitive taxonomy framework more systematically, aligning assessment items with appropriate taxonomic levels and knowledge dimensions. For example, teachers designed diagnostic items that differentiated students' abilities to understand concepts, apply knowledge, and analyze problems, while explicitly articulating indicators of cognitive processes. These findings support previous research indicating that determining appropriate taxonomic levels is often the most challenging aspect for teachers (Du Plessis, 2021). In addition, several teachers demonstrated the ability to apply scaffolding techniques to identify students' learning gaps and design more targeted instructional follow-up.

These findings indicate that the training not only led to statistically significant improvements in teachers' understanding but also resulted in meaningful changes in their actual assessment practices, particularly in designing diagnostic assessments aligned with students' cognitive levels (Dewi et al., 2023). Accordingly, practice-based training interventions play a strategic role in supporting the more effective implementation of the Merdeka Curriculum in classroom contexts.

Conclusions

This community service program, designed using a Participatory Action Research (PAR) approach, has proven effective in enhancing science teachers' competencies in designing cognitive diagnostic assessments. This effectiveness is evidenced by a 29% increase in teachers' understanding, as indicated by pretest and posttest results, and by a very high level of positive responses (97%) toward the program implementation. Furthermore, although the majority of teachers perceived their diagnostic assessment abilities to be high, further evaluation revealed a continued need for reinforcement in technical aspects, particularly in the utilization of assessment-related technologies. These findings suggest that reflective, contextual, and practice-based training approaches can significantly strengthen teachers' capacity to design student-centered assessments aligned with the principles of differentiated learning within the Merdeka Curriculum.

Opportunities for future community service initiatives and research remain substantial. These include the development of advanced, community-based coaching clinics to deepen teachers' technical skills in instrument construction, further exploration of digital technologies in diagnostic assessment practices, and longitudinal studies to examine the impact of diagnostic assessment on students' learning outcomes. Comparative studies across regions or educational levels may also be conducted to evaluate the effectiveness of similar training models in diverse contexts, thereby expanding best practices in the development and implementation of diagnostic assessment in Indonesia.

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