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Essential Components of Teachers' Self-Assessment for Professional Development in Indonesia

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ABSTRACT

Teachers' self-assessment is recognized as a key mechanism for fostering professional growth and improving instructional practices. It allows educators to reflect on and develop their teaching performance autonomously. However, in the Indonesian context, there is a scarcity of self-assessment instruments that are both effective and measurable. This study employed a descriptive qualitative approach with a case study design to analyze existing teacher self-assessment instruments. Indicators from several available tools were examined and categorized using a theoretical framework comprising three core domains: knowledge of content, knowledge of pedagogy and practice, and knowledge of students. The analysis resulted in the identification of seven essential components for teacher self-assessment: (1) connecting students' prior knowledge with new content; (2) effective delivery of instructional materials; (3) addressing students' errors, difficulties, and misconceptions; (4) promoting active student participation; (5) building rapport among students and between teachers and students; (6) effective use of learning resources, media, and technology; and (7) selecting, using, and following up on assessments. These components were further structured across three developmental levels to reflect teachers' growth. The proposed components serve as a foundation for developing more comprehensive and contextually relevant self-assessment instruments for teachers. By aligning self-assessment practices with pedagogical goals and classroom realities, these tools can support sustained professional development and instructional improvement.

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1. INTRODUCTION

Teacher professional development is widely recognized as a dynamic, lifelong process influenced by individual experiences, contextual demands, and evolving pedagogical paradigms. Earlier models conceptualized teacher development as a linear progression through a series of hierarchical stages of competence (Fuller & Brown, 1975). However, this rigid view has been challenged by more contemporary

perspectives that emphasize the non-linear, cyclical, and layered nature of teacher growth. Huberman's (1993) model presents a framework that delineates discrete phases that are simultaneously distinct and interconnected. These phases include career entry, stabilization, experimentation or diversification, and reassessment. Teachers may traverse these phases multiple times, depending on their evolving professional needs, the characteristics of their classrooms, and their personal trajectories. This standpoint acknowledges that professional advancement is not exclusively a consequence of accumulated experience but also of a teacher's ability to introspect, adapt, and recalibrate their pedagogical approaches over time (Khoshnevisan, 2017).

Within this reflective paradigm, self-assessment serves as a pivotal mechanism for enabling teachers to engage meaningfully with their developmental journeys. In particular, during the reassessment phase in Huberman's framework, self-assessment enables teachers to deliberately evaluate their practices, revisit fundamental assumptions, and identify areas for instructional enhancement. As previously indicated by Avalos (2011), effective teacher learning necessitates cognitive engagement and introspective reflection, rather than passive reception of training. Self-assessment is a catalyst for this transformation by encouraging critical inquiry, self-regulation, and the reconstruction of knowledge and beliefs that underpin pedagogical action. It enables teachers to define what constitutes effective teaching, assess the alignment between instructional decisions and student outcomes, and initiate purposeful improvements grounded in professional understanding (Ross & Bruce, 2007; Cheung, 2009; Borgmeier et al., 2016).

Despite its pedagogical importance, the implementation of self-assessment within the Indonesian educational context remains limited and problematic. Studies have indicated that classroom observation instruments are often repurposed as self-assessment tools, despite their distinct functions and design intents (Widodo & Sudarsono, 2016). Observation tools are primarily evaluative instruments, utilized by external parties to assess classroom dynamics and teacher performance (Martin, 1977). In contrast, self-assessment tools are designed for autonomous use by teachers to reflect on their own instructional experiences. These observation instruments frequently incorporate sophisticated and generalized indicators that are challenging for teachers to interpret and that are not readily adapted to facilitate personal reflection or to measure progress in a formative and nuanced manner. Consequently, teachers find themselves lacking practical, structured instruments that would support their reflective practice and professional development in a measurable and meaningful manner.

Addressing this issue necessitates the design of self-assessment tools that are theoretically grounded and aligned with core domains of teacher knowledge. Research in the field of teacher education has identified three fundamental knowledge domains that shape instructional decision-making and reflective inquiry. These domains include knowledge of content, knowledge of pedagogy and practice, and knowledge of students (Kaharasan, 2010; Berry & Van Driel, 2013). Content knowledge is defined as both procedural and conceptual understanding of subject matter, including the ability to establish meaningful connections across mathematical ideas (Melo-Niño et al., 2016). Pedagogical and practical knowledge is defined as the teacher's capacity to select appropriate teaching strategies, manage classrooms, design learning tasks, and use assessments effectively (Simsek & Boz, 2016). As stated by Jong (2009), the knowledge of students encompasses the understanding of students' prior knowledge, misconceptions, potential difficulties, and the ability to respond to diverse needs during instruction. These domains are intricately interconnected and indispensable for the interpretation and enhancement of pedagogical practice.

The integration of these knowledge domains into self-assessment instruments is crucial for ensuring that teacher reflection is not superficial or intuitive, but rather structured, targeted, and pedagogically informed. For instance, in the absence of content knowledge, teachers may neglect to evaluate the conceptual clarity of their explanations. In the absence of pedagogical and practical knowledge, teachers may fail to recognize the appropriateness of their instructional methods or classroom interactions. In the absence of knowledge regarding students' needs and characteristics, teachers may neglect to align instruction with these factors, potentially leading to suboptimal learning outcomes. When these domains serve as the framework for reflection, self-assessment becomes a diagnostic and developmental tool. This

enables teachers to identify specific gaps, make informed adjustments, and support their progression from novice to expert (Cunliffe, 2004; Koster et al., 2005; Weimer, 2013; Boris & Ekiugbo, 2021).

In light of the aforementioned conceptual and practical concerns, there is an evident necessity to devise a teacher self-assessment instrument that is firmly rooted in the fundamental domains of professional knowledge and meticulously tailored to the reflective needs of teachers. Contemporary instruments frequently exhibit a lack of theoretical coherence and are not aligned with teachers' cognitive processes in evaluating their teaching. In order to address this gap, it is imperative to investigate which components should be incorporated into a meaningful self-assessment framework. This framework should facilitate not only general reflection, but also reflection informed by content knowledge, pedagogical and practical reasoning, and student understanding.

Accordingly, the objective of this study is to identify the essential components of a teacher self-assessment instrument by analysing existing instruments through the lens of three key knowledge domains: content, pedagogy & practice, and students. The research is guided by the following question: What essential components should be incorporated into a teacher self-assessment instrument to reflect the core domains of teacher knowledge and support meaningful, targeted reflection?

The objective of this study is to provide a conceptual foundation for developing self-assessment tools that can empower teachers and pre-service teachers to monitor and improve their instructional practices in a structured, personalized, and theoretically informed manner. It is anticipated that the utilization of these tools will foster reflective capacity, inform pedagogical decisions, and, in turn, contribute to the enhancement of teaching effectiveness and responsiveness in a variety of classroom settings.

2. METHODS

The present study employed a qualitative descriptive research approach with a case study design to identify the essential components of teacher self-assessment, particularly in relation to the professional needs of in-service and prospective teachers in Indonesia. The research focused on exploring how teacher self-assessment practices can be meaningfully structured using teacher knowledge domains as a guiding framework for reflection and instructional development.

The participants in this study included both practicing teachers and prospective mathematics teachers, who were selected through purposive sampling. The selection focused specifically on early-career teachers and prospective teachers who had completed their school-based teaching internships, as these groups were considered to have relevant experiences in conducting self-assessment during actual instructional practice. Selection criteria included: (1) direct involvement in teaching or internship activities in classroom settings, and (2) familiarity with reflective processes such as evaluating their own teaching performance. Although participants came from different schools and teacher education programs, they were all located within the same regional area.

The data were collected through in-depth interviews and document analysis of existing observation and self-assessment instruments. The interviews were designed to explore participants' personal experiences in conducting self-assessment across three key contexts: during their teaching internships, throughout their coursework in teacher education programs, and during their professional practice as classroom teachers. The interviews were not oriented towards technical aspects; rather, they were designed to encourage participants to engage in introspection regarding their pedagogical practices. Specifically, they were prompted to reflect on their evaluation of their own teaching, the awareness of their strengths and weaknesses, and the efforts they made to improve their teaching practice. The interviews also captured the challenges encountered, the strategies employed to support reflection, and the participants' perspectives on which tools or structures could enhance the process of self-assessment.

In addition to the interviews, a total of eight instruments were collected and analyzed. These included both classroom observation tools and teacher self-assessment checklists. The instruments were subsequently categorized into two distinct types: (1) instruments developed by Indonesian

schools or national educational institutions, and (2) international instruments selected by the researcher. The selection of instruments was guided by several criteria, including the clarity and specificity of the indicators, the structural comprehensiveness of the instrument, and the extent to which the dimensions reflected multiple teacher knowledge domains.

The data analysis was conducted using a deductive coding approach, in which each indicator from the collected instruments was classified into one of three pre-defined knowledge domains: content knowledge, pedagogical knowledge, and knowledge of students. The development of this coding framework was informed by extant literature on teacher professional knowledge. Each indicator was reviewed and categorized based on the domain it most explicitly addressed. The coding was conducted by the lead researcher using a coding guide developed to ensure conceptual consistency. Although formal inter-rater reliability was not evaluated in this study, consistency was preserved through repeated validation, detailed memo writing, and iterative review of the coding decisions to ensure transparency and internal reliability.

The findings from both the interview data and instrument analysis were then synthesized to develop seven core components of teacher self-assessment. Each component was delineated into three levels of descriptors, reflecting progressive stages of professional development and reflective competence. This framework functions not only as a theoretical foundation but also as a practical guide for the development of teacher self-assessment tools that are contextually grounded, pedagogically informed, and applicable across diverse educational settings.

3. FINDINGS AND DISCUSSION

3.1 Teacher Self-Assessment Needs Analysis Results

This analysis aims to provide a comprehensive overview of the necessity and urgency of developing a self-assessment framework for teachers. To that end, an in-depth interview was conducted with a teacher and a prospective mathematics teacher student who had been teaching for six months at a school in Indonesia. The objective of this interview was to provide an overview of how teachers and prospective teacher students conduct self-assessments in their learning and how aware teachers and prospective teachers are of the importance of conducting self-assessments.

The results of the interview indicated that teachers and prospective teachers already understood the need for self-assessment in every learning activity. Although an explanation of the importance of self-assessment is included in one of the course materials that students take in the first semester, in practice, students rarely conduct self-assessments to evaluate their learning practices. The process of evaluating how prospective teachers "learn to teach" in real classroom conditions is not carried out in a measurable way. This is primarily due to the absence of structured self-assessment tools, with teachers and prospective teachers relying instead on informal verbal feedback and sporadically documenting their progress through observations. Consequently, students' learning progress remains largely unmeasured and unreflect, with their own assessment of their learning being relegated to the sole discretion of the observer. Furthermore, prospective teachers encounter challenges in quantifying the efficacy of their practice improvements during the learning process in authentic classroom settings.

Teachers and prospective teachers employ a general approach to self-assessment. The three components of self-assessment include a mastery of material, class management, and the use of learning resources. However, these three components are not yet specific and the level of achievement is not measurable. Consequently, teachers and prospective teachers perceive a necessity for self-assessment to occur. The learning process, which is executed in real classroom settings, is recognized as being both dynamic and complex in nature. This necessitates the active involvement of the teacher in the classroom during the reflection process. It is hoped that all improvements made will be in accordance with the needs of the teacher concerned.

In addition to direct involvement in the self-assessment process, teachers and prospective teachers also believe that self-assessment components must be validated through discussions with mentors or other teachers. This is necessary to help teachers and prospective teachers understand ideal learning conditions and establish specific goals to become professional teachers. Recognizing this need, the researcher attempted to collect various observation and self-assessment instruments that had been compiled and used in national and international schools or educational institutions.

3.2 Instrument Coding Results

Type 1 instruments exhibit distinct characteristics compared to type 2 instruments. Type 1 instruments comprise multiple indicators as observed components and are equipped with a Likert scale as a measuring tool, with varying scales in each model. In contrast, type 2 instruments encompass several domains that include indicators as observed components, yet utilize distinct ordinal scales in each model.

This study analyzes eight instruments, classified into three type 1 instrument models (model A, model B, and model C) and five type 2 instrument models (model D, model E, model F, model G, and model H). The type 1 instruments are comprised of: (1) one of the instruments utilized in educational institutions (model A), (2) an instrument developed and employed in advanced education program classes for teacher professional programs in Indonesia in 2018 (model B), and (3) an instrument that has the same use as the type 1 instrument model B, but in the teacher professional program in 2019 (model C). Meanwhile, the type 2 instrument consists of: (1) Formative Assessment for Students and Teachers (FAST) (2014), (2) Ohio Teacher Evaluation System (OTES, 2015) (model D), and (3) Self-Assessment Instrument for Teacher Evaluation II (SITE II, 2015) (model E), (4) Massachusetts Model System For Educator Evaluation (2018) (model F), and (5) NCERT TSAR (2019) (model H).

The arrangement of instruments across different types is multifaceted, encompassing a variety of indicator statement models and distinct scoring forms. Coding is meticulously executed on all indicators of each instrument, encompassing four distinct criteria: knowledge of content (c), knowledge of pedagogy and practice (p), knowledge of students (S), and components excluded from the aforementioned three categories (N). The results of the search for the type of knowledge from each indicator are then mapped, so that the dominant type of knowledge is visible. These results are also used to see the intersection between indicators or domains so that they can be used as a reference in the selection for the preparation of recommendations for the essential components of self-assessment. Table 1 below presents the outcomes of coding each component or domain against the categories of teacher knowledge encompassed and a description of the assessment employed in each type 1 and type 2 self-assessment instrument.

Table 1. Coding Results for Type 1 and Type 2 Instruments

Model of Instrument	Number of Indicators / Domains	Number of Knowledge Types				Assessment Scale
		C	*P*	*S*	*N*	
A	12	4	5	3	4	likert scale, with 5 levels
B	20	4	15	3	1	likert scale, with 4 levels and a notes section for each component
C	18	6	13	7	0	likert scale, with 10 levels and descriptors for scores of 1 (not good) and 10 (very good) for each component.
D	10	0	9	3	0	ordinal scale, with 5 levels consist of not observed, beginning, developing, progressing, and extending
E	7	1	3	2	2	ordinal scale, with 4 levels consist of ineffective, developing, skilled, and accomplished

Model of Instrument	Number of Indicators / Domains	Number of Knowledge Types				Assessment Scale
		C	*P*	*S*	*N*	
F	5	1	5	4	0	ordinal scale, with 5 levels, consisting of never, rarely, sometimes, often, and always
G	5	2	3	3	2	ordinal scale, with 4 levels, consisting of unstatisfactory, needs improvement, proficient, exemplary
H	6	1	2	3	2	ordinal scale, with 4 levels, consists of not meeting the expected standard, approaching the expected standard, meeting the expected standard, and beyond the expected standard

3.3 Instrument Analysis Results

In this section, the results of the analysis conducted on all instruments will be presented first. Furthermore, based on the results of the analysis, recommendations for essential components for self-assessment instruments that can be used and developed independently by teachers and prospective teachers will be put forward. Based on the results of coding the Type 1 model A instrument on 12 indicators, it was found that the type of knowledge that dominated was knowledge of pedagogy and practice, with 5 indicators. Additionally, three indicators of knowledge of students were obtained, along with four indicators each for content knowledge and those not classified in the three types of knowledge selected. The type 1 instrument of model A also exhibited intersections between knowledge, with two indicators between knowledge of content and knowledge of pedagogy and practice, and two indicators between knowledge of pedagogy and practice with knowledge of students.

The indicators suggest a persistent emphasis on technical assessment, though they do address knowledge of content and knowledge of pedagogy and practice to a limited extent, as evidenced by indicators A1, A2, A3, A7, A8, and A11. Additionally, there are indicators that pertain to students but have yet to inform the desired level of achievement, as demonstrated by indicators A9 and A12. The extent to which these indicators address the learning content remains ambiguous, as evidenced by indicators A4, A5, and A10. The instrument is also not equipped with an assessment rubric for each grade option, thereby rendering it unmeasurable. Furthermore, there are no indicators present to facilitate evaluation and feedback for students.

A comprehensive analysis of the coding results for the type 1 instrument of model B on 20 indicators revealed the distribution of knowledge areas. Specifically, four indicators were associated with knowledge of content, 15 indicators with knowledge of pedagogy and practice, three indicators with knowledge of students, and one indicator that did not align with any of the aforementioned knowledge types. Furthermore, an intersection between knowledge of content and knowledge of pedagogy and practice was identified, along with two instances of knowledge of pedagogy and practice intersecting with knowledge of students.

The coding results indicate that the type 1 instrument of model B is predominantly characterized by knowledge of pedagogy and practice. This phenomenon may be attributed to the assumption that students possess adequate study experience related to the material content. However, the reflection process necessitates the investigation of the knowledge of content. According to Friedrichsen et al., (2008), teachers' knowledge of content is influenced by three potential sources: (a) the K-12 learning experience of the teacher, (b) teacher education and professional development programs, and (c) teaching experience. This suggests that teachers' knowledge of content begins to develop even before teachers undergo professional education. This finding lends further support to the notion that knowledge of content must be measured in every learning activity and developed during the implementation of the teacher professional program, for which the use of this Type 1 Instrument Model B is intended.

The coding results indicate that only three indicators are associated with the type of knowledge of students. Teacher knowledge about students relates to what students know and do not know (Hill & Chin, 2018). This suggests that teachers' knowledge of students can facilitate the design of assignments and instructions that deliberately identify students' common mistakes with content, which is related to teachers' knowledge of pedagogy and practice. In consideration of these findings, the author hypothesizes that the discrepancy in the number of indicators for knowledge of students can be attributed to the integration of these indicators within the framework of pedagogical knowledge and practice.

In the type 1 instrument of model B, there are several other specific findings, including indicators that are not specific and not measurable, as seen in indicators B6, B7, and B8. Additionally, there are indicators related to the concept of material but which do not explain the level of achievement, such as in indicators B3, B4, and B5. Additionally, there are technical indicators that can be classified as knowledge of pedagogy and practice, such as indicators B1, B9, B13, B14, B17, and B20. Furthermore, indicators B11 and B12 are similar in terms of explaining the use of technology that results in waste. There are components related to communication with students, such as in components B2, B15, and B16. In addition, there are also indicators that assess the implementation of learning evaluation, but have not been able to explain the details of their application, such as in indicators B18 and B19.

The coding results of the type 1 instrument of model C on 18 indicators revealed the presence of six indicators pertaining to knowledge of content, 13 indicators concerning knowledge of pedagogical and practice, and seven indicators relating to knowledge of students. It was observed that no indicators fell outside the aforementioned three categories of knowledge. The analysis of the type 1 instrument of model C further revealed intersections between knowledge domains, with four indicators intersecting between knowledge of content and knowledge of pedagogical and practice, and four indicators intersecting between knowledge of pedagogical and practice and knowledge of the student.

In the type 1 instrument of model C, it can be seen that the dominance of the indicators also lies in knowledge of pedagogy and practice, as in model B. However, a notable distinction emerges in the number of indicators allocated for knowledge of students, which is the highest compared to models B and A, with a total of seven indicators. Other noteworthy observations include components that lack specificity and measurability, as evidenced by indicators C8, C9, and C11. There are indicators related to the concept of material but the level of achievement is unclear, such as in indicators C3, C4, and C5. Additionally, indicators influenced by the personal character of the teacher are evident, though they can still be classified as knowledge of pedagogical and practice, as seen in indicators C12, C15, and C16. While indicators C13 and C14 assess the implementation of learning evaluation, the details of their application remain to be described. Similarly, indicator C18 assesses the implementation of reflection and follow-up, yet it does not provide an overview of its implementation.

The findings of the coding and analysis of type 1 instruments sourced from schools or educational institutions in Indonesia that are available and used in learning serve as a reference for comparison with type 2 instruments. The analysis was conducted on a number of instruments developed by international schools or educational institutions, which exhibit more complex components compared to the three previous type 1 instrument models. The developed type 2 instrument is composed of numerous indicators grouped according to their domain. Each model features a distinct form of scoring descriptor.

Given the considerable intricacies inherent to the composition and components of the type 2 instrument, the researcher proceeded to code and systematically analyze the manifestation of teacher knowledge. This analytical process was executed with the discerning objective of providing a comprehensive overview of the instrument in its entirety. In doing so, it became evident that, upon closer examination of each instrument's specific domain, the existing indicators could serve as a reliable basis for delineating the types of knowledge encompassed. This finding underscores the significance of a holistic approach in comprehending the intricacies of the instrument, underscoring the necessity for a meticulous examination of all domains.

The analysis of the type 2 instrument reveals that the knowledge component concerning content is comparatively minimal in relation to the other two knowledge types within the entire domain. This domain encompasses five distinct domains. The analysis further delineates the existence of twenty-two categories of pedagogical and practical knowledge, alongside fifteen types of knowledge pertaining to students. The analysis also uncovers six domains that are not incorporated within the three knowledge types. These excluded domains tend to pertain to teachers' competencies in establishing relationships with relevant parties, such as families, communities, schools, and the community, as delineated in instrument type 2 model E, model G, and model H. The descriptors employed in each instrument exhibit variable levels.

3.4 Implication of Findings

The analysis of instrument models revealed a consistent underrepresentation of content knowledge indicators, particularly within Type 1 instruments. This finding carries significant implications for teacher learning, as limited attention to content knowledge may hinder a teacher's ability to build conceptually sound instructional sequences, address student misconceptions accurately, and connect subject matter to real-world applications. In the absence of substantial content knowledge, teachers may place excessive reliance on pedagogical routines. While these routines are undoubtedly necessary, they are inadequate for fostering deep learning. Subsequent iterations of self-assessment instruments must ensure that content knowledge is measured systematically and proportionately alongside pedagogical and student knowledge.

In addition to the lack of content knowledge, the dominance of pedagogical knowledge across the instruments—especially in Type 1—suggests an imbalance that may unintentionally reduce teaching to procedural or managerial tasks. This phenomenon has the potential to impede teachers' engagement in critical reflection on the conceptual integrity of their pedagogical practices and hinder a more careful consideration of the student learning process. A more integrated instrument should aim to rebalance this by ensuring that all three domains—content, pedagogy, and student understanding—are explicitly addressed and interconnected.

Another critical implication relates to the vagueness and lack of specificity in many of the instrument indicators. The analysis indicated that numerous indicators failed to provide a clear definition of the expected level of performance, thereby hindering teachers' ability to engage in meaningful reflection or to measure progress in a constructive manner. This underscores the importance of including detailed descriptors that represent progressive levels of teacher competency. These descriptors can function as a catalyst for introspection, offering diagnostic feedback to facilitate goal-setting for professional development.

Additionally, numerous indicators lacked clearly defined criteria or standards, particularly in Type 1 models. Absent explicit levels of performance, teachers may encounter difficulties in identifying the characteristics of improvement or the process of advancing from one level to the next. Instruments must therefore be accompanied by rubrics that describe qualitative differences in teacher behavior or thinking across stages of development.

The finding that many indicators crossed over multiple knowledge domains is not a flaw, but a strength. It reinforces the idea that effective teaching practice is integrative rather than compartmentalized. This suggests that future instruments should allow flexibility and acknowledge the overlap between content, pedagogy, and knowledge of students rather than forcing strict separations.

Lastly, the complexity and comprehensiveness of Type 2 instruments—particularly in their use of descriptors and inclusion of broader teacher responsibilities such as community engagement, character development, and technology use—offer a valuable model for improving local instruments. These features promote a more comprehensive understanding of teaching and reflection, which may serve as a catalyst for the development of more robust, context-responsive instruments within the Indonesian education system.

3.5 Self-Assessment Components Recommendation

The implementation of the teacher professional development program is influenced by a multitude of factors, including cultural, social, political, economic, and individual teacher characteristics within a specific context (Tan & Dimmock, 2014). Utilizing the coding and analysis of each type 1 and type 2 instrument, essential components were subsequently compiled as recommendations for self-assessment instruments, grounded in the knowledge domains that teachers are expected to possess. The final set of components comprises of seven indicators, each accompanied by a descriptor indicating high (level 3), medium (level 2), and low (level 1) levels. Table 2 presents the essential components, which can serve as a reference for self-assessment by teachers. It also includes descriptions of achievement according to the existing levels.

Table 2. Essential Components Recommended for Teachers' Self-Assessment

Level	Indicators	Type of Knowledge		
		C	*P*	*S*
The ability to establish a connection between students' preliminary content knowledge and the subsequent acquisition of new knowledge		✓	✓	
3	Facilitate students with diverse and meaningful contexts in various scientific fields			
2	Facilitate students with abstract contexts and connect them to a few scientific fields			
1	Does not provide context that connects students' knowledge with new knowledge			
The ability to deliver materials		✓	✓	
3	Facilitate students with correct concept material and clear, systematic communication, and provide stimulating questions with appropriate cognitive levels.			
2	Facilitate students with correct conceptual material and clear, systematic communication, but provide prompts with low cognitive levels.			
1	Convey the wrong concept			
The ability to overcome students' mistakes, difficulties, and misconceptions			✓	✓
3	Facilitate students with learning experiences to discover and correct their own mistakes			
2	Ask students to look at and follow the completion steps on the learning resources independently			
1	Tell students directly			
The ability to build active student participation			✓	✓
3	Facilitate students with collaborative learning by providing space that takes into account the different ability levels of students.			
2	Facilitate students with collaborative learning without regard to differences in student ability levels			
1	Does not facilitate students with learning that takes into account differences in student ability levels			
The ability to build rapports among students and between teachers and students			✓	✓
3	Facilitate students with character traits that are consistent and appropriate to the students' stage of social and emotional development			
2	Facilitating students with characters that are appropriate to the students' social and emotional developmental stages, but not yet consistent			
1	Does not demonstrate character traits appropriate to the students' stage of social and emotional development			
The ability to use learning resources, learning media, and technology			✓	✓
3	Facilitate students with learning that uses diverse learning resources, learning media, and technology according to their needs			
2	Facilitating students with learning that uses monotonous and inappropriate learning resources, learning media, and technology			
1	Does not facilitate students with learning that uses learning resources, learning media, and technology			
The ability to choose assessments for students, use them, and follow up on their results		✓	✓	✓

Level	Indicators	Type of Knowledge		
		C	*P*	*S*
3	Facilitate students with assessment in accordance with learning objectives to determine initial and final abilities through various cases with graded levels			
2	Facilitate students with assessment in accordance with learning objectives to determine initial and final abilities through cases with monotonous levels.			
1	Facilitate students with assessments that are not in line with learning objectives.			

The seven indicators that were compiled are as follows: two of them are related to content knowledge, four of them are related to knowledge about students, and one of them is related to all three types of knowledge. The essential components developed in this paper—that is, the indicators that include knowledge of content and knowledge of students—each also include knowledge of pedagogical and practice. This assertion is founded on the premise that a comprehensive understanding of pedagogical principles and the ability to apply them in practice are indispensable components of teaching proficiency. The integration of knowledge of content and pedagogical expertise underscores the multifaceted nature of teaching as a profession, necessitating a comprehensive and synergistic integration of diverse competencies and a profound mastery of knowledge in every instructional design.

Indicator 1 pertains to the teacher's capacity to establish a connection between the students' initial content knowledge and the subsequent material. In the extant instrument, this indicator is limited to the form of a priori knowledge imparted by the teacher, specifically the manner in which the teacher correlates the studied material with the prerequisite material. The proposed indicator 1 aims to assess the depth of the teacher's knowledge of the material taught, so that it considers not only the prerequisite material but also the meaning of the material. The highest-level descriptor seeks to assess whether teachers are able to facilitate students' prior knowledge in diverse and meaningful contexts in various fields of science. This ability underscores the necessity for teachers to not only possess a comprehensive understanding of the subject, but also to discern its significance for students' learning (Shulman, 1986). The comprehension of the material, as delineated here, pertains to the discernment of the abstract components of the subject, which can be applied to the resolution of authentic problems. This construct encompasses two distinct yet interconnected facets of teacher expertise: content knowledge, which refers to the depth and breadth of the subject matter expertise; and pedagogical knowledge, which encompasses the methods and practices employed in presenting the context of problems in alignment with students' cognitive processes (Majewska, 2016).

Indicator 2 pertains to the teacher's capacity to deliver the material, with the objective of evaluating the efficacy with which the teacher constructs the material in a systematic manner and delivers it employing methods that engender active learning. This indicator is concerned with the teacher's aptitude for designing a learning trajectory through a series of layered inquiries that stimulate students' critical and creative thinking to achieve the stipulated learning objectives. This indicator encompasses the teacher's knowledge of content, which facilitates the application of diverse pedagogical strategies to tailor learning experiences to students' individual needs.

Indicator 3 pertains to the efficacy of teachers in addressing students' errors, challenges, and misconceptions. This component seeks to evaluate the extent to which teachers leverage information regarding the learning requirements of each student to personalize their learning process. This indicator encompasses two aspects: first, teachers' understanding of students' individual needs and characteristics; and second, teachers' knowledge of pedagogical principles and practices, particularly the ability to design a learning process tailored to the needs of students.

Indicator 4 pertains to the capacity of teachers to facilitate active student engagement. This component seeks to evaluate how teachers leverage information regarding students' learning requirements to orchestrate collaborative learning according to students' proficiency levels. This

indicator encompasses teachers' knowledge of students and pedagogical knowledge and practice, specifically how teachers foster learning by allocating space for students to assume ownership of responsibilities in completing a task within the learning process.

Indicator 5 pertains to the capacity of teachers to establish rapport between students and among students. This component seeks to evaluate how teachers cultivate relationships with students and among students, aligning with the developmental needs of students at their particular stage of social and emotional growth. teachers' knowledge of students and knowledge of pedagogical and practice, particularly how teachers position themselves to think, behave, and act in a manner consistent with students' developmental stage.

Indicator 6 pertains to the capacity of teachers to utilize learning resources, learning media, and technological tools. This component seeks to evaluate teachers' aptitude in maintaining currency with technological advancements. By demonstrating mastery in information and technology, teachers are equipped to employ a diverse array of learning resources, learning media, and technologies in alignment with students' diverse needs. This indicator encompasses two key domains: teachers' knowledge of students and pedagogical knowledge and practice, particularly the manner in which teachers foster engaging learning environments.

Indicator 7 pertains to the capacity of teachers to select, utilize, and pursue subsequent actions based on assessments for students. This component endeavors to evaluate the manner in which teachers ascertain the fundamental components of each instructional material and subsequently formulate inquiries that align with the respective proficiency levels to ascertain the attainment of student learning outcomes. This indicator encompasses knowledge of content, knowledge of students, and knowledge of pedagogical and practice, specifically the manner in which teachers elucidate the essential elements of the learning process through inquiries following the completion of the learning activity.

The seven essential components described above can serve as guidelines for teachers to develop self-assessment instruments according to their needs. However, it is imperative that these seven components be investigated in every learning process. Given that teachers possess distinct individualities, it is imperative to acknowledge the prolonged duration required for the processing and reflection on novel concepts, the subsequent implementation in the classroom setting, and the subsequent discussion as an evaluation outcome (Bautista & Ortega-Ruiz, 2015; Villegas-Torres & Lengeling, 2021). It is crucial for teachers to recognize the uniqueness of each learning experience, underscoring the absence of a universally applicable instructional strategy. Consequently, the importance of teachers gaining an in-depth self-knowledge cannot be overstated, and they must engage in self-assessment by directing their attention to the main components that can be measured in order to assess their own effectiveness.

3.6 Study Limitations

It is imperative to acknowledge the several limitations of the current study. Firstly, the sample size was limited to two participants, and the scope was confined to a single region in Indonesia, which restricts the generalizability of the findings. Secondly, although the instrument analysis was thorough, the proposed self-assessment framework has not yet been piloted or validated in actual classroom settings. Consequently, the practical effectiveness and user response of the system are yet to be evaluated. Thirdly, the coding process was conducted by a single researcher without formal inter-rater reliability testing, which introduces potential subjectivity. In the interest of scientific advancement, it is recommended that subsequent studies encompass the involvement of multiple coders and incorporate reliability checks to ensure the validity of the findings. Despite these limitations, the study provides significant insights into the development and structure of teacher self-assessment tools, particularly in contexts where reflective practice is in its initial stages but lacks systematic support.

4. CONCLUSION

This study identified seven essential components of teacher self-assessment, which are derived from the integration of three core knowledge domains: knowledge of content, knowledge of pedagogy and practice, and knowledge of students. These components are: (1) connecting students' prior knowledge to new content; (2) delivering materials clearly; (3) addressing students' errors and misconceptions; (4) promoting active student participation; (5) fostering rapport among students and with the teacher; (6) utilizing learning resources and technology; and (7) selecting, using, and following up on assessments. Each component is described across three developmental levels, offering a structured rubric to support reflective teaching practices.

The analysis of eight existing instruments revealed notable gaps, particularly in content knowledge coverage. Despite its foundational role in instructional design, content knowledge remains underrepresented. This underscores the urgent need for tools that explicitly assess and support teacher growth in this domain.

The proposed self-assessment rubric offers practical implications for both in-service and pre-service teachers. It functions as a reflective guide, offering teachers a method for evaluating their teaching practice, identifying specific areas for improvement, and supporting professional development in a measurable and structured manner. Teachers can also employ the rubric collaboratively, using it as a common reference point for peer discussion and collegial learning.

Future research should prioritize the implementation of the rubric in diverse educational settings to assess its validity and usability. Furthermore, the adaptation and contextualization of the instrument for various regions and subject areas is critical to ensure its broader applicability across Indonesia's diverse educational landscape.

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