

## The Role of Diagnostic Assessment in Needs Analysis to Support Differentiated Instruction

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### Abstract

Differentiated instruction is widely recognized as an approach that accommodates student diversity in terms of ability, interest, and learning style. However, the effectiveness of differentiation heavily depends on the accuracy of teachers' perceptions of student needs. This study objective is to conceptually analyse the role of diagnostic assessment as an instrument in needs analysis to support differentiated instruction planning. Given the growing body of empirical research on the widespread implementation of differentiated instruction, a systematic literature review is essential to provide practical guidance for teachers in designing differentiated learning. The data were analysed using the three-stage content analysis method. The findings indicate that diagnostic assessment has three main roles: (1) identifying students' academic readiness levels, (2) mapping students' learning interests, and (3) recognizing students' learning profile. These three assessment outcomes serve as the raw material for needs analysis, which is then interpreted into four differentiation strategies: differentiation of content, process, product, and learning environment. In the absence of diagnostic assessment, efforts to implement differentiated learning remain speculative and may be ineffective. This study recommends that diagnostic assessment be positioned as a mandatory stage before designing differentiated instruction.

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## INTRODUCTION

The Merdeka Curriculum, which has been gradually implemented in Indonesia since 2022, has brought several paradigmatic changes to learning practices. One of the most significant changes is the emphasis on differentiated instruction in response to the diverse characteristics of students (Kemendikbudristek, 2021). From this perspective, teachers are no longer viewed as presenters of uniform material for the entire class, but rather as facilitators capable of adapting learning strategies to individual students' needs. The world nowadays is in an era where knowledge is being developed faster than before. This makes it almost impossible to stay updated with the latest information in our field of work unless we actively

keep up with new developments (Al-Momani & Rababa, 2023). So the teachers should improve the ways they teach or facilitate the class. One of the methods is with the differentiated instruction.

Differentiated instruction, as proposed by Tomlinson (2001), is based on three student characteristics, namely (1) readiness, (2) interest, and (3) learning profile. Readiness refers to students' capacity and ability to learn and understand new learning materials (Rintayati, 2022). These three student characteristics suggest that differentiation cannot be done haphazardly or based solely on intuition. Teachers need accurate data on students' baseline conditions before determining appropriate differentiation strategies. By using research-based differentiated instruction, the learning process will be targeted to the students' personalised needs, allowing student to develop and learn within their capability (Fordyce, et al., 2021). This is necessary to ensure each student can grow and develop according to their potential, which can support learning achievement (Hadiapurwa, et al., 2021).

However, the reality shows that many teachers experience difficulties in designing differentiated instruction because they do not have an adequate understanding of their students' needs (Irawan, 2025; Amanulah & Ramadhan, 2025; Lailiyah & Mas'ud, 2024). This phenomenon raises fundamental questions about how teachers can differentiate the content, process, or product of learning if the teacher does not clearly know what students already know, what students want to know, and how the students learn best. This is also in line with the results of preliminary research conducted by Sugiarto, et al. (2023), which took place among elementary school teachers in Taliwang District, namely one of the problems faced by teachers is a lack of understanding regarding the procedures for compiling, implementing, and processing the results of diagnostic assessments so that they can become information for mapping student groups based on their abilities and learning needs.

The answer to this major issue lies in two interrelated concepts, diagnostic assessment and needs analysis. Diagnostic assessment is a specific assessment conducted to identify students' competencies, strengths, and weaknesses, so that learning can be tailored to their competencies and conditions. Meanwhile, needs analysis is a series of procedures used to gather information about students' needs (Richards, 2001).

Theoretically, the relationship between diagnostic assessments, needs analysis, and differentiated instruction is linear and logical. Diagnostic assessment generates raw data, needs analysis processes that data into meaningful information, and instructional differentiation takes concrete action based on that information. However, many teachers skip the needs analysis stage or even skip the diagnostic assessment altogether. As a result, differentiation is often a mere formality or simply divides students into groups without a clear basis.

Based on the description above, this study is deemed important for conceptually examining the role of diagnostic assessment in needs analysis to support differentiated learning. This study is expected to provide a useful theoretical framework for teachers, prospective teachers, and curriculum developers in understanding the logical flow from diagnostic assessment to differentiated learning. Based on the reasons that have been described, a number of problems can be identified, namely: (1) Differentiated learning requires an accurate understanding of student needs, but not all teachers have a systematic strategy to apply it; (2) Diagnostic assessment is often understood narrowly as an initial test without being followed by an in-depth analysis process; (3) Needs analysis as a bridge between diagnostic assessment and differentiated learning is rarely discussed explicitly in curriculum training.

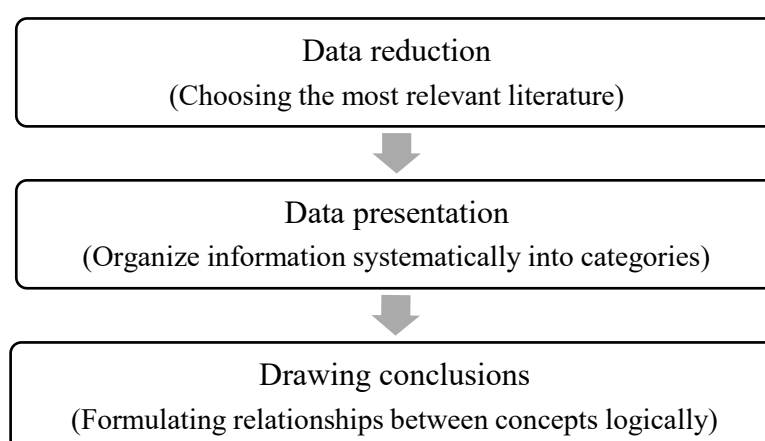
In order for this study to be more focused, the issues to be discussed are focused to the following points: (1) The study only covers conceptual and theoretical aspects, not practical implementation in the field; (2) The main focus is on the role of diagnostic assessment in

generating data for needs analysis; (3) The differentiated instruction referred to is limited to four dimensions according to Tomlinson (2001): differentiation of content, process, product, and learning environment; (4) The diagnostic assessments studied include cognitive (prior knowledge) and non-cognitive (interest, learning style, readiness) diagnostic assessments.

This article is expected to enrich the scientific literature on curriculum and learning, particularly regarding the relationship among diagnostic assessments, needs analysis, and differentiation. Furthermore, it is hoped that this article will provide a conceptual framework that can be used for further empirical research. Practically, this article is also expected to provide teachers with an understanding of the importance of diagnostic assessment and needs analysis before designing differentiated learning and to serve as a consideration in developing guidelines or training on diagnostic assessment and differentiation for curriculum developers.

## METHOD

This article uses a qualitative approach with a library research approach. Library research is research conducted by reviewing, analysing, and synthesizing various literature relevant to the topic being researched (Zed, 2014). The data sources used in this study consisted of primary data sources, namely official documents regarding the Merdeka Curriculum policy (Panduan Pembelajaran dan Asesmen, Kemendikbudristek, 2021), and secondary data sources, namely textbooks, scientific journals, articles, and proceedings. The data collection technique used was documentation. Subsequently, the data were analysed using the three-stage content analysis method, as shown in Figure 1.



**Figure 1.** *Stages of content analysis*

According to Sitasari (2022), content analysis can be used if: 1) The available data consists mostly of documented materials; 2) There is supplementary information or a specific theoretical framework that explains and serves as a method of approaching the data; 3) The researcher has the technical ability to process the collected material because the material is specific.

## RESULTS AND DISCUSSION

### The Concept of Diagnostic Assessment

As stated in the Decree of the Minister of Education and Culture of the Republic of Indonesia No. 719/P/2020, diagnostic assessment is an assessment specifically used to identify students' competencies, strengths, and weaknesses so that the learning process can be designed based on those competencies and conditions. Unlike formative assessments conducted during

learning and summative assessments conducted at the end of learning, diagnostic assessments serve as the initial stage that determines the direction and strategy of subsequent learning.

Azmi, et al. (2025) emphasized that diagnostic assessments serve as a "baseline map" for teachers to understand students' conditions. Without such a map, teachers risk designing learning that is too difficult, too easy, or irrelevant to students' needs. In the context of the Merdeka Curriculum, diagnostic assessments are a mandatory component listed in the Learning and Assessment Guidelines (Kemendikbudristek, 2021). Diagnostic assessment is very important in learning because it can help teachers to evaluate students' abilities individually, determine students' initial ability levels, and design learning strategies that suit students' needs (Atikah, et al., 2024).

Based on its purpose, diagnostic assessment is divided into two main types, namely cognitive diagnostic assessment and non-cognitive diagnostic assessment. Cognitive diagnostic assessment aims to measure students' prior knowledge of the material to be studied. The results of cognitive assessments provide information about concepts that students have mastered and concepts that students have not yet understood. Examples of instruments include simple written tests, initial quizzes, concept maps, or oral questions. Meanwhile, non-cognitive diagnostic assessment aims to understand the psychological and socio-emotional aspects of students that influence the learning process, including learning readiness: the extent to which students are ready to receive new material, interests: what topics or fields attract students' attention, and learning profiles: dominant learning styles (visual, auditory, kinaesthetic, or a combination), motivation and self-confidence: how motivated students are in learning, and socio-emotional conditions: whether students experience psychological or social barriers. Examples of instruments: simple questionnaires, attitude scales, short interviews, or observations.

Diagnostic assessments can be conducted at three different times as needed, for example, at the beginning of the school year, at the beginning of the material scope, and before developing independent teaching modules (Kemendikbudristek, 2021). Diagnostic assessments conducted at the beginning of the school year aim to map the general condition of all students for long-term curriculum planning. Diagnostic assessments conducted at the beginning of each chapter or topic aim to determine students' readiness for the material to be taught. In the context of the Merdeka Curriculum, Kemendikbudristek (2021) recommends that non-cognitive diagnostic assessments be conducted at the beginning of the school year, while cognitive diagnostic assessments be conducted at the beginning of each chapter or topic.

### **The Concept of Needs Analysis**

Needs analysis is a series of processes, from identifying needs to finding solutions to these needs, so that they can be realized in both the short and long term, for individuals and institutions (Erdogan & Guler, 2017). Unlike diagnostic assessments, which focus on data collection, needs analysis is interpretive. Teachers not only collect information about students but also identify and interpret that information to determine their needs. Therefore, in the context of differentiated instruction, needs analysis can act as a bridge between diagnostic assessment data and strategic decisions about how to implement differentiated instruction. Conceptually, Porche (2004) explains three stages in needs analysis: pre-analysis, analysis, and post-analysis. In the pre-analysis stage, a plan is created for conducting the needs analysis, establishing objectives, establishing boundaries, timeframes, and cost allocations, and determining the type of data to be collected. In the analysis stage, data is collected, analysed, and synthesized. The next stage, or post-analysis, involves making decisions, writing reports, and publishing the results.

## The Concept of Differentiated Instruction

Essentially, differentiated instruction means making changes in the classroom so that students have multiple choices in how they learn (Tomlinson, 2001). This means the teacher's role is to proactively design and adapt the learning process to accommodate the diversity of student characteristics, ranging from readiness to interests and learning profiles. It should be emphasized that differentiated instruction is not a response to an emergency, but rather a plan that is carried out from the outset. In the context of the Merdeka Curriculum, differentiated instruction is one of the key principle's teachers must implement. Differentiation is not simply a strategy to accommodate diversity, but rather a bridge that ensures every student can actively engage in meaningful, transformative learning that is oriented toward holistic competency development (Kemendikbudristek, 2025). Tomlinson (2003) identified four dimensions in which teachers can differentiate:

### a. Content Differentiation

Content differentiation refers to what we teach students in response to their learning readiness, interests, or learning profiles (visual, auditory, kinaesthetic), or even a combination of the three (Farda, et al., 2023). An overview of content differentiation strategies can be seen in Table 1.

**Table 1.** Content Differentiation Strategy

| Readiness Level | Content Differentiation Strategy                                                         |
|-----------------|------------------------------------------------------------------------------------------|
| Low             | The material is simplified, concrete examples are given, and the material is visualized. |
| Medium          | Standard materials according to the curriculum                                           |
| High            | The material is enriched with advanced concepts, additional reading, and challenges.     |

### b. Process Differentiation

Process differentiation, namely how students will interpret the material to be studied either independently or in groups by providing tiered activities, having guiding questions or challenges, creating individual student agendas, varying time, developing varied activities, and using flexible grouping (Farda et al., 2023).

### c. Product Differentiation

Product differentiation, which is the work or assignments we expect from students, involves providing challenges or variations and choosing products that interest them. For example, students can choose to create posters, oral presentations, short videos, written essays, or artwork based on their interests (Farda et al., 2023).

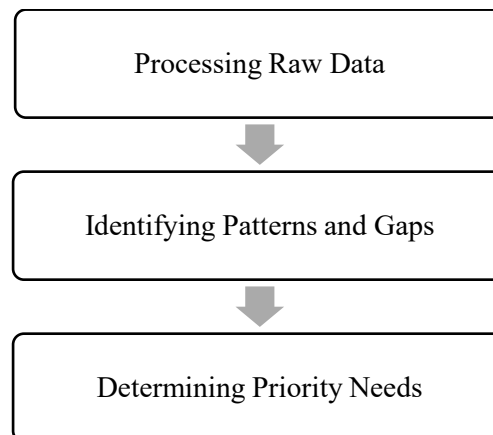
### d. Differentiation of Learning Environments

The learning environment is the atmosphere and physical setting of a classroom. Differentiating the environment means adjusting the classroom layout, rules, and climate to accommodate diverse learning needs. Examples include providing quiet corners for students who are easily distracted, discussion areas for students who prefer group study, adjustable lighting, etc.

## Transforming the results of diagnostic assessments and needs analysis into differentiated instruction strategies

Tomlinson (2001) emphasized that effective differentiation cannot be done instantly or based on preconceived notions. Differentiated instruction is guided by three student

characteristics: readiness, interest, and learning profile. Information regarding these three characteristics of each student can be obtained through diagnostic assessments and needs analyses. The steps in transforming diagnostic assessment results into a differentiated instruction plan are shown in [Figure 2](#).

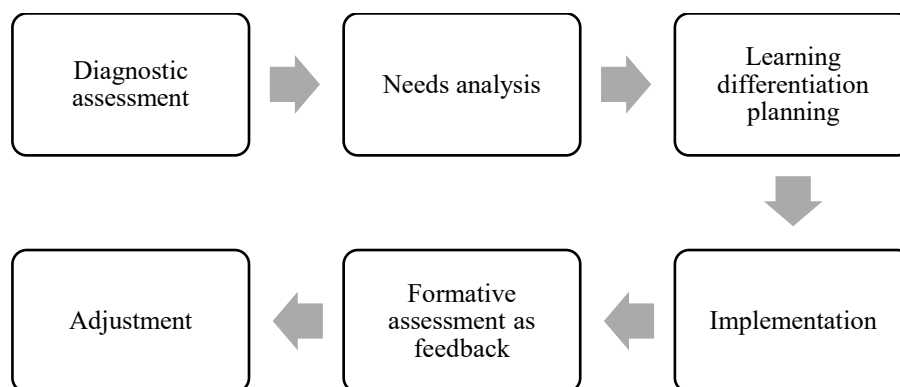


**Figure 2.** Transforming diagnostic assessment results into needs analysis

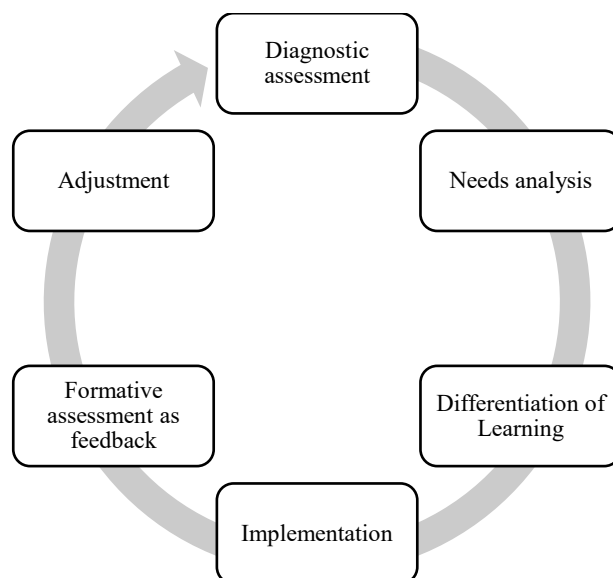
The first step is processing raw data that have been collected. Diagnostic assessment results, just like test scores, questionnaire responses, or observation notes, are grouped and summarized. For example, from cognitive assessment results, teachers can group students into some categories. Next step is identifying patterns and gaps based on the patterns or trends in the data. For example, do most students share the same misconceptions? Are there any students with a kinaesthetic learning style identified? Are there any students who show interest in a particular topic? Again, the teacher can group students if there are some students with the same interest or learning style.

The final step is to determine priority needs. We must highlight that not all needs can be met simultaneously. Teachers need to determine which needs are most pressing or most influential on learning success. Tomlinson (2003) suggests prioritizing readiness needs first, followed by learning profile and interest needs.

After all the transforming process from the diagnostic assessment results into needs analysis, the teachers can start to plan the differentiated instruction strategies to be applied in the classroom. Theoretically, these three concepts form a systematic and logical flow, which is expressed as a linear flow as in [Figure 3](#), as well as a cyclical flow as in [Figure 4](#).



**Figure 3.** Linear Flow Model



**Figure 4.** Cycle Model

The cycle model emphasizes that diagnostic assessments are not only conducted at the beginning but can be repeated periodically to adjust differentiated instruction strategies.

### 1. The Role of Diagnostic Assessment in Identifying Student Learning Readiness

*Instruction should always “be in advance” of a child's current level of mastery. That is, teachers should teach within a child's zone of proximal development. (Byrnes in Tomlinson, et al., 2003).*

This statement illustrates that learning must always be "one step ahead" of the student's abilities. This means that a teacher must understand a student's learning readiness level before implementing the lesson. In this regard, diagnostic assessment plays a central role in identifying a student's level of learning readiness. Readiness to learn is a crucial foundation for a successful learning process (Bulan, et al., 2025). Without information about readiness, teachers cannot determine whether material is too difficult, too easy, or appropriate for students. This readiness to learn can be seen through cognitive diagnostic assessments.

Cognitive diagnostic assessment results allow teachers to group students into readiness levels. Groups with low readiness require content differentiation through simplified material. Groups with high readiness require enrichment and additional challenges. Without diagnostic assessments, teachers would treat all students as homogeneous.

### 2. The Role of Diagnostic Assessment in Mapping Students' Learning Interests

What topics naturally interest students and why interest is important in differentiation are answered by the research conducted by Hidi & Renninger (2006), which shows that when students learn based on interest, they tend to show higher cognitive engagement, exert greater effort, and have a better ability to retain information. In the context of differentiation, information about student interests is primarily used to differentiate products. Teachers can provide assignments or projects that align with students' interests. A student interested in art might be asked to create a poster or comic strip. In contrast, a student interested in technology might be asked to create a digital presentation or short video. Both products can demonstrate the same understanding of the material, but through different mediums that reflect their interests. Conceptually, interest-based product differentiation would be impossible without a diagnostic assessment that first maps students' interests. Without interest mapping, the choices

teachers provide are speculative and may not be relevant to students' actual interests.

### 3. The Role of Diagnostic Assessment in Identifying Students' Learning Profiles

The third and most complex role of diagnostic assessment is identifying students' learning profiles. Learning profiles include preferences for sensory modalities such as visual, auditory, or kinaesthetic, preferences for social settings (studying alone, in pairs, or in groups), and preferences for learning environments (quiet or with music, formal or relaxed). Non-cognitive diagnostic assessments, such as learning style questionnaires or participant observation, can reveal students' learning profiles. This information then forms the basis for process differentiation, which is how students access and process learning materials. Conceptually, the learning profile-based process differentiation strategy can be illustrated in [Table 2](#).

Table 2. Process differentiation strategy

| Learning Profile | Process Differentiation                       |
|------------------|-----------------------------------------------|
| Visual           | Read text, watch videos, make diagrams        |
| Auditory         | Discussion, listening to explanations         |
| Kinaesthetic     | Hands-on practice, experiments, physical play |

It's important to note that diagnostic assessments for learning profiles don't have to be complex. A simple instrument like a questionnaire asking, "Do you prefer to learn by reading a book (visual), listening to a teacher's explanation (auditory), or doing hands-on practice (kinaesthetic)?" is sufficient to provide an initial overview.

### 4. Needs Analysis as a Path to Differentiated Learning

One of the most important conceptual findings of this study is that diagnostic assessment alone is not enough. Raw data from diagnostic assessments must be processed through a needs analysis process before it can be used to design differentiation. Why is a needs analysis necessary? [Hernawan \(2018\)](#) explains in his article that needs arise from a gap between the expected and actual situations. Therefore, it's important to understand the gap between the actual situation, as determined by the diagnostic assessment, and the expected situation from differentiated instruction.

Raw data from a diagnostic assessment is just numbers until it's analysed. For example, a teacher might know that 15 out of 30 students scored low on a diagnostic assessment, but without a needs analysis, the teacher doesn't know what those 15 students actually need. Do they need a review of basic concepts? Do they need different media? Do they need more learning time? Needs analysis answers these questions by interpreting data in a broader context.

### 5. Consequences of Missing Diagnostic Assessment and Needs Analysis

To strengthen the argument for the importance of diagnostic assessment and needs analysis, this study also needs to discuss what happens if these two stages are not carried out. Conceptually, there are three negative consequences: (1) Speculative Differentiation. Without diagnostic assessments, teachers will differentiate based on assumptions, intuition, or habit. A teacher might divide students into groups based on seating positions or previous test scores that may not be relevant to the current material. This type of differentiation is speculative and risks missing the mark; (2) Waste of Resources. Differentiation requires more preparation from teachers (preparing different materials, designing different activities, etc.). If differentiation is not based on an accurate needs analysis, the teachers' efforts and time can be wasted. A teacher

might go to the trouble of creating three versions of materials for three groups, only to find that the groupings are flawed because they were not based on a proper diagnostic assessment; (3) Learning Inequity. Paradoxically, differentiation that isn't based on diagnostic assessment can create inequities. One student might be placed in the "low" group based on a teacher's assumptions, when in fact they only need a slightly different explanation. Conversely, another student might be placed in the "high" group and miss out on the treatment they truly need.

## CONCLUSION

Based on the literature review and discussion that has been conducted, it can be concluded that diagnostic assessment has three main roles in the context of learning differentiation: (a) identifying students' level of academic readiness (through cognitive diagnostic assessment); (b) mapping students' learning interests; and (c) recognizing students' learning style profiles (through non-cognitive diagnostic assessment).

Needs analysis serves as a bridge between diagnostic assessment and instructional differentiation. Raw data from diagnostic assessments must be processed through a needs analysis process (clustering, pattern identification, prioritization) before it can be transformed into a differentiation strategy. Without diagnostic assessment and needs analysis, instructional differentiation is speculative, potentially wasteful of resources, and can create learning inequities.

Teachers should make diagnostic assessment a mandatory step in lesson planning, using simple, easy to develop instruments that do not overwhelm students. Therefore, teachers should set aside dedicated time to conduct a needs analysis before designing the learning differentiation they will implement. Training curriculum developers should include materials on needs analysis and develop concrete examples of transforming assessment results into differentiation strategies. Future researchers can conduct empirical research to test the effectiveness of the conceptual model developed in this study. Furthermore, practical and user-friendly diagnostic assessment instruments and needs analysis guides can be developed.

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