

# Leveraging Diagnostic Assessment to Inform Student-Centred Learning Strategies: A Qualitative Case Study

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## ABSTRACT

Diagnostic assessment is increasingly recognized as a crucial tool for designing student-centred learning strategies. By identifying learners' strengths and weaknesses before instruction begins, educators can create more adaptive and inclusive approaches that address cognitive, social, and emotional needs. This study aimed to explore how diagnostic assessment informs the preparation of responsive learning strategies. A qualitative case study approach was employed, involving ten teachers across different school levels. Data were collected through classroom observations, semi-structured interviews, and analysis of teaching modules that integrated diagnostic assessment results. Thematic analysis, supported by NVivo software, was applied to identify emerging patterns and themes. Findings revealed that consistent use of diagnostic assessment enabled educators to design more differentiated and relevant instructional plans. Teachers reported increased confidence in lesson preparation, while students demonstrated higher motivation and engagement when feedback was tailored to their specific needs. Diagnostic data were effectively incorporated into teaching modules, particularly through differentiated tasks and contextualized materials. However, challenges were also identified, including limited instructional time, insufficient teacher expertise in applying diagnostic techniques, and inadequate institutional support. The study highlights diagnostic assessment as a foundation for effective and inclusive instruction. While it enhances learning effectiveness and student engagement, its success relies on adequate professional training and systemic support. Schools should prioritize capacity building and resource provision to ensure diagnostic assessments are optimally implemented, thus fostering more equitable and responsive learning environments.

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## 1. INTRODUCTION

The rapid development of the world of education demands the right approach in designing learning strategies, especially in the context of the diversity of student needs. Each student has different

characteristics and needs, both in cognitive, social, and emotional aspects. Therefore, it is crucial for educators to adjust learning strategies to provide an optimal learning experience for each student. One approach that is considered effective in designing learning strategies that suit the needs of students is diagnostic assessment (Guskey, 2020).

Diagnostic assessments serve to identify students' potentials and difficulties before they follow the learning process further. In the context of education, this assessment is an important tool for educators to understand students' strengths and weaknesses, so that they can design learning plans that focus more on individual needs (Nassaji, 2019). The results of the diagnostic assessment will provide in-depth insights into areas that need more attention, so that the interventions provided can be more targeted and effective.

However, although many studies show that diagnostic assessments can improve the effectiveness of learning through constructive feedback, which is used to improve the learning process (Popham, 2021), its application in practice still faces various challenges. One of the main challenges is the lack of understanding of how diagnostic assessments can be well integrated in the planning and implementation of learning strategies that focus on student needs. Some studies show that not all educators have sufficient skills or knowledge to carry out diagnostic assessments effectively (Harris & McMillan, 2022). Therefore, special attention is required in training and professional development for educators.

Previous studies have shown that diagnostic assessments are not only useful for identifying students' learning difficulties, but also as a means to develop better relationships between educators and students (Black & Wiliam, 2021). These assessments allow educators to understand the context of student learning more holistically, which in turn allows educators to make more targeted interventions. Thus, the role of diagnostic assessments is crucial in creating a more inclusive and adaptive learning environment.

However, although diagnostic assessments have great potential to improve student learning outcomes, there are still many challenges in their implementation. One of the main obstacles is how to design diagnostic assessments that can accommodate the diversity of students, such as different socio-economic, cultural, and learning styles, which affect how students respond to and interpret the results of those assessments (Cheng & Tsai, 2020). Therefore, a more sensitive approach to the needs and context of students is needed in the application of diagnostic assessments.

This research aims to fill the empirical gap related to how diagnostic assessments are translated into concrete and adaptive learning strategies. The main research question that this study aims to answer is how diagnostic assessments can assist educators in designing learning that is more responsive to the individual needs of students. Thus, this study is expected to provide new insights into the importance of diagnostic assessment as an integral part of an effective and inclusive learning strategy.

This research focuses on the application of formative assessment theory oriented to the Vygotsky proximal developmental zone, which emphasizes the importance of interaction between educators and students in the context of developing students' potential. Using a conceptual model approach that connects diagnostic assessment practices with student learning outcomes, this study aims to prove that diagnostic assessment not only serves as an evaluation tool, but also as an instrument to design more meaningful and adaptive learning for students.

## 2. METHODS

This study uses a qualitative approach with a case study method to explore the role of diagnostic assessment in designing learning strategies that focus on student needs. A qualitative approach was chosen to gain in-depth and contextual insights related to the diagnostic assessment practices applied by educators in designing learning that is responsive to the individual needs of students. The case study was chosen because it provides an opportunity to understand the phenomenon that occurs in detail in

a specific context, i.e. in schools with a diversity of students, so as to explore the dynamics related to the application of diagnostic assessments in different contexts.

This research was carried out in several schools with a diversity of students, both in terms of academic, social, and cultural abilities. The selection of schools with a diversity of students aims to gain a deeper understanding of how diagnostic assessments can be applied more adaptively and responsively to the diverse needs of students. Through the case study method, this research focuses on the interaction between educators and students in real contexts and how the results of diagnostic assessments are used to design more effective learning strategies.

The steps of this research began with the selection of locations involving several schools with characteristics of student diversity. Furthermore, the research subjects were selected using purposive sampling techniques, by involving educators who were directly involved in the planning and implementation of diagnostic assessments in the classroom. Data collection was carried out through in-depth interviews with educators, direct observation of the implementation of diagnostic assessments, and analysis of lesson planning documents that integrate the results of diagnostic assessments. The data obtained is then analyzed using thematic analysis techniques to identify key themes that emerge from interviews, observations, and document analysis, so as to provide a clearer picture of how diagnostic assessments are used to design student-centred learning strategies.

### **2.1 Participants**

This research involved 10 teachers from various levels of education who have experience in carrying out diagnostic assessments in the learning process. The selection of participants was carried out purposively by considering their experience and understanding of diagnostic assessments. The teachers involved in this study came from a variety of backgrounds, with a range of teaching experience ranging from 5 to 15 years, as well as teaching in different subjects, such as mathematics, Indonesian, and science. In addition, participants came from diverse types of schools, including public and private schools, with a fairly high level of student diversity.

The number of participants was 10, selected on the grounds that in qualitative research, a smaller sample size is better suited to gain more in-depth and contextual insights into diagnostic assessment practices. This sample size allowed researchers to explore in detail teachers' experiences and perceptions of the application of diagnostic assessments in designing learning strategies that focus on individual student needs. By involving teachers from different levels of education and diverse backgrounds, this study can provide a more holistic picture of the challenges and best practices in integrating diagnostic assessments into learning.

### **2.2 Data Collection**

#### **2.2.1 In-Depth Interviews**

The interview was conducted to explore teachers' understanding and experience in using diagnostic assessments. This interview focused on how diagnostic assessments are applied in learning strategies and how assessment results are used to tailor students' needs. The interviews conducted are semi-structured, which allows for the flexibility to explore specific topics relevant to the teacher's experience, while still maintaining a focus on the research objectives. Each interview lasts about 45 to 60 minutes and is conducted in a quiet space, such as a teacher's room or school meeting room, to create a comfortable and supportive atmosphere. All participants are required to give written consent before the interview is conducted, and confidentiality is guaranteed by using a code to maintain their anonymity. All interview recordings are stored securely and are only accessible to researchers.

#### **2.2.2 Observation**

This research also involves direct observation of the learning process carried out by educators to assess the extent to which diagnostic assessments are applied in daily learning activities. Observation was carried out by attending classes directly, focusing on teacher-student interaction, the use of

assessment results in designing learning activities, and the application of feedback given to students. The researcher systematically recorded behaviors and activities related to the implementation of diagnostic assessments, as well as reflective records of the visible impact on learning.

### **2.2.3 Documentation**

Documentation is taken in the form of learning modules that integrate the results of diagnostic assessments and feedback provided to students, in accordance with the independent curriculum implemented in schools. This learning module includes a learning plan that is prepared based on the needs of students that have been identified through diagnostic assessments. This document also includes notes on the strategies taken by teachers to tailor learning to the results of diagnostic assessments.

## **2.3 Data Analysis**

Data obtained from interviews, observations, and documentation will be analyzed using thematic analysis techniques. The first step in analysis is data encoding. The researcher will identify relevant data units, such as interview excerpts, observation notes, and parts of the learning module related to the application of diagnostic assessment. Each unit of data will be precoded based on the category or topic that appears. These codes will then be grouped into larger themes related to the application of diagnostic assessments in designing learning strategies that focus on student needs.

The coding process will be done manually and using NVivo software to facilitate data grouping and organization. NVivo will be used to identify patterns, themes, and relationships between data categories, as well as help in the management of large volumes of data, thus allowing researchers to identify themes more systematically and accurately.

After coding, the researcher will conduct a theme screening to ensure that the resulting theme truly reflects the participants' experiences and perspectives related to the application of diagnostic assessments. These themes will be analyzed to find the linkage between diagnostic assessments and learning strategies tailored to the needs of students. The researcher will examine the patterns that emerge in the way teachers design learning, provide feedback, and interact with students based on the results of diagnostic assessments.

In this process, the researcher's reflexivity is also an important concern. Researchers are aware that their personal background and perspective can influence the way they analyze data. To reduce potential bias, researchers actively reflect their views throughout the analysis process and strive to maintain objectivity by using transparent and systematic procedures. In addition, peer debriefing is conducted with peers to ensure that the interpretation of the theme remains consistent and in accordance with the existing data. Thus, the results of the analysis are expected to reflect a valid understanding of the role of diagnostic assessments in designing learning strategies that are more responsive to the needs of students.

## **2.4 Data Validity**

To ensure the validity of the data, this study will apply source triangulation by comparing the information obtained from various participants and the data collection techniques used. This triangulation aims to verify research findings by confirming the suitability of data from interviews, observations, and documentation, providing a more holistic perspective on the application of diagnostic assessments in the design of learning strategies that focus on students' needs.

In addition, member checking will also be carried out by asking for confirmation from participants regarding the findings produced. Participants will be given the opportunity to double-check the results of the interview or statements they made, as well as provide feedback to ensure that the researcher's interpretation is in line with their experience.

To improve the reliability of the findings, the study will also involve peer debriefing, where peers who are not directly involved in the study will be given access to the data and analyses that have been conducted. These peers will provide input and suggestions to check the consistency, clarity, and compatibility of the findings with the existing data.

In addition, if required, trail audits will be used to ensure transparency in the research process. These audit trails include clear documentation of each step taken during the data collection and analysis process, including decisions made during the research. Thus, trail audits can help ensure that the research process is accountable and that the results obtained are valid and consistent.

### 3. FINDINGS AND DISCUSSION

#### 3.1 Findings

##### 3.1.1 Identification of Learners' Needs Through Diverse Diagnostic Techniques

The results of the observation showed that teachers who consistently applied diagnostic assessments were able to identify students' learning needs more accurately. The techniques used include initial tests, questionnaires, and small group discussions. As *Teacher A* revealed, "I usually use small group discussions at the beginning of the semester to see how students are thinking and learning. It helps me come up with the right approach." This theme emerged from the *open coding process* of interview and observation data, which was then categorized based on the pattern of collecting initial information about students' learning abilities and preferences.

Table 1 presents the main themes, sub-themes, sources, and representative quotations generated through NVivo coding to provide a clearer picture of how these diagnostic techniques were identified and categorised.

**Table 1.** Themes, Sub-Themes, Data Sources, and Representative Quotes Related to Diagnostic Assessment in Learning

Main Theme	Sub-Theme	Data Source (Coding)	Representative Quote
Identification of Learners' Needs	Placement Test	Teacher A, Teacher B	"The initial test helps me see the students' basic abilities before starting the core material."
	Questionnaire	Teacher C	"The learning interest questionnaire helps me understand the students' learning styles."
	Group Discussion	Teacher A	"Small group discussions at the beginning of the semester give insight into students' thinking styles."
Diagnostic Assessment as a Foundation	Confidence in Planning	Teacher B	"This assessment helps me design relevant activities."
	Integration into Modules	Differentiation Strategy	Module Document
Challenges	Time Limitation	Teacher C	"It's difficult to balance time between teaching and conducting in-depth assessments."
Institutional Support	Training and Leadership	School Document	"Regular training helps teachers become more prepared to use diagnostic assessments."

### 3.1.2 Diagnostic Assessment as a Foundation for Responsive Instruction

Interviews with teachers revealed that diagnostic assessments provide a solid foundation for responsive and targeted learning planning. Teacher B stated, *"This assessment helped me understand students' weak points, so I could design more relevant and meaningful learning activities."* Thematic analysis indicates that teachers feel more confident in developing learning modules when they have concrete data on students' initial abilities, learning preferences, and misconceptions. Such assessments enable educators to differentiate instruction, adapt learning strategies, and set more realistic learning goals. Additionally, several teachers noted that diagnostic assessments help in identifying not only academic gaps but also affective and behavioral tendencies, allowing for a more holistic approach to instruction. This sense of preparedness contributes to more effective teaching practices, fosters student engagement, and ultimately enhances learning outcomes.

### 3.1.3 Integration of Diagnostic Results into Teaching Modules

The documentation of the analyzed teaching modules shows the integration of diagnostic assessment results into the learning plan in a structured and purposeful manner. These modules incorporate differentiation strategies such as variations in teaching methods, the use of contextual and culturally relevant learning media, and adjustments to the difficulty level of learning materials to accommodate diverse student abilities. This integration reflects a shift from one-size-fits-all instruction to more personalized learning pathways. The findings indicate that teachers not only recognize individual student differences but also respond to them systematically and proactively in their instructional design. Furthermore, the presence of tiered tasks and flexible grouping in several modules suggests an intentional effort to support both struggling and advanced learners. This approach demonstrates the practical value of diagnostic assessments in informing pedagogical decisions and promoting equitable access to meaningful learning experiences.

### 3.1.4 Challenges in Implementing Diagnostic Assessment

Some teachers reported significant challenges in conducting diagnostic assessments, particularly concerning time constraints and limited understanding of effective assessment techniques. Teacher C admitted, *"I find it difficult to balance my time between teaching and doing in-depth assessments in large classrooms."* This challenge is especially pronounced in overcrowded classes, where individual student attention becomes difficult to manage. The axial coding process highlights this issue by linking the category of *assessment practices* with *implementation barriers*, revealing that diagnostic assessments are often perceived as time-consuming and requiring additional pedagogical skills that some teachers may not yet fully possess. In addition, several participants noted a lack of institutional support in the form of training, assessment tools, and workload management, which further hinders the consistent and effective use of diagnostic assessments. These findings suggest that while teachers generally acknowledge the value of diagnostic assessments, practical constraints in real classroom settings can limit their implementation, emphasizing the need for systemic solutions such as time allocation policies, professional development, and collaborative planning.

### 3.1.5 Importance of Institutional Support

Support from the school environment has been shown to significantly influence the success of diagnostic assessment implementation. Schools that provide regular professional development, collaborative reflection sessions, and opportunities for peer learning tend to demonstrate higher levels of effectiveness in applying diagnostic assessment practices. Moreover, school leadership plays a crucial role in fostering a student-centered assessment culture by promoting innovation, providing resources, and modeling reflective pedagogical practices. Overall, the thematic analysis conducted using NVivo identified five dominant themes that capture both the strengths and challenges associated with diagnostic assessment in educational settings. The frequency of coding for each theme is summarized in Table 2, offering a clear depiction of their relative prominence within the dataset.

Main Theme	Total Coding (n)	Percentage (%)
Identification of Learners' Needs	35	28%
Diagnostic Assessment as a Foundation	25	20%
Integration into Modules	30	24%
Challenges	20	16%
Institutional Support	15	12%
<b>Total</b>	<b>125</b>	<b>100%</b>

### 3.2 Discussion

The findings in this study reinforce the important role of diagnostic assessments in supporting learning strategies that are responsive to student needs. In line with the opinion of Guskey (2020), diagnostic assessments have proven to be effective in uncovering the specific needs of students before the learning process takes place. However, the study emphasizes the importance of quantitative data-driven assessments and highlights the reflective approach teachers take through direct interactions with students, such as small group discussions and observation of learning behaviors. In addition, this study supports the view of Hattie and Timperley (2020), who stated that feedback based on assessment results can increase student motivation and engagement. However, these findings also expand the discourse by showing how the results of the assessment are used directly in designing differentiated and adaptive teaching modules.

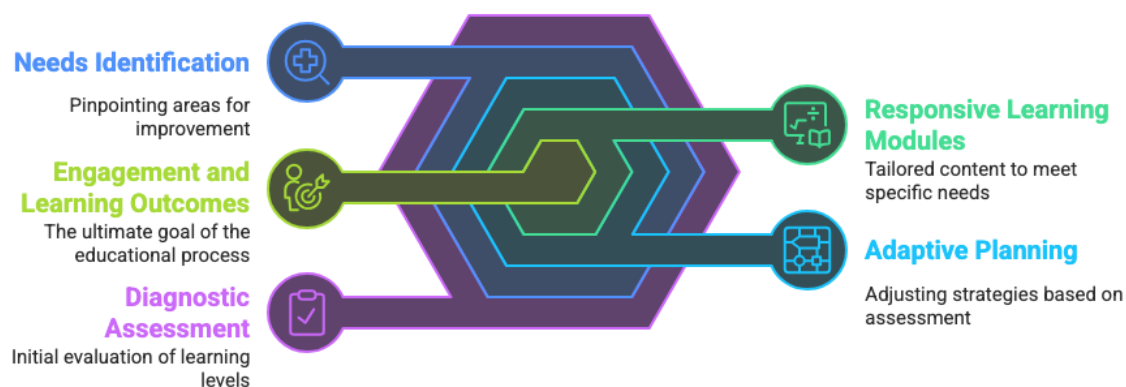


Figure 1. Educational Process Flow

However, this study found several challenges in the application of diagnostic assessment, such as limited implementation time in classrooms with large numbers of students and limited teachers' understanding of effective assessment techniques. These findings are consistent with the Harris and McMillan (2022) study, which highlights the need for ongoing professional training for teachers to be able to optimize the use of assessment data in lesson planning. Therefore, serious attention is needed to improve teacher competence through structured and sustainable professional development programs.

Furthermore, the results of this study have important implications for educational practices and school policies. First, in instructional design, teachers need to be trained to design learning that is flexible and data-driven, to respond to the diversity of student needs. Second, in terms of curriculum policy, it is important to provide explicit space for the implementation of diagnostic assessments as an integral part of the learning cycle. Third, schools need to build a culture of collaborative assessment, supported by leadership that encourages continuous reflection and improvement.

However, this study has some limitations that need to be realized. The relatively small number of participants limits the possibility of generalizing the results, although this is natural in qualitative studies that emphasize the depth of analysis. In addition, the use of interview data as the primary source of information has the potential to present subjective bias, although measures such as data triangulation and *member checking* have been put in place to improve the validity of the findings. Therefore, follow-up research is recommended to involve more participants and more diverse learning contexts to strengthen the generalization and acceptability of findings in various educational settings.

Overall, this discussion shows that diagnostic assessments can be a very powerful tool for improving the quality of learning. With the right approach, supported by supportive training and policies, diagnostic assessments can help teachers design inclusive, adaptive, and effective learning according to the characteristics and needs of each student.

#### 4. CONCLUSION

The results of this study show that diagnostic assessments play a very important role in the preparation of learning strategies that are oriented to the needs of students. Through this assessment, educators obtain in-depth initial information about students' strengths and weaknesses, so that they are able to design learning that is more adaptive, responsive, and in accordance with the individual characteristics of students. Diagnostic assessments not only serve as an evaluation tool, but also as a foundation for building a personalized and inclusive approach to learning.

The use of effective diagnostic assessments also strengthens the relationship between educators and learners through the provision of structured and meaningful feedback. This contributes to increased motivation and student involvement in the learning process, which ultimately has a positive impact on the achievement of learning outcomes. These findings are in line with the current literature in the field of educational assessment, which emphasizes the importance of formative assessments as part of the learning planning cycle.

However, the implementation of diagnostic assessments is inseparable from various challenges. Time constraints, limited teacher competence in designing and managing assessments, and a lack of professional training are the main obstacles that need to be overcome. Therefore, systemic support from schools is urgently needed, especially in the form of ongoing training, adequate provision of resources, and policies that support a reflective and student-centred assessment culture.

Overall, this study confirms that diagnostic assessments are a strategic instrument that can be used to create a more meaningful and effective learning experience. To maximize their benefits, educators need to have a deep understanding of diagnostic assessment techniques as well as the skills to interpret and integrate assessment results into learning practices. Thus, diagnostic assessments can be a catalyst in creating a more humanistic, equitable, and quality educational transformation.

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