Jambura Journal of Educational Chemistry
Volume 7 Issue 1, February 2025
p-ISSN: 2655-7606, e-ISSN: 2656-6427
Journal Homepage: http://ejurnal.ung.ac.id/index.php/jjec

Evaluating Differentiated Chemistry Instruction in Senior High Schools Using Stake's Countenance Model: A Study in Gorontalo City

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Article Info

Article history:
Received: 19-05-2025
Revised: 25-05-2025
Accepted: 07-06-2025
Available online: 08-06-2025

Keywords:
Educational evaluation;
Differentiated instruction;
Senior high school chemistry;
Countenance Stake

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Abstract

This study aims to evaluate the implementation of differentiated instruction in Chemistry subject for Grade 10 students across senior high schools in Gorontalo City using Stake's Countenance Model. The evaluation focused on three key components: antecedent (lesson planning), transaction (instructional implementation), and outcome (student learning results). Data were collected through the analysis of lesson plans and teaching modules, classroom observations, teacher interviews, and assessments of student learning outcomes. The analysis employed both congruence and contingency approaches. The findings indicate that both lesson planning and instructional implementation fall into the "moderate" category, with average scores of 69.82% and 67.52%, respectively, while student learning outcomes were categorized as "good" with an average score of 68.89%. The contingency analysis revealed a misalignment between antecedent and transaction with the outcome, suggesting that student achievement was more strongly influenced by administrative targets (KKTP) rather than the effectiveness of differentiated instruction strategies. This study recommends the need for pedagogical training focused on strengthening conceptual understanding of differentiation, designing adaptive instructional materials, and applying authentic assessment practices to promote inclusive and responsive learning tailored to diverse student needs.

How to Cite: Suryanto., Lukum, A., Salimi, Y. K., La Kilo, A., Laliyo, L. A. R., & Pikoli, M. (2025). Evaluating Differentiated Chemistry Instruction in Senior High Schools Using Stake's Countenance Model: A Study in Gorontalo City. *Jambura Journal of Educational Chemistry,* 7(1), 39-44. https://doi.org/10.37905/jjec.v7i1.31729

1. INTRODUCTION

The The transformation of Indonesia's national education system has driven a paradigm shift in teaching and learning—from uniform, teacher-centered approaches to more student-centered strategies. One such approach is differentiated instruction, which is increasingly recognized as a strategic response to the diverse characteristics of students within a single classroom, including variations in readiness, interest, and learning style. In alignment with the vision of the Merdeka Curriculum, differentiated instruction has become a central element in national education policy, as outlined in the 2024 Revised Edition of the Teaching and Assessment Guidelines published by the Indonesian Agency for Curriculum and Assessment Standards (BSKAP), Ministry of Education, Culture, Research, and Technology.

Differentiated instruction, as conceptualized by Tomlinson (2014), is a proactive teaching philosophy designed to address individual student needs by modifying the content, process, and product of learning. This approach has been conceptually validated to

https://doi.org/10.37905/jjec.v7i1.31729

increase student engagement, motivation, and the development of higher-order thinking skills (Hockett, 2009; Anderson & Krathwohl, 2001). In the context of Chemistry—a subject that demands strong conceptual understanding and high levels of abstraction—differentiated instruction becomes especially relevant for meeting the cognitive demands of students with varying abilities.

Nonetheless, several studies have emphasized that the successful implementation of differentiated instruction largely depends on teachers' ability to plan and execute the strategy effectively (Mairoza et al., 2024; Subban, 2006; Stradling, 2005). In practice, many teachers encounter significant challenges in internalizing the philosophy of differentiation, developing appropriate instructional materials, and conducting authentic and inclusive assessments. These challenges hinder the realization of differentiated instruction as a meaningful, student-responsive practice in the classroom.

This study reveals that Chemistry teachers at senior high schools (SMA) in Gorontalo City are still at the early stage of understanding and implementing differentiated instruction, particularly in terms of planning and classroom execution. Evaluation results of instructional documents (lesson plans and modules) and classroom observations generally fall into the "fair" category for both antecedent (planning) and transaction (implementation) components. Meanwhile, student learning outcomes (outcome) were rated as "good," yet these outcomes do not align (lack of contingency) with the quality of the planning and instructional processes. This inconsistency suggests that student achievement cannot be used as a standalone indicator of the success of differentiated instruction (Stake, 1967; Stufflebeam & Shinkfield, 2007).

These findings are consistent with Wicaksono's (2024) study, which emphasizes that differentiated instruction requires strong pedagogical understanding rather than superficial administrative compliance. In contrast, studies by Hartini et al. (2023) and Fitriyah & Bisri (2023) demonstrate that, with the right instructional strategies and teacher training, differentiated instruction can significantly improve student outcomes and teacher-student relationships. However, those studies were conducted in contexts where teachers had access to intensive training programs—conditions that differ from those observed in Gorontalo.

2. METHODS

This study was conducted in eleven public and private senior high schools (Sekolah Menengah Atas or SMA) across Gorontalo City, all of which have implemented the Kurikulum Merdeka (Independent Curriculum). These schools are distributed across six sub-districts: Kota Utara, Kota Timur, Kota Selatan, Kota Barat, Dumbo Raya, and Sipatana, as recorded by the Gorontalo Provincial Office of Education and Culture (2024). The research subjects comprised chemistry teachers of grade X for the 2024/2025 academic year, selected through purposive sampling based on their active involvement in implementing differentiated instruction—both from government-initiated "Sekolah Penggerak" and independent pathway IKM schools. The research was carried out over a three-month period, from September to November 2024, covering proposal development, field data collection, data analysis, and final reporting.

The study employed Stake's Countenance Evaluation Model, which emphasizes the analysis of three key components: antecedent (planning), transaction (implementation), and outcome (learning results) (Stake, 1967). A mixed-methods approach was adopted, with a qualitative emphasis. The qualitative approach was used to describe and interpret the context and dynamics of the differentiated instruction practices in depth, while the quantitative approach measured the degree of program implementation through analysis of documentation and classroom observations, following the guidelines of Creswell and Creswell (2018). Stake's matrix-based design allowed for comprehensive evaluation by comparing intent, observation, and judgment components, while examining congruence (alignment between planning and implementation) and contingency (interconnection among stages).

Data were collected through three primary techniques: document analysis, classroom observation, and in-depth interviews. Document analysis involved evaluating lesson plans (Rencana Pelaksanaan Pembelajaran or RPP), teaching modules (Modul Ajar), student worksheets (Lembar Kerja Peserta Didik or LKPD), and assessment instruments. Classroom observations were conducted in five selected schools, with two sessions in each school, totaling ten observed chemistry lessons that applied differentiated instruction. In-depth interviews with grade X chemistry teachers were

https://doi.org/10.37905/jjec.v7i1.31729

conducted to explore their perceptions and practices in planning and executing differentiated instruction. All research instruments had been validated by subject matter experts and were constructed based on the national educational standards outlined in Ministry Regulation No. 16 of 2022 (Process Standards), Ministry Regulation No. 21 of 2022 (Assessment Standards), and the 2024 Revised Guidelines for Learning and Assessment published by BSKAP (Center for Curriculum and Assessment Standards).

Data analysis combined qualitative and quantitative descriptive methods. Qualitative data were analyzed using thematic analysis, involving data reduction, categorization, and interpretive synthesis, as proposed by Braun and Clarke (2006). Quantitative data were processed using descriptive statistical techniques with percentage formulas, and the results were then converted into qualitative categories (excellent, good, fair, poor) based on the program achievement conversion scale (Lukum, 2015). The analysis was conducted through two main dimensions: congruence analysis to evaluate the alignment between planning and actual implementation, and contingency analysis to assess the logical and empirical interrelations among antecedent, transaction, and outcome. The ultimate goal of this process was to generate evidence-based judgments and policy recommendations regarding the implementation quality of differentiated chemistry instruction in senior high schools in Gorontalo City.

3. RESULT AND DISCUSSION

This study was conducted in eleven public and private senior high schools (SMA) in Gorontalo City to evaluate the implementation of differentiated instruction in Grade X Chemistry classes. The evaluation employed the Stake's Countenance Model, which emphasizes three main aspects: antecedent (planning), transaction (implementation), and outcome (learning results). Data were collected through document analysis (lesson plans and teaching modules), direct classroom observations, student achievement assessments, and in-depth interviews with Chemistry teachers. The results were analyzed using both congruence and contingency approaches.

The congruence analysis revealed that the planning of differentiated Chemistry instruction in Gorontalo high schools was in the "fair" category, with an average achievement score of 69.82%. Among the eleven participating teachers, 63.64% used the "teaching module" format, while 36.36% used the traditional lesson plan (RPP) format. Although the use of these formats aligned with the Revised 2024 Guidelines for Learning and Assessment by the Ministry of Education, the content of these documents did not fully reflect the principles of differentiation that adapt instruction based on students' readiness, interests, and learning profiles. Only around 60% of teachers were able to formulate specific, measurable, and learning outcome-aligned objectives, while other aspects such as differentiation strategies and the integration of the Pancasila Student Profile were insufficiently addressed.

This misalignment was evident in instructional documents that appeared normative and lacked innovation in managing differentiation across content, process, and product. For instance, most teachers included lecture-based methods only, with little variation in instructional approaches tailored to student characteristics. The instructional steps did not describe differentiated activities based on learning styles, readiness, or interests. This indicates a limited understanding of differentiated instruction as a proactive and responsive teaching strategy. These findings align with Subban (2006), who reported that teachers often struggle with implementing differentiation due to a lack of training and practical support in instructional design.

Conversely, a study by Hartini, Usman, and Prafitasari (2023) found that teachers who participated in intensive training or professional learning communities demonstrated higher competence in integrating differentiation into their instructional planning. These teachers were able to identify students' learning needs and develop varied teaching strategies aligned with differentiation principles. Therefore, the findings of this study reinforce the notion that while teachers in Gorontalo may follow administratively correct formats, the content and substance of their instructional documents still require substantial improvement to embody student-centered learning as emphasized in the Merdeka Curriculum. Without a strong conceptual foundation, teachers merely replicate formats without developing inclusive and meaningful instructional designs.

In terms of the transaction component, observations of eleven Chemistry classrooms revealed that teachers had not systematically implemented

differentiation principles. The average implementation score was 67.52%, with the introductory phase scoring 68.89%, the core phase 68.40%, and the closing phase 66.12%. Learning activities still followed traditional, one-size-fits-all methods, providing the same instruction for all students regardless of their readiness, interests, or learning profiles. For example, there was no initial mapping of student learning profiles, and classroom tasks did not demonstrate content, process, or product differentiation. This indicates that teachers had not yet carried out the essential first steps in differentiated instruction, as emphasized by Tomlinson (2014), namely understanding students' individual characteristics before developing instructional strategies.

Furthermore, during core learning activities, teachers tended to present material without connecting it to students' real-life contexts, thus diminishing instructional relevance. Student grouping was generally random or administrative rather than based on readiness or interest. Collaborative learning activities, which should promote active participation from students of varying abilities, were not effectively utilized. Subban (2006) also emphasized that failure to implement differentiation is often due to the lack of training in strategy implementation and classroom management in heterogeneous settings. On the other hand, Fitriyah and Bisri (2023) showed that teachers receiving pedagogical mentoring and collaborative reflection were better able to apply differentiation strategies in both process and product—even in large classes.

Overall, these findings affirm that the successful implementation of differentiated instruction requires both conceptual and technical readiness from teachers. Without a solid understanding of differentiation principles, instruction tends to default to routine practices that fail to meet the individual needs of students. Although most teachers communicated learning objectives and followed the planned instructional flow, this was insufficient for establishing inclusive learning environments. As Wicaksono (2024) explained, the success of differentiated instruction depends on teachers' ability to adapt teaching strategies to student diversity—not merely on fulfilling administrative structures. Therefore, it is crucial to strengthen teacher capacity through training focused on diverse instructional design and authentic assessment strategies.

Despite the fact that the planning and implementation of differentiated Chemistry instruction in Gorontalo were categorized as "fair," student learning outcomes were relatively good. In the eleven observed schools, most students were classified as "Proficient" or "Skilled" in cognitive achievement, with an average score of 68.89%. Assessments were carried out through written tests and assignments such as worksheets and simple projects. However, this performance must be critically interpreted, as it may not accurately reflect the effectiveness of ideal differentiated instruction. In this context, the outcome did not align (lack of contingency) with the moderate quality of antecedent and transaction, suggesting that student assessments may have been driven more by administrative compliance with Learning Objective Achievement Criteria (KKTP) than by authentic differentiated instruction.

The quality of assessments used by teachers was still largely focused on Lower Order Thinking Skills (LOTS), with limited emphasis on Higher Order Thinking Skills (HOTS) such as critical thinking, creativity, and problem-solving. The evaluation indicated that HOTS-oriented assessment reached only 60%, and problem-solving assessments only 56.67%. Moreover, most teachers did not include assessment rubrics or answer keys in their lesson plans or teaching modules. Yet, authentic assessment is a crucial component of differentiated instruction, as it reflects students' holistic understanding (Tomlinson, 2014). The absence of valid and reliable assessment tools further supports the idea that good learning outcomes do not necessarily represent meaningful, student-centered learning.

This study reinforces Stake's (1967) assertion that discrepancies between process and outcomes indicate suboptimal program implementation. In contrast, Wicaksono (2024) found that consistent application of HOTS-based assessment and differentiated instruction leads to significantly improved student learning outcomes. However, the reality in Gorontalo suggests that limited teacher understanding of differentiated assessment design and a tendency to pursue administrative targets have created a misleadingly positive impression of learning outcomes. Thus, the success of differentiated instruction must not be measured solely by student scores, but also by the quality of instructional processes and the strategies used to assess them.

The contingency analysis in this study revealed a misalignment between planning (antecedent) and implementation (transaction), both of which were categorized as fair—69.82% and 67.52% respectively—compared to learning outcomes (outcome), which were rated as good at 68.89%. This gap indicates that learning outcomes were not entirely the result of effective differentiated instruction. Observational data revealed that instructional activities were not fully aligned with students' readiness, interests, or learning styles. Most teachers still adopted uniform instructional strategies without conducting initial learning needs assessments or adjusting the content and process accordingly.

This misalignment is likely driven by the administrative pressure to meet KKTP benchmarks rather than a pedagogically adaptive approach. Teachers appeared to prioritize student scores over tailored instruction. This was evident in the lack of authentic assessments and the predominance of LOTS-based test items. Only 56.67% of teachers incorporated critical thinking or problem-solving assessments. Stake (1967) emphasized that program effectiveness must be judged not just by outcomes, but also by the alignment between planning and implementation. Therefore, high student performance may not necessarily reflect instructional quality when process and planning are weak.

These findings contradict the work of Hartini et al. (2023), which concluded that consistent differentiated instruction significantly enhances student motivation and achievement. Similarly, Wicaksono (2024) demonstrated that integrating HOTS-based assessments into differentiated instruction improves conceptual understanding. In contrast, this study found that high student performance can occur even in the absence of fully implemented differentiated instruction, emphasizing that student scores alone are not a valid indicator of instructional success. As such, it is imperative to equip teachers with the skills to design meaningful differentiated lesson plans and assessments aligned with actual student needs, rather than merely fulfilling administrative standards.

This study demonstrates that the implementation of differentiated Chemistry instruction in Gorontalo high schools continues to face practical challenges. Teachers have yet to fully grasp the nature of differentiated instruction and are still developing the ability to design and implement learning tailored to individual student characteristics. Systemic intervention is necessary in the form of targeted pedagogical training, contextualized module development, and strengthening of HOTS-based assessment practices to realize inclusive, student-centered learning environments that align with the goals of the Merdeka Curriculum.

4. CONCLUSION

Based on the evaluation using the Countenance Stake Model, it was found that the implementation of differentiated instruction in Chemistry subjects at senior high schools in Gorontalo City still faces several challenges. Instructional planning by teachers was categorized as fair and has not fully reflected the core principles of differentiation, such as adjusting content, process, and product based on students' readiness, interests, and learning styles. The implementation of instruction also did not demonstrate a systematic application of differentiated strategies, with teaching approaches remaining uniform and insufficiently adaptive to individual student needs.

Meanwhile, student learning outcomes were generally categorized as good, although these outcomes were not aligned with the quality of planning and instructional practices observed. This discrepancy suggests that learning achievements were likely driven by administrative pressure to fulfill the national Learning Objective Achievement Criteria (KKTP), rather than by the effective implementation of differentiation. Furthermore, teachers have not fully integrated authentic assessment or Higher Order Thinking Skills (HOTS)-based evaluations, which are essential components of a differentiated instructional strategy.

Therefore, strategic interventions are urgently needed in the form of continuous professional development and pedagogical support for Chemistry teachers—particularly in deepening their understanding of the philosophy of differentiation, developing contextual instructional materials, and designing assessment tools that accurately reflect students' critical and creative thinking abilities. With enhanced teacher capacity, the implementation of differentiated instruction is expected to become more effective and contribute significantly to improving the quality of education at the school level.conclusion contains three important things, namely generalization of findings according to research

problems, research limitations, and recommendations for further research.

5. ACKNOWLEDGEMENTS

The author would like to express sincere gratitude to the Chemistry teachers of senior high schools in Gorontalo City for their valuable participation, openness, and collaboration during the data collection process. Appreciation is also extended to the principals and school administrators who supported the implementation of this study.

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