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From Facilitator to Activator: Evaluating Teaching Professional Practice in the Integration of Differentiated Instruction and Deep Learning

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Abstract: The integration of Differentiated Instruction (DI) and Deep Learning (DL) is crucial for building 21st-century (4C) skills, yet teachers are frequently constrained in mapping student characteristics and face the psychological pressure of curriculum transition. This study aims to analyze the implementation of DI-DL integration and the factors influencing its effectiveness at the junior secondary (SMP) level. Using an explanatory sequential mixed-methods design (QUAN-Qual), the study involved 35 teachers and 81 students. Quantitative survey data were collected through a peer-validated questionnaire in the curriculum field and analyzed using descriptive statistics. Qualitative data were gathered through semi-structured interviews involving 12 key informants (teachers and students), analyzed using QDA Miner in the coding process. The quantitative results show a dominance of visual learners (51.9%). DI-DL integration was shown to significantly improve social-interactive competencies, namely collaboration (M = 15.2) and communication (M = 14.0), but was less optimal for higher-order cognitive skills, particularly creativity (M = 4.8). The qualitative findings reveal that systemic inertia caused by the rigidity of the Minimum Mastery Criteria (KKM) and teachers' cognitive overload triggers instructional fragmentation that hinders deep intellectual growth. The study concludes that DI-DL integration currently remains a fragile innovation. Systemic policy reform and explicit cognitive scaffolding are needed to transform social participation into students' original innovation.
Keywords: Differentiated Instruction; Deep Learning; 21st-Century Skills; Mixed Methods; Systemic Inertia; Junior High School

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Introduction

Global education systems in the 21st century are undergoing a significant paradigm shift, moving beyond rote memorization toward the development of higher-order competencies, including creativity, critical thinking, collaboration, and communication (the 4Cs). This transformation is driven by rapid technological advancement, digitalization, and changing global workforce demands. According to the World Economic Forum, (2025), analytical thinking, creativity, resilience, and lifelong learning are among the most important competencies required in the future labor market. Likewise, OECD reports indicate that education systems are increasingly expected to equip students with transferable skills that allow them to adapt to complex and uncertain environments rather than merely reproducing factual knowledge (OECD, 2023). In response to this challenge, Deep Learning (DL), which emphasizes conceptual understanding, metacognitive reflection, and knowledge transfer, has emerged as a prominent educational approach (Fullan et al., 2018). However, the implementation of DL often faces challenges related to the diversity of students' readiness levels, interests, and learning profiles. Without appropriate instructional adaptation, students with limited prior knowledge

may struggle to engage in deeper learning processes, potentially widening existing learning gaps (Hattie, 2023).

To bridge this gap, Differentiated Instruction (DI) has emerged as an important strategy for ensuring equity in the classroom. DI, as conceptualized by Tomlinson, (2014), holds that teachers must proactively adjust content, process, and product according to students' readiness, interests, and learning profiles. While DL focuses on the excellence or depth of learning, DI focuses on the equity or accessibility of that learning. Recent scholarly discourse suggests that these two frameworks should not be viewed as separate entities but as a synergistic relationship in which DI provides the tailored pathway and DL provides the cognitive engine (Sousa & Tomlinson, 2018). Despite this theoretical promise, empirical evidence on the operational integration of DI and DL, particularly in developing countries, remains scarce and fragmented.

In the Indonesian context, this pedagogical evolution is embodied in the Kurikulum Merdeka (Independent Curriculum), which mandates a transition toward student-centered learning and personalized teaching. Indonesia's Ministry of Education has championed the Merdeka Belajar (Freedom to Learn) philosophy to foster a more flexible and responsive education ecosystem (Makarim, 2020). However, the implementation of such progressive reform in Indonesia has not been without systemic friction. Indonesian schools have long been characterized by a culture of measurement, in which standardized benchmarks and the Minimum Mastery Criteria (Kriteria Ketuntasan Minimal, KKM) dominate the pedagogical landscape. This creates a fundamental tension between the fluid, personalized nature of DI-DL and the rigid demands of national accountability and standardized reporting in the industrial era (Shepard et al., 2018).

Over the past five to ten years, a growing body of research has examined the effectiveness of student-centered differentiated learning approaches in disseminating improved student learning outcomes. A comprehensive review by Smale-Jacobse et al, (2019) synthesized a wide range of empirical evidence from secondary school learning and reported that differentiated instruction generally produces small-to-moderate positive effects on student achievement, although considerable variation exists in implementation strategies and contextual factors. Furthermore, Valiandes & Neophytou, (2018) showed that differentiated learning contributes to more equitable learning opportunities by accommodating students' diverse backgrounds and learning needs. The general conclusion drawn from this body of evidence is that instructional adaptation can enhance student engagement and learning performance. Nevertheless, most of these earlier in-depth studies examined differentiated learning as a stand-alone pedagogical approach, and few have explored its integration within a Deep Learning framework specifically designed to cultivate higher-order competencies such as critical thinking, creativity, collaboration, and communication. As a result, empirical evidence on the integration of DI and DL concepts in secondary school learning remains limited.

Recent literature highlighting educational developments in Indonesia has explored DI and DL extensively, but largely as isolated phenomena. For instance, studies have investigated the impact of DI on student engagement in rural settings or the effectiveness of DL in STEM subjects (Subandiyah et al., 2025; Nofirman, 2025).However, there remains a striking research gap concerning the integrated implementation of DI and DL and its specific impact on the development of holistic 21st-century skills in junior secondary education. Most existing research is either purely qualitative, focusing on teacher perceptions, or purely quantitative, focusing on test scores. This condition creates an urgent need for mixed-methods research capable of capturing measurable outcomes of DI-DL integration alongside the underlying systemic friction that teachers navigate in their daily teaching practice.

In addition, this study departs from the neuromyth of fixed learning styles (VARK) by reframing student profiles as a mapping of multimodal preferences, in line with modern cognitive paradigms. This shift is essential for meeting students' needs, moving the conversation away from outdated psychological categories toward a more contemporary understanding of learner agency. The

tension explored here between Choice and Agency on one hand and Cognitive Overload (Kirschner et al., 2006) on the other provides a critical dialectic that is often missing from Indonesian educational research. By situating the Balikpapan experience within this global debate, this study elevates a local case study into a high-impact investigation of the sustainability of progressive pedagogy in the Global South.

The novelty of this study lies in identifying a divide in pedagogical practice that arises from the ontological divergence between 21st-century learning goals and an evaluation infrastructure still grounded in 20th-century paradigms. Unlike previous studies, which have tended to view instructional reform in flat, optimistic terms, this study introduces the concept of Fragile Innovation to explain the dynamics of implementing Differentiated Instruction (DI) and Deep Learning (DL) in Indonesia. This concept suggests that the sustainability of instructional innovation still depends largely on exceptional, highly resilient teachers who are able to transform within a strong and fully supportive institutional school ecosystem, rather than on the system itself. Through a sequential mixed-methods design, this study not only reveals what happens-namely, the high attainment of 21st-century learning outcomes through the Communication, Collaboration, Critical Thinking, and Creativity (4C) approach among students-but also explains why an apparent contradiction emerges, namely the limited capacity of the assessment system to represent the targeted competencies. This study therefore offers a critical perspective on the direction of education reform while affirming the importance of aligning the 21st-century learning vision with its evaluation mechanisms.

The state of the art in this field remains dominated by studies on differentiated-learning strategy and implementation, while relatively little attention has been paid to teachers' difficulty in digesting and applying epistemological practices built through experience, collaboration, and reflection-practices needed to guide a constructivist understanding among teachers whose schools demand that they act as activators of learning within a system that remains oriented toward standardization. Although global scholars such as Fullan et al, (2018) emphasize the importance of the teacher's role as a driver of Deep Learning, a dimension of Subjectivity Anxiety emerges when teachers must assess complex and varied 4C attainment in order to sustain differentiated learning, even as the assessment benchmark remains anchored to the KKM and a uniform standard of learning outcomes that has not yet adequately accommodated the fundamental diversity of students' learning behavior. This study seeks to fill that gap through an examination of the implementation of Differentiated Instruction (DI) and Deep Learning (DL) at two pioneering schools in Balikpapan, namely SMP Nasional KPS and SMP Islamic Global School. Both contexts provide a unique empirical space for observing how Pedagogical Heroism interacts with Systemic Inertia within an educational environment that remains tightly bound to standardization demands.

This study examines the implementation of Differentiated Instruction (DI) and Deep Learning (DL) in fostering 21st-century skills among students in Indonesian secondary schools and identifies the factors that influence the effectiveness of this implementation, particularly in authentic assessment practice.

Specifically, this study seeks to answer the following research questions:

1. How does the integration of Differentiated Instruction and Deep Learning contribute to the development of 21st-century student skills in Indonesian secondary schools?
2. What factors influence the effectiveness of implementing Differentiated Instruction (DI) and Deep Learning (DL), particularly in authentic assessment practice?

Method

Research Design

This study used an Explanatory Sequential Mixed-Methods Design (QUAN to Qual). This design was chosen to first map the implementation of Differentiated Instruction (DI) and Deep

Learning (DL) through quantitative metrics, followed by a qualitative inquiry to explain the systemic frictions and assessment gaps identified in the initial phase (Creswell & Plano Clark, 2018).

Research Context and Participants

The teacher population at SMP Nasional KPS (n = 26) and SMP Islamic Global School/IGS (n = 9) totaled 35 educators across both schools. This number was treated as a saturated (census) sample, as all teachers were actively involved in the implementation of DI-DL at both schools, consistent with a purposive-cum-census sampling rationale; as Sugiyono, (2019) states, a census technique is used when the population is fewer than 100 people. The student population at the two schools totaled 407, consisting of 352 students at SMP KPS (168 male, 184 female) and 55 students at SMP IGS (38 male, 17 female). Following Cohen et al., (2018) a stratified purposive sampling approach was used to select 81 student respondents (approximately 20% of the population), with strata determined by school location and gender. This sample proportion was considered sufficiently representative of the population's characteristics, while also accounting for time and cost constraints.

At the qualitative data-collection stage, 10 teachers and 12 students served as key informants; the student informants included 3 students with inclusive-education needs. Teachers and students were selected as research participants because of their direct, ongoing engagement in DI-DL learning at both schools. In addition, students' communication ability was used as one of the criteria for selecting interview informants, given their in-depth experience with differentiated learning under the Deep Learning approach in the classroom at both schools.

Data Collection Instruments

Quantitative survey stage. A DI-DL implementation rubric (0-40 scale) was developed by synthesizing Tomlinson, (2014) differentiated-learning framework and Fullan et al, (2018) deep-learning approach, specifically aimed at measuring 21st-century (4C) skills across five dimensions: (a) Student Creativity, (b) DI Fidelity, (c) DL Strategy, (d) Implementation Challenges, and (e) Authentic Assessment. To ensure rigor, the instrument underwent a systematic validation process. First, content validity was established through expert review by three curriculum specialists (peer lecturers), followed by item revision based on their feedback. Second, a try-out was conducted with teachers outside the research site to evaluate instrument validity and item clarity. Finally, construct validity was assessed using item-total correlation analysis, confirming that all items were valid. The instrument showed high internal consistency, with a Cronbach's Alpha coefficient of 0.86, confirming its reliability for survey-based quantitative research.

Qualitative data-collection stage. Data were collected through semi-structured interviews with teachers, students, vice principals, and the principals of SMP KPS and SMP IGS. Documentary review focused on lesson-plan documents (RPP) or teaching modules and student learning portfolios. The interview guide was used to explore teachers' experience as practitioners of differentiated instruction (DI) combined with the Deep Learning (DL) approach. As motivators and innovators of learning, teachers reported anxiety and confusion in understanding students' diverse learning interests amid differing content in authentic assessment, as well as tension in adapting their assessment practices to the Minimum Mastery Criteria (KKM) still in force.

Data Analysis

This study employed a mixed-methods analytical approach. For the quantitative component, descriptive statistics and path analysis were conducted using JASP, (2022) to evaluate the predictive contribution of Differentiated Instruction (DI) and Deep Learning (DL) to student creativity within the 4C skills framework. To address the potential limitations of the small sample size, a bootstrapping

procedure with 5,000 resamples was applied to ensure the robustness of the path coefficients and standard errors.

Qualitative data were analyzed using Thematic Analysis (TA), strictly following the six-phase recursive process proposed by Braun & Clarke, (2021) facilitated QDA minner by Provalis Research, (2020). The process included:

1. Familiarization: repeatedly reading interview transcripts and documents to gain a comprehensive understanding of participants' experiences.
2. Initial coding: generating inductive codes from meaningful data segments, organized systematically through QDA Miner.
3. Generating themes: grouping related codes into candidate themes that reflect broader patterns across the data.
4. Reviewing themes: comparing candidate themes against the original dataset to ensure internal homogeneity and external heterogeneity.
5. Defining and naming: refining the essence of each theme through iterative researcher discussion to ensure alignment with the research objectives.
6. Final reporting: this process culminated in three overarching themes: (a) challenges in authentic assessment, (b) teacher workload and adaptation, and (c) systemic constraints in implementing DI and DL.

Trustworthiness and Ethics

To produce credible findings, this study applied member checking and peer debriefing (Guba & Lincoln, 1985; Nowell et al., 2017). Data from the questionnaire survey and interviews were reported to the relevant policy stakeholders at each school. Research approval was obtained from the principal of each school prior to data collection, and all research subjects were determined by the principals at both research sites. Participants gave their willingness and informed consent after being briefed on the purpose and objectives of the study. The researchers strictly protected participants' confidentiality so that they could share their reflections and experiences openly, particularly regarding professional fatigue and the challenges arising from the implementation of differentiated-learning policy under the Deep Learning approach at each research site. This process is illustrated in Figure 1 below.

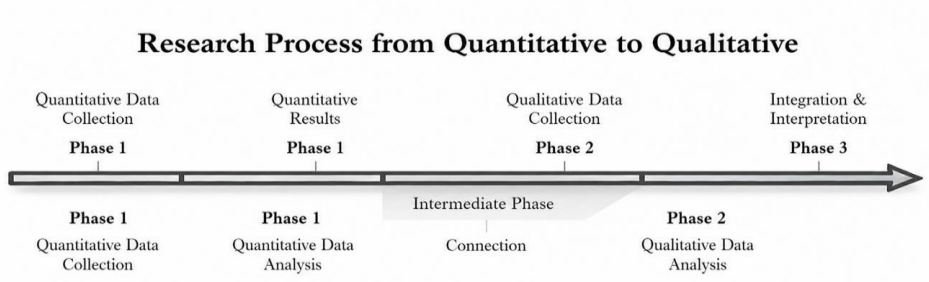

Figure 1. Quantitative and Qualitative Research Process

Results

The diagnostic profile reveals that students' learning preferences are diverse and distinctive; optimally developing each student's potential requires differentiated learning strategies tailored to individual learning needs. This study aimed to integrate differentiated instruction (DI) with Deep Learning (DL) in the classroom. Diagnostic data collected through a Google Form from 81 student respondents showed that 51.9% of students were dominated by a visual learning preference, 28.4% by an auditory learning style, and the remaining 19.8% by a kinesthetic learning style. This finding provides empirical evidence that a uniform, one-size-fits-all instructional strategy within conventional learning is insufficient to address the diverse needs of students in the classroom. As one teacher

reflected, “This condition initially placed an extraordinary burden on us in designing lesson plans. After understanding the learning-style profile data, we realized that many students needed different ways to access content, which our previous lesson plans had not accommodated” (Teacher interview, KPS-IGS).

Given this heterogeneity in student learning preferences, instruction requires a variety of multimodal strategies-commonly delivered through lecture explanations, written texts in teaching modules, diagram displays or behavioral process flowcharts, audio recordings, and animated video-to support diverse learning through digital technology. Differentiated instruction (DI) combined with a deep-learning strategy approach (DL) strongly supports the objectives of this study.

Accordingly, the initial phase of DI-DL integration at SMP KPS-IGS shifted lesson planning away from a single instructional model for all students toward a planning strategy based on diagnostic mapping of students' learning-style preferences as a reference point. After mapping these preferences, teachers used digital tools to identify student characteristics and tailor learning activities to match students' preferences and habitual ways of learning in the classroom each day. This finding is supported by a teacher's reflection on the challenge of this transition: “Moving from a single lesson plan (RPP) or teaching module designed for all students in the class, the DI-DL adaptation required us to design different instructional approaches matched to each student's learning style; this transition felt daunting during the implementation phase of the multimodal design” (Teacher interview, KPS-IGS).

The analysis of the learning profiles of 81 students shows that a visual learning preference is the most dominant characteristic, followed by auditory and kinesthetic preferences. When this profile is linked to 21st-century (4C) skill indicators, collaboration achieved the highest attainment, with an average score of 15.2 out of 40, followed by communication at 14.0, critical thinking at 10.0, and creativity at 4.8. This finding indicates that students are relatively more prepared to engage in social activities and group work than in activities that demand higher-order reasoning and the production of original ideas.

A descriptive analysis of implementation scores (0-40 scale) highlights the transitional nature of DI-DL implementation (see Figure 2). The data reveal a marked disparity across the 4C skills: while teachers succeeded in diversifying the instructional process based on students' learning-style preferences, they remained bound to standard curriculum policy using the Minimum Mastery Criteria (KKM). The figure data show this disparity most clearly in students' critical-thinking and creativity scores during learning.

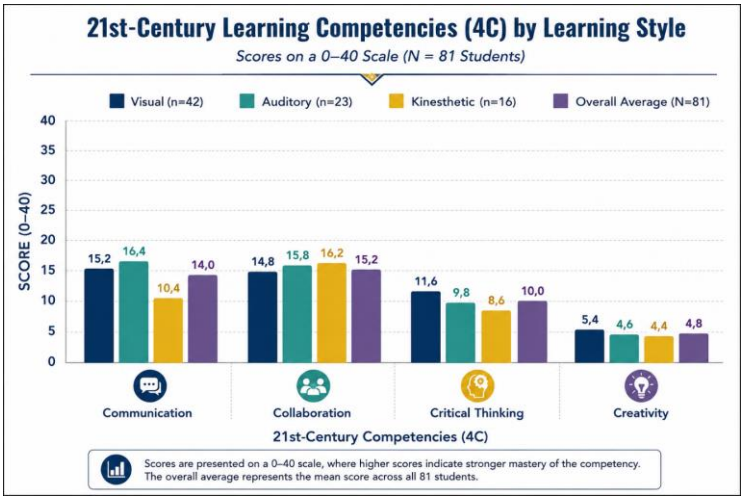

Figure 2. 21st-Century Learning Competencies (4C) by Learning Style

The scores shown in Figure 2 are not single values obtained directly, but rather mean scores derived from measuring four dimensions of 21st-century skills (Communication, Collaboration, Critical Thinking, and Creativity) using a structured, rubric-based 4C observation instrument. Each dimension was assessed through several relevant behavioral indicators observed during the learning process. Indicator scores were summed and converted into a 0-40 range, then averaged for each learning-style group (Visual, Auditory, and Kinesthetic). The evaluation was conducted by two observers who had achieved inter-rater agreement prior to data collection. The final scores presented in the chart represent the average rating of both evaluators to minimize subjectivity. The resulting values-Communication (14.0), Collaboration (15.2), Critical Thinking (10.0), and Creativity (4.8)-thus represent students' average attainment of 4C competencies based on systematic observation during instructional implementation.

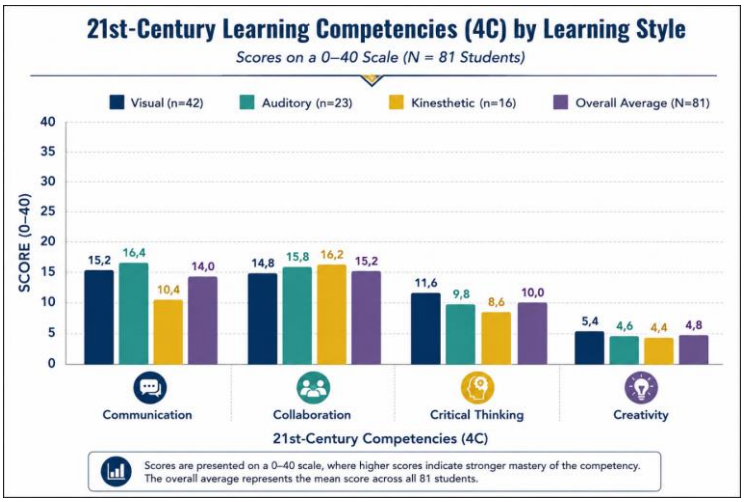

Figure 3. 4C Learning Attainment by Student Learning Style

Figure 3 further disaggregates these results by learning-style group across the 81 students: visual learners (n = 42) formed the largest group, followed by auditory (n = 23) and kinesthetic (n = 16) learners. For Communication, scores ranged from 10.4-16.4, with the highest attainment in the auditory group (16.4; Moderate) and an overall average of 14.0 (Low). For Collaboration, all groups showed relatively stronger attainment, with scores of 14.8-16.2; the kinesthetic group obtained the highest score (16.2; Moderate), while the overall average reached 15.2 (Low, approaching the Moderate category). For Critical Thinking, scores ranged from 8.6-11.6, all falling in the Low category, with the visual group showing the highest attainment (11.6). Creativity obtained the lowest scores across all learning-style groups, ranging from 4.4-5.4, falling in the Very Low category. Overall, no competency reached the High or Very High category; nevertheless, Collaboration and Communication showed stronger development than Critical Thinking and Creativity. These findings indicate that differentiated instruction aligned with learning preferences has had a positive impact on students' social skills, although strengthening instructional strategies oriented toward higher-order thinking and creativity remains necessary.

These quantitative findings from Figure 3 are corroborated by teachers at both schools, who reported: “From the lessons we observed, students appeared to engage more easily when learning activities were designed around discussion, group work, and idea-sharing. Most students were able to communicate and collaborate fairly well, especially when tasks were tailored to their preferred way of learning. Auditory students tended to be more vocal in expressing their opinions, while kinesthetic students showed strong engagement in collaborative activities. However, when learning required deeper analysis, evaluation of alternative solutions, or the construction of logical arguments, many

students still needed guidance and scaffolding from the teacher. The clearest challenge was evident in students' ability to generate new ideas and original solutions, as most students still waited for examples or direction before developing their own ideas. Even so, the implementation of differentiated instruction has helped increase student participation and engagement compared to before, particularly in communication and collaboration" (Teacher interview, KPS-IGS).

These results suggest that the synergy between DI and DL provides a meaningful framework for fostering student creativity, while environmental and assessment factors function as complementary conditions that enhance learning effectiveness. The findings reinforce that the synergy between Deep Learning (DL) and Differentiated Instruction (DI) primarily fosters interpersonal competence, with Collaboration achieving the highest overall mean score (M = 15.2), followed by Communication (M = 14.0). These results indicate that while the DI-DL framework effectively nurtures social-interactive skills, ongoing environmental and assessment factors remain essential in bridging the gap toward higher-order creative output (M = 4.8).

A similar sentiment was echoed in an interview with teachers at SMP KPS-IGS, who stated: "Learning based on Deep Learning combined with Differentiated Instruction makes students more actively engaged in working together in groups. Differences in instructional strategy help students communicate more easily and explain their work to one another. I have seen interaction among students improve because each student has a role suited to their ability. However, students' creativity has not yet been fully optimized without a supportive learning environment. Continuous assessment supports the learning process, but it needs to be followed by consistent feedback. Overall, this approach is very effective in improving students' teamwork and communication."

Discussion

The Social-Cognitive Gap in DI-DL Integration: Replicating Engagement, Contradicting Immediate Innovation

The discussion of these findings offers a response to the outcomes of differentiated instruction (DI) combined with Deep Learning (DL). The results replicate the well-established consensus that DI can foster a robust, interactive learning environment. The relatively higher scores in Collaboration (M = 15.2) and Communication (M = 14.0) validate the belief that when teachers offer students choice of content through multimodal means tailored to their visual, auditory, and kinesthetic preferences, interpersonal engagement is strengthened. This aligns with the Social Constructivist framework, in which DI acts as a catalyst for participation.

However, with respect to critical-thinking outcomes within the 4C framework, this study contradicts the optimistic projection that the autonomy granted to students would translate into creative learning output. Instead, the low scores for Creativity (M = 4.8) and Critical Thinking (M = 10.0) stand in sharp contrast to the theoretical claim that DI inherently transcends rote acquisition. While Goyibova et al, (2025) emphasize that differentiated, learner-centered approaches foster greater student autonomy, our findings suggest that autonomy without adequate cognitive scaffolding can lead to participation without production, rather than innovation. This is consistent with the reality that, during a period of curriculum transition, schools push teachers to adapt quickly without fully mastering the complex and varied learning terrain of their students. Without first building a thinking ladder and a properly scaffolded form of student autonomy, providing space for creative and critical-thinking outcomes within the 4C framework ultimately produces no clear learning standard.

This disparity extends the current discourse by highlighting a time lag between formulating an instructional strategy at the conceptual level and its actual implementation in the classroom during the DI-DL transition. This gap generates anxiety among teachers, as reflected in interview reports, and the low creativity scores support the critique of Kirschner et al, (2006), who argue that minimally guided instruction is often a by-product of differentiated instruction. Providing every student with autonomy

according to their own learning needs can lead to Cognitive Overload, particularly for students who are new to adapting to a learning environment different from the one they previously experienced, since such students often possess only a basic foundation from their prior classroom context and have limited capacity to digest the teacher's instructional procedures and synthesize them into deep conceptual connections. This condition aligns with Hattie, (2023) warning about fragmentation: teachers in this study succeeded in individualizing tasks (as evident in high collaboration scores), but the Deep Learning aspect (DL Strategy) could not yet be organized into standardized learning-outcome levels guided by prevailing curriculum policy. During this DI-DL transition, both teachers and students may experience strain, as the focus of learning shifts toward accommodating students' learning-style preferences rather than the curriculum routines both parties had grown comfortable with. This study therefore shows that while DI-DL effectively builds a social foundation as a bridge toward creativity, it requires more than simply offering differentiated services-it requires explicit cognitive guidance to reduce the complexity of the transition.

The 4C Assessment Gap: Systemic Inertia vs. Pedagogical Evolution

The marked disparity in this study's findings between Collaboration (15.2) and Creativity (4.8) reveals a deep Assessment Gap rooted in systemic inertia. While the DI-DL model represents a relatively new instructional concept within the Indonesian curriculum, and DI-DL has succeeded in fostering social interaction in learning compared with instruction prior to its introduction, the very low creativity scores found in this study reflect what this research identifies as Subjectivity Anxiety. As Lucas & Spencer, (2017) note, assessing creativity requires shifting from right-answer metrics toward process-oriented portfolios. In the Indonesian context, however, this study's analysis suggests that the Minimum Mastery Criteria (KKM) remains a stumbling block for teachers seeking to express the spirit of independent learning that is meant to be directed toward meeting each student's individual learning needs.

The factor underlying this gap is an Ontological Mismatch between the inherently flexible nature of 4C-skill attainment and the rigid, tool-like procedures through which it is perceived and applied. From this perception, teachers face practical doubt in DI-DL learning whenever explicit authentic assessment requires them to award high creativity scores, because, as (Christodoulou, 2016) suggests, authentic assessment often lacks the psychometric reliability demanded by national standardized benchmarks. As a result, teachers prioritize Collaboration, which is more visible and easier to document, while Creativity remains underdeveloped because it cannot easily be audited within the rigid KKM framework. This creates a Formative-Summative Conflict (William, 2018), in which the high-value process of creative inquiry is sacrificed merely to satisfy curriculum bureaucratic compliance.

Teachers as Activators: The Differentiation Paradox and Cognitive Overload

The shift in teachers' role from facilitator to activator reinforces Fullan, (2023) framework; however, qualitative evidence in which teachers describe their workload as extraordinary reveals a darker reality. The primary factor behind the low Critical Thinking (10.0) and Creativity (4.8) scores is the Differentiation Paradox. As Hattie, (2023) shows, although DI is theoretically effective, its real-world implementation often leads to Curricular Dilution.

In this study, the gap is attributable to Instructional Fragmentation. Teachers become so consumed by the logistics of multimodal variation-ensuring that visual, auditory, and kinesthetic learners are all accommodated-that their cognitive capacity to store and process information within a given time is insufficient, particularly for facilitating the Deep Learning (DL) needed for students' higher-order thinking. This is consistent with Kirschner et al, (2006), who argue that minimally guided instructional approaches can create an illusion of active engagement, in which students appear busy

and collaborative, yet instruction remains shallow. Furthermore, the anxiety reported by teachers reflects the psychological pressure of Performativity described by Ball, (2003): teachers focus more on visible social performance through facilitating collaboration, since this form of DI implementation serves as a safer and more immediate indicator of success than the longer-term, higher-risk effort of cultivating genuine student creativity. Without systemic restructuring of teachers' instructional design, DI-DL integration remains a Fragile Innovation, because the adaptation process places teachers under psychological strain that leads to fatigue-a key reason teachers are slow to adapt toward sustained pedagogical depth.

Conclusion

This study concludes that the integration of Differentiated Instruction (DI) and Deep Learning (DL), although still imperfect, is reasonably effective in building social-interactive competence-particularly students' collaborative and communicative behavior in discussion-within 4C-focused learning, while facing a significant implementation lag in achieving higher-order thinking outcomes such as critical thinking and creativity.

Three explicit factors account for this social-cognitive gap:

1. Systemic Inertia: The rigidity of the Minimum Mastery Criteria (KKM) creates psychometric anxiety among teachers, in which pressure for standard compliance overrides the subjective, process-oriented nature of creative assessment.
2. Instructional Fragmentation: The logistical burden of managing multimodal differentiation consumes teachers' cognitive bandwidth, leading to a Differentiation Paradox in which instructional variation is achieved at the expense of conceptual depth.
3. Performativity Trap: Teachers prioritize visible engagement (social participation) as a safer indicator of success during the transition phase, rather than cultivating high-risk, long-term original innovation.

Ultimately, this study shows that for DI-DL to move beyond fragile innovation, it must be supported by systemic policy reform that moves beyond entrenched standards; schools need to provide teachers with sufficient time to develop the instructional designs required to guide students toward explicit higher-order thinking ability. Without such support, DI-DL integration risks remaining merely apparent-visible only in enthusiastic social practice while experiencing intellectual shallowness.

Limitations

1. School assessment-standard context: This study is closely tied to the Minimum Mastery Criteria (KKM) policy applied in school learning, so generalizing the findings to purely competency-based education systems without numerical thresholds may yield different results.
2. Teacher-perceptual focus: The analysis of cognitive bandwidth and psychometric anxiety primarily explores the teacher's side as the implementer, while the direct cognitive impact on students (through standardized test instruments) has not yet been explored in depth.

Future Research

1. Technology mitigation: investigating how AI-based tools or learning management systems (LMS) can reduce teachers' logistical burden in managing multimodal differentiation, in order to resolve the complexity of differentiated learning.
2. Longitudinal study: conducting long-term research to observe whether the performativity trap is temporary (a transition-phase phenomenon) or permanent, and how the transition from social engagement to intellectual depth unfolds over time.

3. Assessment reform: developing and testing alternative assessment models that can accommodate the subjective nature of creativity without triggering psychometric anxiety among teachers.

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