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Differentiated Instruction in Primary and Secondary Education: A Systematic Literature Review

Teofilus Ardian Hopeman[1], Diah Octavia Kusuma Wardani[2], Ali Anhar Syi'bul Huda[3], Arisal Sopyan[4], Jimmy Malintang[5]

[1] Universitas Negeri Manado, Manado, Indonesia
[2] Universitas Jambi, Jambi, Indonesia
[3] Universitas Pendidikan Indonesia, Indonesia
[4] STAI Riyadhul Jannah Subang, Subang, Indonesia
[5] Universitas Islam Negeri Walisongo Semarang, Semarang, Indonesia

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ABSTRACT

Purpose This study examines the development, implementation, and educational impact of differentiated instruction in primary and secondary education. Growing learner diversity has increased the need for instructional approaches that accommodate variations in readiness, interests, learning profiles, and educational needs. The study aims to synthesize recent evidence concerning the conceptual foundations, classroom practices, outcomes, challenges, and future directions of differentiated instruction.

Methods A Systematic Literature Review (SLR) was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework. A total of 31 peer-reviewed journal articles published between 2022 and 2026 were selected through a structured identification, screening, eligibility, and inclusion process. The selected studies were analyzed using thematic synthesis to identify recurring patterns, trends, and research developments.

Findings The review identified five major themes: conceptual evolution of differentiated instruction, instructional adaptation and classroom practices, teacher competence and professional agency, educational outcomes, and structural challenges with emerging technological developments. Differentiated instruction was consistently associated with improved academic achievement, learner engagement, motivation, self-regulated learning, and inclusive participation. Effective implementation was strongly influenced by teacher competence, assessment literacy, professional collaboration, and institutional support. Recent studies also highlighted the growing role of adaptive learning technologies and artificial intelligence in supporting personalized and responsive learning environments.

Research Implications The findings emphasize the importance of strengthening teacher professional development, inclusive pedagogical practices, and institutional support systems to enhance differentiated instruction implementation across diverse educational settings.

Originality This review provides an updated synthesis of differentiated instruction research published between 2022 and 2026 and offers a comprehensive understanding of how differentiated instruction contributes to equitable, inclusive, and learner-centered education in primary and secondary schools.

INTRODUCTION

Differentiated instruction is increasingly positioned within broader discussions of educational equity and inclusion. Lindner and Schwab (2025) emphasize that inclusive education requires instructional approaches capable of accommodating learner variability while maintaining meaningful participation for all students. In heterogeneous classrooms, students differ not only in academic performance but also in motivation, behavioral characteristics, learning preferences, and social-emotional needs. Such diversity challenges educators to design learning experiences that remain accessible without lowering academic expectations. Research examining inclusive teaching practices found that personalization and differentiation constitute essential dimensions of classroom inclusivity, although their implementation remains inconsistent across subject areas and educational contexts (Schwab et al., 2022). Similarly, reviews of inclusive education literature identify differentiation, instructional modification, feedback, flexible grouping, and collaborative support systems as recurring characteristics of effective inclusive classrooms (Rusconi & Squillaci, 2023; Wang, 2026). These findings suggest that differentiated instruction functions not merely as a teaching strategy but as an operational mechanism through which inclusive education is enacted in everyday classroom practice.

The implementation of differentiated instruction has demonstrated positive effects across various educational outcomes. In secondary mathematics education, Bal (2023) reported that differentiated instructional practices significantly improved students' academic achievement. Comparable results have been documented in foreign language education, where differentiated learning environments contributed to higher levels of achievement, learner motivation, and autonomy (Sapan & Mede, 2022). Evidence from studies examining instructional grouping strategies also indicates that adapting instruction according to learner characteristics can enhance academic performance and metacognitive development (Haelermans, 2022). Beyond academic achievement, differentiated approaches have been associated with improved engagement, participation, and learning satisfaction among students. Goyibova et al. (2025) further argue that instructional differentiation creates learning experiences that are simultaneously challenging and supportive, thereby promoting greater learner involvement. These findings collectively suggest that differentiated instruction has the potential to influence both cognitive and affective dimensions of student learning.

Despite its documented benefits, implementing differentiated instruction remains a complex professional challenge. Research consistently indicates that teachers encounter difficulties when attempting to translate differentiation principles into practical classroom actions. Through interviews with Australian secondary school educators, Gibbs (2023) identified limited planning time, resource constraints, student behavioral issues, and insufficient institutional support as major barriers to implementation. Similar challenges were observed by Smets et al. (2022), who found that teachers frequently struggled to assess learner differences accurately and to determine appropriate instructional responses. The complexity of responding to multiple dimensions of student diversity often creates uncertainty regarding instructional decision-making. Furthermore, evidence from Germany suggests that teachers may perceive differentiated instruction as professionally rewarding while simultaneously experiencing increased workload and moderate levels of occupational stress (Pozas et al., 2023). The persistence of these implementation barriers indicates that successful differentiation depends on conditions extending beyond individual teacher commitment.

Teacher competence and professional beliefs have emerged as significant predictors of differentiated instructional practice. According to Gheyssens et al. (2022), teachers who demonstrate a growth-oriented philosophy and a strong ethical commitment toward student development are more likely to engage in instructional adaptation. Research investigating teacher self-efficacy similarly shows that confidence in inclusive teaching capabilities influences the extent to which educators employ differentiated strategies (Woodcock et al., 2022). Comparative studies involving pre-service and in-service teachers reveal that educators who endorse student-centered learning principles are generally more supportive of differentiation and accommodation practices (Ismailos et al., 2022). At the same time, teacher competence encompasses more than pedagogical knowledge alone. Professional expertise, classroom decision-making skills, and the ability to interpret learner needs all contribute to instructional quality and educational outcomes (Yang & Kaiser, 2022). Consequently, the effectiveness of differentiated instruction is closely linked to teachers' professional preparedness and their capacity to respond adaptively to diverse classroom conditions.

Recent studies have increasingly highlighted the importance of collaborative professional cultures in supporting differentiated instruction. While differentiation is often portrayed as an individual teacher responsibility, emerging evidence indicates that collaboration among educators strengthens implementation quality. Pozas and Letzel-Alt (2023) found that intensive forms of collaboration, particularly synchronization and co-construction of teaching practices, were positively associated with differentiated instructional behavior. Leadership support also appears influential. A large-scale study involving primary and secondary school teachers demonstrated that instructional leadership indirectly enhances differentiated instruction through the development of teacher agency (Türkoğlu & Cansoy, 2026). These findings suggest that differentiated instruction should be understood not solely as a classroom-level phenomenon but also as an organizational process shaped by professional relationships, leadership practices, and institutional culture.

The rapid expansion of digital technologies has introduced new opportunities for differentiated instruction in both primary and secondary education. Advances in artificial intelligence, adaptive learning systems, and educational technologies have increased interest in personalized approaches capable of responding to individual learner needs. Kong and Yang (2024) propose a human-centered framework in which generative artificial intelligence supports individualized learning pathways, immediate feedback, and student self-regulation. In primary education, chatbot-assisted learning has been shown to improve language proficiency and communication willingness by providing adaptive learning experiences tailored to learner progress (Yuan, 2024). Likewise, studies examining ChatGPT integration indicate potential benefits for lesson planning, content generation, and instructional differentiation, although concerns remain regarding reliability, ethics, and pedagogical appropriateness (ElSayary, 2024; Zhang & Tur, 2024). These developments suggest that digital innovation may expand the practical possibilities of differentiation while simultaneously introducing new challenges for educators and educational systems.

Although the literature on differentiated instruction has expanded considerably, several conceptual and empirical gaps remain evident. Existing studies are frequently concentrated within specific educational levels, disciplines, or learner populations, resulting in fragmented knowledge regarding broader implementation patterns. Systematic reviews have examined differentiation for high-achieving students (Ziernwald et al., 2022), differentiation within inclusive education (Lindner & Schwab, 2025), and conceptual understandings of educational differentiation (Eikeland & Ohna, 2022). However, comprehensive syntheses integrating evidence from both primary and secondary education remain relatively limited. Moreover, recent developments involving inclusive pedagogy, artificial intelligence, adaptive learning technologies, teacher agency, and professional competence have generated new research directions that have not yet been collectively examined. A systematic review is therefore necessary to consolidate current evidence, identify dominant themes and methodological trends, and clarify future research priorities.

This study conducts a systematic literature review of differentiated instruction in primary and secondary education. The review synthesizes empirical findings related to the conceptual foundations, implementation practices, instructional outcomes, enabling factors, and challenges associated with differentiated instruction across diverse educational settings. By integrating evidence from recent international scholarship, the study seeks to provide a comprehensive understanding of how differentiated instruction is conceptualized and enacted in contemporary education. The review also aims to identify persistent research gaps and emerging directions that may inform future investigations, educational policy development, teacher professional learning, and the advancement of inclusive and equitable teaching practices.

METHOD

Research Design

This study employed a Systematic Literature Review (SLR) design to examine the development, implementation, and outcomes of differentiated instruction in primary and secondary education. The review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines to ensure transparency, rigor, and reproducibility throughout the review process. A systematic review approach was selected because it enables the synthesis of empirical evidence from multiple studies and facilitates the identification of dominant research trends, methodological patterns, and knowledge gaps within a specific field.

Data Sources and Search Strategy

The literature search was conducted between January and March 2026 using five major international databases: Scopus, Web of Science, ERIC, ScienceDirect, and SpringerLink. These databases were selected because they provide extensive coverage of educational research and index high-quality peer-reviewed publications. The search process utilized combinations of keywords and Boolean operators, including: Differentiated Instruction", "Differentiated Learning", "Instructional Differentiation", "Personalized Learning", "Primary Education", "Elementary Education", "Secondary Education", "K–12 Education", "Inclusive Education". The search was limited to publications published between **2022 and 2026** to capture recent developments in differentiated instruction research, particularly studies related to inclusive education, personalized learning, and emerging educational technologies.

Inclusion and Exclusion Criteria

To ensure the relevance and quality of the reviewed studies, predefined inclusion and exclusion criteria were established prior to the screening process.

Table 1. Inclusion and Exclusion Criteria

Criteria	Inclusion	Exclusion
Publication Type	Peer-reviewed journal articles	Books, conference proceedings, editorials
Publication Year	2022–2026	Before 2022
Language	English	Non-English
Educational Level	Primary and secondary education	Higher education
Research Focus	Differentiated instruction	Studies unrelated to differentiated instruction
Accessibility	Full-text articles	Abstract-only publications

The application of these eligibility criteria ensured that only studies directly relevant to differentiated instruction in primary and secondary education were included in the review. Restricting the selection to recent peer-reviewed, full-text publications enhanced the methodological quality and contemporary relevance of the synthesized evidence, while excluding studies outside the specified educational context reduced conceptual heterogeneity. This systematic selection process strengthened the transparency and reliability of the review by ensuring that the included studies addressed comparable research objectives and educational settings.

Study Selection Procedure

The study selection process followed the PRISMA framework and consisted of four stages: identification, screening, eligibility assessment, and inclusion. The initial database search yielded 312 records. After duplicate removal, 278 articles remained for title and abstract screening. Articles that did not meet the inclusion criteria were excluded. The remaining studies underwent full-text assessment to determine their relevance to the research objectives. Following the eligibility evaluation, 31 studies were retained for the final review.

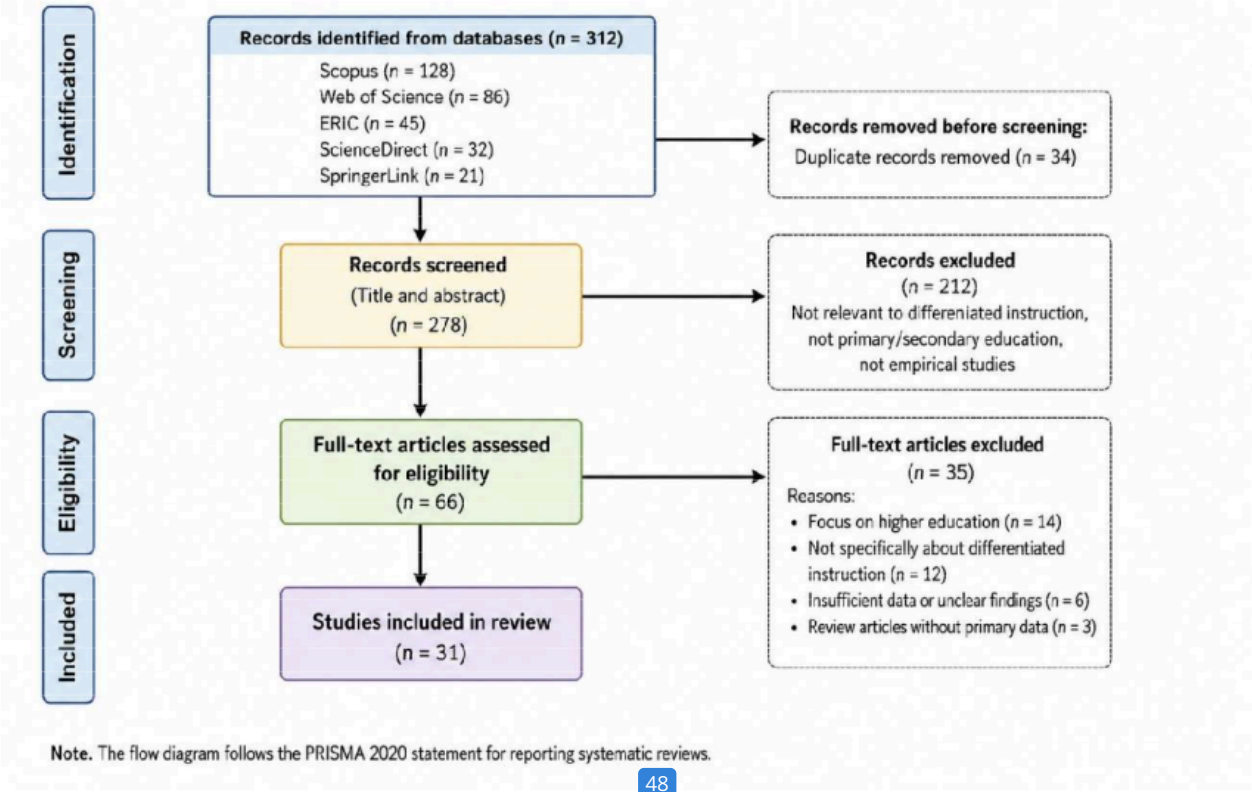

Figure 1. PRISMA-Based Study Selection Process

Records identified through database searching (n = 312)

Figure 1 illustrates the PRISMA-based study selection process used in this review. From the initial 312 records identified through database searching, duplicate records and studies that did not meet the predefined inclusion criteria

were progressively excluded through screening and eligibility assessment. The largest reduction occurred during the title and abstract screening stage, indicating that many publications were not directly related to differentiated instruction in primary and secondary education. After full-text evaluation, 31 studies were retained for the final review, providing a focused body of evidence that aligns with the objectives of the study while maintaining methodological transparency and rigor.

Data Extraction

Data extraction was conducted using a structured review matrix to ensure consistency across studies. Information extracted from each article included author(s), year of publication, country, educational level, research design, participant characteristics, research objectives, and principal findings.

Table 2. Data Extraction Framework

Category	Description
Author and Year	Publication information
Country	Research location
Educational Level	Primary or secondary education
Research Design	Quantitative, qualitative, mixed methods, or review
Participants	Sample characteristics
Research Focus	Main topic investigated
Key Findings	Principal results of the study

The structured extraction framework ensured that comparable information was systematically collected from all included studies, facilitating accurate comparison across different educational settings and research designs. Recording methodological characteristics alongside research focus and key findings enabled the identification of recurring themes, patterns of differentiated instruction implementation, and variations in reported educational outcomes. This standardized procedure strengthened the transparency, consistency, and reliability of the evidence synthesis while reducing the risk of inconsistent data interpretation during the review process.

Data Analysis

The selected studies were analyzed using thematic analysis. This analytical approach was employed to identify recurring concepts, patterns, and relationships across the reviewed literature. The analysis involved three stages: data familiarization, thematic coding, and theme development. The synthesis resulted in four major themes: conceptual foundations of differentiated instruction, classroom implementation strategies, effects of differentiated instruction on students and teachers, and challenges and future directions for differentiated instruction. The thematic approach enabled the integration of findings from diverse methodological traditions and provided a comprehensive understanding of differentiated instruction across primary and secondary educational contexts.

Trustworthiness of the Review

Several procedures were adopted to enhance the credibility and reliability of the review. These included the use of PRISMA guidelines, predefined eligibility criteria, multiple database searches, systematic screening procedures, and structured data extraction. The application of these procedures minimized selection bias and improved the transparency and reproducibility of the review process.

RESULTS

Characteristics of the Included Studies

A total of 31 studies met the inclusion criteria and were included in the final review. The studies were published between 2022 and 2026 and represented diverse educational contexts across Europe, Asia, Africa, North America, and Oceania. The reviewed articles employed quantitative, qualitative, mixed-methods, and systematic review approaches, reflecting the methodological diversity of differentiated instruction research. Most studies examined differentiated instruction in relation to inclusive education, teacher competence, learner diversity, educational equity, student engagement, adaptive learning technologies, and instructional leadership.

The geographical distribution of the studies indicates that differentiated instruction has become a significant area of international educational research. European countries accounted for the largest number of publications, particularly Finland, Germany, Austria, Greece, Belgium, Romania, the Czech Republic, Sweden, and the Netherlands. Additional contributions originated from Türkiye, Tanzania, Ethiopia, China, Australia, and the United States. The

broad international representation suggests a growing recognition of learner diversity and the need for responsive instructional practices across educational systems.

Table 2. Characteristics of the Included Studies

Author(s)	Year	Country	Educational Level	Main Focus
Gheyssens et al.	2022	Belgium	Primary & Secondary	Teacher beliefs and differentiation
Haelermans	2022	Netherlands	Secondary	Ability grouping and differentiation
Sapan & Mede	2022	Türkiye	Secondary	Differentiated instruction in EFL
Yang & Kaiser	2022	International	Secondary	Teacher competence
Gibbs	2023	Australia	Secondary	Teacher perceptions
Gericke et al.	2023	Sweden	Secondary	Laboratory learning
Rusconi & Squillaci	2023	International	Inclusive Education	UDL and teacher competence
Pozas et al.	2023	Germany	Secondary	Teacher well-being
Lindner & Schwab	2025	International	Inclusive Education	Differentiation and individualization
Filiz et al.	2025	Türkiye	K–12	AI-supported learning
Türkoğlu & Cansoy	2026	Türkiye	Primary & Secondary	Teacher agency
Wang	2026	International	Inclusive Education	Support systems and differentiation
Baldinger et al.	2026	Austria	Secondary	Digital adaptive learning
Guo & Keles	2026	International	Inclusive Education	Teacher competence
Kamanzi et al.	2026	Tanzania	Pre-primary	Inclusive pedagogy

The table demonstrates that differentiated instruction research is increasingly linked with broader educational issues such as inclusion, technology integration, professional competence, instructional quality, and student-centered learning. Recent publications also reveal growing attention to digital adaptation and artificial intelligence as tools for supporting instructional differentiation.

Conceptual Foundations of Differentiated Instruction

The reviewed studies consistently describe differentiated instruction as a pedagogical framework designed to address learner variability through instructional adaptation. Across educational contexts, differentiation was associated with adjustments to content, process, assessment, learning environment, and instructional support according to students' readiness levels, interests, abilities, and learning profiles. The literature indicates a shift from teacher-centered instructional models toward more responsive and learner-centered approaches.

A recurring finding across the studies is the strong relationship between differentiated instruction and inclusive education. Research conducted in inclusive settings emphasized that differentiation functions as a practical mechanism for accommodating diverse learners within mainstream classrooms. Studies focusing on students with special educational needs highlighted the importance of individualized support, scaffolded learning, and flexible instructional practices to improve accessibility and participation.

Table 3. Major Conceptual Themes Identified in the Literature

Conceptual Theme	Frequency	Representative Studies
Learner Diversity	Very High	Gheyssens et al.; Kamanzi et al.
Inclusive Education	Very High	Wang; Guo & Keles
Personalized Learning	High	Filiz et al.; Baldinger et al.
Educational Equity	High	Lindner & Schwab
Teacher Responsiveness	High	Türkoğlu & Cansoy
Student-Centered Learning	Moderate	Rusconi & Squillaci

The evidence suggests that differentiated instruction is no longer viewed solely as a classroom strategy but increasingly as a broader framework supporting inclusion, personalization, and educational equity. This conceptual evolution reflects contemporary educational priorities that emphasize responsiveness to diverse learner needs.

Implementation Practices of Differentiated Instruction

The reviewed studies identified numerous instructional practices used to implement differentiated instruction in primary and secondary education. These practices included flexible grouping, formative assessment, individualized feedback, differentiated assignments, scaffolded learning activities, adaptive technologies, collaborative learning, and personalized support. Although the specific strategies varied across contexts, the common objective was to provide learning experiences aligned with students' individual characteristics and needs.

Teachers frequently reported using flexible grouping arrangements to accommodate differences in readiness and achievement levels. Formative assessment was another prominent practice because it enabled continuous monitoring of student progress and informed instructional decision-making. In inclusive classrooms, differentiation often involved modifying learning materials, adapting assessment procedures, and providing individualized support to learners with diverse educational needs.

Table 4. Differentiated Instruction Practices Reported Across Studies

Practice	Frequency
Flexible Grouping	Very High
Formative Assessment	Very High
Individualized Feedback	Very High
Differentiated Tasks	High
Scaffolding	High
Collaborative Learning	High
Adaptive Learning Technologies	Moderate
AI-Assisted Learning	Emerging
Personalized Assessment	Moderate
Individual Learning Pathways	Moderate

The findings indicate that differentiated instruction is implemented through a combination of interconnected strategies rather than a single instructional technique. Successful implementation generally requires ongoing assessment, instructional flexibility, and responsiveness to learner differences.

Educational Outcomes of Differentiated Instruction

The reviewed studies consistently reported positive educational outcomes associated with differentiated instruction. Improvements were observed in both cognitive and non-cognitive dimensions of learning. Academic achievement emerged as the most frequently reported outcome, followed by engagement, motivation, learning autonomy, self-regulation, participation, and inclusive learning experiences.

Several studies reported significant improvements in student achievement following the implementation of differentiated instructional practices. Research conducted in mathematics education found positive effects on academic performance, while studies in foreign language education identified gains in language achievement and learner motivation. Evidence from inclusive education research further demonstrated that differentiated instruction supports participation and academic success among students with diverse learning needs.

Table 5. Educational Outcomes Identified Across the Literature

Outcome Category	Evidence Level
Academic Achievement	Very Strong
Student Engagement	Very Strong
Learning Motivation	Strong
Self-Regulated Learning	Strong
Learning Autonomy	Strong
Inclusive Participation	Strong
Social-Emotional Development	Moderate
Teacher Effectiveness	Moderate

The positive outcomes identified across studies suggest that differentiated instruction contributes to both academic performance and broader educational goals. The strongest evidence was found for achievement, engagement, and inclusive participation, indicating that differentiated approaches support learning across multiple dimensions.

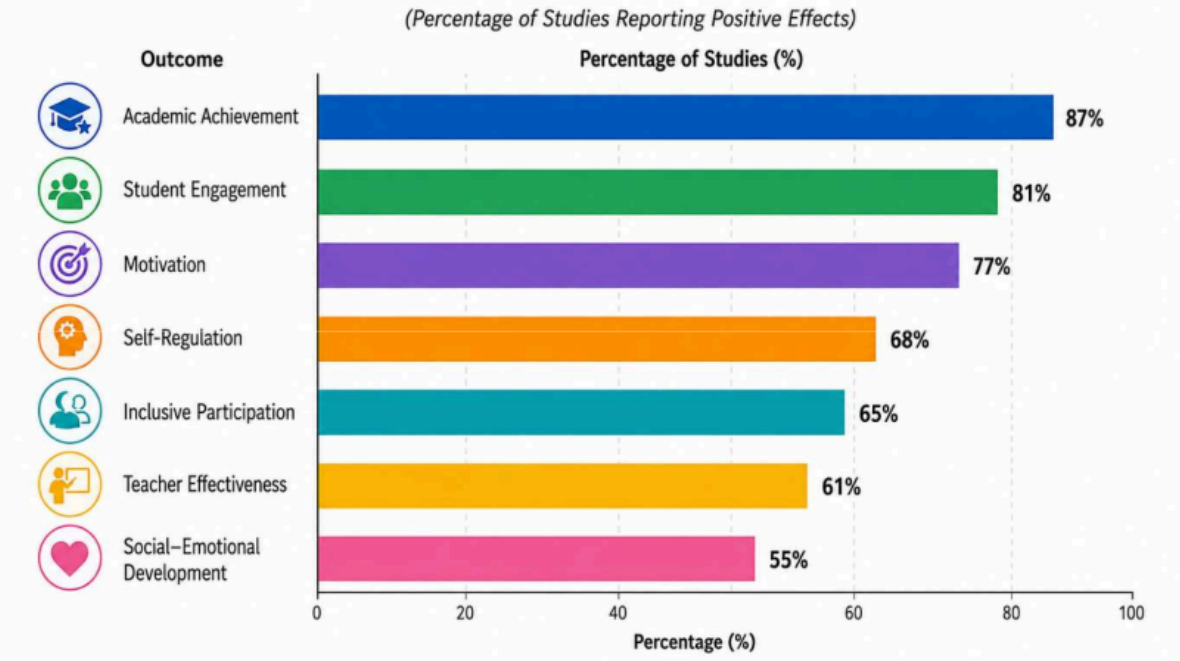

Figure 2. Distribution of Major Outcomes Identified in the Review

The evidence indicates that implementation challenges are largely structural rather than conceptual. Most teachers recognize the value of differentiated instruction but require additional support, training, resources, and organizational conditions to implement it effectively.

Challenges in Implementing Differentiated Instruction

Although the overall findings support the effectiveness of differentiated instruction, the reviewed studies identified several implementation barriers. Teachers frequently reported difficulties related to planning time, large class sizes, limited resources, inadequate professional development opportunities, and challenges in identifying students' individual learning needs. These barriers were reported across both primary and secondary educational settings.

Several studies also highlighted challenges associated with technology integration. While adaptive learning systems and artificial intelligence were recognized as promising tools for supporting differentiation, teachers expressed concerns regarding technological competence, curriculum alignment, accessibility, and ethical considerations. These findings suggest that the successful implementation of differentiated instruction requires systemic support in addition to teacher commitment.

Table 6. Major Challenges Identified Across Studies

Challenge	Frequency
Limited Professional Development	Very High
Time Constraints	Very High
Large Class Size	High
Resource Limitations	High
Curriculum Pressure	High
Assessment Complexity	High
Technology Readiness	Moderate
AI Integration Challenges	Emerging

Insufficient Institutional Support	Moderate

The evidence indicates that implementation challenges are largely structural rather than conceptual. Most teachers recognize the value of differentiated instruction but require additional support, training, resources, and organizational conditions to implement it effectively.

Emerging Research Directions

The final synthesis revealed several emerging directions in differentiated instruction research. Recent studies increasingly examine artificial intelligence, adaptive learning technologies, teacher agency, instructional leadership, digital personalization, and inclusive pedagogical frameworks. These themes appeared more frequently in studies published between 2025 and 2026, suggesting a shift toward technologically enhanced and data-informed models of differentiation.

Table 7. Emerging Research Trends in Differentiated Instruction

Emerging Trend	Representative Studies
Artificial Intelligence in Learning	Filiz et al. (2025)
Adaptive Learning Systems	Baldinger et al. (2026)
Teacher Agency	Türkoğlu & Cansoy (2026)
Inclusive Pedagogy	Wang (2026); Kamanzi et al. (2026)
Teacher Competence Development	Guo & Keles (2026)
Digital Personalization	Filiz et al. (2025); Baldinger et al. (2026)

The reviewed literature suggests that future research will likely focus on the integration of differentiated instruction with digital technologies, artificial intelligence, and inclusive educational frameworks. These developments indicate a continuing transformation of differentiated instruction from a traditional classroom strategy into a comprehensive model for supporting diverse learners in contemporary educational environments.

DISCUSSION

Conceptual Evolution of Differentiated Instruction

The reviewed literature positions differentiated instruction as a pedagogical approach centered on learner variability and instructional responsiveness. Early applications of differentiation largely focused on adapting classroom activities to accommodate differences in academic ability. Recent studies describe a broader conceptual orientation in which differentiation encompasses inclusion, educational equity, learner agency, and personalized learning (Gheyssens et al., 2022; Rusconi & Squillaci, 2023). This expansion reflects changes in educational systems that increasingly recognize diversity as a normal characteristic of classrooms rather than an exception requiring specialized intervention.

Learner diversity emerged as the most frequently discussed foundation of differentiated instruction. Studies conducted across primary and secondary educational settings identified substantial variation in readiness levels, learning preferences, cultural backgrounds, interests, and educational needs among students (Eikeland & Ohna, 2022; Gheyssens et al., 2022; Lindner & Schwab, 2025). Differentiated instruction addresses this diversity through deliberate adjustments to learning experiences while maintaining common curricular objectives. Such an orientation contrasts with standardized instructional models that assume relatively uniform learner characteristics.

The relationship between differentiated instruction and inclusive education appeared consistently throughout the reviewed studies. Research focusing on inclusive classrooms described differentiation as one of the primary mechanisms through which participation and accessibility can be strengthened for diverse learners (Rusconi & Squillaci, 2023; Wang, 2026). Studies examining students with special educational needs reported that instructional adaptation contributed to improved classroom engagement and learning access without requiring separation from mainstream educational environments (Kamanzi et al., 2026; Guo & Keles, 2026).

Connections between differentiated instruction and educational equity were similarly prominent. Equity-oriented educational frameworks emphasize responsiveness to learner circumstances rather than uniform treatment of all students. Studies examining inclusive and learner-centered pedagogies associated differentiated instruction with equitable access to learning opportunities because instructional support was aligned with individual learner requirements (Lindner & Schwab, 2025; Wang, 2026). Educational equity was therefore discussed as a consequence of instructional responsiveness rather than curriculum standardization.

Recent publications increasingly connect differentiated instruction with personalized learning and Universal Design for Learning (UDL). Rusconi and Squillaci (2023) identified substantial conceptual overlap between differentiation and UDL principles, particularly regarding learner accessibility and instructional flexibility. Similar

patterns appeared in studies examining adaptive learning technologies, where personalization was achieved through continuous adjustment of content, pacing, and support mechanisms (Filiz et al., 2025; Baldinger et al., 2026). These developments indicate that contemporary differentiated instruction extends beyond classroom adaptation and increasingly intersects with broader frameworks of educational design.

The conceptual evolution observed across the reviewed studies reflects a transition from differentiation as a teaching strategy toward differentiation as a comprehensive educational philosophy. Contemporary interpretations emphasize responsiveness, accessibility, inclusion, learner autonomy, and educational equity as interconnected dimensions of effective teaching practice (Gheyssens et al., 2022; Lindner & Schwab, 2025; Wang, 2026).

Instructional Adaptation and Classroom Practices

Instructional adaptation occupied a central position across the reviewed studies. Classroom differentiation was rarely implemented through a single instructional technique. Teachers combined flexible grouping, differentiated assignments, formative assessment, scaffolding, individualized feedback, and adaptive learning pathways to address learner variability (Haelermans, 2022; Sapan & Mede, 2022; Goyibova et al., 2025). Such combinations indicate that differentiation functions as a coordinated instructional process rather than an isolated pedagogical intervention.

Flexible grouping emerged as one of the most widely reported instructional practices. Studies conducted in mathematics, language education, and inclusive educational settings associated flexible grouping with increased responsiveness to learner needs and improved alignment between instructional activities and readiness levels (Haelermans, 2022; Sapan & Mede, 2022). Temporary grouping arrangements appeared more frequently than permanent ability-based structures because they allowed instructional decisions to evolve alongside student progress (Schwab et al., 2022; Rusconi & Squillaci, 2023).

Formative assessment represented another essential component of differentiated instruction. Teachers relied on continuous assessment data to identify learning progress, diagnose challenges, and modify instructional activities accordingly (Yang & Kaiser, 2022; Pozas et al., 2023). Assessment served not only evaluative functions but also instructional functions by informing decisions regarding content selection, pacing, grouping arrangements, and support strategies. Similar observations were reported by Wibowo et al. (2025), who described assessment as a foundation for individualized instructional planning.

Individualized feedback occupied a prominent position within differentiated learning environments. Personalized feedback contributed to learner engagement, self-regulation, and academic development because instructional responses were aligned with specific learner needs and performance levels (Sapan & Mede, 2022; Goyibova et al., 2025). Studies examining learner autonomy further associated individualized feedback with increased self-reflection and independent learning behaviors (Kong & Yang, 2024; Yuan, 2024).

Instructional adaptation also involved modifications to learning materials, classroom interactions, task complexity, and assessment procedures. Teachers frequently adjusted instructional resources according to learner readiness and educational objectives (Gibbs, 2023; Smets et al., 2022). Such adaptations required continuous observation and instructional decision-making throughout the learning process. The reviewed studies portray differentiation as a dynamic practice characterized by ongoing adjustment rather than predetermined instructional routines.

Classroom practices associated with differentiation also reflected broader shifts in teacher responsibilities. Teachers increasingly functioned as facilitators, instructional designers, learning diagnosticians, and coordinators of individualized support (Yang & Kaiser, 2022; Rusconi & Squillaci, 2023). These expanded responsibilities contributed to the growing complexity of teaching in differentiated learning environments.

Teacher Competence and Professional Agency

Teacher competence appeared repeatedly as one of the strongest determinants of successful differentiated instruction. Effective implementation depended on pedagogical knowledge, assessment literacy, instructional expertise, and the ability to interpret learner diversity accurately (Yang & Kaiser, 2022; Guo & Keles, 2026). Differentiation requires continuous instructional decisions regarding learning objectives, content organization, support strategies, and assessment approaches. Such responsibilities place considerable demands on professional expertise.

Teacher beliefs exerted substantial influence on differentiated instructional practices. Educators who perceived learner diversity as an educational asset demonstrated stronger commitment to instructional adaptation than teachers who viewed diversity primarily as a challenge (Gheyssens et al., 2022). Similar patterns appeared in studies examining inclusive education, where positive beliefs regarding inclusion were associated with greater use of differentiated strategies and learner-centered pedagogies (Ismailos et al., 2022; Rusconi & Squillaci, 2023).

Professional confidence also influenced implementation quality. Studies examining teacher self-efficacy reported that educators with stronger confidence in their instructional capabilities demonstrated higher levels of differentiation and greater willingness to experiment with adaptive teaching approaches (Woodcock et al., 2022; Pozas

et al., 2023). Lower self-efficacy was commonly associated with reliance on traditional instructional models and reduced instructional flexibility (Gibbs, 2023; Pivarč, 2026).

The reviewed literature also identified collaborative professional cultures as important contributors to differentiation. Teachers working within collaborative environments reported greater access to instructional resources, shared expertise, and opportunities for professional reflection (Pozas & Letzel-Alt, 2023). Collaborative planning supported the development of differentiated learning activities while reducing some of the workload associated with instructional adaptation.

Leadership practices influenced differentiation through their relationship with professional autonomy and teacher agency. Türkoğlu and Cansoy (2026) associated instructional leadership with stronger differentiation practices because supportive leadership structures enabled teachers to exercise professional judgment and instructional flexibility. Similar conclusions emerged from Yu et al. (2022), who emphasized the role of agency in facilitating adaptive teaching and context-sensitive instructional decision-making.

Professional development remained a recurring concern across the reviewed studies. Teachers frequently identified insufficient preparation as a barrier to effective differentiation (Smets et al., 2022; Gibbs, 2023; Pivarč, 2026). Professional learning programs emphasizing learner diversity, assessment literacy, adaptive instructional design, and inclusive pedagogy were associated with stronger implementation outcomes (Guo & Keles, 2026; Wang, 2026). Long-term professional learning structures appeared more effective than short-term interventions because differentiated instruction requires continuous refinement of professional practice.

Educational Outcomes of Differentiated Instruction

Academic achievement represented the most consistently reported outcome across the reviewed studies. Research conducted in mathematics, language education, science education, and inclusive educational settings documented positive associations between differentiated instructional practices and student learning performance (Haelermans, 2022; Bal, 2023; Sapan & Mede, 2022). Achievement gains were most apparent when instructional adaptations were closely aligned with student readiness levels and supported by continuous formative assessment.

Student engagement emerged as another dominant outcome. Learners demonstrated stronger participation, concentration, and persistence when instructional activities reflected their interests, abilities, and learning preferences (Goyibova et al., 2025; Wibowo et al., 2025). Engagement was frequently associated with the perceived relevance and accessibility of learning experiences. Students appeared more willing to invest effort when instructional tasks matched their developmental needs and learning goals.

Motivational outcomes received considerable attention throughout the literature. Studies conducted in language learning and personalized learning environments associated differentiated instruction with higher levels of intrinsic motivation, self-confidence, and academic persistence (Sapan & Mede, 2022; Kong & Yang, 2024). Opportunities for choice, individualized support, and personalized feedback contributed to stronger learner commitment and greater ownership of learning processes (Yuan, 2024; Goyibova et al., 2025).

Differentiated instruction also contributed to the development of self-regulated learning. Learners exposed to adaptive instructional environments demonstrated greater capacity to monitor progress, manage learning strategies, and evaluate performance independently (Kong & Yang, 2024; Yuan, 2024). These outcomes align with contemporary educational priorities emphasizing lifelong learning and learner autonomy.

Inclusive participation constituted another important educational outcome. Studies focusing on inclusive education reported improvements in classroom accessibility, participation, and engagement among students with diverse educational needs (Lindner & Schwab, 2025; Wang, 2026; Kamanzi et al., 2026). Instructional adaptation reduced participation barriers while supporting meaningful involvement in mainstream learning environments.

Patterns identified across the reviewed studies indicate that differentiated instruction influences both cognitive and non-cognitive dimensions of learning. Academic achievement, engagement, motivation, self-regulation, and inclusive participation appeared repeatedly across different educational contexts, suggesting broad applicability of differentiated instructional approaches in primary and secondary education.

Structural Challenges and Future Research Directions

Despite widespread support for differentiated instruction, the reviewed studies documented persistent implementation challenges. Time constraints represented one of the most frequently reported barriers. Teachers often described differentiation as a demanding instructional approach requiring extensive planning, preparation, assessment, and instructional adjustment (Gibbs, 2023; Pozas et al., 2023). Workload concerns were particularly evident in classrooms characterized by substantial learner diversity.

Class size also emerged as a significant challenge. Large classrooms limited opportunities for individualized support and continuous monitoring of learner progress (Smets et al., 2022; Pivarč, 2026). Teachers working with large

student populations frequently reported difficulties implementing flexible grouping, personalized feedback, and differentiated assessment strategies. Such constraints reduced opportunities for sustained instructional responsiveness.

Resource availability influenced implementation across multiple educational settings. Several studies identified limitations in instructional materials, technological infrastructure, and institutional support mechanisms as barriers to differentiation (Gibbs, 2023; Wang, 2026). Resource-related challenges were particularly evident in schools serving diverse learner populations where differentiation demands additional instructional tools and support systems.

Technology integration introduced both opportunities and challenges. Adaptive learning systems, learning analytics, and personalized educational technologies expanded possibilities for instructional responsiveness (Tang et al., 2024; Baldinger et al., 2026). At the same time, concerns regarding digital access, technological competence, infrastructure readiness, and equitable implementation appeared frequently within the literature (Filiz et al., 2025; Zhang & Tur, 2024). Educational benefits associated with technology-supported differentiation depend heavily on contextual conditions and implementation quality.

Artificial intelligence emerged as one of the fastest-growing themes within recent differentiated instruction research. Studies by ElSayary (2024), Kong and Yang (2024), Filiz et al. (2025), and Baldinger et al. (2026) highlighted the capacity of artificial intelligence to support adaptive content delivery, personalized assessment, intelligent tutoring, and automated feedback. These developments introduce new possibilities for large-scale personalization while simultaneously raising questions regarding ethics, transparency, privacy, and professional responsibility.

Future research is likely to focus increasingly on the intersection of differentiated instruction, artificial intelligence, adaptive learning systems, inclusive pedagogy, and data-informed educational decision-making. Comparative investigations across educational systems, longitudinal examinations of implementation outcomes, and studies exploring the long-term effects of technology-supported differentiation remain relatively limited within the current literature. Expanding these areas of inquiry would strengthen understanding of how differentiated instruction continues to evolve within increasingly diverse and technologically mediated educational environments.

CONCLUSION

This systematic literature review demonstrates that differentiated instruction has developed into a comprehensive pedagogical approach that responds to the increasing diversity of learners in primary and secondary education. Contemporary interpretations extend beyond instructional modification and encompass broader dimensions of inclusion, educational equity, learner agency, and personalized learning. The reviewed literature positions differentiated instruction as a mechanism through which educational systems can balance common curricular expectations with diverse learner characteristics. Its relevance is particularly evident in educational environments characterized by heterogeneous academic abilities, learning preferences, cultural backgrounds, and support needs.

The review contributes to the growing body of knowledge by synthesizing recent evidence on the conceptual development, instructional implementation, professional requirements, educational outcomes, and emerging technological dimensions of differentiated instruction. The analysis highlights the interconnected relationship between instructional adaptation, teacher competence, inclusive pedagogy, and learner engagement. This synthesis provides a consolidated framework that may assist educators, school leaders, policymakers, and curriculum developers in understanding differentiated instruction as an integrated educational approach rather than a collection of isolated classroom strategies.

Several limitations should be acknowledged. The review focused exclusively on studies published within the selected period and databases, which may have excluded relevant contributions from other sources. Differences in research designs, educational contexts, participant characteristics, and outcome measures across the reviewed studies also limited direct comparability. In addition, the rapidly evolving nature of educational technology means that recent developments related to artificial intelligence and adaptive learning systems remain underrepresented in the existing evidence base.

Future research would benefit from longitudinal investigations examining the sustained effects of differentiated instruction across different educational levels and cultural contexts. Comparative studies exploring variations in implementation across educational systems may further clarify contextual factors influencing effectiveness. Additional attention is also needed regarding the integration of artificial intelligence, learning analytics, and adaptive technologies within differentiated instructional frameworks, particularly concerning ethical considerations, educational equity, teacher preparedness, and long-term learning outcomes. Such investigations may contribute to a more comprehensive understanding of how instructional responsiveness can be maintained in increasingly digital learning environments.

The broader contribution of this review lies in its relevance to educational practice and public interest. Educational institutions continue to face growing demands to accommodate diverse learner populations while maintaining instructional quality and academic standards. The evidence synthesized in this review supports the view that responsive and adaptive teaching practices remain essential for promoting meaningful participation and equitable learning opportunities. Strengthening differentiated instruction has implications not only for classroom effectiveness

but also for the development of more inclusive and accessible educational systems capable of supporting diverse learners in contemporary society.

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AI DISCLOSURE STATEMENT

The authors declare that ChatGPT, an artificial intelligence tool developed by OpenAI, was used to assist in language editing, grammar checking, paraphrasing, and improving the clarity and readability of the manuscript. The use of ChatGPT was limited to supporting the writing process and did not replace the authors' intellectual contributions. All stages of the research, including the formulation of research objectives, literature selection, data extraction, analysis, interpretation of findings, and preparation of conclusions, were conducted and validated by the authors. The authors carefully reviewed and revised all AI-generated content and assume full responsibility for the accuracy, originality, and integrity of the final manuscript. ChatGPT was not involved in making scholarly judgments and does not qualify for authorship under accepted academic publishing standards.

Teofilus Ardian Hopeman** ***(Corresponding Author)
Department of Primary School Teacher Education, Faculty of Education and Psychology
Universitas Negeri Manado

Tondano, North Sulawesi, Indonesia
Email: teofilus.ardian@unima.ac.id

Diah Octavia Kusuma Wardani
Doctoral Program in Education, Faculty of Teacher Training and Education
Universitas Jambi
Jambi, Indonesia
Email: elcrystalhikaru@gmail.com

Ali Anhar Syi'bul Huda
Department of Islamic Education, Faculty of Social Sciences Education
Universitas Pendidikan Indonesia
Bandung, West Java, Indonesia
Email: alianhar99@upi.edu

Arisal Sopyan
Department of Islamic Education
STAI Riyadhul Jannah Subang
Subang, West Java, Indonesia
Email: arisalsopyan03@gmail.com

Jimmy Malintang
Department of Islamic Education, Faculty of Tarbiyah and Teacher Training
Universitas Islam Negeri Walisongo Semarang
Semarang, Central Java, Indonesia
Email: jimmymalintang81@gmail.com

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