DIFFERENTIATED INSTRUCTION IN IMPROVING INDONESIAN LANGUAGE LEARNING OUTCOMES BASED ON VISUAL, AUDITORY, AND KINESTHETIC LEARNING STYLES

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Article Info	Abstract
	Education plays a strategic role in developing students' potential; however, low learning outcomes remain a persistent challenge, often resulting from teaching methods that fail to accommodate diverse learning styles. Recognizing that learners possess distinct preferences—visual, auditory, or kinesthetic—this study emphasizes the importance of adapting instructional approaches to align with these differences, thereby fostering more effective learning experiences. This research aimed to evaluate the effectiveness of differentiated instruction tailored to students' learning styles in improving learning outcomes among third-grade students at SD Negeri Pao-Pao, Gowa Regency. Employing a quantitative approach with a one-group pretest–posttest experimental design, the study involved 29 students. Instruments included written tests and a VARK-based learning style questionnaire, and data were analyzed using normality and homogeneity tests, followed by one-way ANOVA to examine differences in learning outcomes across the three learning style groups. The results showed that while statistical differences among visual, auditory, and kinesthetic learners were not significant, each group exhibited notable gains in posttest scores. Visual learners benefited most from the use of diagrams and multimedia, auditory learners from discussion-based learning, and kinesthetic learners from hands-on activities. These findings indicate that differentiated instruction—when responsive to learning preferences—can significantly enhance students' engagement and overall academic achievement. The study contributes to the growing body of evidence supporting inclusive and adaptive pedagogy in Indonesian elementary education and provides practical recommendations for teachers to incorporate multimodal strategies in lesson planning while encouraging policymakers to promote professional development programs focused on differentiated instruction as a pathway to improving learning equity and quality.

INTRODUCTION

Education serves as the primary foundation for character formation and the holistic development of learners' potential. In practice, education is not merely a means of transferring knowledge but also a medium for fostering 21st-century competencies such as critical, creative, collaborative, and communicative thinking. In the current era of globalization and technological disruption, educational systems are required to be more adaptive and responsive to the increasingly diverse learning needs of students. This diversity encompasses not only social and cultural backgrounds but also individual learning styles

inherent in each student (Magableh & Abdullah, 2020). Different learning styles, such as visual, auditory, and kinesthetic, significantly influence how students absorb, process, and retain information (Nurasiah et al., 2020). Consequently, instructional approaches tailored to individual learning styles are highly relevant, particularly in primary schools, which represent a critical phase in the formation of students' foundational knowledge and skills (Zulaikha & Laeli, 2023).

In the context of primary education in Indonesia, the quality of teaching remains a significant challenge. Numerous studies indicate that many students still face difficulties in comprehending learning materials due to instructional approaches that do not adequately account for students' individual learning preferences (Al-Shehri, 2020). Uniform, teacher-centered instruction often neglects individual student needs, thereby contributing to poor learning outcomes (Wibowo et.. al). When students' learning styles are not accommodated, the process may lead to boredom, low motivation, and limited active participation in classroom activities (Saleh, 2021). For this reason, strengthening learning strategies through more personalized approaches, such as differentiated instruction, becomes essential to improving learning quality in primary education (Yavuz, 2020).

The central issue addressed in this study is the low effectiveness of learning caused by a mismatch between teaching methods and students' learning styles. Every individual has a unique way of receiving and processing information, which can generally be classified into three categories: visual, auditory, and kinesthetic (Racmadhani & Kamalia, 2023). When these learning styles are disregarded, the instructional process becomes suboptimal, leading to poor academic performance (Asriadi, et. al., 2023). The dominance of lecture-based teaching methods, which are still commonly practiced in many primary schools, may benefit some students but fail to address the learning needs of all (Aljaser, 2019).This results in disparities in academic achievement, with some students struggling to understand the material and becoming passive in the learning process (Malacapay, 2019). Preliminary observations at elementary schools in Pao-Pao, Gowa Regency, reinforce these concerns. The learning process remains homogeneous and pays little attention to variations in students' learning styles. Despite the diversity of learning preferences, teachers tend to employ traditional approaches such as lectures and written assignments, which are not effective for all learners (Supartiningsih & Wibowo, 2023; Wiyono et al. 2024). As a result, many students appear less enthusiastic and demonstrate low engagement in learning. This directly affects their academic performance, showing that one-directional teaching methods are insufficient to meet diverse learning needs (Tas & Minaz, 2024).

In response to these challenges, differentiated instruction is proposed as a solution capable of accommodating students' diverse learning styles. Differentiated instruction is an approach that adapts content, process, product, and learning environment according to students' interests, readiness, and learning profiles. This model facilitates diverse learning styles through various methods, media, and instructional techniques tailored to individual needs (Salam, 2024). For instance, visual learners benefit from images or videos, auditory learners from discussions or verbal explanations, and kinesthetic learners from hands-on practice or simulations. Such adjustments enable students to learn optimally in ways consistent with their characteristics (Sapan & Mede, 2022).

The literature demonstrates that differentiated instruction has yielded significant improvements in student learning outcomes. (Koimah et al., 2024) report that this approach not only enhances conceptual understanding but also encourages active student engagement in the learning process. Similarly, (Ariso et al., 2023) found a substantial improvement in mathematics learning outcomes following the application of differentiated instruction. (Wulan et al., 2024) further note that student engagement significantly increased, indirectly enhancing academic achievement. Moreover, (Achmad et al., 2024) emphasize that this method allows

students to comprehend material in ways that align with their learning preferences. These advantages position differentiated instruction as a strategic solution for addressing disparities in teaching and academic performance.

Nevertheless, the implementation of differentiated instruction in Indonesia still faces challenges. The primary barriers include limitations in time, resources, and teachers' competencies in designing and applying instruction responsive to students' learning needs (Kenney et al., 2024; Ziernwald et al., 2022). Furthermore, most existing studies remain descriptive and rarely evaluate the quantitative effectiveness of this approach, particularly in relation to learning styles. This gap highlights the need for empirical studies based on quantitative data to assess the actual impact of differentiated instruction on improving student learning outcomes.

Based on the literature and existing conditions, this study presents a novel contribution by empirically examining how differentiated instruction, when aligned with students' learning styles, can enhance learning outcomes in Indonesian primary schools. The research not only evaluates the extent of its effectiveness but also identifies practical barriers teachers face in implementation. Therefore, the objectives of this study are: (1) to evaluate the effectiveness of differentiated instruction tailored to students' visual, auditory, and kinesthetic learning styles in improving learning outcomes; (2) to identify the challenges teachers encounter in applying this approach; and (3) to propose practical recommendations for optimizing its implementation. This study is expected to contribute theoretically to the understanding of adaptive learning models and practically to the enhancement of inclusive instructional practices in Indonesian primary education (Salar & Turgut, 2021; Peters et al., 2022).

RESEARCH METHOD
Research Design
This study employed a quantitative approach using a One-Group Pretest–Posttest experimental design, which allows observation of changes in the same participants before and after an intervention to explore potential causal effects (Syarifuddin & Nurmi 2022). This design was chosen because it enables direct measurement of the impact of differentiated instruction tailored to students' learning styles, while controlling for individual differences in baseline abilities. The main limitation of this design is the absence of a control group, which reduces the ability to account for external factors or maturation effects that may influence learning outcomes. Nevertheless, for this study's purpose of evaluating the effectiveness of instructional strategies within a single class, the design provides practical and relevant insights.

Participants
The participants consisted of all third-grade students at Elementary schools in Pao-Pao, Gowa Regency (N = 29). A saturated sampling technique was used, including the entire population to ensure that all students received the intervention and to capture the full range of learning styles present in the class. Selecting this group was practical due to its manageable size and allowed the study to comprehensively assess the intervention's effect on diverse learning preferences.

Research Instruments
To identify learning styles, the VARK Learning Style Questionnaire (Visual, Auditory, Reading/Writing, Kinesthetic) was administered individually, with guidance provided to ensure accurate self-assessment (Cahyanti & Heruddin, 2024) Participants were then categorized into three primary groups—visual, auditory, and kinesthetic—enabling the design of differentiated instructional strategies. Visual learners received image-based or multimedia materials, auditory learners engaged in discussions and verbal explanations, and kinesthetic learners participated in hands-on activities or simulations. These strategies align with the

principles of differentiated instruction, which adapt the learning process, content, and product to the needs of individual learners (Wibowo & Firdaus, 2025)

Learning outcomes were measured using a multiple-choice test developed based on the instructional content. The instrument underwent validity testing via item–total correlation and reliability assessment using Cronbach's Alpha to ensure accurate and consistent measurement of students' competencies. These steps were essential to ensure that observed changes could be attributed to the intervention rather than measurement errors.

Data Analysis

Data analysis began with normality testing of pretest and posttest scores using the Shapiro–Wilk or Kolmogorov–Smirnov tests in SPSS 16.0 to confirm suitability for parametric analysis. Homogeneity of variances across learning style groups was then verified using Levene's Test, ensuring that the assumption for ANOVA was met. A One-Way ANOVA was subsequently conducted to determine whether there were significant differences in posttest scores among visual, auditory, and kinesthetic learners. This analysis allowed simultaneous comparison of multiple groups, enabling evaluation of the effectiveness of differentiated instruction according to learning style. If significant differences were found, it would suggest that learning styles influence the impact of the instructional strategies applied.

RESEARCH FINDINGS AND DISCUSSION
Research Findings

This study aimed to evaluate the effectiveness of implementing differentiated instruction in improving student learning outcomes based on their learning styles, namely visual, auditory, and kinesthetic. The research employed a quantitative approach using a One-Group Pretest–Posttest design, in which students' scores were measured before and after the treatment to determine the direct impact of the instructional strategy. Initial data were obtained by administering a pretest to 29 fourth-grade students at SD Negeri Pao-Pao, Gowa Regency. Following the application of differentiated instruction tailored to each student's learning style profile, a posttest was conducted to assess improvements in learning outcomes. The complete results of pretest and posttest scores, along with the gain values as indicators of improvement, are presented in Table 1.

Table 1
Pretest and Posttest Results by Learning Style

Learning Style	Mean Pretest	Mean Posttest	Mean Gain
Visual	66.17	84.17	0.52
Auditory	67.15	85.31	0.56
Kinesthetic	64.27	84.00	0.58

The data indicate that all learning style categories experienced an increase in mean scores between the pretest and posttest. Auditory learners recorded the highest posttest mean score (85.31), followed by visual and kinesthetic learners. Meanwhile, the highest mean gain was observed among kinesthetic learners (0.58), followed by auditory (0.56) and visual (0.52). These findings suggest that differentiated instruction positively impacted all learning style groups, although the magnitude of improvement varied slightly. A visual representation of the increase in mean scores across learning styles is shown in Figure 1, which illustrates a consistent upward trend across all groups, confirming the effectiveness of differentiated instruction in enhancing academic performance.
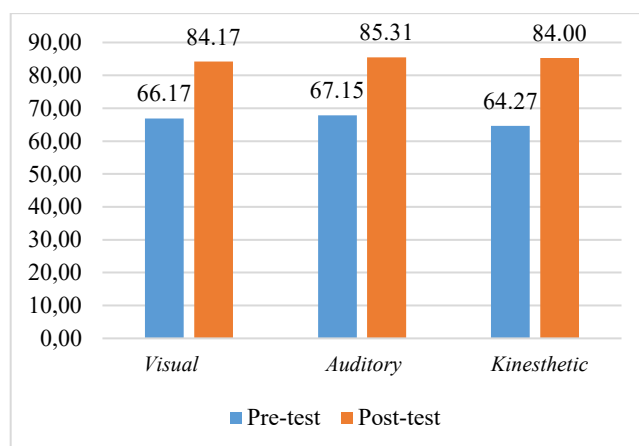
Figure 1. Improvement in Mean Pretest and Posttest Scores Across the Three Learning Styles

The next step was to test the homogeneity of variances using Levene's Test. As presented in Table 2, the significance value of Levene's Test was 0.201 for pretest data and 0.994 for posttest data, both exceeding the threshold of 0.05. This result indicates that no significant differences existed in variance across learning style groups, suggesting that the data were homogeneous and suitable for ANOVA.

Table 2
Distribution of Participants by Learning Style

Learning Style	Number of Participants	Percentage (%)
Visual	6	20.7
Auditory	13	44.8
Kinesthetic	10	34.5

The distribution of participants across learning style categories was proportional, and no missing data were recorded, indicating consistent and valid data collection. This also strengthened the internal validity of the study. To examine whether significant differences existed between pretest and posttest scores across the learning style groups, a one-way ANOVA was conducted. The results showed that for pretest data, the F-value was 1.86 with a significance level of 0.175. For posttest data, the F-value was 0.166 with a significance level of 0.849. Since all significance values exceeded the 0.05 threshold, it can be concluded that no statistically significant differences existed between learning style groups in terms of learning outcomes, either before or after the treatment. Therefore, the null hypothesis (H_0) which posits that no significant differences exist among learning style groups was accepted.

To validate the use of parametric statistical tests in the data analysis, the assumption of normality was tested. This assumption is crucial because parametric tests, such as ANOVA, require data to be normally distributed. Accordingly, normality tests were conducted on both pretest and posttest data across the visual, auditory, and kinesthetic groups. Two statistical methods Kolmogorov–Smirnov and Shapiro–Wilk were employed, both of which are widely used in educational statistics literature to assess data distribution in small and large samples (Cahyanti & Haeruddin 2024).

The results of the normality test are presented in Table 3, showing that the significance (Sig.) values for all groups were greater than 0.05. In the Kolmogorov–Smirnov test, Sig. values for the pretest ranged from 0.093 to 0.200, while for the posttest they ranged from 0.165 to 0.200. Similarly, in the Shapiro–Wilk test, all Sig. values for both pretest and posttest exceeded 0.05 (e.g., Visual posttest = 0.372; Auditory = 0.577; Kinesthetic = 0.308). Based on these findings, it can be concluded that both pretest and posttest data across all learning

style categories met the assumption of normality, thus validating the use of parametric methods such as ANOVA.

Table 3
Normality Test Results for Pretest and Posttest Based on Learning Style

Learning Style		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Pretest	Visual	.215	6	.200	.810	6	.072
	Auditory	.209	13	.123	.922	13	.264
	Kinesthetic	.244	10	.093	.874	10	.110
Posttest	Visual	.196	6	.200	.900	6	.372
	Auditory	.154	13	.200	.949	13	.577
	Kinesthetic	.255	10	.165	.914	10	.308

The next step in the analysis was testing the homogeneity of variances using Levene's Test. As displayed in Table 4, the significance value for the pretest data was 0.201, exceeding the 0.05 threshold. This indicates that the variances among the learning style groups were homogeneous, thereby fulfilling another assumption required for ANOVA.

Table 4
Homogeneity of Variances Test (pretest)

Levene Statistic	df1	df2	Sig.
1.71	2	26	.201

With both assumptions of normality and homogeneity satisfied, a one-way ANOVA was conducted to determine whether significant differences existed in pretest scores among learning style groups. The results, shown in Table 5, indicate an F-value of 1.86 with a significance level of 0.175. Since the Sig. value exceeded 0.05, it can be concluded that no significant differences existed in pretest scores among students with visual, auditory, and kinesthetic learning styles. This suggests that prior to the implementation of differentiated instruction, students' baseline conditions were relatively balanced in terms of academic performance.

Table 5
One-way ANOVA Results for Pretest Based on Learning Styles

Source of Variation	Sum of Squarees	df	Mean Square	F	Sig.
Between Groups	60.32	2	30.156		
Within Groups	420.93	26	16.19	1.86	.175
Total	481.241	28			

To ensure consistency in procedure and to compare treatment effects, the same analysis was conducted for posttest data. The homogeneity test yielded a Levene Statistic of 0.006 with a significance value of 0.994. This value, far exceeding 0.05, reconfirmed that the variances across groups remained homogeneous after the application of differentiated instruction.

The results of the one-way ANOVA for posttest scores are shown in Table 6. The analysis produced an F-value of 0.166 with a significance level of 0.849. Since this value was

greater than 0.05, it was concluded that no statistically significant differences existed in posttest scores among the three learning style groups following the intervention. These findings indicate that improvements in learning outcomes occurred consistently across all groups, without meaningful variation based on learning style.

Table 6
One-way ANOVA results for posttest based on learning styles

Source of Variation	Sum of Squarees	df	Mean Square	F	Sig.
Between Groups	7.284	2	33.624		
Within Groups	574.164	26	22.083	.166	.149
Total	581.448	28			

Based on the ANOVA results, the F-value of 0.166 with a significance level of 0.849 confirms that there were no statistically significant differences among the tested groups. This implies that variability across learning styles was not sufficient to be considered meaningful, and thus the null hypothesis that no differences exist among groups was accepted. Consequently, the findings demonstrate that differentiated instruction improved learning outcomes uniformly across visual, auditory, and kinesthetic learners, with no significant variation between groups.

Discussion
The results of this study indicate that implementing differentiated instruction based on students' learning styles positively impacts learning outcomes. Mean posttest scores increased across all three learning style groups—visual, auditory, and kinesthetic—compared with pretest scores. Although the one-way ANOVA did not show statistically significant differences among the groups, the overall improvement suggests that differentiated instruction effectively promotes a more inclusive and adaptive learning environment. This finding supports the work of Ariso et al. (2023) who highlighted that instructional strategies attentive to learner diversity can enhance learning outcomes regardless of individual style preferences.

The lack of significant differences among learning style groups aligns with Supit et al. (2023), who found no meaningful correlation between learning styles and academic performance. Their study reported very weak Pearson correlation coefficients (visual: r = −0.03; auditory: r = −0.02; kinesthetic: r = 0.08) with significance levels above 0.05. This suggests that factors such as teaching methods, active student engagement, and classroom interaction quality may exert a greater influence on academic achievement than learning style alone.

This study also shows that differentiated instruction fosters a supportive learning environment for students with diverse needs, even if differences among learning styles are not statistically significant. These results are consistent with Pramesthy et al., (2024). who argued that effective learning depends not only on aligning instruction with learning styles but also on implementing student-centered teaching strategies. Despite challenges such as limited time, resources, and variability in teacher expertise, differentiated instruction continues to contribute positively to student achievement.

Consistent with Akbar & Bahri, (2017), the findings highlight the importance of innovative teaching strategies. Their research showed that Project-Based Learning (PjBL) was more effective than Direct Instruction (DI), especially for kinesthetic learners, while learning styles themselves had no significant effect on motivation (p = 0.113) or the interaction between style and instructional model (p = 0.829). Similarly, Hidayatun & Sutama (2018) found that teaching strategies influence outcomes more strongly than learning styles.

Collectively, these studies suggest that the choice of instructional approach plays a more decisive role than students' preferred learning styles.

A key contribution of this research is its empirical evidence that differentiated instruction can improve outcomes without producing significant differences among learning style categories. This aligns with Naibaho (2023), who emphasized that tailoring teaching strategies to the diverse needs of learners is crucial in an inclusive educational framework. Practically, these results highlight the need for teacher professional development programs that strengthen skills in designing and applying differentiated instruction effectively.

Furthermore, these findings underscore the importance of flexible and adaptive instructional approaches, rather than strictly grouping students by learning style. (Fauziyah, & Rofiki, (2024) similarly emphasized that student diversity calls for varied strategies instead of rigid classification. From a policy perspective, curricula should allow flexibility in teaching approaches, enabling teachers to adapt instruction to individual learners while leveraging technology to enhance instructional delivery. Sumarni et al. (2025) reinforced that successful differentiated instruction relies on teacher readiness, training, sufficient time, and resource support.

Theoretically, this study contributes to understanding the relationship between differentiated instruction and learning outcomes in Indonesian primary education, particularly in Bahasa Indonesia. While international research has explored this topic in other contexts, this study provides local empirical evidence, filling a gap in the literature. Moreover, the findings open opportunities for future research into additional factors that interact with differentiated instruction, such as intrinsic motivation, metacognitive strategies, family support, and the use of technology in learning. Take-away: This study confirms that differentiated instruction is a valuable approach for improving learning outcomes in heterogeneous classrooms. Its effectiveness lies not merely in aligning with students' learning styles, but in fostering engagement, inclusivity, and adaptive teaching practices—offering both practical guidance for educators and a foundation for further research in local educational contexts.

CONCLUSION

Based on the findings of this study, it can be concluded that the implementation of differentiated instruction tailored to students' visual, auditory, and kinesthetic learning styles contributed positively to the improvement of primary school students' learning outcomes. Although statistical analyses revealed no significant differences among learning style groups in pretest and posttest scores, all groups demonstrated consistent improvement. This indicates that instructional strategies accommodating the diversity of students' learning preferences can create a more effective overall learning process, foster greater engagement, and collectively enhance academic achievement.

Nevertheless, this study has several limitations. One major constraint lies in the limited time and resources available to teachers for designing and implementing varied instructional strategies that align with individual learning profiles. Additionally, the study's scope restricted to a single primary school with a relatively small sample size limits the generalizability of the findings to broader populations. Therefore, future research is recommended to include larger and more diverse samples across multiple schools, as well as to employ mixed-method or longitudinal approaches to explore the long-term impact of differentiated instruction. The main contribution of this study to the field of Indonesian language learning lies in providing empirical evidence on the effectiveness of inclusive, learner-centered instructional strategies. These findings may serve as a foundation for the development of adaptive learning policies and teacher training programs aimed at equipping educators with the skills necessary to manage heterogeneous classrooms more professionally and effectively.

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INFORMED CONSENT STATEMENT

Participation in this study is entirely voluntary. By agreeing to take part, the participants acknowledge that they have been informed about the purpose, procedures, potential risks, and benefits of the study. Participants understand that their identity are kept confidential and that all information they provide are used solely for research purposes.

DATA AVAILABILITY STATEMENT

The data utilized in this study cannot be made publicly available due to strict adherence to privacy concerns and ethical obligations that safeguard participant confidentiality. This ensures compliance with ethical research standards and data protection regulations.

REFERENCES

Achmad, W.K.S., Rachman, S.A., Aras, L., & Amran, M. (2024). Differentiated instruction in reading in elementary schools: a systematic review. *International Journal of Evaluation and Research in Education*, 13(3), 1997–2005. https://doi.org/10.11591/ijere.v13i3.27134

Akbar, F., & Bahri, A. (2017). Potensi model PjBL (Project-Based Learning) dalam meningkatkan motivasi belajar peserta didik dengan gaya belajar berbeda. *Jurnal Sainsmat*, 6(1), 95–106. http://ojs.unm.ac.id/index.php/sainsmat

Aljaser, A. (2019). Examining the implications of differentiated instruction for high school students' self-actualization. *Of Education and Practice*, 7(3), 184–199. https://doi.org/10.18488/journal.61.2019.73.184.199

Al-Shehri, M. (2020). Effect of differentiated instruction on the achievement and development of critical thinking skills among sixth-grade science students. *Of Learning, Teaching and Educational Research*, 19(10), 77–99. https://doi.org/10.26803/ijlter.19.10.5

Ariso, J., Herwana, E., & S. (2023). Penerapan pembelajaran berdiferensiasi dalam meningkatkan hasil belajar matematika siswa kelas 6 SDN 30 Bengkulu Selatan. *Jurnal Pendidikan Islam Al-Affan*, 4(1), 43–52. http://ejournal.stit-alquraniyah.ac.id/index.php/jpia/

Asriadi, M.A.M., Hadi, S., Istiyono, E., & Retnawati, H. (2023). Does differentiated instruction affect learning outcome? Systematic review and meta-analysis. *Journal of Pedagogical Research*, 7(5), 18–33. https://doi.org/10.33902/JPR.202322021

Cahyanti, A., & H. (2024). Studi literatur: Efektivitas pembelajaran berdiferensiasi terhadap peningkatan hasil belajar matematika peserta didik tingkat sekolah menengah. *Prosiding Seminar Nasional Pendidikan Matematika*, Universitas Mulawarman, 4, 32–42. https://jurnal.fkip.unmul.ac.id/index.php/psnpm

Fauziyah, S.F., & Rofiki, I. (2024). Implementasi pembelajaran berdiferensiasi terhadap kriteria ketercapaian tujuan pembelajaran di sekolah dasar. *WAHANA PEDAGOGIKA: Jurnal Ilmiah Pendidikan Dan Pembelajaran*, 6(01), 14–26. https://doi.org/10.52166/wp.v6i01.6406

Hidayatun, & Sutama. (2018). Gaya belajar dan hasil belajar matematika siswa kelas VII sekolah menengah pertama. *181–188.*

Kenney, A.W., Langley, S.D., Hemmler, V., Callahan, C.M., Gubbins, E.J., & Siegle, D. (2024). Different or differentiated? Recoupling policy and practice in an era of accountability. *Educational Policy*, 38(1), 134–160. https://doi.org/10.1177/08959048231153612

Koimah, S.M., Zahra, N.A., Prastini, E., Sasmita, S.K., & Sari, N. (2024). Implementasi pembelajaran berdiferensiasi untuk memenuhi kebutuhan belajar siswa yang beragam. *JISBI: Jurnal Ilmu Sosial Dan Budaya Indonesia*, 2(2), 58–66.

Magableh, I., & Abdullah, A. (2020). The effect of differentiated instruction on EFL learners: Teachers' perspective. *International Journal of Academic Research in Business and Social Sciences*, 10(5), 626–641. https://doi.org/10.6007/ijarbss/v10-i5/7235

Malacapay, M.C. (2019). Differentiated instruction in relation to pupils' learning style. *International Journal of Instruction*, 12(4), 625–638. https://doi.org/10.29333/iji.2019.12440a

Naibaho, D. (2023). Strategi pembelajaran berdiferensiasi mampu meningkatkan pemahaman belajar peserta didik. *Journal of Creative Student Research (JCSR)*, 1(2), 81–91.

Nurasiah, L., Priatna, B.A., & Priatna, N. (2020). The effect of differentiated instruction on student mathematical communication ability. *Journal of Physics: Conference Series*, 1469(1). https://doi.org/10.1088/1742-6596/1469/1/012160

Peters, M.T., Hebbecker, K., & Souvignier, E. (2022). Effects of providing teachers with tools for implementing assessment-based differentiated reading instruction in second grade. *Assessment for Effective Intervention*, 47(3), 157–169. https://doi.org/10.1177/15345084211014926

Pramesthy, A.P.D., Ulfiyani, S., Hidayahwati, R., & Ulumuddin, A. (2024). Gaya belajar peserta didik mata pelajaran bahasa Indonesia kelas XI-7 di SMA Negeri 14 Semarang. *Jurnal Pendidikan Dan Pembelajaran Indonesia (JPPI)*, 4(3), 831–839. https://doi.org/10.53299/jppi.v4i3.602

Racmadhani, S.A.D., & Kamalia, P. (2023). Analisis strategi pembelajaran berdiferensiasi terhadap hasil belajar peserta didik: Systematic literature review. *Asatiza: Jurnal Pendidikan*, 4(3), 178–192. https://doi.org/10.46963/asatiza.v4i3.1231

Salam, H. (2024). Pembelajaran berdiferensiasi pada mata kuliah Bahasa Indonesia konsep Kurikulum Merdeka-Kampus Merdeka di perguruan tinggi vokasi. *Journal on Education*, 07(01), 8651–8658. http://jonedu.org/index.php/joe

Salar, R., & Turgut, U. (2021). Effect of differentiated instruction and 5E learning cycle on academic achievement and self-efficacy of students in physics lesson. *Science Education International*, 32(1), 4–13. https://doi.org/10.33828/sei.v32.i1.1

Saleh, A.H.A. (2021). The effectiveness of differentiated instruction in improving Bahraini EFL secondary school students in reading comprehension skills. *Of Research and Innovation in Language*, 3(2), 135–145. https://doi.org/10.31849/reila.v3i2.6816

Sapan, M., & Mede, E. (2022). The effects of differentiated instruction (DI) on achievement, motivation, and autonomy among English learners. *Iranian Journal of Language Teaching Research*, 10(July 2021), 127–144. https://doi.org/10.30466/ijltr.2022.121125

Sumarni, S., Adhim, A.N.A.A., Pamungkas, D.T.A., Sari, I.P., & S. (2025). Efektivitas strategi penilaian dalam pembelajaran berdiferensiasi untuk menilai keragaman potensi siswa: Studi literatur sistematis. *Wacana Akademika: Majalah Ilmiah Kependidikan*, 9, 121–133. https://jurnal.ustjogja.ac.id/index.php/wacanaakademika/index

Supartiningsih, E., & Wibowo, S. (2023). Differentiated learning number division material increases elementary school students' interest and learning outcomes. *International Journal of Elementary Education*, 7(4), 608–615. https://doi.org/10.23887/ijee.v7i4.66879

Supit, D.M., Lasut, E.M.M., & Tumbel, N. (2023). Gaya belajar visual, auditori, kinestetik terhadap hasil belajar siswa. *Journal on Education*, 5(3), 6994–7003. https://doi.org/10.31004/joe.v5i3.1487

Syarifuddin, & N. (2022). Pembelajaran berdiferensiasi dalam meningkatkan hasil belajar matematika siswa kelas IX semester genap SMP Negeri 1 Wera tahun pelajaran 2021/2022. *JagoMIPA: Jurnal Pendidikan Matematika Dan IPA*, 2(2), 93–102. https://doi.org/10.53299/jagomipa.v2i2.184

Tas, H., & Minaz, M. (2024). The effects of learning style-based differentiated instructional activities on academic achievement and learning retention in the social studies course. *SAGE Open*, 14(2), 1–14. https://doi.org/10.1177/21582440241249290

Wibowo, S., Wangid, M.N., & Firdaus, F. (2025). The relevance of Vygotsky's constructivist learning theory with the differentiated learning in primary schools. *Journal of Education and Learning*, 19(1), 431–440. https://doi.org/10.11591/edulearn.v19i1.21197

Wiyono, H., Rahayuningtyas, W., & Anggoro, B. (2024). Tren pembelajaran diferensiasi dalam kajian guru di Indonesia: Analisis jurnal terdeteksi Sinta. *Journal of Language, Literature, and Arts*, 4(5), 512–520. https://doi.org/10.17977/um064v4i52024p512-520

Wulan, Y.A., Anam, F., & Suharti, S. (2024). Meningkatkan hasil belajar peserta didik melalui pembelajaran berdiferensiasi pada materi fungsi. *Jurnal Pi: Pendidikan Matematika Dan Integrasinya*, 3(2), 47–54.

Yavuz, A. (2020). The effects of differentiated instruction on Turkish students' L2 achievement, and student and teacher perceptions. *6(2)*, 313–335. https://doi.org/10.32601/ejal.776002

Ziernwald, L., Hillmayr, D., & Holzberger, D. (2022). Promoting high-achieving students through differentiated instruction in mixed-ability classrooms — A systematic review. *Of Advanced Academics*, 33(4), 540–573. https://doi.org/10.1177/1932202X221112931

Zulaikha, I.P.N., & Laeli, A. (2023). Differentiated learning in diverse students to meet curriculum targets. *International Social Sciences and Humanities*, 2(2), 436–441. https://doi.org/10.32528/issh.v2i2.259