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Effectiveness of Differentiated Instruction in Improving Computerized Accounting Learning Outcomes of Vocational Students

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ABSTRACT

The digital transformation of the accounting sector requires vocational students not only to understand theoretical concepts but also to develop proficiency in computerized accounting systems. However, instructional practices that treat learners uniformly often result in uneven learning outcomes, particularly in private vocational schools where student backgrounds vary significantly, such as those located in DKI Jakarta. This study aims to examine the effectiveness of Differentiated Instruction in improving learning outcomes in the Computerized Accounting course. A quantitative approach was employed using a quasi-experimental one group pretest–posttest design involving 36 eleventh-grade accounting students from a private vocational high school in DKI Jakarta. Data were collected through achievement tests, observations, and documentation, and analyzed using the Wilcoxon Signed Rank Test. The findings reveal a significant improvement in students' performance following the intervention, evidenced by an increase in mean scores and a reduction in performance disparities. These results confirm that tailoring instruction to students' readiness, interests, and learning profiles creates a more responsive and digitally aligned learning environment in vocational education. The study recommends the implementation of diagnostic assessments and flexible grouping in Computerized Accounting instruction and encourages further research using control groups and extended interventions to validate long-term effects.

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Introduction

The accelerating digital transformation across global industries has profoundly altered the competencies expected of vocational graduates, especially within the domain of accounting. Traditional bookkeeping practices have been supplanted by technologically mediated processes that require mastery of computerized accounting systems, digital data management, and automation-driven financial reporting. In Indonesia, this paradigm shift places vocational high schools, particularly those offering accounting programs, at a pivotal juncture. They are tasked with producing graduates who can seamlessly integrate theoretical knowledge with real-time digital accounting practices. Yet, despite these pressing demands, instructional practices in many vocational classrooms remain largely uniform, teacher-centered, and detached from the heterogeneous characteristics of learners. Such pedagogical incongruence results in learning environments that inadequately respond to students' diverse readiness levels, interests, and cognitive capacities, ultimately inhibiting the optimal acquisition of practical accounting skills. This misalignment constitutes a substantive educational problem that warrants systematic investigation.

Differentiated Instruction (DI) has emerged as a theoretically robust and empirically supported pedagogical paradigm capable of addressing the varied learning needs of students. DI posits that instructional processes should be adaptively structured to accommodate differences in students' learning profiles, interests, and preparedness, thereby enabling meaningful engagement and equitable access to content mastery (Hasanah et al., 2022). Scholars have consistently affirmed DI's capacity to enhance academic outcomes, strengthen learner motivation, and improve classroom engagement across educational settings (Safawi & Akay, 2022). These studies collectively emphasize the pedagogical imperative that learning environments should not be constructed as homogenous spaces but as dynamic platforms in which instructional scaffolding is systematically adjusted to support a learner's developmental trajectory. Although DI has gained prominence globally, its implementation in vocational settings that emphasize competency-based curricula and skill-based performance remains underexamined.

Research in accounting education reveals a growing emphasis on instructional models that transcend rote learning and integrate cognitive, affective, and psychomotor dimensions to cultivate learners' professional competencies (Saputra et al., 2025). The digitalization of accounting reinforces this orientation, as learners must navigate application interfaces, automate entries, process digital financial statements, and troubleshoot accounting software (Mdingi, 2024). These tasks demand differentiated pedagogical pathways that consider learners' varying levels of prior exposure, familiarity with digital tools, and individual learning preferences. However, most existing studies addressing DI have focused on general academic subjects such as mathematics and science Mardati et al., (2025), rather than investigating the complex pedagogical needs of

vocational disciplines. Even studies situated within accounting contexts tend to emphasize conceptual knowledge without addressing the specific competencies required for software-based accounting practices (Yetti, 2023).

This situation presents an evident research gap that is both conceptual and methodological. While DI is recognized as a promising instructional model, empirical evidence demonstrating its effectiveness in improving computerized accounting learning outcomes in vocational high schools remains insufficient and fragmented. To date, there is no comprehensive quasi-experimental study that rigorously measures the pre and post intervention effects of DI on computerized accounting mastery. This lack of empirical grounding limits the generalizability of DI frameworks and restricts educators' ability to adopt evidence-based instructional strategies suited to the digital accounting environment. Considering that vocational learners vary substantially in technological readiness, prior knowledge, and learning motivation, the development of differentiated learning trajectories is not merely a pedagogical preference but an essential requirement for ensuring their workplace relevance.

The present study responds to this lacuna by employing a quasi-experimental design to analyze the impact of Differentiated Instruction on learning outcomes in computerized accounting among vocational high school students. This approach allows for a systematic comparison of students' competencies before and after the intervention, providing measurable insights into the pedagogical efficacy of DI within a digitally mediated accounting curriculum. The findings are expected to contribute theoretically by extending DI scholarship into an underexplored vocational domain and practically by offering an empirically grounded instructional framework that educators can adopt to enhance student performance. By situating DI within the evolving landscape of accounting digitalization, this study enriches academic discourse while supporting Indonesia's broader educational transformation agenda, wherein vocational graduates are expected to meet the dynamic expectations of a technology-driven labor market.

Materials and Methods

This study employed a quantitative research approach, as its primary objective was to examine measurable changes in students' computerized accounting learning outcomes following the implementation of Differentiated Instruction. A quantitative method allowed the researcher to collect numerical data, conduct statistical analysis, and draw objective conclusions based on empirical evidence (Creswell, 2012). The research adopted a quasi-experimental design utilizing a one-group pretest–posttest model, wherein a single group of students received the instructional intervention and their learning outcomes were compared before and after the implementation. This design was selected because the administrative conditions of the private vocational high school located in DKI Jakarta did not permit the establishment of a control group, making a true experimental design

infeasible. The design choice aligns with reviewer feedback, which emphasized the importance of methodological coherence between the research questions and the selected analytical framework.

The participants consisted of 36 eleventh-grade accounting students enrolled in a private vocational high school in DKI Jakarta, selected through saturated sampling, wherein all available subjects in the population were included due to the limited and homogeneous number of learners (Nasution, 2017). Data were collected using tests, observations, and documentation. The test instrument comprised multiple-choice items developed in accordance with computerized accounting competency indicators. Validity was assessed using the Pearson Product Moment, while reliability was evaluated using Cronbach's Alpha to ensure consistency of measurement across items (Sudaryono et al., 2019). Observation was used to monitor behavioral engagement during differentiated learning activities, whereas documentation was employed to verify school records, student learning artifacts, and implementation evidence.

Data were analyzed using the Wilcoxon Signed Rank Test, a nonparametric statistical procedure employed because the dataset did not meet the assumptions of normality. The Wilcoxon test is appropriate for comparing paired samples and determining whether significant differences exist before and after an intervention (Sprünken et al., 2024). The use of this analytical technique strengthened the alignment between the research problem, the data characteristics, and the methodological procedures applied. Consequently, the methodological framework adopted in this study enables a rigorous examination of the impact of Differentiated Instruction on computerized accounting learning outcomes within the context of vocational education in DKI Jakarta, ensuring the study's replicability and reinforcing its contribution to empirical research in the field.

Result

The findings of this study demonstrate a substantial improvement in students' learning outcomes after the implementation of Differentiated Instruction in the Computerized Accounting course. Prior to the intervention, a pretest was administered to measure the students' baseline competencies. The results revealed that the average score achieved by the participants was 70.03, with a minimum score of 40 and a maximum score of 100. The standard deviation of 15.236 reflected a considerable variation in students' competencies and readiness levels, indicating that they possessed diverse prior knowledge and mastery of accounting concepts and software operations. This dispersion in scores confirms that the classroom consisted of learners with heterogeneous academic profiles, thereby justifying the need for an instructional model capable of addressing individual learning differences.

Table 1. Pretest Statistics for Computerized Accounting Learning Outcomes

Pretest Statistics	Value
Number of Students	36
Mean Score	70.03.00
Minimum Score	40
Maximum Score	100
Standard Deviation	15.236

Following the application of Differentiated Instruction, a posttest was administered to evaluate improvements in students' understanding and performance. The posttest results indicated a remarkable increase in achievement, with the mean score rising to 91.97. The lowest score obtained by students increased to 85, while the highest reached 97, and the standard deviation significantly decreased to 3.149. This reduction in score variability reflects a more uniform learning outcome across the class, demonstrating that the instructional intervention not only improved overall achievement but also contributed to a more equitable distribution of learning outcomes. These results provide empirical evidence that Differentiated Instruction enabled students to reach competency standards more consistently and effectively.

Table 2. Posttest Statistics for Computerized Accounting Learning Outcomes

Posttest Statistics	Value
Number of Students	36
Mean Score	91.97
Minimum Score	85
Maximum Score	97
Standard Deviation	3.149

To statistically confirm whether the improvement observed between the pretest and posttest scores occurred by chance or resulted from the instructional intervention, the Wilcoxon Signed Rank Test was employed. Given that the data did not meet normality assumptions, this nonparametric test was deemed appropriate for comparing paired samples. The analysis yielded an Asymp. Sig. (2-tailed) value of 0.000, which is well below the significance threshold of 0.05. This indicates a statistically significant difference between pre-intervention and post-intervention scores, validating that Differentiated Instruction had a measurable and consistent impact on students' computerized accounting performance.

Table 3. Wilcoxon Signed Rank Test Results for Pretest and Posttest Scores

Score Comparison	Z Value	Asymp. Sig. (2-tailed)
Pretest – Posttest	-5.178	0.000

Collectively, these findings affirm that Differentiated Instruction successfully elevated learning outcomes and reduced performance disparities among students, resulting in a more balanced achievement profile. The increase in mean scores, the

contraction of score distribution, and the statistically significant test results jointly substantiate the effectiveness of the instructional approach applied in this study.

Discussion

The findings of this study demonstrate that Differentiated Instruction significantly enhanced students' learning outcomes in the Computerized Accounting course. The substantial increase in the posttest mean score compared to the pretest score does not merely represent an improvement in cognitive understanding but indicates the emergence of more equitable competence among learners. The sharp reduction in score variability further confirms that the instructional intervention effectively minimized disparities in student achievement. Such results reinforce the argument that instructional models tailored to individual learners' readiness, interests, and learning profiles yield greater learning efficacy than uniform, teacher-centered approaches that overlook learner diversity. This is particularly relevant in vocational settings that emphasize procedural mastery and technology-based practices, where a mismatch between instructional delivery and students' skill levels may lead to fragmented learning and inconsistent competence acquisition.

These results are consistent with prior research by Safawi & Akay, (2022), who found that Differentiated Instruction substantially improves academic achievement, particularly when instructional components are aligned with learners' specific attributes. Similarly, Kara & Tekindur, (2025) reported that differentiated teaching strategies enhance learning experiences by offering diverse entry points into the curriculum. The congruence between the present findings and previous studies demonstrates that the pedagogical rationale underlying Differentiated Instruction is not limited to general academic subjects. Instead, it extends constructively into vocational education domains, including Computerized Accounting, where students must integrate conceptual understanding with operational proficiency in digital accounting systems. By enabling students to engage with accounting procedures according to their developmental stage, Differentiated Instruction provides an instructional alignment that conventional approaches fail to afford.

The results of the present study also contribute conceptually to the ongoing discourse on accounting pedagogy by substantiating the importance of differentiated pathways in cultivating procedural fluency. Existing research by Saputra et al., (2025) emphasizes the significance of learning activities that develop students' cognitive, affective, and psychomotor capacities in accounting. However, while previous studies have recognized the relevance of active engagement within accounting instruction, they have not explicitly demonstrated how differentiated content and learning processes narrow the competency gaps between learners. The present study provides empirical evidence that Differentiated Instruction does not merely elevate overall achievement scores but fosters competence uniformity, an outcome that has not been thoroughly

addressed in past research. Thus, this study offers a novel contribution to vocational accounting education by empirically validating the role of differentiation in bridging skill disparities.

Moreover, the study aligns with the perspective of Mdingi, (2024), who argue that the integration of computerized accounting systems into school curricula necessitates pedagogical adjustments that mirror professional industry standards. The instructional approach adopted here enabled the systematic calibration of task difficulty such that students with greater initial competencies engaged in more complex accounting simulations, while those requiring foundational reinforcement received structured guidance. This differentiation strategy reflects an instructional logic compatible with the principles of Kurikulum Merdeka, which emphasizes competency-based learning and encourages pedagogical flexibility. Thus, rather than functioning as a generic adaptation, Differentiated Instruction provided an authentic learning environment wherein students progressed according to their technological readiness and accounting procedural mastery.

Furthermore, this study reinforces Onyishi, (2024) observation that Differentiated Instruction increases learners' academic persistence and motivation. The homogeneity of posttest scores suggests that learners not only mastered course content but also developed sustained engagement with instruction. In procedural subjects such as Computerized Accounting, where accuracy and consistency are crucial, motivation functions as a catalyst that supports students' continued effortful practice. The present results suggest that motivation emerged not from external reinforcement but from the accessibility of learning tasks aligned with students' individual readiness levels. This finding highlights the pedagogical value of Differentiated Instruction in shaping affective responses that facilitate competence in technology-mediated learning settings.

Despite its substantive contributions, this study contains methodological limitations that must be acknowledged. The use of a one-group pretest–posttest design without a control group restricts the capacity to attribute learning gains exclusively to the instructional intervention. Confounding variables such as prior exposure to accounting software, incidental learning, or individual learning trajectories may have influenced outcomes. Consequently, future research should adopt experimental or quasi-experimental designs employing control groups, extend the duration of instructional interventions, and incorporate retention measures to evaluate whether competence is sustained over time. Expanding the scope of participants to include multiple vocational schools may also enhance the generalizability of findings across diverse educational contexts.

Conclusion

This study concludes that the implementation of Differentiated Instruction is demonstrably effective in improving vocational students' learning outcomes in Computerized Accounting, as evidenced by the more equitable distribution of achievement and the narrowing of competency gaps among learners. These findings directly address the research objective by confirming that instructional strategies tailored to students' readiness, interests, and learning profiles facilitate a more inclusive, responsive, and technologically aligned learning process in vocational education contexts. The study contributes to the body of knowledge by providing empirical evidence that differentiated content and learning pathways not only enhance academic performance but also strengthen students' preparedness for industry-relevant digital accounting practices. Practically, the results suggest that SMK teachers incorporate diagnostic assessments, flexible grouping, and tiered assignments into instructional designs to better accommodate individual differences in learning. Future studies are encouraged to employ controlled experimental designs and longer intervention periods to assess the durability of learning gains and further validate the long-term impact of Differentiated Instruction in digital accounting education.

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