

## **Direct instruction and practice-based learning to improve microsoft excel achievement in vocational school**

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### **Abstrak**

*Penelitian ini mengkaji efektivitas penerapan gabungan model Direct Instruction dan Practice-Based Learning dalam meningkatkan prestasi belajar siswa pada konteks pendidikan kejuruan. Desain Penelitian Tindakan Kelas (PTK) berdasarkan model Kemmis dan McTaggart diterapkan dalam dua siklus, masing-masing meliputi tahap perencanaan, pelaksanaan tindakan, observasi, dan refleksi. Subjek penelitian adalah 30 siswa kelas XI pada Program Keahlian Manajemen Perkantoran dan Layanan Bisnis di SMK Bhakti Karya Karanganyar. Data dikumpulkan melalui tes praktik dan lembar observasi terstruktur. Instrumen observasi divalidasi melalui expert judgment (Aiken's  $V = 0,89$ ) dengan reliabilitas antar-penilai sebesar 83%. Data dianalisis menggunakan metode deskriptif kuantitatif dan kualitatif. Sebelum tindakan, rata-rata nilai siswa adalah 69,87 dengan tingkat ketuntasan 40%. Setelah siklus I, rata-rata nilai meningkat menjadi 79,76 dengan ketuntasan 66,67%. Pada siklus II, rata-rata nilai naik menjadi 83,04 dengan ketuntasan 73,33%. Skor keterlibatan siswa juga meningkat dari 69,77% pada siklus I menjadi 79,05% pada siklus II. Hasil ini membuktikan bahwa model pembelajaran terpadu ini secara efektif meningkatkan capaian kognitif dan pengembangan keterampilan praktis siswa kejuruan.*

*Kata kunci: keterampilan spreadsheet; keterlibatan siswa; ketuntasan belajar; penelitian tindakan kelas; strategi instruksional*

### **Abstract**

This study investigated the effectiveness of integrating Direct Instruction and Practice-Based Learning to improve student learning achievement in a vocational education setting. A Classroom Action Research design based on the Kemmis and McTaggart model was employed, conducted across two cycles each comprising planning, action implementation, observation, and reflection stages. Participants consisted of 30 Grade XI students in the Office Management and Business Services program at SMK Bhakti Karya Karanganyar. Data were collected via practical performance tests and structured observation sheets. Observation instruments were validated through expert judgment (Aiken's  $V = 0.89$ ) and established inter-rater

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reliability of 83%. Data were analyzed using descriptive quantitative and qualitative methods. Prior to intervention, the mean score was 69.87 with a mastery rate of 40%. Following Cycle I, the mean score increased to 79.76 with a mastery rate of 66.67%. After Cycle II, the mean score rose further to 83.04 with a mastery rate of 73.33%. Student engagement scores also improved from 69.77% in Cycle I to 79.05% in Cycle II. These results confirm that the integrated instructional model effectively enhances both cognitive outcomes and practical skill development among vocational students.

Keyword: classroom action research; instructional strategy; learning mastery; spreadsheet skills; student engagement

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## Introduction

Proficiency in spreadsheet applications such as Microsoft Excel represents a critical competency within the Office Management and Business Services vocational program. In professional environments, Excel is widely employed for financial data processing, chart creation, report compilation, and systematic information presentation. Hikmah et al. (2022) highlighted that Excel mastery is essential because it enhances work efficiency, minimizes computational errors, and facilitates more secure and structured data storage. Similarly, Kadun et al. (2023) demonstrated that Excel proficiency strongly supports administrative tasks, particularly in the public service sector, owing to its capacity for rapid, accurate, and interpretable numerical data presentation.

Despite the recognized importance of Excel skills, preliminary observations conducted in Grade XI classrooms at SMK Bhakti Karya Karanganyar revealed significant learning challenges. Many students experienced difficulties with fundamental Excel features, including formulas, data processing functions, and table formatting. The mean score of students was 69.87, and only 40% met the Minimum Mastery Criterion (KKM) of 75. These findings indicate that students had not yet achieved optimal mastery of basic Microsoft Excel skills. Consequently, a more structured and applied instructional strategy was required to bridge the gap between conceptual understanding and practical application.

Two pedagogically relevant approaches to address these challenges are Direct Instruction and Practice-Based Learning. Direct Instruction is a teacher-directed model that emphasizes the explicit and systematic delivery of content through progressive stages, including demonstration, guided practice, and independent practice, thereby enabling students to build understanding incrementally and in a structured manner. As conceptualized by Risdianto et al. (2020), Direct Instruction is a teaching strategy specifically designed to facilitate students' acquisition of well-structured declarative and procedural knowledge through systematic, progressive activity patterns. Its structured and accessible delivery has been recognized as effective in helping students acquire knowledge in a sequential and organized manner.

Practice-Based Learning, by contrast, emphasizes direct engagement through repeated application and authentic experience. This approach underscores the critical role of active student participation in constructing deeper understanding and developing meaningful, sustainable skills. According to BMC Medical Education (2024), Practice-Based Learning and its improvement are considered core professional competencies throughout one's career, as they involve learning through practical experience and reflective practice. Research by Guswan and Learning (2020) has demonstrated that practice-oriented learning approaches yield positive effects on student academic achievement. When students are actively engaged in practical activities, they tend to assimilate instructional concepts more effectively and apply them in real-world contexts. Integrating both models is therefore expected to enhance students' comprehension of Excel concepts and their capacity to apply these skills effectively.

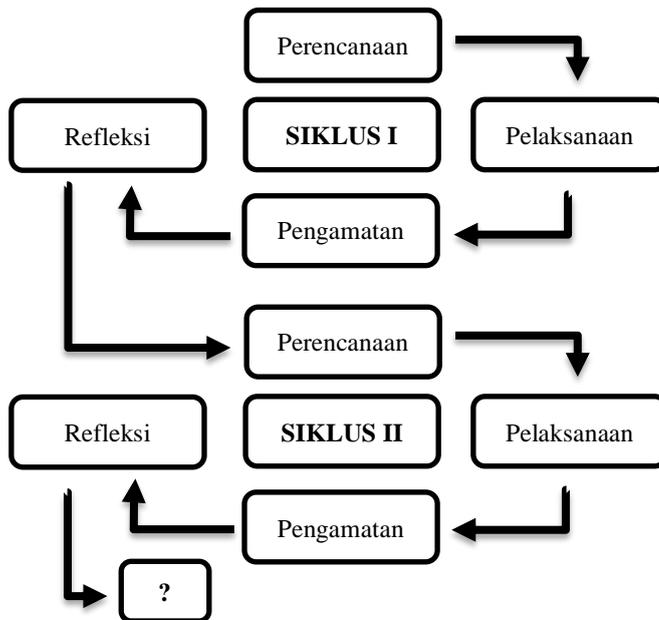
Learning achievement is a key indicator for evaluating the effectiveness of educational processes. Rosyid (2020) described learning achievement as an individual's attainment resulting from a learning process, manifested through specific changes typically represented in the form of symbols, scores, grades, or verbal descriptions, evaluated against predetermined criteria or standards. Sebastian (2022) further clarified that learning achievement reflects the level of competence or skills developed within a subject area, frequently demonstrated through test results or teacher-assigned grades. Thus, learning achievement reflects not only students' content mastery but also the effectiveness of the applied instructional methodology.

Within the vocational education context, mastery of applications such as Microsoft Excel is essential. Excel facilitates automated data processing through formulas, basic calculations, data management, table and chart creation, and data administration (Purwanto, 2017). Excel proficiency enables students to manage and analyze data efficiently a highly valued skill in professional settings. The integration of Excel instruction in vocational curricula has been shown to contribute to improved student data processing capabilities (Musdalifah et al., 2021). Accordingly, embedding Excel training within vocational programs simultaneously enhances students' technical expertise and prepares them for future professional challenges.

Prior research in this domain includes a study by Wirawan (2022), who applied the Student Teams Achievement Division (STAD) cooperative learning model to improve Microsoft Excel learning outcomes, and Prasetyo et al. (2021), who focused on the utilization of animated instructional videos. However, these studies did not combine structured, teacher-directed instruction with hands-on experiential practice. The novelty of the present study lies in its integration of Direct Instruction which emphasizes systematic explanation with Practice-Based Learning which prioritizes direct, experience-based exercises an approach that has not been extensively implemented in Microsoft Excel instruction within vocational schools. This study thus seeks to answer the primary research question: How can the integration of Direct Instruction and Practice-Based Learning support improvements in Grade XI students' Microsoft Excel learning achievement at SMK Bhakti Karya Karanganyar?

## Research Methods

**Figure 1**  
*Kemmis and McTaggart Classroom Action Research Cycle Model*



This study was conducted during the even semester of the 2024/2025 academic year, spanning February to April 2025, at SMK Bhakti Karya Karanganyar, located at Jalan Raden Saleh No. 1, Mendungan, Jungke, Karanganyar District, Karanganyar Regency, Central Java Province, Indonesia. The research employed a Classroom Action Research (CAR) design based on the Kemmis and McTaggart model. This design was selected in accordance with the study's objective of improving instructional processes and learning outcomes through reflective and iterative intervention. CAR enables teacher-researchers to identify learning problems directly, design appropriate instructional solutions, and evaluate their effectiveness within authentic classroom contexts. As argued by Mulyasa (2019), CAR is an appropriate methodology for systematically and contextually improving instructional quality through reflective practice conducted in repeated cycles. Figure 1 illustrates the CAR cycle based on the Kemmis and McTaggart model, which guided the procedural framework of this study.

The implementation of this study proceeded through four integrated stages constituting a continuous cycle. The planning stage involved the development of instructional media, student activity sheets, and assessment instruments designed to support the learning process. During the action implementation stage, researchers applied a combined instructional approach integrating Direct Instruction and Practice-Based Learning to bridge students' conceptual understanding and practical skill development. The observation stage focused on monitoring student participation and evaluating the extent to which learning objectives were being achieved. Finally, the reflection stage involved analyzing observational findings to assess the impact of the implemented actions and to inform strategic adjustments for subsequent cycles as necessary. This cyclical design was implemented across two cycles, each comprising three meetings per week, totaling six weeks of intervention. Systematic scheduling of action activities is critical for ensuring structured data collection and valid results (Creswell, 2018). The research participants comprised all Grade XI students enrolled in the Office Management and Business Services program. A total of 30 students from Class XI MPLB were selected using total sampling a technique wherein the entire population is treated as the sample due to its relatively small and manageable size. This approach aligns with the recommendation of Sugiyono (2017), who stated that total sampling is appropriate when the population size is fewer than 100 individuals and can be comprehensively observed by the researcher.

The data collection instruments included practical performance tests, observation sheets, and documentation. Practical tests were used to measure students' Excel operation skills, while observation sheets were used to monitor student engagement during the instructional process. The observation instrument was validated through expert judgment involving two specialists: one field supervisor lecturer and one cooperating teacher for productive subjects. Each expert rated each indicator on a scale of 1 to 4, and the results were analyzed using the Aiken's V formula (Azwar, 2017). The analysis revealed that all indicators yielded V coefficients exceeding 0.80, with a mean V of 0.89, indicating a highly valid instrument. As stated by Aiken (cited in Santoso & Widiana, 2023), an Aiken's V value of  $\geq 0.80$  reflects a high degree of validity, confirming that the items or indicators are substantively relevant and suitable for use in vocational educational assessment. Reliability was established through an inter-rater reliability procedure, whereby two independent observers conducted simultaneous observations using identical observation sheets. The data were then analyzed using the Percent Agreement formula. The resulting reliability coefficient of 83% was classified as high reliability according to Arikunto (2019), confirming that the observation instrument yields consistent and trustworthy data regarding student engagement. Supplementary documentation including photographs, video recordings, and student work samples was used to corroborate data obtained from tests and observations. The data collection procedure followed the sequential structure of the action cycles: pre-action phase (Week 1), Cycle I implementation (Weeks 2–4), and Cycle II implementation (Weeks 5–6), each concluded with evaluation and reflection activities.

Data analysis in this study employed an integrated descriptive quantitative and qualitative approach. Quantitative data derived from practical test results across both cycles were analyzed by calculating mean scores and determining mastery percentages based on the Minimum Mastery Criterion (KKM). Inter-cycle comparisons were presented as percentage improvements to indicate the effectiveness of the intervention. According to Nazir (2021), descriptive quantitative analysis in

classroom action research is used to monitor tangible learning progress based on outcome indicators. Observational data and reflective notes were analyzed using a qualitative approach, grounded in direct observations of student activities during instructional sessions. Nonetheless, observational data were subsequently categorized into specific rating scales and converted into percentage form for quantitative processing to facilitate interpretation. This integration of both analytical approaches provided a comprehensive and holistic view of the effectiveness of the combined Direct Instruction and Practice-Based Learning model in improving student learning outcomes.

## Results and Discussion

### Research result

To assess improvements in learning achievement among Grade XI students at SMK Bhakti Karya Karanganyar in the Office Technology subject area, a practical performance test in Microsoft Excel operations was administered, aligned with predetermined success indicators. Test results were converted into percentages and classified according to established performance categories. Observational data were also incorporated to strengthen the analysis of Excel skill development. Pre-action baseline data were collected to document students' initial proficiency levels in Microsoft Excel operations prior to the instructional intervention, serving as a comparative reference for post-intervention results. As shown in Table 1, the pre-cycle assessment results are summarized below.

**Table 1**  
*Pre-Cycle Assessment Results*

No	Pre-Cycle Results	Total
1	Students with scores $\geq 75$ (mastery category)	12 students
2	Students with scores $< 75$ (not yet mastered)	18 students
3	Mean test score	69.87
4	Percentage of students achieving mastery	40%
5	Percentage of students not yet achieving mastery	60%

As presented in Table 1, prior to the intervention, the mean student score was 69.87, with only 40% of students (12 out of 30) meeting the Minimum Mastery Criterion (KKM  $\geq 75$ ). This baseline data revealed that the majority of students had not yet achieved adequate proficiency in basic Microsoft Excel operations, underscoring the need for an improved instructional approach. The study was conducted over two cycles, each consisting of three meetings. Learning outcome evaluations were administered through tests at the conclusion of each cycle. Table 2 presents the Cycle I practical test results for Grade XI MPLB students in Excel operations.

**Table 2**  
*Cycle I Practical Test Results*

No	Practical Test Results	Total
1	Students with scores $\geq 75$ (mastery category)	20 students
2	Students with scores $< 75$ (not yet mastered)	10 students
3	Overall mean score	79.76%
4	Proportion achieving competency mastery	66.67%
5	Proportion below mastery standard	33.33%

As shown in Table 2, the practical performance test results at the conclusion of Cycle I revealed a mean score of 79.76%. Among all participants, 20 students (66.67%) successfully achieved scores above the minimum mastery threshold ( $\geq 75$ ). These findings indicate a positive improvement in cognitive attainment among Grade XI students in the Office Technology domain, particularly in Excel operation skills.

To further substantiate the practical test results, observational data were collected to assess student engagement during the learning process. Prior to the intervention, the mean observational

score was 51.37%, indicating that students had not yet developed satisfactory Excel operation skills. Table 3 presents the observational data obtained during Cycle I.

**Table 3**  
*Cycle I Observation Results*

No	Observation Indicator	Score
1	Student attention and focus during content explanation	73.37%
2	Active student engagement in Excel practical exercises	68.37%
3	Student independence in completing practical tasks	66.23%
4	Student ability to follow step-by-step instructions	69.33%
5	Student enthusiasm in completing practice exercises	71.53%
Mean observation percentage		69.77%

As reflected in Table 3, following the implementation of the combined Direct Instruction and Practice-Based Learning model in Cycle I, a positive shift in student engagement was observed, with a mean observational score of 69.77%. Student attention during explanations improved to 73.37%, and the ability to follow step-by-step instructions reached 69.33%, indicating that the direct instruction approach effectively clarified procedural understanding of Excel usage. However, the indicators of student independence (66.23%) and active engagement in practical activities (68.37%) remained at moderate levels and had not yet reached optimal performance. To address these shortcomings, several instructional adjustments were made in Cycle II. The teacher provided greater opportunities for students to independently explore practical tasks, while also delivering real-time feedback during practice sessions to build student confidence in executing tasks autonomously. These modifications were intended to enhance both student independence and active participation in the learning process.

Based on Cycle II test results, student scores improved, with a mean of 83.04% and a mastery rate of 73.33%, indicating that 22 students achieved competency in Excel operations. Table 4 presents the Cycle II practical test results.

**Table 4**  
*Cycle II Practical Test Results*

No	Practical Test Results	Total
1	Students with scores $\geq 75$ (mastery category)	22 students
2	Students with scores $< 75$ (not yet mastered)	8 students
3	Overall mean score	83.04%
4	Classical mastery proportion	73.33%
5	Proportion not meeting minimum criteria	26.67%

As presented in Table 4, the practical performance test results following Cycle II intervention among Grade XI students revealed a mean score of 83.04%, with 22 students (73.33%) achieving scores above the KKM ( $\geq 75$ ). Compared to Cycle I results, this represents an improvement of 3.28 percentage points in the mastery rate, confirming a consistent upward trajectory in student achievement. These findings are further supported by observational data indicating continued improvement in students' Excel operation skills, with a mean observational score of 79.05%. Table 5 presents the Cycle II observational data that corroborates the practical test performance across both cycles.

As demonstrated in Table 5, following the implementation of the Direct Instruction and Practice-Based Learning model in Cycle II, a significant improvement in student learning outcomes was observed, with the mean observational score reaching 79.05%. Notable gains were recorded in student independence in completing practical tasks, which increased to 76.07%, and active engagement in Excel practice, which rose to 76.97%. These results indicate that the instructional strategy refinements introduced in Cycle II specifically, the reinforcement of independent practice opportunities and the provision of direct feedback successfully fostered greater student autonomy and active participation in the learning process. Collectively, the test and observational data from

Cycle I to Cycle II demonstrate that the application of the integrated Direct Instruction and Practice-Based Learning model consistently produced positive effects on student learning achievement, both in terms of cognitive outcomes and practical skill performance.

**Table 5**  
*Cycle II Observation Results*

No	Observation Indicator	Score
1	Student attention and focus during content explanation	81.37%
2	Active student engagement in Excel practical exercises	76.97%
3	Student independence in completing practical tasks	76.07%
4	Student ability to follow step-by-step instructions	82.13%
5	Student enthusiasm in completing practice exercises	78.70%
Mean observation percentage		79.05%

## Discussion

Improvements in the cognitive learning outcomes of Grade XI MPLB students at SMK Bhakti Karya Karanganyar in the Office Technology subject area, particularly in Microsoft Excel operations, were achieved through a series of classroom actions implemented across two cycles. Achievement was evaluated using practical tests and observation sheets developed in accordance with the predetermined success indicators. Prior to the intervention, baseline conditions revealed a mean score of 69.87, with a completion rate of only 40% equivalent to 12 out of 30 students achieving the minimum mastery criterion ( $KKM \geq 75$ ). This baseline profile indicated that the majority of students had not yet attained foundational Excel operation skills and that improvements in instructional methodology were necessary.

Following Cycle I implementation using the combined Direct Instruction and Practice-Based Learning model, the mean score improved to 79.76, with a mastery rate of 66.67%, representing 20 students achieving KKM. These results demonstrate that an approach emphasizing explicit instruction paired with intensive practice effectively supported students in understanding Excel's procedural workflows in a more structured manner. Observational data on student learning activity during the instructional process further corroborated improvements in practical test performance. In Cycle I, the mean learning activity score reached 69.77%, reflecting the emergence of active participation. Prominent indicators included student attention during instruction (73.37%) and student enthusiasm during practice exercises (71.53%). However, indicators such as active engagement and independence in practical tasks remained at moderate levels 68.37% and 66.23%, respectively necessitating enhancement in the subsequent cycle.

The instructional strategy refinements implemented in Cycle II produced more meaningful improvements. A total of 22 students (73.33%) surpassed the minimum mastery threshold, and the mean test score increased to 83.04%. This finding indicates that the modifications in instructional methodology during the second cycle successfully optimized students' mastery of Excel operation skills. Specifically, these refinements involved providing greater opportunities for students to engage in self-directed practice, as well as delivering immediate feedback when students encountered technical difficulties. This approach was designed to foster independence, active participation, and critical thinking throughout the learning process. Observational data from Cycle II also reflected positive development, with the mean observational score increasing to 79.05%. The most notable gains were observed in students' ability to follow instructions (82.13%) and their attentiveness during explanations (81.37%). Student independence also improved to 76.07%, indicating growing capacity to manage practical tasks autonomously without heavy reliance on teacher guidance.

Overall, the implementation of the integrated Direct Instruction and Practice-Based Learning model demonstrated effectiveness in improving student achievement both in practical test results and in learning behavior throughout the instructional process. These improvements occurred progressively across Cycle I and Cycle II, both in terms of learning mastery and the quality of student engagement. The success of this approach confirms that practice-based learning strategies supported by systematic instruction are effective for developing office application skills such as Microsoft

Excel within vocational education settings.

These findings are consistent with the results of Munawarah (2019), who demonstrated that the application of the Direct Instruction model enhances students' active engagement in the learning process and supports teachers in managing classrooms more systematically. This model provides students with clear instructional direction, enabling them to become more focused, active, and demonstrably improved in subject understanding ultimately yielding positive cognitive outcomes. Furthermore, Stockard et al. (2018), in their meta-analysis, concluded that Direct Instruction is consistently effective in improving learning achievement, with a mean effect size of 0.65, indicating that students taught using Direct Instruction outperform those who are not. This finding is particularly relevant for technical and procedural subject matter, where explicit, step-by-step instruction is most appropriate.

The contribution of Practice-Based Learning to student outcomes is similarly supported in the literature. Yusuf (2018) found that practical laboratory-based learning can enhance cognitive achievement because students are directly engaged in the processes of observing, experimenting, and drawing conclusions. These activities not only help students understand concepts more concretely but also encourage them to express opinions and develop greater confidence during the learning process. The improvements in student learning outcomes following the implementation of Microsoft Excel practical instruction in the present study are also consistent with the findings of Csapó et al. (2019), who demonstrated that a direct, schema-based practical learning method (Sprego) significantly enhanced students' understanding of spreadsheet management. This convergent evidence underscores that active engagement through hands-on practice is highly effective in building conceptual understanding and developing technical skills.

## Conclusion

This study demonstrates that the integrated application of Direct Instruction and Practice-Based Learning makes a positive contribution to the cognitive learning outcomes of Grade XI students at SMK Bhakti Karya Karanganyar in Microsoft Excel operations. Through two cycles of classroom action, significant improvements were recorded in both mean student scores and learning mastery rates from an initial mastery rate of 40% with a mean score of 69.87 in the pre-action phase, to a mastery rate of 73.33% with a mean score of 83.04% in Cycle II. Beyond cognitive gains, this integrated instructional approach also proved effective in fostering active student participation, enhancing practical skill development, and increasing student engagement throughout the learning process. Despite these promising outcomes, this study has limitations in terms of geographic scope and sample size, as it was conducted within a single classroom in a single school. Future research is therefore recommended to replicate and extend this study with larger samples across multiple schools with diverse characteristics. Subsequent investigations may also examine the application of this combined instructional model in other practically-oriented subject areas to further establish its effectiveness across varied vocational education contexts.

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