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The Effect of Conducting Practical Hand-On Activities in SMK Negeri 4 Muko-Muko

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Abstract

Background of study: The Fourth Industrial Revolution demands graduates equipped with practical, adaptive skills beyond theoretical knowledge. However, conventional teacher-centered instruction often hinders the development of essential competencies, especially in vocational subjects such as graphic design using CorelDRAW, where direct practice is crucial.
Aims and scope of paper: This study aims to examine the effectiveness of the Hands-On Activity learning model in improving learning outcomes, motivation, and technical skills of grade X Multimedia students at SMK Negeri 4 Mukomuko.
Methods: A quantitative quasi-experimental method was employed using a Nonequivalent Control Group Design involving two naturally formed classes of 30 students each. Class X Multimedia A was assigned as the experimental group (Hands-On Activity), and Class X Multimedia B as the control group (conventional learning). Data were collected through validated pretest and posttest instruments. Normality was tested using Shapiro-Wilk, and homogeneity using Levene's test. An independent samples t-test was conducted to determine the effect of the treatment.
Result: The results showed a significant improvement in the experimental group's learning outcomes. The normality test confirmed the data were normally distributed (Sig. > 0.05), and the homogeneity test indicated equal variances (p = 0.125). Hypothesis testing revealed a t-value of 10.57, exceeding the critical value of 2.0024, leading to the acceptance of the alternative hypothesis.
Conclusion: The study concludes that the Hands-On Activity model effectively enhances student engagement, motivation, and mastery of both theoretical and practical knowledge in Informatics, making it a suitable strategy for vocational education.

A. Introduction

The development of science and technology in the era of the Fourth Industrial Revolution has brought about transformative changes in various sectors of life, including the education sector (Lase, 2019). This revolution is characterized by the integration of digital, biological, and physical systems, which has triggered a fundamental shift in how individuals live, work, and learn. In this context, educational institutions are required to respond quickly and innovatively to the dynamic demands of industry and society. The need for adaptive, creative, and practically skilled human resources has become increasingly urgent in line with the rapid advancement of digital technology (Akbari & Pratomo, 2022). Moreover, in

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today's digital economy, the workplace no longer only values theoretical mastery but instead emphasizes the importance of technical skills, critical and analytical thinking, collaboration, communication competencies, and high levels of digital literacy (van Laar et al., 2020) (Affandi et al., 2020).

As a result, the role of education is undergoing a paradigm shift from merely transferring knowledge to equipping learners with 21st-century competencies. The education system is now expected to act as a catalyst for innovation and as a bridge between theoretical understanding and practical application. It requires continuous curriculum reform, pedagogical innovation, and learning environments that facilitate active student engagement (Huang et al., 2024). The learning process should change from the traditional teacher-centered approach to a more student-centered model in accordance with this framework. Student-centered learning prioritizes student activity in exploring, constructing, and applying knowledge and has been widely recognized as more effective in enhancing learning motivation, conceptual understanding, and student competency development (Listriani & Aini, 2019) (Woods & Copur-Gencturk, 2024).

A strategy aligned with this approach is Hands-On Activity, which falls under the umbrella of experiential learning models. This strategy emphasizes direct student engagement with learning materials through practical experiments, manipulation of tools, and problem-solving tasks (Kibga et al., 2021). Such experiences provide tangible and authentic learning that goes beyond the passive reception of information. Hands-on activities are rooted in the constructivist learning theory, which views knowledge as actively constructed by the learner based on experience and reflection. Through this model, students develop a deeper conceptual understanding, increase curiosity, improve memory retention, and foster essential scientific process skills, such as observing, hypothesizing, measuring, classifying, and drawing conclusions (Yilmaz et al., 2024) (Jumaat et al., 2017).

Empirical studies have demonstrated the effectiveness of hands-on learning in improving cognitive and psychomotor outcomes, particularly in science, technology, engineering, and vocational education contexts (Tindan & Anaba, 2024) (Mutohhari et al., 2023). This learning approach not only enhances student performance in assessments but also contributes to their confidence and engagement in the learning process. Furthermore, hands-on activities align well with the principles of inquiry-based learning and project-based learning, making them suitable for diverse educational settings, including formal, informal, and remote learning environments (Siborus, 2022).

Thus, the application of hands-on learning strategies is increasingly seen as a relevant and necessary innovation in contemporary education. It supports the development of holistic learners who are prepared to face the diverse challenges of the modern world and make a meaningful contribution to a technology-driven society.

The implementation of practice-based learning models, such as Hands-On Activity, is particularly relevant in vocational education at Vocational High Schools (SMK). As a vocational secondary education institution, SMK has the primary mission of producing graduates who are job-ready and capable of applying knowledge and skills in their field of expertise (Yudistiro Bakti et al., 2024). Therefore, a learning approach that is purely theoretical and monotonous will hinder the development of students' competencies (Dwirahayu et al., 2020). Learning that does not involve direct practice will result in a poor understanding of the material, a lack of technical skills, and decreased interest and motivation to learn (Nurhakim et al., 2017).

One subject that requires technical skills and direct practice is Information Technology, particularly graphic design using software such as CorelDRAW. Mastering graphic design software is not sufficient by merely reading manuals or listening to lectures; it requires intensive practice and direct exploration so that students can understand the functions of tools, coloring techniques, placement of visual elements, and design aesthetic principles. However, in reality, the learning process at SMK Negeri 4 Mukomuko still heavily relies on conventional methods with minimal practical application, leaving students underprepared to utilize design software optimally.

Given this situation, it is crucial to implement practice-based learning approaches, such as Hands-on Activities, in the Informatics subject. Through hands-on activities, such as creating a school logo using CorelDRAW, students are not only required to understand the material but also apply it in real-world projects that reflect the school's identity and vocational values. This approach makes learning more contextual, meaningful, and enjoyable.

Based on this background, this study aims to examine the effectiveness of the Hands-On Activity learning model on the learning outcomes of 10th-grade Multimedia students at SMK Negeri 4 Mukomuko. The main focus of the study is to determine the extent to which this learning model can improve students' learning outcomes, motivation, and technical skills in using graphic design software. This study is expected to contribute to the development of more adaptive and applicable learning strategies in vocational education settings, serving as a reference for teachers, curriculum developers, and education policymakers.

B. Research Methods

This study employs a quantitative approach with a quasi-experimental design, specifically the Nonequivalent Control Group Design. This design was chosen because it does not involve randomizing research subjects; instead, it utilizes two groups that have formed naturally within the school environment. This design enables the observation of the treatment's effect on learning outcomes while controlling for external variables that may influence the results (Dewi et al., 2018).

The population in this study was all grade X students in the Multimedia program at SMK Negeri 4 Mukomuko. The sample consisted of two classes, each with 30 students. Class X Multimedia A was designated as the experimental group, which received the treatment of applying the Hands-On Activity learning model. At the same time, Class X Multimedia B served as the control group, following conventional learning according to textbook guidelines without direct practice.

The research instrument used was an objective test consisting of pretest and post-test questions. The pre-test was administered to both groups before the learning process to assess the students' initial abilities. In contrast, the posttest was administered after the treatment to determine the improvement in learning outcomes. The questions used had undergone validation by experts and were tested beforehand to ensure their validity and reliability. The sequence of the experiment in this study can be described as follows:

Table 1. Non-equivalent Control Group Design

Pretest	***Treatment***	***Posttest***
O_1	**X**	**O_2**
O_3		**O_4**

Explanation:

O1 and O3 = Pre-test (students' initial abilities before treatment)

O2 and O4 = Post-test (learning outcomes after treatment)

X = Treatment in the form of applying the Hands-On Activity learning model

To test the effect of treatment on student learning outcomes, a hypothesis test was conducted using an independent sample t-test. Before conducting the t-test, a prerequisite test was first conducted, namely:

1. Normality Test

This test aims to determine whether the data obtained comes from a normally distributed population. The test was conducted using the Shapiro-Wilk test. If the significance value is greater than 0.05, the data is considered to be normally distributed (Faris et al., 2026).

2. Homogeneity Test

This test aims to determine whether two data groups have homogeneous variance. The test was conducted using the Levene test. If the significance value (Sig.) is greater than 0.05, the data is considered homogeneous (Suartama et al., 2024).

The t-test formula used is as follows:

$$t = \frac{\overline{X}_1 - \overline{X}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$$

The hypothesis tested in this study is:

1. H_0: There is no significant effect of the Hands-On Activity learning model on student learning outcomes.
2. H_1: There is a significant effect of the Hands-On Activity learning model on student learning outcomes.

The Hands-On Activity learning model in this study was implemented through direct practical activities by students, namely the creation of logo design projects using CorelDRAW software. This model aims to provide authentic learning experiences, improve technical skills, and encourage students to be active and creative in the learning process. According to (Herdianto et al., 2021), the Hands-On Activity model is effective in increasing student engagement, critical thinking, and confidence in completing learning tasks.

Thus, the research method employed in this study was designed to empirically test the effectiveness of the Hands-On Activity learning model in improving student learning outcomes in computer science within a vocational education setting.

C. Results and Discussion

1. Results

This research was conducted over the course of one month, from January 6, 2025, to February 6, 2025, at SMK Negeri 4 Mukomuko. The study employed a quasi-experimental quantitative approach with a pretest-posttest control group design to assess the effectiveness of the Hands-On Activity learning model on student learning outcomes in the subject of Informatics. Two existing classes were selected: Class X Multimedia A was designated as the experimental group, and Class X Multimedia B served as the control group. The experimental class engaged in hands-on learning activities involving direct application of skills using graphic design software (CorelDRAW), while the control class underwent conventional instruction with a theoretical approach and limited practical exposure.

a. Descriptive Statistics

A descriptive analysis of students' scores was conducted to compare the pretest and post-test results between the two groups. The results are presented as follows:

Table 2. Descriptive statistics for pretest and posttest results

	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
Model Konvensional (pre-test)	30	15.00	65.00	37.5000	16.38702
Model Konvensional (post-test)	30	30.00	75.00	61.1667	11.03938
Model Pembelajaran Hands On Activity (pre-test)	30	15.00	70.00	42.5000	17.35780
Model Pembelajaran Hands On Activity (post-test)	30	70.00	100.00	86.0000	7.81246
Valid N (listwise)	30				

The comparison clearly shows that the experimental group experienced a more substantial improvement in learning outcomes compared to the control group.

b. Data Normality Test

To ensure the validity of the statistical tests used, a normality test was conducted using the Shapiro-Wilk method due to the small sample size (<50 students per group). The significance values for all groups were greater than 0.05, confirming that the data were normally distributed:

Table 3. Normality Test Results

	Kelas	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Hasil Belajar Siswa	Model Konvensional (pre-test)	.144	30	.115	.922	30	.029
	Model Konvensional (post-test)	.155	30	.064	.910	30	.015
	Model Pembelajaran Hands On Activity (pre-test)	.143	30	.118	.926	30	.039
	Model Pembelajaran Hands On Activity (post-test)	.184	30	.011	.941	30	.095

c. Homogeneity of Variance Test

The homogeneity test using Levene's test for equality of variances produced a significance value of 0.125 ($p > 0.05$). It indicated that the variances in learning outcomes between the control and experimental groups were homogeneous, thus fulfilling the assumptions required for a valid independent samples t-test.

Table 4. Homogeneity of Variance Test

		Levene Statistic	df1	df2	Sig.
Hasil Belajar	Based on Mean	2.422	1	58	.125
	Based on Median	2.556	1	58	.115
	Based on Median and with adjusted df	2.556	1	52.516	.116
	Based on trimmed mean	2.535	1	58	.117

d. Hypothesis Testing

Table 5. Hypothesis Testing

	Kelas	N	Mean	Std. Deviation	Std. Error Mean
Hasil_Belajar	Post_Eksperimen	30	86.00	7.812	1.426
	Post_Kontrol	30	61.17	11.039	2.016

To determine the significance of the effect of the Hands-On Activity model, an independent samples t-test was conducted. The results showed that the calculated t-value was 10.57, which exceeded the critical t-value of 2.0024. Therefore, the null hypothesis (H_0) was rejected, and the alternative hypothesis (H_1) was accepted. This statistical result indicates a significant effect of the Hands-On Activity learning model on improving student learning outcomes in Informatics.

2. Discussion

The findings of this research confirm that the Hands-On Activity model significantly enhances learning outcomes in vocational education, particularly in subjects that require practical application, such as Informatics. The substantial improvement in the experimental group's post-test scores compared to the control group illustrates the model's effectiveness in delivering knowledge through active and experiential learning.

The learning experience in the experimental group was enriched through a series of real-world tasks, notably the design of a school logo using CorelDRAW software. It allowed students to explore both creative and technical skills simultaneously, thereby bridging the gap between theoretical concepts and practical applications. The learning process was not only more engaging but also fostered deeper understanding through activities that encouraged student initiative, exploration, and collaboration.

This study aligns with the research of (Herdianto et al., 2021), who reported that learning models emphasizing experience and interaction are highly effective in promoting critical thinking, motivation, and performance among students. Likewise, studies by (Listriani & Aini, 2019) support the assertion that contextual and practical learning strategies, such as Hands-On Activity contribute meaningfully to both cognitive and affective learning outcomes.

The Hands-On Activity model demonstrated the following educational advantages:

1. Active Participation: Students actively engaged in constructing knowledge through designing visual projects. It encouraged student responsibility in learning and supported the constructivist approach.
2. Practical Application: Students developed competency in using CorelDRAW, a crucial software for vocational students. This skill acquisition aligned with workplace demands and increased students' job readiness.
3. Creativity Development: The tasks prompted students to think innovatively and design logos that symbolized their school's identity. It nurtured visual literacy and design thinking.
4. Teamwork and Communication: Students collaborated and shared feedback in groups, enhancing their interpersonal and communication skills, which are essential in professional environments.
5. Learning Reflection: After completing their designs, students conducted self-evaluation and peer review, contributing to metacognitive growth and a deeper understanding of design principles.
6. Technology Integration: Exposure to digital tools through hands-on use of CorelDRAW equipped students with relevant technical skills, helping them adapt to the evolving technological landscape.
7. Increased Motivation and Engagement: The opportunity to participate in meaningful, tangible activities increased students' enthusiasm and sustained their attention throughout the learning process.

By implementing the Hands-On Activity model, the learning process transformed from a passive reception of information to an immersive and interactive experience. The model's impact extended beyond cognitive development to encompass affective and psychomotor domains, which are crucial in vocational education. These benefits are particularly valuable for SMK students who must demonstrate both knowledge and practical proficiency in their future careers. In conclusion, the results and analysis in this study provide empirical evidence supporting the effectiveness of the Hands-On Activity learning model in enhancing student learning outcomes in Informatics. The implications of this research suggest the model's broader adoption in vocational education to foster relevant, engaging, and skill-based learning environments.

2.1 Implications

The application of the Hands-On Activity model in vocational education, particularly in subjects that require practical application, such as Informatics, can significantly improve student learning outcomes. This model is effective in conveying knowledge through active and experiential learning. The substantial increase in posttest scores of the experimental group compared to the control group demonstrates the effectiveness of this model in generating enriched learning experiences through real-world tasks, such as designing a school logo using CorelDRAW software. It bridges the gap between theoretical concepts and applied skills, while encouraging students to explore creative and technical skills simultaneously.

2.2 Research contribution

This research contributes to the field of vocational education by providing empirical evidence on the effectiveness of Hands-on Practical Activity in improving students' learning outcomes at SMK Negeri 4 Mukomuko. It highlights how practical experience enhances students' technical skills, understanding of theoretical concepts, and engagement in the learning process. The findings provide valuable insights for educators, curriculum developers, and policymakers to design more effective vocational training programs that effectively balance theory with practical application. Additionally, this study serves as a reference for future research exploring practical-based learning approaches in similar educational settings.

2.3 Limitations

While this study yielded valuable insights, several limitations must be acknowledged:

1. The research was limited to 60 students from a single vocational school (SMK Negeri 4 Mukomuko), which may not represent other educational settings or regions.
2. The study was conducted within a limited timeframe, restricting long-term observations of the learning model's impact.
3. Differences in teaching delivery between instructors could have influenced the consistency of model implementation.

4. The study did not control for varying levels of student motivation, which could affect learning outcomes.
5. The evaluation was based on academic test scores, which may not fully reflect other skills such as collaboration, creativity, or problem-solving.
6. The study relied on the availability of sufficient equipment and software, which may vary in different institutions.

2.4 Suggestions

Integration of Hands-On Activities across All Subjects, it is suggested that the school incorporate practical hand-on activities not only in vocational subjects but also in theoretical subjects where applicable. This aould enhance students engagement and comprehension across the curriculum.

D. Conclusion

Based on the findings of this research, it can be concluded that the Hands-On Activity learning model significantly improves student learning outcomes in Informatics subjects at the vocational high school level. The model creates a dynamic and interactive learning environment that encourages student participation, enhances motivation, and facilitates the mastery of both theoretical and practical skills. The improvement in the experimental group's performance demonstrates the model's effectiveness in developing relevant competencies aligned with vocational education goals. The integration of practical experiences into the learning process, facilitated by tools like CorelDRAW, enables students to actively construct knowledge, collaborate meaningfully, and develop real-world skills. Therefore, the Hands-On Activity model is highly recommended for broader application in vocational education settings to produce competent, skilled, and motivated graduates ready to meet the demands of the workforce.

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F. Author Contribution Statement

JS and DF both contributed to this research. JS was responsible for the research design, implementation of the classroom learning model, and collection of student learning data. DF oversaw the research methodology, guided the statistical analysis, and reviewed the manuscript for academic rigor. All authors have read and approved the final version of the manuscript.

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