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ORIGINAL

The Effectiveness of the Work Based Learning Higher Order Thinking Skills Employability (Wbl-Hotse) Model on Student Learning Outcomes for 3T Regional Vocational High Schools

La eficacia del modelo de empleabilidad de habilidades de pensamiento de orden superior de aprendizaje basado en el trabajo (Wbl-Hotse) sobre los resultados de aprendizaje de los estudiantes de las escuelas secundarias vocacionales regionales 3T

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ABSTRACT

Learning outcomes serve as a key indicator of the effectiveness of the teaching and learning process. In Vocational High Schools (SMK) located in underdeveloped, frontier, and outermost (3T) regions, students' knowledge-based learning outcomes remain relatively low. This study aims to examine the effect of implementing the Work-Based Learning Higher Order Thinking Skills Employability (WBL-HOTSE) model on students' cognitive learning outcomes during practice-based instruction in vocational schools situated in 3T areas. The research employed a quasi-experimental method using a nonequivalent control group design. One class was taught using the scientific approach as the control group, while the experimental class received instruction through the WBL-HOTSE model. The research subjects consisted of all 11th-grade students at SMKN 1 Kepulauan Mentawai. Data were collected through a test instrument. Based on hypothesis testing using the t-test, the results showed a significant difference in learning outcomes between students who were taught using the WBL-HOTSE model and those who received instruction through the scientific approach. These findings indicate that the WBL-HOTSE model can be effectively applied in practice-based learning to improve students' higher-order thinking skills and learning outcomes.

Keywords: Effectiveness Model Learning; Work Based Learning; Higher Order Thinking Skills Employability; Ability Critical Thinking.

ABSTRACT

Los resultados de aprendizaje son un indicador clave de la efectividad del proceso de enseñanza y aprendizaje. En las Escuelas Secundarias Vocacionales (SMK) ubicadas en regiones subdesarrolladas, fronterizas y alejadas (conocidas como zonas 3T), los resultados de aprendizaje basados en el conocimiento de los estudiantes siguen siendo relativamente bajos. Este estudio tiene como objetivo analizar el efecto de la implementación del modelo Work-Based Learning Higher Order Thinking Skills Employability (WBL-HOTSE) en los resultados cognitivos de aprendizaje de los estudiantes durante la instrucción práctica en escuelas vocacionales situadas en áreas 3T. La investigación utilizó un método cuasi-experimental con un diseño de grupo control no equivalente. Una clase fue enseñada usando el enfoque científico como grupo de control, mientras que la clase experimental recibió instrucción mediante el modelo WBL-HOTSE. Los sujetos del estudio consistieron

en todos los estudiantes de 11º grado de SMKN 1 Kepulauan Mentawai. Los datos fueron recolectados a través de un instrumento de prueba. Basado en la prueba de hipótesis con la prueba t, los resultados mostraron una diferencia significativa en los resultados de aprendizaje entre los estudiantes que fueron enseñados usando el modelo WBL-HOTSE y aquellos que recibieron instrucción mediante el enfoque científico. Estos hallazgos indican que el modelo WBL-HOTSE puede aplicarse eficazmente en el aprendizaje basado en la práctica para mejorar las habilidades de pensamiento de orden superior y los resultados de aprendizaje de los estudiantes.

Palabras clave: Modelo de Aprendizaje Efectivo; Aprendizaje Basado en el Trabajo; Habilidades de Pensamiento de Orden Superior para la Empleabilidad; Capacidad de Pensamiento Crítico.

INTRODUCTION

The teaching and learning process is essential in shaping students' learning outcomes.[1] The learning process fosters a reciprocal interaction between teachers and students aimed at achieving improved educational goals.[2,3,4] However, in Indonesia, the challenges in this area have not been fully addressed. One clear indicator of this is the insufficient critical thinking skills among vocational education graduates, including those from vocational high schools (SMK)[5,6,7,8,9] in frontier, remote, and underdeveloped regions. The Work-Based Learning (WBL) approach represents a suitable model for fostering students' critical thinking abilities.[1,4,10,11,12,13,14,15,16,17] Currently, the concept that is gaining the most attention is Higher Order Thinking Skills for Employability (HOTSE).[16] Two classes of Video Editing subjects from the Department of Audio and Video Engineering at SMKN 01 Kepulauan Mentawai were observed during the 2023–2024 academic year. The WBL-HOTSE learning paradigm is applied in this instructional process to enhance students' higher-order thinking skills (HOTS), which are essential for facing the challenges of the Industry 4.0 era. For a detailed explanation on how to develop students' critical thinking skills based on HOTS in this context, refer to the work of Faiza Dinar et al.[17] and Tan et al.[2].

Work-Based Learning (WBL) and Higher Order Thinking Skills Employability (HOTSE) are two key approaches that form the foundation of the WBL-HOTSE learning model. While the WBL model has limitations in fostering students' critical thinking skills, the HOTSE model is specifically designed to enhance these abilities. This is because HOTSE aims to improve students' competencies through hybrid learning methods. Therefore, the WBL-HOTSE model is applied in this study to explore and demonstrate its advantages as an effective learning approach.

Observation Results on the Video Editing Course in the Department of Audio and Video Engineering at SMKN 01 Kepulauan Mentawai revealed the following findings

1. The learning process predominantly applies the lecture method, resulting in one-way communication from teacher to students. This causes students to become passive, merely receiving information without active engagement.
2. Students' mastery of the material is assessed through learning outcome tests, which serve as indicators of their academic performance. However, both the learning outcomes and students' achievements remain below expectations.
3. The teacher tends to begin lessons by simply presenting the material.
4. Learning activities are still limited to completing exercises and answering questions from the student textbook.
5. The teacher remains the dominant figure in the learning process.
6. Learning interactions are mostly restricted to brief question-and-answer sessions between the teacher and a few students.
7. The learning process does not sufficiently encourage students to express their opinions, ask questions, or actively participate. As a result, some students engage in negative behaviors, such as playing around or walking in the classroom.
8. Multi-directional interactions—such as student-to-teacher or student-to-student communication—are rarely observed.
9. The actual duration of learning activities is shorter than originally planned.
10. At the end of the lesson, students are not involved in drawing conclusions or summarizing the key points of the material covered.

Based on these issues, there is a clear gap in the implementation of integrated thematic learning that needs to be addressed. One promising solution is the application of the Work-Based Learning Higher Order Thinking

Skills Employability (WBL-HOTSE) model. This instructional model serves as a framework or pattern that guides classroom planning, tutorials, and the selection of learning resources, including books, films, computers, curricula, and others. According to Andikos et al.[5], every learning model is designed to support the learning process in such a way that helps students achieve the intended educational objectives.

The Work-Based Learning Higher Order Thinking Skills Employability (WBL-HOTSE) model is an instructional approach designed to help students assimilate concepts and principles effectively.[18] Therefore, instructional models can support teachers in delivering learning content through steps that simplify students' comprehension. Sudjimat et al.[14] His study demonstrated that employing different project-based models tailored to each student's initial assessment outcomes was effective in enhancing the critical thinking abilities of vocational students. Based on the explanation above, it is clear that HOTSE not only supports students in mastering the learning material but also engages them in the process of discovery,[19,20,21,22] In addition, HOTSE also supports teachers in instilling character values in students. Clearly, the Work-Based Learning Higher Order Thinking Skills Employability (WBL-HOTSE) model can be applied in integrated thematic learning and can enhance the learning process based on the scientific approach. Therefore, the researcher is interested in conducting a study using the Work-Based Learning Higher Order Thinking Skills Employability (WBL-HOTSE) model to improve students' engagement and the overall process of integrated thematic learning.

METHOD

This study employed a quantitative research approach with an experimental method. The experimental design applied in this research was a quasi-experimental design, specifically using a nonequivalent control group design. The independent variable in this study was the implementation of Work-Based Learning Higher Order Thinking Skills Employability (WBL-HOTSE). Meanwhile, the dependent variable was the learning outcomes of Grade XI-A students at SMKN 1 Kepulauan Mentawai, particularly for the experimental class XI-A at the same school. The research instruments were tools used to collect data. Several instruments were utilized in this study, including teaching modules, test blueprints, test items, and answer keys as shown in figure 1.

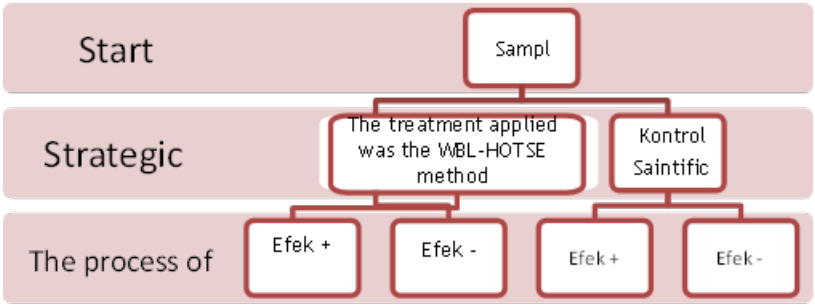

Figure 1. Research Design

The validation testing in this study was conducted through expert judgment, in which the author sought feedback from a panel of five experts. Based on the results of this expert validation, conclusions were drawn regarding which items were appropriate, which needed revision, and which should be discarded. Before administering the test to both the experimental and control classes, a pilot test was carried out. This trial aimed to ensure that the instrument was both valid and reliable, thereby guaranteeing the credibility of the research findings. After the pilot testing, item analysis was conducted to determine the quality of each question. To ensure that the test items met the criteria of a good measurement tool, aspects such as validity, reliability, item difficulty level, and item discrimination index were carefully examined.

The t-test is calculated using the following formula:

$$t = \frac{\overline{X_1} - \overline{X_2}}{S\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}} \qquad \text{dengan} \qquad S = \sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}}$$

The steps taken to analyze the test items in this study include validity testing and reliability testing. Data collection techniques are considered the most strategic step in the research process. The normality test was conducted to determine whether the data were normally distributed, while the homogeneity test aimed to assess whether the sample classes had homogeneous variances. Furthermore, hypothesis testing was performed to examine whether the integrated thematic learning outcomes of students using the WBL-HOTSE learning model showed significant differences. In this study, the t-test was applied to test the hypothesis, provided that the data were normally distributed and had homogeneous variances.

RESULTS

The assessment of learning outcomes was conducted after the learning process by using evaluation instruments, specifically post-tests administered to students following the integrated thematic learning treatment. The research activities took place from January to June 2024, involving Class XI-A as the experimental group and Class XI-B as the control group at SMKN 1 Kepulauan Mentawai. The experimental class received a treatment in the form of integrated thematic learning based on the Work-Based Learning Higher Order Thinking Skills Employability (WBL-HOTSE) model, while the control class was taught using the conventional method typically applied by teachers, which employed the scientific approach. This scientific approach includes activities such as observing, questioning, gathering information, associating, and communicating.[23] Different treatments applied to the experimental and control groups aim to determine their impact on students' learning achievements.

The implementation of learning through the integrated thematic approach of Work-Based Learning Higher Order Thinking Skills Employability (WBL-HOTSE) in the experimental class began with the teacher greeting the students, setting the classroom atmosphere, taking attendance, leading a joint prayer, and introducing the lesson. Before the core learning activities commenced, the teacher first explained the learning objectives to be achieved by the students and motivated them to engage actively in the learning process. The lesson then proceeded to the main instructional activities.

First, the teacher provides stimulation by posing questions related to the topic and presenting reading materials designed to spark curiosity among students. These stimuli encourage students to inquire and reflect on the subject matter. As their curiosity grows, students are guided to independently explore and investigate the questions that arise in their minds. This process allows them to attempt solving problems they have identified themselves. Second, the teacher gives students the opportunity to identify as many relevant problems as possible related to the discussed topic. The problem identification process is directed towards three main guiding questions. Afterwards, students are encouraged to develop their own hypotheses in response to these problems. This approach allows them to analyze and define the issues they are dealing with, fostering their habit of seeking and discovering solutions independently. Third, in groups, students gather relevant information from various sources to examine and verify the validity of their hypotheses. Through this process, they learn to determine whether their assumptions are accurate. Activities may include reading literature, observing objects, conducting interviews with resource persons, or performing simple experiments relevant to the topic discussed in the lesson. Fourth, students process the data and information they have collected through interviews, observations, and literature reviews. They interpret these findings by organizing, classifying, tabulating, and calculating the data, then presenting the results in tables and descriptive columns that reflect their discoveries. This stage allows students to acquire new knowledge from their research findings. Fifth, students carefully examine the data to confirm or refute their initial hypotheses. They link their assumptions with the analyzed data and findings, enabling them to develop a deeper understanding of the concept in a creative and meaningful way. Sixth, students draw conclusions and formulate general principles that apply to similar situations or problems in other learning contexts. After formulating conclusions, they reflect on the generalization process, emphasizing the importance of mastering broad concepts and principles that underlie their learning experiences. This helps students understand the value of organizing and generalizing knowledge gained from their inquiry process. Finally, students present their findings to the class and communicate their results to peers. With the teacher's guidance, the class summarizes the lesson after all groups have completed their presentations.

The lesson concludes with the teacher leading a closing prayer and farewell greeting. This control class learning process did not implement the integrated thematic learning model of Work-Based Learning Higher Order Thinking Skills Employability (WBL-HOTSE) and character education.

The learning process in the control class of this study was carried out without implementing the integrated thematic learning model of Work-Based Learning Higher Order Thinking Skills Employability (WBL-HOTSE) and character education. The instructional activities proceeded as follows: the teacher began the lesson by greeting the students, setting the classroom atmosphere, checking on the students' well-being, recording attendance, and providing an introduction to the lesson. The teacher then conveyed the learning objectives and motivated the students to engage actively in the lesson.

During the exploration phase, students participated in a question-and-answer session with the teacher regarding the topic being discussed. Afterwards, they engaged in peer discussions about the subject matter with their seatmates. The teacher then provided practice exercises in the form of evaluation questions. In the confirmation stage, the teacher briefly clarified any materials or tasks that students found difficult to understand and summarized the key points of the lesson. The class concluded with the teacher leading a closing prayer and a farewell greeting.

In the final meeting, a post-test consisting of 15 multiple-choice questions was administered to both the experimental and control classes in order to assess students' learning outcomes. After the tests were completed, the data were collected and analyzed. The instrument used to measure students' learning achievement was the

post-test itself, which included 15 multiple-choice questions. The test was distributed to both sample groups, totaling 60 students — 30 from the experimental class and 30 from the control class. Both groups took the test at the same time, from 09:00 to 10:00 (60 minutes).

After the post-test was conducted, data regarding students' learning outcomes for the material on video editing techniques (sub-elements 1 and 2) were obtained. The test was administered to Class XI-A, which had been taught using the integrated thematic learning model WBL-HOTSE, and to Class XI-B, which had not implemented the WBL-HOTSE model or character education. The post-test results for both the experimental and control classes included the mean score ($\bar{x}$), standard deviation (S), highest score (x_{max}), and lowest score (x_{min}), as shown in table 1. These data were then processed and analyzed accordingly to assess students' academic performance.

Table 1. Analysis Results of Students' Learning Outcomes

Class	$\bar{X}$	N	Sx	Xmax	Xmin
Experiment	82,6	30	12,76	100	53
Control	72,2	30	10,70	93	53

Based on table 1, it can be seen that the average learning outcomes of students in the experimental class who were taught using the integrated thematic learning model of Work-Based Learning Higher Order Thinking Skills Employability (WBL-HOTSE) and character education ($\bar{x}$ = 82,6) are higher than those of the control class who were taught without this model ($\bar{x}$ = 72,2). The standard deviation of the experimental class (Sx = 12,76) is slightly lower than that of the control class (Sx = 10,70), indicating that the experimental class demonstrated less variability in scores, meaning the students' scores were more concentrated around the class average. Furthermore, the highest and lowest scores between the two classes also show differences. The highest score in the experimental class (xmax = 100) exceeds that of the control class (xmax = 93), while the lowest score in both the experimental and control classes is the same (xmin = 53).

In addition, the number of students who achieved mastery in the experimental class was higher than in the control class, as shown in table 2.

Table 2. Students' Achievement Scores in the Experimental and Control Groups

Class	Number of Students	Number Achieving	Mastery Percentage %
Experiment	30	18	60
Control	30	12	40

As shown in table 2, the percentage of students who achieved learning mastery in the experimental class was higher than that in the control class. In the experimental group, 18 students (60 %) met the established mastery criteria, while 12 students (40 %) did not, from a total of 30 students. Conversely, in the control group, only 12 students (40 %) achieved mastery, whereas 18 students (60 %) did not meet the criteria.

Before drawing conclusions from the students' learning outcome data, statistical analysis was performed. This analysis involved conducting an independent samples t-test. Prior to the t-test, normality and homogeneity tests were administered to ensure the data met the assumptions required for parametric testing. The normality test aimed to assess whether the data collected from the sample followed a normal distribution. This test was carried out using SPSS version 26, and the results are summarized in table 3.

Based on table 3, the significance values obtained from the Kolmogorov-Smirnov test for both groups are greater than 0,05, with Class A showing a significance level of 0,058 (> 0,05) and Class B showing 0,053 (> 0,05). This indicates that the students' video editing learning outcomes are normally distributed. The results of the homogeneity of variances test for both sample classes, conducted using Levene's Test, are presented in table 4.

Table 3. Normality Test Results of the Sample Class Learning Outcome Test

Class		Kolmogorov-Smirnova		
		Statistic	df	Sig.
Experiment	A	0,157	30	0,058
	B	0,157	30	0,053
a. Lilliefors Significance Correction				

Table 4. Results of the Homogeneity Test on the Learning Outcome Scores of the Sample Classes

Experimenal			
Levene Statistic	**df1**	**df2**	**Sig.**
2,851	1	58	0,097

Based on table 4, df1 is calculated as the number of data groups minus 1, or 2–1 = 1, and df2 is the total number of data points minus the number of data groups, or 60–2 = 58. The obtained significance value is 0,097, which is greater than 0,05, indicating that the students' learning outcome data is homogeneously distributed. Since the sample class data has been confirmed to be normally and homogeneously distributed, the next step is hypothesis testing using the t-test. The results of the t-test for both sample classes are presented in table 5.

Table 5. Results of Hypothesis Testing on Thematic Integrated Learning Outcomes in the Sample Class

Group	N	$\bar{X}$	t-calculated	t-critical	α
Experiment	30	82,6	2, 384	1,672	0,05
Control	30	72,2			

Based on table 5, the results of the hypothesis testing using the t-test show that the calculated t-value (t_h) is 2,384 at a significance level of 5 %. According to the testing criteria, if t_h > t-table, then the null hypothesis (H_0) is rejected and the alternative hypothesis (H_1) is accepted. The experimental class consisted of 30 students with an average score of 82,6, while the control class also consisted of 30 students with an average score of 72,2. The obtained t-value of 2,384 is greater than the t-table value of 1,672 with degrees of freedom (df) = 58 (calculated as $n_1 + n_2 - 2 = 30 + 30 - 2 = 58$). Therefore, it can be concluded that the use of the WBL-HOTSE learning model has a significant positive effect on students' learning outcomes compared to those who did not use the WBL-HOTSE model integrated with character education in Grade XI of vocational high schools (SMK) in 3T areas. Adi Fitra Andikos et al.[5] In their study, they stated that Work-Based Learning (WBL) can enhance students' learning outcomes. Bahl et al.[24] The study indicates that Work-Based Learning contributes more effectively to enhancing student performance in vocational education compared to non-vocational education.

The results indicate that using problem-based stimulation can enhance students' interest and engagement in learning activities. The data collection phase in the Work-Based Learning Higher Order Thinking Skills Employability (WBL-HOTSE) model allows students to share their experiences with peers and assign responsibilities for specific tasks. This data collection activity is designed to involve both the physical and cognitive participation of students, ensuring their active involvement in gathering information during the learning process. Subsequently, during the data processing stage, students discuss their findings within their groups. The more time allocated to students, the fewer mistakes they tend to make.[15] This approach provides students with the opportunity to independently express their ideas or thoughts and to compare them with those of their peers. The WBL-HOTSE research model also encourages students to engage in dialogue, allowing them to exchange ideas through discussion activities. During the verification stage of the WBL-HOTSE learning model, students are given the chance to cross-check the results they have obtained to ensure their accuracy. This process helps students develop greater precision in drawing conclusions. Therefore, the WBL-HOTSE learning model offers students the opportunity to construct knowledge both individually and collaboratively.

CONCLUSIONS

Based on the hypothesis testing, the application of the Work-Based Learning approach integrated with Higher Order Thinking Skills for Employability (WBL-HOTSE) has shown better results in terms of learning outcomes achievement compared to the use of the scientific approach. Therefore, the implementation of WBL-HOTSE in vocational high schools located in 3T (frontier, outermost, and underdeveloped) regions has a positive impact on students' learning achievements and proves to be effective for practice-oriented learning. However, this study has limitations, particularly because it only focuses on practice-based learning; classes with non-practice-based approaches have not yet been examined. Additionally, the trial was conducted solely in one of the outermost 3T regions, specifically in the Mentawai Islands Regency, West Sumatra Province, Indonesia, and has not been tested in other underdeveloped or remote 3T areas in the country.

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CONFLICT OF INTERESTS

None.

AUTHORSHIP CONTRIBUTION

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