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Effectiveness of Project Based Learning Models on Microsoft Office Integration Competencies at SMK Negeri 1 Cerme

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Abstract
This study aims to analyze the effectiveness of the Project-Based Learning (PjBL) model in improving learning outcomes, learning interest, and the implementation of learning syntax in the Microsoft Office integration competency at SMK Negeri 1 Cerme. The research employed a Classroom Action Research (CAR) method conducted in two cycles, involving 36 students from class X DKV 1. The results showed a significant improvement in students' cognitive, psychomotor, and learning interest aspects. Learning mastery increased from 13.89% (pretest) to 94.44% (posttest), with statistical tests confirming a significant difference (p=<0.001). Students' learning interest and the implementation of PjBL syntax also showed positive growth. The study concludes that PjBL is effective in optimizing Microsoft Office integration learning. It is recommended that teachers adopt PjBL by providing scaffolding, contextual projects, and visual time management tools to enhance skill-based learning in vocational schools.

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1. INTRODUCTION

As a vocational education institution, SMK Negeri 1 Cerme plays a central role in producing graduates who are ready to work and able to adapt to the needs of the industrial world. Vocational education has the main mission to develop applicable competencies that are in line with labor market needs, so that graduates are able to compete professionally (Syaifuddin, 2019). In the industrial era 4.0, the need for workers who have specific and relevant technical skills is increasing. Data from Sudira (2017) shows that as many as 72% of companies in East Java prefer vocational school graduates who have mastered practical skills compared to those who only master theory. This underlines the importance of mastering applied skills among vocational school students.

However, the development of the digital industry requires mastery of more complex competencies. One of them is the ability to integrate various features of office software, especially Microsoft Office. These capabilities not only cover basic usage, but also include advanced skills such as transferring data from Excel to Word, using mail merge, creating interactive dashboards, as well as *dynamic linking* between applications. According to Wulansari et al. (2020), these skills are an important indicator of work readiness in the business administration and management sector.

A survey by Handayani and Dewi (2021) conducted on 50 companies in East Java showed that 9 out of 10 job providers stated that they had integration skills *Microsoft Office*

is the main requirement in the recruitment process for administrative positions. This shows that integrative skills are a basic competency that must be possessed by vocational school graduates who want to immediately enter the world of work. Unfortunately, conditions in the field show that there is still a gap between industry needs and student competencies. Observations carried out at SMK Negeri 1 Cerme found that class X students still experienced difficulties in using advanced features of Microsoft Office, especially in integration between applications. This finding is also supported by research by Hidayat et al. (2020) in *Journal of Vocational and Career Education*, which states that 58% of vocational school students in the Gresik area experience similar limitations, namely only being able to use basic Office features.

Further analysis at SMK Negeri 1 Cerme revealed four main factors that hinder students' low mastery of software integration competencies. First, the average value of tests on integration material *Microsoft Office is only* 62, far below the Minimum Completion Criteria (KKM), namely 75. Second, the allocation of Information and Communication Technology (ICT) learning time of only four hours per week is considered insufficient to provide intensive training for students in mastering practical skills. Third, the learning method which is still dominated by lectures makes the learning process one-way and has minimal interaction, so that students become passive. Fourth, the lack of project implementation causes students to have difficulty understanding the relationship between the material taught and the professional context in the world of work. Sari et al.'s study. (2021) confirmed that as many as 72% of vocational school students only mastered basic usage *Microsoft Office* and not understanding how those features can be used in real workflows.

Facing these challenges, a more contextual and active learning approach is an urgent need. One learning strategy that is considered relevant and effective is modeling *Project-Based Learning* (PJBL). PJBL emphasizes student involvement in real projects that describe situations in the world of work as the core of the learning process. Through this approach, students not only understand theory, but are also required to apply it directly in solving certain problems or projects. An example of implementing PJBL at SMK Negeri 1 Cerme could be a project for making company financial reports, where students must combine data processing skills in *Excel* and professional document preparation in *Word*.

The effectiveness of the PJBL model has been supported by various studies. Junaedi et al. (2020) in the Journal of Technical Education and Training stated that implementing PJBL was able to increase students' conceptual understanding in productive subjects by up to 28%. Apart from that, Kurniawan et al. (2019) added that project-based learning is able to train 21st century skills such as effective communication, team collaboration, time management, as well as critical thinking and problem solving abilities.

The PJBL model also has high relevance to the needs of the modern world of work. Ramadhani & Fauzi (2021) in their experimental study at vocational schools in the field of business management showed an increase in the average student score of 23 points in data integration assignments after industrial project-based learning was implemented. In addition, projects such as creating sales report dashboards by importing data from *Excel* the *Word* able to hone students' creativity in presenting data and information professionally. Research by Wibowo et al. (2020) also confirms that project-based learning not only improves students' technical abilities, but also strengthens presentation and information visualization skills.

The PJBL approach is also in line with government policy, namely Minister of Education and Culture Regulation No. 34 of 2018 concerning learning process standards in vocational schools, which emphasizes the importance of activity-based learning and the

context of the world of work. This policy aims to increase the competitiveness of vocational school graduates amidst increasingly complex industrial dynamics.

Based on this background, this research aims to measure the effectiveness of the Project-Based Learning learning model in improving integration competence *Microsoft Office*, especially for class X students at SMK Negeri 1 Cerme. It is hoped that the results of this research can make a real contribution to the development of learning strategies that are adaptive to industry demands, as well as becoming a practical reference for teachers in developing more contextual learning methods. In the long term, implementing PJBL can reduce the competency gap between vocational school graduates and the needs of the world of work, while strengthening the position of SMK Negeri 1 Cerme as a leading vocational institution in the field of information and communication technology.

2. RESEARCH METHOD

This research uses the type of classroom action research (PTK). Study Classroom action is classified as quantitative and qualitative research. Classroom action research is different from descriptive research or experimental research. In descriptive research, what is presented is the object at the time the research was carried out, while experimental research that is described is related to the causes and effects after a treatment. Classroom action research is carried out in at least two learning cycles. If the researcher gets poor results then the learning process or providing action is still not good. Therefore, research can be continued to cycle II by planning appropriate improvements, so that the research results can be better (Arikunto, 2019). According to Arikunto (2019) the classroom action research (PTK) cycle can be depicted in the picture below.

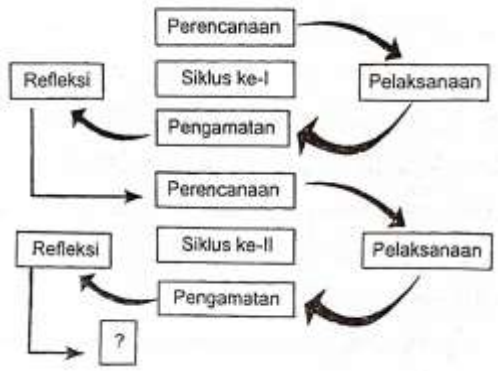

Figure 1. Classroom Action Research Design
(Source: Arikunto, 2019)

The explanation of the process above is:

a. Planning: before carrying out research, researchers are expected to formulate the problem, objectives and action plans to be carried out, such as creating research instruments which include observation sheets, questionnaires, interview guides and creating learning tools such as teaching modules, student worksheets and assessments.
b. Actions and Observations: this stage includes actions or observations carried out to form students' conceptual understanding, namely the application of the project-based learning model and observation of the results of PjBL implementation.

c. Reflection: at this stage analysis, observation is carried out and considering the results or consequences of the actions taken based on the results of the observation sheet from the observer. This stage is the stage that most determines what action will be taken in the next cycle or whether it is sufficient because it is in accordance with the expected targets and in accordance with the success indicators that have been created.

This research was carried out at SMK Negeri 1 Cerme, one of the school centers of excellence in Gresik which is located at Jl. Jurit, cerme kidul, kec. Cerme Gresik Regency, East Java 61171. The research will be carried out in the semester 2024/2025 in class X DKV 1 SMK Negeri 1 Cerme, Gresik.

The population of this research is students of class X Visual Communication Design at SMK Negeri 1 Cerme which consists of X DKV 1 with a total of 36 students. Part of the number and characteristics possessed by that population (Sugiyono, 2020:127). A class is determined whose learning value has not yet reached the criteria for completing the learning objectives (KKTP). This research uses a non-probability sampling technique, purposive sampling type. Purposive sampling is a sampling technique with certain considerations based on the research objectives (Sugiyono, 2020:133). The variables in this research are:

a. Independent variables (Free)
   Independent variables are variables that influence or cause changes or emergence of dependent variables (Sugiyono, 2020:69). The independent variable in this research is the learning model *Project Based Learning*.
b. Dependent Variable (Dependent)
   The dependent variable is a variable that is influenced or is a consequence, because of the existence of an independent variable (Sugiyono, 2020:69). The dependent variables of this research are learning outcomes, implementation of learning syntax and learning interest of class X DKV 1 SMK Negeri 1 Cerme students.

3. RESEARCH RESULTS AND DISCUSSION

3.1.Research result

3.1.1. Instrument Validity and Reliability

a. Validity Test

According to Arikunto (2013: 79), data or information can be said to be valid if it corresponds to actual facts. Sugiyono (2018: 173) added that research validity is achieved when the data obtained by researchers is in accordance with the actual conditions of the object being studied.

In this research, the type of validity used is content validity, especially for test instruments. The validation process is carried out by matching the contents of the test questions with the learning material that has been delivered. To ensure the accuracy of the analysis, validity tests were carried out using program assistance *Microsoft Office Excel* :

Figure 2. Validity Test Results
(Source: Personal Documents 2025)

Based on the test results, all the questions tested were declared valid. This can be seen from the correlation value (r-count) for each question item which is higher than the r-table value. Several questions recorded very high validity values, such as question 3 (0.83), questions 2 and 4 (0.80), question 5 (0.78), and question 1 (0.77). Meanwhile, several other questions also showed a good level of validity, for example question 6 (0.73), question 10 (0.69), question 9 (0.68), question 19 (0.67), question 23 (0.66), and questions 7, 15, and 16 (0.64).

There are also a number of questions with quite satisfactory validity, such as questions 18 and 28 (0.62), question 13 (0.60), question 22 (0.59), question 17 (0.56), question 14 (0.54), and question 20 (0.53). The other questions still meet the validity criteria, although with slightly lower scores, such as question 12 (0.49), questions 24, 25, 26, 27, 29, and 30 (0.48), question 21 (0.47), and question 11 (0.46). Thus, it can be concluded that the 30 questions are valid and suitable for use as testing instruments because they all meet the r-count > r-table requirements.

b. Reliability Test

According to Arikunto (2013: 100) a test can be said to have a high level of confidence if the test can provide consistent results, then the definition of test reliability is related to the problem of the certainty of test results, or if the results change, the changes that occur can be said to be meaningless. The validity of a test is more important and reliability is necessary, because it supports the formation of validity, a test may be reliable but not valid, conversely, a valid test is usually reliable.

Table 1. Reliability Test Results
(Source: Personal Documents, 2025)

Reliability Statistics	
Cronbach's Alpha	N of Items
0.95	30

The Cronbach's Alpha value of 0.95 indicates that the test instrument consisting of 30 questions has a very high level of reliability. This figure far exceeds the minimum limit of 0.6 which is a requirement for the reliability of a measuring instrument. Thus, the data obtained through this instrument is consistent and reliable for further analysis.

c. Difficulty Level

According to Arikunto (2013: 222) good questions are questions that are neither too easy nor too difficult. Questions that are too easy do not stimulate students to increase their efforts to solve them, on the other hand, questions that are too easy cause students to become discouraged and not have the enthusiasm to try again because they are beyond their reach.

Figure 3. Result Difficulty Level
(Source: Personal Documents, 2025)

Based on the diagram presented, it can be observed that all the questions in this test tend to be in the easy category, as can be seen from the results of the analysis using *Microsoft Excel*. The distribution of the difficulty level shows that 1 question is classified as difficult, 10 questions are in the medium category, and 19 questions are included in the easy category.

The results of the evaluation of the level of difficulty reveal that the majority of items in this instrument have relatively easy characteristics. Even though there are several questions that provide certain challenges, in general this test still needs improvement to create a more proportional distribution of difficulty levels between easy, medium and difficult questions.

d. Difference Power Test

The differential power test is carried out to measure the extent to which a question item can differentiate between students who have high and low ability. The calculation results show that the items in this test have varying degrees of differentiation, which are categorized as good, sufficient, poor and poor. According to Arikunto (2013: 226) the discriminating power of questions is the ability of the questions to differentiate between students with high ability and low ability.

Figure 4. Difference Power Test Results
(Source: Personal Documents, 2025)

Based on the diagram presented, the results of the differential power test show that all the questions in this instrument are of adequate quality, with none of them classified as bad. Of the total 30 questions, the distribution of different power qualities shows that 2 questions are in the fair category, 20 questions are in the good category, and 8 questions are in the very good category.

These findings reveal that the majority of items have optimal discrimination ability, with the majority being classified as good to very good. This condition indicates the effectiveness of these questions in accurately identifying differences in abilities between students. Although questions with good differential power are still suitable for use, more in-depth study is needed to improve their quality. Comprehensively, it can be concluded that this evaluation instrument has met objective measurement standards and is able to provide a valid assessment of student competency.

3.1.2. Cycle I Learning Results

a. Cognitive Learning Outcomes

Evaluation of students' cognitive learning achievements is carried out through a test method which includes the implementation of a pretest and posttest. The criteria for learning completeness are set at a minimum score of 75, in accordance with the Completeness Achievement Level Criteria (KKTP). The following image presents a comparison diagram of students' pretest and posttest results in achieving learning integration material *Microsoft Office.*

Figure 5. Cycle I Cognitive Learning Results
(Source: Personal Documents, 2025)

The results of the initial evaluation (pretest) of 36 students showed that only 13.89% (5 people) achieved the minimum standard of completion (KKTP ≥75), with a class average achievement of 69.22. In the final evaluation (posttest), there was a significant increase where 86.11% of participants (31 people) met the completion criteria, with the class average

score increasing to 79.97. Even though the class as a whole has not achieved 100% completion, this data shows quite significant learning progress.

To ensure the validity of these findings, a more in-depth statistical analysis was carried out. The first stage involves testing the normality of the data using SPSS version 27 software, which is a prerequisite for determining the next analysis method, in this case the paired t-test. The complete results of the normality test are presented in the following section.

Table 2. Normality Test
(Source: Personal Documents, 2025)

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest	,127	36	,148	,950	36	,104
Posttest	,181	36	,004	,959	36	,207

a. Lilliefors Significance Correction

Data is declared to be normally distributed if the significance level is more than α (0.05). Based on the normality test in table 4.1 of the Shapiro-Wilk column, it is known that the pretest significance value is 0.104 > 0.05 and the posttest significance value is 0.207 > 0.05, so it can be concluded that the data above is normally distributed. After the data is declared normally distributed, a paired t-test can be carried out to determine the effect of the learning model. *Project Based Learning* on improving student learning outcomes. The results of the paired t-test can be seen in table 4.2 below.

Table 3. Uji Paired t test
(Source: Personal Documents, 2025)

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Posttest - Pretest	10,750	4,436	,739	9,249	12,251	14,540	35	<,001

Ho = Learning model *Project Based Learning* has no effect on improving student learning outcomes.
Ha = Learning model *Project Based Learning* has an effect on improving student learning outcomes.

Ho is rejected if Sig. (2-tailed) < 0.05 and t_count > t_table. Based on the table, it can be seen that the t value is 14,540 and the Sig value. (2-tailed) is <0.001 <0.05, then Ho is rejected and Ha is accepted, so it can be said that the learning model *Project Based Learning* has an effect on improving student learning outcomes.

b. Psychomotor Learning Outcomes

Students' psychomotor learning outcomes are measured using practical instruments by carrying out integrated practical activities *Microsoft Office*. Students are declared complete if the learning outcomes or scores obtained are more or equal to the KKTP, namely 75. The following is a diagram of the completeness of students' practice scores on integrated learning outcomes. *Microsoft Office.*

Figure 6 Cycle I
Psychomotor Learning Results
(Source: Personal Documents, 2025)

Based on the assessment results, the highest average psychomotor score for students was in the aspect of preparing teaching equipment and materials, with a score of 8.6. This shows that students have ensured the completeness of hardware and software, verifying the application version *Microsoft Office* used, as well as maintaining the neatness and readiness of the work environment in accordance with standard operating procedures (SOP).

In addition, the timeliness aspect received an average score of 8.4, which means students were able to complete each stage of application integration efficiently without wasting time. Aspects of personal preparation, setting up the digital work area, and the final document result received a score of 8.2, which reflects that students have followed procedures well, including maintaining a clean document display, ensuring all integration components are available, and producing a final document that is in accordance with the previously designed assignment concept.

Meanwhile, the user or client data preparation aspect received a score of 8.0, which indicates that students have checked data, maintained information security, and adjusted the format and structure of documents according to user or project needs.

An average score of 7.8 was obtained in the aspect of neatness and format consistency, which includes the accuracy of using templates, writing formats, and the suitability of elements between applications during the integration process. The technical work steps aspect received a score of 7.6, which shows that students still need to improve technical skills in integrating features *Microsoft Office* synergistically.

The integration design suitability aspect received a score of 7.4, which means that the final result of the student document reflects the specified integration theme or goal, but still needs to be adjusted to the visual communication needs and data structure to be more optimal.

Overall, students have demonstrated good skills in integration practices at Microsoft *Office,* especially in the aspects of preparation and time efficiency, but there is still a need to improve technical work steps and

design suitability so that integration results are more optimal and professional.

3.1.3. Cycle II Learning Results

a. Cognitive Learning Outcomes

Evaluation of cognitive learning outcomes is carried out through initial diagnostic tests (pretest) and final tests (posttest) in the second cycle of learning. The minimum completion criteria (KKM) are set at 75, where students are declared to have achieved competency if they obtain a score equal to or exceeding that number. The following data visualization presents a comparison of the level of completion between the pretest and posttest results in mastery of integration material *Microsoft Office*.

Figure 7. Cycle II Cognitive Learning Results
(Source: Personal Documents, 2025)

Based on Figure 4.7, the evaluation results show that of the 36 students, 27 participants have achieved completion with a KKM score of ≥75 on the pretest, with a class average score of 78.08. Meanwhile, nine other participants have not met the completion criteria. In the posttest, there was a significant increase where 34 participants succeeded in achieving completion with the class average score increasing to 87.33, and only two participants did not complete. This increase shows significant progress in the learning process.

To validate these findings, further statistical analysis was carried out using SPSS version 27. The first stage was a data normality test to determine the feasibility of using the paired t-test in analyzing the differences between pretest and posttest results. Complete results of the normality test will be presented in the next section.

Table 4. Normality Test
(Source: Personal Documents, 2025)

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Preetest	,105	36	,200*	,978	36	,661
Postest	,082	36	,200*	,979	36	,707

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Data is declared to be normally distributed if the significance level is more than α (0.05). Based on the normality test in table 4.3 of the Shapiro-Wilk column, it is known that the pretest significance value is 0.661 > 0.05 and the posttest significance value is 0.707 > 0.05, so it can be concluded that the data above is normally distributed. After the data is declared normally distributed, a paired t-test can be carried out to determine the effect of the learning model. *Project Based Learning* on improving student learning outcomes. The results of the paired t-test can be seen in table 4.4 below.

Table 5. Test Results Paired t test

Paired Samples Test

To = Learning model *Project Based Learning* has no effect on improving student learning outcomes.

Ha = Learning model *Project Based Learning* has an effect on improving student learning outcomes.

Ho is rejected if Sig. (2-tailed) < 0.05 and t_count > t_table. Based on the table ... it is found that the t value is 10.338 and the Sig value. (2-tailed) is <0.001 <0.05, then Ho is rejected and Ha is accepted, so it can be said that the Project Based Learning model has an effect on improving student learning outcomes.

b. Psychomotor Learning Outcomes

Students' psychomotor learning outcomes are measured using practical instruments by carrying out integration activities *Microsoft Office*. Students are declared complete if the learning outcomes or scores obtained are more or equal to the KKTP, namely 75. The following is a diagram of the completeness of students' practice scores on integrated learning outcomes *Microsoft Office*.

Figure 8. Cycle II Psychomotor Learning Results
(Source: Personal Documents, 2025)

In cycle 2, the highest average psychomotor score for students was 8.8 obtained in the aspects of technical work steps and final document results. Assessment in the aspect of technical work steps includes the correct application of Microsoft Office features, efficient workflow between applications, as well as the selection of data formats and integration in accordance with the task design that students have determined.

Meanwhile, aspects of the final results are assessed based on the document's suitability to the task design, accuracy in using features, creativity in presenting content, innovation in integration between applications, and neatness in the layout and structure of the document.

The aspect of document neatness received an average score of 8.6, which reflects students' accuracy in compiling documents, consistent use of formats, and accuracy in utilizing tools such as tables, graphs, hyperlinks and other visual elements.

Furthermore, an average score of 8.4 was obtained in the aspects of personal preparation, preparation of teaching devices and materials, and suitability of integration design. Aspects of personal preparation include students' mental and physical readiness, mastery of devices, and use of appropriate software. The preparation aspect of teaching tools and materials is assessed based on the completeness of supporting documents, file compatibility, as well as the implementation of data management and security in accordance with standard operating procedures (SOP).

The suitability aspect of integration design shows that the document or presentation created is in accordance with the specified theme, does not contain elements that conflict with the main concept, and has a structure that is in harmony with the goals and characteristics of the audience.

The user or client data preparation aspect received an average score of 8.3, which shows that students have carried out data input procedures well, starting from checking data accuracy, maintaining the confidentiality of information, to adapting the data presentation format to user or project needs.

Finally, aspects of digital work area preparation, cleanliness of documents, and timeliness of work received an average score of 8.2. Aspects of work area preparation are assessed based on folder orderliness, file management, and efficiency of device use. The cleanliness aspect reflects that the entire integration process, from preparation to final storage of documents, has been carried out in accordance with procedures and is free from technical or visual errors.

Meanwhile, the timeliness aspect shows that students are able to complete each stage of integration work well, manage time optimally between preparation, implementation and revision, and complete assignments before the specified time limit.

These results show an increase in students' skills in integration practices *Microsoft Office*, with increasingly developed technical capabilities and creativity from the previous cycle.

3.1.4. Students' Learning Interests

Data on students' interest in learning activities was obtained from the results of filling out a questionnaire that was completed by 36 students of class X DKV 1 which is presented in the following diagram:

Figure 9. Results of Cycle I Learning Interest
(Source: Personal Documents, 2025)

The evaluation results show that indicator 7 received the highest response of 97%, where 35 out of 36 students were able to develop critical thinking skills in mastering integration material. *Microsoft Office*. In indicators 1, 2, 6, 9, and 10, a response of 92% was obtained, indicating that 33 students felt happy during learning, had a positive attitude towards the learning process, were involved voluntarily without coercion, and experienced a significant increase in understanding of the material. Apart from that, students also show high interest in the material and are able to concentrate well during learning.

A response of 89% in indicator 5 indicates that 32 students experienced progress in learning outcomes. Meanwhile, indicators 4 and 8 received a response of 86%, where 31 students had positive perceptions of learning methods and were actively involved voluntarily. In indicator 3, a response of 83% was recorded with 30 students showing creativity and innovation in learning. Overall, student responses in the first cycle reached 90% which was classified as very good. These findings confirm that students' motivation and involvement in integration learning *Microsoft Office* is at a high level.

Figure 10. Results of Cycle II Learning Interest
(Source: Personal Documents, 2025)

Research findings reveal a perfect achievement of 100% on indicators 5, 6, 7, 8, and 10, indicating that all students experienced significant learning progress. They develop critical thinking skills in mastering the material, have a good memory for learning content, and are able to maintain focus during the learning process. In indicators 1 and 2, a positive response of 94% was obtained (34 out of 36 participants) which reflects a high level of satisfaction and emotional involvement in integrated learning *Microsoft Office*.

Furthermore, indicators 3, 6, and 9 received a response of 92% (33 participants) which indicated the emergence of creativity, innovation, and voluntary participation in learning, as well as increasing interest in integration material. *Microsoft Office*. Meanwhile, indicator 4 recorded an achievement of 86% (31 participants) which shows the development of positive attitudes, a sense of belonging, and increased conceptual understanding among students. In aggregate, this second cycle succeeded in achieving an overall response rate of 95% which is included in the special category. These findings clearly prove that there is extraordinarily high enthusiasm and motivation to learn among students regarding the material being taught.

3.1.5. Implementation of Learning Syntax

Data on the implementation of learning syntax was obtained from the results of filling in the instrument which was filled in by 3 observers, curriculum assistant, tutor, and peers. The resulting data is presented in the following diagram:

Figure 11. Results of Implementation of Cycle I Learning Syntax
(Source: Personal Documents, 2025)

Based on the results of the analysis of the learning syntax implementation diagram, it can be seen that:

The highest average implementation of 4.4 was obtained in the core activity aspect, which means that learning took place smoothly and in accordance with the phases and syntax in the teaching module.

An average of 4.2 was obtained for the closing activities and classroom atmosphere, where the teacher and students closed the learning according to the teaching module, with reflection on students' achievements, informing about the next learning activity and ending the activity by providing motivation and prayer, as well as a class atmosphere where learning was centered on students, and students were very enthusiastic in learning.

An average score of 4.1 was obtained in the preliminary activity aspect. This shows that the teacher has implemented the initial steps of learning well, such as conveying learning objectives, providing apperception, and motivating students to be ready to follow the lesson. Even though they have not yet

achieved the highest score, the preliminary activities have been effective in preparing students to enter the core stage of learning.

An average of 4.0 was achieved in the time management aspect. This indicates that the teacher has been able to allocate learning time proportionally according to the syntax planned in the teaching module. However, there is still some inefficiency in dividing time between activities, so optimization is needed so that time allocation is more precise and learning runs more effectively.

Figure 12. Results of Implementation of Cycle II Learning Syntax
(Source: Personal Documents, 2025)

The implementation of learning in Cycle II showed significant improvement compared to the previous cycle. In the preliminary stage, the teacher succeeded in creating a more interesting start to learning with a score of 4.5. This can be seen from the apperception that is linked to students' real lives, the delivery of clear and measurable learning objectives, and effective initial motivation using concrete examples and simple visual media. This activity succeeded in arousing students' interest in learning from the beginning of the learning session.

The core learning activities and classroom atmosphere achieved the highest score of 4.6, indicating the successful implementation of a learner-centered learning approach. Teachers apply various learning methods such as structured discussions and *problem-based learning* which encourages more dynamic and meaningful interactions. A conducive classroom atmosphere is supported by flexible seating arrangements in the form of U models and groups, as well as an increase in active student involvement by 40% based on observation results. Learning takes place in an atmosphere that supports the exploration of ideas and collaboration between students.

In the aspects of learning closure and time management, a score of 4.3 was achieved which shows significant progress in implementation. Time allocation becomes more proportional with a division of 15 minutes for introduction, 60 minutes for core activities, and 15 minutes for closing, as well as smooth transitions between stages. Closing activities are carried out by involving students through the think-pair-share technique in reflecting on learning, providing more personal and constructive feedback, and conveying the next learning plan in an integrated manner with the day's achievements. The use of a

visual timer helps students manage discussion time independently, as well as practicing responsibility for their own learning process.

3.2.Discussion

Based on the analysis results obtained, applying the learning model *Project Based Learning* (PjBL) has a positive influence on improving student learning outcomes in integration material *Microsoft Office*. In cycle I, there was a significant increase from only 13.89% of students who completed the pretest to 86.11% in the posttest, with an increase in the class average score from 69.22 to 79.97. The results of statistical tests confirm that this increase is statistically significant (t=14.540; p=<0.001), so that the alternative hypothesis which states that there is an influence of the learning model can be accepted.

Better achievement was seen in cycle II, where completeness increased from 75% (27 participants) to 94.44% (34 participants), with the average score increasing from 78.08 to 87.33. The results of the paired t-test again showed a significant difference (t=10.338; p=<0.001), strengthening the effectiveness of the PJBL model. This finding is in line with constructivist learning theory which emphasizes real experience-based learning. Project processes in integration materials *Microsoft Office* allows students to develop critical thinking skills and creativity directly. Normal data distribution (p>0.05) in all tests adds to the validity of the findings.

Compared to previous research, such as Pratiwi & Santoso (2022) who reported an average score increase of 15.7 points and a large effect size (1.23) in mastering Office applications, and Handayani (2021) who reported an N-gain of 0.72 and the ability of 92% of students to complete projects, this research shows higher achievements in the integration of advanced features *Microsoft Office* such as mail merge, interactive dashboards, and dynamic linking.

Another advantage lies in the grade level and level of difficulty of the material. This research was conducted in class X, with integrative material that is usually given in class This finding is supported by Nugroho (2021) who emphasizes the role of scaffolding in increasing project efficiency by 25%, where in this research, a structured guide was used to help students develop Office integration products.

The consistency of the results is also supported by Kurniawan et al. (2023) who found a positive correlation (r=0.65) between collaborative skills and final product quality, and Sari & Wijaya (2020) who reported an increase in learning motivation of 32% through PJBL. These results prove that the PJBL model not only improves learning outcomes quantitatively, but also builds applicable and collaborative competencies, which are very much needed in the modern world of work.

The implementation of PJBL has succeeded in increasing students' interest in learning significantly. In cycle I, the highest achievements were in the indicators of critical thinking skills (97%), learning satisfaction (92%), and improving learning outcomes (89%). This is in line with the findings of Wulandari et al. (2022) who reported an increase in critical thinking scores from 2.5 to 3.8 (scale 4) in office application projects. This finding is also supported by Fitriani & Hidayat (2021) who showed an increase in interest in learning by 35% (N-gain 0.68), as well as Saputra & Dewi (2020) who found a positive correlation (r=0.72) between PJBL and student creativity.

In cycle II, student responses increased with 100% achievement in five main indicators, including critical thinking skills, material retention and emotional involvement. The overall response increased to 95% (special category), which

strengthens Kurniawan & Sari's (2023) finding of an average score increase of 22.5 points in learning *Microsoft Office* project based.

The difference with previous research lies in the measurement indicators of learning interest which are not only limited to affective questionnaires, but are also observed from student initiative in exploring advanced features. *Microsoft Office*, initiative in problem solving, and activeness in project discussions. This shows that the emerging interest in learning is applied and independent, different from previous studies which mostly reported increased motivation in the context of basic mastery of applications.

Thus, these findings are not only statistically valid, but also richer in meaning in describing the transformation of learning interest into concrete productivity in the form of projects.

Observation results on the implementation of PJBL syntax show consistent and progressive implementation. In cycle I, the core activity received a score of 4.4, preliminary 4.1, and closing 4.2. Although time management still needs to be optimized (4.0), the student-centered classroom atmosphere (4.2) is in accordance with the principles of interactive PJBL. This is in line with Pratiwi et al. (2022) who stated that structured core activities increased student engagement by up to 85%, and Wijaya (2021) who emphasized the importance of interesting apperception in project learning.

Significant improvement occurred in cycle II, especially in core activities and class atmosphere (score 4.6). The use of structured discussions, U-style seating arrangements, and reflective strategies such as think-pair-share have been proven to improve the quality of interactions, according to the findings of Sari et al. (2020) and Rahmawati (2021). In addition, the use of visual timers in classroom time management supports Darmawan's (2022) findings regarding the importance of time control in educational projects.

The prominent difference of this research compared to previous ones is the integration of PJBL syntax with active classroom design and modern time management techniques, which have not been widely reported in similar studies. Nugroho's (2023) findings regarding the role of problem-based learning in PJBL are also in line with the strategy used in this research, which combines real projects with contextual problem solving.

Thus, the implementation of PJBL in this research not only shows effectiveness in learning outcomes, but also in terms of learning management and the quality of implementing the PJBL syntax itself.

4. CONCLUSION

Based on the results of the research that has been carried out, it can be concluded that the application of the model *Project Based Learning* (PjBL) significantly improves students' cognitive and psychomotor learning outcomes in integration material *Microsoft Office* at SMK Negeri 1 Cerme. In Cycle I, there was an increase in learning completeness from 13.89% to 86.11%, with the average class score increasing from 69.22 to 79.97. In Cycle II, completeness increased even higher from 75% to 94.44%, with an average score of 87.33, indicating that this model is not only effective in improving conceptual understanding but also students' applicative skills. Statistical test results (t=10.338–14.540; p=<0.001) confirmed that this increase was statistically significant.

Students' interest in learning reached 95% in Cycle II (special category), with the highest indicators in critical thinking skills (100%) and emotional involvement (94%), proving that PjBL has succeeded in creating learning that is meaningful and relevant to the needs of the world of work.

The implementation of PjBL syntax also shows positive development, with an average score of 4.6 for core activities and class atmosphere in Cycle II. The use of techniques such as structured discussions, U-style seating arrangements, and think-pair-share reflection has been proven to increase students' active participation by 40%. These results are in line with constructivist learning principles, where real projects spark collaboration, creativity, and problem solving. Thus, PjBL is not only effective for technical mastery *Microsoft Office*, but also develops 21st century skills such as critical thinking, collaboration, and time management.

Based on research findings, it is recommended that vocational school teachers, especially in the Information and Computer Technology (ICT) field, adopt the PjBL model in learning office applications by paying attention to three key aspects: (1) providing scaffolding (structured guidance) to guide students in completing complex projects, (2) optimizing time management through visual tools such as timers, and (3) integrating work-based projects (for example creating financial reports or digital certificates) to increase learning relevance. Additionally, schools can provide training for teachers on collaborative project design and product-based evaluation, as well as provide supporting infrastructure such as stable access to tools and equipment. *software Microsoft Office.*

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