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Original Article

Exploring The Impact of Integrating Problem Based Learning and Agile in the Classroom on Critical Thinking

Madziatul Churiyah[1*], Mohammad Arief[2], Sigit Permansyah[3]

[1-3]Office Administration Education Study Program, Faculty of Economics and Business, Universitas Negeri Malang, Indonesia
Email: [1)] madziatul.churiyah.fe@um.ac.id

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Abstract

The purpose of this study was to improve critical thinking skills and student learning outcomes at SMK Negeri 1 Probolinggo through the implementation of problem-based learning models. This type of research is classroom action research which consists of 2 cycles where each cycle has 2 meetings. This research has two types of data, namely quantitative data and qualitative data. Obtaining research data obtained through initial observation, interviews with teachers and students, tests at the end of the cycle, documentation, and field notes. Data analysis is done by reducing data, presenting data, and drawing conclusions. The results of the research show that the problem-based learning process is used to stimulate critical thinking in problem-oriented situations. The researcher was assisted by 3 observers who observed the course of the learning process. Students' critical thinking skills on the indicators of managing strategies and tactics obtain a high percentage because the giving of actions is carried out by utilizing media. Genially with gamification features so that they affect learning outcomes which experience an increase in each cycle.

Keywords: Critical Thinking, Genially, Learning Outcomes, Problem Based Learning

1. Introduction

Twenty-first century learning competencies comprise a collection of skills necessary for contemporary development. Modern learning requires students to master the 4C skills: critical thinking, creative thinking, communication, and collaboration (Chusni et al., 2020; Dilekçi & Karatay, 2023; Kocak et al., 2021). The concept of learning in education this century began to emphasise the development of higher order thinking skills, where critical thinking is one of the skills that is highly emphasised (Cui & Teo, 2023; Zhang et al., 2023). Critical thinking is learning that focuses on students' ability to solve problems in office communication materials, then connects logic with real life (Alpizar et al., 2022; Rachmawati & Rosy, 2020; Silberman et al., 2021). The development of thinking skills and student learning outcomes needs to be improved using a learning model (Affandy et al., 2019; Saleh, 2019). The learning model that teachers can develop in a student-centred way is the Problem Based Learning model.

Problem Based Learning is a learning model that presents real-life problems to motivate students to learn (Fernandes, 2021; Ottenbreit-Leftwich et al., 2021; Paradina et al., 2019). This learning model exposes students to a problem, followed by a student-centred information seeking process (Boye & Agyei, 2023). The application of the problem-based learning model is one of the intermediaries for students to train their mindset independently and be brave in expressing their opinions (Simamora & Manurung, 2021; Sitinjak & Banurea, 2022). After this

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learning model was implemented, students' learning outcomes improved (Montepara et al., 2021; Nurrohma & Adistana, 2021). In addition, the application of problem-based learning model affects students' critical thinking (Liu & Pásztor, 2022; Pebriyani & Pahlevi, 2020). Problem-based learning is not a new teaching strategy, it is one of the ideal choices that encourages students' critical thinking while solving problems appropriately (Seibert, 2021; Wallace et al., 2020). The implementation of problem-based learning is effective in improving critical thinking skills if the teacher can guide students to learn to actively state problems to evaluate independently (Ariyanto et al., 2020; Sholihah & Lastariwati, 2020; Thorndahl & Stentoft, 2020). The application of problem-based learning model equipped with Genially media can improve critical thinking, creativity, and student learning outcomes in teaching and learning activities (Fatma, 2022; Hermita et al., 2022).

Initial observations at SMK Negeri 1 Probolinggo in August 2022 revealed suboptimal critical thinking and learning outcomes among class X MP students, with 44.4% of 18 students failing to meet the Minimum Completeness Criteria (KKM) in daily tests. This underperformance was largely attributed to the prevailing teacher-centered learning approach, where instruction primarily consisted of lecture-style material delivery and textbook assignments. This traditional model limited student engagement, discouraged active problem-solving, and created a passive learning environment that failed to foster critical thinking skills or meaningful classroom interaction.

The study proposes addressing the identified learning challenges through a problem-based learning model enhanced by Genially, an interactive media platform featuring presentations, animations, infographics, e-posters, quizzes, and gamification capabilities (Castro-Salinas & Ochoa-Encalada, 2021; Vidergor, 2021). Unlike previous research, this study uniquely applies the model to Vocational Basic subjects in class X Office Management at SMK Negeri 1 Probolinggo, measuring both cognitive and psychomotor learning outcomes (Astuti et al., 2022; Khoirun Ni'mah et al., 2022). The integration of Genially aims to increase student engagement through attractive visual content and interactive elements, thereby reducing learning monotony and enhancing overall educational effectiveness.

This research is important to do considering previous research which states that problem-based learning can improve critical thinking skills, especially the ability to analyse and evaluate (Aini et al., 2019; Sharma et al., 2023). Problem-based learning can be used as a strategy to encourage critical thinking and perseverance in Generation Z (Seibert, 2021). PBL had a positive impact resulting in significantly better theory test scores and student feedback scores (Li et al., 2020; Mujumdar et al., 2020). Problem based learning results in significant improvement in learning outcomes and greater insight (Juandi, 2021; Ting et al., 2021). The use of this model is carried out using Genially media which has a good impact on critical thinking when students take advantage of the gamification feature that can make students able to remember science concepts and apply learning in everyday life and creative students when they use interactive tools in Genially (Azizah et al., 2021; Hermita et al., 2022). The interactive tools in Genially provide an on-screen display that has not previously appeared, when clicked it will be connected to a more complete explanation. Based on the problems that have been described, this study aims to improve critical thinking skills and learning outcomes of students of SMK Negeri 1 Probolinggo through the implementation of a problem-based learning model.

2. Methods

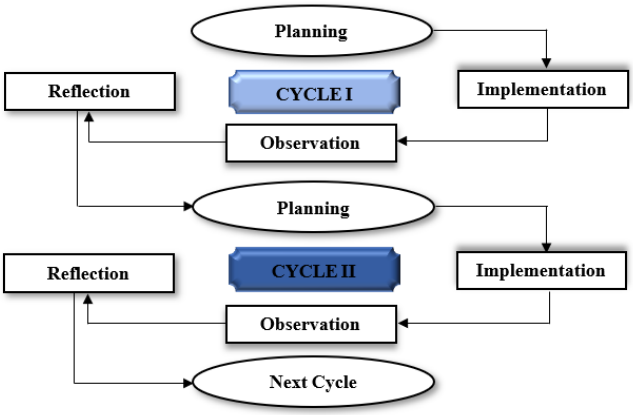

Figure 1. Classroom Action Research Cycle
Source: (Arikunto et al., 2017)

This Classroom Action Research was conducted at SMK Negeri 1 Probolinggo during the even semester of 2023/2024, involving 32 students from Office Management X class. The study employed two cycles, each comprising planning, implementation, observation, and reflection stages. The researcher played multiple roles as planner, data collector, implementer, analyzer, and reporter. Both quantitative data (student learning outcomes) and qualitative data (learning process descriptions) were collected using multiple methods: observation sheets with three observers, interviews, essay and practical tests, documentation, and field notes. The data analysis process involved reduction, presentation, and conclusion drawing.

3. Results and Discussion

3.1. Result 1 about figures

3.1.1. Cycle I

A. Implementation of Problem Based Learning

The implementation of cycle I was carried out in April 2024, the material studied was the concept of logistics services. At the beginning of the lesson, the teacher started the activity with greetings, prayers, and attendance. Furthermore, the teacher gave questions as an apperception to students to link the material to be learned. The teacher conveys the learning objectives to be learned, relates the material to problems in everyday life, and motivates students by explaining the benefits of the material to be learned (Septian & Komala, 2019), then informed that learning would be carried out using the problem-based learning model, which is learning that encourages students to improve their critical thinking skills (Efendi & Mashadi, 2020; Pramestika et al., 2020).

The core activities followed a structured problem-based learning model through five key stages: First, students were oriented to real-world logistics service delivery problems. Second, students were organized into six heterogeneous groups of three students each and given worksheets (LKPD 1) focusing on types and logistics services. Third, during group investigation, students worked collaboratively while receiving teacher guidance when needed, particularly when clarifying worksheet instructions. Fourth, students developed and presented their work using Genially media, sharing their findings through group presentations (Nadya & Santoso, 2022). Finally, the teacher facilitated a collective analysis and evaluation

session where students reviewed the problem-solving process and drew conclusions about the learned material.

In the closing activity, the teacher gives students a posttest question about the concept of logistics services that have been learned and the practice of shipping goods in shipping services. Furthermore, the teacher informs the material that will be studied at the next meeting, namely the material of logistics service documents. The lesson was closed with prayer and greetings. The following are the results of teacher activities and student activities obtained from the observations of 3 observers. The results of the application of problem-based learning stages using Genially media obtained average teacher activity are presented in table 1 below.

Table 1. Teacher Activity Results of Problem Based Learning Implementation Using Genially Media

No.	Syntax	Percentage	Category
1.	Learners orientation to the problem	66,7%	Good
2.	Organising learners	100%	Very good
3.	Guiding individual and group investigations	100%	Very good
4.	Developing and presenting results	100%	Very good
5.	Analyse and evaluate the problem-solving process and results	100%	Very good

Source: Primary data processed, 2023

The results of the application of the problem-based learning model using Genially media are also seen from the average student activity presented in table 2 below.

Table 2. Student Activity Results of Problem Based Learning Implementation Using Genially Media

No.	Indicator	Percentage	Category
1.	Activeness in the learning process	53,3%	Good enough
2.	Courage in asking questions	40,3%	Bad
3.	Discipline in participating in learning	91,7%	Very good
4.	Discussion in learning	86,1%	Very good
5.	Asking questions about material that is not clear	30,6%	Bad

Source: Primary data processed, 2023

B. Critical Thinking Skills

Assessment of students' critical thinking skills is measured from the indicators of each question presented in table 3 below.

Table 3. Percentage of Critical Thinking Skills of Students Cycle I

Indicator	Question Number	Percentage
Providing simple explanations	1	72%
Developing basic skills	2, 3, 4	67%
Summarising	*5*	50%
Providing advanced explanations	6, 7, 8	83%
Organising strategies and tactics	9, 10	56%
Completed		72,2%
Not Completed		27,8%

Source: Processed primary data, 2023

Based on table 3 shows that the highest aspect of students‘ critical thinking lies in the indicator of providing further explanation, namely in questions number 6, 7, and 8 about analysing types and logistics services, while the lowest aspect of students’ critical thinking lies in the indicator of concluding problems with question number 5 regarding logistics services. The percentage of students' critical thinking skills completeness has only reached 72.2% and there are still 27.8% who have not completed, this is because students still have not fully

mastered the material and learning model, therefore it is necessary to implement cycle II to improve the completeness of critical thinking (Noer et al., 2021).

C. Learning Outcomes

The acquisition of student learning outcomes in cognitive aspects is carried out by conducting tests in the form of essay questions regarding case studies of Basic Vocational subjects of business and logistics service elements according to the specified standards. The results of the pre-test scores obtained from cycle I experienced a fairly good increase in the post-test scores (A. Ismail & Gumilar, 2019; Supriatna, 2020). The following is table 4 data on learning outcomes for cognitive aspects of cycle I.

Table 4. Student Learning Outcomes Cognitive Aspects Cycle I

Test Type	Total		Classical Completeness	
	Total Value	Average	Completed	Not Completed
Pre Test	1124	62,4	50,0%	50,0%
Post Test	1504	83,6	94,4%	5,6%

Source: Primary data processed, 2023

D. Reflection

Table 4 shows that there was an increase in cognitive scores from pre test to post test. (Sharma et al., 2023). The data from the pre-test scores obtained an average of 62.4 where there were 9 complete students and 9 people were still not complete. Meanwhile, the post test obtained an average value of 83.6 where 17 students were complete and 1 person was not complete. The increase in learning outcomes in cycle I is included in the average in the good category. Assessment of psychomotor aspects is carried out in each cycle, namely service practices in delivery services with an assessment rubric in the form of 1) Work preparation which consists of arriving on time, preparing to start service practice, and completeness of practical tools and materials. 2) The work process consists of the accuracy of the documents used and the accuracy of the service procedures in the delivery service. 3) The results of work in the form of service practices in shipping services. 4) Attitude during work, namely the student's keniatan in doing practice (Ramadhan, 2021; Wulansari et al., 2019). Learning outcomes of psychomotor aspects seen from the average assessment rubric are presented in table 5 below.

Table 5. Learning Results of Psychomotor Aspects of Cycle I

No.	Indicator	Percentage	Category
1.	Arrive on time for service practice	*68%*	Insufficient
2.	Prepare yourself to start the practice	76%	Enough
3.	Completeness of tools and materials	78%	Enough
4.	Accuracy of documents used during practice	*61%*	Insufficient
5.	Accuracy of service procedures in delivery services	*64%*	Insufficient
6.	Practising services in delivery services	75%	Enough
7.	Student activity in practicing services in delivery services	*60%*	Insufficient

Source: Primary data processed, 2023

During the learning process of cycle I, the lowest teacher activity was in the steps of orientating students to the problem, which was 66.7% in the good category and the other steps were in the very good category. Student activities that are an obstacle are the lack of courage to respond to the presentation of the presenting group and ask about material that is not clear (Díaz-García et al., 2022; Liu & Pásztor, 2022). During the presentation activities there was only 1 group that responded to the results of other groups' presentations, while the others were

still focused on their own group's problems so they could not respond to the results of the presenting group's presentation. In addition, students also did not dare to ask questions about material and questions that were not clear (Davison et al., 2021). Therefore, learning activities in cycle I were still not optimal and needed improvement in cycle II.

After delivering the material by applying Genially media, students' critical thinking skills only reached 56% and there were still 44% who were not complete. The average critical thinking of students is 65% in the critical category and can still be improved. The lowest indicator of critical thinking is to conclude at 50% and the highest indicator is to provide further explanation at 83% from a value range of 0-100%. This critical thinking indicator still needs to be improved. Meanwhile, the results of cognitive scores obtained by students in cycle I were still incomplete. Psychomotor assessment in the aspects of work preparation, work process, and work attitude still needs to be improved. Therefore, researchers continued at the cycle II stage.

3.1.2. Cycle II

A. Implementation of Problem Based Learning

Cycle II, conducted in May 2024, focused on logistics documents and maintained the same initial activities as cycle I, beginning with an apperception linking previous logistics services concepts to new material. The core activities followed the five-stage problem-based learning model with key improvements: students were presented with logistics document-related problems, allowed to self-select their groups, and given LKPD 2 focusing on analyzing logistics service documents. Notable improvements were observed in students' understanding of LKPD questions, group discussion engagement, and presentation confidence using Genially media. The cycle concluded with collaborative analysis and evaluation of the learning process, demonstrating enhanced student participation and comprehension compared to cycle I..

The closing activity, the teacher gives students an evaluation of posttest questions about logistics service documents that have been learned and practices customer complaint services in shipping services. The following are the results of teacher activities and student activities obtained from the observations of 3 observers. The results of the application of problem-based learning stages using Genially media obtained the average teacher activity presented in table 6 below.

Table 6. Teacher Activity Results of Problem Based Learning Implementation Using Genially Media

No.	Syntax	Percentage	Category
1.	Learners orientation to the problem	88,9%	Very good
2.	Organising learners	100%	Very good
3.	Guiding individual and group investigations	100%	Very good
4.	Developing and presenting results	100%	Very good
5.	Analyse and evaluate the problem-solving process and results	100%	Very good

Source: Primary data processed, 2023

The results of the application of the problem-based learning model using Genially media are also seen from the average student activity presented in table 7 below.

Table 7. Student Activity Results of Problem Based Learning Implementation Using Genially Media

No.	Indicator	Percentage	Category
1.	Activeness in the learning process	80%	Good
2.	Courage in asking questions	83,3%	Very Good
3.	Discipline in participating in learning	94,4%	Very good
4.	Discussion in learning	94,4%	Very good
5.	Asking questions about material that is not clear	63,9%	Good

Source: Primary data processed, 2023

B. Critical Thinking Skills

Assessment of students' critical thinking skills is measured from the indicators of each question presented in table 8 below.

Table 8. Percentage of Critical Thinking Skills of Students Cycle II

Indicator	Question Number	Percentage
Providing simple explanations	1	84%
Developing basic skills	2, 3, 4	89%
Summarise	5	73%
Providing further explanation	6, 7, 8	84%
Organise strategies and tactics	9, 10	94%
Completed		**94,4%**
Not Completed		**5,6%**

Source: Primary data processed, 2023

Analysis of the critical thinking assessment revealed that students performed strongest in regulating strategies and tactics, particularly when analyzing logistics document procedures (questions 9 and 10). While problem conclusion skills regarding logistics service documents showed the lowest scores, they still remained within the critical category. Overall, students' critical thinking skills achieved a 94.4% completion rate, categorized as "very critical," demonstrating significant improvement from cycle I and indicating successful mastery of both the material and learning model.

C. Learning Outcomes

The acquisition of student learning outcomes in the cognitive aspect was carried out after the application of the problem-based learning model using Genially media (Astuti et al., 2022; Fahlevi, 2022). The results of the pre-test scores obtained from cycle II have improved quite well in the post-test scores (Noer et al., 2021; Sharma et al., 2023). The following is table 9 data on learning outcomes for cognitive aspects of cycle II.

Table 9. Student Learning Outcomes in Cognitive Aspects of Cycle II

Test Type	Total		Classical Completeness	
	Total Score	Average	Completed	Not Completed
Pre Test	1243	69,1	66,7%	33,3%
Post Test	1529	84,9	94,4%	5,6%

Source: Primary data processed, 2023

Table 9 shows that the pre-test score obtained an average of 69.1 where there were 12 complete students and 6 people were still not complete. Meanwhile, the post test obtained an average value of 84.9 where 17 students were complete and 1 person was not complete. The increase in learning outcomes in cycle II is included in the average in the good category. The learning outcomes of cycle II showed an increase because the teacher had corrected the shortcomings in cycle I. (Bleijenbergh et al., 2021; Davison et al., 2021).

Assessment of psychomotor aspects is carried out in each cycle and in cycle II, the practice carried out is the service of customer complaints to shipping services. The learning

outcomes of psychomotor aspects seen from the average assessment rubric are presented in table 10 below.

Table 10. Learning Results of Psychomotor Aspects of Cycle II

No.	Indicator	Percentage	Category
1.	Arrive on time for service practice	80%	Good
2.	Prepare yourself to start the practice	72%	Fair
3.	Completeness of tools and materials	85%	Good
4.	Accuracy of documents used during practice	90%	Good
5.	Accuracy of service procedures in delivery services	*68%*	Bad
6.	Practising service in delivery services	90%	Good
7.	Student activities in performing service practices in delivery services	66%	Bad

Source: Primary data processed, 2023

D. Reflection

The modifications made to the learning process, including new LKPD materials and allowing independent group selection, successfully enhanced the implementation of the Problem-Based Learning (PBL) model (D. T. Dewi, 2020; Kartika et al., 2020). The significant improvements achieved across teacher and student activities in cycle II eliminated the need for a third cycle (Borrero & Naidoo, 2023; Buchanan et al., 2023). These positive changes in learning implementation, particularly visible in the comparison of teacher and student activity percentages (Safrida & Kistian, 2020), demonstrated the effectiveness of the PBL model, with detailed improvements illustrated in Figure 2.

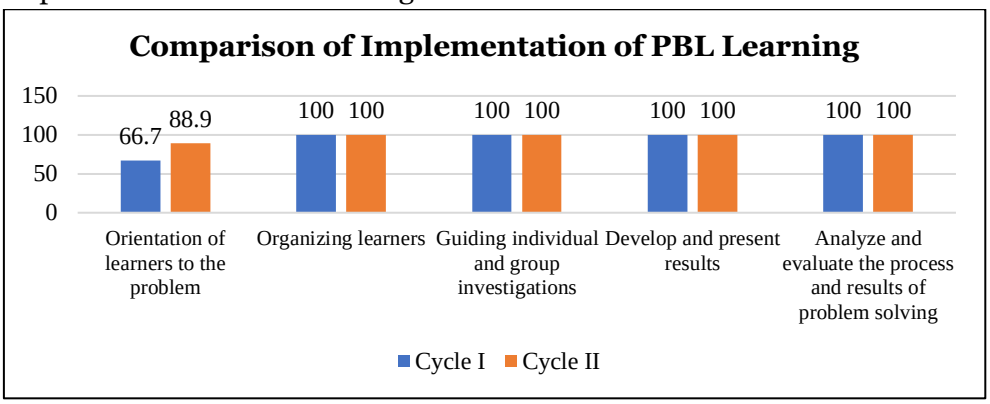

Figure 2. Comparison of Implementation of PBL learning Cycle I and Cycle II

Based on Figure 2 PBL learning steps have increased. The aspect of orienting students to the problem experienced an average increase from 66.7 to 88.9 so that it was categorised as very good. In addition to teacher activities, improvements also occurred in student activities in cycle II. During the learning process of cycle II, student discussion activities looked very active. The discipline of students in groups was also very high. Student activity data can be seen in Figure 3 below.

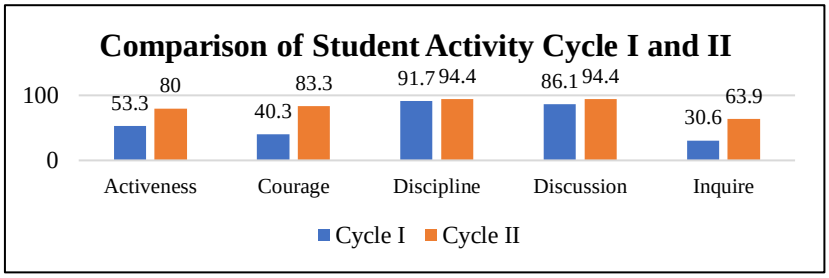

Figure 3. Comparison of Student Activities in Cycle I and Cycle II

Based on Figure 3, the aspects of courage and asking questions have increased significantly, namely courage with a difference of 43% and the aspect of asking with a difference of 33.3%. According to Figure 2 and Figure 3, the implementation of learning with the PBL model increased both in teacher and student activities. These results can be interpreted that students can follow the learning steps when applying the learning model (Chang et al., 2022; Wosinski et al., 2018). The increase in the implementation of PBL learning is supported by students' positive responses to teacher instructions, so that learning conditions in the classroom become conducive (Hamid et al., 2020). After reflecting on cycle I learning, critical thinking skills and student learning outcomes improved in cycle II (Bekiroğlu & Güllühan, 2022). The implementation of the problem-based learning model mediates students to be active in expressing opinions, discussing, and learning to think critically (Hotimah, 2020; Masrinah et al., 2019). Data on the improvement of critical thinking skills are presented in Figure 4 below.

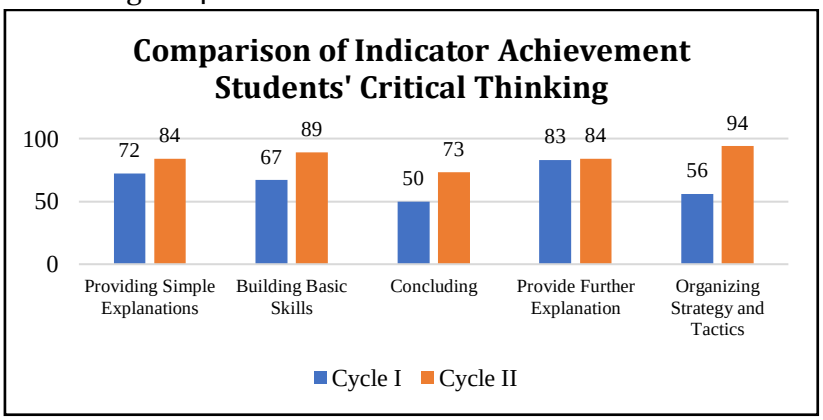

Figure 4. Comparison of Achievement of Critical Thinking Indicators for Cycle I and Cycle II Students

The explanation of Figure 4 above shows that the lowest aspect in cycle I is concluding with a percentage of 50% in the moderately critical category, then increasing in cycle II by 73% in the critical category. Questions with indicators concluded with question number 5 in cycle I regarding problems regarding logistics services and in cycle II regarding the use of logistics service documents.

Assessment of student learning outcomes is measured through cognitive and psychomotor aspects. Students are said to be complete if their learning outcomes reach the minimum completeness criteria value of 75 (Juandi, 2021; Supriatna, 2020). The results of the pre-test scores obtained from cycle I have improved quite well in the post-test scores. However, there are still students who do not reach the KKM, therefore it is necessary to apply cycle II so that their learning outcomes can improve (Noer et al., 2021). The improvement in student learning outcomes in the cognitive aspect is presented in table 11 below

Table 11. Student learning outcomes in the cognitive aspect

Cycle	Test Type	Total		Classical Completeness		Description
		Total Value	Average	Completed	Not Completed	
I	Pre Test	1124	62,4	50,0%	50,0%	Increased
	Post Test	1504	83,6	94,4%	5,6%	
II	Pre Test	1243	69,1	66,7%	33,3%	
	Post Test	1529	84,9	94,4%	5,6%	

Source: Primary data processed, 2023

Table 11 shows that the recapitulation of student learning outcomes in the cognitive aspect increased when the problem-based learning model was applied. The improvement in learning outcomes is based on the improvement of the shortcomings in cycle I. Learning outcomes of psychomotor aspects are carried out by comparing the psychomotor assessment rubric seen in table 12 below.

Table 12. Student Learning Outcomes in Psychomotor Aspects

Indicators	Cycle I	Cycle II	Average	Description
Work Preparation				
Arrive on time	68	80	76,5	
Prepare yourself to start the practice	76	72		
Completeness of tools and materials	78	85		
Work Process				
Accuracy of documents used	61	90	70,8	Increased
Accuracy of service procedures at the delivery service	64	68		
Work Result				
Practising delivery service	75	90	82,5	
Work Attitude				
Student activity in carrying out service practices in delivery services	60	66	*63*	

Source: Primary data processed, 2023

Based on the explanation of table 12 above, it can be seen that the assessment of psychomotor learning outcomes has increased in every aspect but when preparing to start practice, in cycle II it has decreased because most students are not ready to practice. The lowest aspect of cycle I and cycle II is the work attitude aspect, namely the students' willingness to practice services of 60% and 66% and an average of 63% was obtained. The highest aspect of this psychomotor learning outcome is in cycle I the aspect of the completeness of practical tools and materials at 78% and in cycle II the aspect of the accuracy of the documents used and practicing services in shipping services at 90%.

E. Interview Results with Teachers and Students

Student responses were included in this study to reflect the impact of critical thinking and student learning outcomes in the implementation of PBL (Buchanan et al., 2023; Sandberg & Fröjdendahl, 2023). Feedback is taken from the results of interviews with teachers and students after the application of the PBL model (Nurfaizah et al., 2022). Details of the feedback are illustrated in table 13 below.

Table 13. Teacher and Student Responses on the Implementation of PBL aided by Genially

Aspects	Response
Implementation of PBL	Feedback 1: *'I think the application of problem-based learning is interesting to use for class X learning where their abilities are honed to solve their own problems and the teacher is only a facilitator. Students become active when this problem-based learning model is applied. The presentation of the material by the researcher leads to the phenomenon of students' daily lives so that students become fully aware of the problems that must be solved and students are invited to discuss in groups working on case studies which in my opinion can train students to learn independently to solve problems. The problems given by the researcher are HOTS in nature and in accordance with everyday life so that students can practice to think critically and can understand what is meant because it relates to events around them'.* Feedback 2:

Aspects	Response
	'When learning using PBL, lessons are conducted with discussions to solve case study problems that exist in everyday life, the questions given encourage me to think more critically so that I am able to know what I have not learned'.
Use of Genially media	Feedback 1: '*I feel that the material presented on Genially is very easy to understand so that students are able to master the logistics service material which I think is a little difficult, this media is interesting and easy to use, I am quite easy to access Genially because the WiFi signal is not sufficient so I have to use a data package. This media is very new to me and is useful for students to learn anywhere and anytime. There are learning videos whose language is easy to understand and in accordance with the character of students'.* Feedback 2: 'I am happy to learn using Genially media because it is my first time to know it and I think Genially media is very interesting because the features are unique and very easy to use and access. However, there is a slight problem because the school Wi-Fi is slow so I have to wait a few minutes to proceed to the next step. This media is practical for anyone and anywhere to use because there is no need to download material that can fill the cellphone storage. The material presented is very easy to understand because there are videos and pictures that make me want to learn.'

Source: processed by researchers, 2023

3.2. Discussion

The application of problem-based learning model using Genially media in Basic Vocational subjects is carried out by observing teacher and student activities through observation sheets and field notes. The provision of action is carried out through two cycles where each cycle has 2 meetings and each cycle is carried out evaluation and reflection, then this learning model utilises Genially media related to increasing critical thinking skills and student learning outcomes (O'Reilly et al., 2022; Sivaci & Altaş, 2023). The application of PBL was carried out only until cycle II because it had achieved the success of the action desired by the researcher. The increase in the percentage of learning implementation observed from teacher and student activities can be interpreted that the PBL learning model is proven to be able to improve critical thinking skills and learning outcomes (D. T. Dewi, 2020; Mulyani, 2020; Yunitasari & Hardini, 2021). Based on the teacher activity observation sheet, it is known that the PBL syntax, namely orientating students to the problem, obtained a low percentage because the teacher found obstacles in raising the problem so that the two-way interaction was still not optimal (Daryanes et al., 2023; Okolie et al., 2020). The syntax of organising students, guiding individual and group investigations, developing and presenting results, and analysing and evaluating the process and results of solutions obtained a high percentage, this shows that the teacher is able to master the learning process in the classroom so that the implementation of PBL learning can be achieved. In addition, when PBL learning is applied, student activity in the aspect of asking questions gets the lowest percentage because students have not dared to ask unclear material or questions to the teacher so that in working on problems too based on the case study given without seeking information through other sources (Davison et al., 2021). Meanwhile, the aspects of discipline and discussion obtained the highest percentage because students have a dexterous attitude to act and a high enthusiasm for group work so that they consider themselves competent and believe in their abilities (Satwika et al., 2018). The implementation of learning in cycle I had an obstacle, namely not all students could be actively involved in group discussions, from the results of observations it was seen that there were still students who were busy chatting. After being reprimanded by the teacher, the student

In addition, it was seen that students were still shy in presenting the results of the discussion, there was only 1 group that responded to the presenting group presenting the results of the work, while other groups seemed not active and did not dare to respond to the presentation of the group that performed. Cycle II had improvements, namely group

discussion activities had begun to be active and the class became more conducive and most groups had begun to be active and dare to respond to the work of other groups. Based on the increased teacher and student activities, the implementation of learning by applying this PBL model is effectively used (Montepara et al., 2021; Peng et al., 2023; Perusso & Baaken, 2020). This finding is a scientific confirmation that PBL is an appropriate learning model to be used by teachers in 21st century learning (Saekawati & Nasrudin, 2021; Saleh, 2019). The problem-based learning model can improve students' critical thinking and learning outcomes by providing cases for them to solve and discuss so that it allows students to be more active in expressing opinions and discussing because the questions made are HOTS in nature (D. T. Dewi, 2020; Mulyani, 2020; Yunitasari & Hardini, 2021). The utilisation of Genially media in problem-based learning effectively improves their thinking skills and encourages them to learn independently (Choi, 2021; Ulger, 2018). Students can use the Genially feature on any device and reopen the material at any time, because Genially is a web-based platform that can be used anywhere, anytime (Castillo-Cuesta, 2022; Tapia-Machuca et al., 2020). Using Genially as a learning tool allows students to learn independently through the material that has been presented (Castro-Salinas & Ochoa-Encalada, 2021).

Critical thinking skills and student learning outcomes that increased significantly were influenced by the application of the problem-based learning model using the help of Genially interactive media, namely gamification features that make learning fun and interesting (Dharma et al., 2020; Díaz-Garrido et al., 2022; Uliyandari et al., 2021). Gamification features such as digital escape rooms are applied and have been shown to effectively influence students because of the interactive tools that provide an on-screen display that has not previously appeared, when pressed it will be connected to a more complete explanation so that they become more motivated and able to solve problems regarding logistics service concepts and documents (Huang et al., 2020). The results of this study show that on the topic of logistics service concept, interactive learning media affects students' conceptual understanding and critical thinking skills, with this learning media can help students improve their thinking competence and motivate them to develop their learning capacity (Hermita et al., 2022). Critical thinking assessment is obtained from questions that contain five indicators of students' critical thinking, namely: 1) Providing simple explanations; 2) Building basic skills; 3) Concluding; 4) Providing further explanation; and 5) Organising strategies and tactics (Ennis, 1985). The questions made lead to students' critical thinking skills, namely HOTS-based questions, in accordance with the PBL model regarding the concept of logistics services and logistics documents (Nadya & Santoso, 2022; Noer et al., 2021). This is because problem-based learning models encourage students' conceptual understanding and critical thinking more effectively to solve real-life problems (Seki et al., 2023; Yulianti & Gunawan, 2019). The results of the critical thinking assessment in cycle II showed an increase in each indicator (Nurfaizah et al., 2022; Saekawati & Nasrudin, 2021). The highest aspect of students' critical thinking in cycle I lies in the indicator of providing further explanation, because after observing the material on the concept of logistics services, students are able to think reflectively and openly to analyse questions (Azhary, 2021; Bezanilla et al., 2019). Questions with this indicator are in numbers 6, 7, and 8 regarding the analysis of logistics types and services. Students are able to provide further explanation regarding case studies of logistics services that must be provided to customers and choose the type of logistics and provide reasons. The highest aspect of critical thinking of cycle II students lies in the indicator of organising strategies and tactics, because by applying the PBL model assisted by Genially media students are able to choose and plan solutions and suggestions for problems in a problem (Hermita et al., 2022; Khoiron et al., 2021). This indicator is located in numbers 9

and 10, namely analysing the importance of logistics document procedures. Students are able to analyse logistics document strategies in accordance with existing procedures so that they understand the flow of documents in logistics delivery services. While the lowest aspect of students' critical thinking in cycle I and cycle II lies in the conclusion indicator located in question number 5 regarding logistics services. Students are still lacking in making logical and in-depth conclusions about the case study of customer disappointment in Tiktokshop which has recently been on the rise, so the answers given do not lead to critical thinking skills (Rahayu et al., 2019; Supriyatno et al., 2020). Overall, the indicators of students‘ critical thinking in each cycle have increased because the PBL learning model is effectively used to improve students' critical thinking skills and learning outcomes (N. S. Ismail et al., 2018; Uliyandari et al., 2021).

This study uses an assessment of student learning outcomes in cognitive aspects and psychomotor aspects. The acquisition of student learning outcomes in cognitive aspects was carried out by conducting tests at the end of each cycle in the form of essay questions about case studies (Juriah & Zulfiani, 2019; Nuryadin, 2021) Basic Vocational subjects of business services and logistics elements according to the specified standards. The results obtained were carried out after the application of the problem-based learning model using the Genially media (de Souza & Kasseboehmer, 2022; Reina-Guzmán et al., 2022). The learning outcomes of the cognitive aspects obtained showed an increase from pretest to posttest in each cycle when the PBL model was applied (A. Ismail & Gumilar, 2019; Sharma et al., 2023). The improvement in learning outcomes was due to the teacher changing the learning deficiencies that existed in cycle I and then improving them in cycle II (Noer et al., 2021; Supriatna, 2020). In addition, student learning outcomes increased due to group discussions, where students were given case studies of logistics service concepts and documents and then worked on in teams so that they could increase student understanding cognitively (E. H. P. Dewi et al., 2019; Supriatna, 2020). The acquisition of student learning outcomes in the psychomotor aspect is carried out by practicing services in delivery services which contain rubrics for assessing work preparation, work process, work results, and work attitude (Suarbawa, 2019). The highest aspect of psychomotor learning outcomes lies in the work process, namely students are able to use logistics documents appropriately and work results, namely students are able to practice services in shipping services appropriately (Oktaviani et al., 2019; Zebua, 2021). Meanwhile, the lowest aspect of psychomotor learning outcomes lies in work attitude, namely students' enjoyment in carrying out practices (Hutapea, 2019; Patimapat et al., 2019) so that at the time of implementation there was a lot of time wasted waiting for student readiness. However, the learning outcomes of the psychomotor aspects in cycle II have increased from cycle I because they have made improvements from the reflection of cycle I (Karlina & Rasam, 2020; Pannekoeke et al., 2023; Wang & Wang, 2023).

4. Conclusion

The study demonstrated that implementing a problem-based learning model with Genially in Basic Vocational learning at SMK Negeri 1 Probolinggo effectively enhanced students' critical thinking skills and learning outcomes, as evidenced by improvements across all indicators from cycle I to cycle II in both cognitive and psychomotor aspects. Based on these findings, several recommendations emerge: teachers should incorporate problem-solving phenomena and interactive media into their lessons, develop creative questions to stimulate critical thinking, and explore diverse learning models. Students should work on better classroom adaptation, while schools should support teachers by providing adequate learning

facilities. Future researchers are encouraged to investigate different learning models and explore more engaging offline-accessible interactive media to further improve critical thinking skills and learning outcomes.

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