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Profile of Student's Critical Thinking Skills and The Effectiveness of Problem-Based Learning Models Assisted by Digital Worksheet in Science Learning on Motion and Force Materials

Risa Umami[1]*, Madlazim[2], Sifak Indana[3]
[1,2,3] Universitas Negeri Surabaya, Surabaya, Indonesia

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ABSTRACT

Objective: Critical thinking skills are one of the 21st-century skills that must be possessed by students in order to be able to adapt and compete on a global scale. This study aims to describe the profile of students' critical thinking skills and the effectiveness of the Problem-Based Learning (PBL) models assisted by digital worksheets to improve students' critical thinking skills In Learning Science On Motion And Force Materials. **Method:** The research design is quantitative descriptive research. The subjects of this study were 102 students at SMPN 4 Waru with a simple random sampling method. Critical thinking skills tests are analyzed per indicator, which consists of giving simple explanations, building basic skills, concluding, giving advanced explanations, and setting strategies and tactics. **Results:** Based on the results of the analysis, it was obtained that the average proportion of students' thinking skills was in the low category. The indicator that gets the highest percentage is giving a simple explanation at the lowest indicator is setting strategy and tactics. Several factors cause this: learning rarely leads students to train and improve their critical thinking skills, the evaluation instruments used primarily using low cognitive tests, and the learning loss factor students experience while studying at home due to the effects of the COVID-19 pandemic. **Novelty:** Based on several research sources, it was concluded that applying the PBL model assisted by digital worksheets could effectively improve students' critical thinking skills in science learning.

INTRODUCTION

The industrial revolution 4.0 is characterized by the rapid and dynamic development of information technology, which has brought many changes in various sectors of life. These changing situations and conditions require the readiness of qualified Human Resources (HR) to adapt and compete on a global scale. Global competition requires us to have independence and the ability to solve problems. A quality education process is one effort to improve human resources (Suciono et al., 2021). Education plays a significant role in improving reliable and competent human resources. The world of education must be able to educate students so that they can develop according to the times, meaning that education must be able to provide provisions to students, not from the experiences of each teacher but according to the aspects students need in the future (Syahrul et al., 2021).

The government has made various efforts to create human resources by implementing the Independent Curriculum. The current independent curriculum is a refinement of the 2013 curriculum and an effort to restore learning due to the co-19 pandemic. The independent curriculum directs learning to higher-order thinking skills. According to the Ministry of Education and Culture (2016) the The educational process applied in schools must contain the competencies contained in 21st-century skills,

namely: (1) critical thinking skills and problem-solving, (2) communication skills, (3) creativity and innovation, and (4) collaboration. Based on this, critical thinking skills are needed in the 21st century and are educational goals that must be achieved. Critical thinking manifests higher-order thinking (Rachmantika & Wardono, 2019), which has played a role in moral, social, and scientific development (Kartika et al., 2020). Critical thinking is self-regulation in deciding something that results in interpretation, analysis, evaluation, and inference, as well as exposure using evidence, concept, methodology, criteria, or contextual considerations on which decisions are made (Facione, 2015). Critical thinking is an intellectual process of finding, analyzing, and evaluating information obtained from observation and experience, which is later used to make judgments in taking action (Wayudi et al., 2020). The Partnership for 21st Century Skills identified that critical thinking skills are needed to prepare students for higher education and the world of work (Zubaidah et al., 2016) and to build their knowledge and cognitive reasoning (Diharjo, 2017). Thus critical thinking skills are fundamental and integrated into the curriculum to improve the quality of education.

Critical thinking skills are fundamental for students to master because they have several benefits. Namely, students are more skilled in constructing an argument, checking the credibility of sources, or making decisions (Ramadhani et al., 2021) and helping students apply to learn received at school with problems in the real world they face (Utami, 2021). Jusriani (2022) explains a positive correlation between critical thinking and increasing children's thinking power or mindset. Children who can think critically can become children with character. In addition, Mulyani (2022) explains that different critical thinking abilities among students will also make learning outcomes or students' understanding of learning differently. If students have less critical thinking skills, these students tend to need help solving problems. Meanwhile, students with a high level of critical thinking ability can accept the learning given well and master learning optimally.

In its application, critical thinking skills are closely related to science learning because the process aligns with the objectives of the science learning process. By thinking critically, students can apply scientific concepts and make responsible decisions when entering society in the future, respond to realistic situations, and apply scientific concepts scientifically according to logic (Nurhayati et al., 2022). The learning process will more easily achieve maximum goals if students' initial abilities are known, namely their initial critical thinking skills (Ridho et al., 2020). Therefore, learning science requires critical thinking skills. Critical thinking will make students become more character and more open to other people's thoughts or different opinions. Learning activities are reciprocal interactions between teachers and students during the learning process (Kurniati et al., 2022).

The learning process should be student-centered. Students, as active learning subjects, develop their interests and potential. Students are not required to memorize subject matter but construct their knowledge and skills according to their capacity and level of development of thinking. They are invited to contribute to solving real problems that occur in society (Zubaidah et al., 2016). As an educator, a teacher must create a learning process that can train students' critical thinking skills to find information independently and actively create cognitive structures in students. Critical thinking skills must be trained in the learning process because critical thinking is not a skill that is inherent in humans from birth (Rahmawati et al., 2016). The lecture method

cannot teach critical thinking (Ariyati, 2021). However, strengthening appropriate concepts and learning activities can raise critical thinking skills.

Efforts to develop optimal students' critical thinking skills require interactive classes; students are seen as thinkers, and teachers act as mediators, facilitators, and motivators who help students in learning, not teaching (Nuryanti et al., 2018). Suppose the teacher often trains students' critical thinking skills. In that case, there are other benefits to be gained, namely students' scientific attitude (Soh et al., 2010), student motivation (Cholisoh et al., 2015), students' science process skills (Nugraha et al., 2017), self-confidence (Wardami & Sholikhak, 2020) as well as skills for analyzing and solving student problems (Benjamin et al., 2021) have increased. Because critical thinking skills are mental processes that can grow in each individual differently, a climate or activity is needed to support them (Burhan et al., 2021). To support a good science learning process, good preparation is needed regarding what supports it. Not just teaching methods but also learning tools such as worksheets. A suitable student worksheet (SW) is practical and flexible and can be adapted to students' subject matter and character (Augustha et al., 2021).

Currently, many teaching and learning activities utilize technology, changing the conventional learning system to a more modern direction (Sourial et al., 2018). One of them is the development of Digital SW. Digital SW is a digital student worksheet with various features to assist independent learning activities, which contains material abstractions and a collection of questions to guide students in understanding the material (Rakhmaningtyas & Yuni, 2022). The use of digital SW, which can be accessed online and is oriented to critical thinking skills, is an alternative tool that can be used by educators and students so that besides being effective and efficient, learning outcomes, especially efforts to train critical thinking skills, are still implemented. Educators can still monitor the learning process optimally (Alimahdi, 2021). So this helps educators in presenting exciting material, and packaging questions are more interactive and easier to evaluate even though learning is done remotely.

There are various learning models. One learning model that is believed to be able to train and improve students' critical thinking skills is Problem-Based Learning (PBL) (Yulianti et al., 2019; Rosmari & Supardi, 2021; Santuthi et al., 2020; Windari et al., 2021). Mangngella & Kendek (2021) state that the PBL model is a central learning model for students and is currently being developed extensively. The use of the PBL model has several other benefits. Namely, it can lead to students' activeness, motivation, and creativity. At the same time, learning improves creative thinking skills (Putri et al., 2021) and allows students to be more independent in finding solutions based on existing problems. In this study, students are required to be able to find actual problems as a reflection of a study concept. Furthermore, students learn to identify problems, formulate problems, and try to solve problems as solutions and decisions that provide benefits to be taken. Combining the PBL model and digital SW is an effort to integrate digital technology developments with education so that science learning becomes meaningful and fun and can improve students' critical thinking skills.

The material used in this research is motion and force. This material consists of three sub-subjects: straight motion, force, and Newton's Laws. Students' critical thinking skills in understanding this material are needed because this material requires good reasoning, and this material is one of the prerequisites for understanding the following materials. Science learning, especially physics, should not only focus on concepts and facts but should be integrated with students' experiences so that students can

understand scientifically (Rahmadita et al., 2021; Wardani & Jatmiko, 2021). This is because the student's reasoning still needs to be corrected. If it is not corrected, it will cause difficulties that will be faced in the following classes. Based on this, the researcher conducted a study entitled "Profile of Student's Critical Thinking Skills And The Effectiveness of Problem-Based Learning Models Assisted by Digital Worksheet in Science Learning on Motion and Force Materials." This study aims to describe the profile of students' critical thinking skills and analyze the effectiveness of applying the PBL model assisted by digital worksheets to improve student's critical thinking skills in learning science in Motion and Force materials.

RESEARCH METHOD

This quantitative descriptive study was conducted on 20-25 November 2022 at JHS 4 Waru for the 2022/2023 academic year, which was taken using the simple random sampling method.

Participants

Research participants in this study are 102 students in grades VII-3, VII-4, and VII-6.

Instrument and Procedures

The data collection technique uses form tests and non-tests with instruments in the form of 10 essay questions which refer to indicators of critical thinking skills according to Ennis and interview guidelines that experts have validated. The test format used to measure students' critical thinking skills should use an open test because this is more comprehensive than multiple-choice questions (Ennis, 2011). The research procedure includes the preparation stage, the implementation stage, and the data analysis stage. The activities carried out in the preparatory stage were compiling instruments for critical thinking questions by the indicators of critical thinking according to Ennis and compiling interview guide instruments. The activities carried out at the research implementation stage were giving students tests on critical thinking skills and conducting interviews with teachers after completing the tests. The activities carried out in the data analysis stage were analyzing the test results to determine the level of students' critical thinking and the results of the interviews as data reinforcement to describe the initial profile of students' critical thinking.

The indicators of critical thinking skills used, according to Ennis (2011), consist of five aspects, namely providing simple explanations (essential clarification), building basic skills, concluding (inference), giving advanced explanation (advance clarification), and setting strategies and tactics. Assessment of critical thinking skills can be calculated based on the scoring rubric. If the answer fulfills the three elements, namely correct, systematic, and complete, the student will get 3 points. If the answer only fulfills two elements, the student will get 2 points. If the answer given only fulfills one element, then the student will get a value of 1 point. If the answer is wrong or does not fulfill these three elements, the value obtained is zero points (Saphira & Prahani, 2022).

Data Analysis

The data analysis technique used in the form of a test is to add up the scores for each item indicator and then calculate the average percentage using the following formula:

$$\% \text{ Average of each critical thinking indicator} = \frac{\sum Gain\ Score}{\sum Maximum\ Score}\ x\ 100\ \%$$

After obtaining the percentage values for each question and child indicator, they are classified into several categories, as shown in Table 1.

Table 1. Categories of critical thinking skills.

Interpretation (%)	Category
80.00 < X ≤ 100.00	Very High
60.00 < X ≤ 80.00	High
40.00 < X ≤ 60.00	Middle
20.00 < X ≤ 40.00	Low
0.00 < X ≤ 20.00	Very Low

(Ekamilasari & Pursitasari, 2021)

Figure 1 shows the flow of research methods regarding the profile of junior high school students' critical thinking skills and the effectiveness of the PBL model assisted by digital worksheets to improve junior high school students critical thinking skills in motion and force materials.

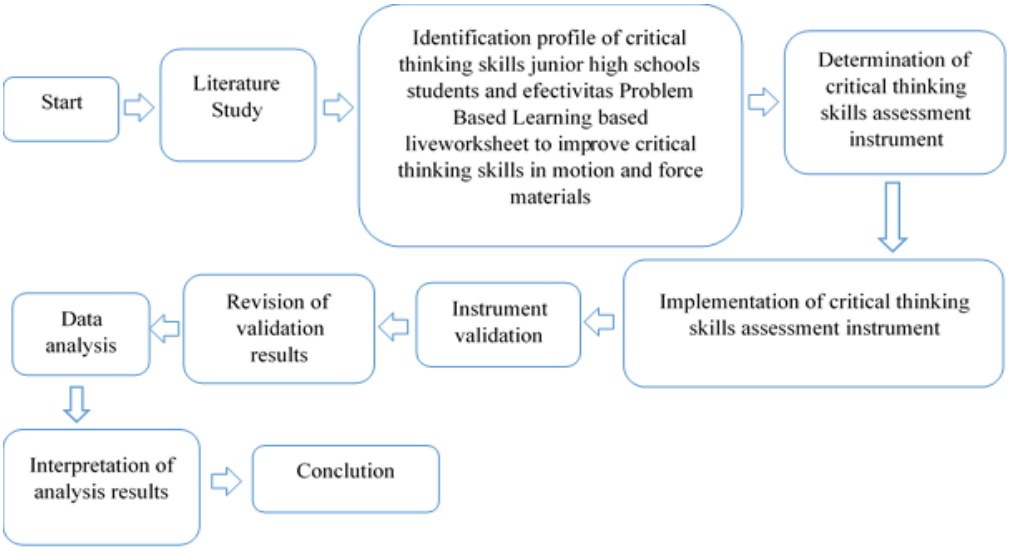

Figure 1. Research method.

RESULTS AND DISCUSSION

Results

Table 2 shows the data results of students' critical thinking skills on each indicator.

Table 2. Critical thinking skills of students for each indicator.

Indicator	Number of Question	Percentage (%)	Average	Category
1. Give a simple explanation	1	66.70%	61.30%	High
	2	55.90%		
2. Build basic skills	3	38.60%	34.80%	Low
	4	31.00%		
3. Make a Conclusion	5	52.60%	43.00%	Middle
	6	33.3%		
4. Give Advanced Explanation	7	19.00%	30.60%	Low

Indicator	Number of Question	Percentage (%)	Average	Category
5. Set strategy and tactics	8 9 10	42.20% 25.50% 29.70%	27.60%	Low
Average			**39.40 %**	**Low**

Table 2 showed that from the ten questions tested on students, different categories were obtained for each indicator of critical thinking skills. Based on the research that has been done, overall, the level of critical thinking skills of JHS 4 Waru students in the subject of motion and style is included in the low category with a percentage of 39.40%.

Discussion

The indicator explains the high category with a percentage of 61.30%, while the low category is found in the indicators of managing strategies and tactics at 27.60%. This is to previous research by A'yun et al. (2020) and Purwanto et al. (2022), which state that the critical thinking skills of junior high school students are, on average, still in the low category. The low critical thinking skills of students are caused by the learning system, which the teacher still dominates, and the learning methods and models used do not maximize students' active role and thinking potential. Wulan et al. (2017) stated that most student evaluation systems use tests that test low cognitive abilities, which becomes a problem for developing students' critical thinking skills.

Indicator 1: Give a Simple Explanations

According to Ennis (1985), in the indicator of giving this simple explanation, students experience a process of focusing on questions, analyzing arguments, asking and answering questions, and clarifying questions by investigating a reason to find out the actual situation. Figures 2 and 3 show one of the indicator questions giving simple explanations and the results of student answers.

Figure 2. Questions about indicators give a simple explanation.

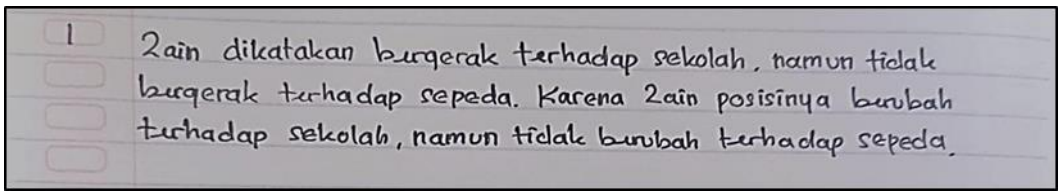

Figure 3. Students' answers to the indicators give a simple explanation.

From the answers given, they contain three elements, namely correct, systematic, and complete explanations. By the theory, an object is said to move if its position changes for another object used as a reference point. Based on the problem, Zain moves if the reference point is school, but Zain does not move if the reference point is a bicycle. The indicator explains obtaining a percentage of 61.30% in the high category. This data illustrates that students can analyze questions accompanied by arguments that support the answers given. This is influenced by the questions in the problem, which are familiar to them. The results of this study are supported by Saregar et al. (2018); students who have low critical thinking skills have limited insight, are inconsistent, and need to know what the question in the problem is.

Indicator 2: Basic Skills Building

Sub-indicators of the ability to build fundamental skills include considering whether a source can be trusted and observing and considering a report on the results of observations. Figures 4 and 5 show one of the indicator questions for building basic skills and the results of student answers.

Sabrina bercerita ke temannya jika dia tidak pernah datang terlambat ke sekolah. Dia pergi ke sekolah dengan naik sepeda. Jarak rumah ke sekolah 1,8 km dan kecepatan sepedanya diusahakan konstan sebesar 3 m/s. Dia berangkat sekolah pukul 06.45 WIB dan sampai disekolah pukul 07.00 WIB. Menurut kalian, apakah rasional cerita dari Sabrina ?

Figure 4. Questions about fundamental skills-building indicators.

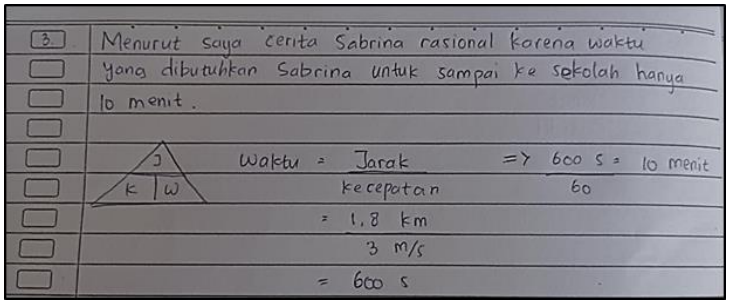

Figure 5. Students' answers on the indicators of building essential skills.

From the answers given, the student can answer questions correctly, systematically, and completely. Nevertheless, most other students still needed help to answer this question correctly. This is because students need to remember the speed formula they have obtained at the previous school level and are wrong in converting units. The indicator for building basic skills obtains 34.80% in the low category. This data illustrates that students need help to answer the questions correctly. Students cannot use reasoning power to analyze, evaluate and review based on their knowledge to find the most effective problem-solving solutions. Students can still not perform calculations using the motion formula, which not all students master. In addition, students cannot use reasoning power because they need insight and help to understand the problems in the questions.

This study's results align with Khumairo et al. (2021), who state that students with high critical thinking skills can reason and use reasoning power to analyze, evaluate and review opinions based on their knowledge and find the most effective problem-solving solutions.

Indicator 3: Make Conclusions

Sub-indicators of the ability to conclude include compiling and considering the results of induction and deduction, as well as making decisions and considering the results (Ennis, 1985). Figures 6 and 7 show one of the indicator questions concluding and the results of student answers.

Perhatikan hasil percobaan gerak beberapa benda berikut ini !

Waktu tempuh (s)	Jarak Tempuh (cm)				
	Benda P	Benda Q	Benda R	Benda S	Benda T
1	3	5	2	10	5
2	6	10	8	20	15
3	12	15	18	30	35
4	24	20	32	40	65
5	48	25	50	50	105

Berdasarkan hasil percobaan di atas, buatlah kesimpulan benda manakah yang bergerak lurus beraturan (GLB) dan manakah yang bergerak lurus berubah beraturan (GLBB) !

Figure 6. Questions about indicators to conclude.

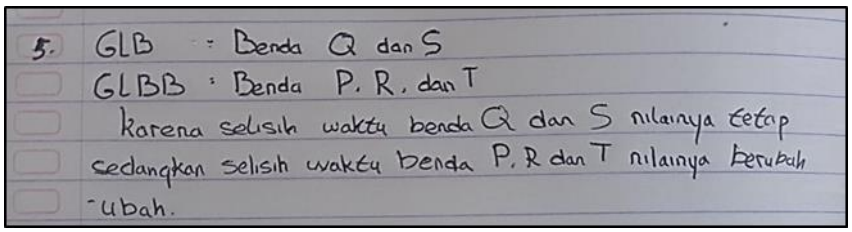

Figure 7. Students answer the indicators to make conclusions.

Analysis based on student answers showed that most of them had yet to be able to answer the questions correctly. Students need to understand the difference between uniformly straight and uniformly altered motions. The correct answer has objected that move uniformly straight motion, namely objects Q and S. While objects that move uniformly altered motion, namely objects R. Students who have good reasoning power can answer this question correctly. In determining uniformly straight motion and uniformly altered motion, students should calculate the difference in the speed of each object, not look at the difference in travel time.

The indicator concludes that it obtains a percentage of 43.00% in the moderate category. The ability of students to conclude learning activities is very dependent on the level of understanding of students. If students understand the lesson delivered by the teacher and focus on listening, concluding is easy for students (Ginanjar et al., 2019). For students to conclude correctly, the teacher needs to provide an explicit explanation at the final stage of learning before drawing conclusions so that students understand what conclusions they got that day.

Indicator 4: Give an Advanced Explanation

According to Ennis (1985), indicators give advanced explanations, including sub-indicators of skills to define terms and consider a definition and skills to identify assumptions. Figures 8 and 9 show one of the indicator questions giving an advanced explanation and the results of student answers.

Hisyam berangkat sekolah dengan naik bis. Tiba-tiba bis yang dinaiki Hisyam mengerem secara mendadak karena ada orang yang menyebrang. Apakah yang akan terjadi dengan tubuh Hisyam ? Berikan penjelasannya !

Figure 8. Questions about indicators provide further explanation.

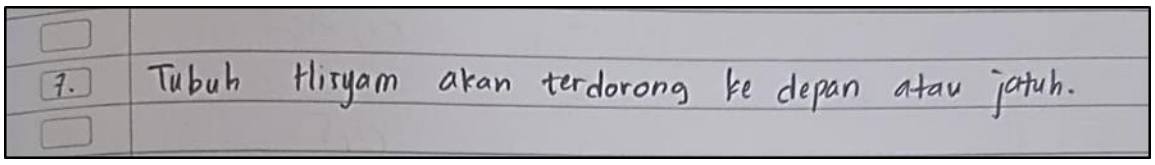

Figure 9. Students answer on the indicator providing further explanation.

Analysis of student answers showed that students answered the questions correctly but needed to be accompanied by a systematic and complete explanation. The student did not explain further why Hisham's body was pushed forward due to inertia by Newton's 1st Law. The indicator provides further explanation obtaining a percentage of 30.60% in the low category. This category occurs because the students' interest in reading is low, so they do not want to look for detailed information about natural science phenomena around them. Anisa et al. (2021) stated that the reading culture in Indonesia still needs to improve. The lack of interest in reading among students and society in Indonesia will ultimately affect their critical thinking skills. By having a high interest in reading, someone will find it easy to find valid information because they are used to sorting out information. So it is essential to improve the literacy culture in Indonesia.

Berikut adalah peta sistem jalan yang menghubungkan beberapa kota. Peta menunjukkan waktu tempuh dalam hitungan menit pada jam 07.00 di setiap ruas jalan !

Gambar Peta Lalu Lintas (sumber : https://www.oecd.org/)

Anneth ingin melakukan perjalanan dari kota Diamond ke kota Einsten dalam waktu 30 menit. Bantulah Anneth menentukan rute tercepat yang bisa dilewati !

Figure 10. Questions about indicators setting strategy and tactics.

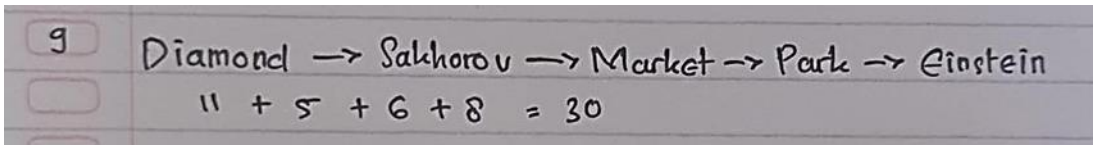

Figure 11. Students answer on indicators of strategy and tactics.

Indicator 5: Setting Strategy and Tactics

According to Ennis (1985), indicators set strategies and tactics consisting of one sub-indicator, namely formulating possible alternative solutions and deciding on an action. Figures 10 and 11 show one of the indicators of the ability to organize strategies and tactics along with the results of student answers.

From the answers given, the student's answers appear correct, systematic, and complete. Analysis of student answers showed that some students could correctly determine the fastest route. Students calculate the travel time for each route that is passed. Nevertheless, most other students determine the fastest route based on the map's long and short traffic lines. Most students cannot do a problem-solving analysis of motion, so they cannot determine which strategy to take when experiencing a problem. The indicator for setting the strategy obtained a percentage of 27.60% with low criteria. This criterion occurs because students can explain or make statements regarding the causes and effects of motion and force in the problem. This situation causes students to be less able to organize strategies and tactics to solve problems in various types of motion in living things (Agnafia, 2019), so the teacher needs to provide student worksheets that contain critical thinking skills for further training (Jatmiko et al., 2018).

Student Interview

To find out student responses related to critical thinking skills, critical thinking was given a questionnaire containing ten statements about the experience of learning science at school through the Google form. Students are given a choice Strongly Disagree (SD), Disagree (D), Agree (A), and Strongly Agree (SA). The results of student responses from the questionnaire are shown in Table 3.

Table 3. Student interview result

Statement	Percentage (%)			
	Strongly Agree (SA)	**Agree (A)**	**Disagree (D)**	**Strongly Disagree (SD)**
Science is a fun subject	19.60% (20)	70.60% (72)	5.80% (6)	3.90% (4)
Motion and forces are essential to learn	68.60 % (70)	50.90% (52)	0.00% (0)	0.00 % (0)
Teachers use the lecture method more often than problem-based learning in science learning	0.00 % (0)	74.50% (76)	17.60 % (18)	7.84 (8)
The textbook is the only natural science learning resource in class	10.80 % (11)	78.40% (80)	6.90% (7)	3.90 % (4)
Critical thinking skills are essential in learning science	88.20% (90)	11.80% (12)	0.00% (0)	0.00 % (0)
I often experience difficulties when	94.1% (96)	4.90%	1.00% (1)	0.00% (0)

Statement	Percentage (%)			
	Strongly Agree (SA)	Agree (A)	Disagree (D)	Strongly Disagree (SD)
answering test questions that train critical thinking skills		(5)		
I am often trained with critical thinking skills in test questions in science learning.	8.93% (10)	29.40% (20)	65.70% (67)	4.90% (5)
I once learned to use digital worksheets	0.00% (0)	0.00% (0)	94.10% (96)	5.90 % (6)
I am interested in using the PBL model assisted by digital worksheets in science learning	73.50% (75)	24.50% (25)	19,6 % (2)	0 %(0)

Based on Table 3, information is obtained that students often experience difficulties when answering critical thinking skills questions. Several factors cause students' low critical thinking skills; the student evaluation system primarily uses tests that test low cognitive abilities (Wulan et al., 2017). Students are still focused on memorizing concepts that only come from books and teachers (Afriana et al., 2021), and the lack of textbooks or books that can support students in developing their critical thinking skills (Sulastri et al., 2022).

Relevant Research

In this study, we can analyze several previous studies and national and international articles in the last five years to determine the effectiveness of developing a live worksheet-based PBL model in improving junior high school students thinking skills. The following summarizes the latest research results, as seen in Table 4.

Table 4. Summary of relevant research.

Researcher (Year)	Research purposes	Results
Cahyono & Dwikoranto (2021)	Describe the application of the Problem-Based Learning learning model and the implications for improving critical thinking skills.	Implementing the problem-based learning model can improve students' critical thinking skills in terms of several relevant articles.
Rosmasari & Supardi (2021)	To improve students' critical thinking skills through applying the PBL learning model in the ork and energy material.	The PBL model can improve students' critical thinking skills in the moderate category and the learning implementation in the very good category.
Alimahdi (2021)	To develop Digital worksheets for distance learning that is oriented to critical thinking skills	The n-gain value of 0.723 indicates that SW-Digital can improve critical thinking skills in the high category. The average student response results were 93.88%, included in the very good category.
Fadillah et al. (2022)	To produce Interactive e-SW on Plant Growth and Development	The developed Interactive e-SW has been declared valid,

Researcher (Year)	Research purposes	Results
	material that is valid, practical, and effective for training critical thinking skills	practical, and effective to be implemented in the learning process.
Utami (2022)	To find out the design of E-SW based on Liveworksheet in Improving critical thinking skills in science learning with the theme of Energy Sources for class IV ES and tested for validity, practicality, and effectiveness	The results of the study showed that there was a significant difference between the average scores before and after applying the E-SW based Liveworksheet.
Neswary & Prahani (2022)	To analyze the profile of students' critical thinking skills and the application of Problem-Based Learning (PBL) models based on digital books on physics learning in high school	The critical thinking skills that students have are low, then it is necessary to improve students' critical thinking skills, namely by the application of digital book-assisted PBL models
Qodiriyah (2022)	To describe whether or not there is an effect of using live worksheets-based E-LKPD on the concept of cell division on product cognitive learning outcomes, process cognitive learning outcomes and students' critical thinking skills.	There is a positive influence on the results of students' critical thinking skills on cultural diversity in Indonesia with the application of problem-based learning with the help of live worksheets.

Based on Table 4 shows that the application of learning tools using the PBL model assisted by digital worksheets is expected to train and improve students' critical thinking skills, especially in motion and force materials.

CONCLUSION

Fundamental Finding: Based on student tests and discussion results, the average level of critical thinking in grade 7 students of JHS 4 Waru is in a low category. The indicator that gets the highest percentage is giving a simple explanation, and the lowest indicator is setting strategy and tactics. Factors that affect students' low critical thinking skills are: (1) learning motivation and students' intellectual abilities (IQ), which are low respectively, (2) learning activities rarely direct students to train and improve their critical thinking skills, (3) the evaluation instrument used mainly uses low cognitive tests (C1-C3) and (4) the loss learning factor experienced by students due to the effects of the COVID-19 pandemic from learning activities at school to learning activities at home. **Implication:** The researchers also found that the Problem-Based Learning model assisted by digital worksheets can help improve students' critical thinking skills in motion and force materials. **Limitation:** Researchers experienced problems in finding additional literature that contained the effectiveness of the PBL model assisted by digital worksheets to increase students' critical thinking skills to a very high category. **Future Research:** Other researchers need more device development literature using digital worksheets-assisted PBL models in science learning. Focus on student learning activities when applying the PBL model assisted by digital worksheets so that students' critical thinking skills can be improved in the future to get more optimal results.

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***Risa Umami, M.Pd. (Corresponding Author)**
Postgraduate of Natural Science Education Programme
State University of Surabaya,
Kampus Lidah Wetan, Jalan Kampus Lidah Unesa, Surabaya 60213, Indonesia
Email: risa.21011@mhs.unesa.ac.id

Prof. Madlazim, M.Si
Postgraduate of Natural Science Education Programme
State University of Surabaya,
Kampus Lidah Wetan, Jalan Kampus Lidah Unesa, Surabaya 60213, Indonesia
Email: madlazim@unesa.ac.id

Dr. Sifak Indana, M.Pd.
Postgraduate of Natural Science Education Programme
State University of Surabaya,
Kampus Lidah Wetan, Jalan Kampus Lidah Unesa, Surabaya 60213, Indonesia
Email: sifakindana@unesa.ac.id