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TEACHERS' PERCEPTIONS ON THE NEED FOR E-LKPD TO ENHANCE HOTS IN PARTICLE KINEMATICS

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Abstract:
This study looks at how students think critically in physics specifically in particle kinematics. We want to know what teachers think about students thinking skills. We also want to see if schools have the technology to help students learn. We want to find out if we need to create digital worksheets for students. We asked 53 high school physics teachers in Ogan Ilir Regency to answer some questions. We used a kind of questionnaire that asked teachers to agree or disagree with some statements. The results show that students are not very optimally at analyzing, evaluating and creating. For C4, 47–57% of teachers somewhat agreed that students possess analytical skills, indicating limited mastery. For C5, 53% of teachers disagreed that students are capable of evaluation, while for C6, 51–53% disagreed that students have creating skills and 11% strongly disagreed that students are able to produce independent work. In contrast, technological support was considered adequate, with 86% of teachers stating that school facilities are sufficient and 100% supporting the use of technology in learning. Additionally, 72% of teachers have used E-LKPD and 96% perceived it as practical. Notably, all respondents (100%) expressed the need for HOTS-based E-LKPD in particle kinematics. These findings highlight the urgency of developing contextually relevant and systematically designed E-LKPD. The novelty of this study lies in integrating empirical data on HOTS, technological readiness, and instructional needs as a basis for developing effective physics learning resources.

Keywords: E-LKPD, HOTS, Particle Kinematics

INTRODUCTION

The 21st-century era of globalization, marked by rapid technological advancement and digitalization, requires students to possess HOTS. These skills include the ability to analyze and evaluate as well as create and generate real world ideas (Widiawati et al., 2018). HOTS are basic capabilities that allow students to respond to emerging scientific knowledge, technological developments and complex real-life problems (Zulfah et al., 2022). At the secondary education level being able to master these types of skills is no longer seen as a supplemental part of learning but instead is considered a major measure of learning quality in that it mirrors students' capacity for critical, logical and reflective thinking

alongside problem-solving (Conklin, 2012).

However, various empirical studies indicate that the implementation of HOTS-oriented learning in schools has not yet been optimal. In many classroom practices, learning is still dominated by teacher-centered approaches, where students tend to focus on memorization and procedural problem-solving rather than engaging in analytical and reflective thinking processes. Students have a time learning to think for themselves and come up with their own ideas. This is especially true when they have to use what they know to solve a problem that they have never seen before. The problem is that students need help learning how to think in a way. We really must ensure that our pedagogy promotes the building of Higher Order Thinking Skills. It is highly essential to enhance Higher Order Thinking Skills. So we have to ensure that how we are teaching evolves students Higher Order Thinking Skills.

In physics class the development of Higher Order Thinking Skills is really important (Safirah et al., 2024). Physics isn't about formulas and math problems. It is also about making sense of things that happen in the world by understanding ideas through logic to figure things out (Puri & Perdana, 2023). For example, when studying how particles move, we need to understand not only their motion but also how different variables relate to one another. It's important to connect the mathematical concepts we use with real-life situations. One way to do this is by analyzing graphs of position, velocity, and acceleration, and reflecting on what these graphs actually represent in physical terms (Fatimah, 2023). This is a way to help students develop their Higher Order Thinking Skills (Zainuddin et al., 2019). What makes particle kinematics interesting is that it encourages students to think more deeply. It's a topic that pushes them to think critically and connect different ideas, rather than just memorizing concepts. Higher Order Thinking Skills are important, in physics class and particle kinematics is a way to learn these skills.

The development of Higher Order Thinking Skills, in physics learning is really important. Teachers play a role in this. They watch how students learn and think in the classroom. For example one study found this out according to Nurzannah (2022). Teachers see how students really learn and what they struggle with. So it is very important to know what teachers think. We need to understand what teachers think before we can make learning plans or educational materials. This way we can make sure that our new ideas are based on what happens in the classroom (Mukarromah & Andriana, 2022).

The way we learn is changing fast because of new technology. This has made it possible for schools to use tools to teach students. One of these tools is the Electronic Student Worksheet or E-LKPD for short. The Electronic Student Worksheet is a way to learn because it has lots of different things like text and images and animations and videos and even interactive games that students can play to learn new things. The Electronic Student Worksheet makes learning fun and interesting, for students (Trinaldi et al., 2022). E-LKPD not only supports structured and independent learning but also has the potential to facilitate HOTS through interactive and contextual activities (Suwastini et al., 2022). However, the effectiveness of E-LKPD implementation depends on the readiness of technological facilities as well as the alignment with teachers' and students' needs.

Therefore, the development of effective learning media should begin with a comprehensive needs analysis. This includes mapping students' HOTS based on teachers' perceptions, identifying the availability of technological facilities in schools, and analyzing the necessity of E-LKPD in physics learning (Mawardi et al., 2020). Without such systematic analysis, learning media development risks being less relevant and not fully addressing classroom needs.

Although previous studies have explored the development of E-LKPD or examined students' HOTS, most of them focus on a single aspect, either evaluating students' thinking skills or developing instructional media separately. Research that integrates the analysis of students' HOTS based on teachers' perceptions, the readiness of school technological facilities, and the need for E-LKPD development, especially for the topic on particle kinematics, is scarce. Thus, the research gap is seen as a call for a more holistic approach. Therefore, the novelty of the study is based on the integration of these three aspects within a single analytical framework. Accordingly, there is a more holistic approach to the creation of contextually relevant technology-supported learning media in physics education. The findings of this study are expected to contribute to improving the quality of physics learning by offering insights into the design of HOTS-oriented E-LKPD that aligns with actual classroom conditions. Based on this rationale, this study aims to: (1) analyze students' HOTS based on teachers' perceptions, (2) identify the availability and support of technological facilities in schools, and (3) examine the need for developing E-LKPD in particle kinematics as an effort to enhance students' HOTS.

RESEARCH METHOD

This study aimed to find out what senior high school physics teachers in Ogan Ilir Regency think about creating Student Worksheets or E-LKPD to help students think critically. We wanted to know their thoughts because we want to see if these worksheets can help students develop their HOTS or HOTS. To do this we asked teachers to fill out a questionnaire to get their opinions.The details of how we designed the study, who participated how we collected data and how we analyzed it are explained in the following sections. We also considered what teachers think about their students current HOTS skills. The subject of this research was high school physics teachers, as well as what they think about E-LKPD and HOTS. What teachers perceive about HOTS and E-LKPD is important to identify the needs of students. The research procedures and instruments used are also important to understand the findings of this research.

Research Design

The purpose of this study was to try to find out what teachers think about students' HOTS. It also tried to find out what teachers need to teach students' HOTS, like E-LKPD development. The study was done at a particular moment in Ogan Ilir Regency, South Sumatra, Indonesia. The study was done from January to February 2026. The researchers asked the teachers at the school in the area to answer the questions online using Google Forms. It was easy for the teachers to do this. The study measured what teachers think about students' HOTS. It also measured what teachers need to teach students' HOTS, like E-LKPD development. The researchers didn't try to change anything. They only observed what the majority of the teachers think about students' HOTS. They also observed what the teachers need. The study measured what the teachers think about students' HOTS. It also measured what the teachers need to teach students' HOTS, like development. Teachers thoughts on HOTS were important. E-LKPD development was also important. The study was about teachers thoughts, on these topics.

Research Target/Subject

The participants in the study consisted of high school physics teachers in Ogan Ilir Regency, South Sumatra, Indonesia. The selection of the participants was not random. We selected 53 good teachers for our study. The selection was good because it enabled us to collect the participants' data who knew a lot about what we were studying. We wanted to know their students' HOTS. We wanted to know how they used E-LKPD. In order to be the participants in the study, the teachers had to: 1) Teach physics in high school; 2) Have experience in teaching particle kinematics; 3) Agree to answer our questionnaire.

Our selection of teachers may not be the best. We did not select them randomly. Therefore, our results may not be the same for other teachers. Our results are mainly for these 53 teachers. We think these teachers are good for our research because they teach physics, and they have experience with the topic of particle kinematics. They also teach with E-LKPD. We think what they say will help us understand what we want to know. Our research is about how these teachers teach and what they think about the thinking skill of their students. We think the experience and knowledge of these teachers with E-LKPD are very important for our research. Our research results will show what these teachers think and do. Our research results will be very helpful for teachers who teach physics at high school. We conducted our research by using a questionnaire to get information from the teachers. What the teachers say will help us understand how they teach. Our research is about teachers in Ogan Ilir Regency, South Sumatra, Indonesia. Our research results will be about teachers, in this regency.

Research Procedure

The research process was initiated with the design of a closed-ended questionnaire that was consistent with the research objectives. The questionnaire was then administered to respondents through Google Forms. Respondents were expected to answer the questionnaire by choosing from the answer options provided. Data was then accumulated from the process and analyzed.

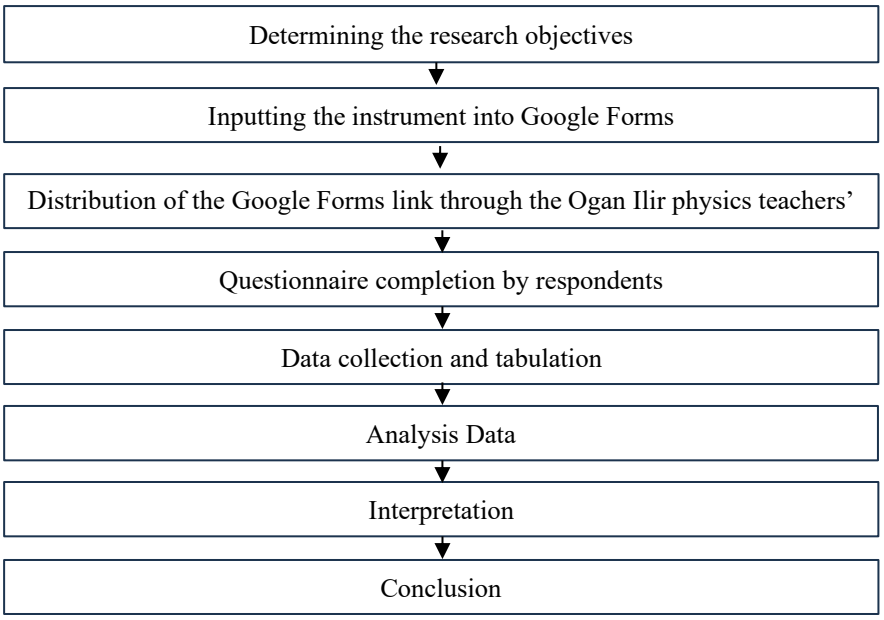

Figure 1. Research Procedure Flowchart

Instruments and Data Collection Techniques

The research instrument employed in this research was a closed-ended questionnaire that was created through Google Forms. It was intended to elicit teachers' perceptions on aspects concerning students' HOTS (HOTS), the role of technology in learning, and the need for E-LKPD development. The questionnaire was divided into three aspects. First, it was intended to elicit aspects concerning students' HOTS according to the revised Bloom's Taxonomy on the cognitive domain, namely C4 (analyzing), C5 (evaluating), and C6 (creating). Second, it dealt with technological support and its use in schools, such as the availability of learning facilities and technology use in the teaching-learning process. Third, it tackled the use of E-LKPD and the necessity for its development in physics learning, especially on the topic of particle kinematics.

In total, the questionnaire comprised 17 questions based on the above variables. The majority were arranged in a Likert scale fashion, whereas a small number were arranged in a dichotomy format (Yes/No). To ensure consistency in terms of variables, indicators, and questions of the research, an instrument blueprint was developed. This blueprint systematically links each variable to its indicators and questions. The blueprint for the entire instrument is presented in Table 1.

The validity of this instrument was also established through expert judgment with three validators, who were two expert lecturers and one expert physics teacher. From this validation, it is clear that a score of 0.84 was achieved, indicating that this instrument is in the highly valid category. In addition, the reliability of this instrument was also established through Cronbach's Alpha coefficient, which is 0.87. Therefore, it was considered appropriate for use as an instrument in data collection for this study. In general, all items in the questionnaire were intended to be used for a needs analysis in developing HOTS-oriented E-LKPD.

Table 1. Instrument Blueprint

Variable	Indicator	Indicator Description	Item Number
HOTS (C4)	Analyzing	Breaking information into more detailed parts	1
		Identifying patterns and relationships	2
		Drawing conclusions based on analysis	3
		Creating representations (charts/diagrams)	4
HOTS (C5)	Evaluating	Making judgments based on criteria and standards	5
		Providing critiques, recommendations, or reports	6
HOTS (C6)	Creating	Generating new ideas (generating)	7

Variable	Indicator	Indicator Description	Item Number
		Developing plans (planning)	8
		Producing new products (producing)	9
Technological Support	School facilities	Availability of laboratories, Wi-Fi, projectors, smart TVs	10
		Support for students' use of devices	11
		Support for teachers' use of technology	12
Use of E-LKPD	Usage experience	Experience in using E-LKPD	13
		Usage habits	14
		Ease of use	15
		Practicality	16
Need for E-LKPD	Development need	Need for HOTS-based E-LKPD	17

The research instrument from which the data was collected on is illustrated in Table 1. The instruments were arranged for each variable according to indicators and also the research objectives so that show what was intended to measure in this study. This arrangement is expected to provide systematic and comprehensive defects of HOTS (HOTS), technology support, E-LKPD utilization and needs analysis development of HOTS-based E-LKPD. Hence, this table is essential to ensure the alignment between the research objectives and instrument items used.

Data Analysis Technique

Descriptive statistics were used to analyze the data using frequency counts and percentages. The findings were then represented in the results of tables and bar charts for a clearer overview of students' HOTS (HOTS) on indicators C4, C5, and C6, the provision of technological facilities as well as demand for E-LKPD development based on it so that it can be used in designing appropriate learning media. These results were interpreted based on the responses given in the Likert scale's response categories, which were strongly disagree, disagree, moderately agree, agree, and strongly agree, to give a better view of the perception of the respondents with respect to each measured indicator.

RESULTS AND DISCUSSION

Respondent Characteristics

The findings will be presented in the form of graphs and tables to make the findings easier to understand. The discussion will begin with the characteristics of the respondents specifically the characteristics of the senior high school physics teachers in Ogan Ilir Regency considering the aspects of their gender and teaching experiences.

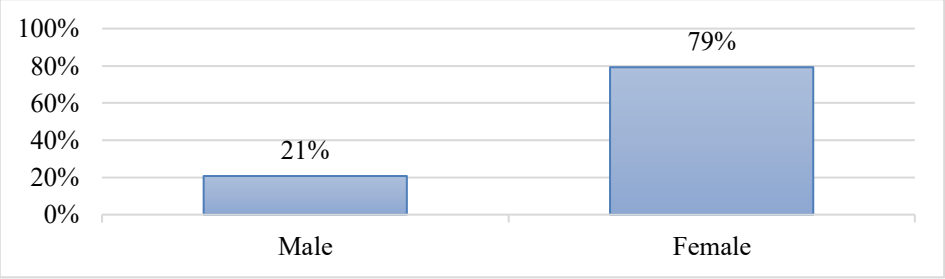

Figure 2. Comparison of Respondents Based on Gender

From Figure 2 above, the majority of the respondents were female teachers, which totaled 42 people or 79%, while male teachers totaled only 11 people or 21%. This means that physics teachers in Ogan Ilir Regency were still dominated by women. Thus the results obtained were based on the point of view of female teachers.

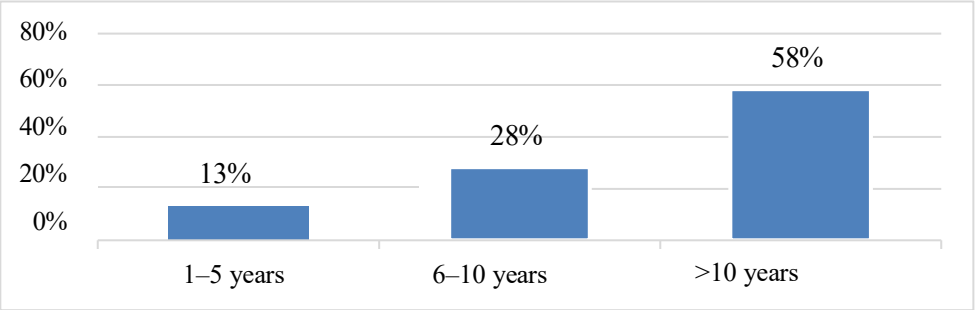

Figure 3. Respondents' Teaching Experience

As shown in Figure 3, most respondents had extensive experience in teaching. From a total of 53 teachers, 31 (58%) had taught for more than 10 years, 15 (28%) had taught for 6 to 10 years, while 7 (13%) had taught for 1 to 5 years. These findings indicate that the views expressed in this study are mainly from experienced physics teachers at senior high schools.

Students' HOTS Based on Teacher Perceptions

Next, an analysis was conducted to obtain an overview of students' HOTS (HOTS) in physics learning based on the perceptions of senior high school physics teachers in Ogan Ilir Regency. The results of this analysis are presented in detail in a table, referring to the revised Bloom's Taxonomy indicators, which include the abilities to analyze (C4), evaluate (C5), and create (C6).

Table 1. Analysis of HOTS in Analyzing (C4) Based on Teacher Perceptions

No.	Aspect	SD	D	MA	A	SA
1	My students are already able to break information down into more detail	0%	28%	57%	15%	0%
2	My students are already able to identify patterns and relationships	0%	34%	57%	9%	0%
3	My students are already able to draw conclusions based on the data	0%	38%	47%	15%	0%
4	My students are already able to create worksheets (spreadsheets)	0%	43%	38%	19%	0%

Note:
SD = Strongly disagree
D = Disagree
MA = Moderately agree
A = Agree
SA = Strongly agree

Based on Table 1, the analysis of students' HOTS (HOTS) for the C4 indicator (analyzing) shows that most teachers somewhat agree or disagree that students have mastered these skills. When it comes to the ability to break down information into detailed parts most of the teachers were kind of in agreement. Fifty seven percent of the teachers, which's thirty teachers somewhat agreed with this. On the hand twenty eight percent of the teachers, which is fifteen teachers did not agree. Then there were the teachers who fully agreed which's fifteen percent or eight teachers. Regarding the ability to identify patterns and relationships the teachers had opinions. 57% (30 respondents) somewhat agreed that they could break information down into smaller parts, while 28% (15 respondents) disagreed and 15% (8 respondents) agreed. When it came to being able to see patterns and connections, 57% of teachers (30) somewhat agreed, 34% (18) disagreed, and 9% (5) agreed. Meanwhile, when it came to making decisions based on the results of the analysis, 47% (25 teachers) somewhat agreed, 38% (20 teachers) disagreed, and 15% (8 teachers) agreed. For the ability to make things like worksheets (spreadsheets), surveys, charts, or diagrams, 43% (23 teachers) disagreed, 38% (20 teachers) somewhat agreed, and 19% (10 teachers) agreed. No respondents indicated strongly disagree or strongly agree for any of the indicators. These findings indicate that students' HOTS, particularly at the analysis level (C4), are

uneven and are still dominated by the "some students" category. This means that the majority of students in the class have not yet fully acquired these skills.

The relatively weakest aspect is seen in the ability to produce representations or products such as charts and diagrams, which many teachers still assess as being mastered by only a few students. Masdukiyanto et al. (2016) elucidated that, for instance, when addressing issues pertaining to Newton's laws, students continue to encounter challenges in constructing force diagrams.Not only are they unable to represent answers in graphical form, but according to Mbayowo & Pasaribu (2022) understanding questions presented in graphic form remains a challenge for students. However, although not yet optimal, Marsiana et al., (2021) argue that the analysis indicator in critical thinking skills is still better developed compared to other indicators.

Table 2. Analysis of Higher-Order Thinking Skills in Evaluating (C5) Based on Teac her Perceptions

No.	Aspect	SD	D	MA	A	SA
5	My students are already able to make judgments based on criteria and standards through processes of review and critique.	0%	53%	38%	9%	0%
6	My students are already able to provide critiques, recommendations, and reports.	6%	43%	43%	8%	0%

Note
SD = Strongly disagree
D = Disagree
MA = Moderately agree
A = Agree
SA = Strongly agree

Based on Table 2, For the ability to make judgments based on criteria and standards through processes of review and critique, 53% (28 teachers) disagreed, 38% (20 teachers) somewhat agreed, and only 9% (5 teachers) agreed that students possessed this skill. Meanwhile, for the ability to provide critiques, recommendations, and reports, 43% (23 respondents) disagreed, 43% (23 respondents) somewhat agreed, 8% (4 respondents) agreed, and 6% (3 respondents) strongly disagreed that students had this skill. No respondents indicated strongly agree for either aspect. These findings indicate that students' evaluative abilities, which require skills in assessing, critiquing, and providing recommendations based on specific criteria, are still relatively low. The majority of teachers perceive that only a small portion of students have acquired these skills. This suggests that students are not yet accustomed to performing reflective and argumentative evaluation processes in physics learning.

In line with this, Febriyati & Fariyani, (2025) explain that students tend to better understand and convey physics concepts visually rather than mathematically or narratively. Therefore, if students still experience difficulties with visual concepts at the analysis stage, they will also struggle to communicate problems scientifically.

Table 3. Analysis of HOTS in Creating (C6) Based on Teacher Perceptions

No.	Aspect	SD	D	MA	A	SA
7	My students are already able to reorganize elements into new patterns or structures through the process of generating new ideas or concepts (generating).	6%	51%	38%	6%	0%
8	My students are already able to systematically develop plans to produce something new (planning).	6%	53%	28%	13%	0%
9	My students are already able to realize these plans through the process of creating new forms or products (producing).	11%	53%	23%	13%	0%

Note:
SD = Strongly disagree

D = Disagree
MA = Moderately agree
A = Agree
SA = Strongly agree

Next, for the C6 indicator (creating), students' ability to generate new ideas and products also shows a limited tendency. For the ability to reorganize elements into new patterns or structures through the process of generating ideas (generating), 51% (27 teachers) disagreed, 38% (20 teachers) somewhat agreed, 6% (3 teachers) agreed, and 6% (3 teachers) strongly disagreed that students possessed this skill. Regarding the ability to systematically develop plans to produce something new (planning), 53% (28 respondents) disagreed, 28% (15 respondents) somewhat agreed, 13% (7 respondents) agreed, and 6% (3 respondents) strongly disagreed. Meanwhile, for the ability to realize plans through the process of creating new forms or products (producing), 53% (28 teachers) disagreed, 23% (12 teachers) somewhat agreed, 13% (7 teachers) agreed, and 11% (6 teachers) strongly disagreed that students demonstrated this ability. Interestingly, no respondents chose the "strongly agree" option for any of the C6 aspects. This may indicate that the creating ability (C6), as the highest level of HOTS, remains particularly challenging for students in physics learning. The majority of teachers perceive that only a small portion of students have mastered this skill, particularly at the stages of planning and product realization.

This aligns with the study by Umar et al., (2024) which analyzed students' HOTS through testing in a physics topic and found that the lowest ability was in executing plans and reviewing them. Similarly, a literature review conducted by (Haris et al., 2021) showed that for the creating indicator (C6), almost all senior high school students had not yet developed HOTS in this area. This suggests that students are not yet accustomed to engaging in learning activities that encourage idea exploration, systematic planning, and independent production of work.

Consistent with these findings, various field studies indicate that students' HOTS at the secondary education level are still suboptimal optimal (Nizam et al., 2023). (Akhiralimi et al., 2022) emphasize that low HOTS are observed across all grade levels in science subjects at senior high school. On average, less than 50% of students demonstrate HOTS for each indicator. The low level of higher-order thinking across grades is largely due to teacher-centered learning processes dominated by memorization and routine problem-solving activities (Simbolon et al., 2025) Consequently, this situation negatively impacts active student engagement in learning and hinders the development of HOTS as expected by the curriculum.

Supporting Facilities at School Based on Teacher Perceptions

After analyzing students' HOTS based on teacher perceptions, the next step is to identify the availability and utilization of supporting facilities at school. Satiri et al., (2025) explain that it is important to look at how teachers feel about school facilities because they are a big part of making the learning process better. This study looks at the technological infrastructure and resources that help students learn physics, such as having access to digital devices and using technology in lessons and activities. Mapping these aspects is essential to obtain an empirical overview of the extent to which the school environment supports the development of learning based on E-LKPD (Electronic Student Worksheets). The results of the analysis regarding technology use at schools, based on teacher perceptions, are presented in Table 4.

Table 4. Analysis of Technology Use at School Based on Teacher Perceptions

No.	Aspect	SD	D	MA	A	SA
10	My school has adequate supporting facilities such as computer laboratories, Wi-Fi, projectors, and smart TVs.	0%	0%	13%	43%	43%
11	My school provides good support when students use electronic devices during the learning process.	0%	6%	6%	51%	38%
12	My school supports teachers in using technology such as gadgets, projectors,	0%	0%	0%	47%	53%

No.	Aspect	SD	D	MA	A	SA
	computers, or smart TVs to deliver learning materials.					

Note:
SD = Strongly disagree
D = Disagree
MA = Moderately agree
A = Agree
SA = Strongly agree

Based on Table 4, the availability and support of technology in schools show a fairly positive trend according to teacher perceptions. For the aspect of supporting facilities such as computer laboratories, Wi-Fi, projectors, and smart TV, 43% of respondents agreed (A) and 43% strongly agreed (SA), while 13% somewhat disagreed (MA). No respondents chose disagree (D) or strongly disagree (SD). This indicates that most teachers perceive the school as having adequate technological facilities. Most respondents viewed school support for students' use of electronic devices during learning positively. A small number of teachers (6% disagree and 6% somewhat disagree) said that there are still some problems, even though 51% agreed and 38% strongly agreed that this kind of support is available. This shows that schools usually make it easier to use digital devices, but support may not be the same in all learning situations yet. The availability of such supporting facilities can motivate both students and teachers in learning activities (Sahpitri & Poppy, 2025). Meanwhile, for school support of teachers in using technology to deliver learning materials, 53% of respondents strongly agreed and 47% agreed. No respondents provided negative responses for this aspect. This indicates that the school consistently supports the integration of technology in the learning process. Overall, these results show that the school environment is relatively well-prepared to support technology-based learning.

Use of E-LKPD Based on Teacher Perceptions

The availability of facilities and supportive policies is an important factor in determining the learning media to be used. One of the learning media that teachers can utilize to enhance students' HOTS is the E-LKPD (Electronic Student Worksheet) (Noviati et al., 2022). Therefore, the researcher conducted an analysis of E-LKPD usage based on teacher perceptions, with the results presented in Table 5.

Table 5. Analysis of E-LKPD Usage in Schools by Teachers

No.	Aspect	Yes	No
13	I have used E-LKPD before.	72%	28%
14	I am accustomed to using electronic types of student worksheets (LKPD).	47%	53%
15	I feel that E-LKPD can be easily operated or used through digital devices.	85%	15%
16	I feel that E-LKPD is more practical because it requires less preparation time and provides clear instructions.	96%	4%

According to Table 5, in general, teachers have a positive perception about E-LKPD usage in schools. 38 Respondents (72%) reported that they had used E-LKPD in the learning process, while 15 respondents (28%) had not, indicating that the majority of teachers already have initial experience with electronic student worksheets. However, when asked about regular use, only 25 respondents (47%) stated that they were accustomed to using electronic forms of LKPD, whereas 28 respondents (53%) were not. This suggests that although E-LKPD has been introduced in classroom practice, its use has not yet become a consistent habit among teachers.

In terms of usability, 45 respondents (85%) of respondents considered E-LKPD easy to operate through digital devices, while only 8 respondents (15%) expressed a different view. Similarly, 51 respondents (96%) of teachers perceived E-LKPD as more practical because it requires less preparation time and offers clearer instructions, with only 2 respondents 4% disagreeing. These findings indicate that teachers tend to view E-LKPD positively, particularly in terms of ease of use and practicality. Even so, greater attention is still needed to encourage more regular and sustained use of E-LKPD in classroom learning. Therefore, its development should be carried out more systematically by considering teachers' needs as well as the characteristics of the physics content being taught. Furthermore, the researcher also

examined the need for E-LKPD in supporting HOTS, as presented in Table 6.

Table 6. Analysis of E-LKPD Needs in Supporting HOTS

Aspect	Yes	No
I feel the need for E-LKPD on the Particle Kinematics topic to enhance HOTS.	89%	11%

As shown in Table 6, most respondents expressed a need for E-LKPD to support HOTS in the Particle Kinematics topic. A total of 48 respondents (89%) reported that E-LKPD is needed to help improve students' HOTS, whereas only 5 respondents (11%) stated otherwise. This pattern reflects a strong demand among teachers for the development of E-LKPD as a learning resource. These findings are also in line with the previous results, which showed that students' HOTS remain below expectations, further emphasizing the need for more innovative and technology-integrated learning tools. Overall, this data indicates that the development of E-LKPD for the Particle Kinematics topic is not only relevant but also a practical necessity to support the enhancement of senior high school students' HOTS.

The results of this study show that students' HOTS (HOTS) are still at a low to moderate level, especially in the evaluation (C5) and creation (C6) stages. This is reflected in the pattern of teachers' responses on the Likert scale, where most answers fall under disagree and moderately agree. This indicates that most students have not yet fully developed these skills. This situation is closely linked to the way physics is commonly taught, which still tends to be teacher-centered. As a result, students are more familiar with following procedures to solve problems rather than engaging in deeper thinking processes such as analyzing, evaluating, and creating. Consequently, many students struggle to express their ideas, build arguments, and come up with solutions on their own.

These findings are consistent with previous studies indicating that students' HOTS in physics learning have not yet developed optimally(Hadi et al., 2018). Research by Astalini et al. (2022) shows that students' HOTS, particularly in creative thinking and science process skills, are still relatively low. In addition, other studies have found that students' HOTS in physics topics remain at a moderate level and are influenced by factors such as motivation and self-efficacy (Aviyanti et al., 2025).

From a theoretical perspective, the development of HOTS requires active student engagement in learning processes that emphasize analysis, evaluation, and creation (Karwadi et al., 2024). However, the results of this study indicate that the implementation of learning strategies that support HOTS is still not optimal. This is supported by findings that conventional, teacher-centered approaches in physics learning are less effective in fostering students' HOTS (Sebastian et al., 2023). On the other hand, the availability of adequate technological facilities suggests that the main issue does not lie in infrastructure, but rather in the optimization of its use in the learning process. Studies have shown that the use of technology-based learning media, such as E-LKPD and interactive multimedia, can enhance students' HOTS when designed systematically and oriented toward higher-order thinking activities (Widyaningsih et al., 2020). Furthermore, the development of HOTS-based E-LKPD has been proven to be feasible and effective in improving students' motivation and learning outcomes (Kahar et al., 2021).

This study is special because it brings together students High Order Thinking Skills, how ready they are to use technology and the need to develop Electronic Learning Modules, all in one framework and it does this for the topic of particle movement. Other studies usually just look at how to make learning materials or how to test High Order Thinking Skills. This study combines these things to help people make better decisions about teaching physics. The study found that it is important to make learning materials that use technology and that help students think critically and to teach students in a way that's more focused on them. This should help students get more involved in learning and improve their ability to think critically be creative and solve problems. However this study has some weaknesses. One problem is that the information came from what teachers thought, which might not be what the students are actually able to do in terms of High Order Thinking Skills. Another problem is that the study only looked at one area, which means the results might not be true, for places. So future studies should try to find out if using Electronic Learning Modules that focus on High Order Thinking Skills really works, by doing experiments and getting detailed information.

CONCLUSION

Based on the findings of this study, it can be concluded that students' HOTS (HOTS) in particle kinematics particularly at the levels of analyzing (C4), evaluating (C5), and creating (C6) have not yet developed optimally and show uneven distribution across students. While most teachers perceive that only a limited number of students demonstrate these skills, especially at the creating level, the availability of technological facilities in schools is considered adequate and supportive of digital-based learning. Additionally, teachers hold positive views regarding the use of E-LKPD in terms of practicality and ease of implementation. Importantly, all respondents emphasized a strong need for HOTS-oriented E-LKPD in particle kinematics. These findings suggest that developing systematically designed E-LKPD focused on HOTS is a strategic and timely approach to enhancing the quality of physics learning. Furthermore, it is recommended that future studies explore the design and implementation of HOTS-based E-LKPD and evaluate its effectiveness in improving students' HOTS through experimental or quasi-experimental methods.

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