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# Validity and Practicality of Digital Teaching Materials Integrating the Deep Learning Approach and Local Wisdom for Kinematics Learning

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**ABSTRACT**

*Developing critical thinking skills has become one of the major goals of twenty-first-century physics education. However, existing physics teaching materials still emphasize procedural problem-solving and have not adequately facilitated students' conceptual understanding and critical thinking skills. This study aimed to develop digital teaching materials based on the deep learning approach integrated with local wisdom to facilitate students' critical thinking skills in kinematics and to evaluate its validity and practicality. The study adopted the Four-D (4D) development model proposed by Thiagarajan et al. and was conducted through the develop stage. The developed product was validated by three expert validators and tested for practicality by two physics teachers and 35 Grade X students at SMAN 12 Padang. The results showed that the digital teaching materials achieved an average validity score of 95%, indicating that it was valid. The practicality assessment yielded average scores of 96.25% from teachers and 90% from students, both categorized as very practical. The developed digital teaching materials s provides a valid and practical learning resource that supports meaningful, contextual, and technology-enhanced physics learning while facilitating students' critical thinking skills.*

**Keywords :**Critical Thinking Skills; Digital Teaching Materials; Deep Learning; Local Wisdom; Kinematicss.



## I. INTRODUCTION

Preparing students for the challenges of the twenty-first century requires more than mastering disciplinary knowledge. Students are expected to develop higher-order thinking skills that enable them to analyze information, evaluate evidence, solve problems, and make reasoned decisions in various contexts [1], [2]. Among these competencies, critical thinking has become one of the primary goals of contemporary education because it supports reflective judgment, logical reasoning, and effective problem solving [3], [4]. Developing these competencies requires learning experiences that actively engage students in constructing conceptual understanding rather than memorizing information [5]. Such learning experiences also promote meaningful student engagement, which has been recognized as an important factor in improving learning outcomes [6].

Physics is one of the subjects that provides strong opportunities to develop critical thinking because it emphasizes scientific inquiry, conceptual reasoning, and evidence-based problem solving [7], [8]. Students are expected to observe phenomena, interpret experimental evidence, evaluate scientific explanations, and apply concepts to unfamiliar situations [9]. These activities encourage students to construct knowledge through investigation rather than passive information transfer. One topic that particularly requires these competencies is kinematics because it introduces fundamental concepts that become the basis for learning subsequent physics topics. Understanding kinematics requires students to relate mathematical representations, graphical interpretations, and real-world phenomena, yet many students still experience conceptual difficulties because classroom instruction often emphasizes procedural calculations rather than conceptual understanding [10], [11], [12], [13].

A preliminary study was conducted during the define stage at SMAN 12 Padang to identify learning problems and development needs. The study included teacher interviews, a critical thinking test, a students' needs analysis, a learning objectives analysis, a concept analysis, and a teaching materials analysis. The main findings are summarized in Table 1.

**Table 1**. Summary of the Preliminary Study Findings During the Define Stage

| Define Stage Analysis | Key Findings |
|---|---|
| Teacher Interview | Physics learning is still dominated by printed textbooks and teacher explanations. |
| Critical Thinking Test | Mean score = 50.25 (moderate); self-regulation = 22.79 (lowest). |
| Students' Needs Analysis | Students need digital teaching materials with videos, discussions, experiments, and deep learning activities. |
| Learning Objectives Analysis | Learning objectives emphasize conceptual understanding, scientific reasoning, contextual problem solving, and critical thinking. |
| Concept Analysis | Kinematics consists of interconnected concepts that require multiple representations and sequential understanding. |
| Teaching Materials Analysis | Existing materials focus on procedural exercises and lack deep learning, critical thinking, and local wisdom integration. |

The findings summarized in Table 1 indicate that the problems identified during the define stage are interconnected and influence the quality of physics learning. Teacher interviews and the teaching materials analysis suggest that current classroom practices still emphasize conceptual explanations and procedural problem solving, providing limited opportunities for students to develop critical thinking through meaningful learning experiences. This condition is reflected in the critical thinking test results, where students achieved only a moderate overall score and demonstrated particularly weak performance in the self-regulation indicator. These findings suggest that students are still not sufficiently encouraged to evaluate their reasoning or reflect on their learning processes, even though such abilities are essential components of critical thinking [4], [9]. In addition, the students' needs analysis indicates a strong demand for interactive digital teaching materials that support independent, contextual, and technology-enhanced learning. Similar findings were reported by Dianti and Emiliannur [14], who found that both students and teachers expressed the need for interactive and contextual teaching materials to support physics learning. Together with the learning objectives and concept analyses, these findings indicate that physics learning requires digital teaching materials that not only present content but also facilitate conceptual understanding, scientific reasoning, and critical thinking through meaningful and contextual learning experiences [7], [8].

The findings of the preliminary study indicate that improving learning quality requires not only changes in instructional strategies but also the availability of learning resources that support active and meaningful learning. Teaching materials are essential learning resources that guide students in constructing conceptual understanding and achieving intended learning outcomes [15]. In physics education, teaching materials should encourage students to observe phenomena, analyze relationships among concepts, and apply scientific principles to solve contextual problems [8]. However, previous studies have reported that many physics teaching materials still emphasize content delivery and routine problem solving, providing limited opportunities for students to develop critical thinking skills [16], [17]. These conditions highlight the need for teaching materials that facilitate conceptual understanding while simultaneously engaging students in meaningful learning activities.

Advances in information and communication technology have transformed conventional teaching materials into digital learning resources. Digital teaching materials can be accessed through computers, tablets, and smartphones, allowing students to learn more flexibly [18], [19]. In addition, digital teaching materials allow the integration of text, images, videos, simulations, and interactive quizzes that support conceptual understanding and student engagement [20], [21]. However, the effectiveness of digital teaching materials depends not only on multimedia features but also on the quality of their instructional design [5]. Well-designed digital learning resources actively engage students in constructing knowledge through meaningful learning experiences [6], [22].

One digital platform that supports the development of interactive teaching materials canva sites. This web-based platform enables teachers to create digital teaching materials without requiring programming skills. Canva Sites allows various learning resources, including text, images, videos, presentations, hyperlinks, and external applications, to be integrated into a single webpage that can be accessed through one web address [23]. Its responsive interface also enables students to access learning materials through computers, tablets, or smartphones, making learning more flexible and accessible. These features provide opportunities to develop physics teaching materials that are more attractive, interactive, and suitable for today's digital learning environment.

Despite the advantages offered by digital platforms such as canva sites, the quality of digital teaching materials is determined not only by technological features but also by the instructional approach that underpins their design. Effective learning resources should encourage students to develop a deep understanding of concepts, connect new knowledge with prior experiences, and reflect on their own thinking processes. These characteristics are consistent with the deep learning approach, which emphasizes learning that is mindful, meaningful, and joyful [24]. Through learning experiences that involve understanding, applying, and reflecting, students are encouraged to construct knowledge actively rather than relying solely on memorization [25]. Previous studies have shown that the deep learning approach enhances conceptual understanding, promotes student engagement, and improves critical thinking across various educational contexts [26], [27].

Meaningful learning can be further strengthened by connecting scientific concepts with students' daily experiences. One way to achieve this is by integrating local wisdom into the learning process. Local wisdom represents the knowledge, values, and practices that develop within communities and are passed down across generations [28]. In physics education, local wisdom provides authentic contexts that help students relate abstract concepts to real-life phenomena [29]. Learning activities that incorporate local contexts have also been shown to improve conceptual understanding, increase learning motivation, and make learning more meaningful [30].

The integration of local wisdom is particularly relevant to physics because many physical phenomena can be observed in students' surrounding environments. Contextual examples encourage students to analyze everyday events using scientific concepts instead of memorizing formulas. Previous studies have reported that local wisdom-based teaching materials improve conceptual understanding and promote more contextual learning experiences [31], [32]. Likewise, R. Aulia and Emiliannur [33] reported that local wisdom-integrated e-modules are highly needed because they present physics problems in meaningful contextual settings while supporting the development of students' critical thinking skills. Local wisdom also helps students appreciate their cultural heritage while developing scientific reasoning skills [28]. These characteristics make local wisdom a valuable component in the development of digital physics teaching materials .

Several studies have demonstrated the benefits of digital teaching materials developed using different instructional approaches. Digital teaching materials supported by interactive multimedia have been reported to improve student engagement and learning effectiveness [22]. Similarly, deep learning-based instructional modules have shown high levels of validity and practicality while enhancing students' critical thinking skills [25]. In physics education, teaching materials integrated with local wisdom have also been found to support conceptual understanding and contextual learning [31], [32]. Collectively, these studies indicate that combining appropriate instructional approaches with contextual learning resources can improve the quality of teaching materials .

Although previous studies have reported positive outcomes from digital teaching materials, several limitations remain. Most studies have focused on multimedia integration, learning effectiveness, or the implementation of a single instructional approach [22], [25]. Other studies have integrated local wisdom into physics teaching materials to promote contextual learning [31], [32]. However, studies that simultaneously integrate the deep learning approach, local wisdom, and critical thinking skills into digital teaching materials for kinematics are still limited. Moreover, few studies have comprehensively evaluated both the validity and practicality of such teaching materials before their implementation in classrooms.

This study addresses these limitations by developing digital teaching materials for kinematics that integrate the deep learning approach and local wisdom to facilitate students' critical thinking skills. This study develops digital teaching materials that systematically integrate the deep learning approach, local wisdom, and critical thinking skills within a single instructional design for kinematics learning. The instructional design was implemented through canva sites to provide an interactive and accessible digital learning environment. The learning activities were systematically designed based on the principles of mindful, meaningful, and joyful learning while incorporating local wisdom as a contextual learning resource. In addition, critical thinking indicators were embedded throughout the learning activities to encourage students to analyze, evaluate, infer, explain, and reflect during the learning process. These characteristics distinguish the developed digital teaching materials from previous studies that generally focused on only one or two of these aspects.

This study adopted the Four-D (4D) development model proposed by Thiagarajan et al. [34] which consists of the define**,** design**,** develop**,** and disseminate stages. The present study was conducted up to the develop stage by evaluating the validity and practicality of the developed product. The resulting product is expected to provide a meaningful, contextual, and technology-supported learning resource for physics instruction. Accordingly, this study aims to develop valid and practical digital teaching materials based on the deep learning approach integrated with local wisdom to facilitate students' critical thinking skills in learning kinematics.

## II. METHOD

This study employed a descriptive research design based on the Four-D (4D) development model proposed by Thiagarajan et al. [32]. The 4D model consists of four stages: define, design, develop, and disseminate. However, this study was conducted only up to the develop stage because the disseminate stage was beyond the scope and time limitations of the research. The define stage was conducted to identify instructional needs and learner characteristics. The design stage focused on preparing the prototype of the digital teaching materials. The develop stage included product validation, revision, and practicality testing to produce a valid and practical digital teaching materials .

The study was conducted at SMAN 12 Padang during the second semester of the 2025/2026 academic year. The participants consisted of Grade XI Phase F students and one physics teacher. The object of this study was the need to develop digital teaching materials based on the deep learning approach integrated with local wisdom to facilitate students' critical thinking skills in learning kinematics. The research site was selected because it represented the actual conditions of physics learning. The participants were involved to provide information regarding students' learning characteristics and classroom learning practices. This selection enabled the researchers to obtain comprehensive information for developing the proposed digital teaching materials .

The development procedures followed the three implemented stages of the 4D model: define, design, and develop. These stages were carried out sequentially so that each stage provided the basis for the subsequent stage. The Define stage focused on identifying instructional needs and determining the requirements for product development. The design stage emphasized planning and preparing the prototype of the digital teaching materials. The Develop stage was intended to evaluate and improve the product through expert validation, revision, and practicality testing. The activities conducted at each stage are described as follows.

The define stage aimed to identify the instructional requirements before developing the digital teaching materials. This stage consisted of five main activities that served as the foundation for the development process. The first activity was front-end analysis through interviews with a physics teacher, analysis of existing teaching materials, and a critical thinking skills test to identify learning problems. The second activity was learner analysis using a student needs questionnaire to identify students' learning characteristics and learning styles. The third activity involved task analysis by examining the learning outcomes (CP), learning objectives (TP), and learning objective achievement indicators (IKTP) for the kinematics topic. The fourth and fifth activities included concept analysis to determine the scope and sequence of concepts presented in the teaching materials and specifying instructional objectives as the basis for product development.

The design stage focused on preparing the prototype of the digital teaching materials. Four development activities were carried out during this stage. The first activity involved designing the structure and components of the teaching materials . The second activity focused on preparing learning content integrated with the deep learning approach and local wisdom. The third activity included designing learning activities, critical thinking exercises, reflection activities, and assessment instruments. The final activity involved developing the user interface and visual appearance using canva before publishing the teaching materials through canva site.

The develop stage consisted of product validation, product revision, and practicality testing. Product validation was conducted by three expert validators from the Department of Physics, Faculty of Mathematics and Natural Sciences, Universitas Negeri Padang. The validation instrument consisted of seven assessment aspects: learning content, visual communication, instructional design, software utilization, implementation of the deep learning approach, integration of local wisdom, and facilitation of critical thinking skills. The product was revised based on the suggestions and recommendations provided by the validators. After the revision process, practicality testing was conducted to evaluate the usability of the developed digital teaching materials . The practicality instruments consisted of teacher and student questionnaires covering four aspects: usability, attractiveness, time efficiency, and usefulness.

The validity data were analyzed using Aiken's V coefficient to determine the content validity of the developed digital teaching materials based on the judgments of the expert validators. A higher coefficient indicates a greater level of agreement among the validators regarding the appropriateness of the developed product. The coefficient was calculated using Equation (1)

$$V = \frac{\sum s}{n(c-1)} \#(1)$$

Where:

$V$ : Aiken's V coefficient

s : The score assigned by the validator minus the lowest score on the rating scale

$n$ : Number of validators

c : Number of rating scale categories

The validity of the digital teaching materials was determined using the criteria proposed by Azwar [35]. A product was considered valid if it obtained an Aiken's V value of 0.80 or higher, whereas a value below 0.80 indicated that the product required revision. These criteria were used to determine the feasibility of the developed product before proceeding to the practicality testing stage. The validity criteria are presented in Table 1.

**Table 2**. Product Validity Assessment Criteria

| Aiken's V Value | Category |
| --- | --- |
| ≥ 0.80 | Valid |
| 0.60–0.79 | Fairly Valid |
| ≤ 0.59 | Not Valid |

Source: Azwar [35]

Practicality data were analyzed using a percentage technique by comparing the total score obtained with the maximum possible score. The analysis was conducted to determine the level of practicality of the developed digital teaching materials based on the responses of teachers and students. The practicality score was calculated using Equation (2).

$$Practicality\ Score = \frac{score\ obtained}{maximum\ possible\ score} x100\% \#(2)$$

## III. RESULTS AND DISCUSSION

### Results

The digital teaching materials based on the deep learning approach integrated with local wisdom was validated by three expert validators from the Department of Physics, Faculty of Mathematics and Natural Sciences, Universitas Negeri Padang. The validation assessment consisted of seven aspects, namely learning content substance, visual communication, instructional design, software utilization, deep learning, local wisdom, and critical thinking skills. The results of the validation assessment are presented in Table 2.

**Tabel 2**. Validation Results of the Digital Teaching Materials

| Validation Aspect | Validation Score (%) | Category |
| --- | --- | --- |
| Learning Content Substance | 96% | Valid |
| Visual Communication | 96% | Valid |
| Instructional Design | 95% | Valid |
| Software Utilization | 92% | Valid |
| Deep Learning | 93% | Valid |
| Local Wisdom | 96% | Valid |
| Critical Thinking Skills | 96% | Valid |
| Average | 95% | Valid |

Table 2 shows that all assessed aspects achieved the valid category. The average validation score of 95% indicates that the developed digital teaching materials is valid and feasible for use in physics learning. Learning content substance obtained an average score of 96%, with concept suitability, terminology accuracy, content coverage, concept understanding, presentation organization, language appropriateness, and content depth achieving the highest score of 100%. These results indicate that the learning content is scientifically accurate, systematically organized, and appropriate for grade X students. The lowest score within this aspect was obtained by alignment with learning outcomes (83%), indicating that several learning materials could still be refined to strengthen their alignment with the intended learning outcomes. Visual communication also obtained an average score of 96%, with Display, Design, and Layout achieving the highest score of 100%, indicating that the interface is visually attractive, consistent, and easy to navigate, whereas navigation, color, and visual Elements obtained 92%, suggesting that these components are appropriate while still allowing room for minor improvements.

Instructional design obtained an average score of 95%. The indicators of learning outcomes, learning materials , learning instructions, student activities, references, and author identity achieved the highest score of 100%, indicating that the instructional components have been systematically designed to support meaningful learning activities. Software utilization obtained the lowest average score among all aspects (92%), although it remained within the valid category. Canva site and visualization achieved the highest score of 100%, whereas ease of use and stability obtained 83%, indicating that accessibility and system stability could still be optimized across different devices. Deep learning obtained an average score of 93%, demonstrating that the developed digital teaching materials has successfully incorporated the principles of the deep learning approach. The indicators of understanding and reflection achieved the highest score of 100%, whereas awareness obtained 83%, suggesting that learning activities promoting students' learning awareness could be further strengthened.

Local Wisdom obtained an average score of 96%, indicating that the integration of local wisdom was appropriate and relevant to the kinematics topic. The indicators of suitability, clarity, and relevance achieved the highest score of 100%, while the phenomenon indicator obtained 83%, indicating that additional contextual examples could further strengthen the connection between local wisdom and physics concepts. Critical thinking skills also obtained an average score of 96%, indicating that the developed digital teaching materials effectively facilitates students' critical thinking skills. The indicators of interpretation, evaluation, inference, and self-regulation achieved the highest score of 100%, whereas explanation obtained 83%, indicating that activities encouraging students to communicate their reasoning can still be improved.

Following the validation process, the developed digital teaching materials was subjected to a practicality test to evaluate its feasibility for classroom implementation. The practicality assessment involved two physics teachers and 35 grade X students of SMAN 12 Padang as the prospective users of the teaching materials . Four aspects were evaluated, namely usability, attractiveness, time efficiency, and usefulness. The results of the practicality assessment conducted by both teachers and students are presented in Table 3.

**Tabel 3**. Practicality Assessment Results of Teachers and Students

| **Aspects** | **Practical Value** | | **Criteria** | |
|---|---|---|---|---|
| | Teacher | Student | Teacher | Student |
| **Usability** | 96% | 91% | Very Practical | Very Practical |
| **Attractiveness** | 97% | 90% | Very Practical | Very Practical |
| **Time Efficiency** | 95% | 88% | Very Practical | Very Practical |
| **Usefulness** | 97% | 90% | Very Practical | Very Practical |
| **Average** | 96.25% | 90% | Very Practical | Very Practical |

Table 3 shows that the developed digital teaching materials achieved a very practical category based on both teachers' and students' assessments. The average practicality score obtained from the teachers was 96.25%, while the students' assessment yielded an average score of 90%, indicating that the digital teaching materials are highly practical for classroom use. Among the evaluated aspects, attractiveness and usefulness received the highest scores from the teachers, each reaching 97%, whereas usability obtained the highest score from the students at 91%. Time Efficiency received the lowest score from both groups, with 95% from the teachers and 88% from the students; however, these values still fall within the very practical category. The consistently high scores across all aspects indicate that the developed digital teaching materials are easy to use, visually appealing, efficient to implement within the allocated instructional time, and beneficial for supporting the teaching and learning process. Overall, the practicality assessment demonstrates that the developed digital teaching materials are suitable for implementation in physics learning on kinematics.

**Discussion**

The developed digital teaching materials achieved an average validity score of 95%, indicating that the product met the criteria of a valid learning resource. This finding demonstrates that the developed digital teaching materials satisfied the expected standards in terms of learning content, instructional design, visual communication, software utilization, implementation of the deep learning approach, integration of local wisdom, and facilitation of critical thinking skills. According to Ulfah et al. [36], a learning product is considered valid when its content, construct, and instructional objectives are systematically aligned, ensuring that the product is appropriate for classroom implementation. The high validity achieved in this study indicates that the instructional components were successfully integrated into a coherent learning system rather than functioning as separate elements. This systematic integration is important because it enables students to experience learning activities that are conceptually structured, pedagogically appropriate, and consistent with the intended learning objectives.

The high validity achieved in this study is closely related to the systematic organization of the instructional components within the developed digital teaching materials . The learning objectives, concept sequence, learning activities, assessments, and multimedia resources were designed as an integrated learning system rather than as independent components. Such alignment enables students to construct conceptual understanding progressively while ensuring that each learning activity contributes to the intended instructional outcomes. [5] Emphasized that constructive alignment between learning objectives, teaching activities, and assessment is essential for promoting meaningful learning. Therefore, the systematic integration of these instructional components contributed substantially to the high validity of the developed teaching materials .

Another factor contributing to the product validity is the implementation of the deep learning approach throughout the digital teaching materials . The learning activities were designed according to the principles of mindful, meaningful, and joyful learning, while guiding students through the processes of understanding, applying, and reflecting on physics concepts. This instructional sequence encourages students to actively construct knowledge instead of memorizing formulas or procedures. Siregar et al. [24] explained that the deep learning approach promotes meaningful conceptual understanding by engaging students in active learning experiences, whereas Anggrayni et al. [25] demonstrated that learning materials developed using this approach achieved high validity and effectively supported critical thinking. These characteristics indicate that the integration of the deep learning approach strengthened both the pedagogical quality and the instructional relevance of the developed digital teaching materials .

The integration of local wisdom also played an important role in achieving the high validity of the developed digital teaching materials. Local contexts were embedded throughout the learning activities, examples, discussions, and problem-solving tasks, allowing students to relate physics concepts to phenomena encountered in their surrounding environment. Presenting scientific concepts through authentic contexts makes learning more meaningful because students can connect new knowledge with their prior experiences. This view is supported by Annisha [28], who stated that local wisdom creates more meaningful and contextual learning experiences, and by Fitriah and Yuliati [29], who reported that integrating local wisdom into physics learning improves conceptual understanding. Similar findings were reported by Habibah et al. [31] and Neratania [32], who found that physics teaching materials integrated with local wisdom were considered feasible because they provided contextual and relevant learning experiences.

The high validity was further strengthened by embedding critical thinking indicators throughout the instructional activities rather than limiting them to assessment tasks. Students were encouraged to interpret information, analyze motion phenomena, evaluate evidence, draw conclusions, explain scientific reasoning, and reflect on their own learning processes during each stage of learning. Embedding these indicators across the learning sequence provides continuous opportunities for students to practice higher-order thinking while developing conceptual understanding. Fisher [3] and Halpern & Dunn [4] argued that critical thinking develops most effectively when it is integrated into everyday learning activities instead of being taught as an isolated skill. Consequently, the developed digital teaching materials not only present physics concepts but also systematically facilitate the development of students' critical thinking skills.

The findings of this study are consistent with previous research on the development of digital teaching materials. Anggrayni et al. [25] reported that instructional modules based on the deep learning approach achieved high validity because they successfully integrated meaningful learning activities with critical thinking development. Likewise, Wachidah et al. [27] found that digital teaching materials integrating the deep learning approach and local wisdom were considered highly valid because they provided contextual learning experiences that matched students' characteristics. Similar results were also reported by Chairani et al. [37], who concluded that teaching materials developed using deep learning fulfilled important criteria related to instructional quality, content, and presentation. The consistency between the present findings and previous studies indicates that integrating the deep learning approach, local wisdom, and critical thinking within digital teaching materials provides a strong foundation for developing high-quality learning resources for physics education.

The practicality evaluation showed that the developed digital teaching materials obtained average scores of 96.25% from teachers and 90% from students, both categorized as very practical. These findings indicate that the developed digital teaching materials were easy to use, visually attractive, efficient to implement, and beneficial for supporting physics learning. A learning product is considered practical when it can be implemented easily by teachers and students while supporting the achievement of the intended learning objectives [36]. The high practicality achieved in this study suggests that the developed digital teaching materials successfully accommodated classroom learning needs while remaining accessible and convenient for both teachers and students. These findings demonstrate that the product is feasible for implementation in physics learning without requiring complex preparation or extensive technical support.

The high practicality can be attributed to the integration of digital technology and instructional design within a single learning environment. The digital teaching materials were developed using canva sites, allowing text, images, videos, animations, hyperlinks, and interactive learning activities to be organized on one web page that can be accessed through computers or smartphones. This organization enables students to navigate learning materials more efficiently while allowing teachers to deliver instruction through a single digital platform. In addition, multimedia integration helps present abstract physics concepts in multiple representations, making learning more engaging and easier to understand [20], [21]. Similar findings were reported by Rasya and Gina [22], who found that interactive digital teaching materials improved students' engagement and learning experiences when multimedia components were systematically integrated into instructional activities.

The implementation of the deep learning approach and the integration of local wisdom also contributed to the high practicality of the developed digital teaching materials . Learning activities encouraged students to understand concepts, solve contextual problems, conduct simple investigations, and reflect on their learning experiences rather than merely completing procedural exercises. Local wisdom contexts further supported learning by connecting physics concepts with situations familiar to students, making the learning process more meaningful and relevant. Meaningful and contextual learning experiences encourage active student participation while improving conceptual understanding and learning motivation [28], [29]. These characteristics made the developed digital teaching materials easier to implement because both teachers and students could readily engage with the learning activities and relate them to authentic situations.

The practicality findings are consistent with previous studies on digital teaching materials developed using the deep learning approach and local wisdom. Anggrayni et al. [25] reported that deep learning-based instructional modules were considered highly practical because they were easy to implement and received positive responses from both teachers and students. Likewise, Wachidah et al. [27] found that digital teaching materials integrating deep learning and local wisdom promoted meaningful learning experiences while maintaining a high level of usability. Similar conclusions were also reported by Habibah et al. [31] and Neratania , who emphasized that integrating local wisdom into physics teaching materials enhances contextual learning and facilitates classroom implementation. Collectively, these findings reinforce the practicality results of the present study and indicate that integrating digital technology, the deep learning approach, and local wisdom can produce digital teaching materials that are not only practical but also capable of supporting meaningful and student-centered physics learning.

## IV. CONCLUSION

This study developed a digital teaching materials based on the deep learning approach integrated with local wisdom to facilitate students' critical thinking skills in learning kinematics. The findings indicate that the developed digital teaching materials met the established validity criteria and was considered very practical for classroom implementation based on expert validation and the responses of teachers and students. These findings suggest that integrating the deep learning approach, local wisdom, and critical thinking activities into digital teaching materials provides a feasible alternative learning resource to support meaningful and contextual physics learning. Nevertheless, this study was limited to evaluating the validity and practicality of the developed product. Therefore, future research is recommended to examine its effectiveness in improving students' critical thinking skills and learning outcomes through broader classroom implementation.

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