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Practicality of a Cognitive Conflict-Based Physics Website Integrated with AR-STEM to Promote Critical Thinking and Misconception Remediation in Dynamic Fluid

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ABSTRACT

Ideally, physics learning should be supported by innovative instructional materials that can develop students' critical thinking skills and help them overcome misconceptions. One potential solution is a cognitive conflict-based physics website integrated with Augmented Reality (AR) and STEM. This study aimed to analyze the practicality of a cognitive conflict-based physics website integrated with AR and STEM as a digital learning resource. The study was part of a research and development project employing the Plomp model, focusing on the one-to-one evaluation and small group evaluation stages. The participants consisted of 12 senior high school students in Phase E at SMA Negeri 6 Padang. Data were collected using a practicality questionnaire covering four aspects: ease of use, attractiveness, efficiency, and usefulness. The data were analyzed using percentage analysis. The results showed that the website achieved an average practicality score of 88% in the one-to-one evaluation stage and 86% in the small group evaluation stage, both categorized as highly practical. Furthermore, all practicality aspects were rated as highly practical during the small group evaluation. These findings indicate that the website is easy to use, engaging, efficient, and beneficial for physics learning. Therefore, the cognitive conflict-based physics website integrated with AR and STEM is suitable for use as a digital learning resource and is ready to proceed to the effectiveness testing stage to investigate its impact on students' critical thinking skills and the remediation of misconceptions.

INTRODUCTION

Education in the era of the Fourth Industrial Revolution (Industry 4.0) and Society 5.0 requires students to develop competencies that enable them to address increasingly complex global challenges. Beyond mastering subject knowledge, students are expected to acquire 21st-century skills, including critical thinking, communication, collaboration, and creativity

(Kelley et al., 2019). Among these competencies, critical thinking is particularly important because it enables students to analyze information, evaluate evidence, and make reasoned judgments (Hirai et al., 2022). Therefore, physics instruction needs to be designed to foster critical thinking skills through student-centered learning, enabling students to actively engage in analyzing problems, evaluating evidence, interpreting information, and constructing scientific understanding based on physics concepts. (Barta et al., 2022).

The importance of critical thinking is particularly evident in physics learning, as physics investigates natural phenomena through interconnected concepts, principles, and laws. This characteristic requires students not only to solve mathematical problems but also to develop a deep conceptual understanding and relate scientific concepts to real-world phenomena (Khabibah, 2025). In this context, critical thinking serves as an essential competency because it supports conceptual understanding and scientific reasoning (Akmam et al., 2025). Students with well-developed critical thinking skills are also better able to explain physical phenomena, interpret scientific data, and solve problems systematically (Admas et al., 2025). Thus, the development of critical thinking in physics learning is closely related to students' ability to construct meaningful conceptual understanding.

However, despite the importance of critical thinking in physics education, numerous studies have reported that students' critical thinking skills remain relatively low. Putri et al., (2024) found that physics instruction in Indonesia has not yet consistently facilitated the development of students' critical thinking skills. This condition contributes to poor conceptual understanding because many students tend to focus on applying formulas rather than comprehending the underlying physical principles (Juniatri et al., 2022). Such limited conceptual understanding can subsequently contribute to the emergence of misconceptions, which are conceptions that differ from scientifically accepted explanations. If these misconceptions are not systematically identified and remediated, they may hinder subsequent learning because physics concepts are highly interconnected (Fitriani et al., 2025). Therefore, physics instruction needs to provide learning experiences that simultaneously develop critical thinking and facilitate conceptual change.

One physics topic that requires particular attention in this regard is dynamic fluids. This topic frequently leads to misconceptions because it involves abstract relationships among variables, including fluid velocity, pressure, cross-sectional area, and height. Students often experience difficulties understanding the continuity equation and Bernoulli's principle, particularly in explaining the relationships among pressure, velocity, and fluid height in various fluid-flow situations. These difficulties are further amplified when students are required to apply theoretical concepts to phenomena encountered in everyday life. In line with these challenges, classroom observations conducted at SMA Negeri 6 Padang revealed that physics instruction remains predominantly teacher-centered and relies heavily on lecture-based learning. Consequently, students tend to receive information passively, while their prior conceptions are rarely explored and existing misconceptions are not systematically addressed. This condition indicates the need for an instructional approach that actively engages students in examining their initial conceptions and reconstructing their understanding through meaningful learning experiences.

One instructional approach that has the potential to address these challenges is Cognitive Conflict-Based Learning. This approach facilitates conceptual change by encouraging students to compare their prior conceptions with scientific evidence through cognitive conflict, thereby supporting the reconstruction of their understanding toward scientifically accepted concepts. According to (Mufit & Fauzan, 2019), the Cognitive Conflict-Based Learning model consists of four stages: activation of prior conceptions and misconceptions, presentation of cognitive conflict, concept discovery, and reflection. Previous research by Mufit et al. (2022) demonstrated that this learning model effectively enhances conceptual understanding while simultaneously remediating students' misconceptions across various physics topics.

Advances in digital technology provide opportunities to optimize the implementation of cognitive conflict-based learning through more interactive instructional media. One of the emerging technologies widely adopted in physics education is Augmented Reality (AR), which enables two-dimensional and three-dimensional virtual objects to be visualized within real-world environments in real time. Such visualization assists students in understanding abstract concepts that are otherwise difficult to observe directly. Alkhabra et al. (2023) reported that AR significantly improves students' learning engagement, conceptual understanding and critical thinking skills. Likewise, Simanullang et al. (2025) found that AR-based learning media create a more engaging learning experience and facilitate students' understanding of physical phenomena.

In addition to technological integration, physics instruction should employ learning approaches that connect scientific concepts with authentic real-world problems. The Science, Technology, Engineering, and Mathematics (STEM) approach enables students to integrate scientific knowledge, technological applications, engineering design, and mathematical reasoning to solve contextual problems. According to Rosilawati & Abidin (2025), the STEM approach not only enhances conceptual understanding but also develops students' critical thinking, creativity, and problem-solving skills. Therefore, integrating STEM with digital technology is expected to create a more meaningful learning experience that aligns with the demands of 21st-century education.

The integration of cognitive conflict-based learning, Augmented Reality, and the STEM approach into a web-based learning platform offers a promising solution for creating interactive, flexible, and student-centered learning environments. A learning website allows students to access instructional materials, simulations, AR visualizations, and learning activities independently using various digital devices. However, learning media must not only demonstrate a high level of validity but also possess a high degree of practicality to ensure that they can be effectively implemented, used, and utilized by both teachers and students across various learning activities in the classroom environment.

The integration of cognitive conflict-based learning, Augmented Reality, and the STEM approach into a web-based learning platform offers a promising solution for creating interactive, flexible, and student-centered learning environments. A learning website enables students to access instructional materials, simulations, AR visualizations, and learning activities independently through various digital devices. However, an instructional medium should not only demonstrate high validity but also possess a high level of practicality to ensure that it can be effectively implemented by both teachers and students in classroom settings. The Cognitive Conflict-Based Physics Website Integrated with AR and STEM for Dynamic Fluids developed by Mufit et al. (2026) has previously demonstrated excellent content validity, with a validity index of 0.95; However, the practicality of the website has not yet been comprehensively evaluated. Therefore, this study aims to analyze the practicality of a physics website—based on cognitive conflict and integrated with Augmented Reality (AR) and the STEM approach for the topic of fluid dynamics—by examining student and teacher responses. Additionally, this study seeks to provide empirical evidence regarding the website's suitability as a digital physics learning medium and its potential to serve as a foundation for future research investigating its effectiveness in enhancing critical thinking skills and remediating student misconceptions.

METHODS

This study was conducted as part of a Research and Development (R&D) project aimed at developing a Cognitive Conflict-Based Physics Website Integrated with Augmented Reality (AR) and STEM that is practical for use in physics learning. The Research and Development approach was employed because it enables the systematic design, development, and evaluation of educational products based on users' needs and the characteristics of the learning environment (Plomp, 2013). In the present study, the development process focused on evaluating the practicality of the developed website, which was designed to enhance students' critical thinking skills and remediate misconceptions in the topic of Dynamic Fluids.

The development process employed the Plomp development model, which consists of three phases: preliminary research, development or prototyping phase, and assessment phase (Plomp, 2013). This study was conducted up to the formative evaluation stage within the assessment phase, specifically focusing on the one-to-one evaluation and small group evaluation. These evaluation stages were intended to obtain information regarding the website's ease of use, attractiveness, efficiency, and usefulness before its implementation in a larger-scale learning environment.

The participants consisted of 12 Phase E students from SMA Negeri 6 Padang, who were selected using purposive sampling. During the one-to-one evaluation, the website was tested with three students representing high-, medium-, and low-achieving academic levels. This stage aimed to identify potential usability issues, evaluate the clarity of the instructions, assess the readability of the learning content, and gather students' initial responses to the developed website. Subsequently, during the small group evaluation, the website was implemented with nine students, comprising three high-achieving, three medium-achieving, and three low-achieving students. Involving participants with diverse academic abilities aims to obtain a more comprehensive evaluation of the website's practicality and to ensure that it can be used effectively by students across various achievement levels.

The research instrument consisted of a practicality questionnaire administered after the students had used the learning website. The questionnaire assessed four practicality indicators: ease of use, attractiveness, time efficiency, and usefulness. Ease of use was measured through the clarity of instructions, ease of navigation, and ease of operating the website. Attractiveness was assessed based on the visual appearance, layout, content presentation, and students' interest. Time efficiency concerned the effectiveness of the website in supporting learning activities and access to learning materials. Usefulness was assessed based on the website's contribution to students' understanding of the learning material and the learning process. The collected data were analyzed using percentage analysis by comparing the total score obtained with the maximum possible score.

The practicality level of the developed website was calculated using the following equation:

$$P = \frac{f}{N} \times 100\% \quad (1)$$

The collected data were analyzed using descriptive percentage analysis to determine the practicality level of the developed website. The practicality percentage was calculated by comparing the total score obtained by the respondents with the maximum possible score and multiplying the result by 100%. The practicality percentage was then interpreted based on the criteria proposed by Anshari et al. (2017), namely very impractical (0–20%), impractical (21–40%), moderately practical (41–60%), practical (61–80%), and highly practical (81–100%).

The overall practicality level of the Cognitive Conflict-Based Physics Website Integrated with Augmented Reality (AR) and STEM was determined by calculating the mean percentage across all evaluated aspects. Data obtained from the one-to-one and small group evaluations were also used as a basis for identifying aspects requiring revision and refinement before broader implementation and subsequent effectiveness evaluation.

RESULTS AND DISCUSSION

Results

One To one Evaluation

The one-to-one evaluation was conducted to obtain preliminary information regarding the practicality of the Cognitive Conflict-Based Physics Website Integrated with Augmented Reality (AR) and STEM through direct interaction with three students representing high-, medium-, and low-achieving academic levels. During this stage, each participant was asked to independently access and use the website by studying the learning materials, completing the learning activities, and exploring the available features. After completing the learning activities, the students were asked to complete a practicality questionnaire assessing four dimensions: ease of use, attractiveness, efficiency, and usefulness. The results of the practicality evaluation obtained during the one-to-one evaluation are presented in Table 1.

Table 1. Results of the One-to-One Evaluation Practicality Questionnaire

Practicality Aspect	Practicality Score (%)	Categori
Ease of Use	89	Highly Practical
Attractiveness	87	Highly Practical
Efficiency	87	Highly Practical
Usefulness	89	Highly Practical
Avarage	**88**	Highly Practical

Based on the results of the one-to-one evaluation, the Cognitive Conflict-Based Physics Website Integrated with Augmented Reality (AR) and STEM achieved an average practicality score of 88%, which falls into the highly practical category. The attractiveness aspect obtained the highest score, with a percentage of 87%, indicating that the website interface, Augmented Reality (AR) features, and learning activities successfully attracted students' attention and enhanced their learning interest. The usefulness aspect also received a highly practical rating, with a percentage of 89%, demonstrating that the website effectively supported the learning process. Meanwhile, the ease of use aspect achieved a percentage of 89%, and the efficiency aspect obtained 87%. Both aspects were categorized as highly practical, indicating that students were able to operate the website with ease and effectively utilize its available features, although minor improvements could further enhance the overall user experience.

During the one-to-one evaluation, the researcher conducted direct observations of the students while they interacted with the Cognitive Conflict-Based Physics Website Integrated with Augmented Reality (AR) and STEM. The observations aimed to identify any difficulties encountered by the students and to obtain additional information regarding the website's practicality from the users' perspective. The observed aspects included ease of use, attractiveness, efficiency, and usefulness of the website in supporting the learning process.

A summary of the observation results for the three students who participated in the one-to-one evaluation is presented in Table 2.

Table 2. Observation Results of Website

Student 1	Student 2	Student 3
The student showed a high level of interest in the learning website. The student was able to understand the learning materials and effectively utilize the available features throughout the learning process. However, the student reported several technical issues with the quiz feature that should be addressed to further optimize the website's usability.	The student was able to operate the website successfully from the beginning and followed the learning sequence without significant difficulty. The student stated that the website interface was attractive, the learning materials were easy to understand, and the illustrations effectively supported the understanding of Dynamic Fluids concepts.	The student was able to use the website effectively and complete all learning activities. The only issue encountered was the relatively long loading time when the website was accessed for the first time. According to the student, improving the website's loading speed would further enhance its usability.

Based on the observation results from the one-to-one evaluation, the Cognitive Conflict-Based Physics Website Integrated with Augmented Reality (AR) and STEM demonstrated a high level of practicality from the users' perspective. All three participants were able to operate the website, understand the learning materials, and complete the learning activities successfully. These findings indicate that the website's user interface, navigation system, and content presentation effectively supported the learning process.

Nevertheless, the students provided several suggestions for further improvement. The first student reported a technical issue with the quiz feature, indicating that it required refinement to optimize the learning assessment process. The second student expressed positive feedback regarding the website's visual design, ease of use, and instructional illustrations, noting that these features facilitated the understanding of Dynamic Fluids concepts. Meanwhile, the third student pointed out that the website required a relatively long loading time during the initial access, suggesting that performance optimization should be undertaken to improve accessibility and enhance the overall user experience.

Overall, the observation results indicate that the website satisfactorily fulfilled the practicality criteria in terms of ease of use, ease of understanding, attractiveness, and usefulness. The feedback obtained during the one-to-one evaluation served as the basis for revising and improving the website before proceeding to the small group evaluation, thereby enhancing the overall quality and practicality of the developed learning media.

As the final product of this development stage, the Cognitive Conflict-Based Physics Website Integrated with AR and STEM incorporates several features designed to support learning in the topic of Dynamic Fluids. The website's homepage was designed to provide users with convenient access to all available learning menus and instructional activities. The homepage of the developed website is presented in Figure 1.

Figure 1. Home Page of the Physics Website

After accessing the website homepage, students can navigate to the learning materials, which are systematically organized according to the Cognitive Conflict-Based Learning model. The instructional sequence consists of four stages: activation of prior conceptions and misconceptions, presentation of cognitive conflict, concept and equation discovery, and reflection. This systematic organization is designed to facilitate conceptual change and promote meaningful learning. Each stage provides students with learning activities that activate their prior knowledge, confront misconceptions, construct scientific understanding, and reflect on the concepts they have learned. Learning materials are presented via an interactive website that integrates various components—such as text, visualizations, simulations, and Augmented Reality (AR) features—thereby providing a more interactive learning experience and fostering a deeper understanding of concepts. The interface of the physics website's homepage is shown in Figure 1.

The learning materials are organized according to the stages of the Cognitive Conflict-Based Learning model to provide students with a structured learning experience. The first stage activates students' prior conceptions and identifies potential misconceptions related to the concepts being studied. The second stage presents cognitive conflict through phenomena, questions, or problems that challenge students' existing understanding. In the third stage, students are guided to discover and understand scientifically accepted concepts and equations through learning activities and interactive resources. The final stage involves reflection, which allows students to evaluate their understanding and recognize changes in their conceptual understanding. The implementation of the Cognitive Conflict-Based Learning model within the website is illustrated in Figure 2.

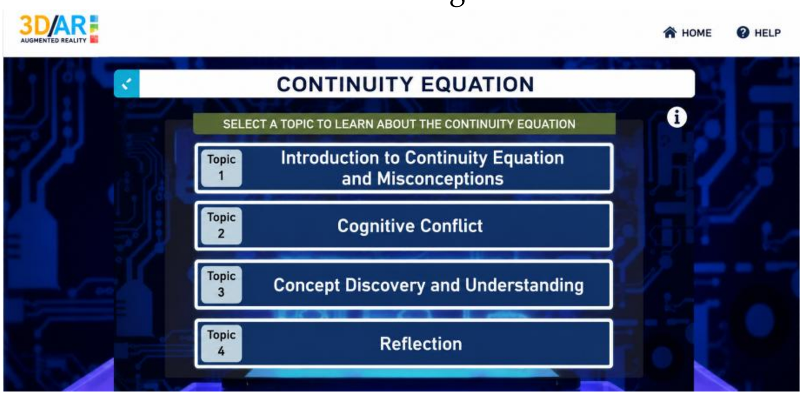

Figure 2. Cognitive Conflict Learning Syntax on the Physics Website

Figure 2 illustrates the syntax of Cognitive Conflict-Based Learning integrated into the physics website. The learning process consists of four sequential stages: activation of prior conceptions and misconceptions, presentation of cognitive conflict, concept and equation discovery, and reflection. In the first stage, students are encouraged to identify and express their initial understanding of the physics concepts being studied. The second stage presents situations or phenomena that create cognitive conflict between students' initial conceptions and scientifically accepted concepts. Students then engage in concept and equation discovery activities to reconstruct their understanding based on scientific explanations and the learning resources provided on the website. Finally, the reflection stage enables students to evaluate their conceptual understanding and confirm the scientific concepts they have learned.

Small Grup Evaluation

Following the completion of the one-to-one evaluation, the practicality testing proceeded to the small group evaluation, which involved nine students representing high-, medium-, and low-achieving academic levels. During this stage, the students used the Cognitive Conflict-Based Physics Website Integrated with Augmented Reality (AR) and STEM as part of the learning activities and subsequently evaluated its practicality. The practicality assessment focused on four dimensions: ease of use, attractiveness, efficiency, and usefulness. The results of the practicality questionnaire obtained during the small group evaluation are summarized in Table 3.

Table 3. Results of the Small Group Evaluation Practicality Questionnaire

Practicality Aspect	Practicality Score (%)	Categori
Ease of Use	89	Highly Practical
Attractiveness	87	Highly Practical
Efficiency	87	Highly Practical
Usefulness	89	Highly Practical
Average	**88**	Highly Practical

Based on the results of the small group evaluation, the Cognitive Conflict-Based Physics Website Integrated with Augmented Reality (AR) and STEM achieved an average practicality score of 86%, which falls into the highly practical category. All evaluated aspects were also classified as highly practical, including ease of use (85%), attractiveness (87%), efficiency (81%), and usefulness (91%). These findings indicate that the website is easy to use, engaging, time-efficient, and beneficial in supporting the learning of Dynamic Fluids. The high scores for the attractiveness and usefulness aspects suggest that students responded positively to the website's features and learning activities. Furthermore, the results indicate that the website has considerable potential to promote students' active engagement throughout the learning process.

Discussion

This study aimed to investigate the practicality of the Cognitive Conflict-Based Physics Website Integrated with Augmented Reality (AR) and STEM as a digital learning resource for supporting students' critical thinking skills and remediating misconceptions. The practicality evaluation demonstrated that the developed website was categorized as highly practical in both the one-to-one and small group evaluation stages. These results indicate that the website can be implemented effectively as a digital learning medium because its features, learning activities, and content are accessible and usable for students. The high practicality level also suggests that the website has the potential to support meaningful learning experiences and facilitate students' active engagement during the learning process.

During the one-to-one evaluation, the website achieved an average practicality score of 88%, while the small group evaluation yielded an average score of 86%. Both results fall within the highly practical category, indicating that the website is easy to use and well suited to support physics learning. The findings also suggest that the revisions implemented based on users' feedback contributed to improving the website's usability and aligning its features with students' learning needs. The slightly lower score obtained in the small group evaluation may reflect the more varied responses of students when the website was used in a broader learning context.

According to Plomp (2013), an educational product is considered practical if it is easy to use, efficient, and beneficial for users in authentic learning environments. The practicality results obtained in this study indicate that the developed website fulfills these criteria. Feedback collected during the evaluation stages enabled the refinement of several website features, thereby improving its overall usability and quality before broader implementation. These findings confirm that the evaluation of practicality is an important stage in educational product development because it provides empirical evidence regarding the feasibility of using the developed media in learning.

The first aspect evaluated was ease of use. The website obtained a practicality score of 89% during the one-to-one evaluation and 85% during the small group evaluation, with both scores falling into the highly practical category. Observation results indicated that some students initially experienced difficulties in understanding the instructions provided on the website. However, after becoming familiar with the interface and navigation, they were able to complete all learning activities successfully. These findings suggest that the website offers a user-friendly navigation system that can be effectively used by students with varying levels of academic achievement. These findings are consistent with the study by Putri et al., (2025), which reported that cognitive conflict-based instructional materials integrated with Augmented Reality (AR) and STEM demonstrated a high level of practicality because they were easy for students to learn and use. The study also found that AR-supported cognitive conflict-based physics learning materials were categorized as highly practical in terms of ease of use. Furthermore, (Alkhabra et al., 2023)reported that AR enhances students' motivation, engagement, and learning experiences by providing interactive visualizations of abstract concepts.

The second aspect evaluated was attractiveness. This aspect obtained a practicality score of 87% in both the one-to-one evaluation and the small group evaluation, indicating that the website was highly practical in terms of visual appeal. The students responded positively to the website interface, learning content, and the Augmented Reality (AR) features. The integration of AR enabled students to visualize abstract concepts in Dynamic Fluids, making the learning process more engaging and meaningful. These findings are consistent with Zhang et al., (2024), who reported that AR and Extended Reality (XR) technologies enhance students' engagement by providing immersive and interactive learning experiences. Likewise, Vidak et al., (2023) concluded that AR facilitates concept visualization, reduces cognitive load, and improves learning quality in physics education.

The third aspect evaluated was efficiency. The website achieved practicality scores of 87% in the one-to-one evaluation and 81% in the small group evaluation, with both scores categorized as highly practical. Observation results indicated that one student experienced a relatively long loading time when accessing the website for the first time. However, after the initial loading process, the website functioned smoothly and supported learning activities without significant technical difficulties. These findings indicate that the website can be used efficiently in classroom learning. This result is in agreement with Vidak et al., (2023), which states that although Augmented Reality (AR)-based learning media still face a number of technical limitations—such as device specifications and system performance—the pedagogical benefits offered far outweigh these constraints, making them worthy of implementation in the learning process.

The fourth aspect evaluated was usefulness. The website obtained practicality scores of 89% during the one-to-one evaluation and 91% during the small group evaluation, both of which were classified as highly practical. These findings indicate that students perceived the website as beneficial for improving their understanding of Dynamic Fluids and supporting the learning process. Mufit et al., (2023) reported that cognitive conflict-based learning effectively promotes conceptual understanding while reducing students' misconceptions in physics. In addition, Tan et al. (2023) explained that the STEM approach encourages students to integrate science, technology, engineering, and mathematics knowledge to solve contextual problems, thereby fostering the development of critical thinking skills. Therefore, the high usefulness scores suggest that the developed website has the potential to support both conceptual understanding and critical thinking.

The website was developed based on the Cognitive Conflict-Based Learning model, which consists of four instructional stages: activation of prior conceptions and misconceptions, presentation of cognitive conflict, concept and equation discovery, and reflection (Mufit & Fauzan, 2019) These stages encourage students to identify their initial conceptions, compare them with scientific evidence, and reconstruct scientifically accepted concepts. Bao et al. (2014) reported that cognitive conflict is an effective instructional strategy for promoting conceptual change and facilitating meaningful knowledge construction. Similarly, Akmam et al. (2025) The study found that cognitive conflict-based learning enhances scientific literacy and helps students reconstruct their conceptual understanding through a process of conceptual change that is more scientific.

Furthermore, integrating the STEM approach into the website provides opportunities for students to apply scientific knowledge in solving authentic problems involving science, technology, engineering, and mathematics. Such learning activities encourage students to analyze information, evaluate evidence, and formulate appropriate solutions, which are essential components of critical thinking. Zhang et al.(2024) reported that integrating AR into STEM learning significantly enhances higher-order thinking skills, including critical thinking and problem-solving. Likewise Ilyas et al. (2022) found that STEM-based instruction has a positive and significant effect on students' critical thinking skills. Zulfawati et al. (2022) also demonstrated that integrating STEM into problem-based learning effectively strengthens students' critical thinking abilities.

The findings of the present study are also consistent with previous research. (Agusto et al. (2025) reported that cognitive conflict-based learning integrated with AR and STEM promotes positive attitudes toward physics learning. Similarly, Dhanil & Mufit, (2025) found that integrating cognitive conflict, AR, and STEM significantly improves students' learning motivation, scientific literacy, self-efficacy, and learning retention. Devana et al.(2025) and Putri et al. (2025) further concluded that cognitive conflict-based physics instructional materials integrated with AR demonstrate a high level of practicality and are suitable for implementation in physics classrooms.

Overall, the findings demonstrate that the Cognitive Conflict-Based Physics Website Integrated with Augmented Reality (AR) and STEM achieved a high level of practicality across all evaluated dimensions, namely ease of use, attractiveness, efficiency, and usefulness. These results indicate that the website is suitable for implementation as a digital learning resource in physics education. Moreover, the integration of cognitive conflict-based learning, AR, and the STEM approach provides a strong foundation for enhancing students' critical thinking skills and facilitating the remediation of misconceptions. Therefore, the developed website is appropriate for subsequent effectiveness testing to examine its impact on students' critical thinking skills and conceptual understanding in greater depth.

CONCLUSION

This study demonstrated that the Cognitive Conflict-Based Physics Website Integrated with Augmented Reality (AR) and STEM is highly practical as a digital learning resource for physics instruction. The website achieved average practicality scores of 88% in the one-to-one evaluation and 86% in the small group evaluation, with both results falling into the highly practical category. In addition, all evaluated dimensions—ease of use, attractiveness, efficiency, and usefulness—were classified as highly practical, indicating that the website is user-friendly, engaging, efficient, and beneficial for supporting physics learning. The findings suggest that the developed website is suitable for classroom implementation and has the potential to facilitate more interactive and meaningful learning experiences through the integration of cognitive conflict-based learning, Augmented Reality (AR), and the STEM approach. Therefore, the website fulfills the practicality requirements of educational product development and is appropriate for proceeding to the effectiveness evaluation stage to examine its impact on students' critical thinking skills and the remediation of misconceptions in Dynamic Fluids.

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