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Integration of Edupark and Digital Technology: Analysis of the Need for a Physics Learning Website to Address Misconceptions

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Abstract: The integration of digital technology with a contextual learning approach is a strategic solution to improve conceptual understanding and reduce misconceptions in physics learning. This study aims to analyze the need for developing website-based learning media that integrates the concept of edupark as a contextual approach. The method used in this needs analysis employs the EDUPARK development model, limited to the EDU stage. Data collection instruments include the EDUPARK potential format, physics concept observation sheets at the EDUPARK, questionnaires, interview sheets, and curriculum reviews at SMAN 4 Padang. The results of the Edupark Finding stage identified the Lumindai Stone Forest tourist attraction. The Direct Observation stage revealed that the physics concepts present at the edupark location include gravity and equilibrium, thermodynamics, sound and light waves, and energy. Finally, the Understanding of Teacher, Students, and Curriculum Characteristics stage revealed that students experienced high levels of misconceptions due to the lack of interactive and contextual media, as well as the suboptimal utilization of local potential (edupark). To address these issues, the integrated edupark learning website is viewed as an innovative solution to support the Merdeka Curriculum and enhance the quality of physics education.

Keywords: Edupark; Learning website; Misconceptions

Introduction

Digital technology can be utilized in the world of education. Digital technology can provide opportunities for accessing and delivering learning materials (Ambarwati et al., 2022; Rahayu et al., 2022; Sinaga, 2023) enabling the learning process to become more efficient, easily accessible, and capable of simplifying complex materials (Amalia et al., 2024). The use of digital technology is supported by the Merdeka Curriculum as information and communication technology that has provided tools and platforms to enchance the effectiveness of the learning process (Trisnani et al., 2024). The Merdeka Curriculum also provides space for educators to innovate in the learning process, including the use of out-of-class learning. One form of out-of-class learning is edupark. Edupark, or educational park, integrates learning with real objects in the environment as a source of contextual learning (Hamdi & Kinanti, 2024). The presence of edupark as learning resources makes physics learning enjoyable and easy to understand because it is based on real-life situations (Hamdi & Kinanti, 2024; Rifai et al., 2019). Research on physics edupark has been extensively conducted, such as the Science and Technology Center in Sawahlunto (Waskita & Rifai, 2023), the Geopark Ranah Minang Silokek in Sijunjung (Ummah & Rifai, 2020), and Bukik Cinangkiak (Lestari & Rifai, 2021). However, to date, no

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research has specifically examined the potential of the Lumindai Stone Forest as a physics edupark.

The use of technology among students can be utilized as multimedia learning (Huda et al., 2024; Nazar et al., 2024), because digital-based independent learning systems have been proven effective in supporting the learning process (Azmi et al., 2024; Chastanti et al., 2024; Sarah, 2024). One application of digital technology is the use of websites as educational platforms. The implementation of websites in learning facilitates educators in delivering content, and students can access it anytime and anywhere, thereby making the learning process more flexible and efficient (Yusuf et al., 2020).

One of the great potentials that has not been widely explored is the development of an edupark-based physics learning website. Learning websites have a number of advantages, such as flexible access, interactive features, support for independent learning, and the ability to accommodate various forms of media such as text, video, animation, and quizzes (Nurhayati et al., 2025; Yusuf et al., 2020). By combining digital technology and edupark, learning becomes not only more engaging but also more relevant to the real-life experiences of students.

However, in the context of physics learning, the complexity of the material and its abstract nature often cause students to have difficulty understanding basic concepts (Handayani et al., 2025). This often triggers misconceptions, which are incorrect understandings that persist even after the learning process (Alberida et al., 2024; Ibrahim, 2019). On the other hand, although digital technology has become part of students' daily lives, its use has not yet been fully directed as a productive learning tool (Doyan et al., 2020; Farida et al., 2021), students tend to use digital technology for entertainment rather than learning, so more effective educational strategies are needed to optimize technology to support learning (Arake & Winarti, 2022).

Most previous studies have only emphasized the development of learning websites or the use of edupark separately, but few have integrated the two. As a result, there is no framework that integrates digital platforms and local learning resources to address misconceptions in physics. Digital content is also often not contextual and poorly suited to students' learning styles (Mayasari, 2025), limiting its effectiveness.

Therefore, analyzing the needs of students is very important in designing media that is in line with the Merdeka Curriculum and diverse learning styles. A project-based and contextual approach through direct interaction with edupark has been proven to enhance understanding of scientific concepts (Satuti & Atmojo, 2025). When supported by digital technology, such as simulations and interactive websites, this experience becomes more effective in helping students overcome misconceptions (Hendra et al., 2023).

This study aims to analyze the needs of students in the context of developing learning media. The results of this analysis will form the basis for designing a physics learning website integrated with edupark, as a strategic solution to address misconceptions, while supporting the implementation of the Merdeka Curriculum.

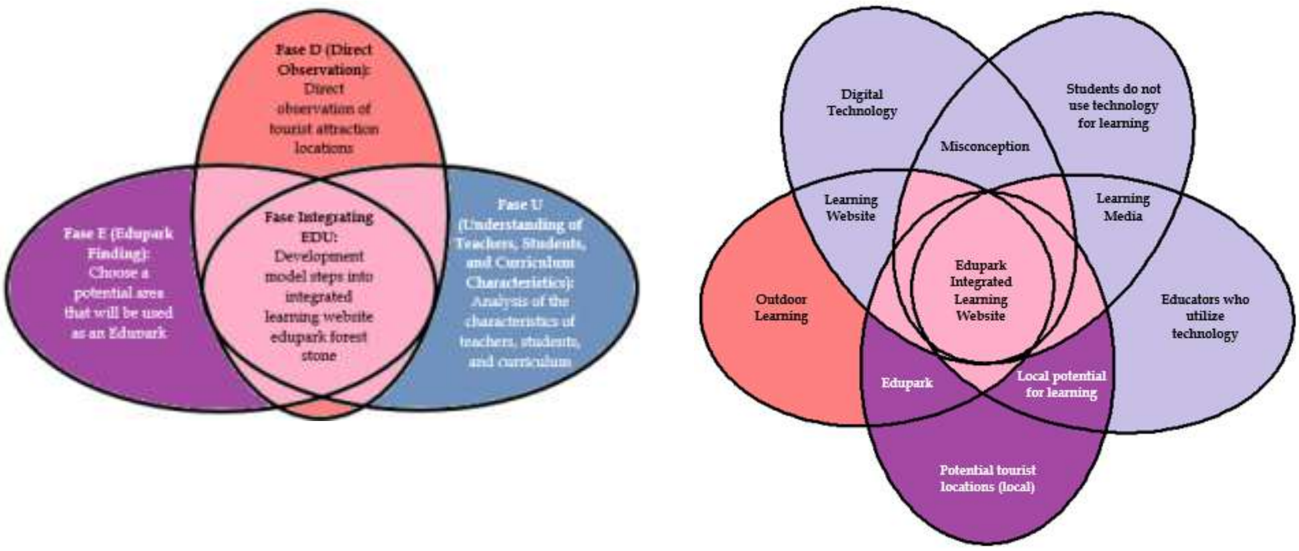
Method

This study adopts the EDUPARK development model, which is part of the R&D type. This model consists of two main stages, namely the research stage (EDU) and the development stage (PARK) (Hamdi & Kinanti, 2024). The method used in this study is descriptive analysis, employing the concept fitting technique to integrate the Lumindai Stone Forest tourist destination as a learning tool for physics concepts. The entire process follows the step-by-step framework for EDUPARK-based product development, known as the EDUPARK model. This model consists of seven systematic steps: Edupark Finding, Direct Observation, Understanding of students, teachers, and curriculum characteristics, Preliminary Design by Concept Fitting Technique, Auto Assessment, Result of the Product Quality Test, and Kick Off Publish. Through this approach, the research aims to develop contextual physics learning media based on relevant and applicable local potential, particularly in educational tourist areas such as the Lumindai Stone Forest.

In this study, the stages carried out focused on the EDU stage in the EDUPARK development model. The EDU stage consists of four main phases that form the basis of the research process, namely: Phase ‘E’ (Edupark Finding): selection of tourist attractions or regional potential to be developed into an edupark, Phase ‘D’ (Direct Observation): direct observation of the selected tourist attraction sites to integrate them into the learning process, Phase ‘U’ (Understanding of students, teachers, and curriculum characteristics): analysis of the characteristics of teachers, students, and the curriculum, and Integrating EDU: the final stage for designing the pre-design of integrated physics learning media for the Lumindai Stone Forest EDUPARK.

After the four phases of the EDU stage have been completed, the process can proceed to the development stage, which involves compiling and developing learning materials based on the potential of the Batu Lumindai Forest area. The development of learning materials is carried out by applying the concepts fitting technique, which is an approach that integrates three main elements: physics concepts, tourism destination potential (edupark), and the needs of learners, all of which are interconnected to create an integrated edupark learning media product.

Data collection was carried out using several instruments to obtain accurate and relevant information. First, a questionnaire was distributed to students to identify learning styles, understanding of the edupark concept, needs for learning media, and indications of misconceptions in understanding physics concepts. Second, semi-structured interviews were conducted with physics teachers to explore classroom learning implementation, challenges in delivering material, the potential for integrating educational tourism, and expectations for the learning media to be developed. Third, a curriculum review was conducted to assess the alignment of the edupark concept with physics learning outcomes in the Merdeka Curriculum, as well as to identify the initial level of misconceptions among students regarding the material. The instruments from the EDU phase are presented in Table 1.



(a) (b)

Figure 1. (a) Integration of EDU stage results, (b) Details of EDU stage integration using the concepts fitting technique

The data obtained was analyzed descriptively to provide an objective picture of the existing conditions and needs. This needs analysis covered aspects of the curriculum, teacher and student characteristics, learning styles, learning challenges, use of teaching materials, and the potential of edupark as a source of physics learning. Additionally, the researchers conducted a literature review of existing references and previous studies to strengthen the theoretical foundation, identify research gaps, and guide product development in line with current needs and trends. The results of this analysis serve as the basis for formulating the initial specifications of a contextual learning website that is integrated with local potential (edupark) and effective in reducing students' misconceptions.

Table 1. EDU Stage Instrument (Hamdi & Kinanti, 2024)

Stages	Activities	Instruments
Edupark finding	Analysis of tourist attractions	Potential edupark format sheet in the region
Direct observation	Analysis of physics concepts	Observation sheet for physics concepts at Edupark
Understanding of students, teachers and curriculum characteristic	Student analysis	• Questionnaire on knowledge about the location of the edupark • Learning style instruments • Questionnaire on teaching material requirements • Initial comprehension test instruments for students
	Educator analysis	• Interview guidelines • Questionnaire on the use of teaching materials • Questionnaire on the application of learning models
	Curriculum analysis	Merdeka Curriculum Observation Sheet

Result and Discussion

Edupark Finding

Based on data (Arieswaty, 2024; Dinas Pariwisata Pemuda Dan Olahraga, 2025), there are several tourist destinations such as: Goedang Ransoem Museum, Soero Coal Mine Site Museum, Railway Museum, Cemara Peak, Sawahlunto Camping Ground, Waterboom The Unique Park, Kandi Animal Park, Kandi Fruit Garden, Rantih Tourism Village, Batu Runciang, Mudia Lugha Swimming Pool, and Meer Von Kandi Heritage. After conducting a study on these destinations, Lumindai Stone Forest was selected as the research location because it was deemed to have numerous natural phenomena that could be linked to physics concepts. However, this tourist attraction is not widely known by the public and has relatively difficult access.

To overcome these limitations, the solution offered is to utilize digital technology, one of which is through digital platforms such as websites (Suhendi et al., 2023). This website not only serves as a bridge between tourist sites and the world of education. Through this digital platform, the learning process becomes more flexible, personalized, and can reach more students, including those with mobility limitations. The website enables the integration of various interactive media such as videos, simulations, and context-based quizzes, which can enhance student engagement and understanding of the learning material (Ekosantoso et al., 2025; Tangkudung, 2025).

Direct Observation

Table 2. Analysis of Physics Concepts in Stone Forests

Materials	Concepts of Physics
Gravity and Equilibrium	Gravitational force
	Equilibrium
	Center of gravity and center of mass of the aid
	Moment of force
Thermodynamics	Heat transfer
	Heat capacity
Sound Waves	Sound reflection
	Absorption
	Resonance
	Wave diffraction
Light Waves	Light reflection
	Shadow formation
	Light refraction
	Light dispersion
Static Fluid	Hydrostatic pressure
	Fluid friction
Energy	Energy transformation
	Energy conservation
	Mechanical energy

Based on observations conducted at the Lumindai Stone Forest tourist attraction, various naturally unique rock formations were discovered, such as caves, trekking trails, and distinctive rock structures. These observations led to the identification of several physics concepts that can be found naturally in the tourist area.

The material analysis was conducted based on the Merdeka Curriculum using the Concept Fitting Technique approach (Anjani & Rifai, 2024; Hamdi & Kinanti, 2024). The physics material was analyzed based on the objects and activities found in the Lumindai Stone Forest edupark and adjusted to the basic competencies of physics learning. The results of the analysis of physics material relevant to the Lumindai Stone Forest tourist attraction are presented in Table 2.

Understanding Teacher, Student, and Curriculum Educator Analysis

Based on an interview with one of the physics teachers at SMAN 4 Padang, it is known that the school has implemented the Merdeka Curriculum. In its implementation, students are allowed to use gadgets in learning activities, but their use has not been maximized to support the learning process. Most of the media used by teachers are still conventional, such as PowerPoint, educational videos, and laboratory experiments, without further exploration of interactive digital technology. This situation highlights a gap between students' relatively high digital technology skills and the still-traditional approach to learning. This aligns with research by Sinambela et al. (2024), which states that many students now possess adequate digital technology skills and can easily access various devices and digital content. However, the learning systems in many schools still rely on conventional methods that fail to utilize technology optimally. According to Darmawan et al. (2025), the gap arises due to limitations in school technology infrastructure, particularly in remote areas, as well as teachers' ability to integrate technology into the learning process.

In addition, the teaching materials available in schools do not support interactive and contextual learning, so they are unable to bridge abstract physics concepts with students' real-life experiences. In line with the opinion of Mislaini et al. (2022) who state that contextual learning will make physics learning more enjoyable, active, and improve understanding of the material. According to Haryadi et al. (2021), contextual-based learning will enable students to play an active role in relating physics concepts to real-world contexts.

Most of the learning media used are also not integrated with local potential, such as the Lumindai Stone Forest tourist attraction. Teachers have never utilized the potential of the surrounding environment as a relevant learning resource, even though a contextual approach is very important in physics learning. Therefore, attractive, easy-to-understand, and locally relevant learning media are needed to increase student engagement and understanding. Furthermore, the implementation of self-directed and problem-based learning has not been fully optimized. In line with the opinion of Ramli et al. (2024), who state that media that connects physics concepts with phenomena in the surrounding environment or the location of a particular area will make the material more meaningful for students. As a solution to this problem, the researcher proposes the development of physics learning media based on the Lumindai Stone Forest edupark. This media is expected to connect physics concepts with real phenomena occurring around students. In line with the opinion of Sinambela et al. (2024), who also suggest the use of digital technology for more interactive, personalized, and technology-based learning.

1. *Student Analysis*

Based on observations at SMAN 4 Padang, the results of a questionnaire distributed to students about learning styles are shown in Figure 2.

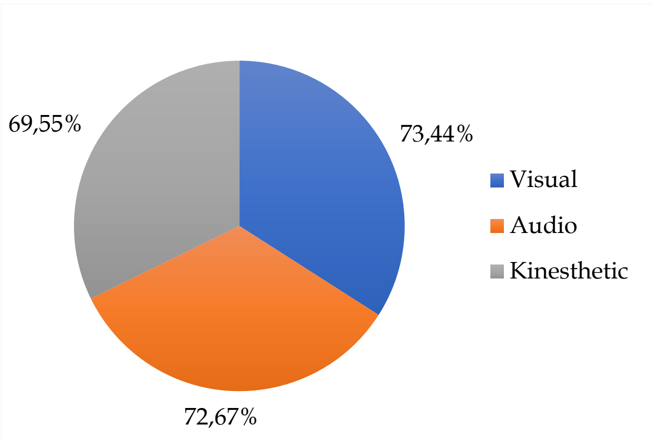


Figure 2. Results of learning style analysis of students

Based on Figure 2, students tend to have visual (73.44%) and auditory (72.67%) learning styles. This condition indicates that students find it easier to understand learning materials through images, graphics, colors, diagrams, animations, and sounds to support their learning process (Supit et al., 2023). This finding reinforces the importance of understanding variations in learning styles in the learning process, as stated by Amelia et al. (2025), that the application of learning strategies that match students' learning styles can maximize their academic potential. This has important implications for the development of learning media in the classroom.

In this context, the development of a physics learning website as a learning medium is highly relevant. As a digital medium, websites are flexible, accessible, and capable of presenting content in various multimedia formats (Pamuraja et al., 2022). This is in line with the increasing digital literacy among students, who are now growing up in an information technology ecosystem. Students are actively utilizing various digital devices and platforms in their daily lives (Depita, 2024). They are accustomed to accessing information quickly through the internet, using learning applications and digital forums. Therefore, their ability to understand and adapt to technology is an important asset in the digital learning process.

To respond to the demands of the times and the characteristics of the current digital generation, the learning website that is developed should meet several characteristics of the latest technology, including (Ambarsari, 2024; Dzulfikar & Karnita, 2025; Oktaga & Susanti, 2023): (1) Responsive and multiplatform, accessible via various devices such as laptops, tablets, and smartphones. (2) Interactive and user-friendly, with an intuitive interface that is easy for students to navigate. (3) Multimedia-rich content, presenting material through text, images, experimental videos, physics simulations, and audio explanations. (4) Integration of automatic evaluation features, such as quizzes, polls, or digital-based diagnostic tests to detect misconceptions. (5) Cloud-based, so that student interaction data can be stored, analyzed, and used for adaptive learning follow-up.

However, in its development, several supporting components must be considered that must be present in a learning website according to Horton (Tangkudung, 2025) namely: (1) Learning content that is organized based on learning objectives. (2) Interactive media such as videos, animations, and simulations. (3) Evaluation features such as online tests, quizzes, or assignments that help assess student understanding. (4) A management system to manage learning activities, such as student registration, progress tracking, and learning outcome reports.

Furthermore, based on the results of the questionnaire given to students, they do not yet understand the potential of tourism as a place of education. Students tend to see the location as a place of entertainment, even though there are many physical phenomena that can be observed directly (Prasetyo et al., 2021; Septyaningrum et al., 2021). This shortcoming increases the likelihood of misconceptions arising because students do not gain meaningful and contextual learning experiences. The results of the analysis of tourist destination objectives can be seen in Figure 3.

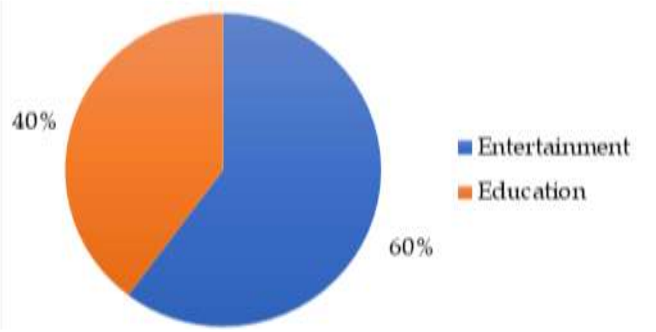


Figure 3. Results of the analysis of tourist destination objectives

Furthermore, the results of the initial ability test on students showed that there was a high level of conceptual misconception among students, reaching 39.69%, as shown in Figure 4. This indicates a discrepancy between students' understanding and the correct scientific concept. Additionally, the lack of interactive and contextual learning media, as well as the low utilization of local resources as teaching tools, exacerbates this gap (Cahyani & Suniasih, 2022; Mukhtar et al., 2022). Ideally, physics education should be able to connect theory with real-world practice, actively engage students, and accommodate different learning styles (Kurniawan, 2025). However, in reality, education remains classical, abstract, and disconnected from students' real-life contexts. Therefore, there is an urgent need to design digital-based media that presents physics learning in a visual, contextual, and interactive manner, and is integrated with local potential such as edupark.

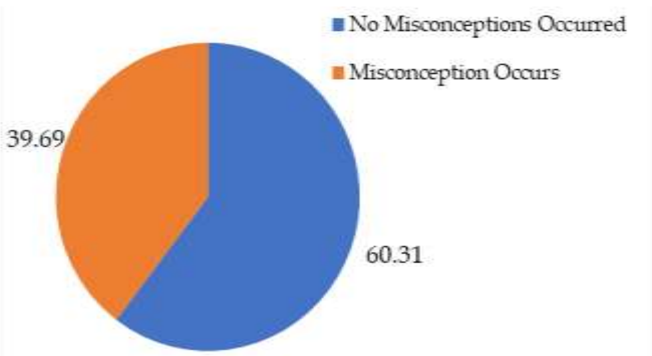


Figure 4. Results of initial ability tests for students

This misconception reflects a gap between students' conceptual understanding and scientific concepts, which has not yet been able to bridge abstract physics concepts with concrete and contextual learning experiences. This situation is exacerbated by the use of technology that is not yet directed toward learning activities. Students tend to use their digital devices more for entertainment, such as social media and games, rather than to support their understanding of the subject matter.

Curriculum Analysis

Based on curriculum studies, ideally, physics learning in the Merdeka Curriculum should be contextual, integrated with the surrounding environment, and support project-based learning (Hartono & Masnidar, 2024; Virijai et al., 2024). This is not in line with the actual conditions in schools, which still lack innovation in learning media. Therefore, there is a need for learning media that is digital, interactive, visual and audio-based, and highlights the local context as part of the learning process (Wardhani et al., 2021).

From a curriculum perspective, the integration of technology and the use of edupark are important components in supporting the direction of the Merdeka Curriculum transformation, which emphasizes project-based learning and the strengthening of local contexts (Suweta, 2023). This curriculum encourages students to not only understand theory but also connect lesson materials to real-life situations (Mardiana & Emmiyati, 2024). In this context, the developed website serves not only as a digital learning resource but also as an interactive medium for developing student projects and implementing authentic assessment. Through this platform, learning becomes more flexible, collaborative, and meaningful, as it enables students to explore various topics independently and purposefully according to the characteristics of their environment.

Integrating EDU

This stage involves combining all findings into an initial framework for designing integrated local potential physics learning media (Figure 1). The main objective is to consolidate data from observations of the edupark location, characteristics of students and teachers, and relevant curriculum studies as a basis for developing contextual and interactive learning media.

The initial step involves mapping the physical phenomena present in the Stone Forest, such as gravity, equilibrium, thermodynamics, static fluids, sound waves, and light, in accordance with the core competencies outlined in the curriculum. These phenomena were selected because they can be directly observed at the location and are capable of connecting abstract concepts with students' real-world experiences (Kusuma & Nugraha, 2023; Yolanda et al., 2024). Additionally, the results of the analysis of students' learning styles indicate a dominance of visual and auditory learning styles, so the developed media were designed using an interactive multimedia approach in the form of videos and simulations (Hadi et al., 2021; Kartina & Afriansyah, 2024).

Findings from interviews with teachers also reinforce the need for media that is not only visually appealing but also functional in addressing the challenges of learning, which have remained conventional to date (Narpila et al., 2025; Yuniarti et al., 2023). Therefore, the website was designed with responsive features, easy access across various devices, content based on local context, and diagnostic quizzes to measure students' misconceptions. The final results indicate that combining local potential with school learning characteristics provides a strong foundation for creating learning media tailored to specific needs.

Based on these findings, it can be concluded that the development of educational media in the form of an edupark-based website is greatly needed. This medium is expected to provide a contextual, enjoyable, and relevant learning experience, while also helping to overcome students' misconceptions about physics material. By utilizing local potential and adapting it to the characteristics of students and curriculum requirements, the development of this medium has the potential to become an innovative solution in improving the quality of physics learning in schools.

Conclusion

Based on the results of the analysis and findings in this study, it can be concluded that physics learning at SMAN 4 Padang has not fully achieved contextual learning objectives. The high level of misconceptions among students indicates that the learning media used are still ineffective. Local potential has not been utilized as a learning resource, while the majority of students have visual and auditory learning styles that require a visualization-based and interactive approach. The development of learning media in the form of a website integrated with the edupark concept is a much-needed innovative solution. The website is designed to accommodate students' learning styles, integrate local potential through the edupark concept, and address misconceptions using a diagnostic approach. As a result, the developed product reflects actual field needs while fully supporting the implementation of the Merdeka Curriculum. Thus, the edupark-based physics learning website has significant potential to enhance learning quality and reduce students' misconceptions regarding physics concepts.

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Author Contributions
Lathifa Khairani's contributions include: conceptualization, data curation, formal analysis, methodology, and preparation of the initial draft; Hamdi Rifai: supervision, validation and review of the writing, and editing; Husna: review of the writing and editing. All authors have read and approved the published version of the manuscript.

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Conflicts of Interest
The author declares that he/she has no conflict of interest.

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