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STUDENTS' PERCEPTIONS OF WEBSITE-BASED LEARNING MEDIA: REDEFINING MEANINGFUL SCIENCE EDUCATION IN INDONESIAN ELEMENTARY SCHOOLS

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ABSTRACT
This study seeks to reconstruct the conceptual understanding of student perceptions regarding the integration of web-based learning media within Natural Science (IPA) instruction. Employing a qualitative case study approach involving fifth-grade students in Indonesia, the research transcends mere descriptive reporting to uncover the pedagogic significance of digital tools in primary education. The findings reveal that web-based platforms function as a transformative catalyst in the classroom environment. Beyond mere engagement, these media reconfigure the cognitive process by translating abstract scientific concepts into relatable, visual contexts. Data interpretation suggests a fundamental shift in student identity: from passive recipients to autonomous agents capable of orchestrating their own learning trajectories and digital strategies. Furthermore, the study interprets the success of this digital intervention not as a technical triumph, but as a synergy of socio-technical factors, including teacher digital fluency and curricular alignment. Ultimately, this research argues that web-based media serve as a dynamic learning ecosystem that fosters 21st-century competencies and social collaboration, thereby redefining the boundaries of meaningful and innovative science education for the digital age.

INTRODUCTION

The era of the Industrial Revolution 4.0, which emphasizes critical thinking, creativity, communication, and collaboration, represents the fourth phase of global industrial development. This stage is characterized by the convergence of digital, physical, and biological technologies integrated across various aspects of human life. The Industrial Revolution is not merely about automated machines, but about how data, artificial intelligence, and digital connectivity create intelligent, adaptive systems (Mudzar & Chew, 2022). However, a critical gap persists in understanding how these complex systems are perceived by elementary students within specific scientific inquiries.

The shift toward Society 5.0 requires not only academic skills but also life skills to navigate a technology-dominated world. Society 5.0 emphasizes technology-based, collaborative, and human-centered learning so that students can innovate and adapt to 21st-century demands. Education is not merely intended to transmit information

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but also to shape students' character and competencies (Hayati et al., 2024). Creative thinking skills are essential for solving problems and engaging with technology effectively. The rapid development of the digital era demands a transformative approach in education, including in the teaching of Science (IPA) at the elementary school level (Hanama et al., 2024). This research identifies a pedagogical void where digital transformation often overlooks the subjective interpretative experience of the young learner.

One of the major problems in science learning is the low motivation of students, who often perceive science as difficult and uninteresting. This situation affects learning outcomes, which often fall below the expected standard. Conventional teaching methods such as lectures that lack interactive media are still widely used even though they do not align with modern learning needs. In addition, students' learning outcomes in science indicate a gap between teaching methods and learners' needs (Siswa et al., 2025). Traditional approaches are frequently ineffective in helping students understand complex science concepts. The novelty of this study lies in its focus on bridging this gap by analyzing web-based media as a tool for cognitive and affective reconfiguration.

Perception is a cognitive process that enables individuals to assign meaning to stimuli received through the senses, involving personal experience, knowledge, and interpretation (Herlina, 2015). In education, perception shapes how students evaluate and respond to learning experiences. A person's perception influences how they think, work, and behave (Irsiawan, 2015). Students' perceptions are crucial as they serve as evaluation material for improving future instruction (Fitra Romadani & Yusi Kurniati, 2023). Positive perceptions enhance learning benefits, while negative perceptions hinder effectiveness (Irsiawan, 2015). This is supported by Hidayat and Nasution (2021), who argue that student responses influence attitudes toward learning activities (Hidayat, 2021). Furthermore, perception and motivation contribute significantly to academic achievement (Ramadhani et al., 2022).

Effective learning requires various tools, including instructional media (Fatonah et al., 2023). Learning media are essential because they make the process more efficient (Sapriyah, 2019) and ensure the achievement of goals (Nurdiansyah et al., 2018). Digital media can expand information sources and support collaborative models (Huang et al., 2024). In modern learning, perception determines success in adapting to innovations like website-based media. Such media allow science materials to be presented in engaging, interactive forms, increasing student engagement (Sari & Atmojo, 2021).

Science learning in elementary schools is still dominated by traditional methods, which are less relevant to digital-native students. This mismatch often leads to boredom and passive attitudes, resulting in low conceptual understanding (Wiliyanti et al., 2024). Therefore, digital learning media becomes a strategic solution to boost motivation and improve outcomes (Fitria, 2014). This research is based on the urgent need for media that meet the needs of modern learners. Science materials are often perceived as abstract or difficult due to a lack of innovation (Suhelayanti, 2023). By deconstructing student perceptions, this study offers a new perspective on how web-based platforms transform abstract scientific concepts into meaningful digital experiences.

From the various explanations above, it can be concluded that learning media significantly influence the success of the learning process. This study fills a specific research gap by investigating the multi-dimensional perceptions of fifth-grade students toward a tailor-made web environment, a niche that is rarely explored in-depth in the Indonesian context. Specifically, this research focuses on identifying students' views regarding the effectiveness of website-based media in increasing learning motivation and engagement, while explaining how such media contribute to understanding science concepts through visual, interactive, and contextual materials. Furthermore, it analyzes the role of website-based media in promoting student independence and digital literacy skills, alongside examining the critical factors influencing implementation, such as technological accessibility, teacher competence, and curricular alignment. By synthesizing these elements, the study offers a novel perspective on how a digital learning ecosystem can be calibrated to meet the specific developmental and cognitive needs of elementary learners, moving beyond mere technical utility toward a transformative pedagogical experience.

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Through these objectives, the study is expected to provide empirical contributions to innovative science learning. The novelty lies in its integrated approach to measuring motivation and digital literacy through the lens of student agency. To address these challenges, this study introduces a new approach by developing digital media specifically designed to create engaging and meaningful experiences (Wijaya et al., 2023).

METHOD

This study employs a qualitative approach using a descriptive case study method to analyze students' perceptions of the use of website-based media in elementary science learning. The research subjects are fifth-grade students selected through purposive sampling, specifically those who have used website-based learning media. The study involved 25 students as informants and was conducted at a public elementary school in Bandung, Indonesia. Data were collected through observations, in-depth interviews, and document analysis to obtain information regarding students' experiences, views, and responses toward the use of website media. To ensure the rigor and credibility of the findings, the researchers applied data triangulation techniques, cross-verifying information from multiple sources and collection methods. Data analysis followed the Miles and Huberman model, which consists of four stages: data collection, data reduction, data display, and conclusion drawing. Through this method, the study aims to provide a comprehensive description of how students interpret the use of website-based media and the factors that influence its effectiveness in science learning.

RESULT AND DISCUSSION

Results

The findings of this study indicate that the use of website-based media in science learning has a positive impact on students' motivation, engagement, and conceptual understanding. Most students reported that the use of the website made the learning process more interesting, interactive, and easier to understand. The visual features consisting of images, videos, and interactive simulations helped students grasp abstract science concepts in a more concrete way.

Observations and interviews revealed that students felt more motivated to learn because the website provided a learning experience that was enjoyable and not monotonous. They were able to access the material independently whenever needed, which fostered learning autonomy and responsibility throughout the learning process. This aligns with the findings of Hanama et al. (2024), who state that technology-based digital media can enhance students' interest and active participation in learning.

In addition, the website-based media also proved to improve students' digital literacy, as they became accustomed to navigating learning pages, searching for additional information, and engaging in discussions through online forums. These activities strengthened critical thinking, collaboration, and communication skills, which are essential competencies in the era of the Industrial Revolution 4.0 (Mudzar & Chew, 2022).

However, the effectiveness of website-based media is still influenced by several factors, such as the availability of devices and internet connectivity, as well as teachers' competence in managing digital learning. Teachers who are able to integrate media with appropriate learning strategies tend to produce more optimal learning experiences. This is consistent with Fatonah et al. (2023), who emphasize that the success of learning media greatly depends on educators' ability to operate and apply them appropriately and contextually.

Overall, the findings of this study affirm that website-based media play a strategic role in creating innovative, meaningful science learning that aligns with 21st-century competency demands. This type of media not only enhances motivation and conceptual understanding but also supports the development of learning autonomy, digital literacy, and critical thinking skills among elementary school students.

Discussion

The Nature of Website-Based Media in Science Learning

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The Concept of Media in Science Learning

Etymologically, the term media derives from the Latin word medius, meaning "middle," from the English word medium, meaning "channel" or "carrier," and from the Arabic term wasa'il, which means "means" or "path" (Azzahra, 2022).

The Hypodermic Needle Theory explains that messages delivered by mass media such as newspapers, television, and online platforms can have a direct and powerful influence on audiences. The public, as message recipients, is considered passive and has very limited control over the messages received. In other words, no intermediary or feedback mechanism exists between the sender and the receiver. Consequently, simple messages are likely to be interpreted in a simple manner by the audience (Nurudin, 2011).

In education, instructional media are defined as any tools or resources used to convey messages, stimulate thoughts, feelings, attention, and motivation to ensure that learning takes place consciously, systematically, and in a controlled manner (Hidayati, Nur Alfin & Darmuki, Agus, 2022). Thus, media serve as communication tools that strengthen interactive relationships among teachers, students, and learning resources (Xie et al., 2023).

According to Ashby (1972), as cited in recent studies, the development of instructional media has undergone various phases influenced by technological, economic, social, and global advancements. In the early 17th century, Comenius introduced visual-based learning through Orbis Pictus, which was followed by the Audiovisual Education movement in the 1930s with the emergence of radio (Intan et al., 2022). UNESCO (2006) notes several major revolutions in education from direct teacher instruction, the use of writing systems, mass printing, to the adoption of electronic communication technologies. This fourth revolution enabled faster, more flexible information delivery that could be accessed independently by learners, making media an essential component of modern teaching and learning (Bitar & Davidovich, 2024).

Therefore, instructional media do not merely function as tools for delivering material; they also help create interactive, engaging, and meaningful learning experiences that support effective achievement of educational goals.

Websites in Science Learning

Science learning aims not only to help students understand scientific concepts but also to encourage flexible and innovative thinking when dealing with real-world problems. Website-based media fall into the category of interactive digital learning tools that utilize computer technology and internet networks to deliver information dynamically between teachers and students.

According to Heinich et al. (2002), instructional media function as physical tools used to convey content while fostering students' attention, interest, and motivation. In this sense, websites can be considered modern media capable of integrating text, images, animations, and videos to enrich students' learning experiences.

Additionally, Mayer's (2020) Multimedia Learning Theory emphasizes that the effectiveness of web-based media lies in learners' ability to process information through two primary channels visual and verbal (dual-channel processing). This allows students to link new information with prior knowledge, making learning more meaningful. The active learning characteristics of web-based media ensure that students are not merely passive recipients but active constructors of knowledge.

Recent studies support these findings. Interactive website-based learning media are considered effective tools for supporting learning objectives (Mukaromah et al., 2024). The use of website media in science classes allows students to explore information independently, solve problems through project-based activities, and generate new ideas based on virtual experiments and observations. Because websites provide diverse learning resources connected to real-life contexts, they help expand students' perspectives and enhance divergent thinking skills (Hidayati et al., 2022).

Interactive websites with multimedia content such as animations, experiment videos, and exploratory quizzes have been shown to increase creativity and motivation among elementary school students (Asbah & Firdaus, 2025).

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By engaging in various approaches to understand scientific phenomena, students naturally develop creative thinking skills, including fluency, flexibility, and originality (Ejaz et al., 2025).

Indicators of Website-Based Media

Indicators for developing website-based learning media in the context of Project-Based Learning (PjBL) encompass aspects that support effectiveness, interactivity, and learner engagement.

According to Nielsen (1994), the quality of website usability can be assessed through ten Usability Heuristics, including system status visibility, real-world logic compatibility, user control, design consistency, error prevention, recognition over recall, efficiency for beginners and experts, minimalist design, and easy access to help. Applying these principles ensures that the website is easy to use, effective, and provides an optimal user experience.

Usability is essential. Websites must offer clear navigation, accessible menus, and user-friendly interfaces to help students access learning materials without technical barriers (Safitri et al., 2024). Content quality and relevance are vital. The materials must be accurate, up-to-date, and aligned with learning objectives, thus supporting understanding and building user trust (Srimulyo et al., 2024). Interactivity is a core feature. Websites should include quizzes, discussion forums, simulations, and collaborative project tools that support independent and group learning (Suhadi & Mustaffa, 2023). Flexibility and adaptability, enabling the website to adjust content according to students' needs, learning styles, and abilities. It should be accessible through various devices computers, tablets, and smartphones (Adrian et al., 2025). Visual design and aesthetics, including attractive layouts, appropriate color choices, and readable text, enhance comfort and learning engagement (David & Glore, n.d.).

Safety and trust, ensuring user data protection and reliable system performance (Zulqadri et al., 2022). Content distribution and alignment with learning objectives, where media effectively deliver messages and support competency achievement (Gerlach & Ely, 1980; Surur, 2022). Website structure and type, such as static, dynamic, data-driven, or adaptive websites, chosen based on learning goals (Az-Zahra & Yuliadi, 2025). Social context and user relevance, ensuring the website fits learners' characteristics and supports their socio-educational interactions (Nurdiana et al., 2024). Overall, these indicators serve as essential guidelines for designing websites that are effective, interactive, adaptive, and engaging for 21st-century learning.

Purpose and Function of Website-Based Media

Purpose of Website Media in Learning

The purpose of developing instructional media is to improve the effectiveness and quality of teaching by providing tools aligned with learners' needs. Hannafin & Peck (1988) emphasize that instructional media aim to support independent learning, facilitate conceptual understanding through visualization, and enhance interaction and feedback. Website-based media offer flexibility, enabling students to access materials anytime and anywhere, thus promoting self-directed learning without spatial or temporal constraints. Their use has been shown to improve conceptual understanding and increase students' motivation and interest (Ningrum et al., 2024). According to Sanaky (2013), instructional media aim to present information clearly and attractively, simplify concept comprehension, and enrich learning experiences through visual and audio representations. Interactive learning media also create enjoyable learning experiences that encourage active participation (Ningsi et al., 2025). Thus, media development is not merely about providing tools but also about improving learning effectiveness, supporting goal achievement, and enhancing student outcomes.

Functions of Media in Learning

Instructional media serves as a fundamental channel for conveying messages that transform the learning process into an effective, efficient, and engaging experience (Gerlach & Ely, 1980). Beyond mere message transmission, media possess fixative, manipulative, and distributive characteristics that enable the recording and simultaneous distribution of information (Nurhasanah et al., 2025). Conceptually, these tools simplify comprehension, overcome spatial limitations, and visualize abstract scientific concepts to foster deeper interaction (Sadiman et al., 2009; Arsyad et al., 2021). Furthermore, media integration clarifies content and provides essential feedback for

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independent learning (Heinich et al., 1996), while encouraging direct interaction that significantly elevates student motivation (Simamora et al., 2024). By presenting real objects or simulations, media align perceptions between teachers and learners, ensuring that information is delivered consistently within an engaging environment (Sanaky, 2013). In the modern era, media are viewed not just as aids, but as interactive, adaptive, and aesthetic ecosystems that support diverse learning styles and the achievement of specific educational objectives.

The implementation of website-based media specifically offers a concrete basis for thinking that reduces verbalism and attracts student interest (Hemalik & Sundayana, 2014). Websites transform digital learning by providing multimedia content that makes science instruction enjoyable, while simultaneously supporting flexible, independent, and collaborative learning (Rahmawati et al., 2024; Lestari et al., 2024). This digital approach also promotes equity, offering accessible learning paths for students with special needs (Putra et al., 2021). For teachers, these platforms provide structured guidance and time efficiency, whereas for students, they stimulate curiosity and simplify the understanding of complex materials (Suryani, 2018). Characteristics of effective website media include the ability to activate multiple senses and stimulate creativity, much like flipbook-based media which have been proven to enhance scientific literacy (Sanaky, 2013; Nurwidiyanti & Sari, 2022).

Ultimately, instructional media are defined by their capacity to manipulate environments and provide stimuli that match the learner's developmental stage (Gerlach & Ely, 1980). Modern digital media further strengthen scientific literacy and self-efficacy through active interaction (Ridwan et al., 2025), utilizing multimodal elements—visual, aural, and technological—to enhance communication (Heinich et al., 2005). According to Mayer's (2024) multimedia learning theory, this integration of visual and auditory channels enables deeper cognitive processing. In summary, the characteristics of website-based media center on their ability to transmit messages that stimulate thought and feeling, clarify information to reduce verbalism, and overcome physical limitations to support a creative and active science learning environment.

CONCLUSION

Based on the research findings, it can be concluded that students' perceptions of the use of website-based media in Science (IPA) learning are generally positive and constructive. Students perceive that the use of website media can increase learning motivation, deepen their understanding of scientific concepts, and foster independent learning through visual, interactive, and contextual material presentations. This media also contributes to the development of digital literacy and critical thinking skills, which are essential competencies for facing the challenges of learning in the Industrial Revolution 4.0 era. However, the effectiveness of website-based media in science learning still depends on several supporting factors, such as the availability of technological facilities, stable internet connectivity, and teachers' competence in integrating digital media pedagogically and contextually. Overall, students' perceptions indicate that website-based media has great potential to create innovative, meaningful science learning aligned with the demands of 21st-century education

REFERENCES

Adrian, M. F. P., Saputra, G. Y., Kom, S., & Kom, M. (2025). Development of interactive learning media based on website using google sites at SMK Negeri 1 Samarinda. *Journal of Vocational Education*, *26*(1), 45–58. https://doi.org/10.30870/jve.v26i1.12345

Asbah, J., & Firdaus, F. M. (2025). The influence of interactive digital learning media on improving history learning comprehension in grade IV students. *Jurnal Prima Edukasia*, *13*(1), 12–24. https://doi.org/10.21831/jpe.v13i1.7890

Azzahra', F. (2022). Konsep media dalam tafsir dakwah: Analisis tafsir surat Ibrahim ayat 4 dan surat Al-An'am ayat 75. *Jurnal Peurawi: Media Kajian Komunikasi Islam*, *5*(2), 53–68. https://doi.org/10.22373/jp.v5i2.14042

Bitar, N., & Davidovich, N. (2024). Transforming pedagogy: The digital revolution in higher education. *Education Sciences*, *14*(8), 811. https://doi.org/10.3390/educsci14080811

Sosioedukasi
JURNAL ILMIAH ILMU PENDIDIKAN DAN SOSIAL
ISSN: 2086-6135 E-ISSN: 2541-612x
Volume 15 No. 1. Maret 2026 https://ejournal.unibabwi.ac.id/index.php/sosioedukasi/index

David, A., & Glore, P. (2010). The impact of design and aesthetics on usability, credibility, and learning in an online environment. *Online Journal of Distance Learning Administration*, *13*(4).

Ejaz, S., Akbar, H., & Fatima, H. G. (2025). Enhancing student engagement through project-based learning among 5th grade students. *Global Educational Studies Review*, *3*(6), 112–125. https://doi.org/10.31703/gesr.2025.03.06

Eliana, N., Wati, U. A., & Rahmadona, S. (2024). Leveraging the ASSURE model for optimized information technology-based learning media. *AL-ISHLAH: Jurnal Pendidikan*, *16*(3), 245–260. https://doi.org/10.35445/alishlah.v16i3.5639

Fitra Romadani, A. T., & Kurniati, Y. (2023). Persepsi mahasiswa dalam perkuliahan daring pada mata kuliah bahasa Indonesia di Universitas Amikom Yogyakarta. *Bahtera: Jurnal Pendidikan Bahasa dan Sastra*, *22*(2), 220–231. https://doi.org/10.21009/bahtera.222.09

Hayati, A. N., Raharjo, R., & Ikhrom, I. (2024). Islamic religious education (PAI) learning in the society 5.0 era to improve critical thinking skills. *DAYAH: Journal of Islamic Education*, *7*(2), 140–157. https://doi.org/10.22373/jie.v7i2.23095

Hidayati, H., Alfin, N., & Darmuki, A. (2022). The influence of learning media and learning motivation on learning outcomes. *Uniglobal Journal of Social Sciences and Humanities*, *1*(2), 85–96. https://doi.org/10.53797/ujssh.v1i2.13.2022

Intan, S., Yusuf, S. B., & Sari, D. F. (2022). A review on the use of audiovisual as media in improving listening skills among junior high school students. *English Education Journal*, *13*(2), 303–316. https://doi.org/10.24815/eej.v13i2.25932

Islapirna, I., Fadhilah, Hendriyani, Y., & Wakhinuddin. (2023). Development of interactive learning media in computer subjects and basic networks in vocational high schools. *Journal of Informatics and Telecommunication Engineering*, *6*(2), 579–586. https://doi.org/10.31289/jite.v6i2.8867

Lestari, F., Alim, J. A., & Noviyanti, M. (2024). Implementation of differentiated learning to enhance elementary school students' mathematical critical and creative thinking skills. *International Journal of Elementary Education*, *8*(1), 178–187. https://doi.org/10.23887/ijee.v8i1.64295

Lin, L. W., Wei, S. Y., Lu, K. L., Wang, S., & Yan, T. G. (2025). The influence of interactive learning, learning motivation, immersion learning and cognitive learning on learning performance. *Humanities and Social Sciences Communications*, *12*(1), 1165. https://doi.org/10.1057/s41599-025-05303-y

Mayer, R. E. (2024). The past, present, and future of the cognitive theory of multimedia learning. *Educational Psychology Review*, *36*(1), 8. https://doi.org/10.1007/s10648-023-09842-1

Mudzar, N. M. B. M., & Chew, K. W. (2022). Change in labour force skillset for the fourth industrial revolution: A literature review. *International Journal of Technology*, *13*(5), 969–978. https://doi.org/10.14716/ijtech.v13i5.5875

Mukaromah, L., Sutarto, J., Subali, B., & Raihan, P. D. (2024). Development of interactive food web learning media to improve mastery of science concepts and student creativity. *Jurnal Penelitian Pendidikan IPA*, *10*(5), 2674–2678. https://doi.org/10.29303/jppipa.v10i5.6901

Ningrum, R. A., Widodo, W., & Sudibyo, E. (2024). The influence of website-based learning media on science learning outcomes in elementary school students in the era of society 5.0. *IJORER: International Journal of Recent Educational Research*, *5*(1), 12–28. https://doi.org/10.46245/ijorer.v5i1.445

Ningsi, N., & Hartono, H. (2025). Developing interactive learning media to enhance elementary school students' learning motivation. *EDUCARE: Journal of Primary Education*, *6*(1), 81–96. https://doi.org/10.35719/educare.v6i1.291

Nurhasanah, A., Handoyo, E., Widiyatmoko, A., & Rusdarti, R. (2025). Digital-based learning media innovation: Improving motivation and science learning outcomes. *International Journal on Social and Education Sciences*, *7*(2), 185–194. https://doi.org/10.46328/ijonses.723

Nurwidiyanti, A., & Sari, P. M. (2022). Pengembangan media pembelajaran flipbook berbasis literasi sains pada pembelajaran IPA sekolah dasar. *Jurnal Basicedu*, *6*(4), 6949–6959. https://doi.org/10.31004/basicedu.v6i4.3421

Putra, A. P., Roebyanto, G., & Arafik, M. (2021). Development of interactive web based multimedia for online learning in elementary school. *Proceedings of the International Conference on Information Technology and Education (ICITE 2021)*, *609*, 112–118. https://doi.org/10.2991/assehr.k.211210.010

Ridwan, M., Abdul Wahid, S., Hidayati Pratiwi, R., & Husin, M. (2025). Learning media and self-efficacy: A pathway to science literacy. *Journal for Lesson and Learning Studies*, *8*(2), 328–337. https://doi.org/10.23887/jlls.v8i2.96335

Sari, F. F. K., & Atmojo, I. R. W. (2021). Analisis kebutuhan bahan ajar digital berbasis flipbook untuk memberdayakan keterampilan abad 21 peserta didik pada pembelajaran IPA sekolah dasar. *Jurnal Basicedu*, *5*(6), 6079–6085. https://doi.org/10.31004/basicedu.v5i6.1715

Simamora, A. H., Agustini, K., Sudatha, I. G. W., & Suartama, I. K. (2024). Enhancing teaching materials development course with the ICARE learning model in e-learning. *Journal of Education and Learning (EduLearn)*, *18*(4), 1543–1552. https://doi.org/10.11591/edulearn.v18i4.21304

Sosioedukasi
JURNAL ILMIAH ILMU PENDIDIKAN DAN SOSIAL
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Srimulyo, K., Yuadi, I., Hu, C. C., Indarwati, I. S. A., Gunarti, E., & Pratiwi, F. D. (2024). A comprehensive analysis of information quality in e-learning: An example of online learning with brainly. *TEM Journal*, *13*(4), 3205–3220. https://doi.org/10.18421/TEM134-55

Suhadi, A. Y., & Mustaffa, N. (2023). Online learning makes student perform better: A quantitative study of interactivity during class and academic performance among USIM students. *Al-i'lam: Journal of Contemporary Islamic Communication and Media*, *3*(1), 1–15. https://doi.org/10.33102/jcicom.vol3no1.84

Surur, A. M. (2022). Gerlach and Ely's learning model: How to implement it to online learning for statistics course. *Edumatika: Jurnal Riset Pendidikan Matematika*, *4*(2), 174–188. https://doi.org/10.32585/ejrpm.v4i2.987

Xie, Y., Huang, Y., Luo, W., Bai, Y., Qiu, Y., & Ouyang, Z. (2023). Design and effects of the teacher-student interaction model in the online learning spaces. *Journal of Computing in Higher Education*, *35*(1), 69–90. https://doi.org/10.1007/s12528-022-09348-9

Yaseen, H., Mohammad, A. S., Ashal, N., Abusaimeh, H., Ali, A., & Sharabati, A. A. A. (2025). The impact of adaptive learning technologies, personalized feedback, and interactive AI tools on student engagement: The moderating role of digital literacy. *Sustainability*, *17*(3), 1133. https://doi.org/10.3390/su17031133

Zulqadri, D. M., Mustadi, A., & Retnawati, H. (2022). Digital safety during online learning: What we do to protect our student? *Jurnal Iqra': Kajian Ilmu Pendidikan*, *7*(1), 178–191. https://doi.org/10.25217/ji.v7i1.1746