

## **Web-Based Learning Innovation in Economics Education: Leveraging Google Sites to Boost Interactivity and Conceptual Understanding**

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**Abstract:** The integration of digital learning environments has become increasingly important in economics education, particularly in facilitating students' understanding of abstract and interconnected concepts. Nevertheless, previous studies on Google Sites-based learning media have primarily focused on technical feasibility and usability, while the pedagogical relationship among instructional design, student engagement, and conceptual understanding remains underexplored. This study aimed to develop and evaluate Google Sites-based learning media and examine its role in fostering engagement and conceptual understanding in economics instruction. The study employed a Research and Development (R&D) approach using the 4D model, consisting of the define, design, develop, and disseminate stages. The participants included tenth-grade students at SMA Nusantara Indah Sintang and two expert validators. Data were collected through classroom observations, expert validation instruments, and student response questionnaires using Likert scales and were analyzed descriptively through feasibility and validity assessments. The findings indicated that the developed media achieved high validity scores from media experts (90%) and subject-matter experts (89%), while student responses reached 92.5%, reflecting high levels of usability, interactivity, and cognitive engagement. The results further demonstrate that multimedia integration, structured navigation, and interactive learning activities contribute to improved conceptual understanding in economics learning. The novelty of this study lies in its integrative instructional perspective, which positions student engagement as a pedagogical mechanism linking digital instructional design and conceptual learning outcomes within web-based learning environments.

**Keywords:** google sites; learning media; student engagement; conceptual understanding; economics education

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### **INTRODUCTION**

Education plays a fundamental role in improving the quality of human resources and supporting broader social and economic development. In the digital era, the rapid advancement of information and communication technologies has significantly transformed educational

practices and reshaped the ways learning environments are designed and implemented. The integration of educational technology is increasingly recognized as a strategic approach to improving learning accessibility, instructional effectiveness, and student engagement (Pillai et al., 2024). Digital learning environments enable more interactive, collaborative, and personalized learning experiences that encourage active participation and flexible knowledge construction (Kumar & Priyanka, 2024). Furthermore, multimedia technologies such as interactive simulations, audiovisual resources, and web-based platforms have been shown to enrich learning experiences and strengthen conceptual understanding across various educational contexts (Yao, 2025). Consequently, students' digital competence and their ability to engage effectively in technology-supported learning environments have become increasingly important dimensions of contemporary education (El Ouaddane et al., 2025).

The integration of technology in education has encouraged the development of web-based learning media that support more dynamic and learner-centered instructional processes. Such media function not only as tools for information delivery, but also as pedagogical systems that facilitate interactions among learners, instructional content, and learning activities. Through the integration of visual, textual, and auditory representations, instructional media facilitate more effective information processing and conceptual interpretation (Mayer, 2020). Previous studies have shown that technology-supported instructional media can enhance students' motivation, participation, and learning engagement by creating more interactive learning experiences (Al-Rahmi et al., 2023; Rahim et al., 2022). Interactive digital environments further support communication, collaboration, and cognitive development through active learner-content interaction (Katsarou & Chatzipanagiotou, 2021). Therefore, the integration of multimedia-based instructional media has become increasingly important in supporting meaningful and effective learning experiences.

Learning media possess important characteristics and functions that contribute to improving students' conceptual understanding and learning outcomes. Multimedia-based instructional media can concretize abstract concepts through visualization, animation, and simulation, thereby helping students understand complex learning materials more effectively (Made Rajendra & Made Sudana, 2018). Empirical evidence consistently demonstrates that effective digital learning media positively influence students' academic achievement, engagement, and overall learning effectiveness (Devega et al., 2022; Hidayati & Slamet, 2025; Lubis et al., 2023). From the perspective of multimedia learning theory, meaningful learning occurs when learners actively process verbal and visual information through integrated cognitive channels (Mayer, 2020). This perspective is reinforced by Cognitive Load Theory, which emphasizes that instructional design should minimize unnecessary cognitive load so that learners can focus more effectively on processing relevant information (Sweller et al., 2019). Accordingly, instructional environments that integrate structured navigation, multimodal representation, and interactive learning activities are considered capable of supporting deeper conceptual learning processes.

The effective use of learning media offers significant opportunities to address instructional challenges in economics education. Economics learning requires students to understand abstract, systemic, and interconnected concepts such as inflation, market mechanisms, production systems, and economic distribution. Unlike many school subjects, economics education requires learners to simultaneously interpret causal relationships, dynamic socio-economic interactions, and real-life contextual phenomena. Consequently, economics instruction requires learning environments capable of supporting conceptual visualization, contextual interpretation, and analytical reasoning rather than rote memorization alone (Agustin

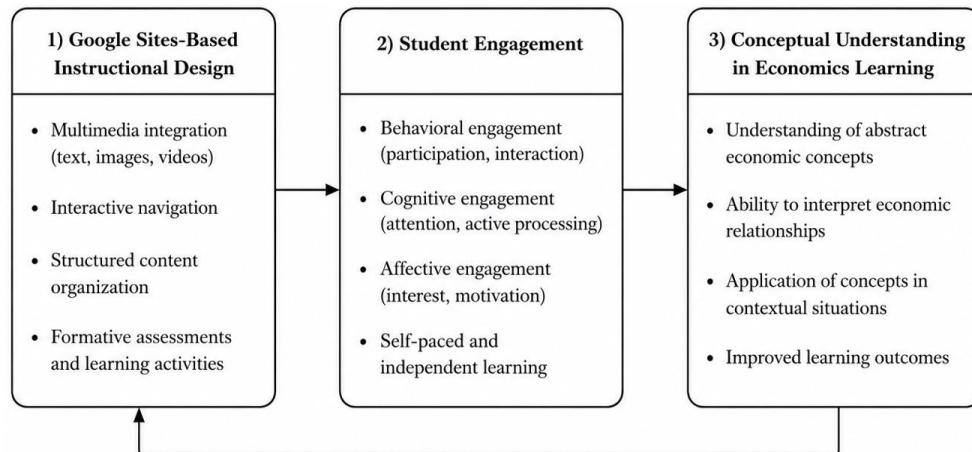
et al., 2025; Permana et al., 2024). However, classroom instruction in many educational contexts, including West Kalimantan, still relies heavily on lecture-centered approaches and presentation-based media that provide limited opportunities for interaction and active student participation (Manek & Butar-Butar, 2024; Syfani et al., 2023). Previous studies further indicate that limited variation in instructional media negatively affects students' participation and motivation, whereas interactive digital media can significantly improve engagement, conceptual understanding, and learning outcomes (Ali et al., 2025; Citra & Rosy, 2020; Kusumo et al., 2024).

The growing demand for more flexible, interactive, and student-centered learning environments has increased the urgency of utilizing technology-based instructional media. One increasingly accessible alternative is web-based learning media, which allows flexible access, self-paced exploration, and continuous interaction with learning resources beyond classroom limitations. Among various digital platforms, Google Sites has attracted considerable attention because of its accessibility, ease of use, and ability to integrate multimedia resources within a unified instructional environment. Previous studies have reported that Google Sites positively supports learning accessibility, student participation, and instructional effectiveness (Halim & Halim, 2024; Sagita et al., 2023). Other studies further demonstrate that Google Sites-based learning media are highly feasible for classroom implementation and contribute positively to students' learning outcomes and conceptual understanding (Nasution & Astuti, 2024; Waraga et al., 2023). These findings indicate that web-based instructional platforms have considerable potential to support more interactive and learner-centered educational practices, particularly in learning environments that require active conceptual engagement.

Despite the growing body of research on digital instructional environments, existing studies on Google Sites and similar web-based platforms remain predominantly focused on technical feasibility, usability, student satisfaction, or general learning outcomes (Nasution & Astuti, 2024; Waraga et al., 2023). Although several studies have examined student participation and conceptual understanding within digital learning contexts (Fauziyah & Martiningsih, 2025; Johdi et al., 2024), the pedagogical mechanism through which instructional media simultaneously influence student engagement and conceptual learning remains insufficiently explored. Existing literature tends to position engagement and conceptual understanding as separate instructional outcomes rather than interconnected learning processes. In economics education, this limitation becomes particularly important because students are required not only to participate actively in learning activities, but also to interpret complex causal relationships and socio-economic phenomena conceptually. As emphasized by (Kim et al., 2020), the effectiveness of online learning environments depends not only on technological accessibility, but also on how instructional interactions are systematically designed to sustain learner participation over time. In addition, Self-Regulated Learning theory highlights learners' active role in planning, monitoring, and evaluating their own learning processes within flexible instructional environments (Schunk & Greene, 2017). These perspectives suggest that web-based instructional environments should be understood not merely as technological tools, but as pedagogical systems capable of shaping how learners engage cognitively and behaviorally during the learning process.

Accordingly, this study positions Google Sites-based learning media not merely as a digital platform, but as an integrated instructional environment that organizes multimedia representation, interactive navigation, and learner participation to facilitate deeper conceptual processing in economics learning. Within this framework, student engagement is conceptualized as a pedagogical mechanism through which instructional design influences conceptual understanding. Unlike previous studies that primarily emphasize usability or technical feasibility,

the present study adopts a more integrative pedagogical perspective by examining the interconnected relationship among instructional design, learner engagement, and conceptual learning processes. Based on this perspective, the study aims to: (1) develop and validate Google Sites-based learning media for economics instruction; (2) examine students' responses as indicators of engagement toward the developed instructional media; and (3) explain how web-based instructional environments facilitate conceptual understanding through interactive and learner-centered learning experiences. Therefore, this study is expected to contribute to the development of more pedagogically grounded and contextually relevant perspectives on technology-enhanced economics learning..



**Figure 1.** Conceptual Framework of Google Sites-Based Learning Media

**METHOD**

This study employed a Research and Development (R&D) approach to systematically design, develop, and evaluate a web-based learning media using Google Sites for economics instruction. The R&D framework was chosen for its suitability in producing an educational product while simultaneously assessing feasibility, usability, and pedagogical effectiveness. The development followed the 4D instructional design model—define, design, develop, and disseminate—providing a structured, iterative framework aligning instructional objectives, learner characteristics, and curriculum standards, with continuous refinement through expert validation and field implementation.

The study was conducted at a senior high school in Sintang, Indonesia, involving tenth-grade economics students selected via purposive sampling. An economics teacher also participated to provide contextual insights. Two experts, a media specialist and a subject-matter expert, validated the technical quality and content appropriateness of the learning media.

In the define phase, a needs analysis was conducted, including curriculum review, learner profiling, content analysis, and classroom observation, highlighting reliance on conventional, less interactive media. The design phase involved constructing an instructional blueprint, organizing content, designing user interface and navigation, and integrating multimedia and formative assessments to support active learning. In the develop phase, the media was created, validated, and iteratively revised to enhance usability, visual design, content accuracy, and alignment with learning objectives. The disseminate phase implemented the validated media in classroom instruction, enabling evaluation of practicality and user acceptance.

Data were collected through observation sheets, expert validation, and student response questionnaires, all using five-point Likert scales. Validation instruments assessed content

accuracy, instructional quality, interface design, interactivity, and usability. Content validity was ensured via expert review, and construct validity aligned with educational technology and instructional design frameworks. Reliability was confirmed using Cronbach's alpha ( $\alpha \geq 0.70$ ).

Data collection mirrored the development stages: classroom observation and teacher interviews identified instructional needs; expert validation assessed feasibility and quality; classroom implementation captured student interaction with the media; and student questionnaires measured perceptions of usability, engagement, and instructional effectiveness. Descriptive statistics, including mean and standard deviation, were employed, while feasibility was quantified using the formula:

$$\text{Feasibility Index} = \frac{\text{Obtained Score}}{\text{Maximum Score}} \times 100\%$$

Values were interpreted against predefined criteria from very low to very high. Ethical standards were strictly followed, with informed consent obtained, voluntary participation ensured, confidentiality maintained, and classroom instruction uninterrupted.

## RESULTS AND DISCUSSION

### Result

#### Instructional Needs Analysis

The analysis stage constituted the initial phase in the development of the Google Sites-based learning media, focusing on identifying instructional conditions, learner needs, and student characteristics. The findings from classroom observations conducted at SMA Nusantara Indah Sintang revealed that the tenth-grade level consisted of six study groups facilitated by two economics teachers. The school was equipped with basic technological infrastructure, including projectors to support instructional delivery. Furthermore, students were permitted to bring personal mobile devices, thereby enabling the integration of digital learning media into classroom activities. However, limited internet connectivity remained a significant constraint, as students often relied on personal data networks to access online learning resources.

In terms of instructional practices, teachers predominantly utilized presentation-based media such as PowerPoint. While this approach provided certain advantages, including structured content delivery and improved clarity of explanations, it was found to be suboptimal in practice. Observational data and interviews with the economics teachers indicated that the presentation slides were largely text-heavy, visually unappealing, and lacked interactive elements, which consequently limited their effectiveness in stimulating student interest and engagement.

Additionally, the nature of economics as a subject, which involves abstract concepts such as production, distribution, and consumption, requires more contextualized and visually enriched instructional media to facilitate meaningful understanding. The limited variation in learning media contributed to a predominantly teacher-centered instructional approach, resulting in low levels of student participation. These findings highlight the need for innovative, interactive, and visually engaging learning media capable of enhancing student engagement and supporting conceptual comprehension.

From a curricular perspective, the school had implemented the Merdeka Curriculum, which emphasizes deep learning approaches and the development of critical thinking skills. Therefore, the instructional media to be developed needed to align with these pedagogical principles by promoting active learning, conceptual understanding, and student-centered engagement.

#### Design of Google Sites-Based Learning Media

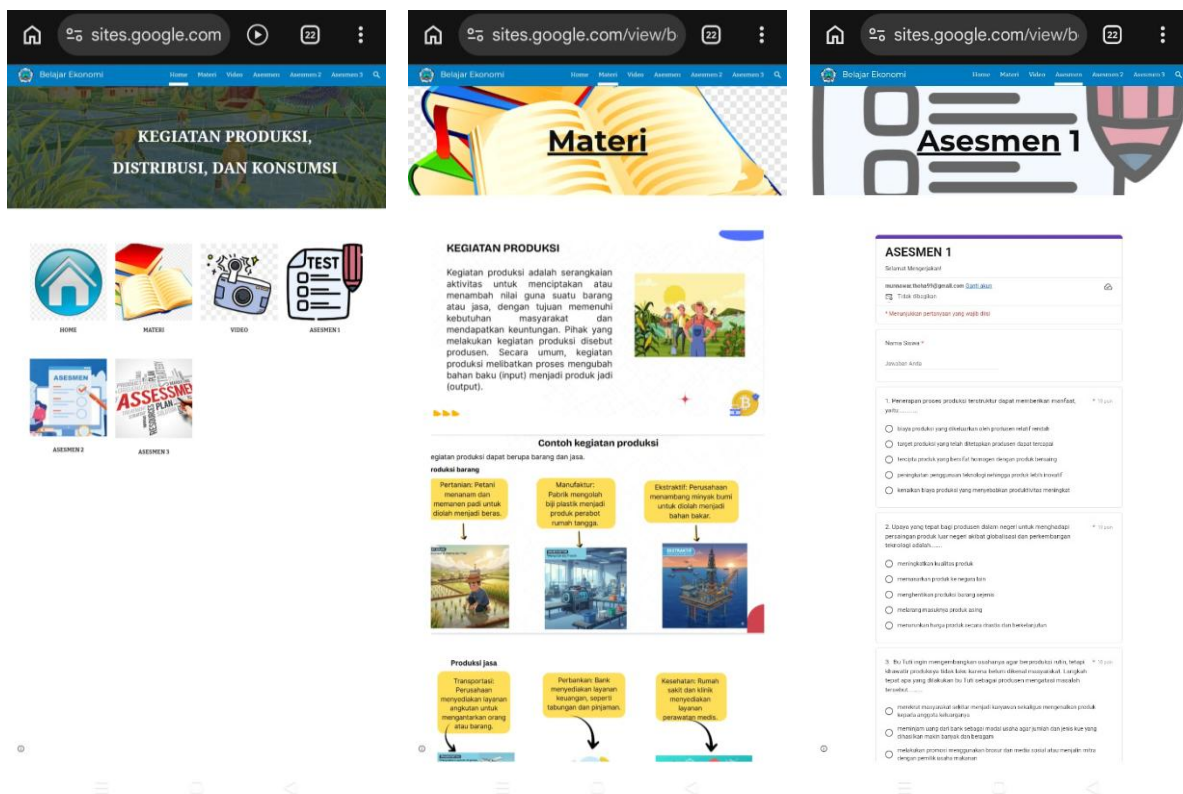
Following the analysis phase, the design stage focused on conceptualizing and structuring the Google Sites-based learning media. The platform was selected due to its ease of use, accessibility, and capability to integrate diverse learning resources, including text, images, videos, and external links.

The design process involved the systematic organization of learning content, the development of user-friendly interface layouts, and the construction of evaluation instruments. Particular attention was given to visual design elements and navigation structures to ensure that the media was both engaging and accessible for students. The interface was carefully structured to support intuitive navigation, allowing students to progress through the learning materials in a logical and sequential manner, from introductory concepts to evaluative tasks.

**Table 1.** Structure of Google Sites-Based Learning Media

Menu	Description
Home	Main page containing an introduction to the learning material and user guidelines
Materials	Provides instructional content on production, distribution, and consumption
Videos	Offers learning videos to support conceptual understanding
Assessment 1	Practice exercises to measure students' initial understanding
Assessment 2	Advanced exercises to deepen students' understanding
Assessment 3	Final evaluation to assess overall student comprehension

Source: Research data, 2025



**Figure 2.** Interface of the Developed Google Sites-Based Economics Learning Media

The developed learning media consists of several interconnected main menus designed to support the instructional process comprehensively; these menus—including a homepage providing an overview and usage instructions, a materials section presenting core content on production, distribution, and consumption, a video section offering supplementary audiovisual

explanations, and multiple assessment components aimed at evaluating students’ understanding at different stages of learning—are illustrated in Figure 2.

**Validation and Development Results**

The development stage involved producing the Google Sites-based learning media based on the instructional design developed in the previous phase, followed by expert validation to evaluate its feasibility and instructional quality. The validation process involved media experts and subject-matter experts, focusing on visual design, navigation, interactivity, content accuracy, and instructional alignment. This stage aimed to ensure that the developed media was not only technically functional, but also pedagogically appropriate for supporting economics learning.

The media expert validation results showed a score of 72 out of 80, equivalent to 90%, which falls within the “highly valid” category. The evaluation covered several important dimensions, including visual presentation, navigation, and interactivity. These findings indicate that the developed media was systematically designed and capable of supporting interactive and learner-centered learning activities. In particular, the high interactivity score suggests that the media successfully facilitated active learner-content interaction, which is essential for sustaining cognitive engagement in digital learning environments. Meanwhile, the subject-matter expert validation obtained a score of 51 out of 57 (89%), also categorized as “highly valid.” This result indicates that the instructional content was accurate, clearly presented, and aligned with the intended learning objectives in economics education.

**Table 2.** Media Expert Validation Results

Evaluation Aspect	Score	Maximum Score	Percentage	Category
Visual Design	18	20	90%	Highly Valid
Navigation	17	20	85%	Highly Valid
Interactivity	19	20	95%	Highly Valid
Total	54	60	90%	Highly Valid

Source: Research data, 2025

Overall, the validation results confirm that the developed Google Sites-based learning media is both technically feasible and pedagogically appropriate for classroom implementation. The findings further suggest that interactive instructional design plays an important role in supporting student engagement and conceptual understanding within web-based economics learning environments.

**Classroom Implementation and Student Responses**

The validated Google Sites-based learning media was implemented in classroom economics instruction for tenth-grade students to evaluate students’ responses toward its use. The classroom implementation enabled students to utilize the developed web-based learning media through interactive instructional activities and multimedia-supported learning processes.

**Table 3.** Students’ Responses to the Learning Media

Evaluation Aspect	Score	Percentage	Category
Media Attractiveness	47	94%	Very Good
Ease of Use	45	90%	Very Good
Content Clarity	46	92%	Very Good
Total	185	92.5%	Very Good

Source: Research data, 2025

The findings from the student response questionnaire indicated a highly positive reception, with a total score of 185 out of a maximum score of 200, corresponding to 92.5%, which

falls within the “very good” category. The evaluation included several instructional aspects, namely media attractiveness, ease of use, visual quality, and clarity of instructional content.

As presented in Table 3, students reported positive perceptions regarding media attractiveness (94%), ease of use (90%), and clarity of instructional content (92%). These findings indicate that the Google Sites-based learning media was perceived as accessible, interactive, and supportive of classroom learning activities. Overall, the implementation results demonstrate that the developed learning media was well accepted by students and feasible for use in economics classroom instruction through the integration of multimedia content and interactive learning features.

**Observation of Student Learning Engagement During Implementation**

To complement the questionnaire data, classroom observations were conducted during the implementation stage to examine students’ engagement while using the Google Sites-based learning media. The observations focused on students’ participation, interaction with multimedia features, classroom discussions, and independent learning activities.

The observational findings indicated that students actively participated in the learning process by independently accessing instructional materials through their mobile devices and navigating the learning menus systematically. Students showed greater interest in the video and assessment sections, where they frequently revisited materials and discussed economics concepts with peers. In addition, the structured organization of the learning content supported students in following the instructional sequence more effectively and encouraged more interactive classroom participation compared with previous presentation-based instruction.

**Table 4.** Observation Results of Student Learning Engagement

<b>Observed Aspect</b>	<b>Observation Findings</b>
Participation in learning activities	Students actively explored learning materials independently
Interaction with multimedia features	Students frequently accessed videos and interactive assessments
Classroom discussion	Students discussed economics concepts during learning activities
Independent learning behavior	Students revisited learning materials when experiencing difficulties
Learning participation	Classroom participation became more interactive

Source: Research data (2025)

Overall, the observational findings indicate that the Google Sites-based learning media supported more interactive and learner-centered instructional activities in economics learning. The integration of multimedia resources, structured navigation, and self-paced learning features appeared to facilitate students’ engagement during the instructional process..

**Discussion**

The findings of this study indicate that the effectiveness of Google Sites-based learning media extends beyond technical feasibility and user acceptance. The effectiveness of the Google Sites-based learning environment emerged not merely from technological accessibility, but from the pedagogical organization of multimedia interaction, learner engagement, and conceptual scaffolding. The integration of videos, structured navigation, and interactive assessments enabled students to process abstract economic concepts through multiple cognitive channels, thereby

facilitating deeper conceptual understanding. In this context, Google Sites functioned not merely as a digital platform, but as an instructional ecosystem that organized multimodal representation, active learner participation, and self-paced learning within economics education. This finding suggests that web-based instructional environments should be understood as pedagogically structured learning systems capable of simultaneously supporting cognitive engagement and conceptual learning processes. In line with (Kim et al., 2020), sustained engagement in digital learning environments is strongly influenced by how instructional features are systematically organized to facilitate continuous learner interaction rather than by technological access alone.

From a theoretical perspective, these findings align with the principles of multimedia learning theory. As articulated by (Mayer, 2020), the integration of visual, textual, and interactive elements facilitates deeper cognitive processing and supports knowledge construction. The high validity scores obtained in this study suggest that the developed media adhered to key instructional design principles, including coherence, clarity, and interactivity. This interpretation is further supported by Al-Rahmi et al. (2023; Yao (2025), who argue that well-designed digital media enhance both content delivery and cognitive engagement. Similarly, Iyamuremye et al. (2025) found that structured web-based learning environments significantly improve conceptual understanding and skill acquisition, although misconceptions may still persist without targeted instructional reinforcement.

The effectiveness of the developed learning media can be understood through the interaction between instructional structure and students' cognitive processing. The integration of videos, sequential navigation, formative assessments, and multimodal representations enabled learning materials to be presented in a more organized and interconnected manner, thereby reducing cognitive fragmentation when students processed abstract economic concepts.

In this context, Google Sites functioned not merely as a digital repository, but as a structured instructional scaffold that guided learners through progressive conceptual stages. Among the instructional features, multimodal representation and structured navigation appeared to contribute most significantly to students' engagement and conceptual understanding. The combination of textual explanation, visual illustration, and video integration enabled students to process abstract economic concepts through multiple cognitive channels, thereby reducing conceptual ambiguity. In addition, the sequential navigation structure supported self-paced exploration, allowing learners to revisit instructional materials according to their individual learning needs. However, the effectiveness of Google Sites should not be interpreted as the result of technological presence alone. Without pedagogically structured content organization and active teacher facilitation, web-based learning platforms may function merely as digital repositories rather than meaningful instructional environments.

Such instructional organization is important because repeated interaction with systematically designed online activities can strengthen students' familiarity with learning resources and support independent learning capacities (Mamun & Lawrie, 2023). In addition, students' positive responses regarding media attractiveness and ease of use indicate that interface quality and user experience played a substantial role in sustaining engagement. This finding is consistent with previous studies suggesting that intuitive navigation and visually stimulating interfaces can reduce cognitive distraction while simultaneously increasing students' situational interest and active participation in digital learning environments (Holtgrave & Good, 2026; Wong et al., 2024).

The strong positive responses from students further highlight the central role of engagement in mediating the relationship between instructional design and learning outcomes.

(Panigrahi et al., 2021) conceptualize engagement as a critical mechanism through which instructional interventions influence learning effectiveness, while Fei et al. (2025) empirically demonstrate its mediating role in online learning environments. The present findings extend this perspective by indicating that engagement is not generated solely through the use of technology itself, but through the systematic integration of interactive and learner-centered instructional features. In line with Ilin (2022); Kumar & Priyanka (2024), the structured interaction embedded within the Google Sites platform appears to promote sustained attention, active exploration, and self-paced learning. These forms of participation are particularly important in economics education, where students are required to process abstract and relational concepts through continuous cognitive engagement.

Compared with previous studies on Google Sites and similar platforms, this research adopts a more integrative analytical perspective. While (Nasution & Astuti, 2024; Sagita et al., 2023) primarily focused on isolated indicators such as usability or learning outcomes, the present study simultaneously examines media validity, engagement, and conceptual understanding. In this regard, (Kim et al., 2020) argue that the effectiveness of online learning platforms depends not only on access to learning resources, but also on how instructional components are systematically designed to sustain learner interaction over time. The current findings provide empirical support for this argument by demonstrating the interconnected relationship among design quality, engagement, and cognitive outcomes.

The primary contribution of this study lies in the formulation of an integrative instructional perspective explaining how google Sites-based learning media influence learning outcomes through interconnected affective and cognitive pathways. Unlike previous studies that mainly focused on usability, satisfaction, or general achievement outcomes, the present study conceptualizes Google Sites-based learning media as an integrated pedagogical ecosystem in which instructional design, learner engagement, and conceptual understanding mutually reinforce one another. This perspective extends the digital learning literature by emphasizing the mediating role of engagement in facilitating conceptual learning processes. Huang et al. (2025) argue that instructional designs integrating motivational elements and language support can strengthen engagement and subsequently enhance critical thinking and conceptual understanding. Similarly, (Wang et al., 2022) demonstrate that behavioral, cognitive, and emotional engagement collectively mediate the influence of platform value on learning outcomes in online learning environments. In addition, (Iyamuremye et al., 2025) highlight the close relationship between conceptual understanding and broader skill development in structured web-based learning contexts. By synthesizing these perspectives, the present study offers a more comprehensive explanation of how digital instructional environments simultaneously shape affective participation and cognitive learning processes.

The specific focus on economics education further strengthens the contribution of this study. As a discipline characterized by abstract and complex constructs, economics often presents substantial challenges for secondary-level learners. The findings suggest that Google Sites-based learning media can facilitate the visualization and contextualization of abstract concepts, thereby reducing cognitive load and supporting deeper conceptual comprehension. This observation is consistent with (Agustin et al., 2025; Permana et al., 2024), who argue that technology-based learning environments are particularly effective in supporting higher-order thinking skills. Similarly, (Tani et al., 2022) emphasize that multimedia presentations improve learning effectiveness in non-STEM disciplines, including economics, through engaging visual and auditory representations. Nevertheless, these findings should not be interpreted as suggesting that

technology alone guarantees conceptual improvement. (Zhou & Park, 2024) emphasize that the effectiveness of multimedia learning depends heavily on instructional design quality, including conceptual organization, information density, and cognitive load management. Likewise, (Turmuzi et al., 2024) found that although digital learning platforms improve instructional efficiency, concerns related to user experience and learning pace may still emerge. Therefore, the effectiveness of web-based learning environments remains dependent on instructional organization, teacher facilitation, and the alignment between media design and pedagogical objectives.

Despite these contributions, several limitations should be acknowledged. This study relied primarily on descriptive quantitative analysis and self-reported student responses, which may limit the generalizability of the findings. Kim et al. (2020) further note that long-term engagement in online learning environments is also influenced by teacher involvement, a variable that was not extensively examined in this study. Moreover, (Fei et al., 2025) recommend incorporating additional variables and more diverse participant samples to strengthen explanatory models in digital learning research. Future studies should therefore employ more rigorous methodological approaches, such as quasi-experimental or longitudinal designs, to validate the proposed instructional framework and examine long-term learning outcomes. Qualitative investigations may also provide deeper insights into students' engagement experiences and learning behaviors within web-based instructional environments, particularly among learners with limited prior exposure to online learning (Getenet et al., 2024).

In conclusion, the present study confirms that the effectiveness of Google Sites-based learning media is shaped not only by technological accessibility, but also by the pedagogical organization of interaction, engagement, and conceptual scaffolding within web-based learning environments. The findings demonstrate that multimodal and learner-centered instructional design can simultaneously support affective participation and cognitive comprehension, particularly in economics education, where students are required to understand abstract and relational concepts. Accordingly, this study contributes to the digital pedagogy literature by proposing an integrative instructional perspective that connects instructional design, student engagement, and conceptual learning processes within technology-enhanced economics education.

## **CONCLUSIONS**

This study confirms that Google Sites-based learning media are both pedagogically feasible and instructionally effective in supporting economics learning at the secondary education level. The developed media obtained high validation scores from both media experts (90%) and subject-matter experts (89%), while students' responses reached 92.5%, indicating strong levels of acceptance, usability, attractiveness, and clarity of instructional content. These findings suggest that web-based learning environments can provide more interactive, accessible, and learner-centered learning experiences than conventional presentation-based instruction. In the context of economics education, the integration of multimedia explanations, interactive navigation, and formative assessments was found to facilitate students' understanding of abstract and interconnected economic concepts more effectively.

Beyond its practical feasibility, this study contributes an integrative instructional perspective on how web-based learning media influence learning outcomes through interconnected pedagogical processes. The findings indicate that Google Sites functions not merely as a digital platform, but as an instructional mediation system that connects multimedia

instructional design, student engagement, and conceptual understanding within a unified digital learning environment. Within this framework, student engagement operates as a pedagogical mechanism through which interactive and multimodal instructional features promote deeper cognitive processing and conceptual comprehension. This contribution extends previous studies that have primarily focused on usability or general learning outcomes by offering a more comprehensive explanation of how instructional interaction design supports both participatory and cognitive dimensions of learning in economics education.

The findings further imply that web-based instructional media should not be viewed solely as supplementary technological tools, but as structured pedagogical environments capable of strengthening conceptual engagement, independent learning, and learner interaction. For economics teachers, this study highlights the importance of integrating multimodal content presentation, intuitive navigation, and self-paced learning activities into instructional design to support active conceptual learning. At the institutional level, schools may utilize Google Sites-based learning environments as part of broader digital pedagogy initiatives aimed at improving interactivity and conceptual mastery in secondary education. Nevertheless, this study is limited by its reliance on descriptive analysis and self-reported student responses. Future research is therefore encouraged to employ experimental or longitudinal approaches to examine the long-term effects of web-based instructional environments on conceptual understanding, higher-order thinking skills, and knowledge retention.

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