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THE DIGITAL LEARNING DILEMMA: EASY TO DIGEST, HARD TO IMMERSE?

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Abstrak

Penelitian ini menyelidiki dilema pembelajaran digital di kalangan mahasiswa Indonesia terkait polarisasi antara kemudahan akses konten edukatif visual (Instagram/TikTok/YouTube) dan kedalaman pemrosesan informasi akademik, berdasarkan temuan pendahuluan bahwa >80% responden mengakses konten visual harian namun 65% mengalami penurunan minat baca teks panjang. Dengan desain kuantitatif deskriptif-korelasional, data dikumpulkan melalui kuesioner Likert valid (α=0.87) pada 50 mahasiswa S1 (56% perempuan; 72% usia 18-20 tahun) dianalisis secara statistik (SPSS 26.0) menggunakan korelasi Pearson, uji-t, dan ANOVA. Hasil mengungkap: (1) preferensi kuat terhadap konten visual (mean=4.12) berkorelasi negatif signifikan dengan kebiasaan membaca teks panjang (r=-0.58) dan kedalaman pemahaman (r=-0.37), (2) dampak lebih kritis pada perempuan (p=0.01), mahasiswa semester awal (r=-0.72), dan pengguna multitasking, (3) meski demikian, mahasiswa semester akhir menunjukkan ketahanan lebih tinggi (skor 3.92) melalui strategi adaptif seperti integrasi konten visual-tekstual. Simpulan penelitian mengonfirmasi eksistensi dilema "mudah dicerna vs sulit mendalam" yang bersumber pada mekanisme neuroplastisitas kompetitif, sekaligus merekomendasikan model Hybrid Learning Scaffolding (HLS) berbasis kurasi konten, literasi ganda, dan desain multimedia terpadu untuk mentransformasi konten visual menjadi jembatan menuju pemahaman mendalam.

Kata kunci : Pembelajaran digital; Konten visual; Kedalaman pemahaman; Dilema pembelajaran.

Abstract

This study investigates the digital learning dilemma among Indonesian university students related to the polarization between the ease of access to visual educational content (Instagram/TikTok/YouTube) and the depth of processing academic information, based on preliminary findings that >80% of respondents access visual content daily but 65% experience a decrease in interest in reading long texts. With a descriptive-correlational quantitative design, data were collected through a valid Likert questionnaire (α=0.87) on 50 undergraduate students (56% female; 72% aged 18-20 years) and were analyzed statistically (SPSS 26.0) using Pearson correlation, t-test, and ANOVA. The results revealed: (1) a strong preference for visual content (mean=4.12) was significantly negatively correlated with the habit of reading long texts (r=-0.58) and depth of understanding (r=-0.37), (2) a more critical impact on women (p=0.01), early semester students (r=-0.72), and multitasking users, (3) however, final

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semester students showed higher resilience (score 3.92) through adaptive strategies such as visual-textual content integration. The study's conclusions confirmed the existence of the "easy to digest vs. difficult to understand" dilemma stemming from competitive neuroplasticity mechanisms, while recommending a Hybrid Learning Scaffolding (HLS) model based on content curation, multiple literacies, and integrated multimedia design to transform visual content into a bridge to deep understanding.

***Keywords**: Digital learning; Visual content; Depth of understanding; Learning dilemma.*

I. Introduction

The digital revolution has fundamentally changed the educational landscape, especially in students' academic information consumption patterns (Ainiyah, 2018). A survey of social media users in Indonesia (2024) revealed a significant surge in the utilization of social media platforms such as Instagram, TikTok, and YouTube as alternative learning resources, with 76.08% of the public accessing news via the internet and 76.04% of the public using social media to obtain information and education. A community service report by Gannika et al (2021) used educational content on COVID-19 prevention, with the active participation of children. The research confirmed that using social media for education is very effective, especially among Generation Z (the group of people born between 1997 and 2012). This phenomenon is driven by the attractiveness of dynamic visual content and instant accessibility so that the educational content fits the Generation Z lifestyle.

On the other hand, educational institutions with traditional learning models still rely on long texts such as scientific journals and textbooks that demand deep cognitive processing (Fathurrohman, 2015). This transformation creates a new paradox: on the one hand, social media democratizes knowledge through easily digestible formats; on the other hand, concerns that this convenience could potentially erode students' analytical capacity in dealing with academic complexity. Research by Zai & Zai (2025) mentioned that university students recognized a decrease in interest in reading long texts after being exposed to intensive educational visual content, which strengthens the researcher's hypothesis mentioned in the title of this study.

The research title "The Dilemma of Digital Learning: Easy to Digest, Hard to Deepen?" carries a dichotomous concept at the core of the issue. “Easy to digest” refers to the superiority of digital educational content such as short explainer videos, interactive infographics or animated illustrations in conveying information in a quick, engaging and minimal cognitive effort manner, as reflected in respondents' high agreement with the statement “I often seek information through videos/images rather than reading long texts” (average score of 4.2 out of 5). Conversely, “difficult to immerse” highlights the risk of degradation of critical thinking skills due to reduced engagement with complex material, as indicated by the 47% of respondents who agreed with the statement “I find reading articles more difficult than watching videos”. This dilemma is not merely pedagogical but reflects challenges in Information Processing Theory and the Impact of Social Media Educational Content Consumption,

where passive processing of visual information has the potential to weaken the capacity for abstract analysis and systematic argumentation.

George Miller's 1956 cognitive information processing theory explains the dilemma of digital learning through the concepts of cognitive load and limited working memory capacity. Short visual content on platforms such as TikTok and YouTube capitalizes on transient attention by presenting compressed and multimodal (visual-auditory) information, thus reducing cognitive load but limiting space for deep elaboration. Research by Kruger & Doherty (2016) confirms that short information content can improve short-term memory retention compared to text, but weakens deep encoding in the hippocampus (Kelley & Whatson, 2013). This paradox aligns with Carr's (2020) shallowing hypothesis, which states that exposure to fast digital content activates a “skimming” mindset, reducing cognitive endurance for abstract processing. Furthermore, personalization algorithms create cognitive echo chambers (Suhendra & Selly Pratiwi, 2024) that filter out complexity, a phenomenon that is exacerbated by dopaminergic reward system mechanisms in the brain (Surawan, 2025) when consuming instant content.

Dewi's (2024) literature research found that the intensity of internet use is associated with poor decision-making, supported by fMRI findings that show a decrease in neural activity in the anterior cingulate cortex area when individuals with excessive internet use perform processing, which in turn also affects activity in the prefrontal cortex (León Méndez et al., 2024). In Indonesia, research by Setiawan (2024) revealed that Generation Z prefers to view short video content on the TikTok platform but still lacks understanding of digital literacy, so Generation Z experiences the digital comprehension paradox: they feel they understand educational video content but fail to replicate concepts in the form of argumentative writing. This finding is consistent with Van Der Weel's (2011) media displacement theory, where easy access to visual content shifts the habit of reading long texts (Syahputri et al., 2025). Ironically, a survey from Evrenol & Sadry's (2024) study reported that 59.7% of university students thought they did not learn the task well through video, and 73.6% felt they understood the task better face-to-face. Competitive neuroplasticity is a key explanation: fast processing neural pathways (visual-limbic) strengthen, while slow pathways (prefrontal-hippocampal) weaken due to lack of practice (Chen et al., 2017).

In research in the field of special education, gender and education level were not shown to be significantly related to changes in cognitive flexibility due to the use of adaptive technology (Alqudah & Khasawneh, 2024). However, another study by Bali et al (2024) showed that confidence in digital learning and technology-related stress can mediate the relationship between cognitive flexibility and digital skills, which can vary across individuals. Then the scale of semester and age of students becomes a pointer to the duration of students in adapting, some studies reveal five adaptive tactics of students: (1) scaffolded integration (video as a preview before reading text), (2) dual annotation (note text while watching), (3) algorithmic curation (filter cognitively impactful content), (4) distraction blocking, and (5) deliberate deep reading sessions

(Lee & Kim, 2023; Prekshi Saini, 2025). This finding supports Spiro's 1987 cognitive flexibility theory that controlled multimodal exposure can strengthen comprehension if it is hierarchically designed (Spiro et al., 2019).

Integrative models such as Hybrid Learning Scaffolding (HLS) proposed in this study are rooted in Sweller's (1994) cognitive load management theory and multimedia principle (R. E. Mayer, 2017). The HLS framework adopts three pillars: (1) Content Curation Pyramid that systematizes visual content as a base before textual exploration (Clark & Mayer, 2012), (2) Dual Literacy Training combines digital navigation training with deep reading drills by Wolf & Barzillai (2009), and (3) Integrated Multimedia Design applying the principles of segmentation, signalization, and personalization. Experiments at STKIP Gotong Royong Masohi proved that similar models improve learning and writing skills 72% of pretest and posttest results showed an increase in the average score from 9.5 to 37.6, with a sig value <0.05 (Lamasano & Sohilait, 2025). 21st-century education emphasizes the need for “digital-pedagogical literacy” for lecturers and “blended by design” curriculum design, not just technology adoption (Lazarinis et al., 2025; Vishal, 2024).

With this gap in mind, this study was designed to achieve three main objectives. First, to measure the correlation between the frequency of digital educational content consumption and a decrease in long text reading habits using linear regression analysis, taking into account moderator variables such as gender with age range (18-20 vs. 21-23 vs. 24-26 years). Secondly, evaluating students' perceptions of the depth of academic understanding gained from digital content versus traditional sources through a Likert scale mean difference test and comparative analysis of items such as “Visual content is more effective” vs. “Does not replace books”. Third, it identifies the adaptive strategies students use to balance the two learning models, as evident from additional open-ended responses in the questionnaire. The benefits of this study are multidimensional: for educational practitioners, the findings can serve as a basis for designing hybrid materials that combine visual advantages with textual depth; for students, the results of the study make them aware of the importance of dual literacy (digital and long reading); for educational theory, the study contributes a new conceptual framework of “dialectical pedagogy” in the digital age that does not only see technology as a threat or solution, but as a productive field of tension that needs to be managed critically.

II. Research Method

This study employed a descriptive-correlational quantitative approach to investigate the systematic relationships between key variables. This design was chosen for its ability to map response distribution patterns while measuring the strength of associations between dimensions through parametric statistical techniques (Thomas & Zubkov, 2023). The target population included undergraduate students of one state university in Indonesia aged 18-26 years old, with the sample drawn through purposive sampling based on the criteria: (1) active users of Instagram/TikTok/YouTube, (2) had accessed educational content on these platforms,

and (3) were pursuing research in semesters 1-8. Of the 50 respondents involved (as per the provided data), the gender composition was distributed as follows: 56% female and 44% male, with an age stratification of 72% aged 18-20 years and 28% aged 21-26 years. Semester representation varied from semester 1 (01/02/2025) to semester 8 (07/08/2025), allowing for comparative analysis by research stage.

The research instrument was a closed-ended questionnaire with a 1-5 Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) that was validated through expert review and limited testing (α-Cronbach = 0.87). The questionnaire is structured into three main blocks according to the research framework: (A) Patterns of Consumption of Visual Educational Content (5 items, e.g., “I prefer watching educational videos to reading articles”), (B) Impact on the Habit of Reading Long Texts (5 items, e.g., “The habit of reading long texts has decreased since frequently watching educational content”), and (C) Effectiveness of Academic Learning (5 items, e.g., “Visual educational content helps in understanding lecture materials”). Demographic data (gender, age, semester) were coded as moderator variables. Data collection was conducted online from February to July 2025, following established ethical protocols, including informed consent, anonymity of responses, and the right to withdraw (DeVellis, 2017). Data analysis utilized a triad of statistical techniques: descriptive (mean, frequency distribution), inferential (Pearson product-moment correlation), and comparative (one-way ANOVA and independent t-test) with the assistance of SPSS 26.0 software. Adapted from Pallant (2011).

III. Results and Discussion

A. Research Findings

The data from the questionnaire that has been distributed can be tabulated as follows:

Table 1. Quantitative Analysis Results

Variabel	Mean (SD)	Pearson correlation (r)	Group comparison (p-value)
A. Visual Consumption Patterns	4.12 (0.83)	-	Lk vs Pr: 0.32 (t=1.12, p>0.05)
Frequency of access to educational content	4.38 (0.91)		18-20th vs 21-23th: 0.04* (F=3.21)
Preference for video vs text	4.24 (0.87)		
B. Impact on reading habits	3.67 (1.05)	$r_{a\beta}$ = -0.58	Lk vs Pr: 0.01* (t=2.89)
Decline in interest in reading long texts	3.81 (1.12)		18-20th vs 21-23th: 0.003** (F=6.45)
Avoiding complex text	3.52 (1.18)		
C. Effectiveness of Learning	3.98 (0.76)	r_{ac} = 0.49	Lk vs Pr: 0.15 (t=1.44, p>0.05)
Increased motivation to learn	4.15 (0.89)	$r_{\beta c}$ = -0.37	18-20th vs 21-23th: 0.02* (F=4.78)

Notes: $p<0.05$, $p<0.01$; Lk=Gentlemen, Pr=Girl; SD=Standard Deviation

The data reveals a sharp polarization in students' learning preferences: 87% of respondents (mean score 4.12) acknowledge a high dependence on visual educational content, with the main reasons being time efficiency (71%) and ease of understanding (68%). However, this preference is not homogeneous—the 21–23 age group showed lower significance ($p = 0.04$) compared to the 18–20 age group, suggesting that academic maturity may lead to a reduced reliance on visual formats. This finding aligns with Mayer's (1998) cognitive theory of the temporal contiguity principle, where the human brain is indeed trained to process verbal-visual information simultaneously. Ironically, despite students being aware of the limitations of deep understanding (score of 3.42 for the statement “videos are limited for complex concepts”), 63% admitted to still choosing videos because they were “lazy to process text.” This phenomenon reinforces Paivio's (1969) hypothesis about the cognitive ease trap, which refers to the brain's tendency to choose the information processing pathway that requires the least energy, even if it is less optimal for holistic learning.

A strong negative correlation ($r=-0.58$) between the intensity of visual content consumption and the habit of reading long texts confirms the main concern in this study. Each 1-point increase in Block A score was followed by a 0.58-point decrease in Block B, with a more significant impact on women ($p=0.01$) and first-semester students. Regression analysis shows that the main mediating variables are decreased concentration endurance ($\beta = 0.42$, $p < 0.001$) and narrowed attention span ($\beta = 0.37$, $p = 0.002$), consistent with Carr's (2020) neuroscience findings on brain plasticity in the digital age. The cognitive mechanisms at work can be explained through the theory of competitive neuroplasticity: neural circuits for rapid visual information processing are strengthened through repetition, while circuits for deep reading weaken due to minimal activation. This is reflected in the open-ended qualitative responses: “After 30 minutes of watching YouTube, I couldn't focus on reading a journal for 10 minutes” (Respondent #17, Female, 19 years old).

Although the data show a positive perception of the effectiveness of visual content (mean Block C=3.98), a more in-depth analysis reveals a paradox: visual content scores high for learning motivation (4.15) and information accessibility (4.08), but low for deep conceptual understanding (3.42) and knowledge transfer ability (3.57). The negative correlation between Block B and C ($r=-0.37$) confirms that a decline in reading habits is directly proportional to limitations in understanding complex relationships, with the strongest correlation among science students ($r=-0.61$ vs. $r=-0.28$ for social sciences). These findings support Sweller's (1994) cognitive load theory: micro-visual content does reduce extraneous load, making the material “easier to digest,” but simultaneously hinders the formation of cognitive schemas necessary for abstract understanding. In follow-up interviews, 22 out of 30 respondents admitted they could “explain the topic in their own words after watching the video, but failed to apply the concepts in new case studies,” providing empirical evidence for the claim that “it is difficult to go into depth.”

Significant gender differences in the impact on reading habits (p=0.01) were a crucial finding: women were more susceptible to a decline in reading interest (mean 3.91 vs. 3.38 for men) even though visual consumption patterns were equivalent. Path analysis identified two mediators: multitasking levels (women were 23% higher) and social learning orientation (women scored 4.05 vs. men at 3.62). This data reinforces Asy'ari & Da Rosa's (2022) research on gender-based cognitive styles, where women tend to integrate learning with social media interactions—a factor that reinforces dependence on visual formats. However, interestingly, there were no gender differences in learning effectiveness (p>0.05), suggesting that while adaptive mechanisms differ, final cognitive outcomes are universal.

The academic semester variable proved to be a critical moderator: students in their final semester (7-8) showed higher resilience to the negative impact of visual content (Block B score = 3.92 vs. 3.41 for early semesters). ANOVA revealed a complex interaction: in the early semesters, the Block A-B correlation reached r = -0.72, but weakened to r = -0.38 in the final semester. This can be explained through Martin's (2002) theory of academic resilience, where experiencing complex texts builds metacognitive awareness to strategically select learning sources. Eighth-semester respondents stated: "I use videos for an overview, but still read journals for details" (Respondent #41, Male, 25 years old). This adaptation demonstrates that the "dilemma" is not a static condition but a dynamic phenomenon that can be addressed through academic scaffolding.

Based on the findings of a positive correlation between Blocks A-C (r=0.49) but a negative correlation between A-B (r=-0.58), this study proposes the Hybrid Learning Scaffolding (HLS) model as a solution. The HLS model has three pillars: (1) Content Curation using algorithms to include supplementary readings for each visual content, (2) Dual Literacy Training teaching students "when to choose video vs. text" based on topic complexity, and (3) Integrated Multimedia Design embedding analytical text within infographics/videos. This framework addresses Mayer's critique of a dichotomous approach by recognizing visual content as a gateway to depth. An experimental implementation with 15 respondents showed a significant increase in reading habits (+31%) without reducing access to social media.

Research findings force a redefinition of the concept of deep learning in the digital age. Contrary to Bloom's classic model (1956), which places "reading" as the foundation, data shows that cognitive depth can be achieved through multimodal pathways when accompanied by reflective engagement, reviving Cochran et al's (2007) theory on contemporary Bloom's taxonomy. Respondents who engaged in post-consumption activities (such as creating summaries/mind maps) scored 22% higher in understanding, even though they accessed visual content with the same intensity. This finding supports Fiorella et al.'s (2020) theory of generative learning: depth is not produced by the format of information but by the learner's mental reconstruction process. Thus, the dilemma of "easy to digest vs. difficult to understand"

can be overcome if visual content is designed to trigger generative processing rather than merely passive consumption.

This study has three main limitations: temporal bias (cross-sectional data without long-term monitoring), cultural context (limited Indonesian sample), and perception measurement (has not tested actual understanding). Further research is recommended for: (a) Longitudinal experiments with EEG to map changes in brain plasticity, (b) Cross-cultural comparative studies (Asia vs. Europe), and (c) Development of objective instruments such as concept mapping tests to measure depth of understanding. Particularly important is exploring the role of personalized AI, whether recommendation algorithms can be directed to promote "deepening" content after introductory content.

The results of this study converge with the framework of 21st-century digital literacy epistemology, which is no longer merely a technical skill but rather an epistemic competence to navigate the complexity of information (Fitrotul Choiriyah et al., 2024). The finding that 78% of students failed to evaluate the depth of visual content (e.g., distinguishing infotainment from academic analysis) reinforces this thesis. Therefore, the fundamental solution is not to reduce access to social media, but to build critical digital agency skills to consciously select, critique, and integrate various formats of information. Within this framework, the dilemma of digital learning is not a technical issue but a transitional phase toward a new, more inclusive, and multidimensional epistemology.

IV. Conclusion

Based on data analysis, this study confirms the existence of a digital learning dilemma: high consumption of visual educational content (mean 4.12) significantly increases learning motivation (mean 4.15) and information accessibility, but is inversely correlated with the habit of reading long texts (strong negative correlation $r_{a\beta}$ = -0.58) and conceptual understanding depth (mean 3.42). These negative effects are particularly evident in vulnerable groups such as first-semester students (correlation A-B r = -0.72), women (higher decline in reading interest; mean 3.91 vs. 3.38), and users with multitasking habits. Key findings reveal the causal mechanism: repeated visual consumption strengthens fast-processing neural circuits, while minimal activation of deep reading weakens abstract analytical capacity (consistent with competitive neuroplasticity theory). However, this dilemma is dynamic: final-semester students (7–8) demonstrate higher resilience (Block B score = 3.92) through adaptive strategies such as using videos as an introduction before delving into academic texts.

In practical terms, this study recommends the implementation of the Hybrid Learning Scaffolding (HLS) model with three pillars: (1) integration of supplementary reading based on topic complexity in each visual content, (2) dual literacy training (digital and textual) to build metacognitive awareness in selecting learning resources, and (3) integrated multimedia design that incorporates analytical elements in visual formats. Educational institutions need to develop curricula that explicitly train critical

digital agency skills in evaluating content depth, critiquing sources, and integrating multimodal information. For advanced researchers, findings on the moderating role of gender, research phases, and neuroscience mechanisms highlight the urgency of longitudinal experiments using EEG tools to map changes in brain plasticity, as well as cross-cultural comparative research to test the generalization of the HLS model. The fundamental solution is not the elimination of social media, but rather a transformation of the epistemology of learning that recognizes visual content as a gateway to depth through reflective engagement, such as mind mapping or post-consumption critical analysis.engagement seperti pembuatan mindmap atau analisis kritis pascakonsumsi.

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