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The Impact of Social Media Integration on Cognitive Load and Information Processing in High School Classrooms: A Literature Review

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Abstract— This literature review examines the complex relationship between social media integration in traditional classroom settings and its effects on cognitive load and information processing among high school students. Through analysis of research papers, this study investigates how various social media features influence students' learning processes, attention spans, and academic performance. The review synthesizes findings from 28 key studies, revealing both beneficial and detrimental effects of social media on learning outcomes. Results indicate that while strategic social media integration can enhance collaborative learning and self-regulation, unstructured use often increases cognitive load and impairs information processing. This research provides information for educators and administrators seeking to optimize social media integration in educational settings while minimizing its potential negative impacts on student learning.

Keywords— *social media, cognitive load, information processing, educational technology, student engagement, learning efficiency, cognitive development*

I. INTRODUCTION

In modern education, social media has emerged as a pivotal component, deeply influencing students' learning experiences. Research indicates that over 97.9% of students have access to smartphones, and actively use social media platforms for both personal and educational purposes [14].

The intersection of social media and education presents both unprecedented opportunities and significant challenges. Social media platforms can serve as powerful tools for connecting formal and informal learning experiences, potentially enhancing student engagement and self-regulated learning [2]. However, studies reveal concerning correlations between excessive social media use and decreased academic performance [3].

Understanding the cognitive and educational impacts of social media on student learning processes has become very important. Research emphasizes how media multitasking affects information processing and attention spans [24], while documenting significant challenges of media-induced task-switching during study sessions [6]. These findings underscore the urgent need for evidence-based strategies to optimize social media integration while mitigating potential negative effects on cognitive load and learning efficiency.

The central research question examines how the integration of social media into traditional classroom settings affects the balance between cognitive load and effective information processing among high school students. This investigation is particularly crucial as social media has become an increasingly prevalent tool in academic

environments [1, 2]. While strategic social media integration can enhance collaborative learning and student engagement, unstructured use often leads to increased cognitive burden and compromised information processing capabilities [7]. This dynamic presents a critical challenge for educators and researchers, especially for high school students who are at a crucial stage of cognitive development [19, 20].

From a cognitive science perspective, internet-based technologies, including social media, are fundamentally reshaping cognitive processes in educational contexts [25]. Research on attention and cognitive control under load provides crucial insights into how social media engagement affects students' information processing capabilities [23]. Digital distractions can disrupt critical cognitive processes essential for academic success [27], particularly during complex learning tasks [4].

Studies highlight how social media can either enhance or impede student engagement depending on its implementation [7, 13]. Understanding individual differences in executive functions is crucial when considering social media's educational applications [28]. As educational practices continue to evolve, there is a pressing need for research that can inform evidence-based policies for effective social media integration in classrooms [10].

This literature review aims to synthesize current research on the impact of social media integration in high school classrooms, with particular attention to cognitive load theory and information processing frameworks. Examining both the benefits and challenges of social media in education will allow this study to provide information for educators striving to create effective, technology-enhanced learning environments.

II. LITERATURE REVIEW DESIGN

A. Methodological Approach

This systematic literature review used a comprehensive search strategy to examine the intersection of social media integration and cognitive load in educational settings. The investigation synthesized findings from 28 key studies, and used a structured approach to identify, evaluate, and analyze relevant research publications.

B. Search Strategy and Source Selection

The primary search was conducted through academic databases, with Google Scholar serving as the main search platform. Initial search parameters incorporated specific Boolean combinations of key terms including "social media integration," "cognitive load," and "high school learning." The search was further refined using additional terms such as

"information processing," "educational technology," and "student engagement", which emerged as significant themes during preliminary review.

C. Inclusion Criteria and Quality Assessment

The selection process followed strict inclusion criteria to ensure academic rigor. Sources were limited to:

- Peer-reviewed journal articles.
- Conference proceedings from recognized academic institutions.
- Scholarly books and book chapters from established publishers.
- Publications primarily focused on secondary education settings.

D. Thematic Organization and Analysis

The selected literature was systematically categorized into distinct thematic areas, including:

- Cognitive Load Theory and Working Memory.
- Social Media Implementation in Educational Settings.
- Technology-Enhanced Learning Outcomes.
- Student Engagement and Academic Performance.
- Information Processing and Attention Management.

E. Refinement Process

The initial broad search yielded numerous potential sources (89 to be exact), which were subsequently filtered through a multi-stage review process:

- Preliminary screening of titles and abstracts to assess relevance.
- Review of methodologies and findings.
- Cross-referencing of cited works to identify additional pertinent studies.
- Assessment of research quality and empirical validity.

F. Research Evolution

The investigation had several strategic pivots as new patterns emerged from the literature. Initially focused solely on social media's impact on cognitive load, the scope expanded to include broader aspects of information processing and attention management. This adaptation was necessary to fully understand the complex interplay between social media use and cognitive functions in educational contexts.

G. Synthesis Framework

The final analysis framework integrated findings across multiple theoretical perspectives, including:

- Cognitive architecture and instructional design principles.
- Social media's role in formal and informal learning.
- Technology-enhanced learning effectiveness.

- Impact of digital multitasking on cognitive resources.

This methodological approach enabled a thorough examination of how social media integration affects cognitive load and information processing among high school students, while maintaining focus on practical implications for educational practice.

III. RESULTS

The relationship between social media use and academic performance represents a complex and multifaceted phenomenon in modern education. Research demonstrates that while strategic social media integration can enhance collaborative learning and student engagement [2, 7], excessive or unstructured use often leads to decreased academic performance and increased cognitive load [3, 24]. Studies reveal that media-induced task-switching significantly impairs learning effectiveness [6], with research showing that students struggle to maintain focused attention during study sessions [5]. This cognitive impact extends beyond immediate distractions, as investigations have established clear relationships between smartphone addiction, increased stress levels, and declining academic performance [15]. Brain research further indicates that frequent media multitasking fundamentally affects how individuals process information and maintain attention [24]. However, when properly structured, social media platforms can effectively connect formal and informal learning experiences [2]. These findings show the critical importance of developing evidence-based strategies for optimizing social media integration in educational settings while mitigating its potential adverse effects on cognitive load and learning efficiency [4, 23].

A. Excessive Social Media and Academic Performance

Recent studies have demonstrated a significant negative correlation between excessive social media use and academic performance among students. Research by Junco revealed that increased Facebook usage directly corresponds to lower academic achievement and reduced time spent on educational activities [1]. This finding is further supported by Kirschner and Karpinski's research, which established a clear connection between Facebook use and diminished academic performance [3]. Additionally, studies have shown that media-induced task-switching during study sessions severely impairs learning effectiveness and information retention [6].

The cognitive impact of excessive social media use extends beyond immediate academic outcomes. Samaha and Hawi's research identified notable relationships between smartphone addiction, increased stress levels, and declining academic performance [15]. Furthermore, investigations into classroom learning revealed that off-task multitasking with technology significantly reduces real-time learning comprehension and overall academic achievement [9]. These findings align with Lepp et al.'s research, which demonstrated that intensive cell phone use correlates with lower grade point averages and increased anxiety levels among college students [17]. The collective evidence suggests that uncontrolled social media engagement poses substantial risks to students' academic success and cognitive well-being.

B. Managing Cognitive Load

Research has revealed significant impacts of social media use on learning outcomes in educational settings. This

literature review demonstrated that while strategic social media integration can enhance collaborative learning, unstructured use often impairs information processing and increases cognitive load [2]. Research by Rosen found that students struggle to maintain focused attention, with the average adolescent finding it difficult to study for 15 minutes at a time, typically spending at least five of those minutes in a state of distraction [5]. When students engage in media-induced task-switching while studying, their learning effectiveness is significantly compromised [6].

The cognitive impact of excessive media use extends beyond immediate distractions. Research by Samaha and Hawi demonstrated clear relationships between smartphone addiction, increased stress levels, and decreased academic performance [15]. Studies examining real-time classroom learning found that off-task multitasking with technology resulted in measurably reduced comprehension and learning outcomes [16]. This aligns with findings showing that cell phone use correlates with lower academic performance and higher anxiety levels among students [17]. Brain research on media multitasking has revealed that frequent task-switching fundamentally affects how individuals process information and maintain attention [24], highlighting the importance of structured approaches to technology use in educational settings [7].

C. Alignment with Pedagogical Goals

The integration of educational technology must consider fundamental aspects of cognitive psychology, including attention control mechanisms, working memory limitations, and information processing pathways [18]. Research by Uncapher and Wagner [24] revealed specific performance differences between heavy and light media multitaskers, with approximately half of their 24 tests demonstrating that heavy media multitaskers (HMMs) significantly underperformed compared to light media multitaskers (LMMs) on working memory tasks. Their research provided granular insights into cognitive impairments, showing that HMMs performed markedly worse at recognizing previously viewed objects and demonstrated diminished ability to ignore distracting information during encoding tasks [24]. These findings align with Lavie's [23] work on attention control, which demonstrated how cognitive resources become strained under increased information load.

Baddeley's [18] research on working memory systems provides a theoretical framework for understanding these effects, particularly how the phonological loop and visuospatial sketchpad interact with long-term memory during learning tasks. Diamond and Ling [27] further contextualize these findings, showing how executive functions, including cognitive flexibility, inhibitory control, and working memory, can become overwhelmed by excessive media multitasking. While the effects are not uniform across all studies, the preponderance of evidence suggests that heavy media multitasking is generally associated with decreased performance across multiple cognitive domains [24]. These findings emphasize the critical importance of structured approaches to technology use in educational settings, particularly given the increasing prevalence of media multitasking among students [23].

D. Benefits of Multimedia Learning

Research on cognitive architecture and instructional design demonstrates that multimedia learning can

significantly enhance educational outcomes when properly structured [4]. Studies show that effective multimedia integration must carefully consider cognitive load theory and information processing limitations to maximize learning potential [4], [9]. Wood et al.'s research specifically demonstrates how technology integration affects real-time classroom learning, emphasizing the importance of structured approaches to multimedia content [9].

Consider TikTok as an illustrative example of modern multimedia learning potential. While primarily known as an entertainment platform, research by Gikas and Grant [13] shows how mobile computing and social media platforms can be effectively repurposed for educational content. Chen and Bryer [7] demonstrate successful strategies for integrating social media in both formal and informal learning environments. When educational content incorporates clear visual cues and systematic segmentation, it aligns with Uncapher and Wagner's [24] findings on optimal cognitive processing in media-rich environments. Their research specifically shows how attention and memory systems respond to different forms of media presentation, making it crucial to structure content appropriately [24].

The effectiveness of such multimedia approaches is supported by recent cognitive science research. Lavie [23] demonstrates through attention and cognitive control studies how properly structured multimedia content can optimize information processing. Studies by Kirschner and Karpinski [3] reveal specific relationships between digital media use and academic performance, highlighting the importance of intentional design. When digital content is structured according to cognitive load principles, as shown in research by Sweller et al. [4], it can create more effective learning experiences. This is particularly relevant as studies by Wood et al. [9] demonstrate how strategic integration of technology can enhance rather than impede classroom learning, provided the content is designed to manage cognitive load and maintain focused attention [23].

E. Social Media Fosters Engagement

Research by Dabbagh and Kitsantas [2] shows that when properly implemented, these platforms can enhance self-regulated learning and connect formal and informal learning experiences. Chen and Bryer [7] found that social media platforms facilitate both formal and informal learning experiences, allowing instructors to integrate casual learning into structured educational contexts. The interactive nature of these platforms enables students and instructors to connect beyond traditional classroom boundaries [6]. Gikas and Grant [13] demonstrated that mobile computing devices combined with social media features create opportunities for immediate engagement and authentic learning experiences. However, this integration must be carefully managed, as Tess [10] indicates that informal learning using social media is most effective when facilitated by instructors while being driven by students' personal interests. Studies by Samaha and Hawi [15] revealed significant relationships between smartphone use, academic stress levels, and academic performance. Furthermore, Wood et al. [9] found that off-task multitasking with technology can have substantial impacts on real-time classroom learning. To optimize learning outcomes, Kirschner and Karpinski [4] suggest that educators must carefully balance the engagement benefits with cognitive load challenges. When appropriately structured, these platforms can create an environment that encourages social and active

learning while maintaining focus on academic objectives [6, 10].

F. Digital Distraction vs. Digital Tool

The dual nature of digital technology in educational settings presents both opportunities and challenges [24]. Research demonstrates that media multitasking can significantly alter cognitive processing patterns, with studies revealing both immediate and potential long-term effects on brain architecture and cognitive control mechanisms [12]. When examining cognitive load and information processing, evidence shows that unstructured technology use frequently leads to decreased academic performance, primarily due to the brain's limited capacity to manage multiple information streams simultaneously [4]. This cognitive strain particularly impacts working memory systems, where task-switching caused by digital distractions can fragment attention and create what researchers term "attention residue" [5, 6]. However, when digital tools are implemented strategically with consideration for cognitive architecture, they can effectively support executive functions and enhance learning outcomes [27]. Studies in cognitive neuroscience indicate that the internet and digital technologies are fundamentally reshaping human cognition, influencing everything from attention spans to information processing strategies [25]. Success lies in aligning technological integration with the brain's cognitive architecture, as research shows that properly structured digital learning environments can enhance cognitive engagement while minimizing cognitive overload [19]. This careful balance requires understanding how the developing brain processes information in our increasingly multitasking world, with evidence suggesting that successful educational technology implementation must work within, rather than against, the natural constraints of human cognitive processing [23].

IV. DISCUSSION

This comprehensive review reveals significant implications regarding the complex relationship between social media use and cognitive functioning in educational contexts. The findings demonstrate that while strategic social media integration can enhance collaborative learning [2, 7], uncontrolled usage significantly impairs academic performance through increased cognitive load and attention fragmentation [3, 24]. This duality presents a critical challenge for educational institutions in developing evidence-based frameworks that maximize learning benefits while minimizing cognitive disruption.

The importance of this review lies in its synthesis of cognitive science research related to digital media's impact on learning processes. By illuminating how media multitasking fragments attention and creates "attention residue" [5, 6], these findings provide crucial insights for educators and cognitive scientists. The research demonstrates that students' inability to maintain focused attention, often struggling to study for even 15 minutes without distraction [5], represents a fundamental challenge to traditional educational approaches.

The practical implications extend beyond academic settings into broader cognitive development concerns. The established relationship between smartphone addiction, elevated stress levels, and declining academic performance [15, 17] suggests that intervention strategies must address both educational and psychological aspects of digital media use. These findings are particularly relevant for developing

comprehensive digital literacy programs that can help students navigate the increasingly technology-dependent educational landscape [9, 13].

From a cognitive science perspective, this review emphasizes the critical importance of aligning educational technology with fundamental cognitive architecture. The research reveals that heavy media multitaskers significantly underperform in working memory tasks compared to light media multitaskers [24], suggesting that current patterns of technology use may be fundamentally altering how students process and retain information. These findings align with established cognitive load theory and working memory models [18, 23], providing a theoretical framework for understanding the impact of digital distractions.

The evidence supporting structured multimedia learning approaches offers promising directions for educational technology implementation. When digital content is designed according to cognitive load principles [4] and incorporates systematic segmentation [24], it can enhance rather than impede learning outcomes. This understanding is particularly valuable for developing educational technologies that work in harmony with, rather than against, natural cognitive processes [19].

The research also demonstrates the potential for strategic social media integration to foster meaningful educational engagement. When properly implemented, social media platforms can effectively connect formal and informal learning experiences [2], while mobile computing devices can create opportunities for authentic learning [13]. However, these benefits are contingent upon careful management of cognitive load and structured implementation approaches [4, 23].

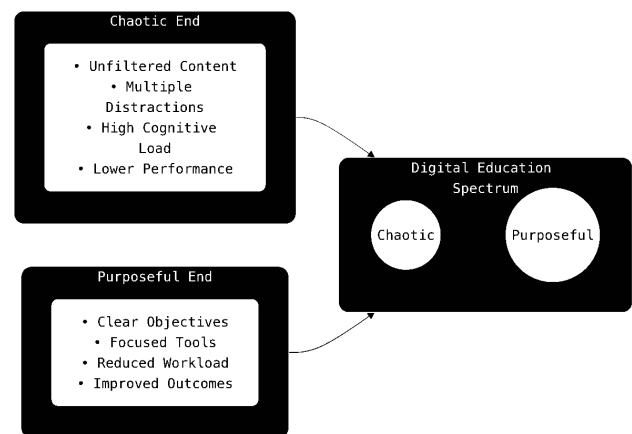


Figure 1 – Digital Education Spectrum

Based on the research from this literature, I propose that educators and parents understand the Digital Education Spectrum (illustrated in Figure 1) and plan digital learning experiences that support rather than hinder student learning. The Digital Education Spectrum is a conceptual framework that I am presenting that maps digital tool usage in education along a range from chaotic, unstructured engagement to purposeful, guided interaction. At the chaotic end, students are overwhelmed by unfiltered digital content, leading to distractions, frequent task-switching, and ultimately lower academic performance due to increased cognitive load [4], [5], [6]. In contrast, at the purposeful end, digital tools are aligned

with clear learning objectives and supported by simple, focused instructional designs that reduce unnecessary mental workload and boost understanding and retention [2], [7]. This framework draws from established research showing how structured social media integration can enhance self-regulated learning and academic outcomes [9], while unstructured use often leads to decreased performance [15], [17]. Research suggests that when properly implemented, this approach can transform digital distractions into effective tools for deeper learning and improved academic outcomes [10], [11].

Several avenues for future research emerge from these findings. Further investigation is needed into the long-term effects of media multitasking on cognitive development [24], particularly regarding attention control mechanisms and working memory capacity. Research should explore the effectiveness of specific interventions designed to optimize cognitive load in digital learning environments [27]. Additionally, longitudinal studies examining how different social media platforms affect various cognitive domains would provide valuable insights for educational technology design. Future research should also investigate the potential development of adaptive learning systems that can automatically adjust content delivery based on individual cognitive load levels [4, 19].

V. CONCLUSION

Through this comprehensive literature review, I have examined the complex relationship between social media integration and cognitive functioning in educational environments. The analysis of 28 key studies revealed that strategic social media implementation can enhance collaborative learning and student engagement, while unstructured use often leads to increased cognitive load and impaired information processing [1]. Social media has indeed emerged as a pivotal component in modern education [2], though its effectiveness varies significantly based on implementation approaches [6].

My research highlighted a particularly significant finding: media-induced task-switching during study sessions can substantially diminish learning effectiveness [5], [6]. This finding underscores the importance of developing structured approaches to technology integration in educational settings.

Moving forward, these insights suggest the need for careful attention to cognitive load management and attention regulation in educational technology implementation [4]. Future work should focus on developing evidence-based strategies that consider individual cognitive capacities [23]. This research provides a foundation for making informed decisions about technology integration in educational settings [1], while suggesting new directions for investigating how digital tools can better support student learning without overwhelming cognitive resources [24].

VI. LIMITATIONS

While this research provides insights into social media's impact on cognitive processes and learning, several key limitations should be addressed in future studies.

- The study primarily focuses on classroom-based learning environments without considering various learning contexts and settings. Future research could explore how cognitive load and information

processing differ across diverse learning environments, including remote learning, hybrid settings, and informal educational spaces.

- The current research lacks a detailed investigation of individual differences in cognitive processing and multitasking abilities. Future studies should examine how personal traits, cognitive capabilities, and prior experience with technology influence students' ability to manage social media-related cognitive load.
- The temporal aspects of social media's effects on cognitive development are not fully explored. Longitudinal studies could track how sustained social media use shapes cognitive architecture and learning strategies over extended periods, particularly during critical developmental stages.
- The interaction between different cognitive systems (attention, memory, executive function) and social media engagement is not comprehensively mapped. Future research could employ more sophisticated cognitive assessment methods to understand how various cognitive domains respond to and are shaped by social media integration in learning.

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