

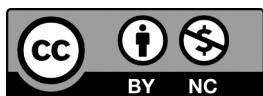
From Information Cocoons to Cognitive Risks: Deep Reading Dilemmas and Countermeasures for Vocational Students in AI-Fragmented Environments

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Abstract: In the era of deeply embedded artificial intelligence in information dissemination, the fragmented information environment centered on algorithmic recommendations has become the primary field for knowledge acquisition among vocational college students. This environment, through the information cocoon effect, triggers cognitive risks such as cognitive shallowing, superficial thinking, and metacognitive degradation. These risks consequently lead to a crisis in deep reading, posing a structural threat to the quality of vocational talent cultivation. Following the progressive logic of “information cocoon → cognitive risk → deep reading dilemma”, this study systematically analyzes the generative mechanisms of this crisis and constructs a four-dimensional intervention system encompassing “technological regulation, ecological reconstruction, individual empowerment, and institutional safeguard”. The research indicates that the formation of the deep reading dilemma results from the interplay of algorithmic technology, individual cognition, and socio-psychological factors. It requires systematic interventions across algorithm ethics, information ecology reconstruction, individual metacognition enhancement, and multi-stakeholder collaborative governance.

Keywords: Information cocoon; Cognitive risk; Deep reading; Shallow reading; Vocational college students; AI-driven fragmented environment



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1 The Reading Crisis of Vocational College Students in the AI Era

With the advent of a new wave of technological revolution, the new quality productive forces driven by artificial intelligence as their core impetus, are profoundly reshaping the labor market and human resource structure, imposing unprecedented demands on the adaptability and learning capacity of vocational skilled talents (Fan, 2025). This presents heightened challenges to vocational education, whose mission is to cultivate high-quality technical and skilled personnel, skilled craftsmen, and master artisans.

Concurrently, generative artificial intelligence (GenAI) and intelligent algorithms are redefining the information age. AI-driven media technologies are not merely tools; they are “architects” that shape the cognitive ecosystem, giving

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rise to fragmented information flows characterized by brevity, speed, and convenience (Yu et al., 2024). According to the 2024 China Digital Reading Report, which was released in April 2025, the number of digital reading users in China has reached 670 million. Short videos, social media feeds, and AI-generated summaries have become mainstream modes of information acquisition (China Government Network, 2025). This information environment, defined by algorithmic recommendation and fragmented presentation, has become the primary domain of knowledge exposure for vocational college students, who are digital natives. Highly personalized information distribution mechanisms gradually ensnare individuals in homogeneous, closed “information cocoons”, triggering tendencies toward cognitive narrowing and superficial thinking. This consequently gives rise to cognitive risks and poses a structural threat to deep reading abilities and the development of higher-order thinking.

Compared with undergraduate students, vocational college students’ cognitive foundations and learning characteristics render them more vulnerable to the impact of AI-driven fragmented information. Research indicates that vocational college students generally possess weaker foundational humanities knowledge, poorer reading habits, inadequate reading strategies, and strongly utilitarian learning motivations (Song, 2024). These weaknesses are further amplified in a digital environment that prioritizes brevity, speed, and convenience, trapping them in shallow reading behaviors characterized by low cognitive investment, entertainment orientation, and fast-food information consumption (Shang, 2024). This makes them more susceptible to falling into information cocoons and less capable of achieving cognitive breakthroughs through their own efforts.

In contrast, deep reading — a reading activity involving full cognitive, behavioral, and emotional engagement, active meaning construction, and deep thinking — provides individuals with a composite nourishment of knowledge, entertainment, aesthetic experience, and moral cultivation. It is also an indispensable deep cognitive activity and cultural heritage for individual survival and societal development in the digital age (Li, 2017). The innovative spirit, critical thinking ability, and knowledge integration capacity required for vocational education to cultivate “new quality talents” are all built upon deep reading and systematic thinking. The weakening of deep reading ability directly affects the transformation of vocational college students from “proficient operators” into technically skilled new quality talents who “understand principles, can innovate, and are capable of knowledge transfer”.

Therefore, this study aims to investigate how the AI-driven fragmented environment produces systematic risks to the cognitive abilities of vocational college students through the mechanism of information cocoons, thereby leading to deep reading difficulties. Based on this analysis, it proposes countermeasures to promote deep reading abilities, providing a theoretical framework and practical pathways for the high-quality development of vocational education.

2 From Information Cocoons to Cognitive Risks: The Evolutionary Mechanism

2.1 The Information Cocoon Effect

The concept of information cocoons, introduced by Cass Sunstein in his work *Infotopia: How Many Minds Produce Knowledge*, refers to a phenomenon in which individuals, under algorithmic recommendation, are exposed to homogeneous information environments over extended periods. This exposure, aimed at reducing cognitive costs,

gradually leads to isolation from the inflow of heterogeneous and diverse information. This results in the constriction and narrowing of information processing across knowledge acquisition, emotion, and attitude formation (Zhang et al., 2023; Huangfu, 2023).

From the perspective of communication studies, the formation of information cocoons is the product of the interaction among technological, psychological, and social logics. At the technological level, personalized algorithms push homogeneous content to users at high frequency based on their preferences, constructing “interest cages” that narrow users’ horizons and cognition (Guan & Qi, 2026). At the psychological level, individuals’ innate cognitive biases predispose them to select information consistent with their existing beliefs, thereby exacerbating cognitive narrowing (Qu & Xu, 2026). At the social level, online communities formed around shared interests are highly homogeneous, with opinions continuously self-reinforcing, creating “echo chambers” that intensify closure and group polarization (Yang & Liu, 2023).

Due to their structural deficiencies in cognitive resources, information management, and critical literacy (Song, 2024; Shang, 2024), vocational college students experience a more pronounced information cocoon effect and are more susceptible to being locked into homogeneous information cycles.

2.2 Cognitive Risks: From Information Overload to Brain Rot

Prolonged confinement within information cocoons induces a systematic transformation in individuals’ cognitive processing patterns: from information overload leading to cognitive shallowing, and superficial thinking, to the degradation of metacognitive monitoring capacity, and ultimately, to the risk of “brain rot” — a phenomenon characterized by cognitive decline, diminished independent thinking, weakened critical thinking, and reduced depth of thought (Jing, 2026).

AI-driven media technologies generate content with exceptional efficiency and deliver it to users with precision, immediacy, and high frequency based on their preferences, thereby creating massive fragmented information flows. According to cognitive load theory, human working memory capacity is limited. When confronted with a continuous stream of fragmented information, the cognitive system is forced into an “energy-saving mode”, resulting in diminished knowledge internalization and a progressive tendency toward cognitive shallowing. Prolonged operation in this energy-saving mode gradually erodes individuals’ motivation for deep processing. As cognitive outsourcing becomes increasingly pronounced, a self-reinforcing cycle sets in: waning motivation for deep processing and escalating cognitive outsourcing mutually reinforce one another, ultimately crystallizing into cognitive inertia that undermines autonomous thinking and independent judgment (Wang, 2026).

Metacognition refers to the cognition of cognitive processes, encompassing the assessment of one’s own depth of understanding and the strategic adjustment thereof. Long-term reliance on algorithms and AI tools leads to the degradation of individuals’ metacognitive monitoring capacity.

2.3 The Evolutionary Path from Information Cocoons to Cognitive Risks

Information cocoons reinforce cognitive risks through the following three pathways (see Figure 1).

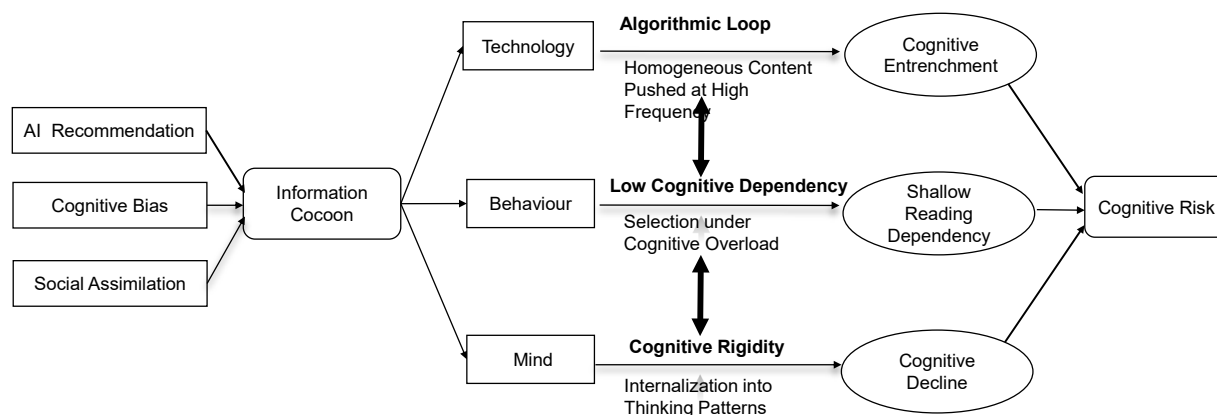


Figure 1 From Information Cocoons to Cognitive Risks: An Evolutionary Perspective

Algorithmic Self-Reinforcement Loop: AI-driven algorithmic recommendation systems push homogeneous content to users over extended periods and at high frequency based on their preferences, thereby reinforcing cognitive pathway entrenchment, which results in rigid knowledge structures and narrowed cognitive horizons.

Low-Cognitive Path Dependency: In an information environment flooded with massive, low-quality recommended content, individuals experience cognitive overload and naturally gravitate toward shallow reading characterized by rapid browsing, partial attention, and low cognitive investment (Zhu, 2021) — i.e., cognitive shortcuts — ultimately forming a path dependency of low cognitive investment (Jing, 2026).

Cognitive Rigidity: Low cognitive investment evolves from a behavioral pattern into a psychological habit and becomes internalized as a mode of thinking, leading to the gradual weakening of deep cognitive abilities such as critical thinking.

3 The Deep Reading Predicament of Vocational College Students in the AI Era

In contrast to shallow reading, deep reading — also referred to as deep reading — is defined as a highly engaged reading behavior that arises when readers develop positive behavioral motivation in interaction with suitable reading materials within appropriate contexts (Li, 2017). It constitutes a practical activity that integrates materiality, embodiment, and situatedness (Zhao, 2023). In the digital intelligence era, driven by AI and inundated with fragmented information, vocational college students become trapped in information cocoons, triggering cognitive risks. As shallow reading behaviors prevail, deep reading finds itself in a state of crisis.

3.1 Weak Cognitive Foundations and the Formation of Information Cocoons

The underdeveloped reading habits and cognitive deficits of vocational college students constitute the primary cause of their deep reading difficulties. First, there is insufficient metacognitive awareness of deep reading. Many vocational college students lack a clear understanding of the value, methods, and significance of deep reading. Accustomed to passively receiving information, they lack reading strategies that support in-depth thinking (Zhang et al., 2023). Their reading tends to remain at the level of “knowing” without engaging in critical analysis, synthesis, or evaluation. Second,

there is a deficiency in information literacy and screening ability. Confronted with information overload and massive online resources of uneven quality, students struggle to identify and select valuable reading materials (Lou, 2026), making them prone to becoming trapped in low-quality, fragmented information flows. Third, there is a decline in attention span and cognitive persistence. Short video addiction, fast-food reading habits, and the frequent distractions of digital devices significantly impair the sustained attention and cognitive persistence required for prolonged, high-investment reading (Xu, 2025; Cao, 2025). Frequent short-text reading on screens diminishes the cognitive persistence needed for long-form deep reading (Hakemulder & Mangen, 2024). These deficiencies are markedly amplified and entrenched within the consumptive, highly engaging virtual information space, rendering students more susceptible to falling into a cycle of “entertainment — relaxation — aimless browsing”, thereby making them the most vulnerable group within information cocoons.

3.2 Media Dependency and Cognitive Habit Alienation

The prevalence of shallow reading is not merely a product of individual preference or time pressure; it is a direct consequence of AI recommendation and generation systems restructuring the rhythm of information production and dissemination (Luan et al., 2026). Digital media are not merely tools; they reshape vocational students’ reading habits and cognitive patterns, constituting a “media predicament” for deep reading. First, fragmented reading habits have become entrenched. A vast amount of fragmented, utilitarian, and entertainment-oriented reading encroaches upon the time and psychological energy required for deep reading. Second, a visual preference mode has taken shape. The “modal bias” of generative AI and intelligent algorithms reinforces sensory stimulation while undermining critical thinking, leading to the erosion of attention span and reflective capacity (Chen & Zhang, 2024). Third, technological dependency and the crisis of cognitive autonomy have emerged. The convenience of AI tools may induce a reliance on “cognitive outsourcing”, fostering in vocational college students a dependency in thinking and an illusion of competence. This weakens their capacity for independent critical thinking and active knowledge construction, thereby eroding cognitive autonomy and the motivation for deep engagement with content (Lin, 2025).

3.3 Social Influence and Conformity Psychology

The reading ecology of vocational college students is strongly affected by social assimilation effects. Social influence plays a significant role in driving shallow reading, as conformity psychology and interactive feedback reshape individuals’ reading preferences, leading students to abandon deep reading in pursuit of group identity. When “everyone is scrolling through short videos” becomes the norm, individuals tend to conform under peer pressure (Wang & Zhang, 2023). This social reinforcement further solidifies information cocoons, psychologically marginalizing deep reading.

3.4 Structural Solidification of the Predicament: Shallow Reading Behaviors

The shallow reading behaviors of vocational college students exhibit distinct characteristics. First, low cognitive investment and superficiality, characterized by minimal brain engagement, manifested as rapid browsing and skip-reading, with students content with “knowing” rather than “understanding” (Shang, 2024). Second, poor reading habits and a lack of strategy, with limited time and cognitive energy devoted to reading, and an absence of post-reading reflection or note-taking. Third, monotonous and low-level reading content, marked by a lack of critical judgment

and a tendency to follow trends, consisting largely of superficial web novels, entertainment news, or examination-oriented materials. Fourth, strong media dependency coupled with the fragmentation of time and space, as fragmented reading occupies virtually all available leisure reading time, rendering systematic deep reading nearly impossible. Fifth, utilitarian reading purposes, driven by a clear employment orientation and lacking intrinsic motivation rooted in interest, self-cultivation, or systematic knowledge construction. Together, these entrenched behaviors constitute a vicious cycle of “shallow reading — cognitive shallowing — greater reliance on shallow reading”.

4 The Multidimensional Negative Effects of Pervasive Shallow Reading among Vocational College Students

The pervasive spread of shallow reading behaviors exerts multidimensional and deep-seated negative impacts on vocational college students' personal development, academic achievement, and social adaptability. It not only leads to declining academic performance but, more profoundly, undermines critical thinking, complex problem-solving abilities, and the capacity for precise comprehension and rigorous expression required in professional contexts. This trajectory runs directly counter to the concentration, deep engagement, and pursuit of excellence embodied in the “craftsman spirit”.

4.1 Hindering Cognitive Development and Professional Competence

Prolonged shallow reading leads to fragmented attention, weakened critical thinking, and difficulty in knowledge integration (Xu, 2025; Cao, 2025; Hu, 2025). Fragmented attention makes it difficult for vocational college students to maintain sustained focus on complex technical documents or case studies in professional coursework. Weakened critical thinking impairs their ability to evaluate and optimize technical solutions from multiple perspectives, and difficulty in knowledge integration directly obstructs the transfer and application of interdisciplinary knowledge. Consequently, vocational college students find themselves ill-equipped when confronted with professional learning and technological innovation that demand systematic analysis and complex problem-solving, thereby hindering their development into “innovative” skilled talents.

4.2 Triggering Information Anxiety and Mental Health Risks

Shallow reading — particularly short video consumption — indirectly increases mental health risks such as depression by encroaching upon sleep and exercise time (Yao et al., 2022). This “time encroachment” not only disrupts physiological circadian rhythms but also generates a sense of anxiety — a feeling of “never being able to catch up” amid information overload. This consequently forms a vicious cycle of “the more anxious one feels, the more one scrolls; the more one scrolls, the more anxious one becomes”. Information overload and cognitive shallowing may precipitate “brain rot”, manifested as value nihilism, emotional dysregulation, and diminished self-worth (Jing, 2026). Neuroscientific research further suggests that prolonged fragmented reading is associated with smartphone addiction, sleep disorders, and diminished self-control, potentially impairing the integrity of cerebral white matter and compromising the efficiency of neural networks underlying attention and executive control (Hu, 2025).

4.3 Leading to Value Formation and Cultural Identity Confusion

Overly instrumentalized approaches to reading may suppress the expression of cultural identity, potentially precipitating identity confusion and anxiety (Nan, 2010). When reading serves only utilitarian purposes such as examination preparation and job seeking, the textual content students encounter becomes highly homogeneous, lacking deep engagement with diverse cultural values and historical traditions. This makes it difficult for students to develop a stable value judgment system, rendering them susceptible to blindly following trends and superficial content. This condition that is detrimental to the formation of stable, well-grounded values.

4.4 Undermining Academic Performance and Comprehensive Competence

The decline in attention span and fragmentation of thinking caused by shallow reading habits directly affect vocational students' academic performance, particularly in professional courses that require in-depth literature reading, report writing, and project design (Cao, 2025). Such courses demand that students screen, integrate, and critically reconstruct complex information — a cognitive chain whose integrity is precisely undermined by shallow reading. This also perpetuates the preexisting weakness in foundational humanities knowledge among vocational students, thereby impeding the enhancement of their comprehensive competence.

4.5 Deepening the Digital Divide

The sustained effect of information cocoons creates an information ecology in which “the weak remain weak”. Vocational college students, already at a disadvantage in information access, find their gap with privileged groups further widened — in terms of information access channels, information quality, and information processing capacity — after being subjected to targeted recommendations of low-level knowledge and entertainment content. Having remained for extended periods in a state of low cognitive investment, vocational college students struggle to access high-quality, systematic knowledge resources, and their capacities for information screening, critical analysis, and knowledge integration are correspondingly weakened. Consequently, they become trapped in a vicious cycle of information poverty and cognitive decline in the digital society.

5 Pathways for Constructing a Deep Reading Ecology for Vocational College Students in the AI-Driven Fragmented Environment

In the AI-driven fragmented environment, vocational college students are deeply trapped in information cocoons, triggering cognitive risks and deep reading difficulties. Faced with this crisis, interventions that rely solely on individual awareness and literacy enhancement while ignoring the structural effects of technology, or that emphasize only platform self-regulation without addressing the underlying commercial logic and driving forces, are unlikely to reach the root of the problem. Deep reading is a complex process in which readers mobilize their mind and body, engage in deep dialogue with texts within their environment, actively construct meaning, and generate new knowledge (Guo, 2023). Its realization depends on the effective functioning of individual metacognitive monitoring and sustained cognitive effort (Wang, 2026). The AI-driven fragmented environment precisely dismantles the internal conditions necessary for deep reading by systematically removing these “beneficial difficulties”. Therefore, a composite governance paradigm

characterized by systematic, multi-dimensional, and synergistic intervention is urgently needed to break the impasse. This study thus constructs a four-dimensional interlocking intervention framework encompassing technological regulation, ecological reconstruction, subject empowerment, and institutional safeguards (see Figure 2).

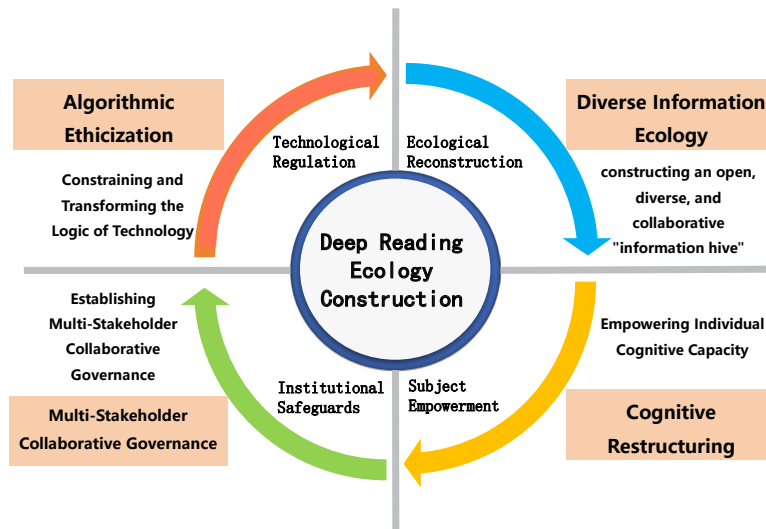


Figure 2 A four-dimensional Interlocking Intervention Framework

5.1 Technological Regulation: Algorithmic Ethicization

Algorithms have evolved from mere tools into “invisible constructors” of social operation, possessing systemic power characteristics. Algorithms are not neutral; behind them lie the biases of their creators and the profit-driven logic of commercial capital, readily giving rise to negative effects such as information cocoons. It is essential to break information narrowing by constraining and transforming the logic of technology itself. First, reshape the technological ethic from an “efficiency-first” paradigm to one that is benevolent and human-centered. Redirect the algorithmic orientation from maximizing user engagement to simultaneously serving cognitive growth and the public interest, embedding “humanistic care” and “value rationality” into algorithm design, and incorporating principles such as cognitive diversity and information fairness as core algorithmic parameters (Kuang & Chen, 2025; Gao, 2025). Second, construct a “diversity recommendation” mechanism to actively break homogeneous cycles. Through technological means, design recommendation systems that balance personalization with diversification, along with reverse recommendation models, to dismantle content distribution mechanisms that exhibit a high degree of consistency with user preferences, and appropriately increase the exposure weight of cross-domain and cross-perspective information. Third, enhance algorithm transparency and user control. Platforms should assume the responsibility of information disclosure, improving the transparency and explainability of algorithms, and granting users the right to be informed and the right to adjust recommendation systems. Fourth, establish algorithmic ethics auditing and dynamic regulatory mechanisms. Platforms should conduct regular internal ethical reviews, while independent third-party auditing institutions should be established externally, forming a multi-stakeholder governance framework.

5.2 Ecological Reconstruction: Building a Diverse Information Ecology

The essence of information cocoons is a closed, passive, and distorted “island ecology” that systematically blocks

the inflow of heterogeneous information, trapping users in highly homogeneous “echo chambers” (Guan & Qi, 2026). The solution lies in constructing an open, diverse, and collaborative “information hive” (Sun et al., 2026). First, transform the ecological paradigm from “island” to “garden”. Lower the threshold for accessing diverse information through technological design, and employ measures such as “disruption intervention” and “content deduplication” to prevent excessive homogenization, proactively introducing high-quality heterogeneous information beyond users’ interest profiles. Second, cultivate high-quality “information nectar sources”. Rely on professional media, domain experts, opinion leaders, and authoritative institutions to produce accurate, in-depth, and comprehensive content. Vocational college libraries and academic departments should collaboratively curate high-quality bibliographies that are professionally relevant, aligned with students’ cognitive levels, and intellectually substantial, along with developing guided reading materials. Third, establish an ecological core based on the triadic co-construction of “algorithm, user, and value”. Platforms should develop a “cognitive-diversity-friendly” recommendation architecture, introducing a “cognitive challenge index” that actively pushes high-quality content with differentiated viewpoints or perspectives when detecting that users have been consuming homogeneous content over extended periods.

5.3 Subject Empowerment: Cognitive Restructuring

Environmental governance and technological regulation create external conditions for deep reading, but the fundamental transformation of reading behavior ultimately depends on the enhancement of individual cognitive abilities.

First, strengthen individual information management capacity and metacognitive strategies. Research indicates that information management ability is the most decisive factor in resisting shallow reading (Luan et al., 2026). Vocational colleges should offer specialized courses or extracurricular training programs such as “Information Literacy and Deep Reading Skills”, systematically training students in information retrieval, classification, discernment, and integration. Concurrently, emphasis should be placed on cultivating metacognitive abilities, guiding students to recognize algorithms’ manipulation of attention, formulate and execute personal reading plans, and evaluate and transition between reading tasks at different levels (Wu & Yang, 2025).

Second, promote deep interpersonal communication to compensate for digital isolation. Sincere, in-depth interpersonal communication fosters deep thinking, strengthens the connection between self and the world and with others, and reduces the emptiness and anxiety caused by information fragmentation (Li & Jiang, 2025). Vocational colleges should actively organize reading salons, thematic seminars, interdisciplinary dialogues, and other activities, encouraging students to engage in the collision of ideas and intellectual exchange through face-to-face or high-quality online communities, internalizing the habit of deep dialogue into their personal cognitive patterns.

5.4 Institutional Safeguards: Multi-Stakeholder Collaborative Governance

The effective implementation of technological regulation, ecological reconstruction, and subject empowerment cannot be achieved without robust institutional safeguards. A multi-stakeholder collaborative governance framework characterized by “government guidance, platform responsibility, school leadership, social coordination, and individual participation” should be established.

At the government level, the legal and regulatory system for algorithm governance should be improved, with legislation clearly defining platforms’ primary responsibilities in areas such as algorithm transparency, content review, and youth protection, establishing “traffic red lines”, and penalizing algorithmic behaviors that foster information

cocoons and group polarization.

At the platform level, a regular social responsibility reporting system should be established, with periodic publication of algorithmic ethics audit results, information diversity indicators, and user complaint handling status, subject to public oversight.

At the school level, deep reading literacy should be incorporated into talent cultivation plans, with clear reading hours and credit requirements, improved institutionalization of library reading promotion, and integration of information literacy and critical thinking training throughout the entire educational process (Hu & Hu, 2026).

At the societal level, the supervisory and guiding roles of public welfare organizations, industry associations, and public media should be fully leveraged to create a cultural atmosphere that values deep reading and promotes the rational use of technology.

6 Conclusion and Prospects

This study examines the mechanisms underlying deep reading difficulties among vocational college students in the AI-driven fragmented environment and the corresponding governance pathways, from the evolutionary perspective of information cocoons to cognitive risks. The main conclusions are threefold. First, through technological, psychological, and social logics, AI algorithm recommendation confines vocational college students within homogeneous information environments, triggering cognitive risks such as cognitive shallowing, superficial thinking, and metacognitive degradation, ultimately dismantling the internal conditions necessary for deep reading — namely, high engagement, active meaning construction, and sustained cognitive investment. Second, the deep reading difficulties of vocational college students result from the structural interaction of weak cognitive foundations, media dependency, and social assimilation, manifested as a vicious cycle of low cognitive investment, utilitarian orientation, and high media dependency. Third, addressing these difficulties requires the construction of a four-dimensional systemic intervention framework encompassing technological regulation, ecological reconstruction, subject empowerment, and institutional safeguards.

Future research can be deepened in the following directions. First, longitudinal tracking and empirical validation should be conducted, employing quasi-experimental research to test the actual effectiveness of the four-dimensional intervention framework, thereby validating and optimizing the theoretical model. Second, attention should be paid to intra-group differences, exploring variations in information cocoon effects and susceptibility to cognitive risks among vocational college students with different professional backgrounds, cognitive styles, and media usage habits, thereby providing a basis for targeted interventions. Third, a novel human-machine collaborative reading literacy framework should be explored, seeking a balance between technological empowerment and cognitive autonomy.

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