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# Research on the "Information Cocoons" Effect and Cognitive Flexibility Reshaping of College Students from the Perspective of Algorithm Recommendation

**Zichuan Huang**

Southwest Petroleum University

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***Corresponding Author:** Zichuan Huang

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**Abstract** **Review Article**

With the deep intervention of generative artificial intelligence and algorithm recommendation technologies, the information acquisition modes and cognitive interaction patterns of college students have undergone fundamental changes. Based on the algorithm recommendation mechanism, this paper explores the dual impact of the "information cocoons" effect on college students' cognitive flexibility. The study finds that while algorithm recommendation improves information processing efficiency through cognitive offloading, it also leads to mental set and the degradation of critical thinking. Based on this, this paper introduces the theories of "Moderate Cognitive Offloading Zone" and "Self-Regulated Learning" to analyze the psychological mechanism of algorithm dependence, and proposes cognitive reshaping strategies shifting from "passive reception" to "active exploration," aiming to help college students maintain cognitive independence and flexibility in the algorithm era.

**Keywords:** Algorithm Recommendation; Information Cocoons; Cognitive Flexibility; Cognitive Offloading; Self-Regulated Learning.



## 1. Introduction

In the era of digital intelligence, algorithm recommendation platforms represented by TikTok (Douyin) and Bilibili have become the main channels for college students to acquire information. Through precise user profiling, algorithms achieve efficient distribution of "information finding people." However, while this personalized recommendation provides convenience, it also constructs invisible "information cocoons." College students, surrounded by homogeneous information for a long time, are facing severe challenges to their cognitive flexibility—the ability of individuals to adjust thinking patterns and behavioral strategies according to environmental changes. How to balance algorithmic efficiency and cognitive autonomy has become an urgent problem to be solved in educational psychology and communication studies.

## 2. Literature Review & Theoretical Basis

### *2.1 Formation Mechanism of Algorithm Recommendation and Information Cocoons*

Sunstein (2006) first proposed the concept of "information cocoons," pointing out that the public only pays attention to the information fields they

choose, and over time, they will bind themselves in "cocoons" like silkworms. In the era of algorithm recommendation, this mechanism is strengthened by technology. Sun Baoying (2026) pointed out that social media uses personalized recommendation algorithms to push content based on users' browsing history and interest preferences. Although this "catering to preferences" mechanism satisfies users' instant gratification, it also limits the diversity of information acquisition, leading college students into the "echo chamber effect," making it difficult to access heterogeneous viewpoints, thereby solidifying existing cognition.

### *2.2 Conflict between Cognitive Flexibility and Algorithm Dependence*

Cognitive flexibility requires individuals to break mental sets and think from multiple perspectives. However, research by Wang Fan et al. (2026) shows that "cognitive offloading" brought by Generative Artificial Intelligence (GAI) and algorithm recommendations is changing this process. When algorithms complete information screening, viewpoint integration, and even decision-making suggestions for students, students tend to outsource cognitive tasks to machines. Although this "unidirectional offloading" mode reduces cognitive load, in the long run, it will lead to the degradation of students' critical thinking abilities, making them exhibit cognitive rigidity when facing complex and ambiguous situations.

### *2.3 The Moderating Role of Self-Regulated Learning*

Feng Ruyuan (2026) found that the impact of technology on cognition is not deterministic but depends on the user's behavioral patterns. In an algorithmic environment, students with high Self-Regulated Learning (SRL) abilities can use algorithms as "scaffolds" for active exploration, while students with low SRL abilities are prone to passive reception. This indicates that the negative impact of algorithms on cognitive flexibility can be alleviated by intervening in learning behavior patterns.

## 3. Analysis of the Impact Mechanism of Algorithms on Cognitive Flexibility

### *3.1 Negative Effects: From "Information Narrowing" to "Cognitive Rigidity"*

- **Homogenization of Information Acquisition:** Algorithm recommendation systems, based on collaborative filtering technology, continuously push content that users like. Sun Baoying (2026) pointed out that this leads to a single dimension of information accessed by college students, lacking the collision of diverse viewpoints.
- **"Black Boxing" of Thinking Process:** The "Cognitive Offloading" theory proposed by Wang Fan (2026) explains this phenomenon. When algorithms directly provide answers or conclusions, students skip the higher-order thinking processes of "analysis-synthesis-evaluation." Students who remain in the "passive receptive" mode for a long time exhibit significantly lower cognitive flexibility than those in the "active exploratory" mode.
- **Degradation of Critical Ability:** The efficient feedback of algorithms creates a dependence on "instant gratification." Once detached from algorithmic assistance, when facing problems requiring deep thinking and multi-angle analysis, students are prone to anxiety and cognitive stagnation.

### *3.2 Positive Effects: Optimization of Cognitive Resources*

Algorithms are not entirely harmful. According to the "Moderate Cognitive Offloading Zone" theory, moderate algorithmic assistance can liberate students from low-order memory and retrieval tasks, allowing them to invest limited cognitive resources into higher-order creative thinking. The key lies in how to control the degree of "offloading" to keep it at the top of the inverted U-shaped curve, rather than sliding into the abyss of over-reliance.

## 4. Breaking the Deadlock: Self-Regulation Based Cognitive Reshaping Strategies

### *4.1 Individual Level: Building an "Human-Machine Collaboration" Active Exploration Mode*

College students should transform from "passive receivers" to "active explorers." Feng Ruyuan's (2026) research shows that active exploratory behavior patterns (such as presetting goals, multi-turn dialogues, and critical verification) can significantly improve cognitive flexibility.

- **Strategy 1: Breaking Algorithmic Feeding.** Consciously search for and browse heterogeneous information that does not match one's own interests, actively piercing the "information cocoons."
- **Strategy 2: Metacognitive Monitoring.** Maintain the alertness of "I am thinking" when using algorithm-recommended content, and regularly reflect: Am I being guided by the algorithm, or am I utilizing the algorithm?

### *4.2 Educational Level: Establishing a "Moderate Cognitive Offloading Zone"*

The "Moderate Cognitive Offloading Zone" proposed by Wang Fan (2026) provides a theoretical basis for educational intervention. Universities should guide students to identify when to "offload" (e.g., information retrieval) and when to "retain" (e.g., logic construction).

- **Strategy 1: Differentiated Instructional Design.** For low-order knowledge, allow students to use algorithmic assistance; for high-order thinking training, set up "no-algorithm zones" or "in-depth discussion zones" to force students to conduct independent cognitive processing.
- **Strategy 2: Prompt Engineering Education.** Teach students how to guide algorithms to output diverse viewpoints through high-quality questioning (Prompt Engineering), rather than passively accepting a single answer.

### *4.3 Platform Level: Optimizing Recommendation Logic and Algorithm Transparency*

Sun Baoying (2026) suggested that platforms should assume social responsibility and optimize algorithm recommendation mechanisms.

- **Strategy:** Introduce a "Serendipity" mechanism. Forcefully insert a certain proportion of cross-domain, counter-intuitive, or diverse value content into the recommendation stream to increase the randomness and richness of information contact, maintaining users' cognitive flexibility from the technical source.

## 5. Conclusion

Algorithm recommendation is a double-edged sword. It can improve efficiency through cognitive offloading, but it can also solidify thinking through information cocoons. The reshaping of college students' cognitive flexibility lies in moving from "technological dependence" to "technological mastery." By establishing a "Moderate Cognitive Offloading Zone" and cultivating active exploratory self-regulated learning habits, college students can maintain the openness and acuity of their thinking in the algorithm era, achieving a cognitive leap under human-machine collaboration.

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