Fragmented Use of Social Media and Learning Engagement: An Attention Depletion Mediation Model

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Abstract. This study explores the mechanism of fragmented use of social media affecting learning engagement among secondary vocational students from the perspective of attention depletion. Data from 1,002 students were analyzed using Pearson correlation and the PROCESS mediation model. Results indicate that fragmented use of social media significantly and positively predicts attention depletion, while attention depletion significantly and negatively predicts learning engagement. The direct effect of fragmented use of social media on learning engagement is not significant. Schools should guide students' social media use and improve their attention to enhance learning engagement and boost the high-quality development of secondary vocational education.

Keywords: Secondary vocational education, Fragmented use of social media, Learning Engagement, Attention Depletion.

1 Introduction

In the era of big data, social media serves as a key platform for information, communication and entertainment. As heavy users, secondary vocational students benefit from convenient access to information and opportunities for self-expression. However, their frequent, short-duration fragmented use of social media occupies leisure time and impairs sustained concentration required for learning.

As vocational students are in a crucial stage for developing professional competencies and personal qualities, their learning emphasizes practicality and task orientation. Yet many suffer from inattention and a lack of deep learning. Numerous empirical studies indicate that students' use of social media across various scenarios has become a widespread phenomenon.[3] Fragmented use of social media reduces effective learning time, depletes attention, weakens task-handling abilities, and ultimately hinders professional skill acquisition and literacy development.

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2 Literature Review

Most existing studies on how fragmented use of social media affects learning engagement have focused on middle, high school and university students. Research on secondary vocational students, especially with attention depletion as a mediator, remains scarce. As secondary vocational students are in a critical stage of skill and professional development, this study is highly necessary.

The concept of "fragmentation" first emerged in postmodernist studies during the 1980s, originally denoting the disintegration of a complete entity into scattered fragments, resulting in the loss of wholeness.[7] In this research, fragmented use of social media is defined as a pattern of short-duration and high-frequency engagement among students on platforms such as Douyin, Weibo, and others. According to John Sweller's Cognitive Load Theory, attention depletion includes encroachment on learning time and the formation of maladaptive cognition.[1] Based on Fredricks' view, learning engagement involves behavioral, emotional and cognitive dimensions[2][4]—are shown in Figure 1.This study examines how fragmented use of social media affects secondary vocational students' learning engagement through attention depletion, aiming to improve their learning engagement and support the high-quality development of secondary vocational education.

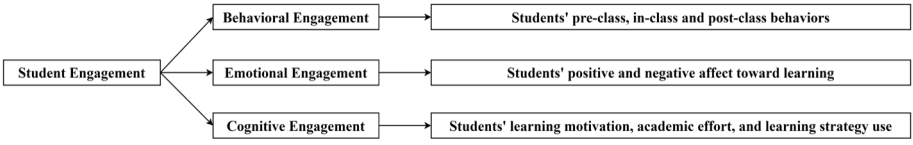


Fig. 1. Dimensions Of Learning Engagement

3 Research Design

3.1 Research Hypotheses

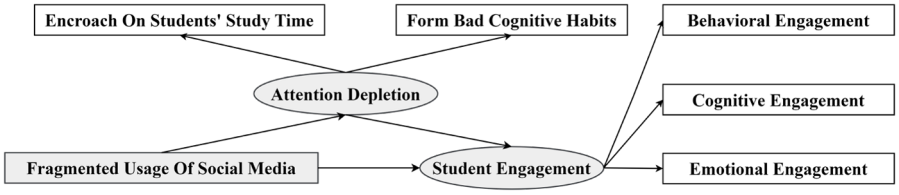


Fig. 2. Model of Social Media Fragmentation on Learning Engagement

As shown in Figure 2, this study examines how fragmented use of social media influences learning engagement through attention depletion. Based on cognitive load theory, attention depletion consists of encroachment on learning time and maladaptive cognition.[1] Following Fredricks, learning engagement includes behavioral, emotional, and cognitive dimensions. [2][4]Two hypotheses are proposed:

H1: Fragmented use of social media has a negative impact on learning engagement among secondary vocational school students.

H2: Attention depletion plays a significant mediating role in the relationship between fragmented use of social media and learning engagement among secondary vocational school students.

3.2 Research Participants

To ensure the objectivity of the survey and data availability, this study adopted a combination of random sampling and cluster sampling. Classes were randomly selected as sampling units, and questionnaires were distributed to all students in the selected classes. Data were collected from Grade 10 to 12 students across various majors in multiple secondary vocational schools in Hubei Province via both online and offline surveys. After data cleaning, 1,002 valid responses were retained. To guarantee sample representativeness, data were weighted using the ratio of population proportion to sample proportion for each grade and major as the weight, i.e.:

$$\omega_i = P_{population} \,/\, P_{sample} \tag{1}$$

A 5-point Likert scale (1=strongly disagree, 5=strongly agree) was used to measure fragmented use of social media, attention depletion, and learning engagement. Learning engagement was quantified through numerical transformation and standardization of categorical variables to ensure research validity.

4 Data Analysis

4.1 Sample Description and Correlation Analysis

Table 1. Correlation Analysis Among All Variables

		Fragmented Social Media	Encroachment on Study Time	Maladaptive Cognition	Behavioral Engagement	Emotional Engagement	Cognitive Engagement
Fragmented Social Media	1	--					
Encroachment on Study Time	1	.541**	--				
	2	.000					
Maladaptive Cognition	1	.365**	.280**	--			
	2	.000	.000				
Behavioral Engagement	1	-.161**	-.418**	-.260**	--		
	2	.000	.000	.000			
Emotional Engagement	1	-.146**	-.462**	-.276**	.659**	--	
	2	.000	.000	.000	.000		
Cognitive Engagement	1	-.119**	-.517**	-.129**	.561**	.667**	--
	2	.000	.000	.000	.000	.000	

Note:1=Pearson correlation, 2=Significance (2-tailed).

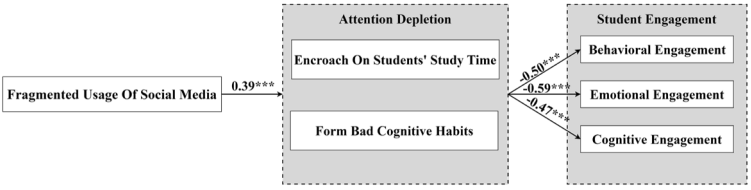
The sample comprised 1,002 secondary vocational students (50.8% male, 49.2% female), aged 14–18 (mean = 15.5), with 833 aged 15–16. Regarding learning characteristics, 39.7% had moderate academic performance, 24.8% were class cadres, and 61.2% used social media 1–3 hours daily. Mean learning engagement was moderate: emotional 3.2, behavioral 3.1, cognitive 3.0. Additionally, 23.7% reported high learning difficulty.

As shown in Table 1, after controlling for gender, age, and family background, fragmented use of social media was positively correlated with two dimensions of attention depletion (r_1=0.541, r_2=0.365), and negatively correlated with behavioral, emotional and cognitive engagement (r_3=0.161, r_4=−0.146, r_5=−0.119). The two attention depletion dimensions were negatively associated with three engagement subscales (|r|=0.129-0.517). Correlation coefficients ranged from 0.119 to 0.667, supporting further analysis.

4.2 Test of Mediating Effect

To explore the mechanism linking fragmented use of social media to lower learning engagement, this study incorporated attention depletion as a mediator in a structural equation model. Mediation effects were tested using Model 4 in the SPSS Process macro and verified via Hayes' Bootstrap method.

The path coefficients among the three variables—fragmented use of social media, attention depletion, and learning engagement—are shown in Figure 3.



Note: ***p<0.001, **p<0.01, *p<0.05

Fig. 3. Path Coefficient Diagram of Independent, Mediating and Dependent Variables

Table 2. Total, Direct and Mediation Effects Decomposition

	No.	Effect	SE	LLCI	ULCI	Effect Direction
Total Effect	1	-0.21	0.04	-0.29	-0.13	Neg. Sig.
	2	-0.20	0.04	-0.29	-0.12	Neg. Sig.
	3	-0.16	0.04	-0.25	-0.08	Neg. Sig.
Direct Effect	1	-0.02	0.04	-0.10	0.06	Neg. NS.
	2	0.03	0.04	-0.05	0.11	Pos. NS.
	3	0.02	0.04	-0.06	0.11	Pos. NS.
Mediation Effect	1	-0.19	0.03	-0.25	-0.15	Neg. Sig.
	2	-0.23	0.03	-0.29	-0.18	Neg. Sig.
	3	-0.18	0.03	-0.24	-0.13	Neg. Sig.

Note:1 = Behavioral, 2 = Emotional, 3 = Cognitive Engagement.

As shown in Table 2, the 95% confidence intervals for the mediating effects of attention depletion obtained via the Bootstrap method do not include zero. This suggests that the direct effects of fragmented use of social media on behavioral, emotional, and cognitive engagement are not significant, and its influence is mainly exerted through the mediating role of attention depletion.

Fragmented use of social media shows no significant direct effect on learning engagement, but exerts a significant negative impact through attention depletion, with competitive mediation observed across behavioral, emotional, and cognitive engagement.

5 Discussion

This study examines how fragmented use of social media affects learning engagement from the perspective of attention depletion. Results show that its significant negative effect operates only through the mediating role of attention depletion, supporting both Hypothesis 1 (no significant direct effect) and Hypothesis 2 (significant mediation). In short, fragmented use of social media depletes students' attention via encroachment on study time and maladaptive cognition, thereby lowering learning engagement.

5.1 Mechanism of Social Media Fragmentation on Learning Engagement

Fragmented social media use—marked by high frequency, short duration, and frequent task-switching—depletes cognitive resources. Interruptions disrupt sustained attention, while stimulating content (e.g., short videos, trending topics) raises arousal thresholds, weakening focus during learning.[3] Attention depletion then reduces learning engagement across all dimensions: behavioral persistence, emotional motivation, and cognitive concentration. Mediation analysis shows significant indirect effects: −0.21 (behavioral), −0.20 (emotional), −0.16 (cognitive), with the weakest impact on cognitive engagement—likely due to its longer-term nature.

5.2 Mediating Role of Attentional Depletion

A core finding of this study is that attention depletion is not an ancillary variable, but an indispensable mediator between fragmented use of social media and learning engagement. On the one hand, the direct effects of fragmented use of social media on learning engagement are not significant, indicating that its influence is not direct but relies entirely on the indirect transmission of attention depletion. On the other hand, the effect decomposition table shows that the mediating effect values (−0.19, −0.23, −0.18) are much larger than the direct effects (−0.02, 0.02, 0.03), with confidence intervals excluding zero. This confirms that attention depletion acts as a strong link: without this mediator, the actual impact of fragmented use of social media on learning engagement would hardly be observable.

6 Strategies and Conclusion

6.1 Research Strategies

Cultivate Self-Regulation Ability Through Intentional Training[8] and Goal Decomposition. To address high-frequency task-switching—a key driver of attention depletion—implement intentionality training to transform fragmented use into goal-oriented behavior. Three steps:

1.Intention setting: Clarify purpose before use (e.g., "Find a lathe tutorial in 5 minutes"), reducing aimless browsing.

2.Single-task commitment: Complete one task without switching, targeting high-frequency switching.

3.Post-use reflection: Record usage-intention alignment, reinforcing metacognition.

Daily practice reduces study time encroachment and maladaptive cognition, weakening the mediating pathway.

Fragmented use shows the weakest correlation with cognitive engagement, which is more affected by cumulative cognitive load. Goal decomposition breaks abstract goals (e.g., mastering CNC) into concrete tasks (e.g., learning 10 G-code commands daily), providing immediate feedback and reducing cognitive burden, complementing intentional training.

Use Micro-Learning to Guide Focused Learning and Counteract Fragmentation. As shown in Figure 4, to address attention depletion and low learning engagement caused by fragmented use of social media among vocational students, this study proposes a micro-video learning platform.[6]

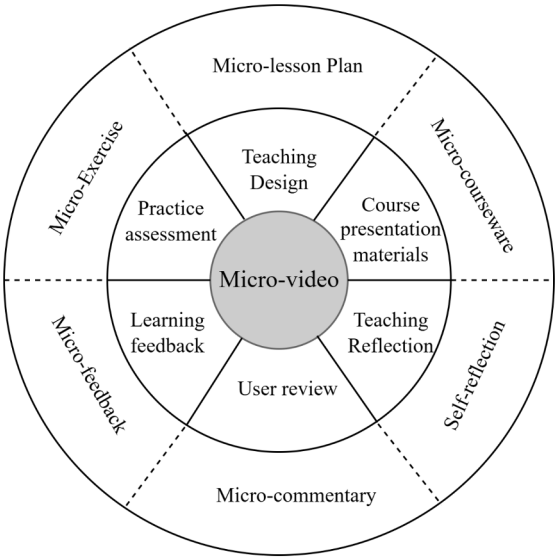


Fig. 4. "6+1" Micro-lecture Resources: Composition and Application Environment

Adopting a "micro-lecture + classroom integration" model, it provides 5–10 minute structured professional videos to support focused fragmented learning. Integrated into whole-class teaching, it helps students build systematic professional abilities and reduce distractions.[5] With micro-videos as the core, static resources are produced via Camtasia and CapCut, and dynamic resources are generated from LMS data. Teachers use visual learning profiles to identify gaps, provide AI-assisted personalized feedback, and optimize teaching.

6.2 Research Conclusion

As digital media permeates campus life, fragmented use of social media among secondary vocational students and its impact on learning engagement require attention. Examining this mechanism through attention depletion clarifies its influence, offers new approaches to low engagement and distraction in vocational education, and provides scientific support for digital-era teaching quality.

This study takes attention depletion as a mediator and verifies the chain: fragmented use of social media→attention depletion→learning engagement. Results show no significant direct effect, but a significant negative indirect effect via attention depletion. Targeted interventions are proposed to regulate social media use, preserve attention resources, and enhance learning engagement.

Future research may expand samples across majors and grades, explore heterogeneous effects of entertainment and learning-oriented use, analyze group differences, and implement intervention experiments to apply findings and advance the high-quality development of secondary vocational education.

Acknowledgments

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